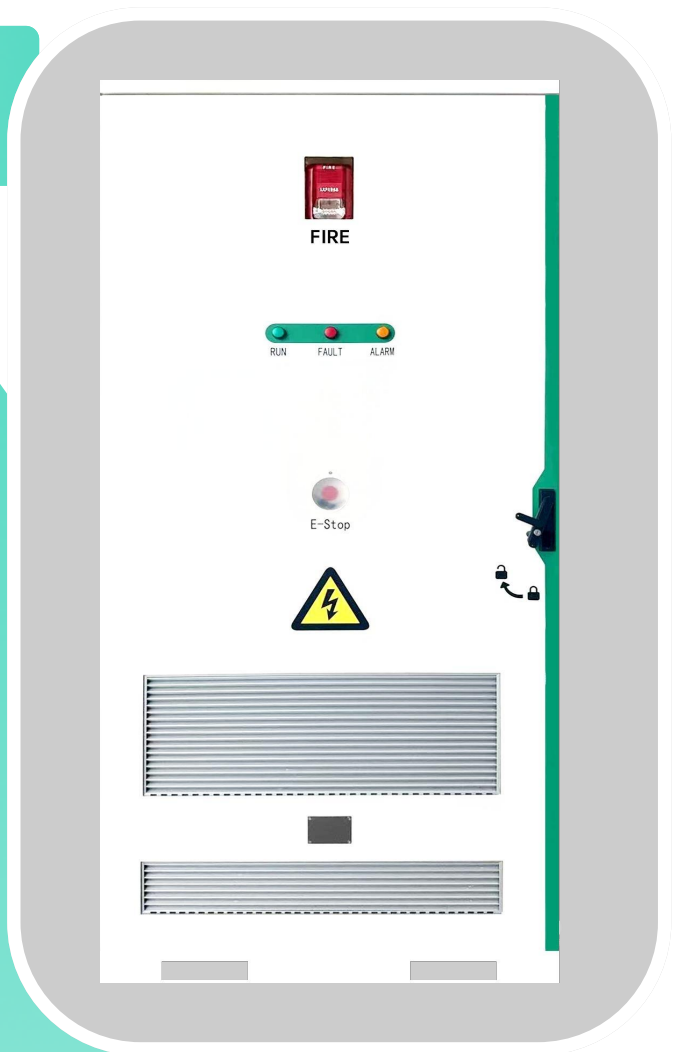


User Manual



Applicable
Models

ESS 261kWh/125kW



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About this document

This manual describes the product information, installation, electrical connection, commissioning. Read through this manual before installing and operating the product. All the installers and users have to be familiar with the product features, functions, and safety precautions. This manual is subject to update without notice. For more product details and the latest documents, please contact the supplier.

Revision History

Revision No.	Revision Date	Revision Reason
V1	2026-03-01	First Published
V2	2026-04-13	Revise some images and content

1 Overview

1.1 Main Contents

This manual provides a comprehensive guide to the 261kWh industrial and commercial liquid-cooled energy storage battery cabinet, covering product specifications, transportation, installation, operation, maintenance, and troubleshooting. Before using this product, please read the manual carefully and follow the instructions to operate the energy storage system. Failure to do so may result in equipment damage or personal injury.

1.2 Target Audience

This manual is intended for personnel involved in transportation, installation, and other operations related to this product. Participants must meet the following requirements:

1. Proficient in electrical, electronic, and mechanical engineering, with strong comprehension of electrical schematics and structural drawings;
2. Understand the products, fundamental knowledge, working principles, and control logic of the energy storage industry;
3. Possess a professional electrician construction certificate and qualifications recognized by the local laws of the product's usage area, and be familiar with relevant local regulations;
4. Possess emergency incident response capabilities, and handle related incidents in accordance with the laws and regulations of the product's applicable regions;
5. Proficient in the provisions of this manual, with professional skills and a strong sense of responsibility.

The manual contains important information. Please read it carefully before operating or maintaining the system. Keep this manual and other materials in the product components together for operators and maintenance personnel to access promptly.

1.3 Definition of Manual Warning Signs

To ensure user safety and property protection while using this product, and to enhance operational efficiency, this manual provides detailed information with explanatory symbols for clearer understanding.

The following symbols may appear in this document, with the following meanings:

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symbol	explain
	Used to warn of an emergency hazard that, if not avoided, will result in death or serious personal injury.
	Used to warn of potential dangerous situations that, if not avoided, may result in death or serious personal injury.
	Used to warn of potential hazards that, if not avoided, may result in moderate or minor personal injury.
	Used to convey safety warnings for equipment or environments. Failure to avoid this may cause equipment damage. Malfunction, data loss, reduced device performance, or other unforeseen consequences. Note: This does not involve personal injury.
	Display additional information in the manual, emphasizing and supplementing the content. It may also provide tips or tricks for optimizing product usage, helping you solve a problem or save time.

1.4 Terminology explanation

terminology	explanation
BESS	Battery Energy Storage System
PCS	Power Conversion System
ESS	Energy Storage System
S/G	Switch gear
DC/DC	Direct Current/Direct Current Converters
FSS	Fire Safety System
TMS	Thermal Management System
ACS	Air Cooling System
LC	Local Controller
EMS	Energy Management System
SMPS	Switched-Mode Power Supply
SCADA	Supervisory Control and Data Acquisition

Unless otherwise specified, the device names in this manual are the abbreviations above.

2 Safety Instructions

2.1 Safety Notice

Please strictly comply with all safety regulations in this product manual. To prevent potential injuries or property damage during use and to enhance the product's service life and efficiency, please carefully review all safety guidelines.

1. Do not immerse the battery in water;
2. Improper use and storage of batteries pose risks of fire, explosion, and burns. Do not disassemble, crush, incinerate, heat, or dispose of batteries in open flames.
3. Do not put batteries in fire or expose them to high temperature for a long time beyond the temperature conditions specified in this manual, otherwise it may cause fire;
4. When the battery reaches the end of its service life, it should be disposed of in a timely manner according to local recycling or waste regulations.
5. Do not disassemble, remove, or repair the battery in any unauthorized manner.
6. Do not mix lithium-ion batteries of different specifications or brands.
7. Do not use if the battery emits an odor, heats up, deforms, changes color, or exhibits any other abnormal behavior.
8. Do not short-circuit the battery's positive and negative terminals, as this may cause dangerous currents and high temperatures, potentially leading to injuries or fires.
9. Connect the battery terminals strictly according to the labeled polarity; reverse or parallel charging is strictly prohibited.
10. Avoid overcharging or overdischarging the battery, as this may cause overheating and fire hazards.
11. In case of electrolyte leakage, avoid contact with skin and eyes. If contact occurs, immediately wash the affected area with large amounts of clean water and seek medical assistance.
12. No person or animal shall ingest any part of the battery or any substance contained therein;
13. Batteries pose potential hazards, and appropriate protective measures must be taken during operation and maintenance. Otherwise, serious personal injuries and property damage may occur;

14. Customers are aware of the following potential hazards during battery operation: Operators may be exposed to chemical hazards, electric shocks, or arc injuries. Although the human body reacts differently to direct current (DC) and alternating current (AC), both DC voltages above 50V and AC currents pose equally severe risks. Therefore, customers must implement appropriate safety measures during operation. Adopt a conservative posture to avoid electric current injuries. There exists a chemical risk from the electrolyte in the battery. When operating the battery and selecting personal protective equipment (PPE), customers and their employees must consider the aforementioned potential risks to prevent accidental short circuits, which may lead to arc explosions or thermal runaway.
15. Do not discard or drop batteries, as gravitational impact may damage protective mechanisms and trigger abnormal chemical reactions that could cause overheating or fire.
16. Avoid any actions that may cause battery deformation, such as pricking, hammering, or stamping, as these could lead to internal short circuits or fires.

Failure to comply with the above warnings may lead to a variety of disasters.

If any of the above abnormal usage situations occur, it should not be used and the after-sales service should be contacted as soon as possible for further evaluation.

2.2 Operator Requirements

1. When operating or maintaining energy storage systems, wear safety helmets, insulated gloves, insulated shoes, and goggles. Wearing watches or other metal accessories is strictly prohibited.
2. Only certified electricians may operate or maintain this product, and must be equipped with complete professional electrical tools.
3. Be able to assess assigned tasks and identify potential hazardous events;
4. Be able to provide first aid to injured persons;
5. Understand the relevant maintenance standards of the product;
6. Comply with local laws, regulations, and standards.

2.3 Electrostatic Protection

The buildup of static electricity may lead to electric shocks, fires, explosions, and the failure or damage of electronic devices. Since circuit boards and other electrostatic-sensitive components are present in energy storage systems, implementing effective static protection is essential to prevent or mitigate the hazards of static electricity. This involves suppressing static generation, accelerating its dissipation, and performing static neutralization. Preventive measures include, but are not limited to:

1. During component replacement, all uninstalled equipment components should be stored in electrostatic shielding packaging bags, while temporarily removed components must be placed on anti-static foam pads.
2. Do not touch the solder joints, pins, or exposed circuits.

3 Product Introduction

3.1 Overview of Energy Storage Systems

A single 261kWh industrial-commercial liquid-cooled energy storage cabinet constitutes one storage unit, comprising five liquid-cooled battery packs, a high-voltage enclosure, and a 125kW Power Conversion System (PCS). Each liquid-cooled pack consists of 52 series-connected cells with a rated capacity of 314Ah. The high-voltage enclosure integrates a battery cluster management unit and protective/control components to manage and safeguard the entire cluster. The cabinet features a compartmentalized design with separate battery and electrical compartments, facilitating installation and maintenance.

3.2 Model Description

ESS	Energy Storage System
261kWh	rated energy

3.3 Application Scenarios

Power generation side:

It is designed to mitigate the impact of transient variations in photovoltaic and wind power systems on the grid, smooth power fluctuations, and reduce resource waste and wind curtailment.

Grid side:

The peak shaving, valley filling, load smoothing, and rapid frequency regulation can improve the stability and reliability of the power grid.

In microgrids, energy storage systems help maintain the system's dynamic balance and ensure voltage stability for critical loads.

User side:

Save electricity bills by using off-peak hours and benefit from the price difference between peak and off-peak hours.

As a backup power source, it reduces peak electricity demand.

3.4 Main Functions

1. The battery system monitors operational parameters (including voltage, current, temperature, SOC/SOH, etc.) and dynamically adjusts charging/discharging

cycles and energy storage based on real-time battery status and component performance.

2. The battery system features high-voltage sampling and MSD (Maximum Safe Discharge) monitoring, along with safety device status checks including fuses. When a battery fault occurs, the system automatically reports the issue and restricts charging/discharging current or power to ensure electrical system safety.
3. The battery system controls the cooling, heating, and temperature settings of the water-cooled unit.
4. The liquid-cooled energy storage cabinet meets IP54 protection rating, enabling outdoor operation.

3.5 Technical Parameters of ESS 261kWh

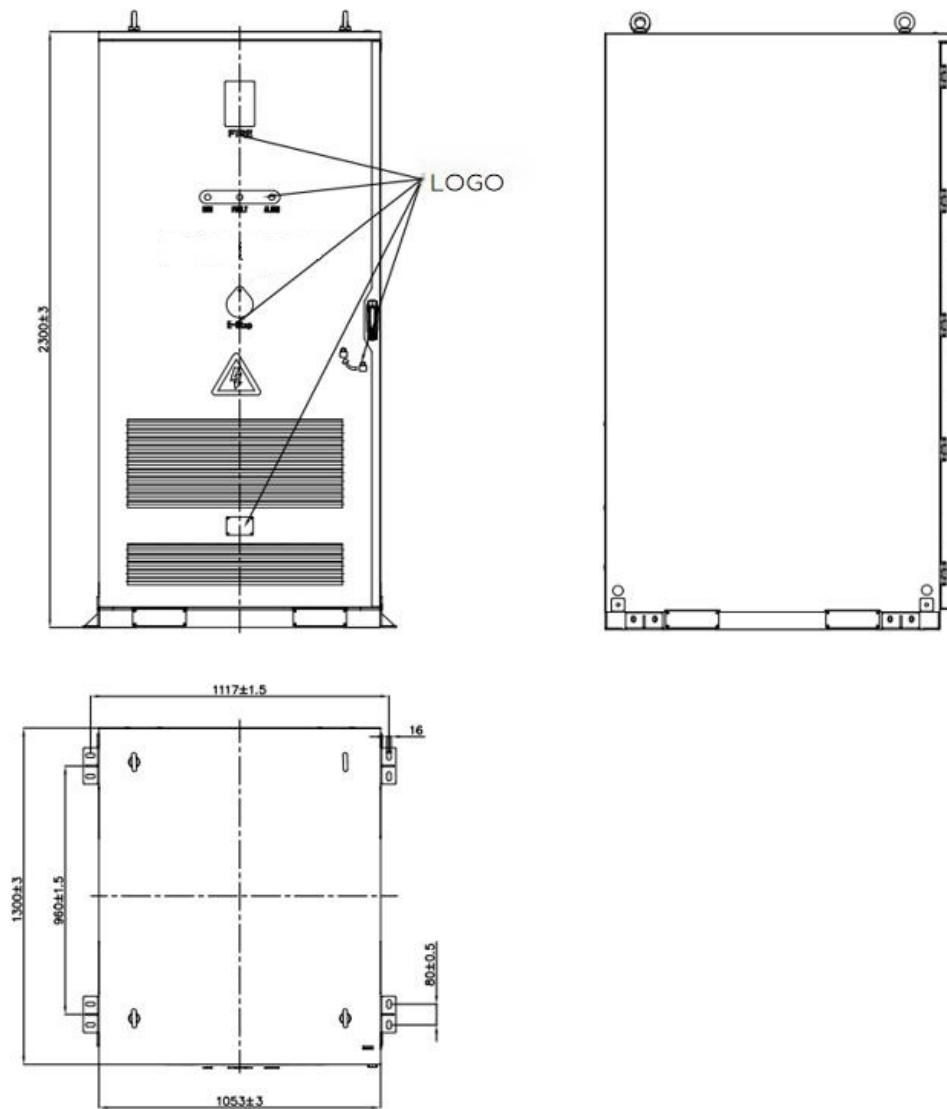
Parameters Table of ESS 261kWh			
number	project	parameter	remarks
Battery parameters			
1	Battery type	Lithium iron phosphate (LFP) prismatic cell	
2	Cell specifications	3.2V/314Ah	
3	Max charge and discharge rate	0.5C	
4	system grouping	1P260S	
5	rated energy	261kWh	
6	rated voltage	832VDC	
7	voltage range	728~936VDC	
8	cooling-down method	liquid cooling	
AC side parameters			
9	rated AC power	125kW	
10	rated voltage	230/400Vac, 3L+N+PE	
11	AC side wiring method	Three-phase four-wire	
12	rated frequency	50/60Hz	
13	total current waveform	<3%	

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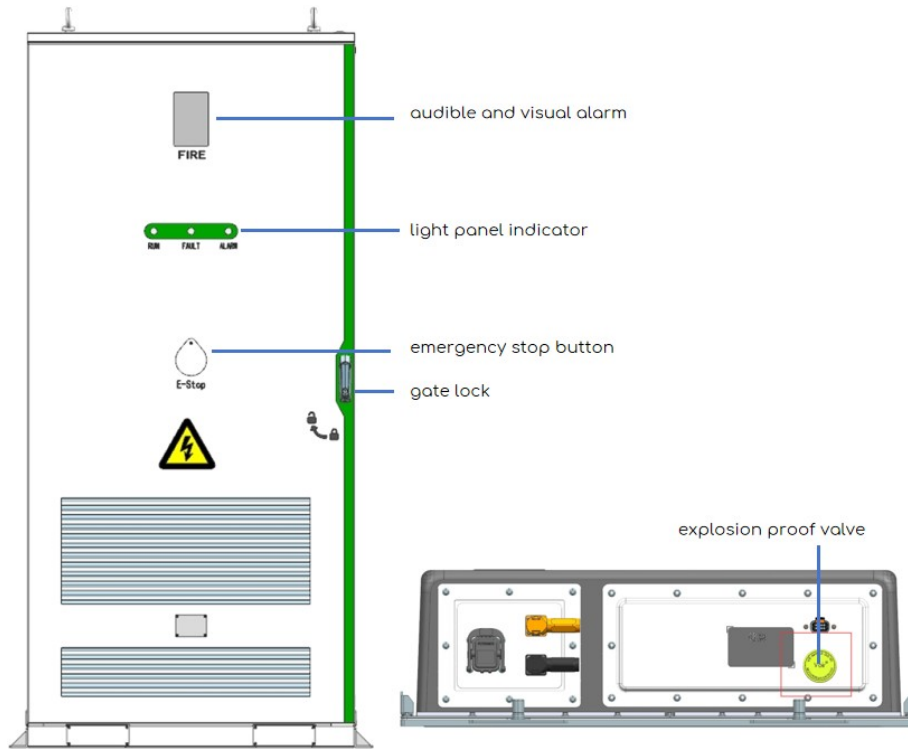
	distortion rate		
14	cooling-down method	intelligent forced air cooling	
system parameter			
15	ambient temperature	-20~55℃	
16	ambient humidity	≤95%RH	no condensation
17	height	≤2000m	
18	levels of protection	IP54	
19	fire extinguisher system	aerosol fire extinguishing device	
20	CI	Ethernet/RS485	
21	corrosion protection grade	C4	
22	Product dimensions (W×D×H)	1055×1300×2300mm	
23	Package dimensions (W×D×H)	1130×1400×2510mm	
24	weight	About 3 tons	Including packaging weight

