261kWh Liquid-Cooled Energy Storage

DC Cabinet

User's Manual

V1.0



Catalog

Legal Notice 4
Revision History 4
1. Manual Guide 5
1.1 Manual Usage 5
1.2 Applicable Products 5
1.3 Product Description 5
1.4 Symbol Description 5
2. Safety Instruction 5
2.1 General Safety 6
2.2 System Security 6
2.3 Operator Requirements 7
2.4 System Operating Environment Safety Requirements 7
2.5 Safety Requirements for Transportation and Installation 7
2.6 Daily Maintenance 8
2.7 Product Scrapping 8
3. product presentation 8
3.1 Product System Overview 8
3.2 System Composition 9
3.3 Technical Parameters 9
3.4 System Extension 10
3.5 Product Appearance Introduction 11
3.6 Product Internal Introduction 13
3.6.1 Battery System 13
3.6.2 Thermal Management System 14
3.6.3 Fire Protection System 15
4. Delivery Transportation and Storage 16
4.1 Check Before Signing 16
4.2 Transport 16
4.2.1 Transportation Requirements 16
4.2.2 Requirements for transporting mobile equipment 16
4.2.3 Hoisting and Transportation 17
4.2.4 Forklift Transportation 18
4.3 Device Storage 18
5. Install 19
5.1 Installation Environment Requirements 20
5.2 Installation Space Requirements 20
5.3 Equipment Ventilation Requirements 21
5.4 Installation and Fixing 21
5.4.1 Pre-installation Inspection 21
5.4.2 Installation of Energy Storage System 21
6. Electrical Connection 22
6.1 Safety Precautions 22
6.2 Preparation of Installation Tools 23
6.3 Cable and Connector Requirements 24

6.4 Cable Installation 24
6.4.1 Protection Area Connection 24
6.4.2 Power cables,auxiliary power supply,and communication cable connections 25
6.5 Check after wiring 25
7. Power-on Procedure 25
7.1 Pre-power-on Check 25
7.2 Power-on Steps 26
8. System Usage Requirements 27
8.1 Requirements for Normal Operation of the System 27
8.2 System Usage Requirements for Extended Use 27
8.3 Maintenance Notes 27
8.4 Maintenance of Outdoor Cabinets 28

Legal Notice

It is strictly prohibited to use any part or all of the data in the firmware or software developed by this company for non-product-related purposes, whether such purposes are commercial or not.

It is forbidden to decompile, decrypt, or otherwise tamper with the original program design of the software developed by this company.

This product complies with the design requirements for environmental protection and personal safety. The storage, use, and disposal of the product shall be conducted in accordance with the product manual, relevant contracts, or applicable laws and regulations.

Please note that the product may be modified without prior notice.

Revision History

Release Version	Revision Date	Revision Summary
1.0	2026.1.6	Initial issue

1. Manual Guide

Before installing or operating this product, read this manual carefully. Keep this manual for reference.

1.1 Manual Usage

Contents: This manual provides key safety guidelines, product features, and technical specifications for the 261kWh liquid-cooled energy storage DC cabinet.
Delivery and storage, wiring installation, power-on and power-off process, system operation parameter setting, system maintenance and quality assurance, etc.

Target Audience: This manual is designed for professional technicians handling installation and maintenance of 261kWh liquid-cooled energy storage DC cabinets, as well as end-users performing routine operations.

1.2 Applicable Products

This document applies to the following model:

Zpower-DC-261L-2H Zpower-DC-313L-2H

Zpower-DC-365L-2H Zpower-DC-418L-2H

1.3 Product Description

Product Overview: This outdoor energy storage DC cabinet provides peak shaving, load shifting, capacity reduction, demand response, and renewable energy integration services. It is widely applicable in charging stations, commercial buildings, manufacturing facilities, and other industrial settings.

1.4 Symbol Description

To use this manual effectively, the following symbols are used to highlight important information. Please read the symbols and their descriptions carefully.

Danger
●Indicates a situation with a high potential risk of death or serious injury if not avoided.
Warning
●Indicates a moderate potential risk of death or serious injury if not avoided.
Caution
●Indicates a low potential risk of moderate or minor harm to people if not avoided.
Pay Attention to
●The emphasis and supplements on the content may also provide tips or tricks for optimizing product usage, helping you solve a problem or save time.

2. Safety Instruction

Please strictly comply with all safety regulations in this product manual.

Pay Attention To
●To prevent potential injuries or property damage during use and to extend the product's lifespan and efficiency, please carefully review all safety guidelines.

2.1 General Safety

Pay Attention To
●Due to product version upgrades or other reasons, the document content may be updated periodically. Unless otherwise specified, the document content cannot replace the safety precautions in the product label. All descriptions in the document are for guidance only. ●Before installing the device, read this document carefully to understand the product and precautions. ●All equipment operations must be performed by qualified electrical technicians who are familiar with the local standards and safety regulations of the project site. ●When operating the equipment, insulated tools must be used and personal protective equipment (PPE) should be worn to ensure personal safety. Contact with electronic components requires the use of electrostatic gloves, electrostatic wrist straps, or anti-static clothing to protect the equipment from electrostatic damage. ●Damage to equipment or personal injury caused by improper installation, use, or configuration of the device as specified in this document or the corresponding user manual is not the responsibility of the equipment manufacturer.

