

Cube261-plus

users manual

CX-125/261-FP2 GM-261.2-HPB2



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1 Introduction

summary

This article primarily outlines the installation, electrical connections, commissioning, and troubleshooting methods for the Cube261-plus distributed cabinet-type energy storage system. Before installing or using the energy storage product, please carefully read this manual to understand safety information and familiarize yourself with the systems functions and features.

Reader Target Audience

This manual is intended for equipment operators and qualified electrical technicians.

symbol description

The following symbols may appear in this document, and their meanings are as follows.

symbol	explain
	A hazard with a high risk level that, if not avoided, will result in death or serious injury.
	A hazard with medium risk level indicates that failure to take precautions may result in death or severe injury.
	This refers to hazards with a low risk level that, if not avoided, may result in minor or moderate injury.
	Used to convey safety warnings for equipment or the environment. Failure to avoid this may result in equipment damage. Malfunctions, data loss, reduced device performance, or other unforeseen consequences. It should be noted that "Xu Zhi" does not involve personal injury.
	Used to highlight important/critical information, best practices, and tips. The "Description" is not a safety warning and does not contain information regarding personal, equipment, or environmental hazards.

amendant record

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1	V1.0	initial issue	202 60324	

2 Safety Precautions

2.1 General Safety

statement

Before installing, operating, or maintaining the equipment, please read this manual and follow all safety precautions indicated on the equipment and in the manual.

The "Notes," "Cautions," "Warnings," and "Hazards" sections in the manual do not represent all safety precautions to be observed, but rather serve as supplementary guidelines. The Company assumes no liability for any consequences resulting from violations of general safety operating procedures or breaches of design, manufacturing, or equipment safety standards.

This equipment must be used in an environment that complies with the specified design requirements; otherwise, it may malfunction, leading to functional abnormalities, component damage, personal injury accidents, or property losses, none of which are covered by the equipments warranty.

When installing, operating, or maintaining the equipment, comply with local laws, regulations, and standards. The safety precautions outlined in the manual serve solely as a supplement to local laws, regulations, and standards.

The Company shall not be liable under any of the following circumstances.

- The installation and usage environment exceeds the requirements specified in relevant international, national, and regional standards.

- Do not operate under conditions not specified in this manual.
- Do not disassemble, modify the product, or alter the software code without authorization.
- Did not follow the operating instructions and safety warnings in the product and documentation.
- Equipment damage caused by abnormal natural conditions (force majeure events such as earthquakes, fires, storms, floods, or landslides).
- Damages caused by the customers failure to comply with transportation and installation requirements.
- Damage caused by storage conditions that do not meet the product documentation requirements.
- The hardware or data of the equipment is damaged due to customer negligence, improper operation, or intentional damage.
- System damage caused by third parties or customers, including damage resulting from relocation and installation not compliant with this manuals requirements, or from adjustments, modifications, or removal of identification marks that violate these requirements.
- Defects, malfunctions, or damages resulting from acts, events, negligence, or accidents beyond the sellers reasonable control—including power outages or electrical failures, theft, war, riots, civil unrest, terrorism, or intentional or malicious damage—are covered.

Standard Requirement



The equipment operates at high voltage; improper operation may result in electric shock or fire, leading to fatalities, severe personal injuries, or significant property damage. Please follow standardized operating procedures:

- Please follow the operational sequence and safety precautions outlined in this manual and other relevant documents.
- Please comply with the warning signs, alerts, and protective measures on the equipment.
- Please follow the requirements of this manual, use the correct tools, and master their proper usage.
- Only personnel authorized to operate the equipment may approach it; other individuals are prohibited from approaching. During operation, temporary warning signs or barriers must be erected to isolate the equipment.
- Warning signs, alerts, and protective measures on the equipment must be clearly visible. Manual alteration, damage, or obstruction is prohibited; if blurred, replace them promptly.
- It is prohibited to perform installation, wiring, maintenance, or replacement operations while the equipment is energized.

- Do not use water to clean the electrical components inside the equipment.
- Check whether the device is damaged, such as holes, dents, or other signs of internal damage.
- Check that the cables pre-installed on the device are securely connected.
- Check that no internal components of the equipment have shifted. Do not alter the equipments structure or installation sequence without authorization.
- Do not power on the device if it is not fully installed or verified by a professional.
- Before contacting any conductor surface or terminal, measure the voltage at the contact point and verify that the protective ground wire of the equipment or component requiring maintenance is reliably grounded to ensure no risk of electric shock.
- Do not open the cabinet door while the system is running.



- It is prohibited to perform arc welding, drilling, cutting, or similar operations on the equipment. Such operations may compromise the overall sealing integrity of the enclosure, the electromagnetic shielding performance of the equipment, as well as its internal components and cables. Metal debris generated during these operations can enter the equipment, leading to electrical short circuits, impaired functionality, or equipment damage.
- During operation, the casing temperature is high and poses a burn risk; do not touch it.
- During equipment operation, if any malfunction that may cause personal injury or equipment damage is detected, the operation must be immediately terminated, the responsible person must be notified, and effective protective measures must be implemented.
- When operating or maintaining equipment, if personnel need to leave temporarily, close and lock the cabinet door.

Instructions

- During operations such as transportation, transshipment, installation, wiring, and maintenance, compliance with the laws, regulations, and relevant standards of the respective country or region is mandatory.
- Materials provided by the user and tools required during operations must comply with the laws, regulations, and relevant standards of the respective country or region.
- To operate on the grid, permission must be obtained from the electricity authority of the respective country or region.

- During installation, operation, and maintenance, first remove all standing water, ice, snow, or other debris from the top of the box before opening the door to prevent debris from falling inside.

explain

- It is prohibited to perform reverse engineering, decompilation, disassembly, modification, adaptation, implantation, or any other derivative operations on the device software. Under no circumstances may researchers investigate the devices internal implementation, obtain the software source code, infringe intellectual property rights, or disclose any results of device software performance testing.
- Users are advised to bring their own camera equipment to document the detailed procedures for installing, operating, and maintaining the equipment.

2.2. Personnel Requirements

- Only qualified personnel are permitted to operate the equipment, including tasks such as transportation, transshipment, installation, wiring, and maintenance. When operating the equipment, they must wear protective gear that complies with local safety requirements.
- Operators must complete the companys relevant training and pass the corresponding examinations to acquire professional expertise in energy storage systems.

explain

Specific qualification requirements shall comply with local regulations and industry standards.

Instructions for Wearing Protective Equipment



- During installation, operation, and maintenance, it is strictly prohibited to wear conductive objects such as watches, bracelets, bracelets, rings, or necklaces to avoid electric shock or burns.
- During operations such as transportation, transshipment, installation, wiring, and maintenance, compliance with the laws, regulations, and relevant standards of the respective country or region is mandatory.
- Be familiar with the composition and working principles of the entire energy storage system, and operate according to the manual instructions.

2.3 Storage and Installation Environment Requirements

General Requirements

explain

- During storage, relevant documentation meeting the products storage requirements must be retained, such as daily temperature and humidity log data, photos of the storage environment, and inspection reports.
- Long-term storage of energy storage systems is not recommended. Lithium-ion batteries experience capacity loss during prolonged storage; after 12 months of storage at the recommended temperature, the general irreversible capacity loss ranges from 3% to 10%. It is advised to operate the energy storage system every three months.
- Store in a clean and dry place, and protect against dust and moisture exposure. Avoid exposure to rainwater or standing water.
- The ambient air must not contain corrosive or flammable gases.
- Do not store in a tilted or inverted position.

Storage System Storage Requirements

- Do not remove the packaging during long-term storage.
 - Stacking is prohibited.
 - The ground should be level for storage (whether long-term or temporary).
 - Close the box door tightly.
 - Storage environment temperature: -20°C to +50°C; humidity: 5% RH to 95% RH.
 - Storage requirements for battery systems/battery packs
1. The battery system/battery pack must be stored indoors, away from direct sunlight or rain, in a dry and well-ventilated area with a clean surrounding environment. It should be free from excessive infrared radiation, organic solvents, and corrosive gases, and kept away from fire sources.
 2. The total storage and transportation period for the battery system/battery pack shall not exceed 6 months (calculated from the date of shipment). If the period exceeds 6 months, recharging and SOC calibration are required, with the SOC level maintained at a minimum of 45%. Failure to recharge as specified may adversely affect battery performance and service life.
 3. When storing the battery system/battery pack, place it correctly according to the instructions on the packaging box; do not invert or place it sideways.

4. When stacking battery systems/battery packs in packaging boxes, the stacking requirements specified on the outer packaging must be complied with.
5. The storage environment requirements are as follows:
 - Recommended storage temperature: 20°C to 30°C.
 - Relative humidity $\leq 95\%$.
 - A dry, well-ventilated, and clean area.
 - Avoid contact with corrosive substances or organic solvents (including gaseous contact).
 - Avoid direct sunlight.
 - The distance from heat sources (such as heating equipment) must be no less than 2 meters.
6. The warehouse administrator shall compile monthly statistics on the storage status of battery systems/battery packs and regularly report their inventory levels to the planning department. For battery systems/battery packs stored beyond the recommended period, timely replenishment must be arranged.
7. When shipping stored battery cabinets, the first-in-first-out principle must be followed.

Conditions for determining that a cabinet has been stored beyond its recommended shelf life

In principle, battery cabinets should not be stored for extended periods and should be used promptly.

Storage temperature requirements	Actual storage temperature (T)	Recharge cycle	remarks
0~40°C	$0^{\circ}\text{C} \leq T \leq 30^{\circ}\text{C}$	6 months	● During the replenishment cycle: No special handling required; consume promptly. ● Achieved supplementary charging time: Supplementary charging treatment ● The total storage time shall not exceed the maintenance period.
	$30^{\circ}\text{C} < T \leq 40^{\circ}\text{C}$	4 months	



explain

The storage duration should be calculated starting from the last charging time indicated on the battery cabinets outer packaging, with the latest charging time updated after each recharge. Upon successful charging, the cabinets designated area must display both the most recent charging date and the recommended next charging interval (the

last charging date plus 4 months for storage above 30°C or 6 months for storage below 30°C). The total storage time must not exceed the specified maintenance lifespan.

Installation environment requirements

The following requirements must also be met during site installation:

- The installation layout of energy storage systems must comply with the fire separation distances or firewall requirements specified by local standards, including but not limited to the "GB 51048-2014 Design Code for Electrochemical Energy Storage Power Stations" and the "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems".
- Do not place the device in environments with flammable or explosive gases or smoke, and do not perform any operations in such environments.
- It is prohibited to install, use, or operate outdoor equipment and cables under adverse weather conditions such as lightning, rain, snow, or winds of level 6 or higher (including but not limited to handling equipment, operating devices and cables, plugging and unplugging signal interfaces connected outdoors, high-altitude work, and outdoor installations).
- The energy storage system must be equipped with protective measures such as fences and walls, and safety warning signs must be erected for isolation to prevent unauthorized personnel from entering during equipment operation, thereby avoiding personal injury or property damage.
- Do not block the ventilation openings or cooling system while the equipment is operating to prevent fires caused by high temperatures.
- The equipment shall be installed in a location away from liquids and should not be positioned directly beneath water pipes, air outlets, or other areas prone to condensation formation. It should also avoid placement directly beneath air conditioning inlets, ventilation openings, or cable distribution windows in equipment rooms, where water leakage may occur, to prevent liquid ingress that could cause equipment malfunction or short circuits.
- Install the device away from fire sources, and do not place flammable or explosive materials around it.
- If the equipment is installed in a vegetation-rich area, in addition to routine weeding, the ground beneath the equipment should be hardened to prevent weed growth.

Requirements for working at heights

- Implement proper safety precautions: wear a safety helmet, safety harness, and waist strap, securing them to sturdy structural components. Do not attach the harness to mobile or unstable objects or to metal surfaces with sharp edges to prevent hook slippage and subsequent falls.

- At high-altitude work sites, a hazardous exclusion zone shall be demarcated with clear signage, and unauthorized personnel are prohibited from entering.
- The ground below the high-altitude work area must not be piled with scaffolding, planks, or other debris. Personnel on the ground are prohibited from standing or passing directly beneath the high-altitude work area.
- It is prohibited for workers performing high-altitude operations to throw objects from heights to the ground or vice versa. Objects should be transported using ropes, hoists, elevated vehicles, or cranes.
- Scaffolding, planks, workbenches, and other equipment used for high-altitude operations must undergo prior safety inspections and assessments to ensure structural integrity, and the scaffolding must not be overloaded.
- Cease all high-altitude operations during rainy weather or other potentially hazardous conditions. After such conditions have passed, the company's Safety Director and relevant technical personnel must inspect all operational equipment and confirm their compliance before resuming work.
- At edges and openings during high-altitude work, guardrails and warning signs must be installed to prevent falls or stepping into empty spaces.
- Carry all necessary operating instruments and tools to prevent them from falling.
- The site supervisor and safety officer must immediately identify any workers performing high-altitude operations who are not adhering to established procedures, order them to correct the violations, and permit resumption of work only after compliance with operational standards is confirmed.

2.4 Loading, Unloading, and Transportation Requirements



Batteries must be handled in accordance with local laws, regulations, and industry standards. Improper handling may cause short circuits or damage to battery systems/battery packs, potentially leading to electrolyte leakage, rupture, explosion, or fire.

Instructions

This product falls under Category 9 of hazardous materials according to UN38.3 (Section 38.3 of the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria).

Shipping conditions:

- If the battery cabinet experiences collision, falls, emits smoke, or catches fire before shipment, follow the emergency response protocol accordingly; otherwise, shipment is prohibited.

- Before shipment, the energy storage system must be inspected: the enclosure must be intact without damage, cabinet doors must be closed and securely locked, no foreign objects should protrude from the interior, and no smoke or burnt odor should be detected. Otherwise, shipment is prohibited.

explain

During loading, unloading, and transportation, handle with care and implement moisture-proof measures. Due to external environmental factors (such as temperature, transportation, and storage), the product specifications shall be subject to the factory date.

Transportation requirements:

- Energy storage systems or batteries are not suitable for railway or air transportation.
- The maritime transport complies with the requirements of the IMDG CODE and the International Maritime Code for the Transport of Dangerous Goods.
- Land transport complies with ADR transportation requirements.
- Comply with the regulatory requirements of the transport authorities in the country of origin, transit countries, and destination country.
- Comply with international regulations for the transport of dangerous goods and the regulatory requirements of the respective national transport authorities.
- Full monitoring of the transportation process.
- Land transport speed limits: 80 km/h on flat roads and 60 km/h on rough roads. In case of any conflict, refer to local traffic regulations.
- Stacking is prohibited during port and ship transportation.
- The following must be prohibited during transportation:
 - It fell into the water.
 - Fall or mechanical impact.
 - Inverted or overturned.

explain

If any of the above situations occur, follow the emergency response procedure.

2.5 Mechanical Safety

Lifting Safety

- The foundation for lifting operations must meet the load-bearing requirements of the crane.

- Before performing lifting operations, ensure that the lifting equipment is securely anchored to a fixed object or wall that meets the load-bearing standards.
- During lifting operations, it is prohibited to drag steel cables or lifting equipment, and to use hard objects for impact.
- When lifting heavy objects, it is prohibited to move around beneath the crane boom or the lifted object.
- The lifting area must be isolated with temporary warning signs or barriers.
- During the lifting operation, ensure that the angle between the two cables is $\leq 90^\circ$, as shown in the figure below.



Ladder Use Safety

- The single-step ladder is prohibited.
- Before using a ladder, ensure it is in good condition and capable of supporting the required weight. Overloading is strictly prohibited.
- When performing high-altitude operations involving electrical hazards, use a wooden ladder or a fiberglass ladder.
- For elevated operations, prioritize using platform ladders equipped with guardrails. During work, all four feet must be secured and the worker must hold onto the ladder.
- When using a A-frame ladder, the rope must be securely fastened, and someone must hold the ladder during operation.



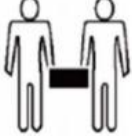
- When climbing stairs, please follow these precautions to reduce risks and ensure safety.
 - Keep your body stable.
 - The maximum height at which workers should stand should not exceed the fourth step counting downward from the top of the ladder.
 - Ensure that your body's center of gravity does not deviate from the edge of the ladder frame.

Safety of drilling holes on the exterior of the device itself

- Before drilling, select an appropriate location to avoid issues such as short circuits.
- During drilling operations, safety protective equipment such as goggles and protective gloves must be worn.
- During drilling operations, the equipment must be protected to prevent debris from entering its interior. Debris should be promptly cleaned up after drilling is completed.

Safety when lifting heavy objects

- When lifting heavy objects, operate in coordination with the number of people recommended in the diagram and prepare adequately for bearing the load.

			
<18kg (<40lb)	18kg~32kg (40lb~70lb)	32kg~55kg (70lb~121lb)	>55kg (> 121lb)

- When handling equipment manually, protective gloves and impact-resistant footwear should be worn as safety equipment.
- During equipment handling, avoid scratching the equipment surface or damaging components or cables.
- When using a forklift for handling, the forks must be positioned in the central area to prevent tipping over. Before moving the equipment, secure it firmly to the forklift with ropes; during transportation, a designated person must supervise the process.
- Handle the device with care to avoid impacts or drops.

2.6 Electrical Safety

Cabling Requirements

- Prohibited operations include pushing cables directly off the vehicle or other non-standard practices.
- No cables shall pass through the equipments air inlets and outlets.
- Cables of the same type should be bundled together, while cables of different types must be spaced at least 30 mm apart; mutual entanglement or cross-laying is strictly prohibited.
- Upon completion of wiring or during temporary departure from the wiring process, immediately seal the cable opening with sealing mud to prevent entry of small animals.
- Using cables in high-temperature environments may cause insulation layer aging or damage. The distance between cables and surrounding areas of heat-generating components or heat sources should be at least 500 mm.