3.6 ESS 261kWh Composition Description

3.6.1 Product Dimensions

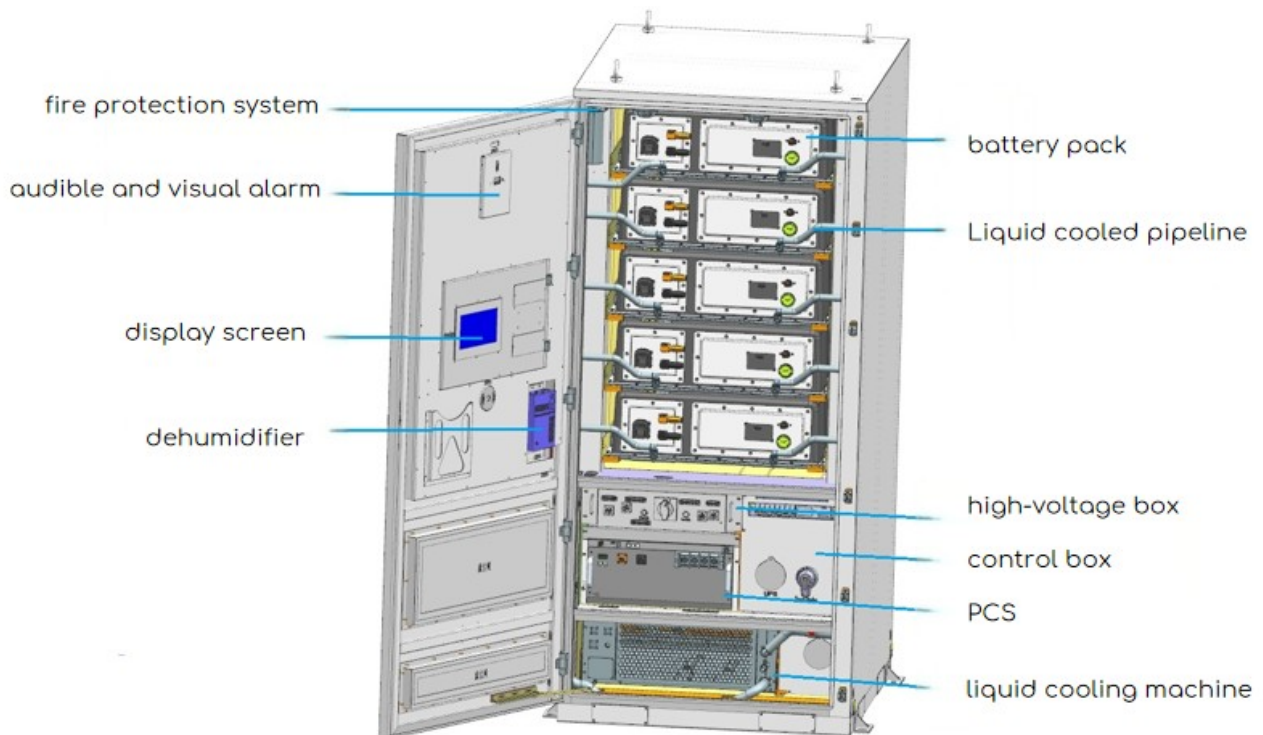


3.6.2 Appearance and Function Introduction

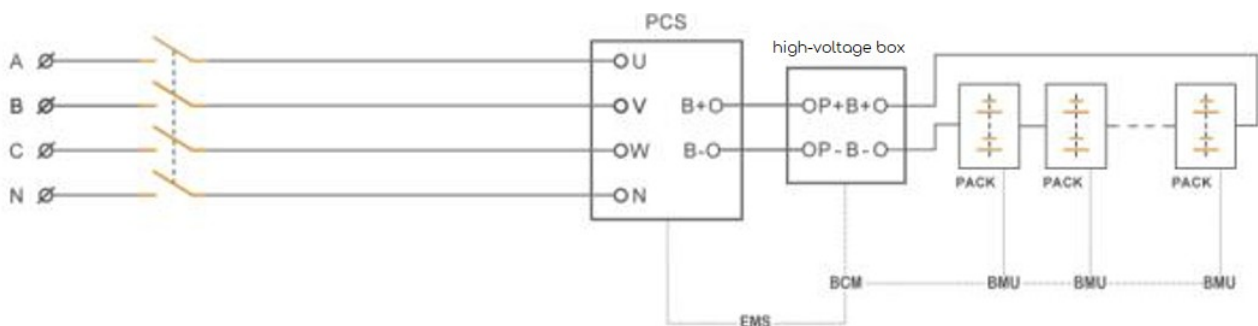


number	name	explain	
1	light panel indicator (Note: Yellow and red lights do not interfere with each other)	● run indicator lamp	Light: AC circuit breaker turn on; Off: AC circuit breaker turn off
		● alarm indicator lamp	Light: BMS alarm, charging/discharging prohibition, or access control alarm; Off: Alarm restored.
		● fault indicator lamp	Light: PCS failure/stop button pressed/water ingress trigger/fire alarm trigger; Off: Fault recovery
2	emergency stop button	Press the button to stop the system when the device is in an abnormal state.	
3	gate lock	Exerting an insurable protective effect	
4	audible and visual alarm	An audio-visual alarm is a device that emits sound and light signals to alert people.alarm signal device	
5	explosion proof valve	Locking measures belonging to hydraulic systems	

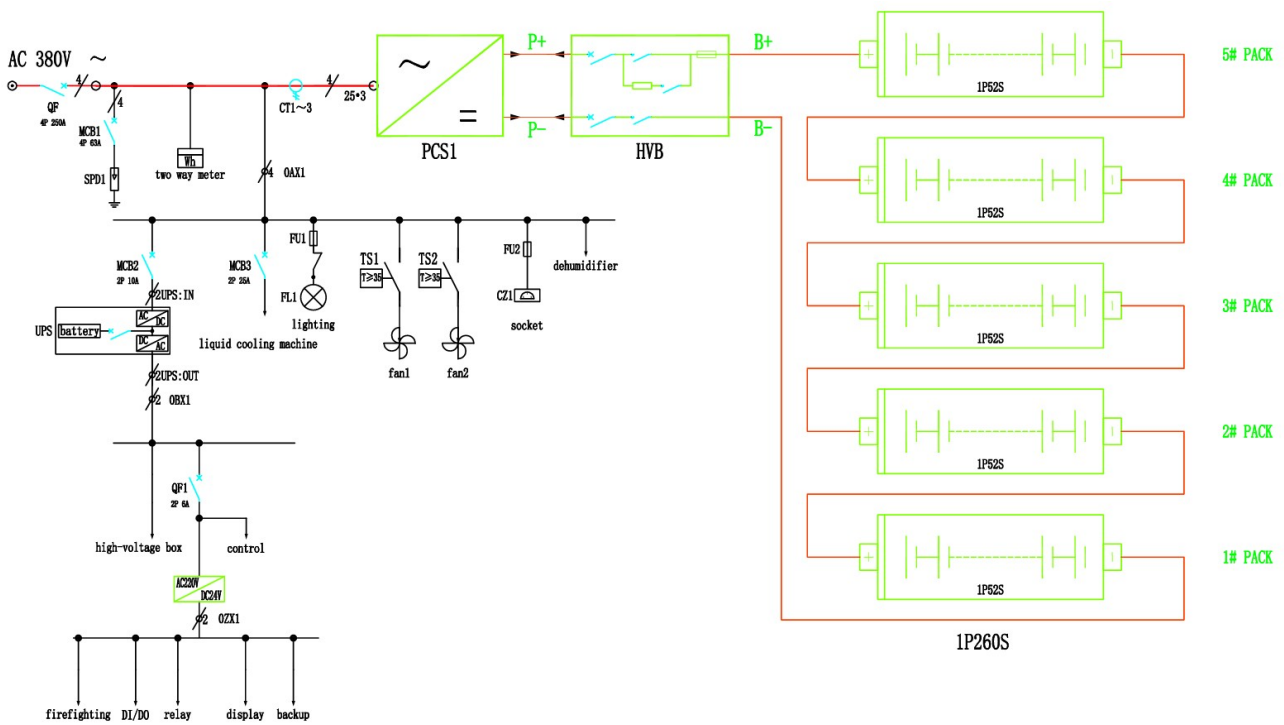
3.6.3 Introduction to Main Internal Components



3.7 Communication Topology Diagram



3.8 Single-line Chart



Wiring switch capacity:

number	Switch name	specifications
1	AC IN/OUT switch 4P 400VAC 250A(3P4W)	4P 400VAC, 250A
2	MCB1 Surge Protector Switch	4P 400VAC, 63A
3	MCB2 UPS switch	2P 400VAC ,10A
4	MCB3 liquid cooling machine switch	2P 400VAC,25A
5	QF1 DC power module switch	2P 400VAC,6A

Select the appropriate cable based on the load size. Single-phase loads should be balanced as much as possible.

4 Hoisting, Transportation and Storage

4.1 Unboxing

1. When opening the box, please note the following points and check if all accessories are included.
2. Avoid applying any impact to the battery during unpacking, as this may cause damage.
3. After opening the box, check for any scratches, deformation, or other abnormalities on the exterior.
4. If any issues are found after opening the box, contact the authorized dealer.
Continued use may cause electrical leakage, fire, or battery damage.



Figure 4-1 Schematic Diagram of Integrated Energy Storage Cabinet Packaging

Product accessories:

name	use	quantity
SC70-10 terminal	For DC wiring	10pcs
SC25-8 terminal	For ground wiring	3pcs
SC120-10 terminal	For AC IN/OUT switch wiring	10pcs
High voltage CAN box		1pcs
Low voltage CAN box		1pcs
Network cable 3m		1pcs
Network cable 5m		1pcs

If the product configuration does not include the DCDC module, the device will not have the accessories listed in the table above.

4.2 Lifting Operations

4.2.1 Precautions for Hoisting



1. Throughout the lifting process, operators must strictly follow the crane's safety operating procedures.
2. No standing within 10 meters of the operation area, especially under the crane boom or moving machinery, to prevent accidents.
3. Operations should be halted in case of adverse weather conditions such as heavy rain, dense fog, or strong winds.

4.2.2 Pre-hoisting Preparation

1. Crane preparation:

The total weight of the equipment (including packaging) is approximately 3 tons. Select the crane's lifting capacity based on the equipment's total weight and site conditions. Recommended capacity: 5–8 tons.

2. Hoisting equipment preparation:

Steel wire rope, unloading buckle, support bar, etc.

4.2.3 Lifting Process

1. When loading or unloading, a crane with appropriate tonnage must be used. For lifting operations, nylon slings or steel cables may be employed.
2. The hoisting process must strictly follow the hoisting diagram, as detailed in the attached Figure 4-2 below.
3. It should be lifted vertically and must not be dragged on the ground or pushed on any surface.
4. When the cabinet is lifted 300mm above the ground, stop moving it temporarily and check the hoisting equipment's connections. Only after confirming the connections are secure should you continue lifting.
5. During the entire lifting process, proceed slowly and monitor the box's balance carefully to avoid excessive speed.
6. During the entire lifting operation, no one is permitted to stand beneath the outdoor cabinet or crane.

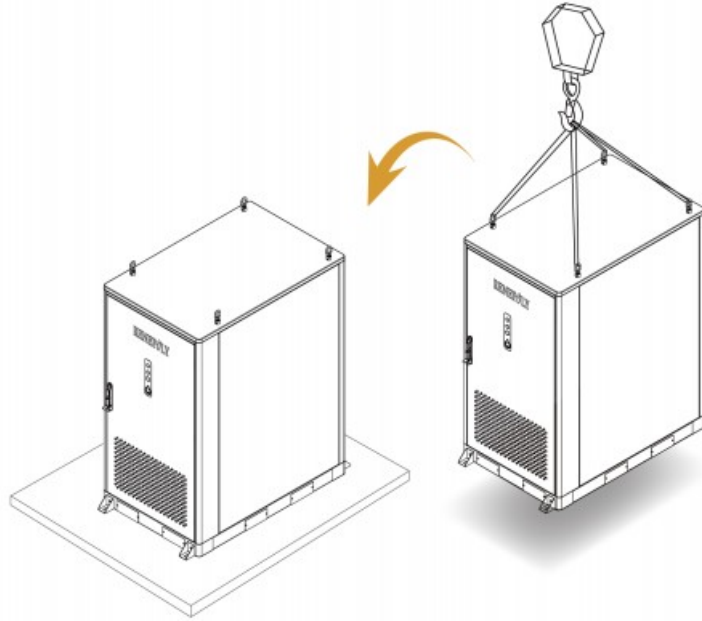


Figure 4-2 Schematic Diagram of Integrated Energy Storage Cabinet Installation

4.3 Forklift Operation



During transportation and handling, always keep the mechanical parameters of the energy storage system in mind: Packaging dimensions (L×W×H): 1130×1400×2510mm
Weight: approximately 3000 kg

The following conditions must be met when using a forklift for forklift lifting operations:

1. The forklifts used must have sufficient load capacity (minimum recommended capacity: 5 tons);
2. The forklift's forks must fully penetrate the depth of the integrated cabinet, with a minimum length of 1500mm. See Figure 4-3 below for the forklift hole schematic.

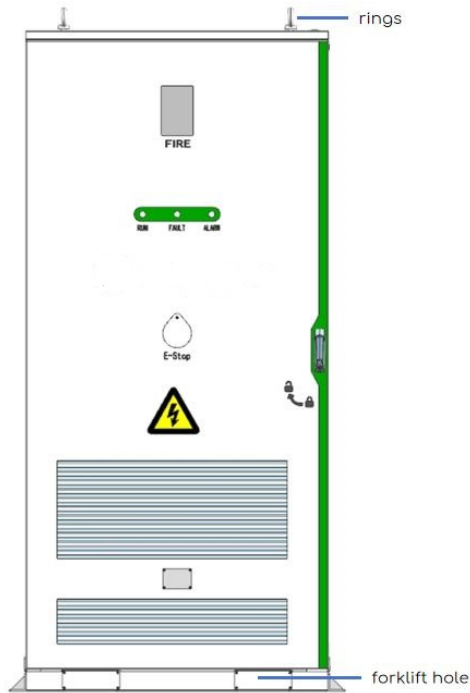


Figure 4-3 Schematic Diagram of Forklift Holes in Integrated Energy Storage Cabinet

3. During the process of lifting, lowering, and moving the fork, ensure it is performed slowly and steadily, and a trial lift must be conducted;
4. Safety considerations should be taken into account during forklift handling. It is recommended to secure a safety harness around the integrated cabinet and connect it to the forklift's crossbeam.

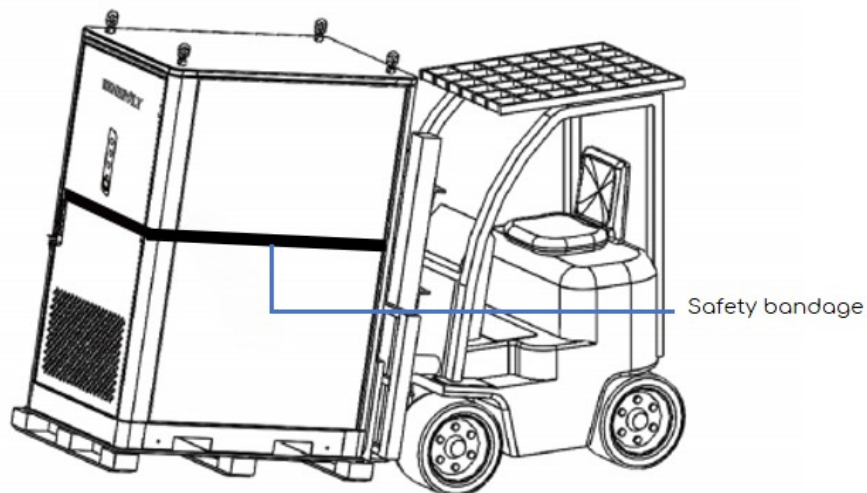


Figure 4-4 Schematic of Forklift Loading for Integrated Energy Storage Cabinet.

For specific forklift operations, please refer to Figure 4-4 above

4.4 Storage

Liquid-cooled energy storage battery cabinets should be stored in a dry warehouse, protected from direct sunlight and rain. The warehouse must be free of toxic gases, flammable or explosive materials, and corrosive chemicals. Avoid mechanical impact, heavy pressure, and strong magnetic fields. Direct sunlight exposure should be prevented. The cabinet must be at least 2 meters away from heat sources and 50 centimeters from walls, windows, or air inlets.

number	project	parameter
1	daily average storage temperature	$\leq 20^{\circ}\text{C}$
2	allowed storage temperature	Storage temperature range: -20 to 55°C
		Recommended storage temperature: 5°C to 45°C
3	storage humidity	$\leq 95\%$, no condensation

Under these specified conditions:

It is recommended to perform a battery discharge and recharge every three months to maintain the state of charge (SOC) within the 30%-50% range. Additionally, a capacity verification test and re-inspection should be conducted every twelve months.



The manufacturer/seller shall not be liable for any system damage caused by users failing to comply with the storage methods and requirements specified in this manual during the storage of the energy storage system.

5 Equipment Installation

5.1 Installation Notes



The integrated energy storage battery cabinet is a high-voltage energy storage device classified as hazardous material. Improper operation or use by non-professionals may lead to severe consequences such as electric shock, combustion, or explosion. Installation and maintenance of the integrated energy storage battery cabinet must be performed by qualified technical personnel, and strict adherence to relevant safety regulations is mandatory during operation.



1. When lifting the cabinet to the floor, ensure it does not touch the workers.
2. A dedicated installation isolation zone must be established when performing installation operations.
3. During hoisting, handle the integrated cabinet with care.
4. Installation must be performed exclusively by personnel trained in high-voltage electrical work.
5. Do not install the integrated cabinet if it has defects, cracks, or damage.
6. During installation, do not attempt to open, disassemble, repair, tamper with, or modify the integrated cabinet.
7. Do not install under adverse weather conditions such as rain or dust storms.
8. To protect the integrated cabinet and its components from damage during transportation, please handle with caution; Do not collide, pull, drag or step on the integrated cabinet. Do not subject the integrated cabinet to any strong external force.
9. Do not insert foreign objects into any part of the integrated cabinet;
10. Do not expose the integrated cabinet or its components directly to flames.
11. Do not install integrated cabinets near heating equipment;
12. Do not immerse the integrated cabinet or its components in water or other liquids;
13. Place the integrated cabinet on a level surface, ensuring it is stable, free from shaking or tilting.

	14. The installation of energy storage systems must consider the load-bearing capacity of the installation ground.
--	--

The internal equipment of the energy storage system has undergone reliable connection and testing before leaving the factory. On-site, the installation and fixation of the integrated cabinet, as well as the connection of external communication and auxiliary power supply cables, are required.

The installation procedure for energy storage systems is detailed in the table below:

Installation Process	description
Check before installation	1. Inspect the cabinet for any visible damage; 2. Inspect the integrated cabinet for any damaged or detached components; 3. Verify that all components are intact and not missing; 4. Verify that the installation environment meets the requirements. 5. Verify if the project site has the necessary equipment for installation.
Structural installation	1. Use a crane to hoist the integrated cabinet onto the precast foundation; 2. Install the integrated cabinet according to project specifications.
electrical connection	1. Connect to the grounding point; 2. Connect the communication and signal cables between the integrated cabinet and the host. 3. Power cables connecting the master and slave units of the integrated cabinet to the user; 4. The communication cable connecting the main unit of the integrated cabinet to the user

5.2 Pre-installation Preparation

5.2.1 Installation Environment Requirements

The installation environment for energy storage systems must meet the following requirements:

project	Environmental Requirements
Installation site requirements	1. Areas with good outdoor ventilation and high airflow 2. The air intake and exhaust ports must be equipped with professional rainproof, windproof, and dustproof treatments. 3. Necessary fireproofing, waterproofing, and rodent-proofing measures 4. Surface slope $\leq 1^\circ$, seismic resistance > 8 degrees
Foundation requirements	1. The installation surface must be flat and dry, with no standing water allowed on the ground. 2. Ensure the ground remains level and stable to support the weight of the energy storage equipment.
space requirement	Adequate space must be left in front, behind, left, right, and above the equipment for ventilation, maintenance, and evacuation
ambient temperature	$-20^\circ\text{C} \sim +55^\circ\text{C}$
relative humidity	$\leq 95\%$, no condensation
altitude	$\leq 2000\text{m}$

5.2.2 Installation Site Requirements

Energy storage equipment must be installed on concrete or other non-combustible surfaces, ensuring the installation plane is level, secure, and flat with sufficient load-bearing capacity. Protrusions or tilts are strictly prohibited.