2.2 System Security

Danger
●When operating the equipment, you must strictly follow the safety precautions specified in this manual and other relevant documentation, as well as the safety labels on the product. ●When operating the equipment, strictly comply with local laws, regulations, and industry standards. ●To protect the equipment from damage during transportation, ensure that the transport personnel are professionally trained. Record the operation steps during transportation and keep the equipment balanced to avoid drops. ●When handling equipment transportation, strictly comply with local regulations and industry standards. Rough handling may cause battery pack short circuits or damage, potentially leading to electrolyte leakage, fire, or explosion. ●This energy storage system is classified as heavy equipment. Use appropriate tools and protective measures during installation and maintenance. Improper operation may cause personal injury or product damage. ●The device contains a dangerous high voltage. Do not touch it. ●Non-professionals must not open cabinet doors or touch internal components without permission, as this may cause electric shock. ●The device may pose risks of electric shock and fire if it is damaged or faulty. Ensure the device is undamaged and fault-free before operating. ●When the device triggers a ground fault alarm, it may contain lethal high voltage, posing an electric shock hazard. ●Before operating the equipment, ensure the system is properly grounded and take necessary protective measures. Otherwise, there is a risk of electric shock. ●Do not open the cabinet door or touch any wiring terminals or components during operation, as this may cause electric shock. ●Ensure all switches are turned off before installation, wiring, or maintenance. ●Do not disassemble or modify any part of the device without official authorization from the manufacturer. Any damage caused by such actions is not the responsibility of the manufacturer.

Warning

- Do not impact, pull, drag, or step on the equipment. Do not use sharp objects to pierce the equipment housing, and do not place unrelated items in any part of the cabinet.
- Select cables that comply with local laws and regulations.
- Ensure that the voltage and frequency of the grid-connected access point meet the grid connection specifications of the energy storage system.
- It is recommended to add protective devices such as circuit breakers or fuses on the AC side of the equipment.
- Do not place the device in a high-temperature environment. Ensure there are no heat sources near the device.

Pay Attention To

- After installation, labels and warning signs on the equipment enclosure must remain clearly visible. Any obstruction, alteration, or damage is strictly prohibited.

2.3 Operator Requirements

Warning

- When operating the energy storage system, wear safety helmets, insulated gloves, insulated shoes, and goggles. Wearing watches or other metal accessories is strictly prohibited.
- Only certified electricians may operate or maintain this product, and a complete set of professional electrical equipment is required.
- can assess assigned tasks and identify potential hazardous events;
- to be able to provide immediate assistance to injured persons;
- Understand the relevant maintenance standards for the product;
- Comply with local laws, regulations, and standards.

2.4 System Operating Environment Safety Requirements

Warning

- Do not install or use this product in environments with temperatures below-20°C or above 50°C.
- Do not install or use this product near any heat source or combustible materials.
- Do not install or use this product in areas with frequent human movement.
- Do not expose this product to corrosive gases or liquids.
- Keep the product away from children and animals;
- The maximum altitude for product installation shall not exceed 4000 meters. If the altitude exceeds 2000 meters, the rated capacity must be reduced.
- Allow enough space for the installation of the product to ensure adequate ventilation;
- A barrier must be set up during installation to prevent any unauthorized personnel from entering the site.

2.5 Safety Requirements for Transportation and Installation

Warning

Personnel Operation Specifications

- Forklifts, cranes, and other construction machinery used during installation must be operated by qualified personnel.

●During installation, operators must wear safety-compliant insulating protective gear.
●When connecting the power supply, a guardian must be designated to protect the switch to be turned off. This guardian should be a fully capable person with electrical expertise.
●During installation, each completed project must be checked once and cross-checked.
●The device must be installed in the correct order.
●Before installing this product, ensure it has no electrical connections.
wiring equipment specification
●Use appropriate measuring devices and follow the standards and instructions for the equipment.
●Before any measurement is taken, the user manual of the measuring equipment must be understood;
Run after installation
●Only after confirmation by professionals and permission from the local power department can it be put into operation.
●Before operation, all power distribution circuit breakers must be turned off. Do not disconnect them during machine operation.

2.6 Daily Maintenance

Warning

●Without authorization for neutralization, the software, casing, and components of the equipment shall not be replaced. Unauthorized replacement will result in the invalidation of the corresponding warranty.
●Do not delete or change the nameplate.
●Do not open the cabinet door in bad weather such as rain, snow, ice and strong wind.

2.7 Product Scrapping

When a product as a whole or a specific internal component shows signs of aging or damage and requires disposal, it should not be treated as regular waste. Some components of the product can be recycled and reused. Improper disposal may cause environmental pollution. Please contact a qualified local professional recycling agency to properly handle the product and its internal components.

3. product presentation

3.1 Product System Overview

This product provides an integrated outdoor energy storage solution for industrial and commercial applications, supporting PV integration, peak shaving, and demand response. Through battery storage technology, it enables efficient power management, storage, and utilization, helping balance energy supply-demand fluctuations and enhance energy efficiency. Its core functionality involves distributing AC power from the grid to storage batteries and inverter outputs, providing services such as peak shaving, load shifting, renewable energy integration, and demand response. Widely applicable in charging stations, factories, industrial parks, and commercial buildings, the system supports multi-unit parallel operation based on specific power requirements.