- Select a cable that complies with local laws and regulations.
- The edges of cable trays and conduit holes must be free of sharp edges and require proper protection.
- The location where cables pass through conduits or wire holes must be protected to prevent damage from sharp edges or burrs.
- The cables used in energy storage systems must be securely connected, properly insulated, and meet appropriate specifications.
- After completing the cable wiring, the cables must be securely fastened using cable supports and clamps, followed by backfilling the soil around the cable area.
- The cable must fit tightly against the ground to prevent deformation or damage caused by mechanical stress during backfilling.
- At excessively low temperatures, severe impacts or vibrations may cause brittle cracking of the cables plastic sheath. To ensure construction safety, the following requirements must be adhered to:
 - All cables shall be installed at temperatures above 0°C. During handling, especially in low-temperature environments, cables must be handled with care.
 - If the cable storage environment temperature is below 0°C, the cables must be stored at room temperature for at least 24 hours before installation.

Grounding Requirements

- Do not damage the grounding conductor.
- Do not operate the equipment without installing a grounding conductor.
- For equipment requiring grounding, the protective ground wire must be installed first during installation and removed last during dismantling.
- The main grounding conductor of the equipment shall be permanently connected to the protective grounding grid. Before operating the equipment, inspect its electrical connections to ensure reliable grounding.
- The equipments grounding impedance complies with the national standard GB 50054 and local electrical standards.

AC/DC Operation Requirements

- Before installing or removing the power cord, turn off the power switch first.
- Before connecting the power cord, ensure the label is correctly labeled before proceeding.
- If the device has multiple inputs, disconnect all inputs and wait until the device is completely powered off before operating it.

Safety Requirements for Operation and Maintenance

- Before connecting or disconnecting the cable, first turn off the protection switch of the corresponding circuit.
- Place a warning sign prohibiting closure at the disconnected switch.
- Use a voltage tester corresponding to the voltage level to check for live current and ensure the equipment is completely de-energized.
- If there are live electrical objects nearby, use insulating boards or insulating tape to shield or wrap them.
- After reliably connecting the circuit to be repaired with the grounding circuit using a grounding wire, proceed with the operation and maintenance inspection.

Instructions

- Before connecting the cables, ensure the cable labels are correctly identified before proceeding with the connection.
- If the device has multiple inputs, disconnect all inputs and wait until the device is completely powered off before operating it.
- After completion of the maintenance, disconnect the grounding wire between the maintenance circuit and the grounding circuit.

Instructions

Static electricity generated by the human body can damage electrostatic-sensitive components on circuit boards, such as large-scale integrated circuits (LSI).

- Wear anti-static gloves before handling equipment, boards, or rectifier modules (PSUs).
- When handling a PCB or PSU, always hold the edge of the board that is free of components; never touch the components with your hands.
- The disassembled circuit board or PSU must be packaged with anti-static materials before storage or transportation.

2.7 Battery Safety

statement

The Company shall not be liable for any damage to the battery system/battery pack provided by the Company caused by the following reasons:

- Failure to charge the battery promptly due to customer reasons results in prolonged storage of the battery system/battery pack, leading to capacity loss or irreversible damage.

- Mechanical damage, liquid leakage, or rupture caused by improper operation or failure to connect the battery system/battery pack as required.
- The battery system/battery pack was installed on-site and connected to the system. Damage occurred due to over-discharge caused by the customers failure to power it up promptly.
- Damage to the battery system/battery pack caused by the customers failure to complete timely acceptance inspection.
- The customer did not correctly configure the battery system/battery pack operation management parameters.
- Customers or third parties may modify the usage scenarios of battery systems/battery packs without notifying our company. Such modifications include connecting additional loads to the battery systems/battery packs independently, or mixing our provided battery systems/battery packs with those from other manufacturers or with batteries of different rated capacities, among other practices.
- Direct damage to the battery system/battery pack caused by the operating environment of on-site equipment or external power parameters failing to meet normal operational requirements, including excessively high or low actual operating temperatures of the battery system/battery pack.
- Inadequate customer maintenance leads to frequent over-discharge of the battery system/battery pack, as well as issues such as on-site capacity expansion or prolonged inability to achieve full charging.
- The customer failed to perform proper maintenance of the battery system/battery pack in accordance with the user manual for the accompanying equipment, including but not limited to: failing to regularly check whether the terminal screws of the battery system/battery pack are properly tightened.
- The battery system/battery pack was stolen.
- Battery systems/battery packs past the warranty period.
- Basic requirements: hazardous.
- Do not expose the battery system/battery pack to high-temperature environments or near heat-generating devices such as sunlight, open flames, transformers, or heaters. Overheating of the battery system/battery pack may cause fires or explosions.
- Do not disassemble, modify, or damage the battery system/battery pack (e.g., by inserting foreign objects, immersing it in water or other liquids), as this may cause leakage, overheating, fire, or explosion.
- Lithium-ion/sodium-ion battery energy storage systems pose a significant fire hazard. The following safety risks must be thoroughly considered prior to conducting battery operations:
- The electrolyte in the battery system/battery pack is flammable, toxic, and volatile.

- Thermal runaway in battery systems/battery packs generates flammable gases as well as harmful gases such as CO and HF.
- The combustible gas generated after thermal runaway in the battery system/battery pack poses risks of detonation and explosion due to its accumulated volume.
- If the battery system/battery pack is accidentally exposed to water, continue installation is prohibited; transport it to a safe isolation site and promptly request replacement parts.
- The storage area shall be free from direct sunlight or rain exposure, well-dried and well-ventilated, with a clean surrounding environment and no significant infrared radiation.
- Radiation, organic solvents, and corrosive gases, etc.
- The battery system/battery pack must be stored in a dedicated warehouse and kept within its original packaging to prevent mixing with other materials, outdoor storage, or excessive stacking. The site must be equipped with compliant firefighting facilities, such as fire sand and fire extinguishers.
- Energy storage systems shall undergo regular fire safety inspections, no less than once per month.
- Under normal circumstances, do not remove the outer packaging of the battery system/battery pack. If charging is required, it must be performed by a professional according to the specified procedures. After charging, the battery system/battery pack must be reinstalled into its original packaging.
- After unpacking the outdoor scenario battery system/battery pack, it is recommended to power it on within 24 hours. If this cannot be done promptly, the battery system/battery pack should be stored indoors in a dry environment free from corrosive gases.
- The battery system/battery pack should be properly positioned according to the anti-inversion warning label on the packaging box to prevent electrolyte leakage caused by prolonged storage in an inverted position.
- The battery system/battery pack should be protected from impacts.
- When handling battery systems/battery packs, move them in the direction specified by the manufacturer; inversion or tilting is strictly prohibited.
- Use the battery system/battery pack within the temperature range specified in this manual. Charging is prohibited when the ambient temperature of the battery system/battery pack falls below the lower operating temperature limit to prevent crystallization-induced internal short circuits.
- Dispose of used battery systems/battery packs in accordance with local laws and regulations. Do not treat them as household waste. Improper disposal of battery systems/battery packs may cause environmental pollution.

- Do not use damaged battery systems/battery packs (with dents or other damage to the casing), as they may release flammable gases. Do not store damaged battery systems/battery packs near undamaged products.
- The storage area for damaged battery systems/battery packs should not contain flammable materials. Non-professionals should not approach them.
- During storage of the damaged battery system/battery pack, monitor it to ensure there are no signs of smoke, flames, electrolyte leakage, or overheating.

Power Supplement Requirements

- If the battery system/battery pack has been uncharged for more than 6 months, it should be recharged. Failure to recharge as required may affect the performance and service life of the battery system/battery pack.
- The completion time for battery system/battery pack production can be obtained by checking the shipment records using the battery system/battery pack SN number or by consulting our companys service engineers.

Short-circuit protection for battery systems/battery packs



A short circuit in the battery system/battery pack generates a sudden high current and releases a large amount of energy, potentially causing personal injury and property damage.

- When installing or maintaining the battery system/battery pack, use insulating tape to cover the exposed cable terminals on the system/battery pack.
- Avoid foreign objects (such as conductive materials, screws, liquids, etc.) entering the battery system/battery pack, as this may cause a short circuit.

Hazard and Toxicity Description



- Risk: Contact between battery system/battery pack terminals and other metals may cause overheating or electrolyte leakage. The electrolyte is flammable; if leakage occurs, immediately isolate the battery system/battery pack from any ignition source.
- Toxicity: The vapors produced by combustion of battery systems/battery packs may irritate the eyes, skin, and throat.

Abnormal Handling Measures for Battery Systems/Battery Packs



- In the event of electrolyte leakage or the presence of an abnormal odor, avoid contact with the leaked liquid or gas. Non-professionals should not approach the area and must immediately contact professional personnel for handling. Professional personnel should wear protective goggles, rubber gloves, gas masks, and protective clothing to prevent hazards caused by electrolyte spillage.
- The electrolyte is corrosive; contact may cause skin irritation and chemical burns. In the event of electrolyte exposure, the following measures should be taken.
- Inhalation: Evacuate the contaminated area, immediately inhale fresh air, and seek medical assistance immediately.
- Eye contact: Immediately rinse the eyes with plenty of clean water for at least 15 minutes, avoid rubbing, and seek medical assistance promptly.
- Skin contact: Immediately wash the affected area with plenty of water and soap, and seek medical assistance promptly.
- Intake: Seek immediate medical assistance.

In the event of a drop of the battery system/battery pack

- When a battery system/battery pack is dropped (whether or not enclosed in protective packaging), provided there is no significant deformation or damage to its appearance, and no noticeable odor, smoke, or fire occurs, proceed under safety precautions:
- Storage Area: Evacuate personnel; have professionals use mechanical tools to move the battery system/battery pack to an open, safe location, contact our service engineers, allow it to rest for 1 hour while monitoring the battery system/battery pack temperature within $\pm 10^{\circ}\text{C}$ of room temperature, and then proceed with further handling.
- At the energy storage system site: Evacuate personnel, close the energy storage system doors, and have professionals use mechanical tools to move the battery system/battery pack to an open, safe area. Contact our companys service engineers and leave it undisturbed for 1 hour before handling.
- If the battery system/battery pack exhibits noticeable odor, damage, smoking, or fire after a drop, immediately evacuate personnel, contact professionals, and report the incident promptly. Professional personnel should then use firefighting equipment to extinguish the fire while ensuring safety.
- The battery system/battery pack must not be used after a drop; contact our service engineer for evaluation.

2.8 Maintenance and Replacement



- Before removing the component from the cabinet, ensure that no other components on the cabinet are loose.
- When maintaining an energy storage system, there must be two or more personnel on-site.
- During equipment maintenance, nearby live parts should be covered with insulating materials.
- Do not open cabinet doors during rain, snow, thunderstorms, sandstorms, or heavy fog.
- Before the fan is powered off and stops rotating, do not allow any object (such as fingers, components, screws, or tools) to come into contact with the operating fan.
- Do not power on the device before troubleshooting.
- During live-line system inspection, pay attention to the hazard warning signs on the equipment and avoid standing near the cabinet doors.
- After powering down devices other than the battery system/battery pack, wait for 15 minutes to confirm the devices are fully discharged before operating them.
- For switches that must be opened for maintenance purposes, a warning sign prohibiting closure should be placed at the switch.
- After replacing power components or modifying wiring in an energy storage system, manual activation of wiring inspection and topology identification is required to prevent abnormal system operation.
- After completing the maintenance and replacement procedures, promptly lock the cabinet door, secure the safety rope, and store the keys properly.

2.9 Emergency Response Plan

In the event of any hazardous incident listed below or similar incidents, immediately ensure the safety of all personnel on site and contact our companys service engineers.

When the device is smoking or on fire:

- Get away immediately
- keep off
- Do not open the door
- Remote power shutdown

During exhaust start-up

- On-site personal protection: Operators must not face the exhaust port directly.
- Post-disaster product maintenance: Contact our service engineers for an assessment.

When a fire extinguishing agent erupts or catches fire

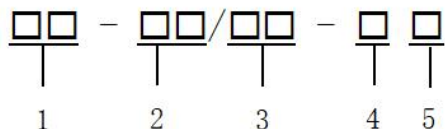


- Recommendations for on-site operations and maintenance personnel:
 1. In the event of a fire, evacuate the building or equipment area, activate the fire alarm, immediately call the fire emergency number, notify professional firefighters, and provide them with relevant product information, including but not limited to: type of battery system/battery pack, energy storage system capacity, and location distribution of the battery system/battery pack.
 2. Under no circumstances shall re-entry into the burning building or equipment area be permitted, nor shall the doors of the energy storage system be opened. The site shall be isolated and secured, and unauthorized personnel shall be prohibited from approaching.
 3. After calling the fire emergency number, remotely shut down the system (e.g., smart box-type substations, smart energy storage controllers, auxiliary power supply equipment, or combiner box power supplies) while ensuring your own safety.
 4. Upon arrival, professional firefighters were provided with relevant product information, including but not limited to: types of battery systems/battery packs, energy storage system capacity, spatial distribution of battery systems/battery packs, and user manuals.
 5. After professional firefighters confirm the fire has been extinguished, the matter shall be handled by qualified personnel in accordance with local regulations; unauthorized opening of the energy storage system door is strictly prohibited.
 6. Post-disaster product maintenance: Contact our service engineers for an assessment.
- Recommendations for fire protection professionals:
 1. For product information, please refer to the details provided by the operations and maintenance personnel, including but not limited to: battery system/battery pack type, energy storage system capacity, battery system/battery pack location distribution, and user manual.
 2. Do not open the energy storage system door until the internal safety of the system is ensured.
 3. Firefighting operations must comply with local fire safety regulations.

3 Product Introduction

3.1 demonstration of the type

All-in-one machine model description:



1、 **Product series designation:** CX stands for Cube Series Distributed Cabinet Energy Storage; GM stands for Energy Storage System Components.

2、 **Power value:** PCS power, unit: kW; None: indicates no PCS

3、 **Capacity:** Battery capacity, unit: kWh

4、 **Cooling method:** A stands for Air cooling; F stands for Fluid cooling; H stands for High-voltage battery cooling

5、 **First bit of the feature code:** P

6、 **Second digit of the feature code:** B represents battery; None: indicates no such feature code.

7、 **Version number:** Represented by numbers 2 or 3. None: Represented as version 1.

give an example :

CX-125/261-FP2: The Cube series integrated distributed cabinet-type energy storage system, featuring a grid-connected power output of 125 kW and a capacity of 261 kWh. It employs liquid cooling technology and represents the second generation model.

GM-261.2-HPB2: Component, capacity 261.2 kWh, high-voltage battery, Version 2;

3.2 System Functions and Features

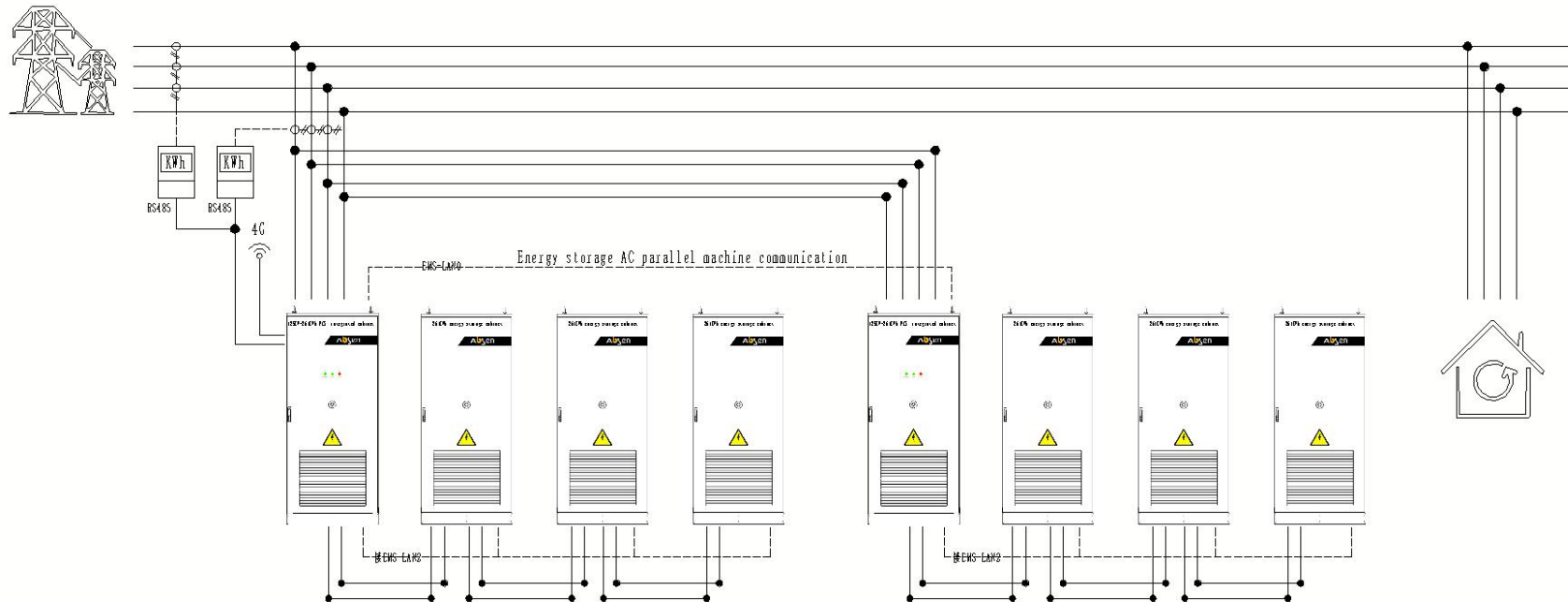
The Cube261-plus energy storage system primarily consists of energy storage batteries, a grid-connected inverter system, a power and environmental protection system, a fire protection system, a surge protection system, and a DC-side energy storage expansion cabinet. It features peak shaving and valley filling (peak-valley arbitrage), demand control (dynamic capacity expansion), long-duration energy storage (DC-side expansion), and integration with photovoltaic systems for self-generated and self-consumed power. With fully automated control and support from a cloud-based monitoring platform, the system enables remote real-time parameter monitoring and configuration to meet diverse operational requirements across grid-connected applications.

characteristic :

1. Security and anti-theft: The cabinet is designed with anti-theft features.
2. The entire unit has an IP54 rating, featuring an outdoor waterproof cabinet that withstands wind and rain.

3. Opt for long-lasting lithium iron phosphate energy storage batteries, which offer superior consistency, extended service life, and lower overall costs.
4. Configurable photovoltaic systems enable expansion of multi-cluster DC-side capacity, allowing comprehensive storage of solar energy and more efficient utilization of photovoltaic power.
5. By configuring a 4G card, you can remotely view device details and control the device.
6. The EMS master-slave configuration enables AC parallel expansion of two energy storage systems;
7. The modular design of the all-in-one unit and the DC-side extended energy storage cabinet enables convenient installation and flexible layout.