When constructing the foundation, the equipment's wiring needs to be considered, and a trench or other wiring holes should be reserved.

The equipment employs a bottom-outlet configuration, requiring cabling through a dedicated trench. Therefore, a trench must be pre-installed on-site. The trench must meet the following requirements:

1. The trench must incorporate proper waterproofing and moisture-proofing measures to prevent cable aging and short circuits, which could compromise the normal operation of energy storage systems.
2. Given the high power consumption of the equipment, thicker cables are required, and the cable cross-sectional area must be fully considered during trench design.
3. Customers may customize the number of cable supports according to their requirements, with full consideration given to the equipment's weight and dimensions.
4. When laying cables, communication lines, power lines, and power supply lines must be installed separately. DC circuits and AC circuits should be installed separately, with a minimum distance of 300mm between different cables.
5. The installation site should have a dry climate, good ventilation, and be located away from Class A workshops or flammable and explosive areas.
6. The foundation soil must maintain adequate compaction. The recommended relative compaction of the installation site soil should be $\geq 98\%$. If the soil is loose, appropriate measures must be taken to ensure foundation stability

5.2.3 Equipment Ventilation Requirements

The operation of energy storage devices may cause temperature rise, which can affect their electrical parameters and potentially damage the equipment. To ensure proper heat dissipation, the installation environment must meet the following requirements:

	The equipment should be installed in a well-ventilated environment. The air inlet must ensure sufficient fresh air intake. The ventilation system of the equipment should be isolated from other ventilation systems in the control room. If overheating is detected, ensure proper airflow through the ventilation outlets.
---	---

The integrated energy storage battery cabinet features a front-inlet and rear-outlet design, with the air intake and exhaust ports positioned as shown in the figure below.

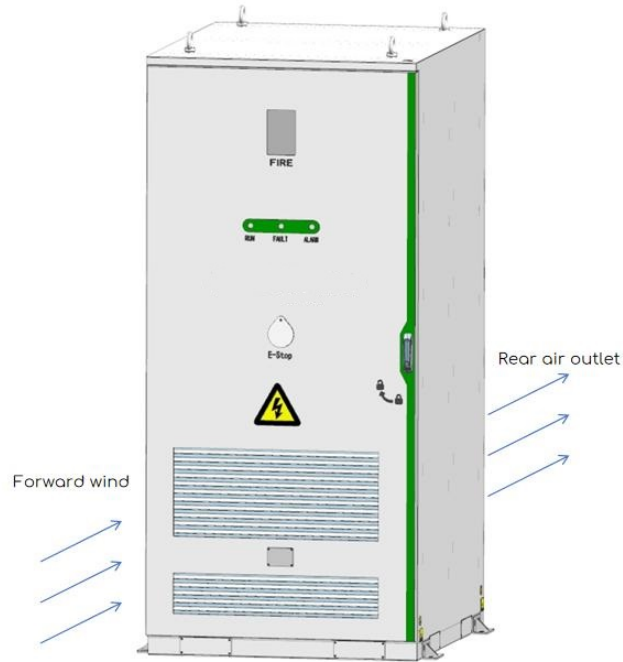


Figure 5-1 Schematic of Air Outlet in Integrated Energy Storage Cabinet

5.2.4 Preparation of Installation Tools

tool	quantity	direction for use
forklift	1 vehicle	For indoor and outdoor handling. Load capacity greater than 5t, fork length greater than 1500mm, center-to-center distance of forks greater than 600mm
crane	1 unit	The load capacity ranges from 5 to 8 tons.
bandage	8m	Flexible straps, steel cables, or binding straps for crane transportation
Sleeve and wrench	1 set	For fixed use, the maximum torque must exceed 70 N·m

5.2.5 Space Requirements for Installation Site Maintenance

Considering the spatial requirements for the integrated energy storage battery cabinet, the front door must provide at least 1m of maintenance clearance (2.5m recommended for forklift-based PACK replacement), with minimum 0.1m clearance on the left and sufficient space on the right.

The cabinet rear door must maintain a minimum clearance of 0.5m, with a maintenance space requirement of no less than 0.8m. The exact installation distance shall comply with local design and installation specifications.

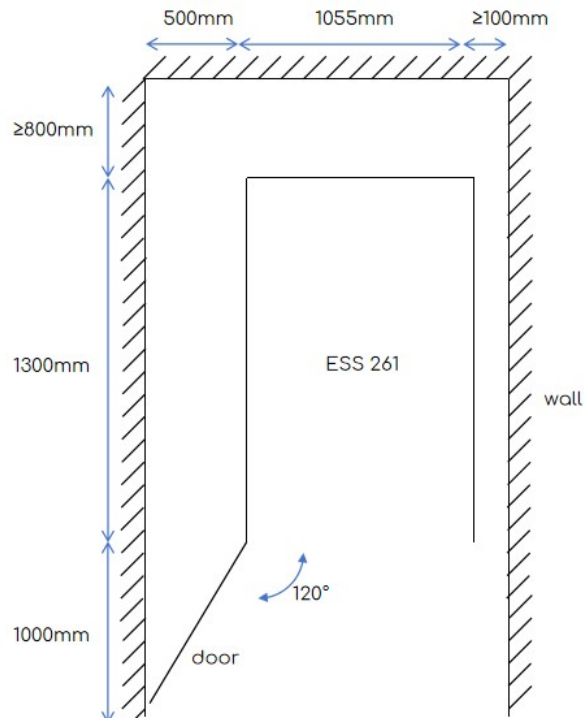


Figure 5-2 Schematic diagram of installation and maintenance space for energy

storage battery integrated cabinet

number	inspection items
1	Check the packaging box for any missing, damaged, or damp items.
2	After unpacking, please check that there are no abnormalities such as deformation, paint peeling, or cracking on the outer shells of each module, and that there are no water stains inside the shells.
3	Please check the internal accessories of the packaging box and count the items according to the list to ensure completeness (optional accessories).

5.3 Installation of Energy Storage System Structure

5.3.1 Removable Installation

As shown in the figure below, place the machine on a flat and sufficiently supported cement platform, and feed the wire into the forklift on the side of the machine.

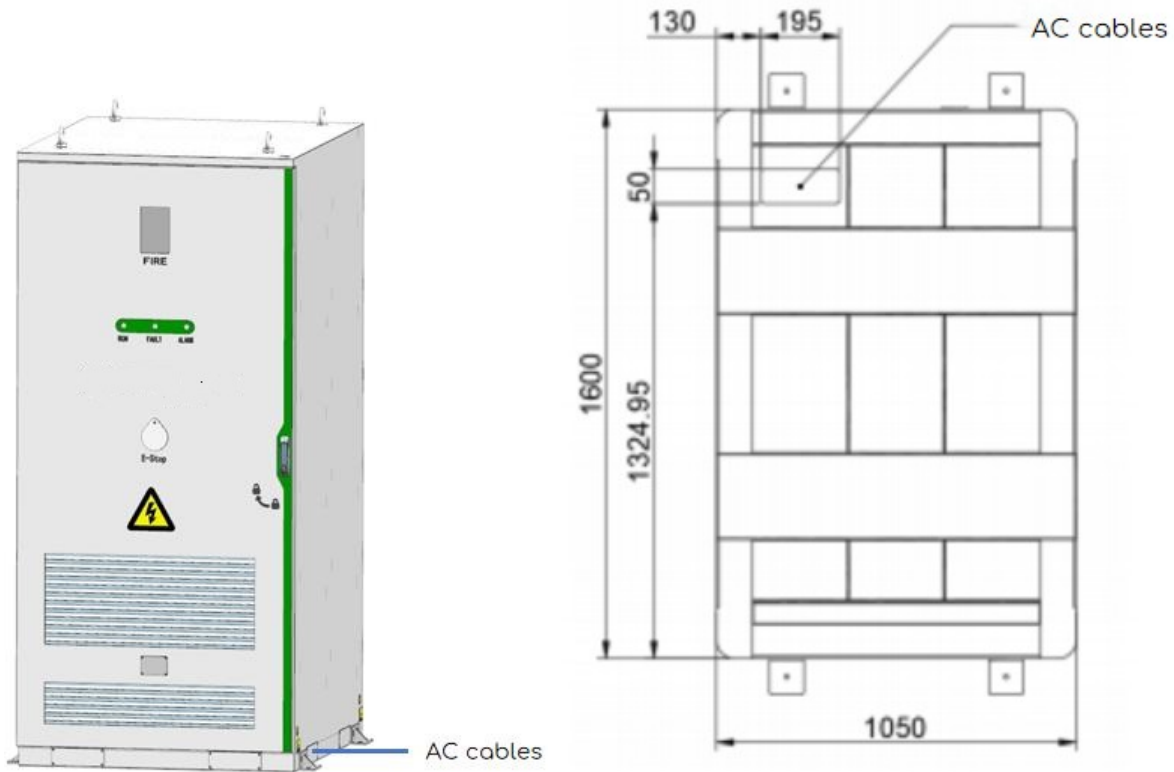


Figure 5-3 Schematic diagram of installation line inlet for energy storage integrated cabinet

5.3.2 Customized Installation

After the energy storage system is lifted, use M12 (recommended torque: 40N·m) bolts to fix the integrated cabinet base according to project requirements. As shown in the following figure:

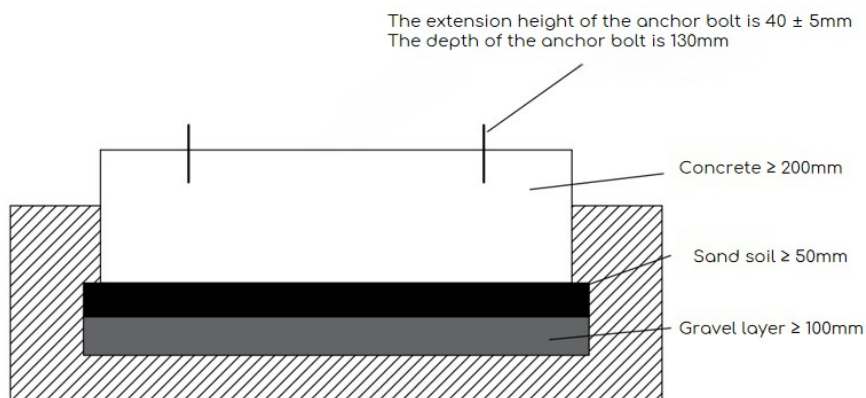


Figure 5-4 Schematic diagram of pile driving for installation of energy storage integrated cabinet (subject to the actual situation of the project)

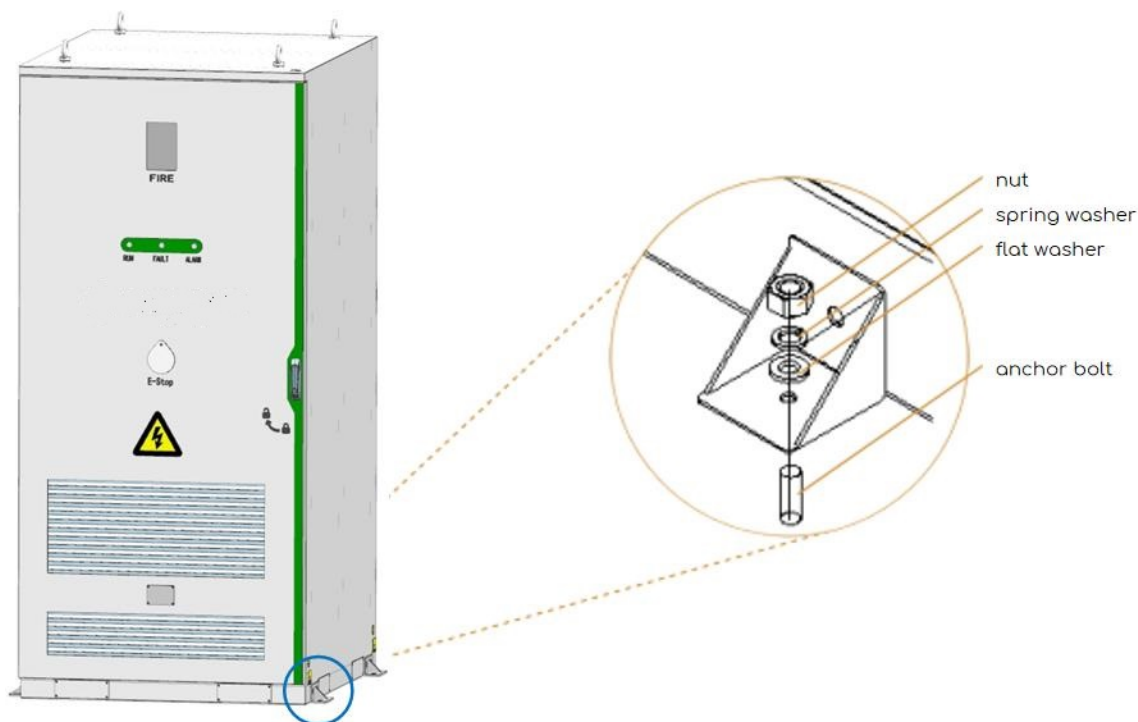


Figure 5-5 Schematic diagram of installation and fixation of energy storage integrated cabinet (subject to the actual situation of the project)

5.3.3 Installation Inspection

number	inspection item	treatment measure
1	Is the fastener tightened?	If the screw is loose, tighten it again.
2	Does the space meet the installation size requirements?	If space is insufficient, redesign and reinstall
3	Whether the air duct is unobstructed and free of foreign objects	Remove any foreign bodies if present. If obstruction persists, identify and resolve the cause.

5.3.4 Preparation of Installation Tools

Number	Tool name	Tool
1	insulating gloves	
2	eye shield	

3	Insulated shoes	
4	breathing mask	
5	hydraulic wrench	
6	bolt driver	
7	connection cover cutting pliers	
8	diagonal pliers	
9	churn drill	
10	torque spanner	
11	ruler	
12	band tape	
13	marker pen	

5.4 Electrical Connection of Energy Storage System

The internal wiring of the energy storage integrated cabinet is fully completed by professional electrical engineers before shipment, requiring users only to connect the inter-cabinet cables and external wiring.

5.4.1 Interface and Switch Specifications for Integrated Energy Storage Cabinet

The interface position and name, switch position and name of the energy storage cabinet are introduced as follows

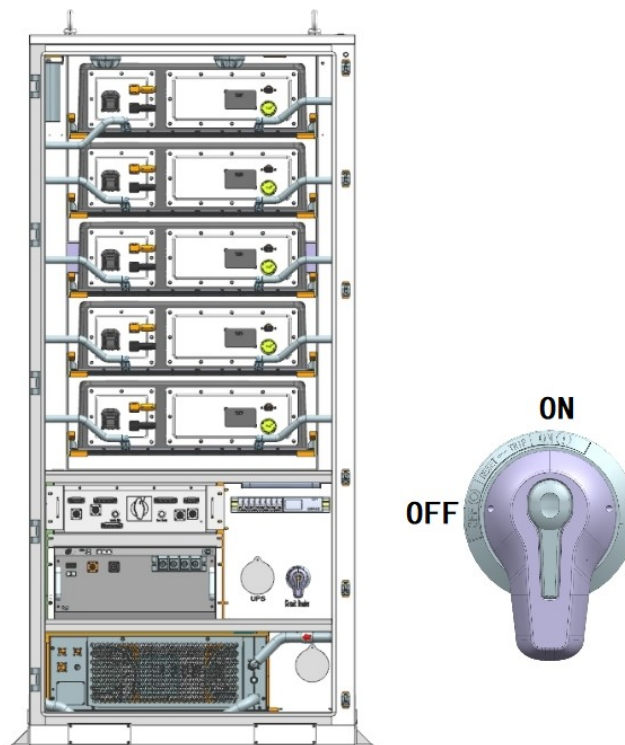


Figure 5-6 Schematic Diagram of Main Switch for Integrated Energy Storage Cabinet Distribution Panel

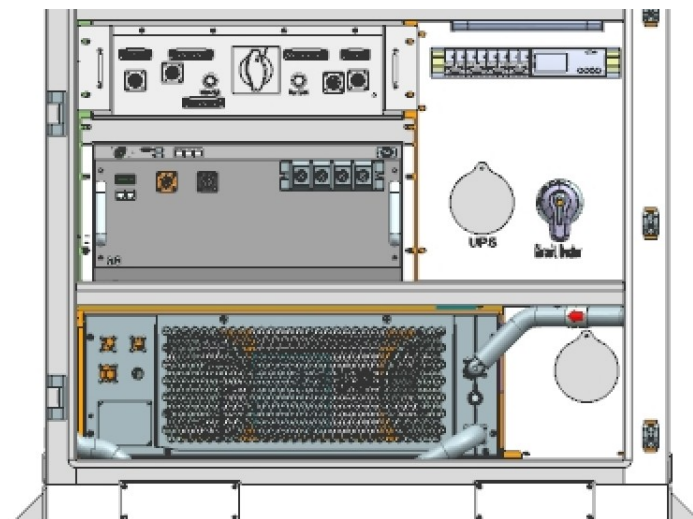


Figure 5-7 Schematic Diagram of Integrated Energy Storage Cabinet, Distribution Cabinet, and High Voltage Box



High Voltage Box (HVB)



PCS

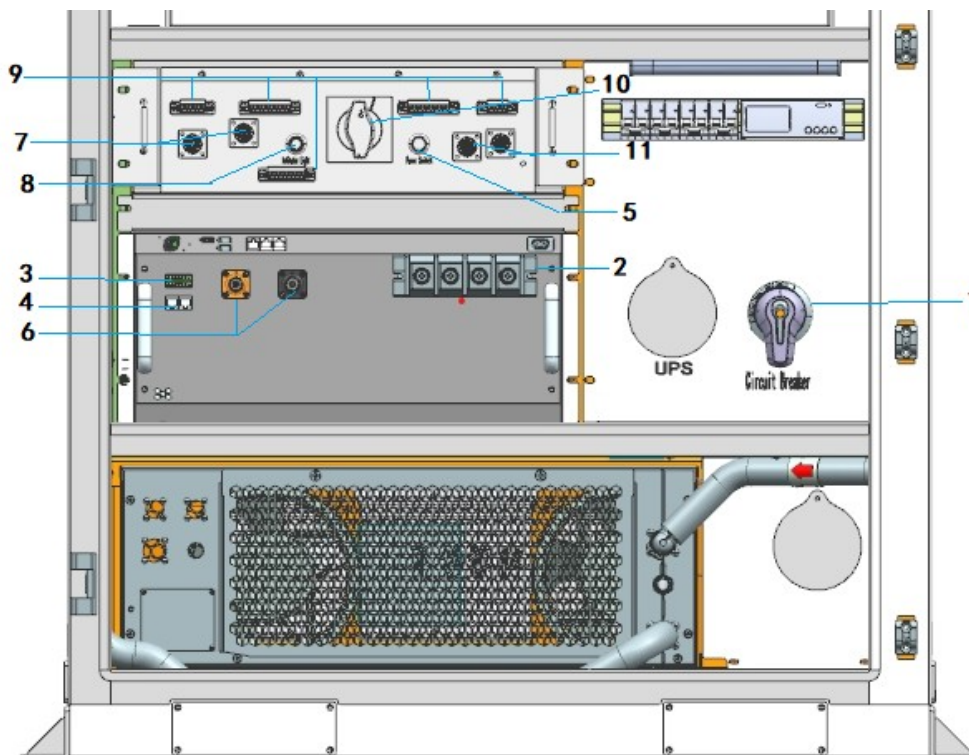


Figure 5-8 Schematic Diagram of Key Interfaces in Integrated Energy Storage Cabinet

number	name	function
1	AC side circuit breaker master switch	Control the on-off of AC circuit breaker
2	AC interface	AC termination cable
3	power grid current sampling interface	A/B/C three-phase current sampling interface (125kW device reserved)
4	power grid voltage sampling interface	A/B/C/N grid voltage sampling interface (125kW equipment reserved)
5	Push-button switch	Control the startup of the high-voltage box
6	DC aviation interface	DC terminal wiring
7	P+/P-	Pcs input
8	Power light	Power light
9	com	P+,P-/CANL,CANH/DIH/SW/RS485A,RS485B/DEBUG
10	DC side main switch	high voltage box isolating switch
11	B+/B-	Battery cluster input positive and negative poles

5.4.2 PCS and High-Voltage Box Circuit Connections

The schematic diagram of the external interfaces of the energy storage integrated cabinet PCS and high-voltage box is shown below. Users can connect the lines according to the diagram.