This product is a system combining high-voltage direct current (HVDC) and three-phase alternating current (AC), featuring modular design for flexible capacity configuration. The systematic safety design ensures efficient and long-lasting battery operation.

The product system topology is as follows:

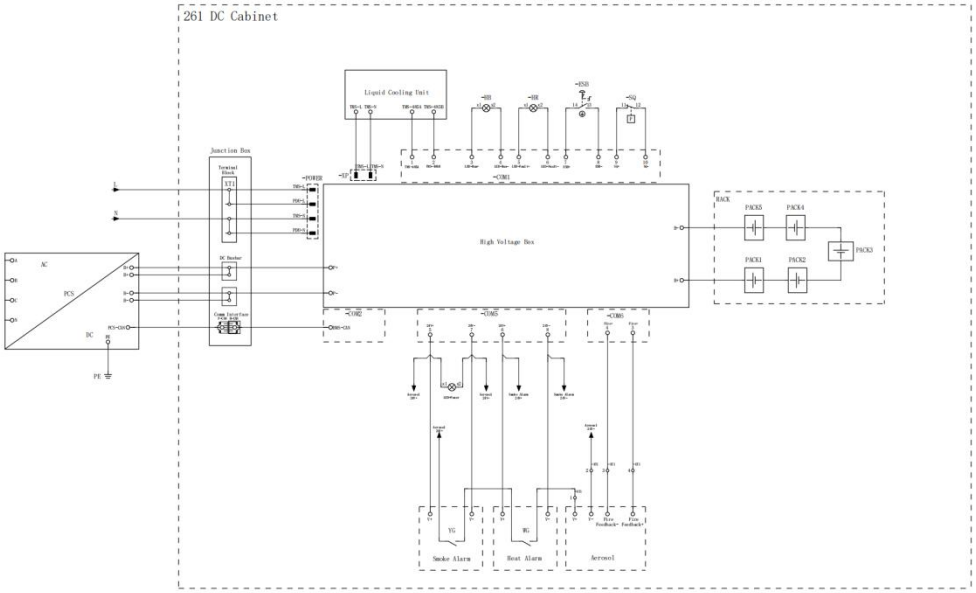


Figure 3-1 System Principle Topology Diagram

3.2 System Composition

1) This product mainly includes the Pack, high-pressure chamber, fire protection system, and liquid cooling system.

2) The fire protection system of this product is equipped with detectors (including built-in smoke and temperature sensors) and aerosol fire suppression systems.

3) This product features multi-level protection devices including circuit breakers, fuses, and contactors, ensuring reliable power disconnection to safeguard both personnel and equipment.

3.3 Technical Parameters

The system parameters are as follows (some parameters may be updated during product optimization and upgrades without prior notice)

Table 3-1 ESS Parameter Table

Cell Parameters	
Cell Type	$LiFePO_4$
Rated Capacity (Ah)	314
Rated Voltage (V)	3.2
Rated Energy (Wh)	1004.8
Module Parameters	
Series-parallel Mode	1P52S
Rated Capacity (Ah)	314
Rated Energy (kWh)	52.249

Operating Voltage Range (V)		140.4 ~ 187.2
Rated Voltage(V)		166.4
Energy Storage Cabinet Parameters		
Series-parallel Mode		1P260S
Rated Voltage (V)		832
Rated Capacity (Ah)		314
Rated Energy (kWh)		261
Operating Voltage Range (V)		728 ~ 936
Working Temperature for Charging (℃)		0 ~ 55
Discharge Operating Temperature (°C)		-20 ~ 55
Recommended Storage Temperature (℃)		0 ~ 35
Noise (dB)		< 75
Dimensions (W*D*H) (mm)		1300*1300*2280
Weight (t)		2.46±0.1
Corrosion Protection Grade		C3/C4/C5 Optional
Levels of Protection	Battery compartment	IP55
	Electric storage room	IP20
Relative Humidity Allowance		0~95% (No Condensation)
Maximum Altitude (m)		≤4000 (Depreciation Rate Above 2000m)
BMS Communication Mode		CAN/RS485
Approval Standards *		IEC62619,IEC63056,IEC60730,UL9540A IEC61000,UN38.3