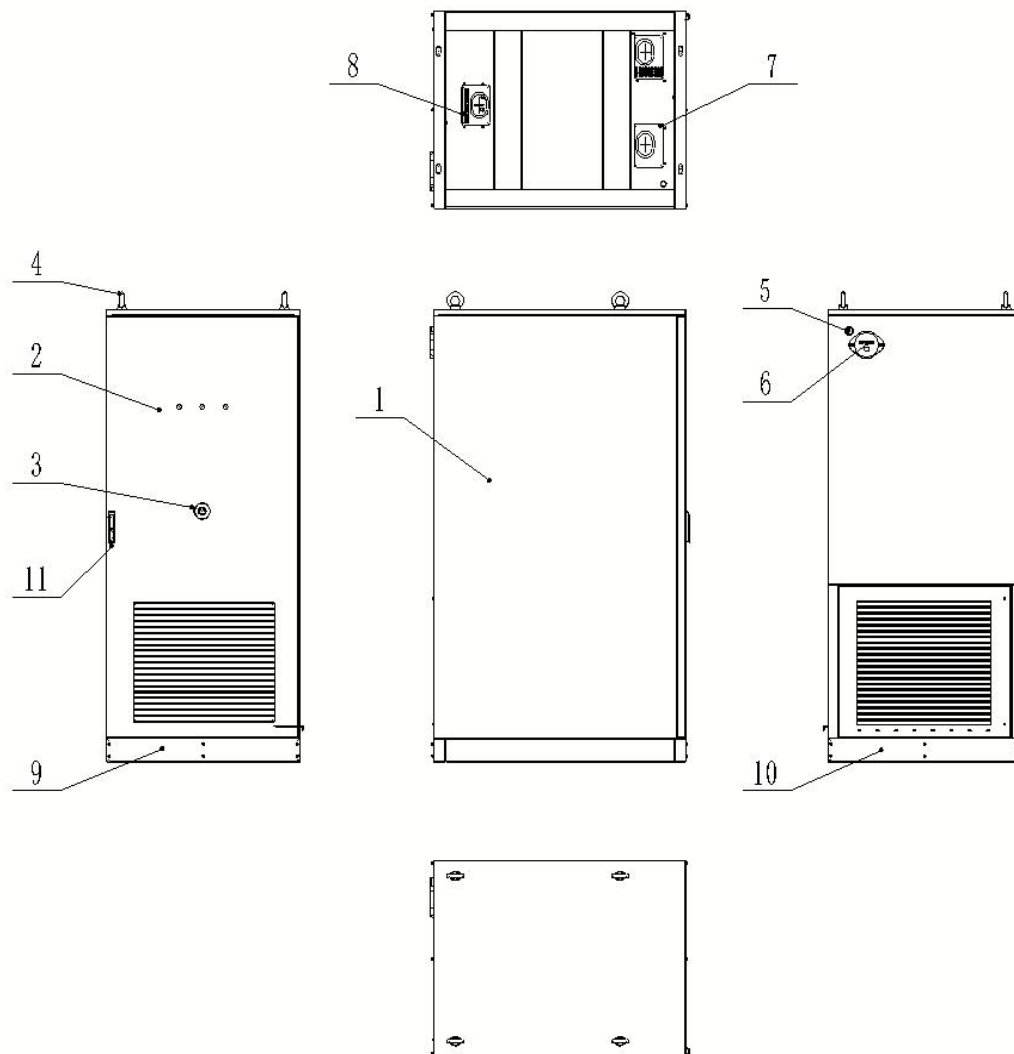
3.3 System Block Diagram



pour :

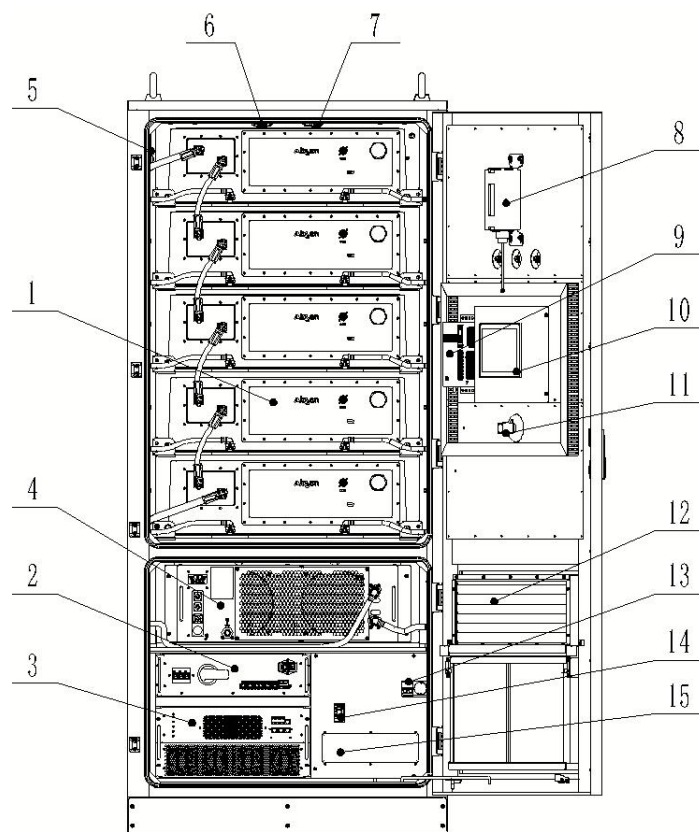
- 1、The system supports third-party EMS for scheduling and monitoring the entire system via LAN ports, using the MODBUS TCP communication protocol format.
- 2、The system supports third-party EMS for scheduling and monitoring the entire system via 4G communication, using the MQTT protocol format.
3. When a third-party EMS system handles scheduling, it must comply with the communication protocol provided by our company.

3.4 Appearance Description



order number	name	quantity	remarks
1	cabinet	1	CX-125/261-FP2、GM-261.2-HPB2
2	pilot lamp	3	CX-125/261-FP2
3	emergency stop switch	1	CX-125/261-FP2、GM-261.2-HPB2
4	ring	4	CX-125/261-FP2、GM-261.2-HPB2
5	antenna	1	CX-125/261-FP2、GM-261.2-HPB2
6	Explosion-proof valve	1	CX-125/261-FP2、GM-261.2-HPB2
7	Front door thread hole	2	CX-125/261-FP2、GM-261.2-HPB2
8	Backdoor wiring hole	1	CX-125/261-FP2、GM-261.2-HPB2
9	Front panel for forklift fork position	1	CX-125/261-FP2、GM-261.2-HPB2
10	Forklift fork position rear panel	1	CX-125/261-FP2、GM-261.2-HPB2
11	gate lock	1	CX-125/261-FP2、GM-261.2-HPB2

3.4.1 Internal Introduction to CX-125/261-FP2 and GM-261.2-HPB2



order number	name	quantity	remarks
1	52S PACK	1	CX-125/261-FP2、GM-261.2-HPB2
2	PDU	1	CX-125/261-FP2、GM-261.2-HPB2
3	125KW PCS	1	CX-125/261-FP2
4	Liquid cooling machine	1	CX-125/261-FP2、GM-261.2-HPB2
5	Access control switch	1	CX-125/261-FP2、GM-261.2-HPB2
6	Smoke detection sensor	1	CX-125/261-FP2、GM-261.2-HPB2
7	Thermal sensor probe	2	CX-125/261-FP2、GM-261.2-HPB2
8	Fire Protection Module	1	CX-125/261-FP2、GM-261.2-HPB2
9	dehumidifier	1	CX-125/261-FP2、GM-261.2-HPB2
10	Station-side EMS	1	CX-125/261-FP2、GM-261.2-HPB2
11	emergency stop switch	1	CX-125/261-FP2、GM-261.2-HPB2
12	dust gauze	1	CX-125/261-FP2、GM-261.2-HPB2
13	Auxiliary power switch	1	CX-125/261-FP2、GM-261.2-HPB2
14	Three-phase AC switch	1	CX-125/261-FP2
15	Input cable baffle	1	CX-125/261-FP2、GM-261.2-HPB2

3.5 Basic System Parameters

3.5.1 Basic Parameters of the Integrated Cabinet

product model	CX-125/261-FP2
System Basic Parameters	
Size (W*D*H)	1000*1300*2388 mm (excluding the hanging ring)
weight	Approximately 2450 kg
pigment	white
levels of protection	IP54
cooling-down method	Liquid cooling on the DC side + Air cooling on the AC side
system effectiveness	About 86%
Maximum working altitude	3000m
cloud platform	Web version (third-party optional)
Cloud Communication Method	4G
operating temperature range	-20°C-55°C
Working humidity	0-95%
Battery Parameters	
Battery Type	lithium iron phosphate
Battery Pack Configuration	1P52S/52.24kWh
Number of battery packs	5PCS
System Battery Configuration	1P260S
Battery voltage range	676V~949V
maximum current	206A
System Capacity Configuration	261.2 kWh (scalable multi-cluster configuration with 261.2 kWh DC-side parallel operation)
communication mode	RS485/LAN
AC input	
power rating	125kW
maximum power	150kW

maximum current	218A
System Voltage Standard	AC400V, 3W+N+PE
Grid voltage range	AC300-460V
Grid Frequency	50Hz/60Hz
current harmonics	<3% (at rated power)
power factor	-1 ~+1
AC output	
Output voltage form	400V, 3W+N+PE/3W+PE
rated frequency	50/60 Hz
voltage deviation	±2%
Total Voltage Harmonic Distortion Rate	<3% (linear load)
Inverter efficiency	
maximal efficiency	98.9%
Interface Characteristics	
AC input/output port	AC Terminal Station
Anti-backflow meter	Terminal board (RS485)
Electricity Meter	Terminal board (RS485)
Combiner cabinet circuit breaker control feedback interface	Terminal board (drive, feedback: dry node)
DC expansion cabinet main circuit interface	Copper plate
DC expansion cabinet communication interface	LAN
protect	
surge protection	Communication Level 2
AC output overcurrent	possess

protection	
Island Protection	possess
Integrated DC Switch	possess
Fire Protection	possess
Water Immersion Protection	possess
Emergency Stop Protection	possess
Other parameters	
topology	No isolation transformer
noise (dB)	<75dB

3.5.2 Basic Parameters of DC Expansion Cabinet

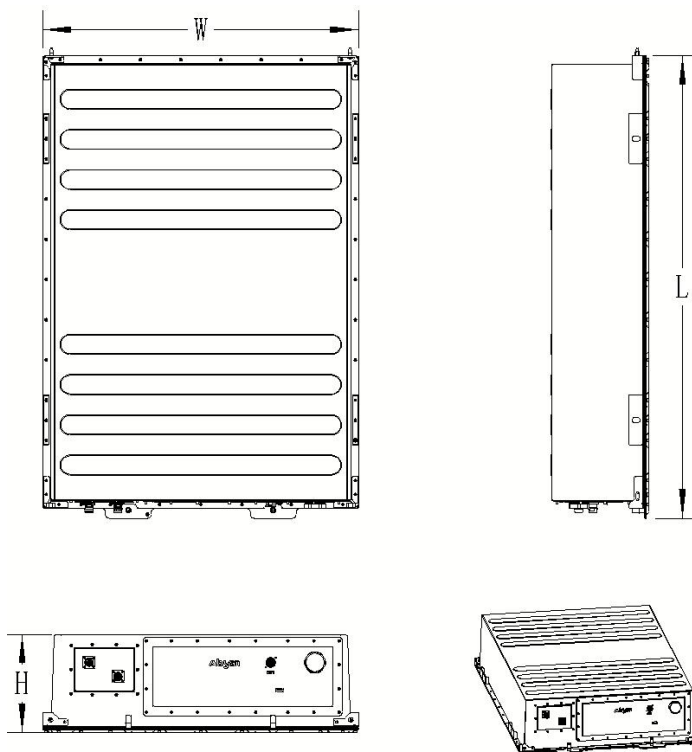
product model	GM-261.2-HPB2
System Basic Parameters	
Size (W*D*H)	1000*1300*2388 mm (excluding the hanging ring)
weight	Approximately 2400 kg
pigment	white
levels of protection	IP54
cooling-down method	liqukd cooling
system effectiveness	About 93%
Maximum working altitude	3000m
operating temperature range	-20°C-55°C
Working humidity	0-95%
Battery Parameters	
Battery Type	lithium iron phosphate
Battery Pack Configuration	1P52S/52.24kWh
Number of battery packs	5PCS
System Battery Configuration	1P260S
Battery voltage range	676V~949V

maximum current	206A
System Capacity Configuration	261.2kWh
communication mode	RS485/LAN
AC input	AC220V 50Hz/60Hz (auxiliary power supply)
Interface Characteristics	
Main Loop Interface	Copper plate
DC expansion cabinet communication interface	LAN
protect	
Integrated DC Switch	possess
Fire Protection	possess
Water Immersion Protection	possess
Emergency Stop Protection	possess
noise (dB)	<72dB

Special Note: Do not exceed the rated power capacity of the energy storage system; otherwise, irreversible damage to the battery system may occur.

3.6 Introduction to Key Components

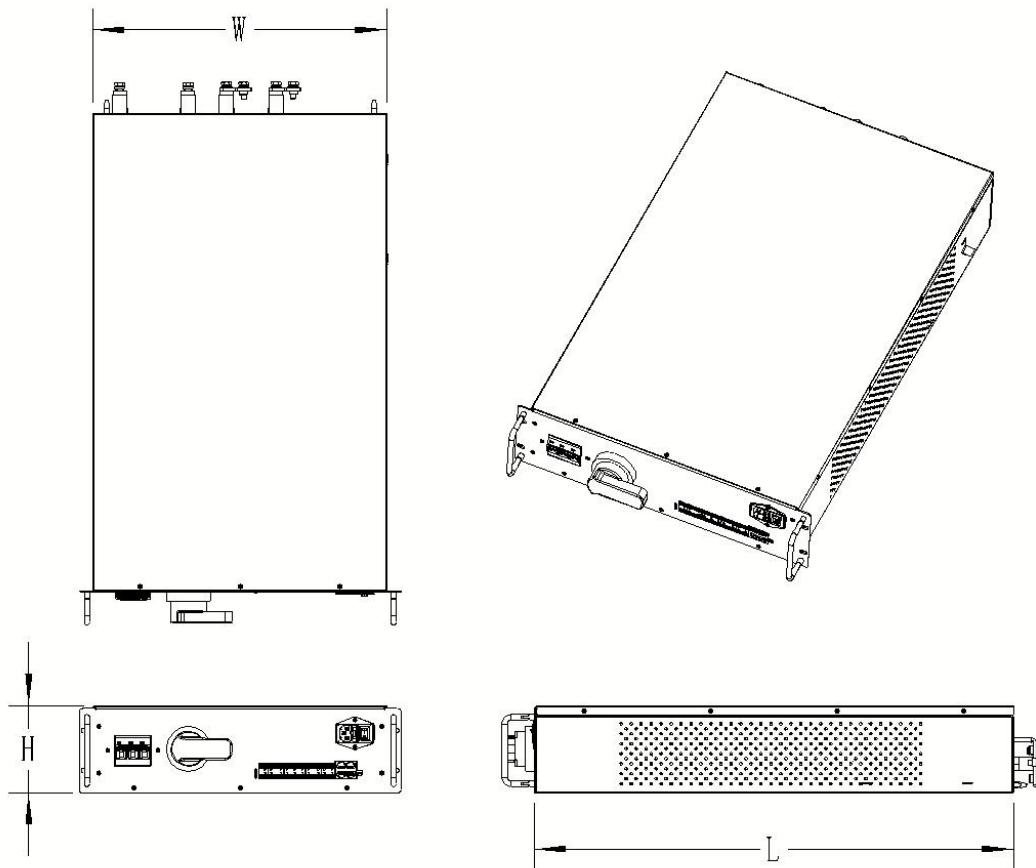
3.6.1 Battery PACK Dimensions and Parameters



Battery Pack Parameter Table

project	parameter
Battery Type	lithium iron phosphate
burst mode	1P 52 S
rated capacity	314 Ah
rated energy	52.249Kwh
rated voltage	166.4V
rated current	206A
Charging cutoff voltage	187.2V
Discharge cutoff voltage	145.6V
weight	340Kg
size L*W*H	1150*787*243.5 mm (excluding connectors)
BMU Balanced Method	Passive Equilibrium
cooling-down method	liqukd cooling

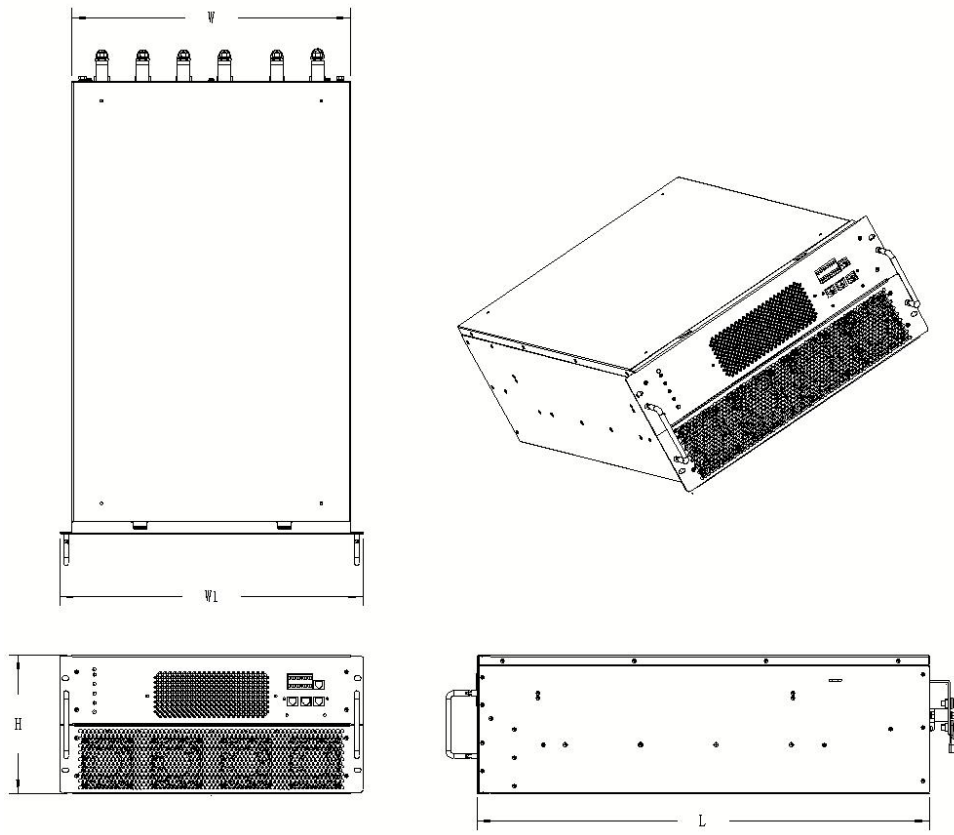
3.6.2 PDU dimensions and parameters



PDU parameter list

project	parameter
AC input voltage range	180~264 Vac
DC input voltage range	100~1000 Vdc
rated current	210A
Low-voltage output voltage	24Vdc
Size: L* W* H	719.2 × 441 × 130.5 (excluding connectors) mm
communication mode	LAN/CAN/RS485
cooling-down method	natural cooling