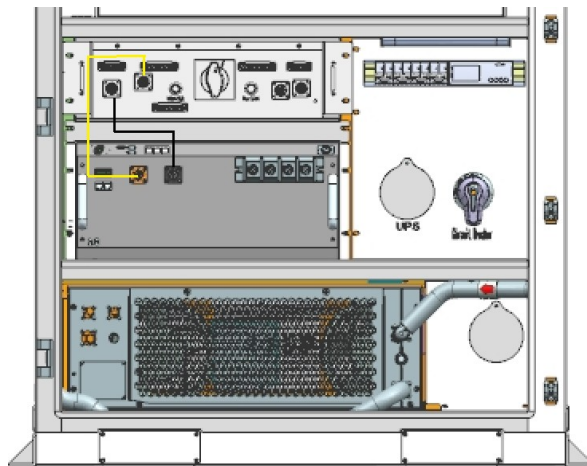
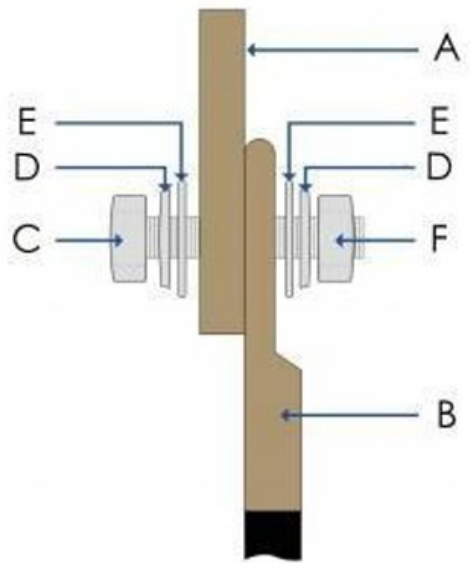


Figure 5-9 Schematic Diagram of External Wiring for PCS and High-Voltage Box

5.4.3 External Communication Cable Connection and Procedures

The recommended terminal types for AC cables and grounding wires are listed in the table below:

number	project	description
1	AC cable wiring	For 4×70+35 power cables running through the cabinet base to connect with the AC terminal block, neutral copper busbar, and ground busbar of either the main or slave unit in the liquid-cooled energy storage battery integrated cabinet, use five M10×25 combination screws (performance grade 8.8) to secure both the terminal blocks and copper busbars. Tighten with a 17mm socket wrench, applying a recommended torque of 40N·m.
2	Terminal block model	Copper tube terminal: Wire diameter 70, M10 fixing hole Copper tube terminal: Wire diameter 35, M10 fixing hole



A	B	C	D	E	F
Copper plate	copper terminal	nut bolt	spring gasket	flat gasket	nut

5.4.4 Connection of Ground Wire

1. The cables are provided by the customer. Please use appropriate cables in accordance with local regulations.

2. When installing equipment that requires grounding, the protective grounding wire must be installed first; when disassembling the equipment, the protective grounding wire must be removed last.
3. Do not damage the grounding conductor.
4. Before wiring, ensure all switches are turned off.
5. Do not operate the equipment without grounding.
6. Before operating the equipment, check its electrical connections to ensure reliable grounding.
7. Do not operate or work with wet hands.

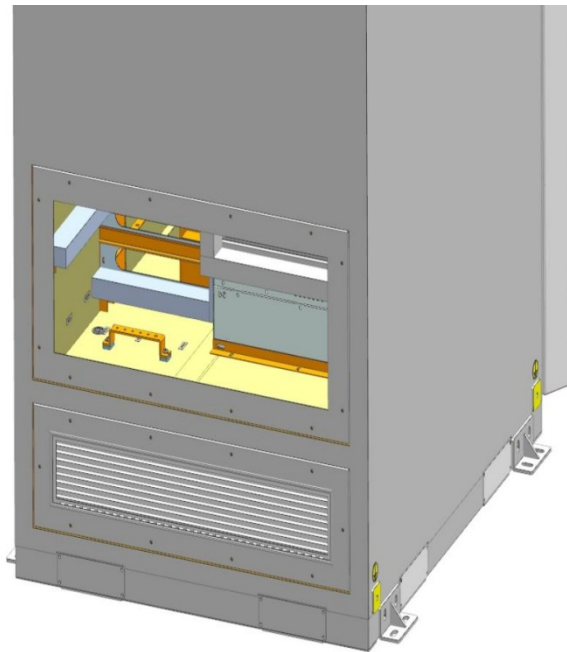


Figure 5-10 Schematic diagram of copper grounding plate connection

5.4.5 Position of the Inlet and Cable Crossing

As shown in the top view below, the inlet is located directly beneath the distribution box.

To install the incoming cable, first unscrew the cover plate screw on the right side of the cabinet. Insert the cable through the cover plate, then connect it upward from the bottom cable inlet to the ABCN terminal block.

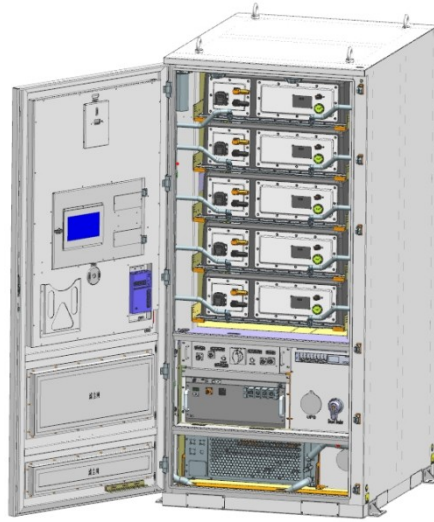


Figure 5-11 Schematic diagram of side cover plate position

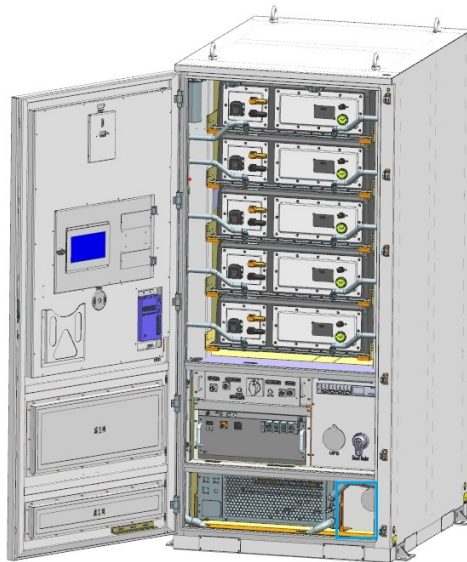


Figure 5-12 Schematic diagram of the bottom inlet position

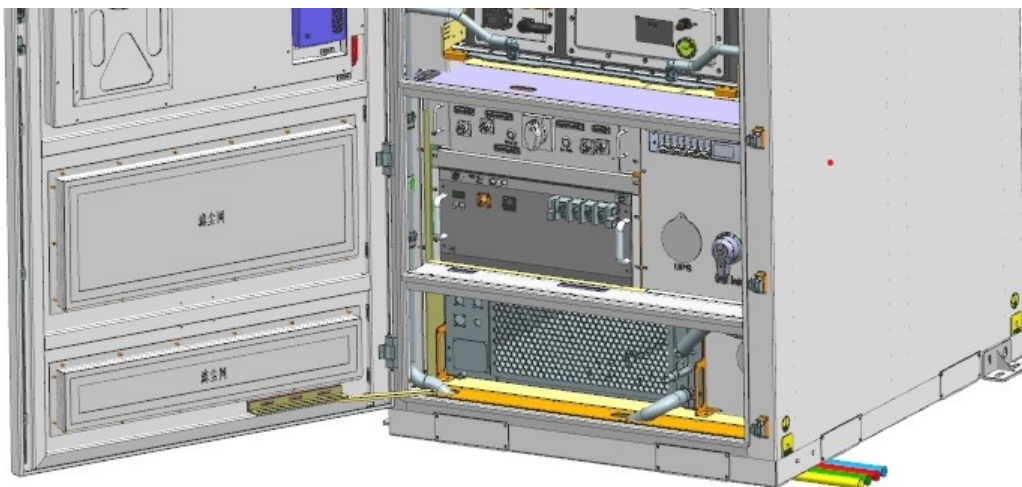


Figure 5-13 Schematic diagram of AC-side cable threading

5.4.6 AC Input and Output Line Connections

- Before wiring, ensure all switches are set to OFF.
- Do not operate or work with wet hands.

Remove 6 screws from the distribution cabinet

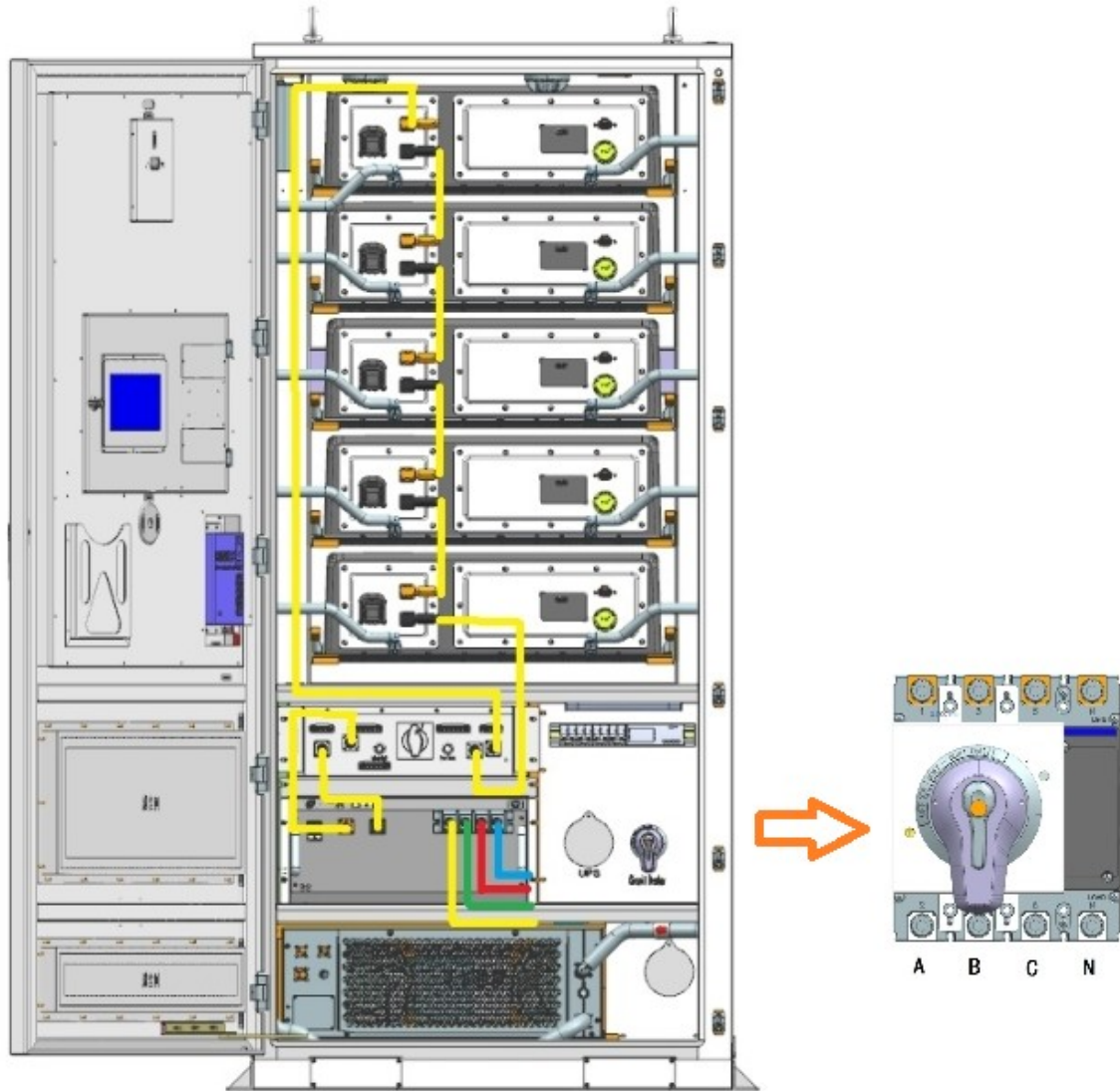


Figure 5-14 Schematic Diagram of Distribution Cabinet Door Panel Removal and AC Input/Output Cable Connection

5.4.7 Wiring Procedures for AC and Grounding Cables

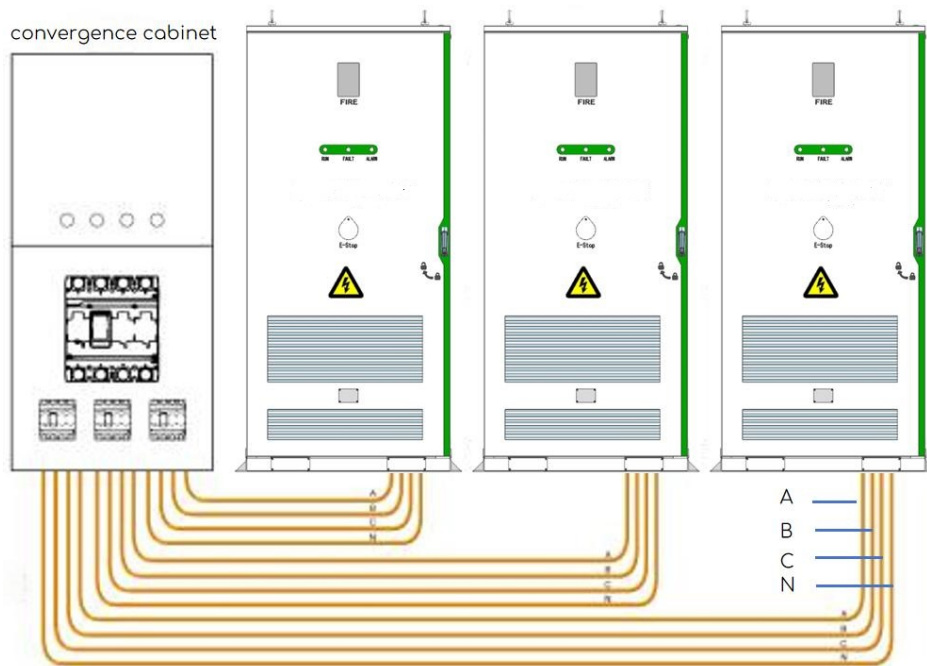


Figure 5-15 Schematic diagram of wiring for multiple parallel machines

1. Ensure all output switches in the front and rear sections of the integrated energy storage battery cabinet and high-voltage distribution box are in the open position.
2. Strip the insulation from the cable end. The length to be removed should be approximately 5mm beyond the depth of the wire crimping hole on the copper connector.
3. Select appropriate copper crimping connectors for crimping according to the chosen cable specifications.
 - (1) Insert the exposed copper core portion of the stripped wire end into the crimping hole of the copper connector.
 - (2) Secure the copper wire connectors using a terminal crimping machine, with at least two crimping steps.
4. Install the heat-shrink sleeve.
 - (1) Select a heat-shrink sleeve matching the cable dimensions, with its length extending approximately 2 cm beyond the copper connector's crimping tube.
 - (2) Fit the heat-shrink sleeve over the copper terminal pin, ensuring full coverage of the pin's crimping hole.
 - (3) Heat the heat-shrink sleeve with a heat gun to achieve thermal shrinkage.

5. Select screws, spring washers, flat washers, and nuts that match the copper nose connectors, and connect them to the copper busbars of the junction box or grid-connected cabinet, securing them with a recommended torque of 40N·m.

5.4.8 Inspection after Equipment Wiring

After installation, to prevent equipment damage and property loss, the following items must be re-inspected and measured.

number	inspection item
1	Before measurement, disconnect the battery-side and grid-side switches to ensure the DC and AC sides of the energy storage device are de-energized.
2	Ensure the correct polarity connection between the battery and energy storage device, with proper AC phase sequence and secure fastening. Measure the three-phase resistance, which should be in the megohm range. If it is in the kilohm range or lower, inspect the wiring.
3	The external control cable, grounding wire and communication cable have been fastened.
4	The grounding wire resistance is less than 0.1Ω , and the cable is intact without damage or cracks.
5	Clean the installation area to ensure no tools or foreign objects are left behind.
6	Fireproof sealant blocks cable gaps to prevent small animals from entering.

6 Product Operation

6.1 Power-on Procedure for Energy Storage System

6.1.1 Pre-power-on Inspection

1. Check whether the circuit breaker in the electrical compartment of the integrated energy storage battery cabinet is open.
2. Check the battery packs and their connection to the high-voltage box's power cables for reliability.
3. Check whether all communication and power supply cable connectors are securely connected.
4. Check whether the communication, power supply harness, and power cables on the high-voltage box panel are properly connected.
5. Check all network cable connections in the energy storage battery integrated cabinet and the three-level display control system for any issues.