3.4 System Extension

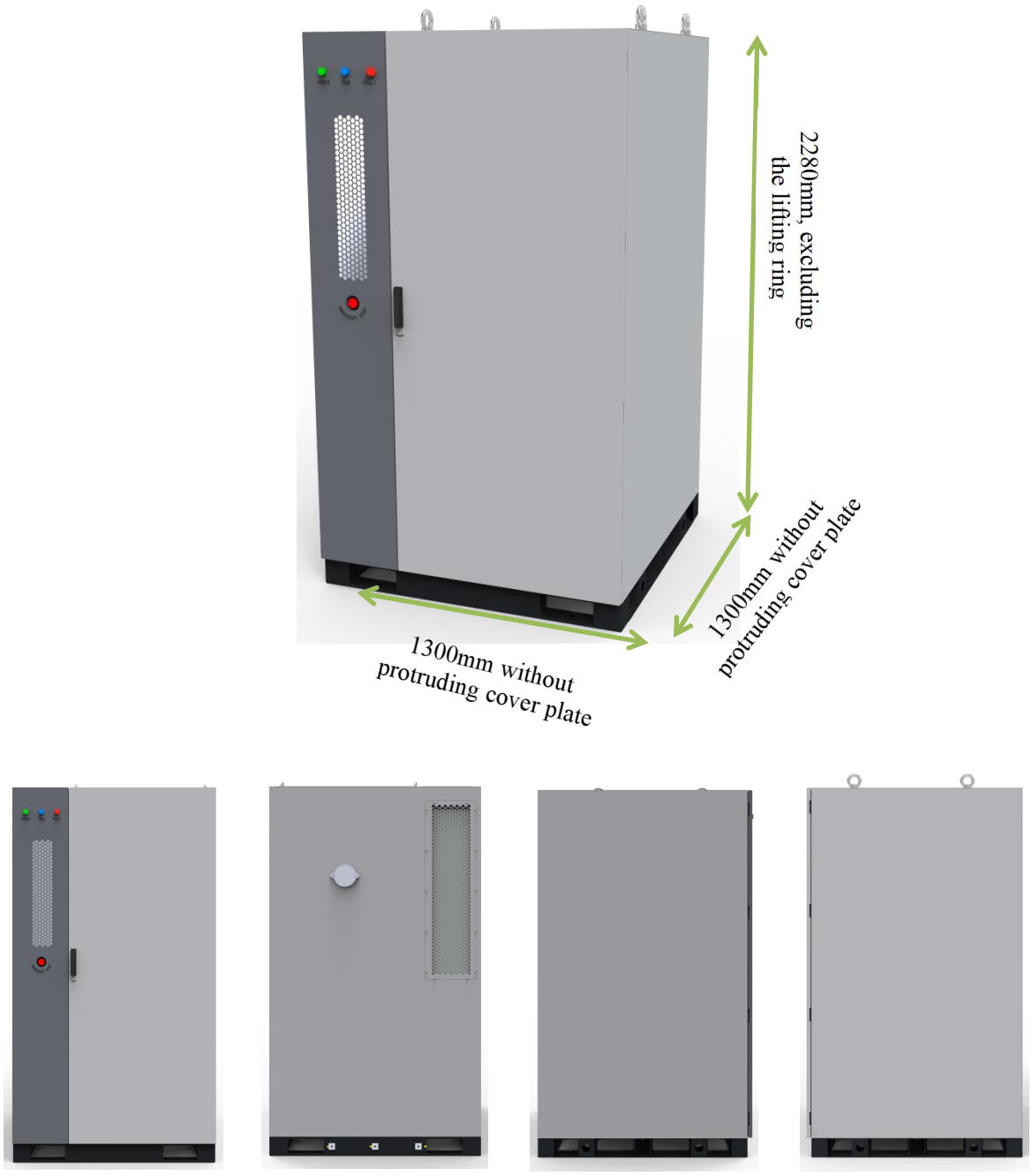
1. The system supports up to 10 parallel systems, with a total capacity of 2.61 MWh.

2. The product features side-by-side splicing installation, with the cabinet supporting both bottom inlet and outlet for easy setup.

3. All external connections of the product are routed to a junction box, from which they are uniformly distributed externally.

3.5 Product Appearance Introduction

- System size: 1300*1300*2280mm
- Net weight of the system: 2.46±0.1 t
- System protection rating: IP54
- System corrosion resistance level: C3/C4/C5 available