3.6.3PCS dimensions and specifications



project	parameter
model	Mars-125KT-F
power rating	125kW
maximum power	150kW
Rated AC current	182A
Maximum AC current	218A
Maximum DC charge/discharge current	216A
Rated AC input voltage	AC400V, 3W+N+PE 50Hz/60Hz
Rated output voltage	AC 400V,3W+N+PE, 50Hz/60Hz (manual off-grid mode)
power factor	>0.99
Power factor range	-1~1
overload capacity	1.2Pn @For 1 minute

Size: L*W*H (mm)	720*444*245
------------------	-------------

3.6.4 Station-side EMS

The station-side EMS integrates functions such as the human-machine interface (HMI), port control and communication, system parameters, and operational strategy configuration, enabling monitoring and management of the energy storage system. Its key parameters are as follows:

product model	ESCCU
power input	DC 9-32V
processor	ARM platform, quad-core 64-bit Cortex-A55 processor with a maximum clock speed of 2.0 GHz
internal storage	4GB LPDDR4
memory	16GB eMMC256G SSD (actual capacity ranging from 240G to 256G is within the normal range)
operating system	Linux
interface	H5
Data recording time interval	$\geq 1\text{S}$ (customizable)
Event Log Database	> 100,000 event records, including exception types, occurrence times, and protection actions
Search Method	On-site panel query method, remote computer query method, data export/downloads method
CI	3 LAN channels with communication rates: LAN0/LAN1: 100 Mbps/1000 Mbps; LAN2: 10 Mbps/100 Mbps; 3 isolated CAN channels with CAN communication rates: 250 Kbps–500 Kbps, voltage rating: 1530 V DC; 5 isolated RS485 channels with RS485 communication rates: 9600 bps–19200 bps, voltage rating: 1530 V DC; 2 USB ports.
DO/DI Interface	The DIH features 6 IO inputs with photo-isolation, operating at 9–32 V effective and with a withstand voltage of 1530 V DC; the DIL features 6 IO inputs with photo-isolation, operating at 0–0.7 V effective and with a

	withstand voltage of 1530 V DC; 12 IO outputs provide relay dry-contact outputs at 1 A/30 V DC or 1 A/250 V AC, with a withstand voltage of 1530 V DC; and 1 AC power failure detection channel operates within 220 V AC $\pm$ 30% and 110 V AC $\pm$ 30% ranges.
work environment	Environmental temperature: -20 to 65 °C Relative humidity: <95% (no condensation) Environmental magnetic field: <400 A/m; no corrosive, flammable, or explosive gases are permitted in the vicinity Altitude: $\leq$ 5000 m
LCD	10.1-inch true-color LCD screen (16:9 aspect ratio), resolution 1280×800
Alarming Method	An audio-visual alarm is triggered, displaying the alarm details; the faulty node outputs a closed circuit.

3.7 Indicator Light

3.7.1 Cabinet panel indicator light

Indicators	Status	Description
POWER	Green light on	system power supply is normal
	OFF	system is not turned on
RUN	Green light on	system is running normally
	OFF	system is not running
FAULT	Red light on	system failure
	OFF	system is fault-free

3.7.2 PCS panel indicator light

pilot lamp	state	explain
POWER(green)	Always On	Both the battery and the power grid are connected.
	quick flashing	The battery is not connected
	Flash	The power grid is not connected.

	Always Off	Both the battery and the power grid are connected.
SEMS(green)	quick flashing	Communication is normal
	Always Off	Communication error
RUN (green)	Always Off	The PCS is offline.
	Always On	The PCS is in standby mode.
	quick flashing	The PCS is charging.
	Flash	The PCS is in a discharge state.
FAULT(red)	Flash	report an emergency
	Always On	Failure, downtime
	Always Off	No failures and no alarms

Note: The flash period is 1 second, and the slow flash period is 3 seconds.

3.7.3 PDU indicator light

pilot lamp	state	explain
POWER	Always On	The battery systems secondary power supply is functioning normally.
	Always Off	The secondary power supply for the battery system is not connected.
FAULT	Always On	A severe failure has occurred in the battery system.
	Always Off	The battery system is functioning normally.

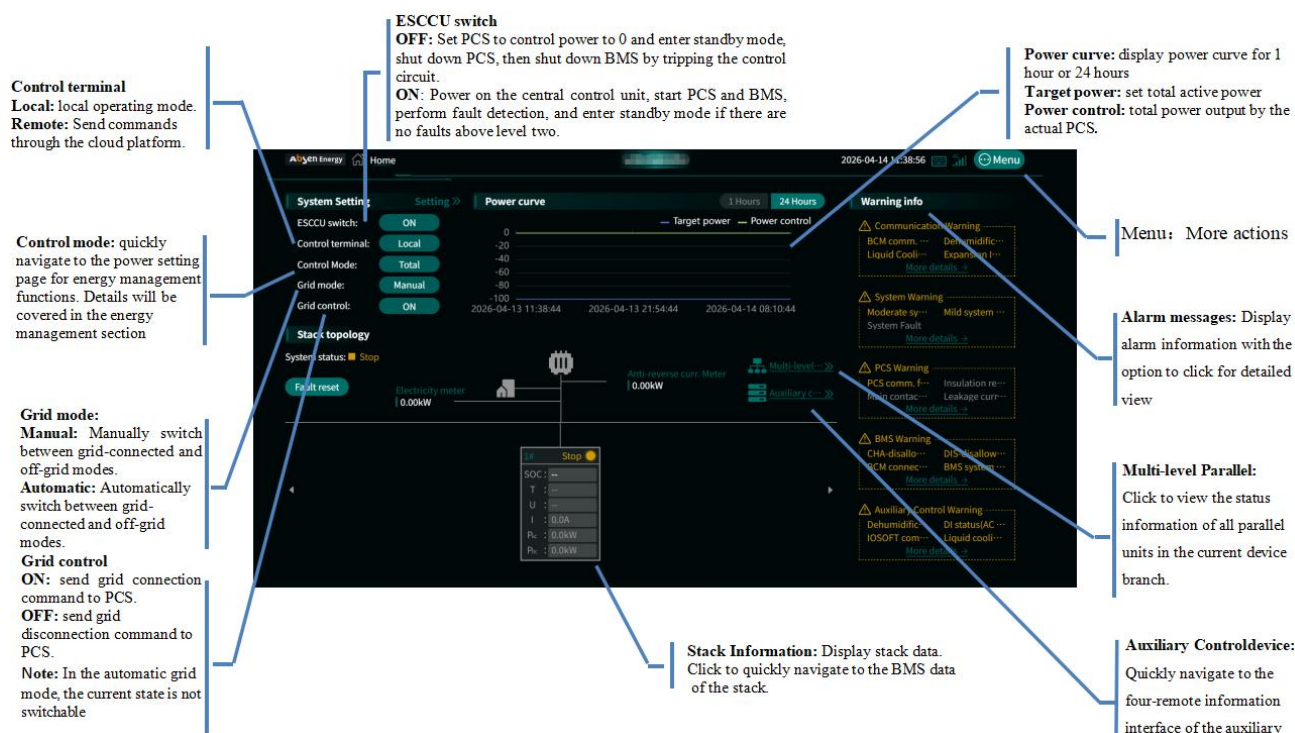
3.8 EMS Operation Instructions

3.8.1 Station-side EMS Operation Instructions

3.8.1.1 System Homepage

After powering on, the LCD touchscreen displays the startup interface. After 30 seconds, the startup interface disappears and the system transitions to the "Home" interface, as shown below.

The home screen displays real-time system information including power, voltage, current, power generation, operating mode, status, and alarms. See the figure below:



The homepage enables quick switching between operating modes, power-on/off operations, and off-grid modes. It also allows rapid switching to multiple parallel systems via shortcut keys, facilitating easy access to operational parameters of other systems.

Through the menu interface, you can access the next level to configure additional parameters.

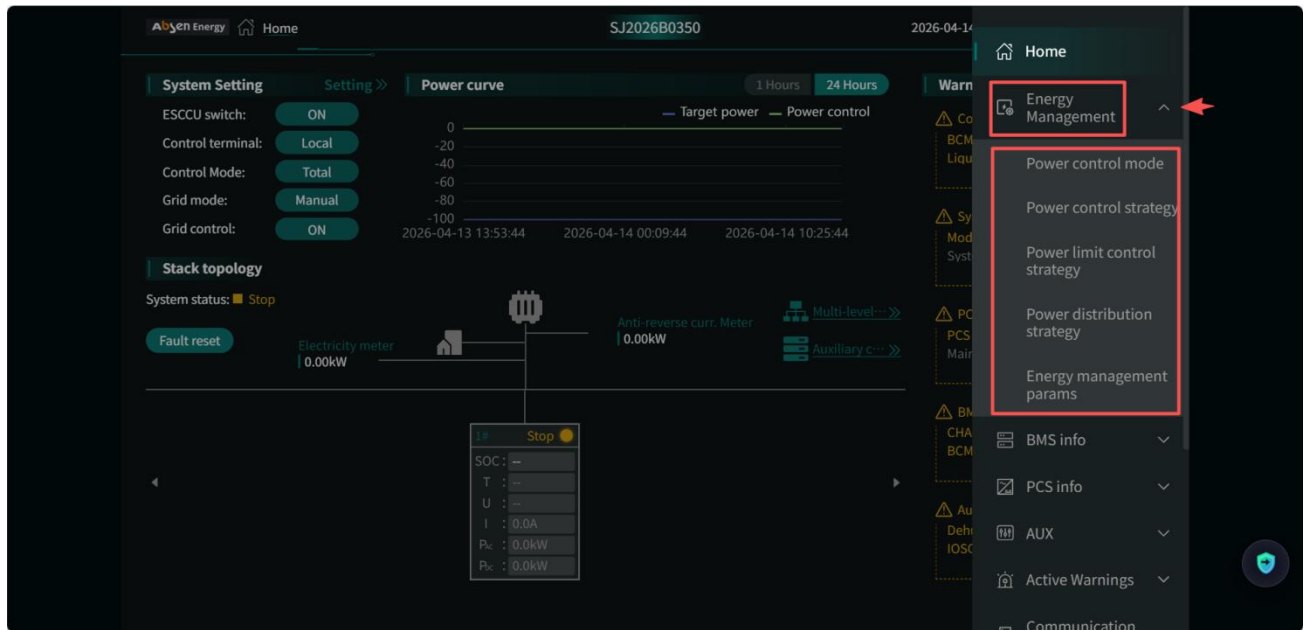
For a detailed explanation, please refer to the attachment, "EMS (ESCCU) User Manual V1.0".



EMS (ESCCU)
User Manual V1.0

3.8.1.2 Energy Management

By clicking "Menu" Click the button to enter the Energy Management Interface:



The operations available under the Energy Management menu are shown in the table below:

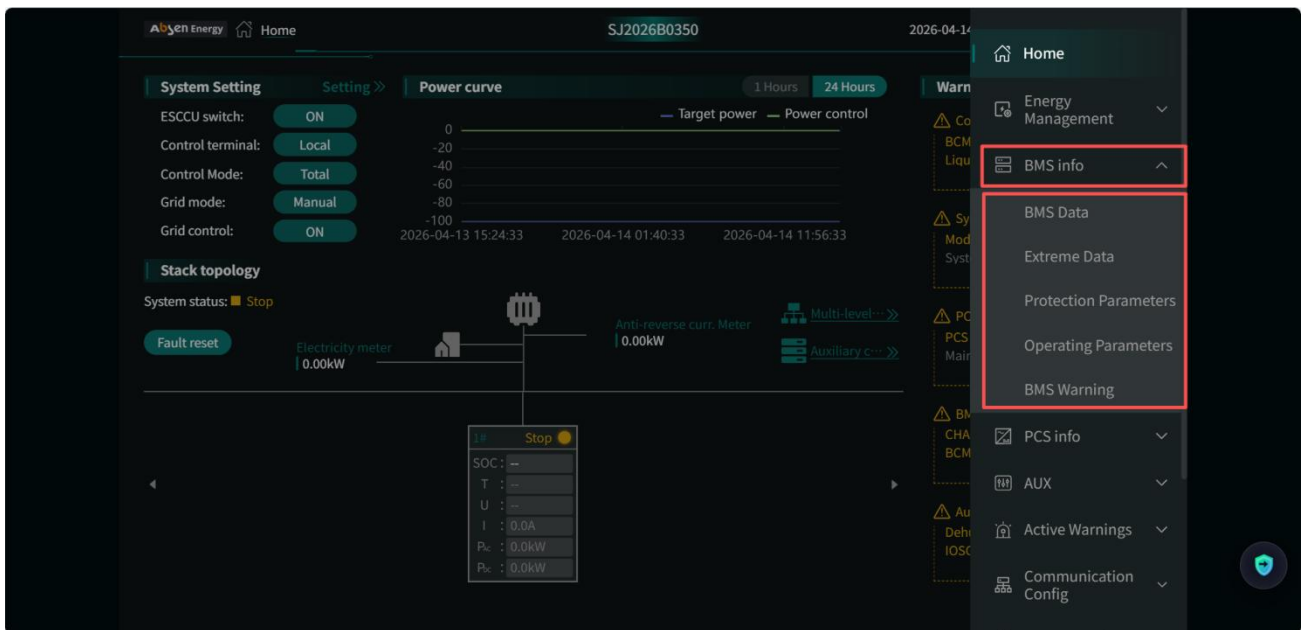
energy management	project	explain	remarks
control model	Total Power Mode	Through this mode, local users directly set the total power of the EMS management system.	
	Sub-power Mode	This item does not apply (This mode is only suitable when one EMS manages multiple PCS.)	
	Demand-side Response Mode	Perform charging and discharging operations based on the specified time period and power rates. This mode does not allow grid feeding and can only be performed within the local power grid.	All three modes can be activated simultaneously,
	Peak-valley Arbitrage Model	The charging and discharging operations are performed according to predefined time intervals and power settings. This mode supports annual and monthly cycles, allowing flexible configuration of system operating hours through strategic time interval selection. The battery's State of Charge (SOC) range for	with demand-side response having the highest priority, peak-valley arbitrage mode

		charging and discharging is set between 5% and 95%.	followed by priority, and the 24-hour plan having the lowest priority.
	24-hour plan mode	This mode allows you to set two distinct 24-hour operation strategies, A and B. The policy activation start time cycles over a 12-month period. When both Policy A and Policy B have their activation times set to 0, only Policy A is executed. The minimum configurable time interval per day is 15 minutes.	
Power Control Strategy	Anti-backflow control	You can configure the system to prevent energy storage from feeding back electricity to the grid when the load is too light, thereby avoiding energy waste.	
	Static Demand Control	A static demand limit power for 12 months can be set separately and must be used in conjunction with a metering panel.	
	Dynamic Demand Control	It can smoothly regulate demand control power and preemptively reduce the charging power of the energy storage system.	
	Peak shaving and valley filling strategy	The energy storage system can perform dynamic charging and discharging based on the power setpoint and peak shaving time, thereby smoothing the grids peak and off-peak electricity consumption.	
	Solar-Storage Strategy	Control the photovoltaic-storage system to achieve coordinated operation between photovoltaic power generation and energy storage, prioritize the consumption of	

		locally generated solar electricity, enhance energy self-consumption rates, and reduce dependence on the grid.	
	Back-up power supply guarantee	Charging begins when the gate meter in the equipment falls below the set threshold; the energy from the standby energy storage system, charging power, and charging SOC can be configured.	
Power Limitation Strategy	PCS Restriction Policy	Set the maximum power value for PCS	
	Monomer Voltage Limitation Strategy	Set the maximum and minimum individual cell voltage values for the energy storage battery	
	Temperature Gradient Limitation Strategy	Maximum power values for charging and discharging of energy storage batteries at different temperatures	
	Voltage Gradient Limitation Strategy	Set the charge and discharge power values for the energy storage battery at different voltages	
	SOC Access Control Policy	Set the upper and lower limits for the State of Charge (SOC) of the energy storage battery	
Power Distribution Strategy	Power Distribution Strategy	Support both equal distribution and SOC weight redistribution strategies	
Energy Management Parameters	Parallel Machine Topology	System topology configuration, CCU communication configuration, MENS communication configuration, LEMS communication configuration, AEMS communication configuration (the system supports multi-level EMS communication)	

		configuration)	
	Master-slave address	Set communication IP addresses for EMS at different levels	
	Electric Meter Configuration Function	Set the addresses for multi-level anti-backflow meters, demand meters, and metering meters.	
	Switch configuration	Central control interface switch mode: Manual click to start/stop Device Power On/Off Strategy Interface: Auto-power on/off based on the policy	