6.1.2 Power-up Procedure

1. Turn on the AC circuit breaker QF of the equipment, measure and confirm that the voltage between the input and output terminals is 380V. The PCS indicator illuminates green for normal operation.
2. Turn on MCB1.
3. Turn on MCB2; long-press the UPS power button to power on.
4. Turn on MCB3; the water chiller operates normally.
5. Turn on QF1
6. Turn on QS of the high-voltage box, turn on the DC disconnect switch with operating handle of the high-voltage box, and press the power switch of the high-voltage box. The green indicator of the high-voltage box power switch is on; the main positive and main negative circulating current relays will engage after a few seconds.
7. Observe the status of the indicator lamp on the cabinet. A green illuminated light indicates that the cabinet is energized.
8. Observe the display and control screen, and confirm that BMS communication, EMS communication and water chiller communication are in normal status.
9. Send charge and discharge commands to the battery via the display and control screen. The battery charges and discharges normally. The PCS interface on the display and control screen shall properly display the battery charge/discharge

power and power curve. Verify that all parameters on the EMS interface are correct, which indicates the completion of system power-on.

Number	Breaker	Application	remark
1	QF	AC circuit breaker	
2	MCB1	Surge Protective Device(SPD) breaker	Behind the ESS 261kWh
3	MCB2	Uninterruptible Power Supply(UPS) breaker	UPS
4	MCB3	liquid cooling machine breaker	Liquid Cooling
5	QF1	AC to DC power module breaker	ACDC
 Before closing the internal switch for the energy storage system's auxiliary power supply, verify that the AC auxiliary voltage is within the standard range (220V±10%).			

Three phase AC power cables

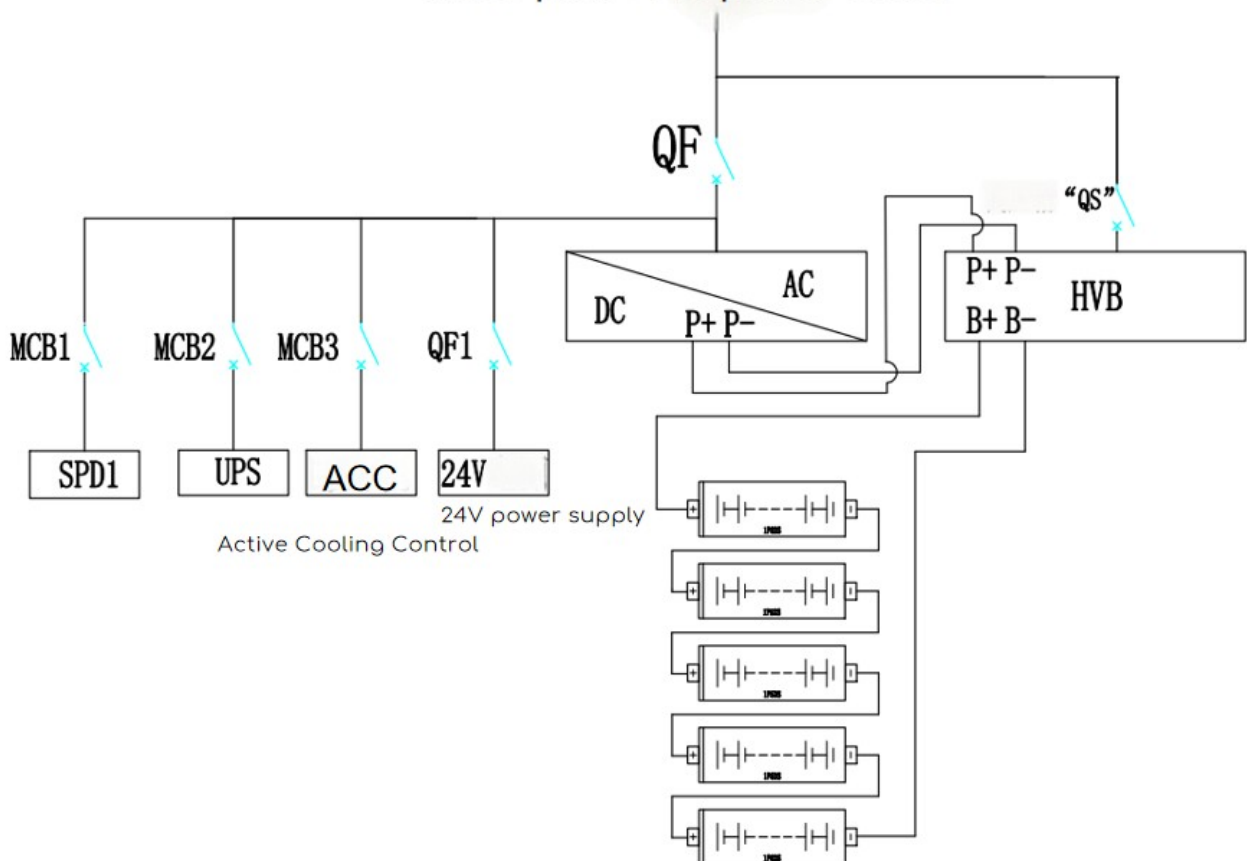


Figure 6-1 Schematic diagram of power on process for integrated energy storage cabinet

6.2 Normal Shutdown Procedure

The steps are as follows:

When the 'stop' command is issued through the control mode of the ESSCU, the AC/DC side switches of the energy storage device automatically disconnect, halting the system's operation.

When the energy storage device operates in external power mode, disconnect all circuit breakers and external power sources.



Before removing the protective baffle, ensure the energy storage device is fully de-energized (after PCS power-off, allow at least 5 minutes of static rest).

Under normal conditions, shut down the energy storage device using the standard shutdown procedure.

In emergency situations, emergency shutdown must be activated to ensure rapid response and protect energy storage systems and peripheral devices.

6.3 Emergency Shutdown Procedures

In case of an emergency, follow these steps:

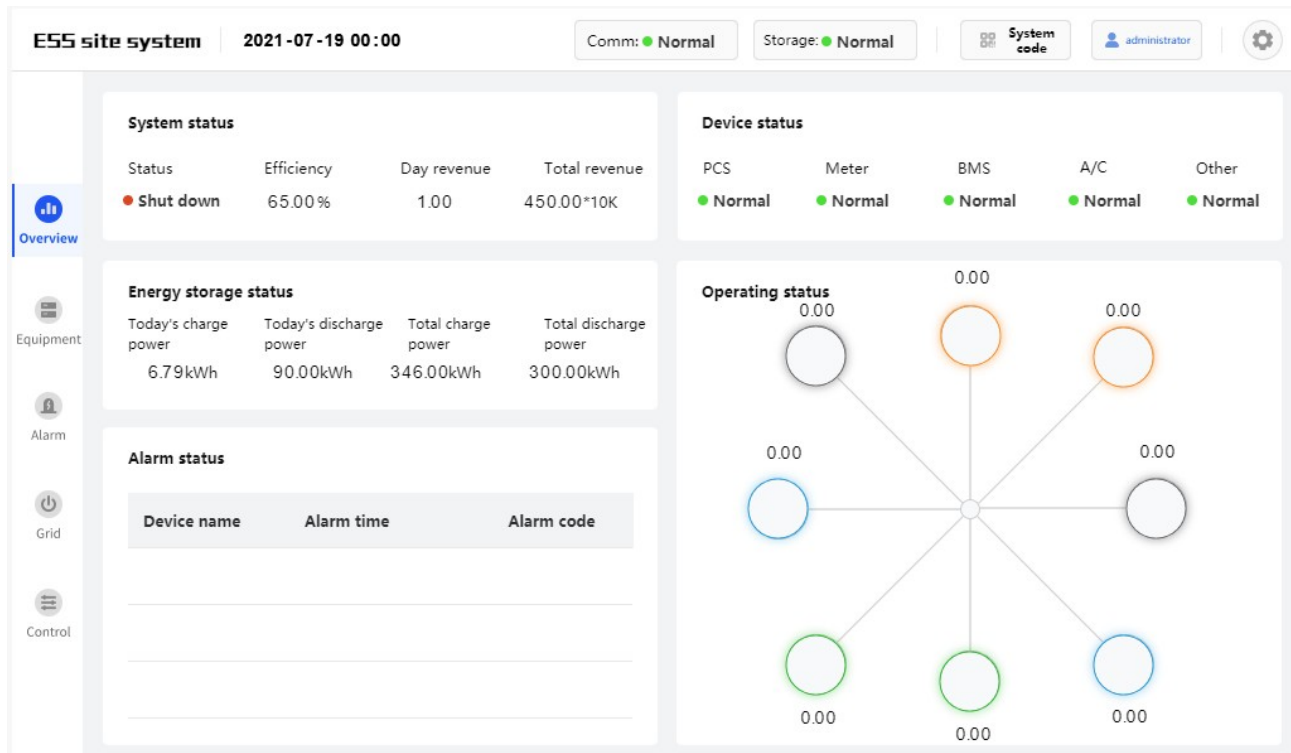
1. Press the emergency stop switch on the cabinet door to automatically disconnect the AC/DC side switches of the energy storage device, halting the system's operation.
2. When the energy storage device operates in external power mode, disconnect all circuit breakers and external power sources.



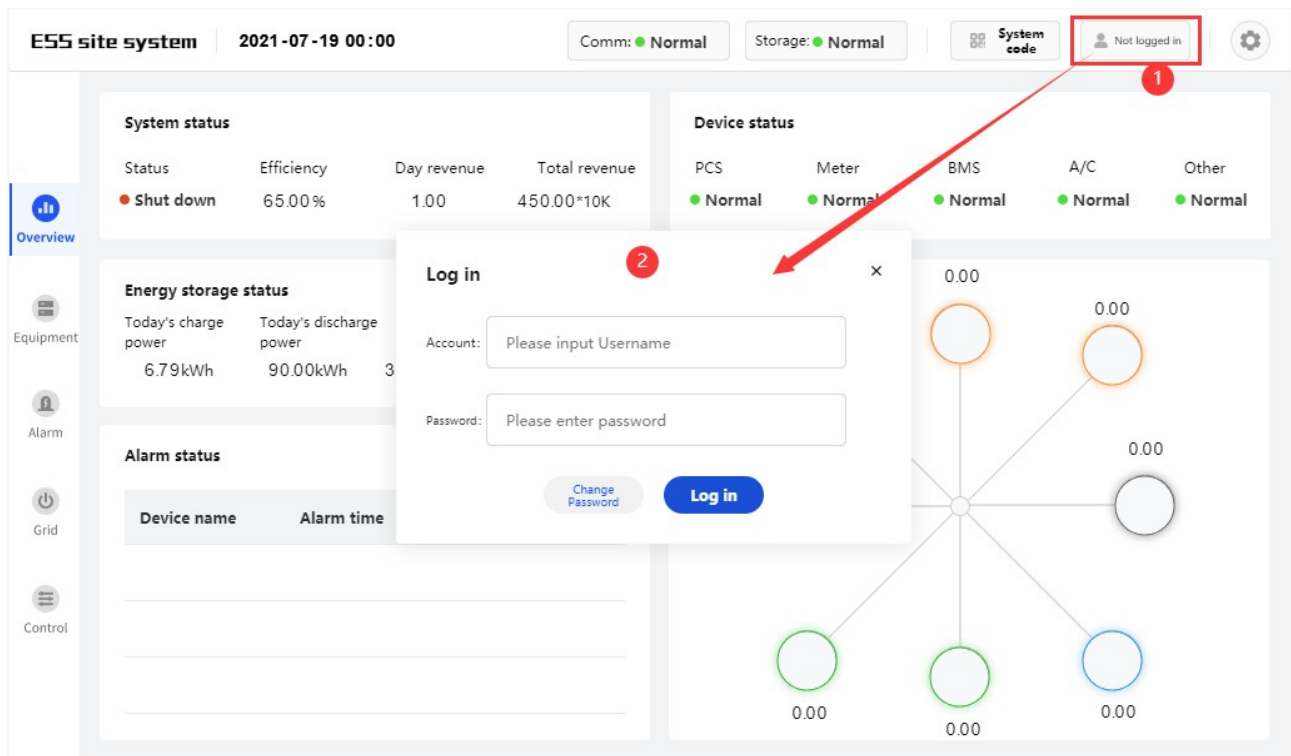
Warning signs must be installed at the switch disconnection points to prevent accidental power activation and protect personal and property safety. When the energy storage system is reactivated, ensure all related equipment faults have been resolved.

6.4 Display Screen Interface and Operation

System Overview



User login



System code

The screenshot displays the 'ESS site system' interface. At the top, the status bar shows 'Comm: Normal' and 'Storage: Normal'. A red box labeled '1' highlights the 'System code' button in the top right corner. Below this, a modal dialog box titled 'System code' is open, indicated by a red box labeled '2'. The dialog contains a QR code and the text 'Scan the QR code to get system information'. The background interface shows various system status metrics: System status (Shut down, 65.00% efficiency), Energy storage status (6.79kWh charge, 90.00kWh discharge), and Device status (PCS, Meter, BMS, A/C, Other, all Normal). A network diagram on the right shows a central node connected to several peripheral nodes, each with a '0.00' value.

Communication status

The screenshot displays the 'ESS site system' interface. At the top, the status bar shows 'Comm: Normal' and 'Storage: Normal'. A red box labeled '1' highlights the 'System code' button in the top right corner. Below this, a modal dialog box titled 'Communication Status' is open, indicated by a red box labeled '2'. The dialog shows the following information: 4G status: Normal; Network Configuration_1 and Network Configuration_2, both with Port status: Normal. The network configurations are detailed as follows:

Network Configuration_1	Network Configuration_2
IP: 111.222.333.444	IP: 08.09.11
Mask: 111.222.333.444	Mask: 08.09.11
Gateway: 08.09.11	Gateway: 08.09.11

The dialog also includes a 'Closure' button. The background interface is identical to the previous screenshot, showing system status, energy storage status, and device status.

Setting

ESS site system | 2021-07-19 00:00 | Comm: ● Normal | Storage: ● Normal | System code | Not logged in

System status

Status	Efficiency	Day revenue	Total revenue
● Shut down	65.00 %	1.00	450.00*10K

Device status

PCS	Meter	BMS	A/C	Other
● Normal	● Normal	● Normal	● Normal	● Normal

Energy storage status

Today's charge power	Today's discharge power	Total power
6.79kWh	90.00kWh	346.00kWh

Setting 2

Please select the operation to be performed, and then click OK

Restart
Switch Chinese

Cancel
Confirm

Alarm status

Device name	Alarm time

PCS

ESS site system | 2021-07-19 00:00 | Comm: ● Normal | Storage: ● Normal

PCS
BMS
Meter
A/C
Fan

PCS_1#

Status: ● Charge	Grid: On-grid	Error codes: 0
Day Charge: 0.00 kWh	Total active: 0.00kW	Total reactive: 0.00kvar
Day Discharge: 0.00 kWh	A-P: 0.00kW	A-Q: 0.00kvar
Frequency: 0.00Hz	B-P: 0.00kW	B-Q: 0.00kvar
Power Factor: 0.00	C-P: 0.00kW	C-Q: 0.00kvar
AB-voltage: 0.00V	AB-current: 0.00A	A-voltage: 0.00V
BC-voltage: 0.00V	BC-current: 0.00A	B-voltage: 0.00V
CA-voltage: 0.00V	CA-current: 0.00A	C-voltage: 0.00V
Avg temp: 0°C	Ambient temp: 0°C	PcsInTemp: 0.00°C
A1-temperature: 0.00°C	B1-temperature: 0.00°C	C1-temperature: 0.00°C
A2-temperature: 0.00°C	B2-temperature: 0.00°C	C2-temperature: 0.00°C
Branch 1 Charging DC power: 0.00kW DC voltage: 0.00V DC current: 0.00A		
Branch 2 Discharging DC power: 0.00kW DC voltage: 0.00V DC current: 0.00A		

BMS

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Abnormal

PCS BMS Meter A/C Fan

Stack view Stack_2#

Status: **Idle** Running: ● **Charge** Error codes: 0

Total voltage:	0.0 V	SOC:	0.0 %	Rechargeable:	0.0 kWh	Max. temp:	0 °C	0	-	0
Total current:	0.0 A	SOH:	0.0 %	Dischargeable:	0.0 kWh	Min. temp:	0 °C	0	-	0
Insulation:	0 KΩ	Charge limit:	0.0 A	Avg temp:	0 °C	Max.voltage:	0 mV	0	-	0
Insulation+:	0 KΩ	Discharge limit:	0.0 A	Avg voltage:	0 mV	Min.voltage:	0 mV	0	-	0
Insulation-:	0 KΩ	PDU Temp1:	0 °C	PDU Temp2:	0 °C					