Front View Back View Left View Right View

Figure 3-2 Product Appearance Diagram

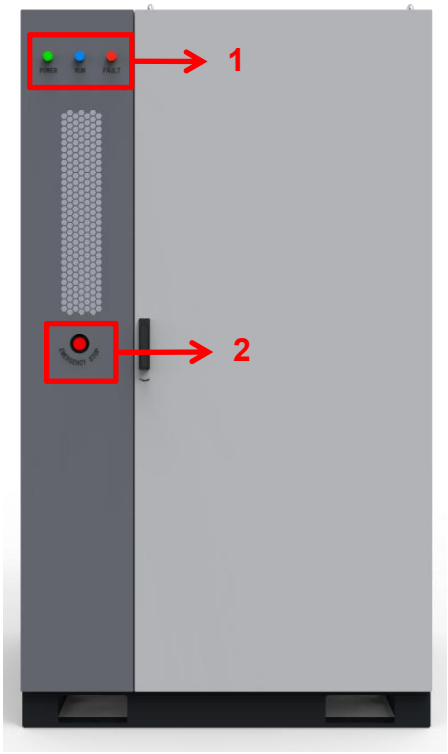


Figure 3-3 Indicator lights and buttons

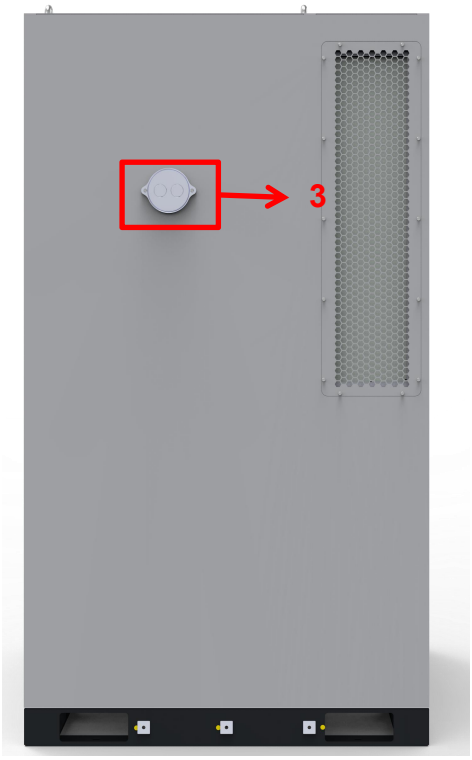


Figure 3-4 Battery compartment vent valve

Table 3-3 Appearance and Function Description

NO.	Name	Function Declaration
1	Pilot Lamp	Power status, operational status, and fault
2	Scram Button	The system stops running after pressing
3	Atmospheric Valve	Adjust the pressure in the battery compartment

Table 3-4 Indicator Light Function Description

Light Color	Name	Function Declaration
POWER	Power Light	On: Power supply is normal; Off: Power supply is abnormal or the device is not powered on
RUN	Running Light	On: The device is running; Off: The device is not running or powered off
FAULT	Trouble Light	Bright: Device malfunction or contactor failure to engage. Off: The device is normal or not powered on

3.6 Product Internal Introduction

The product is divided into three parts: battery system, thermal management system and fire protection system.

3.6.1 Battery System

The battery system consists of a battery module and a high-voltage control box. The battery module is responsible for storing and releasing electrical energy, while the high-voltage control box controls the charging and discharging of the battery.



Figure 3-5 Battery System

NO.	Component	Explain
1	High-Voltage Box	Control the charge and discharge of the battery; Includes a BMS controller that monitors battery voltage, temperature, and fault information.
2	Battery Pack	Cells form modules, which assemble into battery packs for energy storage.
3	Connecting Box	For wiring power cables, communication cables, and auxiliary cables

3.6.2 Thermal Management System

The thermal management system consists of liquid cooling units and liquid cooling pipelines, which are used to cool and heat the battery pack.

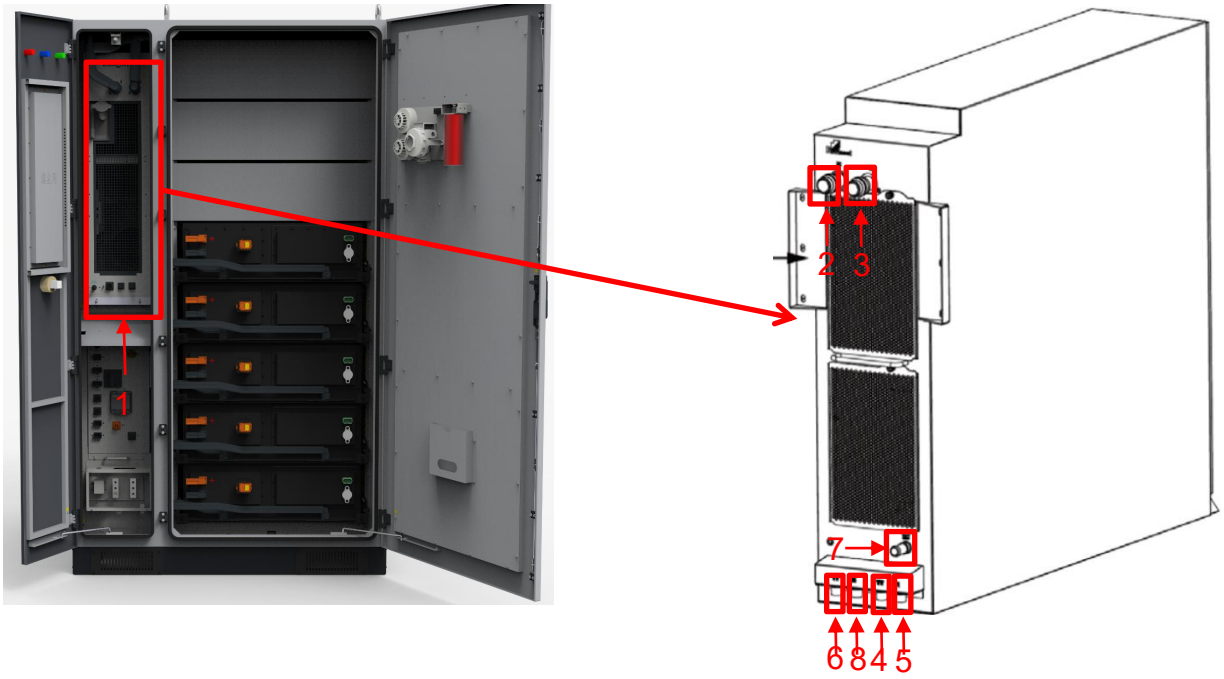


图3-6 热管理系统

NO.	Component	Explain
1	Liquid Cooler	Used for cooling and heating the battery pack
2	Blast-hole	Liquid cooler inlet, interface model: CQC20
3	Delivery Port	Liquid cooler outlet, interface model: CQC20
4	Debugging Interface	Liquid cooling machine debugging interface for connecting the debugging screen
5	Communication Interface	The liquid-cooled machine's external communication interface for interfacing with EMS
6	Power Supply Interface	Liquid-cooled machine power supply interface, providing AC power
7	Injection Port	Liquid cooler injection port, interface model: SAE18
8	Fluid Infusion Pump Power Supply	Power output interface of the fluid replacement device, wiring gauge: 6mm2 copper wire

3.6.3 Fire Protection System

The cabinet is equipped with smoke detectors, heat detectors, and fire extinguishing devices. In the event of a fire, the smoke and heat detectors generate electrical signals to activate the fire extinguishing devices, which then implement fire suppression and transmit feedback signals to the BCU via dry contact.