3.8.1.3 BMS Information

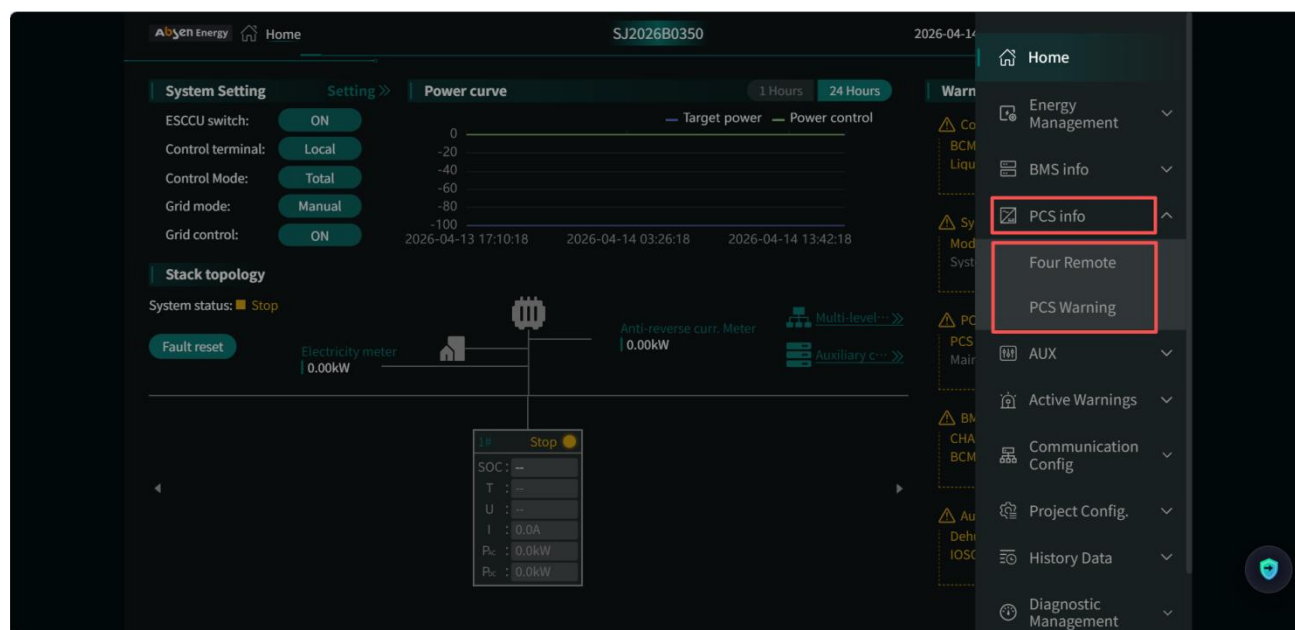


The operations available under the BMS information menu are listed in the table below:

BMS information	project	explain
System topology	View the overall information of the entire energy storage system	You can view the basic operational parameters of the entire system, including the overall reactor operating status, information from the anti-backflow meter, basic battery system details, and alarm notifications.
✓Stack	View the classification data for	Examine the classification data of multiple stacks across

Information	each heap	the entire system, including PCS, batteries, auxiliary control equipment, and alarm information for individual stacks.
Cluster Information	View the classification data for each cluster	Examine the classification data for each cluster separately, including comprehensive battery information, charge/discharge status, topology, PACK information, cell information, and alarm information.
Monomer Information	View the individual data for each cluster	Show the voltage and temperature information for each battery in detail using charts and curves.
Extreme Data	View the extreme value data for each cluster	Display the highest/lowest voltage and cell number, highest/lowest temperature and cell number, highest/lowest SOC and cell number, and highest/lowest SOH cell number for the cluster.
Protection Parameter	Stack protection parameter	Set the heap protection parameters
	Cluster protection parameter	Set cluster protection parameters
	Monomer protection parameter	Set individual protection parameters
	Battery data initialization	Initialize SOC, SOH, and cumulative battery charge for individual cells
operational factor	Stack operation parameters	Set the number of heaps, the starting address of clusters, and the number of heap clusters per cluster. The heap cluster settings can only be set to values less than or equal to the factory defaults.
	Cluster Operation Parameters	Set the basic information for the cluster
	Auto-allocate from control address	Mainly used to set the number of slaves
	The stack allows for maximum power.	Set the maximum charge/discharge power, voltage, and current for the cluster
	Main control communication parameters	Set the communication address for the master controller of each cluster

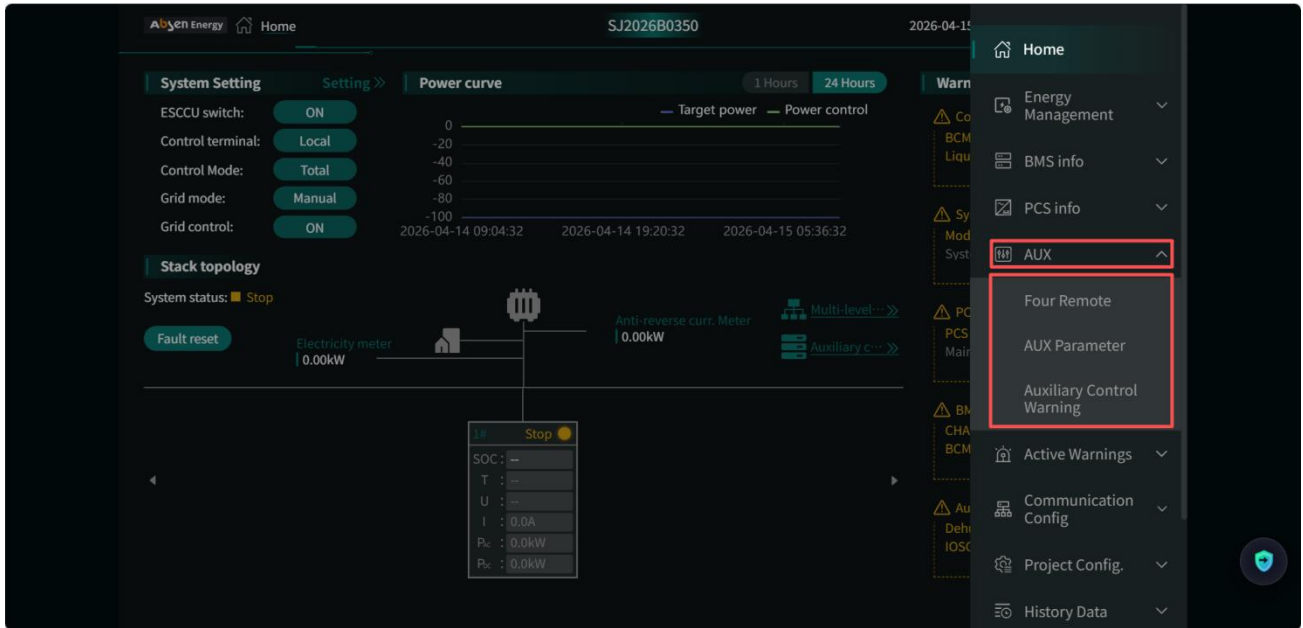
3.8.1.4 PCS Information



The available operations under the PCS information menu are listed in the table below:

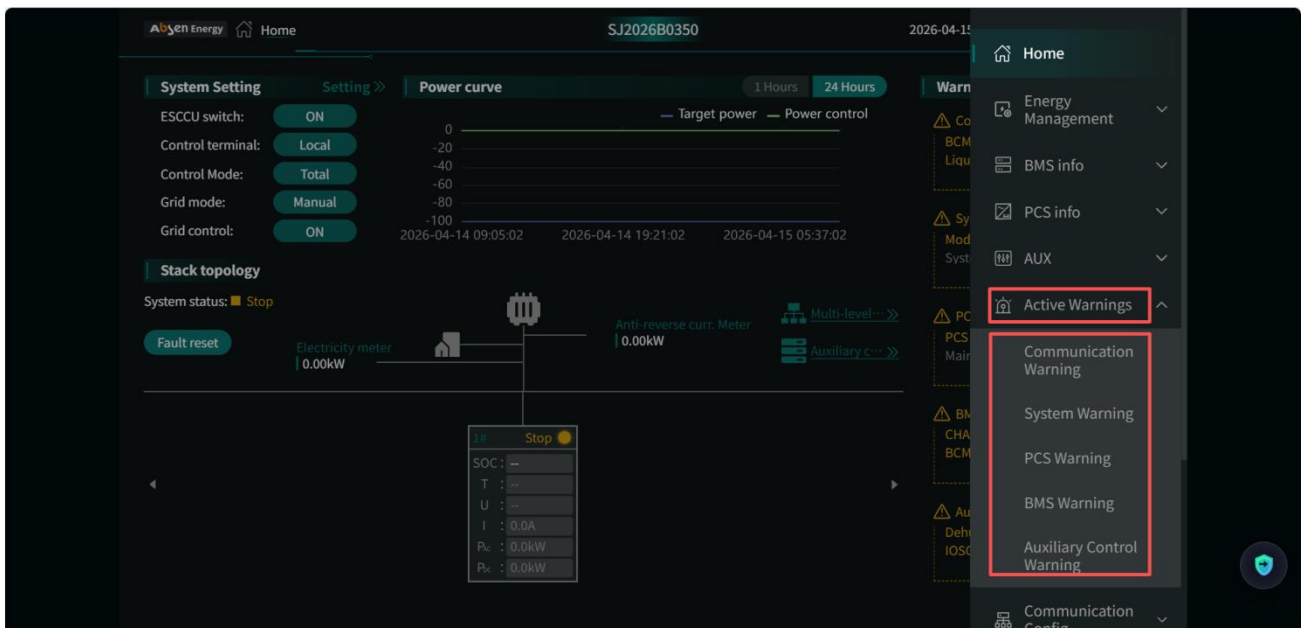
BMS information	explain
Siyao Information	Display telemetry, remote control, and remote signaling information; remote control and remote adjustment functions support data transmission.
PCS report an emergency	Display alarm information for all PCS units, where the stack number indicates which PCS unit under that stack triggered the alarm, and the device number is the device ID of the PCS unit.

3.8.1.5 Auxiliary Control Information



Display information and control parameters of auxiliary control equipment, such as: electricity meters, fire protection systems, liquid cooling systems, dehumidifier parameters, and alarm information.

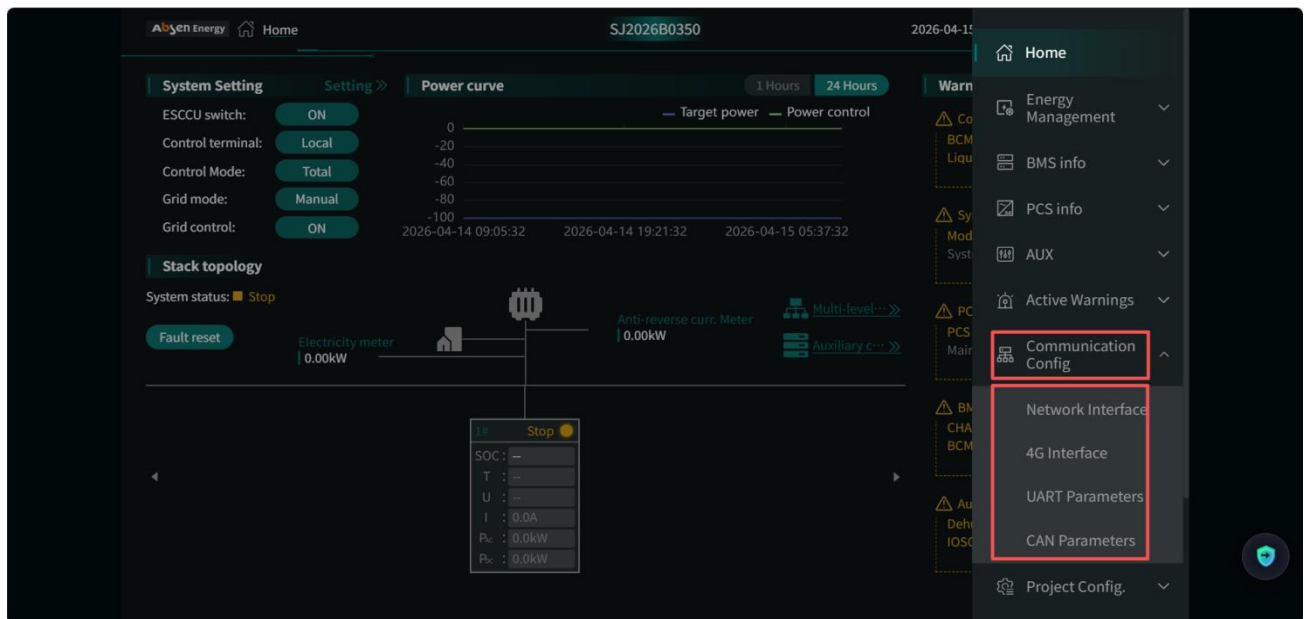
3.8.1.6 Real-time Alert



The system is maintained through real-time alarm functionality to resolve faults. Faults are categorized into three levels: Level 1, Level 2, and Level 3. Standard procedures include Level 1 fault alarms, Level 2 fault alarms with charging/unloading restrictions, or both charging/unloading and charging/unloading restrictions. Level 3 faults typically require Level 2-level operations supplemented by a system shutdown procedure.

Real-time Alert	explain
Communication Alert	Show the communication status of each device
System Alert	Show whether the project has system alerts or failures, displaying multiple pieces of information.
PCS report an emergency	Show whether the PCS has alarms or faults, displaying multiple pieces of information.
BMS report an emergency	Show whether the BMS has alarms or faults, displaying multiple pieces of information.
Secondary Control Alarm	Show whether the project has alerts and failures, displaying multiple pieces of information

3.8.1.7 Communication Configuration

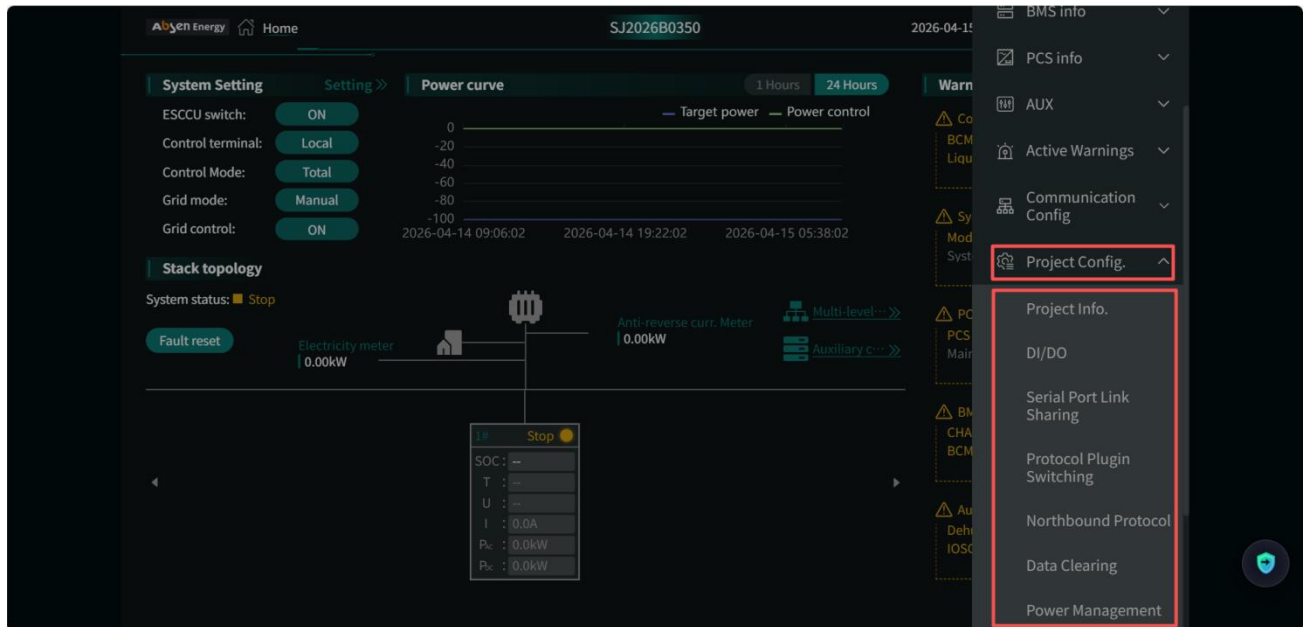


Use the communication configuration feature to view and configure the addresses of the EMS communication ports:

Communication Configuration	explain
Network Interface Configuration	Supports IP address queries and configuration for CAN0/CAN1/CAN2 ports, as well as IP address queries (operator IP) for a single 4G interface.
4G interface	Display basic information and signal strength of the 4G card
UART Parameter Configuration	Show the configuration of the current devices 485 serial port, including

	baud rate, data bits, and stop bits.
CAN Parameter Configuration	Display the configuration of the current devices CAN interface, including CAN standards, baud rate, and sampling points.