Meter

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Abnormal

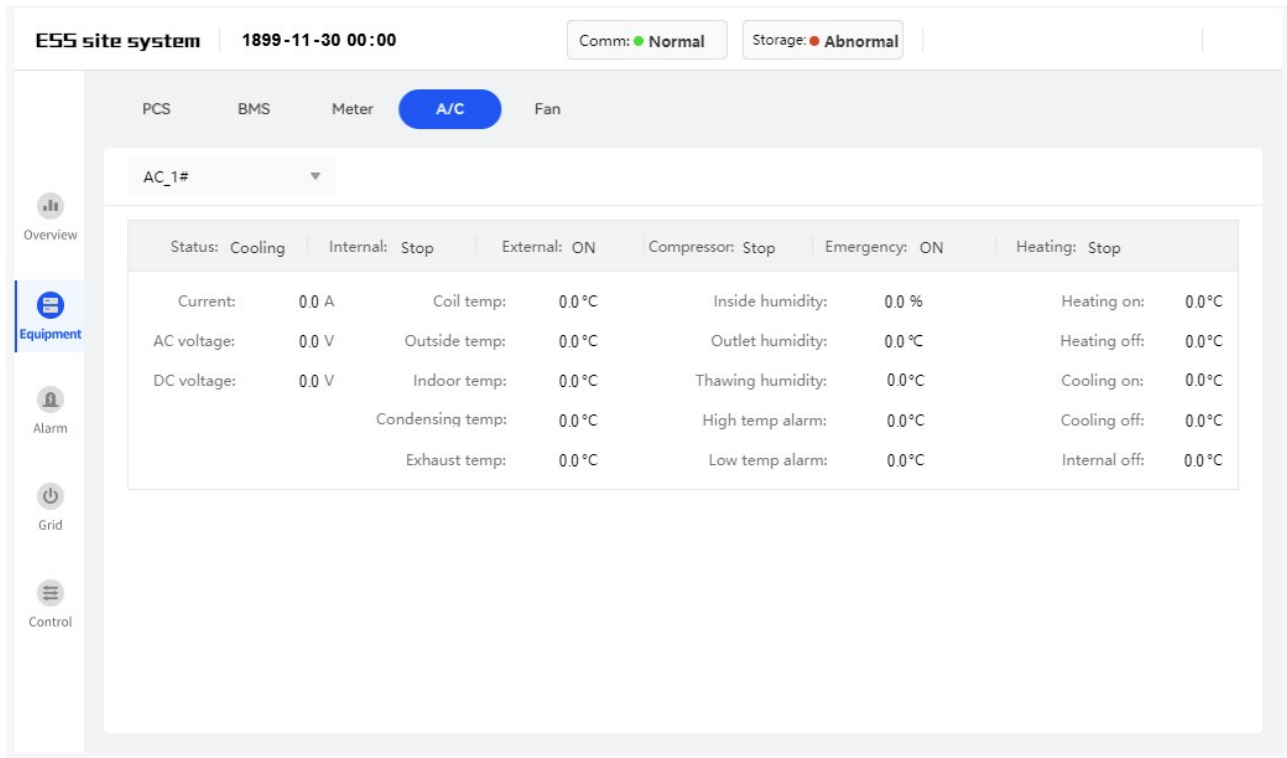
PCS BMS **Meter** A/C Fan

Grid

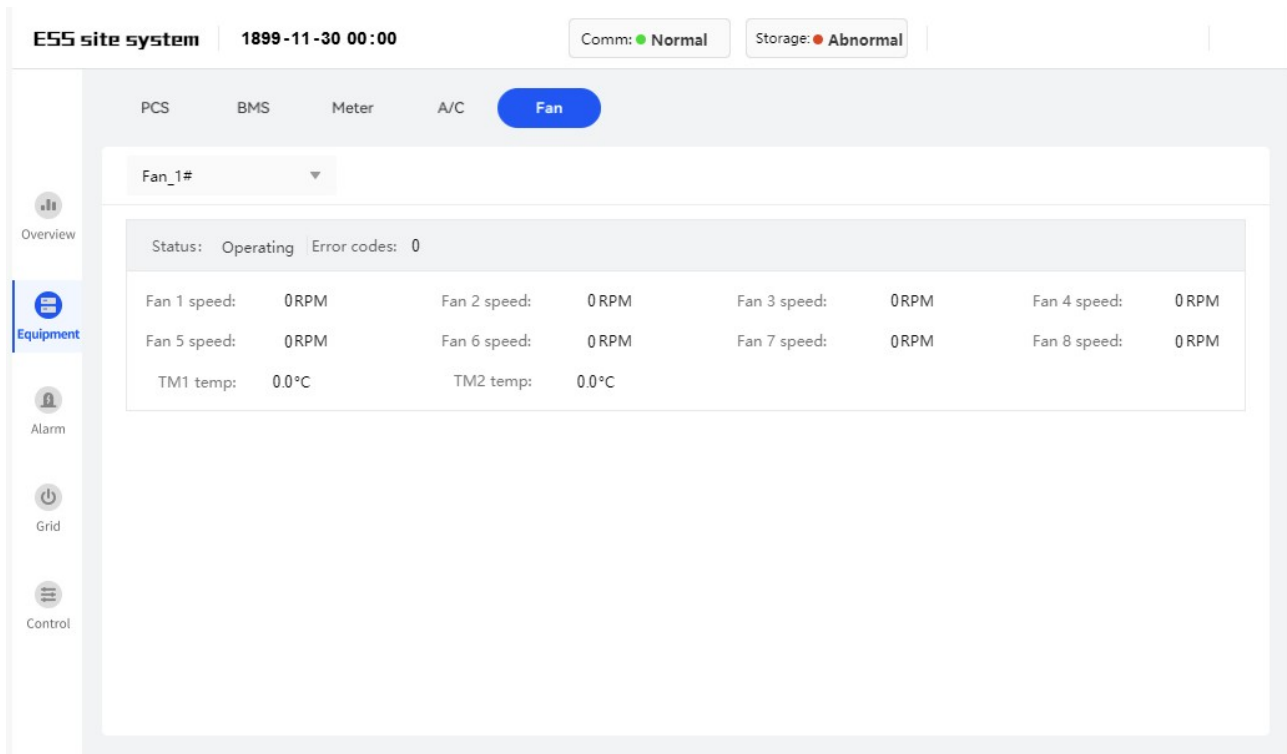
Category	Total/kWh	Sharp/kWh	Peak/kWh	Shoulder/kWh	Valley/kWh
Energy Daily DChg	0.00	0.00	0.00	0.00	0.00
Energy Daily Chg	0.00	0.00	0.00	0.00	0.00
Energy Total DChg	0.00	0.00	0.00	0.00	0.00
Energy Total Chg	0.00	0.00	0.00	0.00	0.00

Total active:	0.00kW	A-P:	0.00kW	B-P:	0.00kW	C-P:	0.00kW
---------------	--------	------	--------	------	--------	------	--------

A/C (air conditioner)



Fan



Real-time alert

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Abnormal

Real-time alert

History alarm

Stack_2# Cluster_1#

OverChrg	OverDischarge	test	test	test	

● Normal ● level 1 ● level 2 ● level 3

Previous Present 1 PageTotal 1 Page Next

History alarm

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Abnormal

Real-time alert

History alarm

Equipment

level

Start ime

End time

Code

Stack 2 -23	● (Level 3)	2024-02-08 20:10:55	2024-02-09 09:22:46	56
Stack 4 -36	● (Level 3)	2024-02-08 20:10:55	2024-02-09 09:22:46	23
Stack 7 -01	● (Level 3)	2024-02-08 20:10:55	2024-02-09 09:22:46	02

● level 1 ● level 2 ● level 3

Previous Present 1 PageTotal 1 Page Next

Grid

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Abnormal

Stack_2#

Battery Cluster	Parallel cluster state	Control status	Operational status	Error Code	Operation
1#	Decustering	BMS CTRL	● Normal	13, 44, 8	<button>ON</button>
2#	Decustering	BMS CTRL	● StopDisCharging	13, 44, 8	<button>ON</button>
3#	Decustering	BMS CTRL	● StopCharging	23, 56, 22	<button>ON</button>
4#	Decustering	BMS CTRL	● Standby	16, 3	<button>ON</button>

Previous page At present 1 Page Total 1 Page Next page

Energy Control

In Energy Control, ESS 261kWh/125kW charging and discharging strategy control can be performed.

You can refer to the (Cloud Platform Energy Control) chapter.

ESS site system 1899-11-30 00:00 Comm: ● Normal Storage: ● Normal

Energy Control Overload prevention Prevent reverse flow Manual control Secondary Protection Local Remote

Charge

00:00 - 00:00	0.0 kW
00:00 - 00:00	0.0 kW
00:00 - 00:00	0.0 kW

Discharge

00:00 - 00:00	0.0 kW
00:00 - 00:00	0.0 kW
00:00 - 00:00	0.0 kW

Apply

Overload prevention

ESS site system | 1899-11-30 00:00 | Comm: ● Normal | Storage: ● Normal

Energy Control | **Overload prevention** | Prevent reverse flow | Manual control | Secondary Protection

Local | Remote

Overview
Equipment
Alarm
Grid
Control

Anti overload setting Disable anti overload ☐

Charge limit threshold (kW)	Boot threshold (kW)	Charging prohibition threshold (kW)
0.0	0.0	0.0

Apply

Prevent reverse flow

ESS site system | 1899-11-30 00:00 | Comm: ● Normal | Storage: ● Normal

Energy Control | Overload prevention | **Prevent reverse flow** | Manual control | Secondary Protection

Local | Remote

Overview
Equipment
Alarm
Grid
Control

Anti backflow setting Disable anti backflow ☐

Limiting discharge threshold (kW)	boot threshold (kW)	Prohibit discharge threshold (kW)
0.0	0.0	0.0

Apply

Manual control

ESS site system

1899-11-30 00:00

Comm: ● Normal

Storage: ● Normal

Energy Control

Overload prevention

Prevent reverse flow

Manual control

Secondary Protection

Local

Remote

Overview

Equipment

Alarm

Grid

Control

Current status

Control mode

Automatic

Control parameters

Follow energy control

Adjust the control status

Control mode

Manual

Automatic

Control parameters

Follow energy control

Apply

Grid-connected control

PCS control

Secondary Protection

ESS site system

1899-11-30 00:00

Comm: ● Normal

Storage: ● Normal

Energy Control

Overload prevention

Prevent reverse flow

Manual control

Secondary Protection

Local

Remote

Overview

Equipment

Alarm

Grid

Control

Current parameters

SOC upper limit	SOC Lower limit	Discharge cut-off voltage	Overdischarge release voltage	Charging cut-off voltage	Overcharge release voltage
0 %	0 %	0.000 V	0.000 V	0.000 V	0.000 V

Adjust the parameters

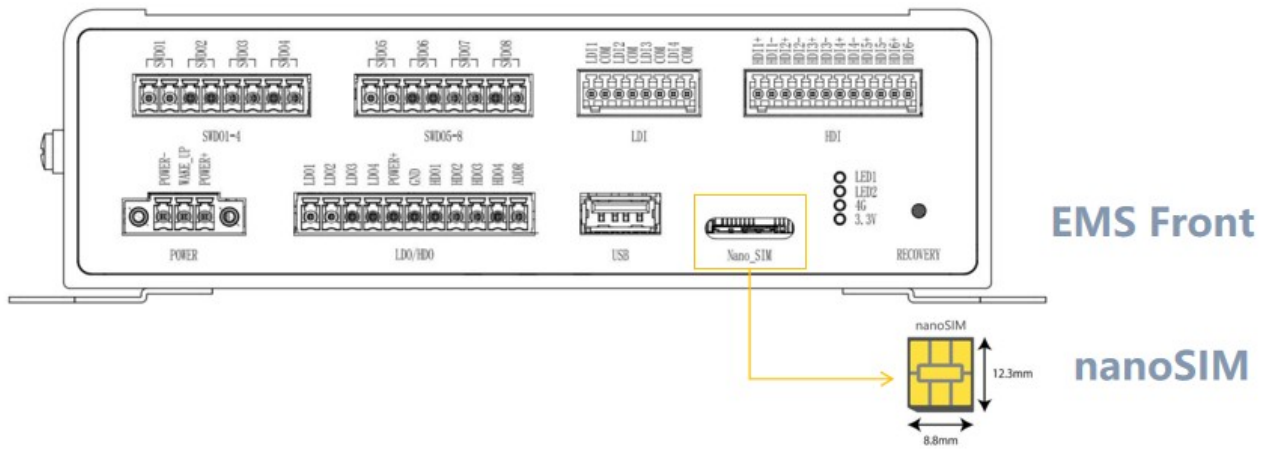
SOC upper limit	0 %	SOC lower limit	0 %
Discharge cut-off voltage	0.000 V	Overdischarge release voltage	0.000 V
Charge cut-off voltage	0.000 V	Overcharge release voltage	0.000 V

Apply

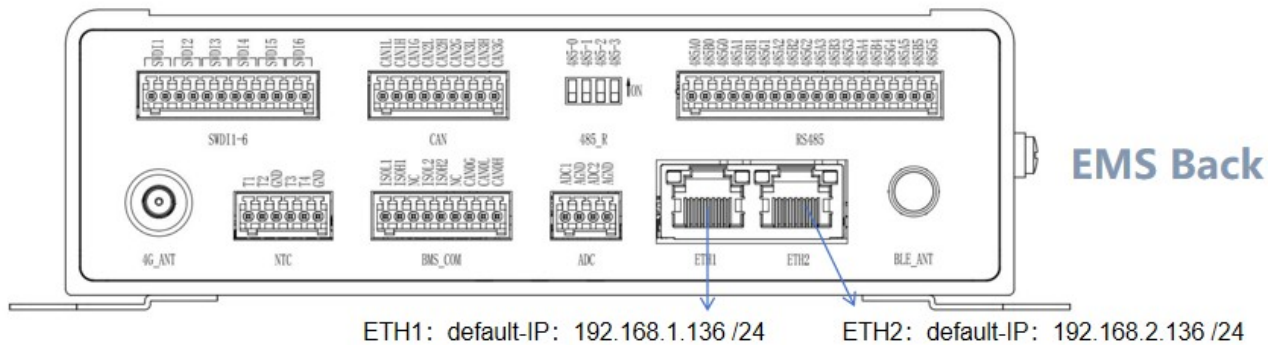
48

6.5 EMS Cloud Platform

1. Insert the SIM card of the local cellular network into the ESS 261kWh/125kW EMS.



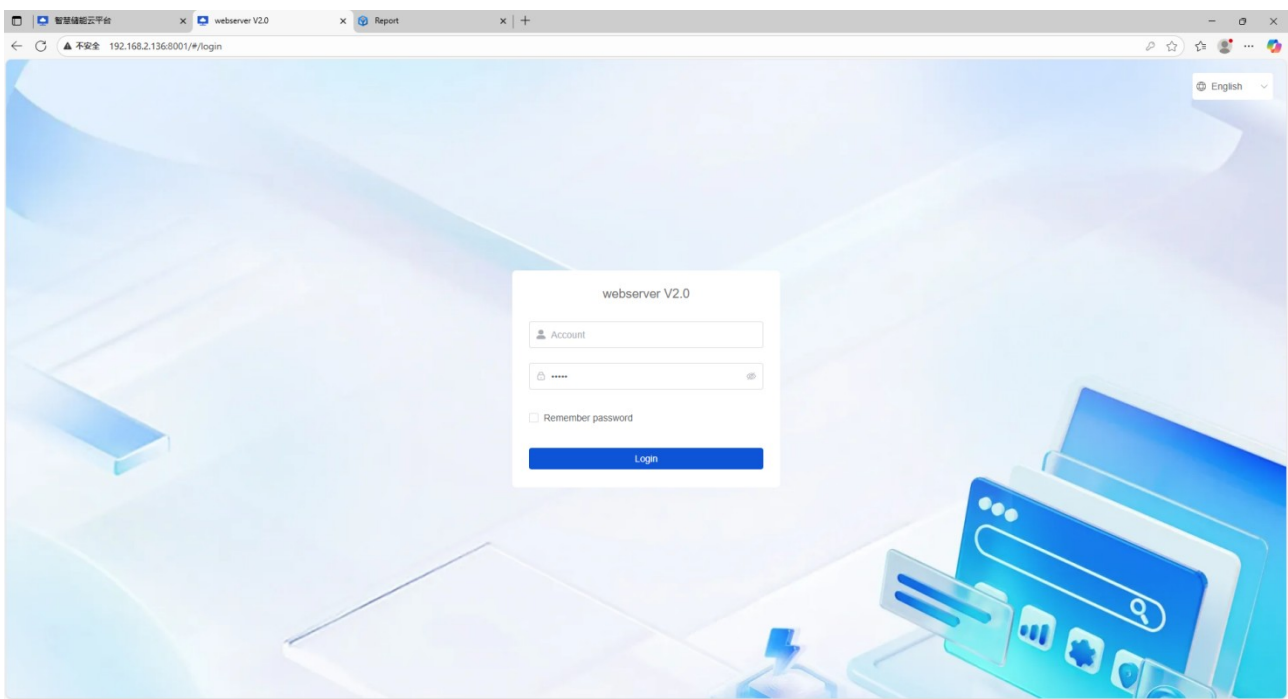
2. Connect the network ports of the PC and EMS through Ethernet cables, and set the IP address of the PC's network port to the same network segment as EMS.



3. Enter the website address in the computer browser:

<http://192.168.1.136:8001/#/login>

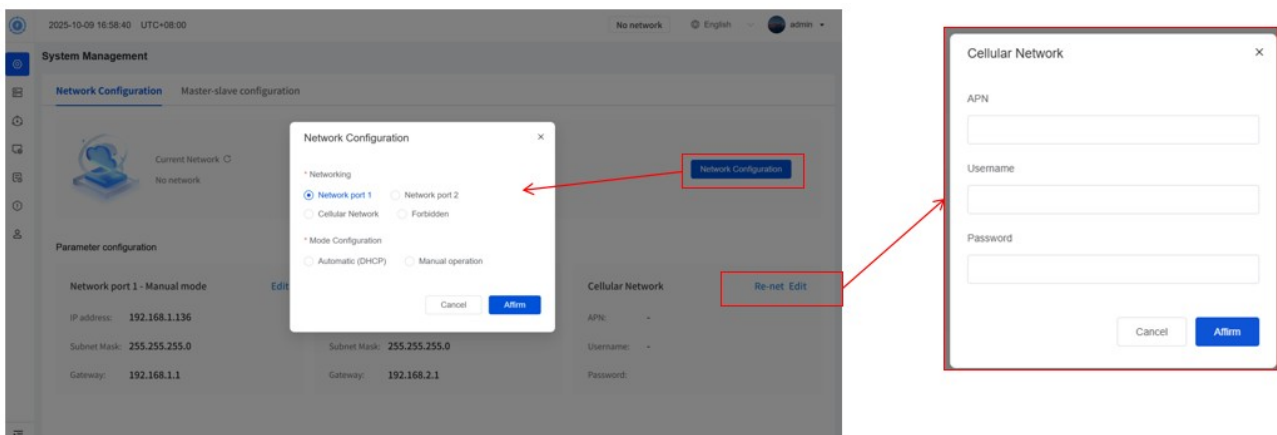
<http://192.168.2.136:8001/#/login>



Enter the username and password:

To avoid accidental operation, please contact the after-sales department to obtain the account password and provide guidance.

Note: This account is a general account. If the client wants to make changes later, they can set account permissions after logging in. If the browser fails to log in to the website, you may need to contact after-sales to request a webserver update tool for EMS.



4. After setting the APN of the SIM card on the PC, the ESS 261kWh/125kW device can be connected to the network for normal operation.

5. Due to limitations in the length of the manual, specific Cloud Platform operations can be found in the (Smart Energy Storage Cloud Platform - User Manual).