Figure 3-7 Fire Protection System

NO.	Component	Description
1	Smoke Detector	When a fire breaks out in the energy storage system, the smoke detector detects smoke and sends an electrical signal to the fire extinguishing device to put out the fire.
2	Thermal Probe	When a fire breaks out in the energy storage system, the temperature sensor detects the high temperature and outputs an electrical signal to activate the fire extinguishing device.
3	Aerosol Fire Extinguishing Device	When a fire occurs, the fire extinguishing device activates upon receiving an electrical start signal. The aerosol initiator within the electrical starter fire extinguishing device releases heat through an oxidation-reduction reaction, which decomposes the chemical coolant. This enables the aerosol initiator and coolant to work together in extinguishing the fire. Simultaneously, a feedback signal is transmitted to the BCU.

4. Delivery Transportation and Storage

Table 4-1 Supply List

NO.	Name	Quantity	Remarks
1	All-in-one system	1	
2	User's manual	1	Electronic Edition
3	Certificate of competency	1	
4	Warranty and Service Terms	1	

Warning

●Failure to transport, use, maintain, or store as specified in this manual may void the warranty.

4.1 Check Before Signing

●After receiving the product, check all shipped components against the "Supply List" to ensure completeness.

●Check if the received product model matches the ordered model.

●Please carefully inspect the product for damage. Transportation may cause equipment collisions. If any issues are found, please contact us immediately.Contact our company or the transportation company.

4.2 Transport

4.2.1 Transportation Requirements

●All internal components are pre-installed and secured within the cabinet before shipment, allowing the product to be transported as a complete unit.

●Ensure all cabinet doors are securely locked before transportation.

●For the transportation of individual energy storage cabinets, wooden crates should be designed for packaging, with additional cushioning between the crates and the cabinets.

●Before transportation, warning signs or warning tapes must be installed to prevent unauthorized personnel from entering the lifting and transportation area, thereby avoiding accidents.

●During transportation, remove all obstacles such as trees and cables that may be present or likely to be present.

●When transporting, the weather conditions should be selected as good as possible.

4.2.2 Requirements for transporting mobile equipment

●Select the appropriate lifting tool based on the site conditions, which should have sufficient load -bearing capacity, arm length, and rotation radius.

●Additional traction devices may be required when moving on slopes.

●When transporting vehicles, always secure the product's top ring to the vehicle with ropes to prevent excessive tilting during transit.

Table 4-2 Requirements for Transport Equipment

Tools	Quantity	Requirements Specification
Forklift	1 Vehicle	The load capacity exceeds 5 tons, the fork length is over 1500 mm, and the center-to-center distance of the forks is greater than 600 mm.
Crane	1 Unit	The load capacity ranges from 5 to 8 tons.

4.2.3 Hoisting and Transportation

●When loading and unloading, a crane of appropriate tonnage must be used. For lifting, nylon slings (straps) or steel wire ropes can be employed.

●The lifting process must be carried out in strict accordance with the lifting diagram. For details, refer to Figure 4-1 below.

●Lifting should be performed vertically. Dragging on the ground or pushing/dragging on any surface is prohibited.

●After the cabinet is lifted 300 mm off the ground, movement should be suspended to inspect the connections of the lifting equipment. Lifting can only resume after confirming that the connections are secure.

●During the entire lifting process, proceed slowly, monitor the balance of the cabinet, and avoid excessive movement speed.