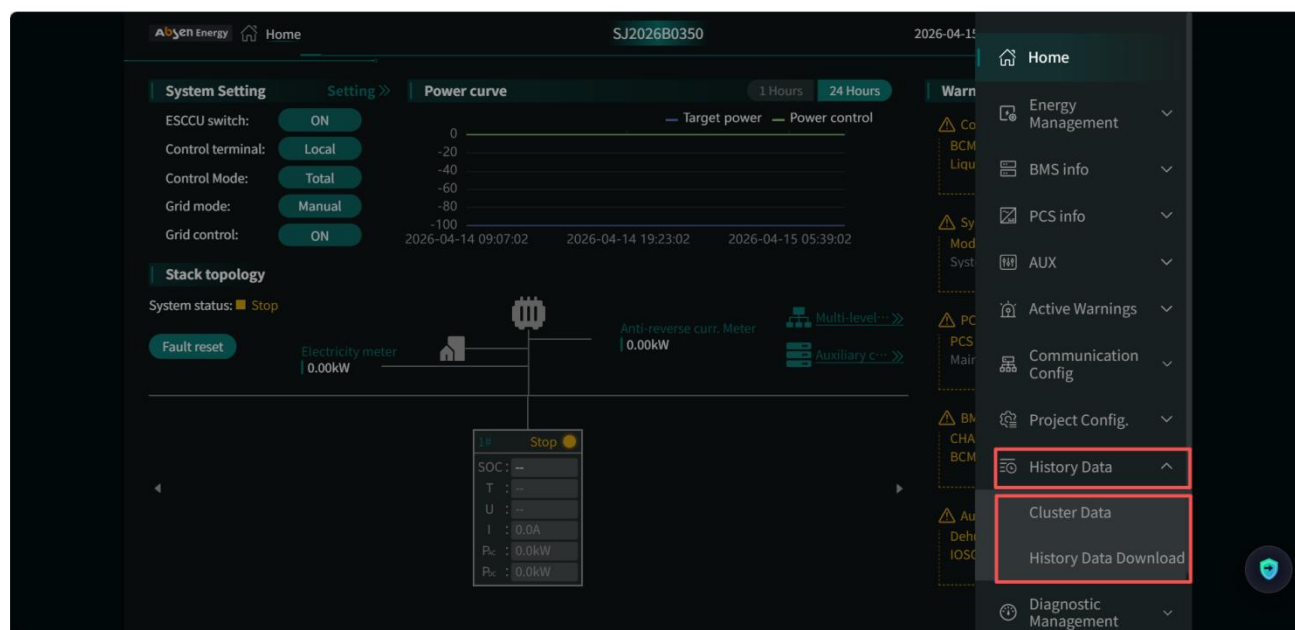
3.8.1.8 Project Configuration



The project configuration feature allows you to set and modify the following key project parameters:

Project Configuration	explain
Project Information	Set the project LOGO, project name, and unit serial number (can be set only once).
Local DIDO	Set the enable/disenable status of the DIDO interface, its default high and low levels, and trigger levels.
Serial Link Sharing	Establish the master-slave relationship for the station-side EMS and the slaves IP address
Protocol Plugin Switch	This interface allows you to configure the protocols for PCS and electricity meters to accommodate protocols from different manufacturers.
Northbound Agreement	Set the IP address, secret key, account, password, ID, and basic parameters of the MODBUS interface for the northbound protocol.
Data Clear	In this interface, you can select historical alarms, historical events, and historical data, and clear the data.

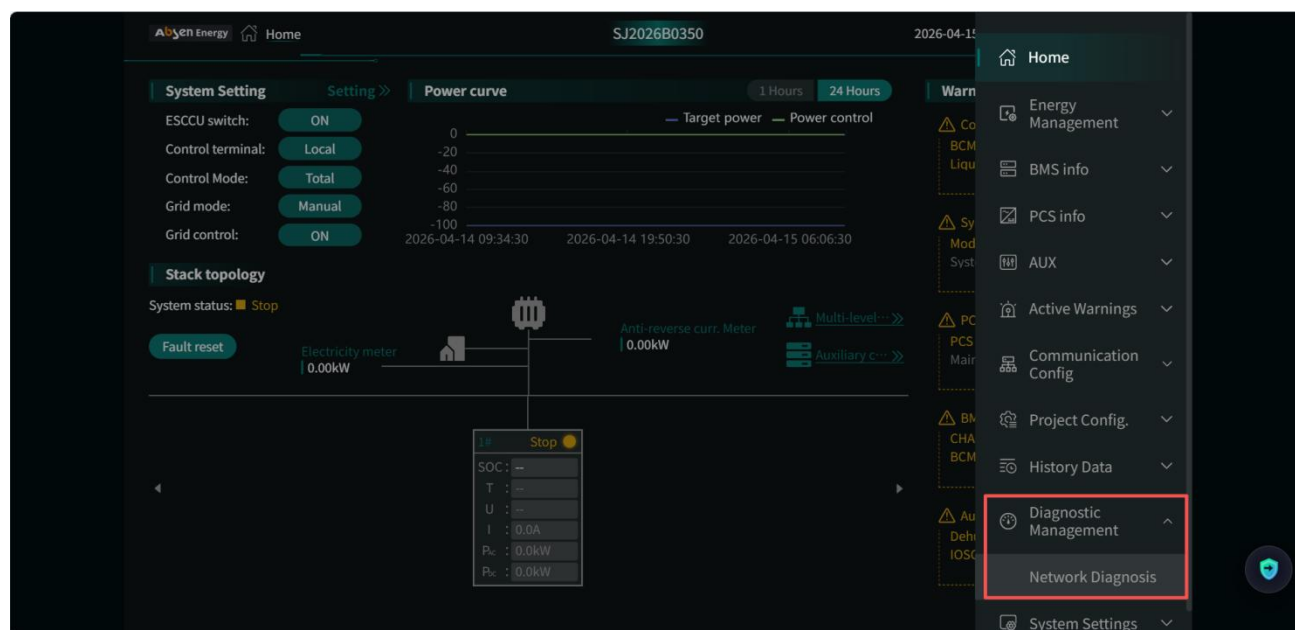
3.8.1.9 Historical Data



Historical data allows you to view various historical records and curve data, and download historical data:

historical data	explain
report an emergency	Show historical alarm information and export this information
event	Show historical operation event information and export this information
Cluster Data	You can view the 24-hour historical data for a selected cluster and export detailed cluster history for the past 7 days in cloud-based Excel format.
Data Download	You can download more historical compressed data on a monthly basis.
Export from USB Drive	Insert the USB drive into the machine, then go to the USB drive export page. Select the cluster, event end, and choose U. Chart, time interval, export all data

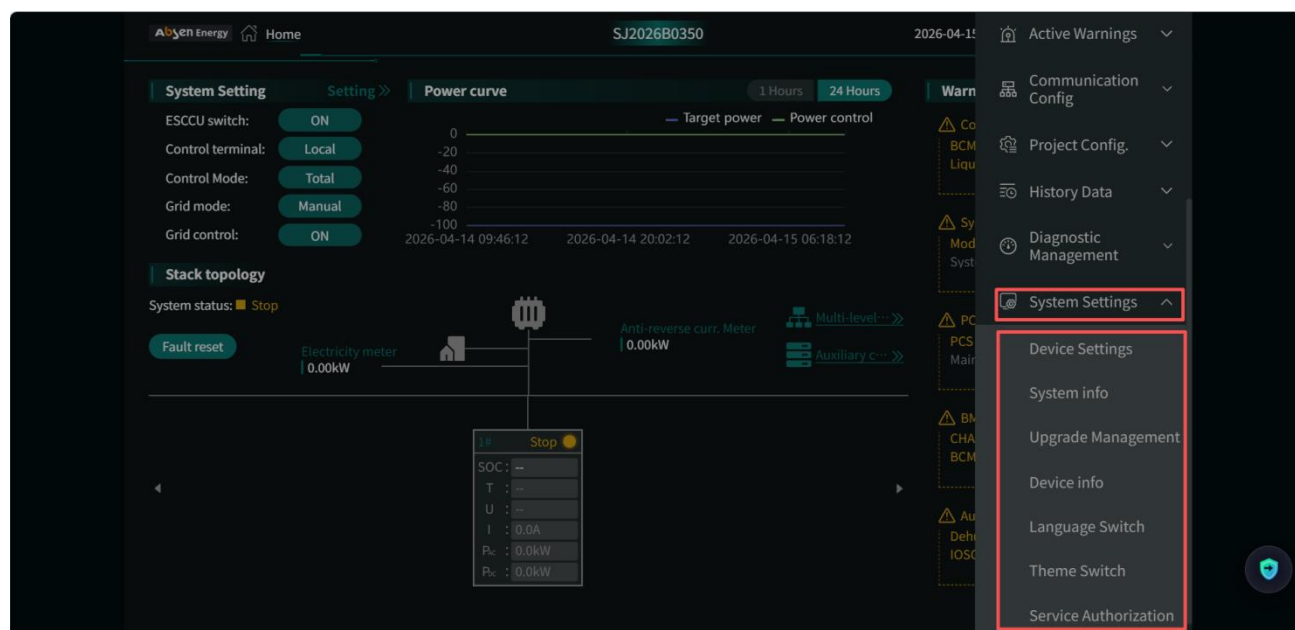
3.8.1.10 Diagnostic Management



Through diagnostic management, the root cause of system failures can be analyzed more accurately via traceability, along with real-time operational mode information of the system.

Diagnosis Management	explain
Protection Diagnosis	Protective diagnostics can trace the causes and timing of actions such as charging and discharging prohibitions, facilitating problem troubleshooting.
Energy Diagnosis	Display real-time operational strategy information, including: input power information, output power information, power limitation strategy, power control strategy, and parallel operation control strategy.
network diagnosis	The system includes port-based ping diagnostics and real-time data packet capture displays for each network interface.

3.8.1.11 System Management

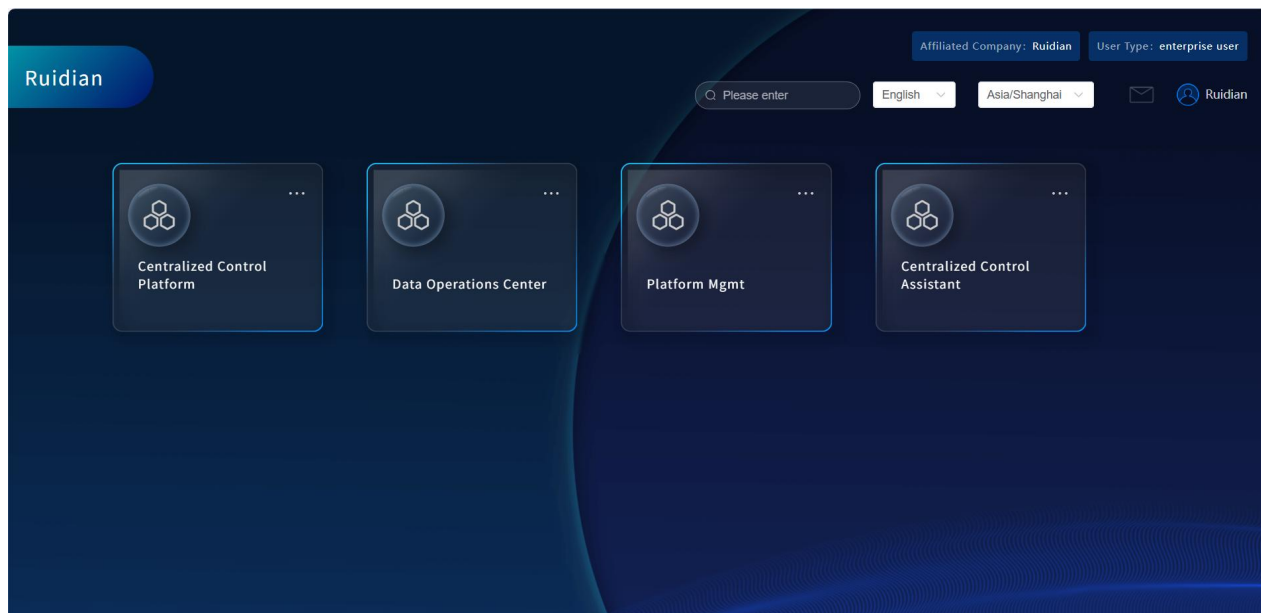


Through system management, the following aspects can be managed and operated:

system management	explain
device management	You can perform remote software restart, password modification, and time calibration.
basic information	Display the program version number, device serial number, service number, and ICCID (displayed when 4G communication is available).
Upgrade Management	You can use EMS or BMS for software upgrades. The locally uploaded upgrade package should be a tar.gz compressed file.
facility information	Scan the QR code on the device information page to view the device profile, including revenue, charge/discharge capacity, power, and other metrics (not supported for northbound protocol devices).
language selection	Switch the display language of the interface. Currently supports switching between Chinese and English.
Topic Selection	Select a theme display; supports black and white themes, with black as the default.

3.8.2 Basic Usage Instructions for the EMS Cloud

The EMS Data Service Platform is a comprehensive value-added solution for full-cycle energy storage systems. Built on a microservices architecture, it serves as an integrated energy data management and service system for microgrids, offering services including data aggregation, data operations, and data maintenance.



Its core functions are shown in the table below:

project	explain	
Create Account	First create a corporate account, then create a personal account. The information displayed on the personal account is governed by the role management settings of the corporate account.	
Platform Management	Role Management	Assign different information permissions based on roles
	Data Access Management	It includes manual permission allocation and automatic permission allocation.
	menu management	Click the shortcut icons and their order displayed on the main interface when entering the website
	User Group	User Group
	Position Management	Management of the Job Assignment Process in the EMS System
	Create an invitation code	Create a personal site invitation code through role management

Data Operations Center	Site Details	Show an overview of a single site
	Energy Revenue Report	Generate platform or meter-based revenue by setting rules.
	Platform Website Construction	On the station side, the EMS configuration specifies the cloud platform connection IP address with the default port number 1883.
		Obtain the MQTT protocol meter (obtained from the device manufacturer)
		On the data aggregation platform—under the Console section—create a new power station via either direct platform registration or invitation code registration. Individual users can register by scanning the station-side EMS QR code.
	configuration management	On the data aggregation platform—under Console → Alert Management—users can flexibly configure alert rules as needed. When a rule is triggered, alerts are delivered to the user-defined notification groups and the centralized control platform via email, SMS, chatbots, or other channels.
		In the Data Aggregation Platform--Console--Alert Management--Device Management--including adding and modifying devices
Centralized Control Platform	Under the Data Operations Center, this serves as a quick access point that displays site lists, site details, energy revenue reports, device details, and device location export functionality in the cloud.	
Central Control Assistant	Including device analysis (overview), device management, and the device desktop (consistent with the station interface)	

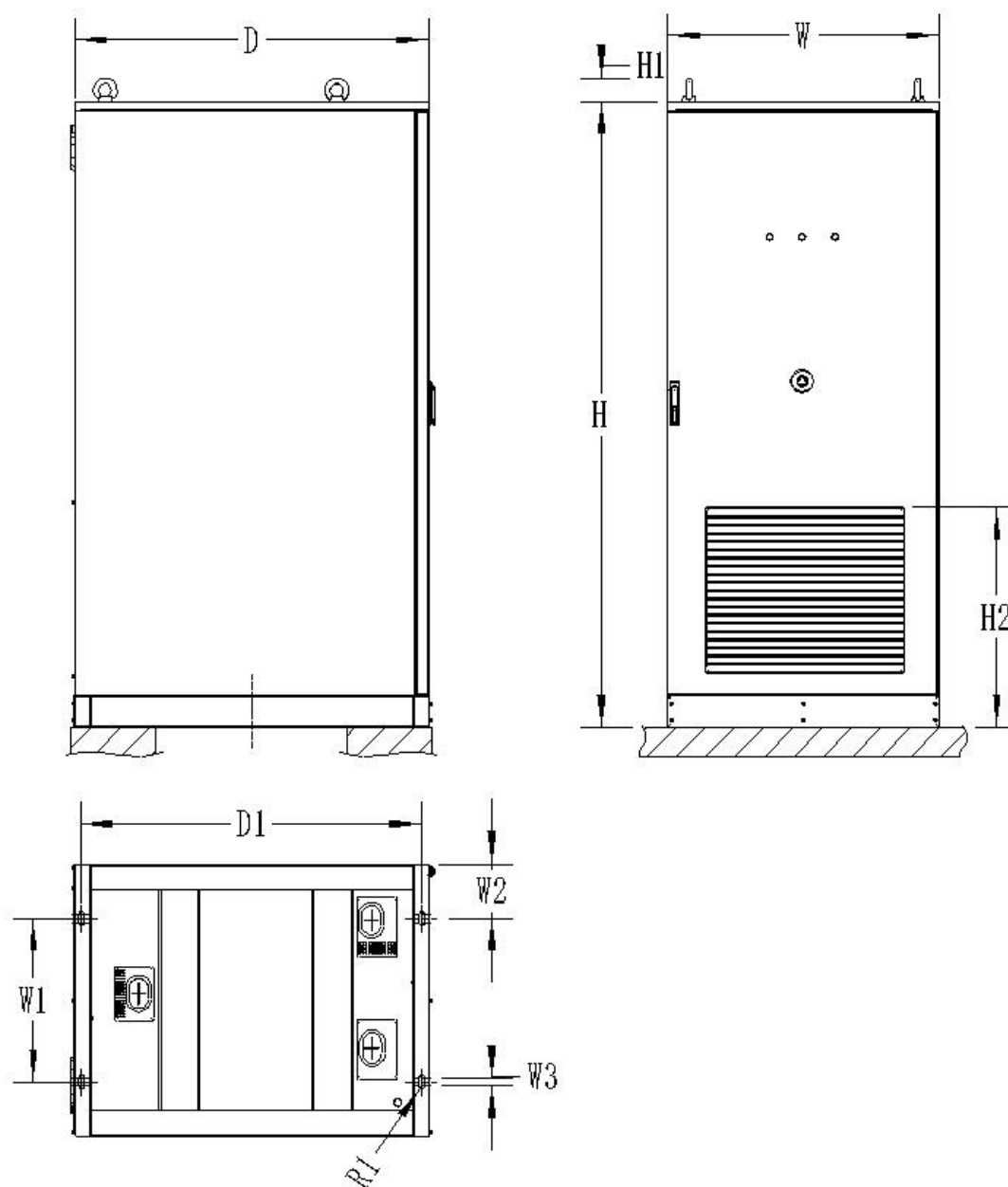
For detailed information, please refer to the attachment "Data Service Platform User Manual V1.2".



Data Service
Platform User Manual

4 Product Installation

4.1 Product Installation Dimension Diagram



Product Dimension Table (Unit: mm)

product model	H	W	D	H1	H2	W1	W2	W3	D1	R1
CX-125/261-FP2										
GM-261.2-HPB2	2300	1000	1300	88	812	600	200	30	1250	10

4.2 Preparations Before Installation

Installation Instructions

Place the battery cabinet on a level surface, ensuring it remains stable without shaking or tilting. The installation should consider the load-bearing capacity of the floor and ceiling (as specified in architectural drawings). Do not block ventilation openings to prevent impaired heat dissipation, which could raise internal system temperatures and compromise battery safety and lifespan. Maintain adequate ventilation in the installation area. Avoid installing the cabinet in excessively hot, cold, or humid environments. Keep it away from water, flammable gases, corrosive substances, heat sources, and direct sunlight. Ensure dust-free conditions at air intake and exhaust vents. Avoid using the cabinet in environments with dust, volatile gases, corrosive substances, or high-salt concentrations; do not place flammable or explosive materials near it. To minimize fire risks and damage, walls, ceilings, and floors of the cabinet room should be constructed with fire-resistant materials whenever possible, and portable dry powder fire extinguishers must be available. Follow all applicable safety regulations during installation.