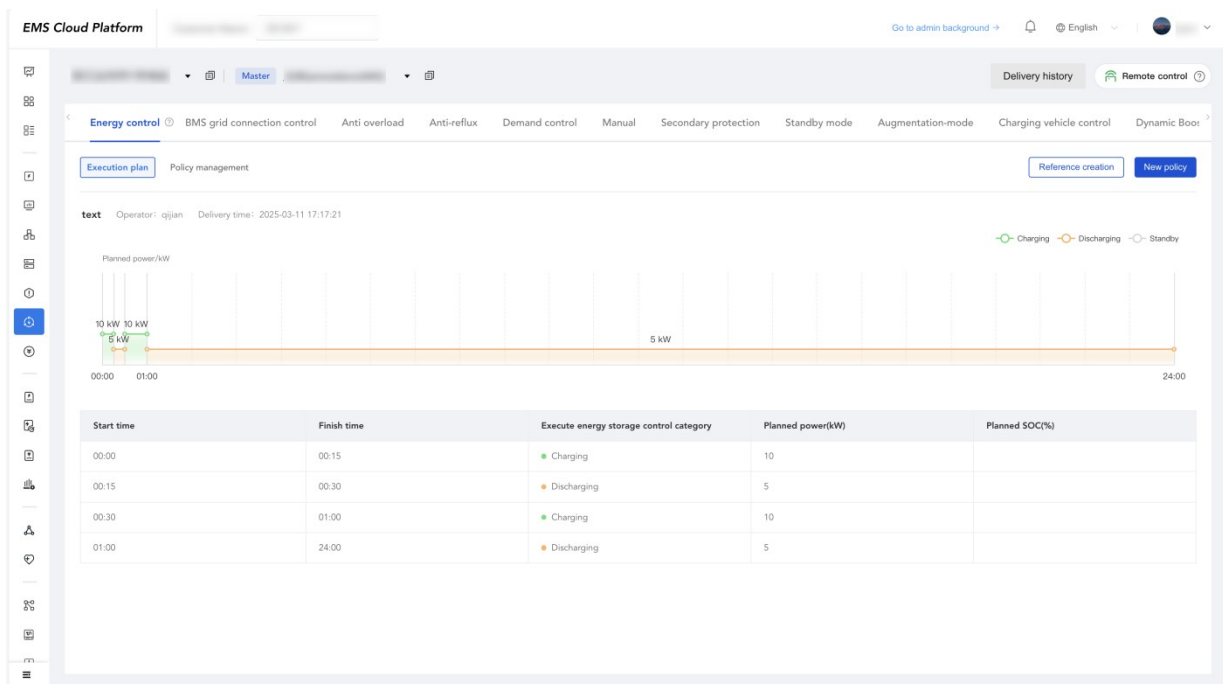
6.6 Cloud Platform Energy control

Energy management can realize the energy scheduling function. It formulates reasonable scheduling strategies according to the changes in energy demand, achieves the rational allocation and utilization of energy, and at the same time avoids the energy storage devices from being in an overloaded or over-discharged state for a long time.

The system runs automatically according to the configured energy control strategy. (It supports two modes: "Long-term Control" and "Flexible Control". For Long-term Control: there is a single charging and discharging plan, which runs for a long time; for Flexible Control: the strategy supports multiple plans, which are set on a daily basis and issued on a monthly basis.) The switching between the two modes requires contacting the after-sales department for operation.

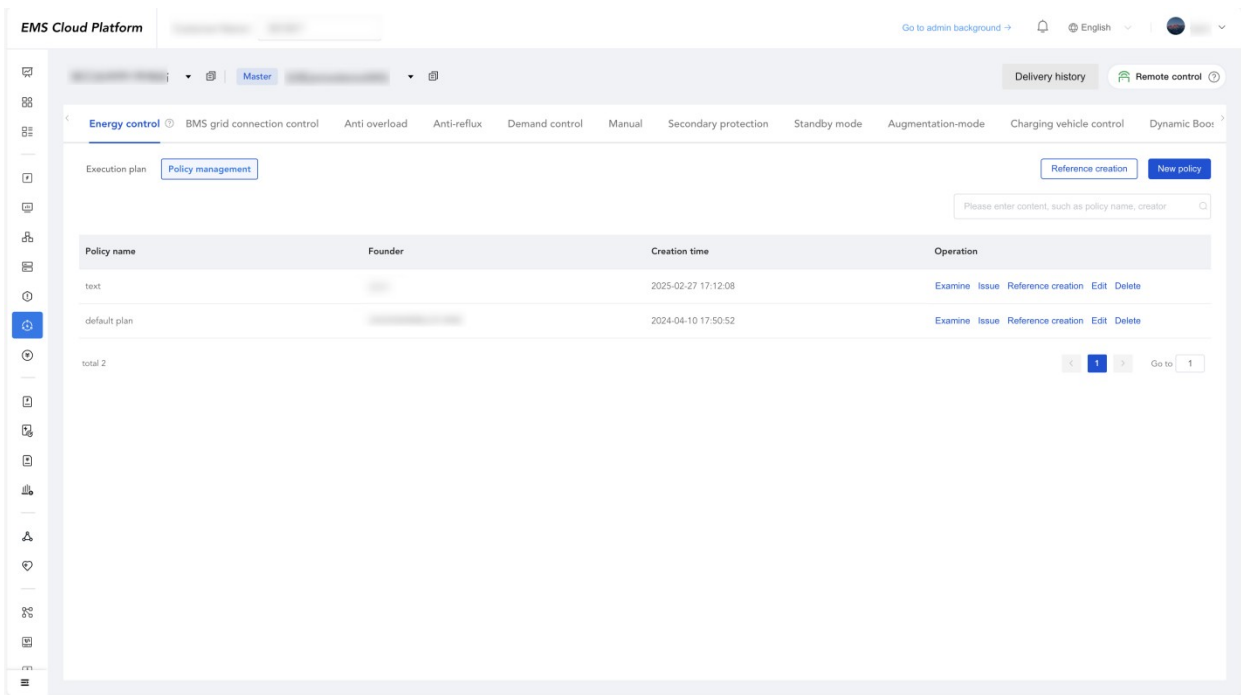
Long-term Control

Execution plan: Display the information of the charging and discharging plan that the device is currently executing.

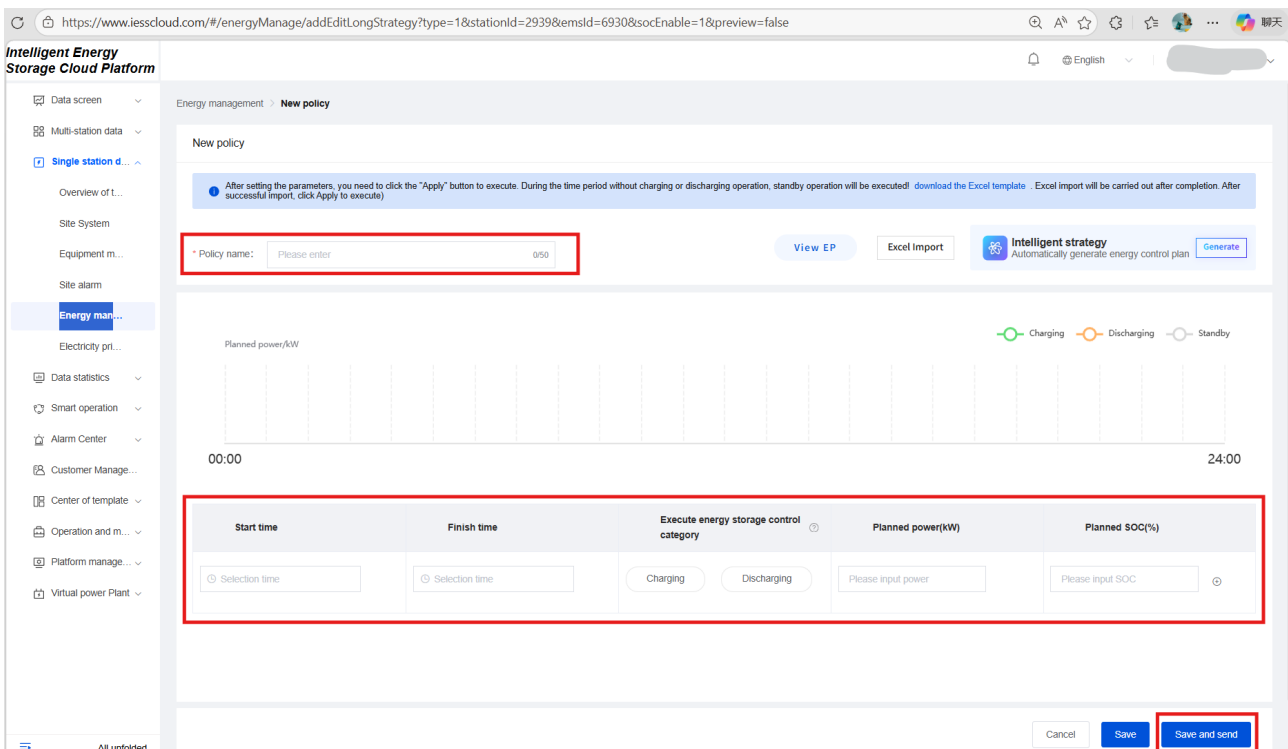


Policy management: Creation and operation of energy control strategy.

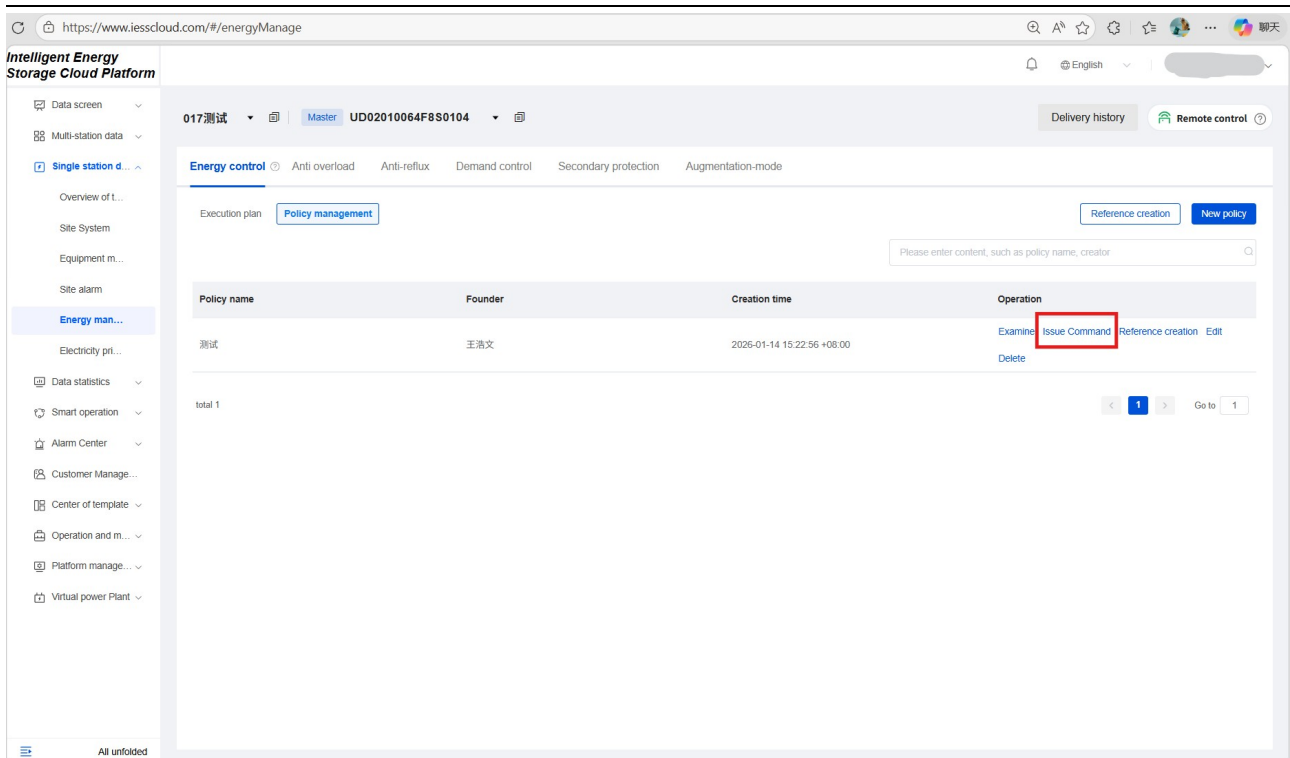
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Click the "New Policy" button to enter the subpage and create a policy for use.

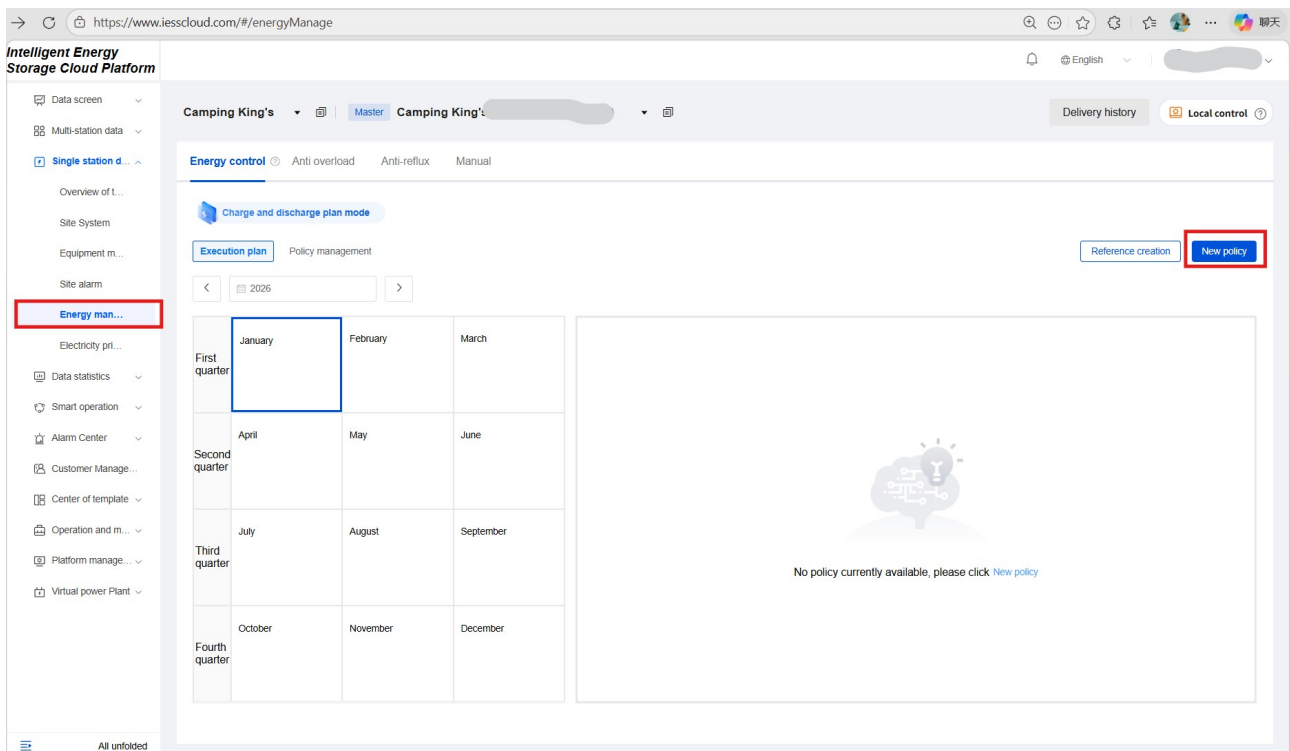


1. Fill in the strategy name.
2. Set a charging and discharging plan, including start time, finish time, execute energy storage control category, planned power(kW), planned SOC(%).
3. Click Save and send.
4. Or after clicking Save, the policy will not be executed immediately. The policy will only be executed after clicking on the Issue Command in Policy Management.



Flexible Control

1. Click on "Energy Management" to enter the energy control page.
2. Click the "New policy" button to create an energy control policy;



3. Once you have entered the policy creation subpage, configure the settings in the order shown on the page
 - Policy Name: A user-defined name used for identification

- **Control Schedule:** Refers to the charging and discharging schedule. Supports weekly selection (Monday through Sunday); dates not selected will remain in standby mode. Multiple schedules can be set
- **Add Schedule:** General Schedule (set on a weekly basis); Scheduled Schedule (set on a daily basis)

The screenshot shows the 'New policy' configuration page in the Intelligent Energy Storage Cloud Platform. Key elements include:

- Policy name:** A text input field with a red box around it.
- Control plan-1:** A section for selecting days of the week (Monday through Sunday) with checkboxes. A red box highlights this section.
- Scheduling Table:** A table with columns for 'Start time', 'Finish time', 'Execute energy storage control category' (with 'Charging' and 'Discharging' buttons), and 'Planned power(kW)'. A red box highlights the table area.
- Buttons:** At the bottom right, there are 'Cancel', 'Save', and 'Save and send' buttons. A red box highlights the 'Save' and 'Save and send' buttons.

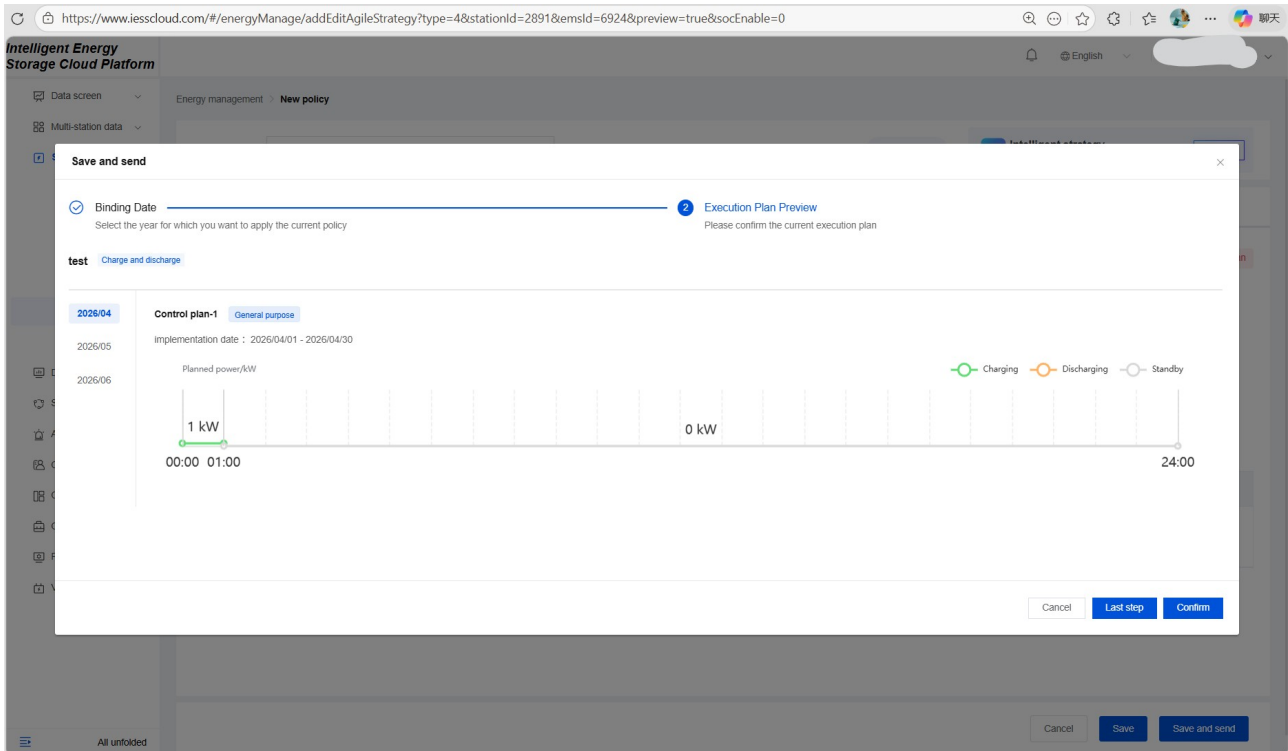
4. After clicking "Save and send," the deployment process will begin.