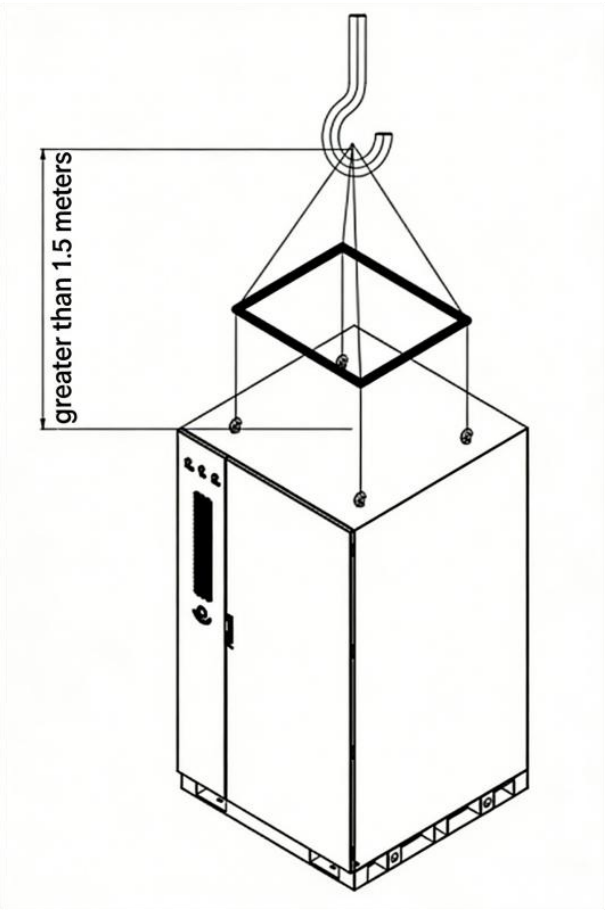


Figure 4-1 Schematic of hoisting

Danger

●No standing within 10 meters of the operation area, especially under the crane boom or moving machinery, to prevent accidents.

Warning

●The lifting ring must be installed on-site, and ensure that the lifting ring bolts are tightened.

●Throughout the lifting process, operators must strictly follow the crane's safety operating procedures.

●If severe weather conditions such as heavy rain, dense fog, or strong winds occur, hoisting operations must be halted.

4.2.4 Forklift Transportation

The product features dedicated forklift transport holes at its base, allowing movement through front and rear holes. When the installation site is level, forklifts may be used for transportation, provided the forklift transport method complies with the following requirements:

●The forklift must have sufficient load capacity, with a minimum recommended capacity of 5 tons.

●The length of the legs must meet the equipment's requirements, with the fork legs measuring at least 1500mm.

●The plug should be inserted into the fork hole at the bottom of the workstation.

●When transporting the product, the movement and lowering should be slow and steady.

●The product must be placed in a stable location. The location should have good drainage and be free of any obstacles or protrusions.

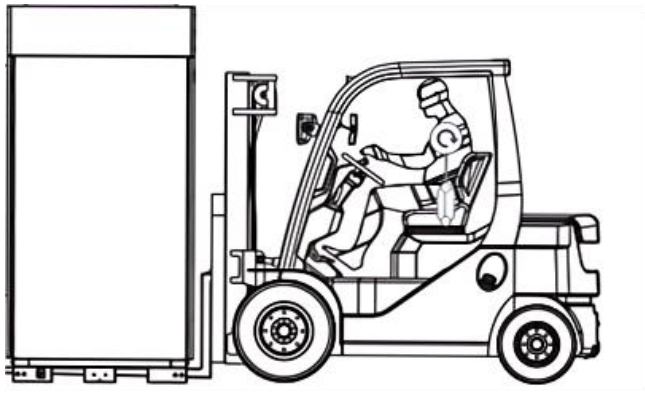


Figure 4-2 Schematic diagram of forklift handling

Danger

●Forklifts are prohibited from accessing the energy storage cabinet through side holes for forklift operation.

4.3 Device Storage

If the energy storage system is not put into use immediately, store it as follows:

Storage environment requirements:

●Storage ambient temperature: -20℃ to +35℃, storage ambient relative humidity: 0% to 95%, no condensation.

●To prevent condensation inside the product or exposure to rainwater, store the product in a higher location.

●The product should be stored in a dry, flat, and adequately load-bearing environment.

●The device should be stored in a cool place, away from direct sunlight.

●The equipment storage should be kept away from flammable, explosive, corrosive and other items.

●Ensure the energy storage system remains undamaged during transportation and storage.

Storage operation requirements:

●The energy storage system packaging wooden box should not be tilted or inverted.

●Before storage, ensure the product cabinet door and all internal equipment cabinet doors are securely locked.

●Protect the product's air inlets and outlets effectively to prevent rainwater, dust, and sand from entering the cabinet interior.

●Batteries experience capacity degradation with prolonged storage, so long-term storage is not recommended. For storage exceeding 30 days, the battery SOC should be maintained at 30%~45% and a full charge/discharge cycle should be performed every three months.

●Prior to installing products intended for long-term storage, the cabinet door should be opened for visual inspection to ensure there is no condensation on the exterior and to confirm that the cabinet body and internal equipment are intact. Additionally, the system must be powered on and activated for inspection. If necessary, professional testing by qualified personnel should be conducted before installation.

5. Install

Only certified engineers are authorized to perform electrical connection work. Please strictly follow all safety guidelines in this manual. The company shall not be held liable for any personal injury or property damage resulting from failure to comply with these safety requirements.

Danger

●Do not touch live parts under any circumstances.

●Ensure both AC and DC sides are de-energized, and all electrical connections must be performed when the equipment is completely de-energized.

●Before wiring, verify the polarity and phase sequence of all input cables to ensure each input channel is correctly configured.

●Do not place the device on flammable surfaces.

Warning

●Sand and moisture may damage the electrical equipment in the energy storage system or impair its operational performance.

●Avoid electrical connections during sandstorms or when ambient humidity exceeds 95%.

●During electrical installation, avoid pulling cables or wires forcefully to prevent insulation damage.

Pay Attention To
●All cables and wiring must allow for adequate bending clearance. ●Take necessary auxiliary measures to reduce the stress on cables or wires. ●After each wiring step, conduct a thorough inspection to verify proper and secure connections. ●All electrical connections must be made in strict accordance with the wiring requirements.