Space Reserve

A sufficient operating and ventilation space should be reserved around the cabinet: at least 1200 mm of ventilation and operating space must be provided in front of the cabinet.

At least 1000 mm of operating space should be reserved on the back of the chassis.

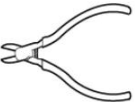
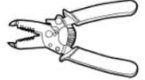
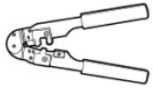
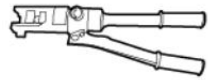
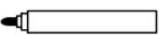
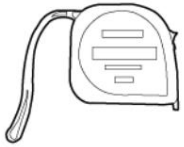
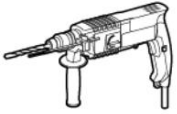
4.3 Tool Preparation

explain

- The diagram tool is for reference only; please refer to the actual product.
- Due to varying on-site conditions, this tool list does not comprehensively cover all potentially required tools.

On-site installers and users should prepare additional tools as needed based on actual circumstances.

Installation tools and instruments

  Cross-insulation torque screwdriver	  One-wire insulation torque screwdriver	 Insulation torque socket wrench (Including the extended rod) ● Sleeve specifications: 7mm~19mm ● Sleeve depth $\geq 32\text{mm}$ ● Suction port and torque Wrench Matching ● Torque range: 1.2 N·m~45N·m	 diagonal pliers
 Stripping pliers	 wire nipper	 Rubber hammer	 art knife
 Crystal head wire clamp	 Hydraulic clamp	 Multimeter – DC voltage range $\geq 1500\text{V DC}$	 marker pen
 levelling instrument	 Steel tape measure	 churn drill	 vacuum cleaner
 Impact drill bit $\Phi 16\text{mm}$	 heat-shrinkable tubing	 heat gun	 Strapping tape

 Insulation ladder	 crane	 Lifting rope ring The rope length is ≥ 1845 mm $\times$ 4	 Electric forklift
 Manual forklift			

Personal Protective Equipment

 protective glove	 insulating gloves	 eye protector	 dust mask
 reflective vest	 insulant shoe	 safety helmet	 life belt

4.4 Product Installation

4.4.1. Unpack

Step 1: Use a forklift to move the battery cabinet to the designated location.

Step 2: Remove the outer packaging of the battery cabinet.

Step 3: After confirming the equipment is in good condition, remove the bolts securing the battery cabinet to the pallet. Use a screwdriver to remove the base protective cover, exposing the fork lift access opening, and then detach the battery cabinet from the pallet.

4.4.2 Installation Environment

Do not install the battery cabinet in environments with high temperatures, low temperatures, or humidity.

The electrical cabinet should be kept away from water sources, heat sources, and flammable or explosive materials.

Avoid installing battery cabinets in or near desert environments.

Avoid installing the battery cabinet in environments with direct sunlight, dust, volatile gases, corrosive substances, or high-salt conditions.

Do not install the battery cabinet on unstable or vibrating surfaces.

Do not install the battery cabinet in work environments containing metallic conductive dust. The optimal operating temperature for batteries is 20°C–30°C. Operating in environments above 30°C reduces battery service life, while operating below 20°C shortens battery standby time.

4.4.3 packing list

Accessories may vary depending on the project; refer to the actual project order requirements.

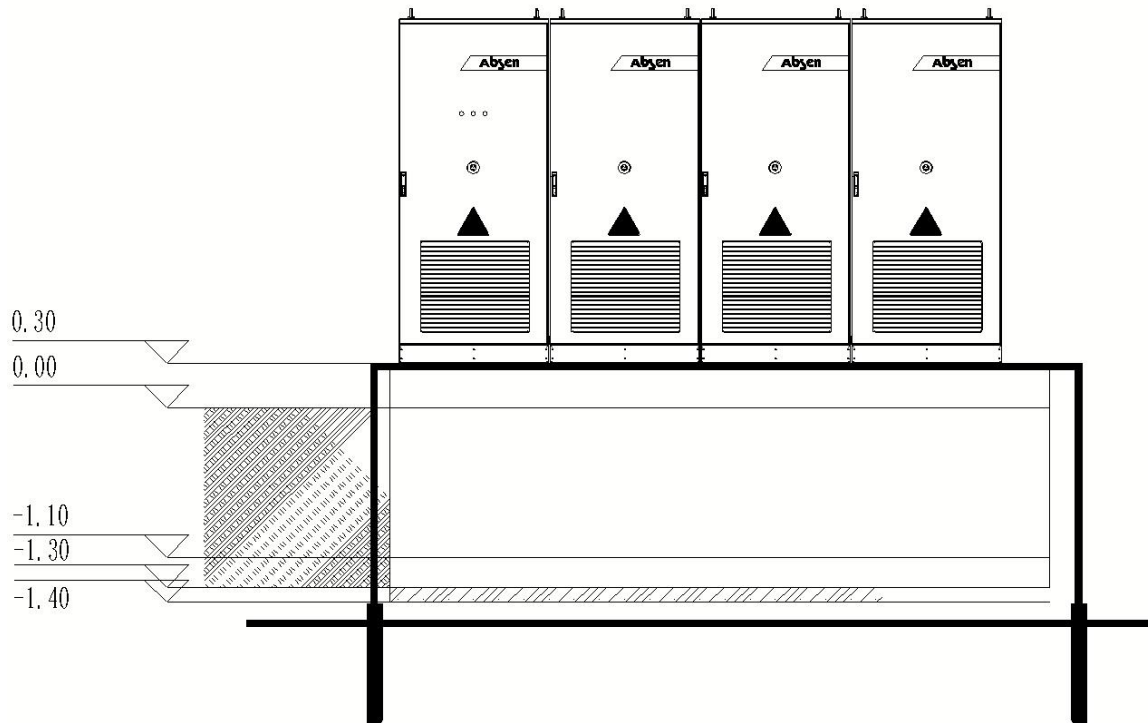
order number	name	description	unit	quantity	check out	remarks
1	Integrated Energy Storage Cabinet	Battery system + Power and Environmental Protection System + Power Conversion System (PCS) + Energy Management System (EMS)	Set	1	☒	
2	Energy Storage Expansion Cabinet	Battery System + Power and Environmental Systems	Set	N	☒	Configure according to the order
3	Product User Manual	Product User Manual	PC	1	☒	Configure according to the order
4	expansion cabinet cable	major loop	PC	2	☒	According to the order configuration, one positive electrode and one negative electrode are provided.
5	expansion cabinet communication cable	communication	PC	1	☒	Configure according to the order

6	External hexagonal bolt	M12* 25mm	PC	4	☒	Fixed to the card plate
7	Three-phase anti-backflow meter	ADL400	PC	1	☒	Optional
8	Three-phase metering electricity meter	ADL400	PC	1	☒	Optional
9	key	Front door key	PC	2	☒	
10	fireproofing mud	High-temperature resistant organic fireproof mortar	kg	2	☒	
11	certificate	work certificate	PC	1	☒	
12	warranty card	warranty card	PC	1	☒	
13	inspection report	Shipments Inspection Report	PC	1	☒	

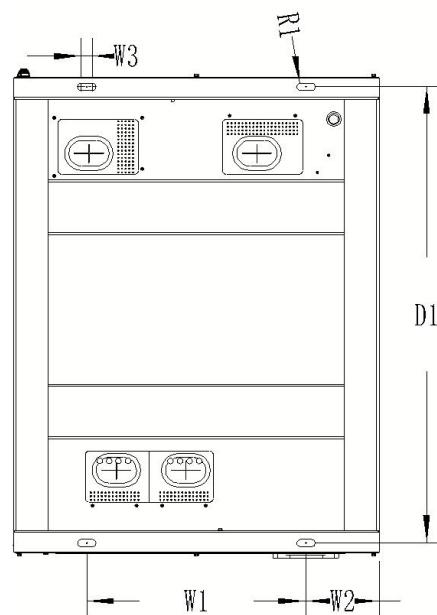
4.4.4 Installation Cabinet

operating steps

The basic Pareto chart is shown below:



Step 1: According to the cabinet base drawing requirements, determine the cabinet installation position on the installation platform and mark it with lines.

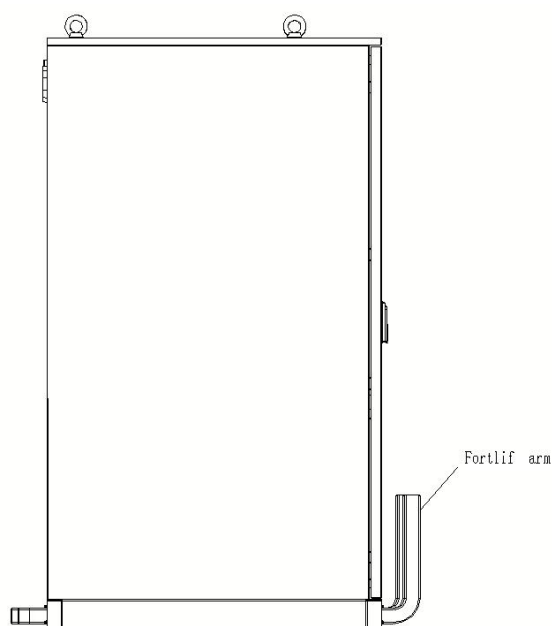


product model	W1	W2	W3	D1	R1
CX-125/261-FP2	600	200	30	1250	10
GM-261.2-HPB2					

Step 2: Drill screw holes at the marked positioning locations;

Step 3: Use a forklift to transport the battery cabinet to the designated location and secure it to the foundation with M12×25 bolts.

Note: When moving battery cabinets with a forklift, the toothed gear must extend fully through the cabinet depth—meaning the gear must protrude beyond the cabinets rear surface!!!

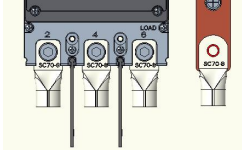
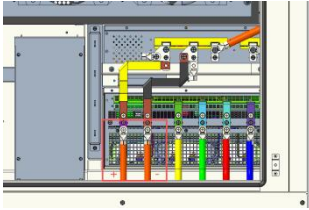
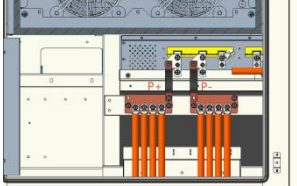


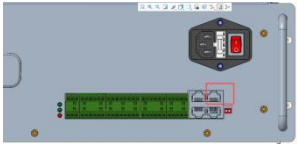
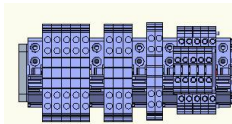
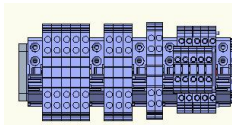
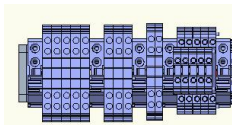
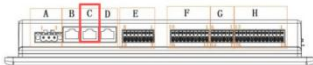
Step 4: After installation is complete, check whether the cabinet body is tilted, whether the cabinet spacing meets the requirements, and whether the four screws securing the cabinets are properly tightened.

Step 5: Install other expansion cabinets sequentially using the same method described above. The cabinet installation is complete!

4.5 Device wiring and installation

4.5.1 Overview of Equipment Wiring

project	purpose	point of junction	Wiring location
AC power grid cable	Connect the power grid to the energy storage cabinet	From the power grid to the lower end of the integrated cabinet AC circuit breaker 	Open the input cable baffle
grounding cable	Connect the grounding cable	From the grounding point to the ground wire busbar of the energy storage cabinet 	Disassemble the forklift boom shield plate
Power cable for the expansion cabinet	Direct current parallel operation of integrated cabinets and expansion cabinets	The copper busbar for wiring of the PDU on the rear side of the cabinet Main Cabinet: Positive on the left, negative on the right  expansion cabinet: positive on the left, negative on the right 	Open the cabinet rear door
Communication	EMS and cabinet	Any RJ45 port on the main	Left lower inside of the front

cable between the expansion cabinet and the main cabinet	communication	cabinet network switch  Communication interface of the expansion cabinet PDU 	cabinet door
Anti-backflow electricity meter communication cable (for customer use)	Connect the anti-backflow meter to the communication port of the integrated cabinet.	Connect the anti-backflow meter to the communication terminal station of the integrated cabinet. 	Open the input cable baffle
metering meter communication cable (provided by customer)	Connect the electricity meter to the communication port of the integrated cabinet	Connect the electricity meter to the control terminal panel of the integrated cabinet. 	Open the input cable baffle
Main circuit breaker control feedback line for the combiner cabinet (provided by the customer)	Connect the circuit breaker control coil and feedback contacts of the combiner cabinet to the integrated cabinet.	From the circuit breaker of the combiner cabinet to the communication terminal station of the integrated cabinet 	Open the input cable baffle
Third-party EMS communication cable	Connect to the EMS communication port inside the cabinet	LAN1 port connected to the cabinets EMS 	Six types of unshielded network patch cords (UTP Cat.6, RJ45 connectors)

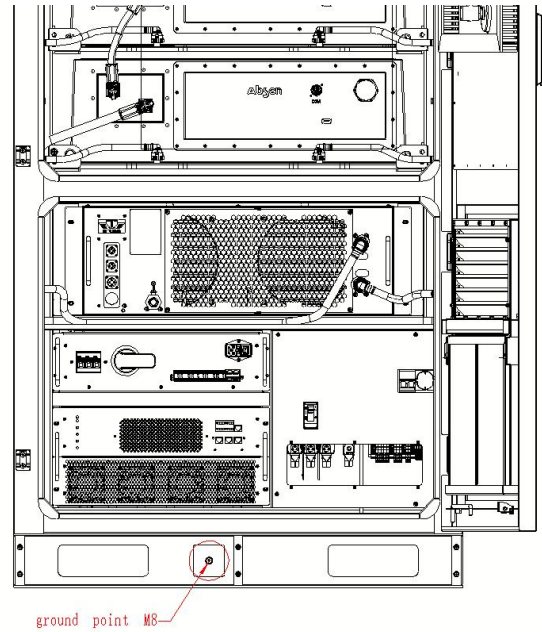
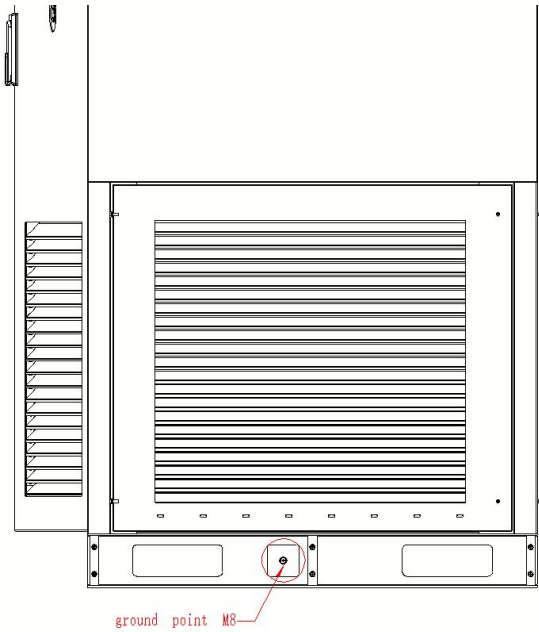


Note: The wire dimensions and OCPD dimensions should be determined in accordance with the following requirements to comply with national electrical codes (NEC) and local standards.

4.5.2 Grounding Wire Installation

Grounding schematic diagram:

The grounding point is shown in the figure, located at the red circle; choose one of them.



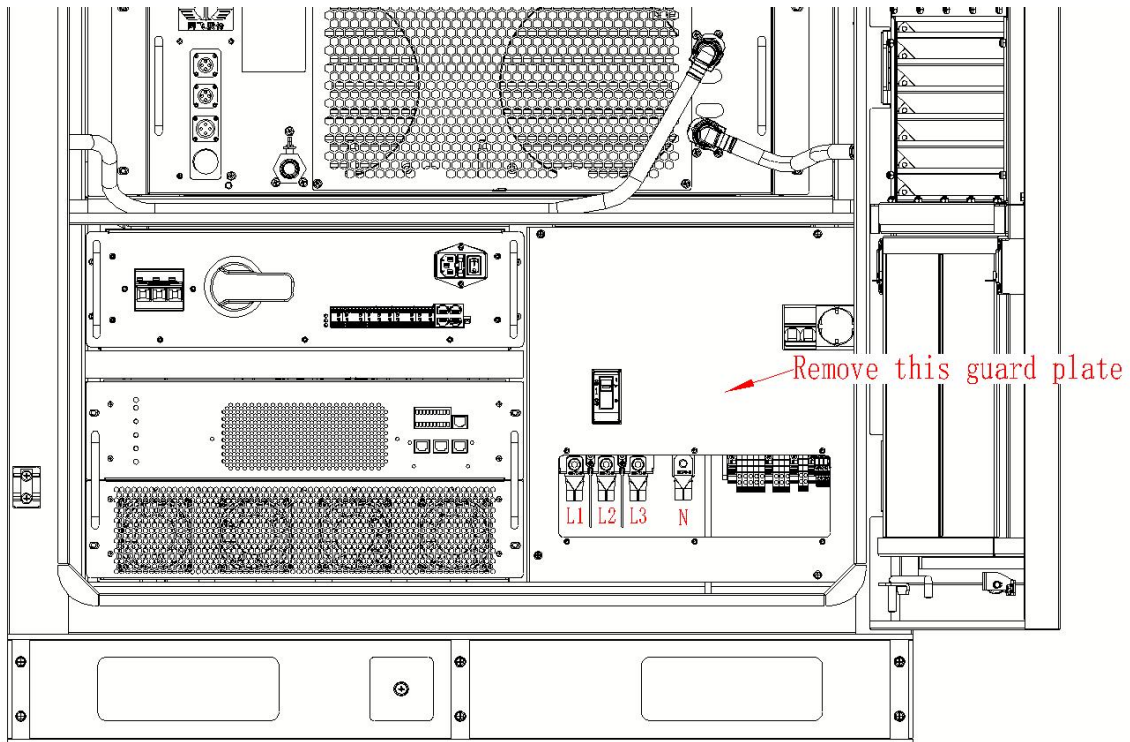
Cable specification table:

wire marking	sectional area (mm ²)	torsion (Nm)
0 AWG	53.5	25-40

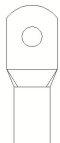
4.5.3. Grid cable installation

Open the cabinet door, remove the input cable guard plate on the bottom of the cabinet, and reattach it after completing the cable installation.