- First, select the month and year for the policy to take effect, then click "Next step"
- Verify that the policy details and effective date are correct. Once confirmed, click "OK," and "Next step"

The screenshot shows the 'Save and send' dialog box, which is part of the policy deployment process. It includes the following details:

- Binding Date:** A step where the user selects the year for which the policy will be applied. A date picker is open, showing the month of April for the year 2026.
- Execution Plan Preview:** A section for confirming the current execution plan.
- Buttons:** At the bottom right, there are 'Cancel' and 'Next step' buttons.

5. Once you have verified that the information is correct, click Confirm.



7 Battery System Maintenance Instructions

Professional term explanation:

number	term	description
1	normal operation	The system that works every day
2	interval run	A system with an irregular monthly operation frequency that cannot guarantee daily operation.
3	Left unused for too long	battery system that has not been activated for more than 3 consecutive months

7.1 System Usage Requirements

7.1.1 Requirements for Normal Operation of the System

Perform system inspections every 12 months (refer to Appendix 1) and maintain inspection records.

7.1.2 System Usage Requirements for Long-Term Storage

The recommended SOC range for energy storage batteries is 30% to 50%. Avoid storing cells below 15% SOC for extended periods, and disconnect power-consuming devices when batteries are idle.

1. Perform a system inspection every three months (see Appendix 1) and document the inspection records.
2. Before first use of the long-term storage system, the battery must undergo at least one full charge to restore its performance to optimal condition.



Prolonged disuse of energy storage systems may cause irreversible damage to batteries. Regular maintenance is essential.

7.2 Maintenance Notes

Before performing maintenance or repair operations on the system, personnel must first disconnect the DC circuit breaker switch on the high-voltage panel and ensure it is set to OFF with the fire protection system in manual mode. After completing the

maintenance or repair, the DC circuit breaker switch must be reset to ON and the fire protection system to automatic mode.

This energy storage system features a high protection rating, making it suitable for outdoor use. However, prolonged operation in harsh environments may still lead to aging of the storage equipment or damage to internal components. Regular maintenance and inspection, along with replacement of aged or damaged parts, can effectively extend its service life and enhance the performance of internal equipment.

The maintenance intervals specified in this section are for reference purposes only. Actual maintenance schedules should be determined based on the specific environmental conditions at the project site. For energy storage systems operating in harsh environments such as desert regions, the maintenance intervals should be shortened. Particular attention should be paid to more frequent internal and external cleaning, as well as anti-corrosion and rust prevention measures. For instance, when energy storage systems are installed in desert areas, it is recommended to conduct thorough inspections and complete cleaning of both the interior and exterior after each sandstorm.

Check the following items. If they do not meet the requirements, correct them immediately:

7.2.1 annual inspection

Maintenance type	inspecting item	test method
Cabinet and structural components	System status and cleaning	Check the following items. If they do not meet the requirements, correct them immediately: Check for damage or deformation to the enclosure and internal equipment Check for abnormal noise from internal devices during operation Check if the temperature inside the container is too high Check whether the internal humidity and ash content of the container are within normal ranges. Clean promptly if necessary. Check whether the air inlet and outlet of the enclosure are blocked

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	Warning label	Check that warning signs and labels are clearly visible and free from damage. Replace them if damaged
	cable shield grounding	Check whether the cable shielding layer is properly connected to the insulation sheath; verify that the grounding copper busbar is securely installed.
	Lightning protection equipment and fuses	Check if the lightning protection equipment and fuses are securely fastened
	Corrosion condition	Check for oxidation or rust inside the cabinet.
	The exterior of the cabinet	Check the following items. If they do not meet the requirements, correct them immediately: Check the cabinet top for flammable materials; Inspect the welds between the cabinet and the foundation steel plate for firmness and corrosion (if corrosion reaches ISO8501-1 standard grade C, repair is required). Inspect the cabinet casing for damage, paint peeling, oxidation, or similar issues; Check if cabinet door locks and similar components can be opened smoothly; Check whether the sealing strip is properly fixed and whether there are any signs of aging or breakage.
	Inside the cabinet	Inspect the energy storage integration system for foreign objects, dust, dirt, and condensation. Check if the external outlet is properly sealed.
	Inlet and outlet vents	Check whether the air intake and exhaust louvers and filters are clean. If necessary, use a vacuum cleaner to remove dust. Replace the

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		filters regularly based on usage conditions.
	Wiring and cable layout	Wait until all internal devices in the energy storage integration system are completely powered off for 3 minutes before starting the inspection. If any non-conformities are found during the inspection, correct them immediately. Inspect cable routing for standard compliance and potential short circuits. Any abnormalities must be corrected immediately. Check whether all cable entry and exit holes in the cabinet are properly sealed. Check for water leakage inside the box; Check if the power cable connections are loose and tighten them again using the torque specified previously. Inspect power and control cables for damage, particularly checking for cuts on the metal-contact surfaces. Inspect the power cable terminal for any detached insulation wrapping tape.
	Grounding and equipotential connection	Check if the grounding connection is correct; Verify the correct equipotential bonding within the energy storage integration system.
	electric fan	• Check the fan's operating status; • Check whether the fan is clogged; • Check for abnormal noise when the fan is running.
	nut bolt	Check the cabinet interior for any loose screws or similar issues
extinguishing and protection	Every 6 months Add maintenance	1. Look for signs of structural problems: • Surface wear; • cut ;

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	items Inspect fire extinguishing containers	• morals and manners ; 2. Ensure they are properly connected; 3. Check the fire extinguisher pressure gauge to ensure the pressure is within the working range; 4. Check whether the sensor wiring is secure and free from contaminants.
Electrical components	equipment maintenance	Maintenance of Circuit Breaker/Isolator and Contactor • Conduct routine inspections of all metal components for corrosion; • Perform annual inspections on circuit breakers/isolating switches and contactors (including auxiliary switches and micro switches) to ensure proper mechanical operation. • Check the operating parameters (especially voltage and insulation); Surge protector circuit maintenance (recommended every six months, with frequency adjusted based on actual conditions; for high-voltage areas, increased maintenance frequency is advised). • Check the front-end fuse with a multimeter to ensure it is functioning properly. • Inspect the surge protector for cracks, deformation, or physical damage; verify the wiring integrity; confirm cable joints and terminals are free from oxidation; check grounding wire tightness; ensure installation surface is clean with no dust, oil stains, or other contaminants. UPS maintenance (if applicable). • Keep the surrounding area clean and dust-free; • Replace the battery at least every 4 years under normal use to ensure maximum

		efficiency.
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7.2.2 Half year inspection

Cabinet and structural components	safety function	Check the warning signs and other equipment signs on the machine, and replace them promptly if they are found to be blurry or damaged. Check the emergency stop button stop function. Simulate shutdown.
Cabinet and structural components	Internal component inspection	Check the cleanliness of each component; Check the temperature and dust of the radiator. If necessary, a vacuum cleaner can be used to clean the heat dissipation module, etc; If necessary, please replace the air filter screen; Attention! The ventilation of the air intake must be checked. Otherwise, if the module cannot be effectively cooled, it will malfunction due to overheating.
Cabinet and structural components	Device maintenance	Perform routine inspections on the corrosion of all metal components (every six months).
firefighting	Maintenance projects every 3 months plus inspection of medication dosage	Check the pressure gauge of the fire container to ensure that the pressure is within the working pressure range.
liquid cooling system	Reliability of power and signal cables in the wiring panel	Reliability of power cables and signal cables in the wiring panel; Electrical and signal cables are free from aging, damage, abnormal heating, and other abnormalities; There is no dust at the wiring panel.

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liquid cooling system	Unit appearance	The unit is clean and free of dust and dirt.
liquid cooling system	Reliability of fan operation	The fan is free of dust and there are no foreign objects blocking the air outlet; The fan blades are undamaged, and the fan rotates smoothly without any abnormal noise.
liquid cooling system	Condenser cleaning	The condenser is free from dust and foreign object blockage.
liquid cooling system	Liquid cooled pipeline inspection	Check if there is any leakage or seepage at the connection of the liquid cooling pipeline and the liquid cooling pipeline
liquid cooling system	Coolant status (visual inspection and reagent inspection)	1. Open the valve and take 10-50ml of coolant from the system; 2. Observe the condition of the coolant to see if there are any abnormalities such as discoloration or impurities; 3. Check if the pH value of the coolant is lower than pH 7.3; If the above abnormalities exist, follow the injection and discharge process to drain the original system liquid and refill the coolant.
BMS	Primary BMS module	1. Before each power on, try to confirm that the connectors are properly plugged in and not loose; 2. Check and confirm that the voltage of the power supply is within the specified range before each power on; 3. For battery packs that have not been working for a long time (more than 1 month), check whether the individual and group terminal voltages are within the normal range before powering on the module; When it is necessary to connect a CAN card

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		for software operation, confirm that the resistance values of the CANH and CANL channels corresponding to the CAN card connection module are 60 Ω before powering on, insert the USB cable, and then power on.
BMS	Secondary BMS module	1. Before each power on, try to confirm that the connectors are properly plugged in and not loose; 2. Check and confirm that the voltage of the power supply is within the specified range before each power on; 3. Before each power on, check whether the contactor and fuse (if any) are normal; 4. When it is necessary to connect a CAN card for software operation, confirm that the resistance values of the CANH and CANL channels corresponding to the CAN card connection module are 60 Ω before powering on, and insert them Connect the USB cable and then power it on.
BMS	Third level BMS module	1. It is advisable to keep the screen clean regularly and be careful not to bump it; 2. During long-distance transportation, it is recommended to disassemble it into a paper box with foam protection and restore it on site.
BMS	current sensor	Current sensors (Diverter or Hall sensors) that have not been used for a long time (more than 1 month) need to be checked to confirm that the sensors are not rusted or dusty;
BMS	wiring harness	Wiring harnesses that have not been used for a long time (more than one month) need to be rechecked to confirm that the wires

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		and connectors are not damaged, disconnected, or rusted;
BMS	Module replacement	When replacing and repairing components, it is necessary to communicate with professionals in a timely and sufficient manner.
BMS	software maintenance	View the configurable parameters of the web.
battery	The state of charge (SOC, capacity state) should be maintained between 30% and 50%	When stored for a long time (more than 6 months), a standard charge and discharge cycle should be performed every 6 months.

7.2.3 Quarterly inspection

convention	Inspect the protected area	1. Daily cleaning; 2. The condition of the pipes and nozzles; 3. Ensure that the protected area remains unchanged.
convention	inspection of equipment	1. Fire extinguishing containers (pressure gauges, supports, damage conditions); 2. Detector (cleanliness level); 3. Nozzle (no blockage).
convention	Check the detection device	1. Ensure they are installed in the correct position; 2. Make sure they are not damaged; 3. Ensure that they are clean and not covered with grease, dust, paint or any other dirt; 4. Measure the sensitivity of each detector according to the manufacturer's manual.

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convention	Check all warning facilities	1. Check for dust accumulation; 2. Check for corrosion; 3. Check for damage; 4. Reset the alarm circuit after each test. Check the nozzle.
convention	Check the nozzle.	1. Ensure the nozzle is installed in the correct position; 2. Ensure the nozzle is free from dust, grease, or paint buildup to prevent clogging during spraying.
convention	Check all components	1. Look for signs of damage; 2. Identify the disconnected components and reconnect them to the system. 3. Identify and tighten any loose connections; 4. Check for corrosion; 5. Look for twisted or dented parts.
convention	Check the pressure gauge of the fire container	Check the pressure and ensure it is within the working pressure range.
convention	Inspect the fire safety equipment	1. Check whether the fire extinguishing containers are securely installed; 2. Check for corrosion; 3. Check for damage; 4. Check for missing parts; 5. Check the pressure gauge reading.
PCS	Electrical and fixed connection inspection	1. Grounding connection; 2. Module grounding connection; 3. DC input electrical connection;

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		4. Electrical connections for input communication; 5. Connection of communication cables; 6. Fan.
PCS	Clean and tidy up	Clean the copper bars, terminals, and mesh holes. Clean the ventilation baffle; Clean air ducts and ventilation ducts; Check the fan for any abnormalities, and inspect for dust or foreign object blockages.
PCS	appearance inspection	inspection tag ; Check the latch, door stop, and hinge.
Cell	SOC calibration (maintenance frequency varies by application scenarios. For optimal performance, perform full charge-discharge cycles once every 3 months. If daily cycles are impractical, monthly calibration is recommended).	1. A standard full charge and discharge cycle test is required, with the software automatically performing calibration. 2. If the requirements cannot be met, a standard full-release experiment may be conducted, and the software will automatically perform calibration. 3. If the requirements cannot be met, a standard full charge test can be performed, and the software will automatically calibrate. 4. If standard discharge testing cannot be performed, a single standard discharge test may be conducted, with the discharge level reduced to below 20% and the

		battery left undisturbed for over 1 hour. Calibration should be performed via software settings. standard
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7.2.4 monthly inspection

cell	SOC calibration (maintenance frequency varies by application scenarios. For optimal performance, perform full charge-discharge cycles daily for 3 months. If daily cycles are impractical, monthly calibration is recommended).	1. A standard full charge and discharge cycle test is required, with the software automatically performing calibration. 2. If the requirements cannot be met, a standard full-release experiment may be conducted, and the software will automatically perform calibration. 3. If the requirements cannot be met, a standard full charge test can be performed, and the software will automatically calibrate. 4. If standard discharge testing cannot be performed, a single standard discharge test may be conducted, with the discharge level reduced to below 20% and the battery left undisturbed for over 1 hour. Calibration should be performed via software settings. standard .
BMS	System Alarm and Fault Troubleshooting	View system alarm information and troubleshoot faults through the SCU display screen.

	The maintenance cycle above is recommended and can be adjusted according to actual planning.
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7.3 Appendix I Inspection Form

Inspection items	Inspection method	Yes/No	exception record
Is the fire extinguishing system complete?	Visual inspection		
Is the fire extinguishing system still valid?	Visual inspection		
Is the cooling system complete?	Visual inspection		
Is the air duct of the cooling system blocked?	Visual inspection		
Is the cabinet's exterior deformed?	Visual inspection		
Is the exterior of the integrated cabinet rusted or damaged?	Visual inspection		
Is there moisture inside the integrated cabinet?	Visual inspection		
Is the low-voltage wiring harness loose or damaged?	Visual inspection		
Is the high-voltage cable bundle loose or damaged?	Visual inspection		
Whether the wiring harness interferes with structural components	Visual inspection		
Ablation of high-voltage connections	Visual inspection		
Are the fastening bolts of the structural components loose or missing?	Visual inspection		
Check if the MSD switch is intact and securely installed	Visual inspection		
Is the liquid cooling pipeline damaged?	Visual inspection		
Is there a foul odor in the integrated cabinet?	Olfactory inspection		

Presence of irritating odors in the cabinet	Olfactory inspection		
Is there a burnt odor at the high-voltage connection site?	Olfactory inspection		
Is the summary data complete?	Supervisory computer		
Are the single-cell voltage data complete?	Supervisory computer		
Are the temperature data of the monomer complete?	Supervisory computer		
Check for abnormal alarms in the alarm bar	Supervisory computer		

7.4 Common faults and their solutions

Number	Fault	Possible reasons	treatment method
1	AC overvoltage in the power grid	The grid voltage is higher than the AC overvoltage point	Check if the voltage of the power grid is normal
2	AC undervoltage in the power grid	The grid voltage is lower than the AC undervoltage point	Check if the voltage of the power grid is normal
3	Off grid AC overvoltage	Off grid AC voltage higher than AC overvoltage point	Please contact the manufacturer for details
4	Off grid communication under voltage	Off grid AC voltage below AC undervoltage point	Please contact the manufacturer for details
5	Grid-connected AC over-frequency	The grid frequency is higher than the overfrequency point	Check whether the grid voltage is normal
6	Grid-connected AC under-frequency	The grid frequency is lower than the underfrequency point	Check whether the grid voltage is normal

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7	AC overcurrent fault	Short circuit on the AC side/AC load is too large	Please contact the manufacturer for details
8	Output phase failure	The main circuit output line is loose/the main circuit output is short-circuited to ground	Check whether the three-phase output wiring is normal
9	Grid voltage imbalance	The voltage amplitude difference of the three-phase grid exceeds the allowable range/grid input phase is missing	Check whether the grid voltage is normal
10	Ambient over temperature	Ambient temperature exceeds protection point/fan failure	Check whether the fan is operating normally/check whether the temperature sensor is operating normally
11	Low ambient temperature	The ambient temperature is lower than the protection point	Check if the temperature sensor is working properly
12	Insulation resistance is low	Insulation resistance is low	Check if the main circuit is grounded/please contact the manufacturer for details
13	Grid voltage reverse sequence	Reverse order of grid connection	Any exchange of two phases in a three-phase connection
14	EMS communication failure	EMS communication disconnected	Check whether the EMS communication line is connected normally
15	Battery voltage is too high	The battery voltage is higher than the battery overvoltage point during	Check the battery voltage

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		operation	
16	Battery voltage is too low	The battery voltage is lower than the battery undervoltage point during operation	Check the battery voltage
17	Host abnormal shutdown	The slave detects that the master stops running	Please contact the manufacturer for details
18	Energy storage inverter communication	Communication abnormality between the energy storage converter and EMS	Check the communication line between EMS and energy storage converter
19	BMS Communication	Communication abnormality between BMS and EMS	Check the communication line between EMS and energy storage converter
20	Liquid cooling unit communication	Communication abnormality between the liquid cooling unit and EMS	Check the communication line between EMS and liquid cooling unit
21	Temperature and humidity sensor communication	Communication between temperature and humidity sensor and EMS is abnormal	Check the communication line between EMS and temperature and humidity sensor
22	Fire System Communications	Communication anomaly between fire protection system and EMS	Check the communication lines between EMS and fire protection system
23	Meter communication	Abnormal communication between the metering meter and EMS	Check if the communication line between EMS and the metering meter is properly connected
24	Measuring meter communication	Communication abnormality between	Check the communication line

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		measuring meter and EMS	between EMS and the measuring meter
25	System emergency stop	The emergency stop switch is activated	Check the emergency stop switch
26	BMS single unit overvoltage level 1 BMS single unit overvoltage level 2 BMS single unit overvoltage level 3	Battery is fully charged PCS is not shut down	Stop charging
27	BMS single unit undervoltage level 1 BMS single unit undervoltage level 2 BMS single unit undervoltage level 3	Battery discharged PCS not stopped	Stop discharging
28	BMS single unit over temperature level 1 BMS single unit over temperature level 2 BMS single unit over temperature level 3	Temperature is too high	Cooling treatment
29	BMS monomer low temperature level 1 BMS monomer low temperature level 2 BMS monomer low temperature level 3	Temperature is too low	heating treatment
30	BMS charging	The charging current	Reduce power

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	overcurrent alarm	exceeds the maximum system current	
31	BMS discharge overcurrent alarm	The discharge current exceeds the maximum system current	Reduce power