Schematic diagram of cable installation location: see red text

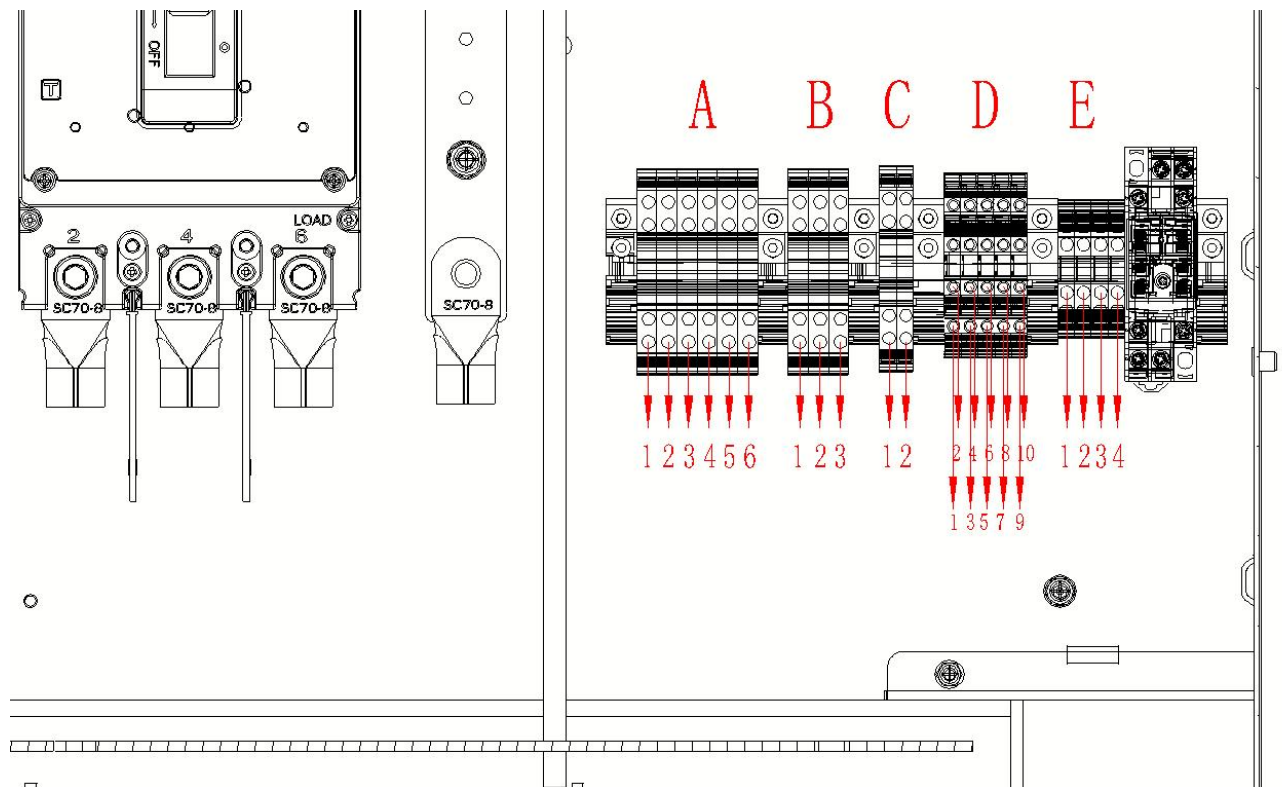


Cable specification table:

project	wire marking	sectional area (mm ²)	Torque (Nm): Grade 8.8	End model	End schematic diagram
GRID cable	2/0 AWG	67.4	25-40	SC70-8	

4.5.4 Installation of Communication Control Cables

Schematic diagram of cable installation location:



wire list:

Terminal Table	foot position	function	remarks
A	1、4	AC220V	Terminal board A of Expansion Cabinet 1#
	2、5	AC220V	Terminal Board A of Expansion Cabinet 2#
	3、6	AC220V	Terminal Board A of Expansion Cabinet 3#
	1、5	AC220V (standby)	Terminal Board A of Expansion Cabinet 4#
	2、6	AC220V (standby)	Terminal Board A of Expansion Cabinet 5#
B	1	\	\
	2	\	

	3	\	
C	1	\	\
	2	\	
D	1	RS485B	Anti-backflow meter
	2	RS485A	
	3	RS485B	Electricity Meter
	4	RS485A	
	5	\	\
	6	\	\
	7	Switch position signal NO	The main circuit breaker inside the combiner cabinet
	8	Switch position signal COM	
	9	tripping coil NO	The main circuit breaker inside the combiner cabinet
	10	tripping coil COM	
E	1	\	\
	2	\	
	3	\	
	4	\	

Cable specification table:

project	Cable Type	wire marking	Input signal type	End model	End schematic diagram
Anti-backflow electricity meter communication cable	2-core shielded twisted-pair cable	20AWG	Communicatio n Line	E7508	

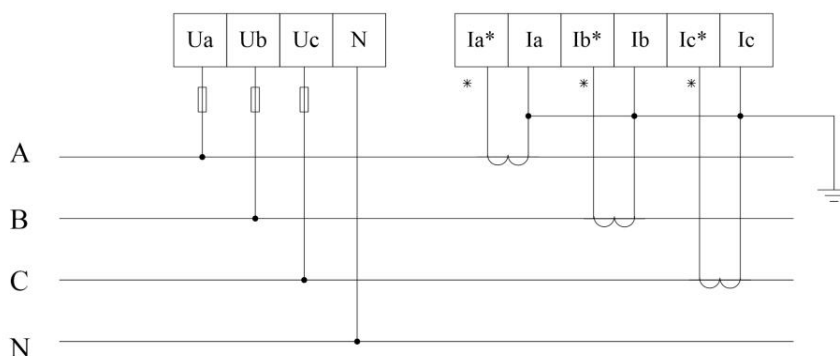
The main circuit breaker inside the combiner cabinet Switch Position Signal	2-core shielded twisted-pair cable	20AWG	Dry contact	E7508	
The main circuit breaker inside the combiner cabinet tripping coil	2-core shielded twisted pair cable	20AWG	Dry contact	E7508	

4.5.5 Installation of Anti-Backflow Meters and Metering Meters

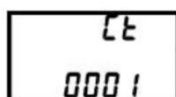
The anti-backflow meter and metering meter use the meter accessories provided in the accessory kit (optional). The anti-backflow current transformer (CT) is connected at the main inlet of the local power grid to monitor the power flow and capacity. The metering meter is installed at the inlet of the energy storage systems combiner cabinet to measure the energy charged and discharged by the system.

When installing and wiring the electricity meter, strictly follow the connection method specified in the meters instruction manual. Ensure the voltage phase sequence and phase are identical to those of the current transformer (CT). After installation, adjust the CTs transformation ratio via the meters display to match the actual installed ratio; no other settings require adjustment.

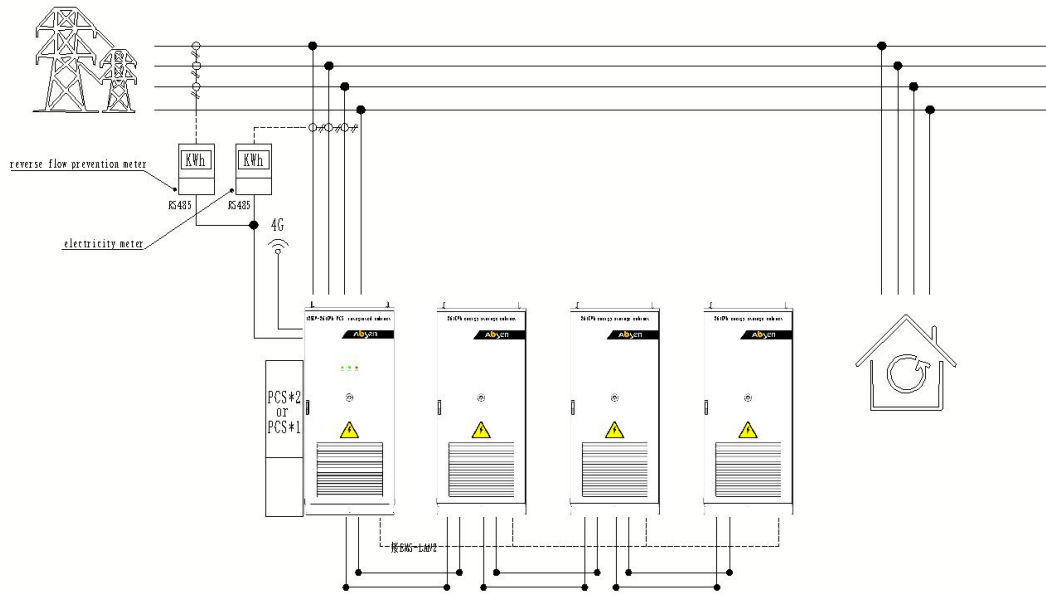
The recommended wiring method is shown in the figure below:



The meters setting parameter password is "0001". For the transformation ratio: if the CT display shows "2000/5", set it to "400". The configuration diagram for the CT transformation ratio is as follows:



The electricity meter is connected to the control terminal panel of the energy storage cabinet via an RS485 communication cable, with the total length not exceeding 50 meters. The wiring locations are shown in the figure below:



5 System Inspection

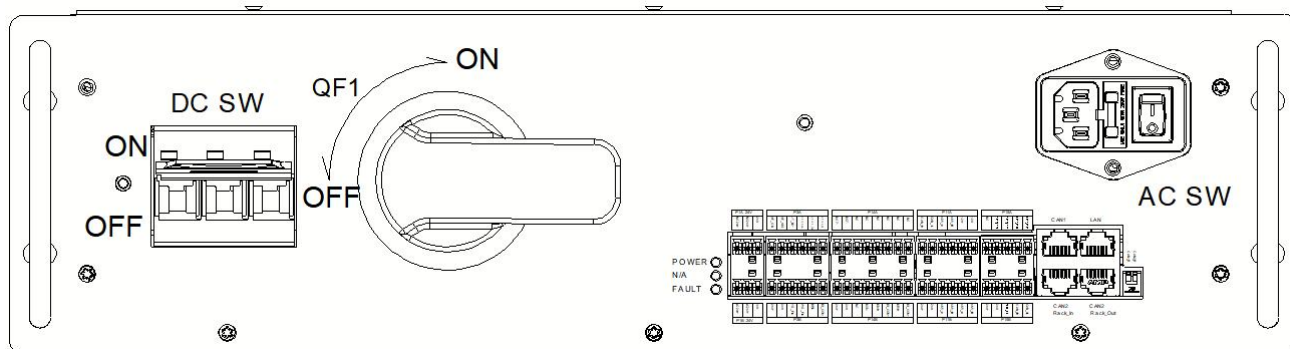
5.1 Pre-power-on Inspection

order number	content
1	Check for condensation on the device (presence of a water film or droplets on the surface). If present, open the cabinet door for ventilation until the condensation disappears. Inspect the pipeline connections to ensure no liquid leakage occurs.
2	Measure whether the power grid input voltage falls within the specified range and confirm the absence of faults such as phase loss or short circuits.
3	The power input terminals (L1, L2, L3, N) must be correctly and securely connected.
4	The equipment must be reliably grounded.
5	All control signal communication cables are properly connected.
6	The wiring terminals are intact without damage and have been insulated.
7	There are no foreign objects such as wire ends or metal shavings inside or outside that could cause short circuits in signal lines or power lines.

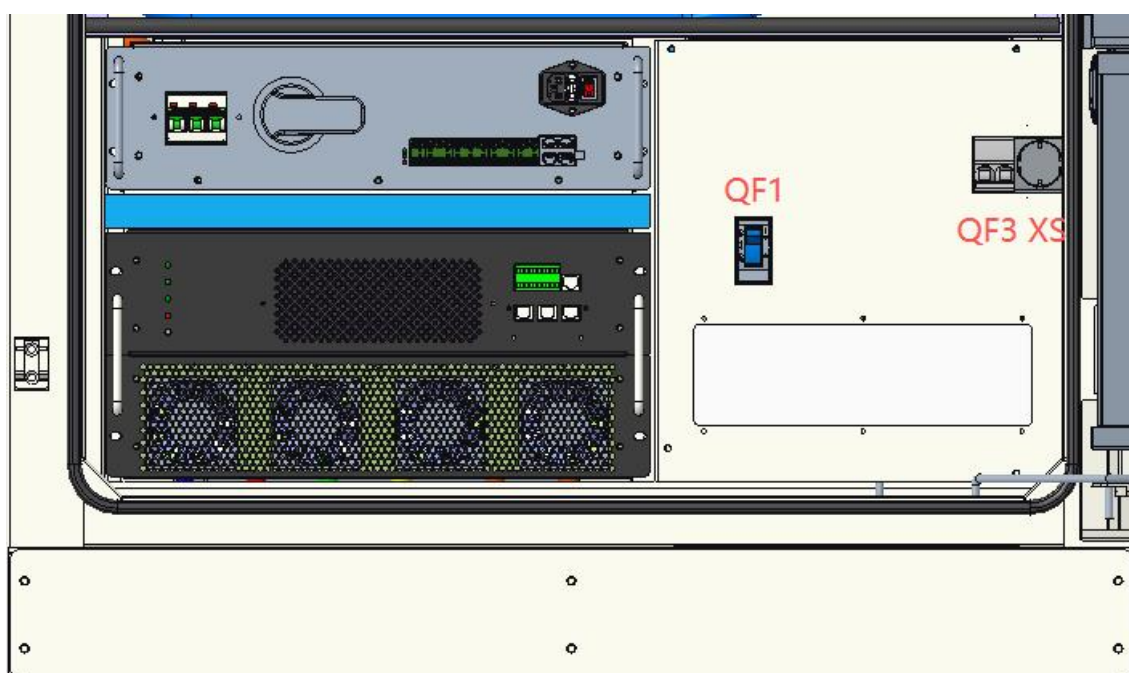
5.2 Power-on Steps

1. Open the doors of the integrated cabinet (with indicator light) and the extended energy storage cabinet (without indicator light). After confirming that all internal components are properly installed, first close the "QF1" switches

in both cabinets (from OFF to ON), then operate the "DC SW" and "AC SW" switches. The power indicator on the PDU will illuminate, the "POWER" light on the cabinet door will light up, the battery management system will perform a power-on self-test, and the EMS display inside the cabinet will activate, showing the systems basic status and information.



2. If the EMS indicates no battery system fault, a "click" sound will be heard inside the PDU within approximately 30 seconds, signaling the closure of the main contactor. The EMS display homepage shows all cluster contactors closed, allowing the high-voltage battery to supply high-voltage DC power to the converter. The converter is then powered on, and the "POWER" indicator light on the inverter begins to flash slowly.
3. After verifying that the voltage of the three-phase input power supply (line voltage $AC400V*3\pm10\%$, phase voltage $AC240V*3\pm10\%$) and phase sequence from left to right ($L1>L2>L3$) are correct, turn on switches QF1 and QF3 to supply AC power to the inverter and liquid cooling unit. The "POWER" indicator light on the inverter will illuminate fully, and the system enters standby mode.



4. Insert the 4G card into the station-side EMS, open the web-based cloud platform, and wait for the system to connect to the cloud. Set the parameters and select the appropriate operating mode via either the web platform or the station-side EMS display. For instructions on operating the station-side EMS display and the cloud-based EMS, refer to Chapter "3.9 EMS Operation Instructions".
5. After completing the parameter setup, select the control mode (e.g., "Peak-valley Arbitrage"). Set the operating time period, then click "Start" on the local or remote interface to initiate system operation. Once the system starts, if the PCS is in charging or discharging mode, the "RUN" indicator light on the cabinet door will illuminate.

5.3 Downtime Procedures

1. On the EMS cloud platform or the on-site EMS, click "Shut Down" to stop the device operation; (This step can be skipped in emergency situations.)
2. Close the QF1 and QF3 switches inside the integrated cabinet (with indicator lights), disconnect the mains power input, and cut off the AC power supply from the grid.
3. Turn off the QF1 (OFF→ON) and DC SW switches inside the integrated cabinet (with indicator light) and the extended energy storage cabinet (without indicator light).

Note the risk: If you directly trip the AC/DC circuit breaker without shutting down the system through the cloud platform, the system will resume automatic operation in the previously set mode upon power restoration.

6 Product Maintenance



For routine maintenance, all maintenance operations inside the battery cabinet must be performed using insulated tools by personnel who have received proper training. Components located behind protective covers that require tool access are not suitable for user operation. For maintenance needs, consult an engineer.

6.1 Battery Cabinet Maintenance

The battery cabinet must be maintained regularly; otherwise, it will impair its normal operation and shorten its service life. Inspect the battery system/battery pack at least once per month to check whether the battery voltage and temperature are within normal ranges. Review historical data to identify any severe faults.

6.2 Liquid Cooling Unit Maintenance and Care

periodic inspection

- Check whether the power cable and communication cable of the liquid cooler are functioning properly;
- Check whether the liquid-cooled unit is operating normally and whether there is a noticeable temperature difference between the indoor and outdoor air inlets and outlets when the refrigeration system starts up.
- Check whether the exhaust fan and compressor are operating normally during the operation of the liquid cooler, and observe for any noticeable abnormal noises or vibrations.
- Check the mechanical structure of the liquid cooler for any damage or deformation;
- Check whether the air intake and exhaust vents of the liquid coolers internal circulation system and the mesh screens on the cabinets external protective cover are clogged.
- Based on the air quality in the actual operating environment, schedule maintenance personnel to inspect the cabinets liquid-cooled unit every 3 to 6 months.

maintenance routine

During operation, dust accumulates on the heat exchanger fins, increasing thermal resistance and impairing heat transfer efficiency. In severe cases, this can lead to reduced performance of the liquid cooler. It is recommended to clean and maintain the heat exchanger every 3–6 months, with the maintenance interval adjusted based on regional air pollution levels and operating duration. Avoid using hot water or organic solvents such as gasoline for cleaning.

7 Alert Reference

If you encounter device alarms or fault reports on the cloud platform, please contact our after-sales service department.

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