5.1 Installation Environment Requirements

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

Project	Environmental requirements
Installation site requirements	Areas with good ventilation and high airflow
	Appropriate fireproofing, waterproofing, and rodent-proofing measures are required.
	Surface slope ≤1°, seismic resistance>8
Foundation requirements	The installation surface must be flat and dry, with no standing water allowed on the ground.
	Ensure the ground remains level and stable, capable of supporting the weight of the energy storage equipment.
Space requirement	Sufficient space must be maintained in front, behind, left, right, and above the equipment for ventilation, maintenance, and evacuation.
Ambient temperature	-20 - +50℃
Relative humidity	≤95%, no condensation
Above sea level	≤4000m, operation at reduced capacity above 2000m

5.2 Installation Space Requirements

To ensure optimal heat dissipation and equipment maintenance, it is recommended to reserve sufficient space around the cabinet installation area.

●The front space reservation distance of a single product should be no less than 1800mm.

●The reserved distance on the back of a single product should be no less than 500mm.

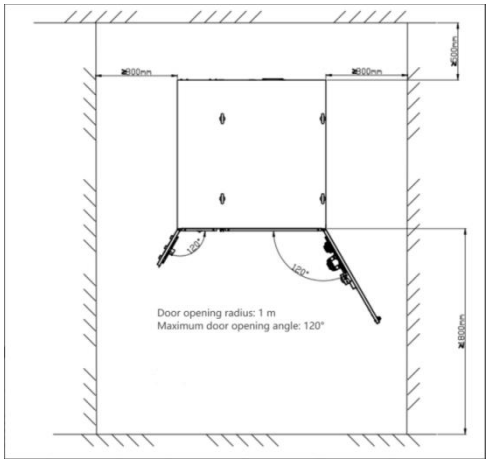


Figure 5-1 Single Cabinet Installation Distance

Space requirements for multi-machine parallel scheme:

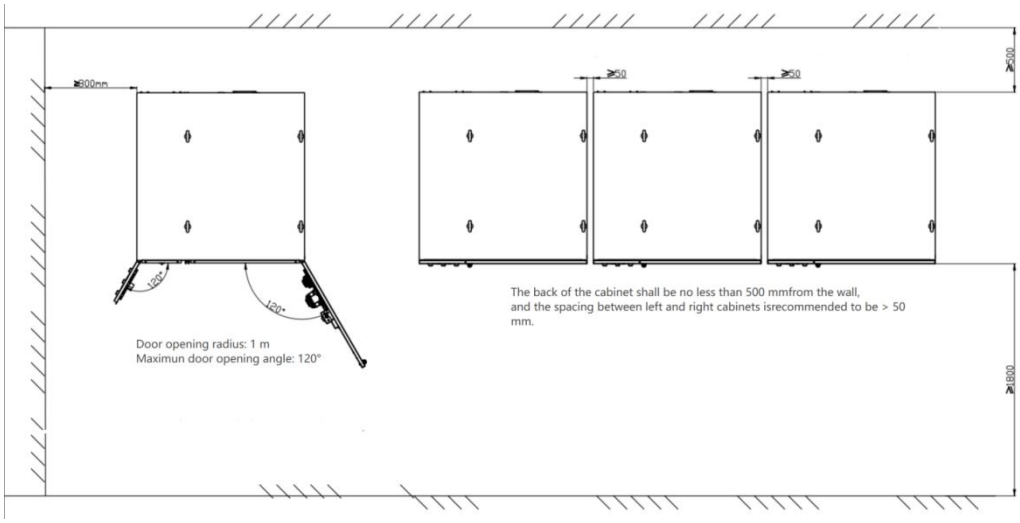


Figure 5-2 Multiple Cabinet Installation Distance

5.3 Equipment Ventilation Requirements

Energy storage devices generate significant heat during operation. Excessive temperature can degrade their electrical parameters and potentially cause damage.

Warning

- The device shall be installed in a well-ventilated environment.
- The air intake must ensure sufficient fresh air supply.
- The ventilation system of the equipment is recommended to be separated from other ventilation systems in the operating room.
- If the device overheats, check the ventilation port for proper airflow.
- Ensure there are no trees around the installation site to prevent strong winds from knocking down branches or blowing leaves that could block the product's air intake.

5.4 Installation and Fixing

5.4.1 Pre-installation Inspection

Warning

- During the entire mechanical installation process, strict compliance with the relevant standards and requirements of the project location is mandatory.
- The product cabinet and its equipment are intact and undamaged.
- Inspect the internal accessories of the packaging box and verify the completeness of items according to the checklist.

5.4.2 Installation of Energy Storage System

Pay Attention To

- Ensure the energy storage equipment is vertically aligned with the foundation to prevent tipping.
- Ensure the energy storage system is securely installed to prevent tipping and potential injuries.

Energy storage cabinet installation steps:

Step 1: As shown in Figure 5-3, use a marker pen to mark the drilling positions on the horizontal ground according to the base hole drawing.

Step 2: Drill a hole with a 15mm-diameter impact drill to a depth of approximately 70mm, then install the expansion bolt.

Step 3: Position the energy storage system at the designated hole and tighten the expansion bolts with a socket wrench.

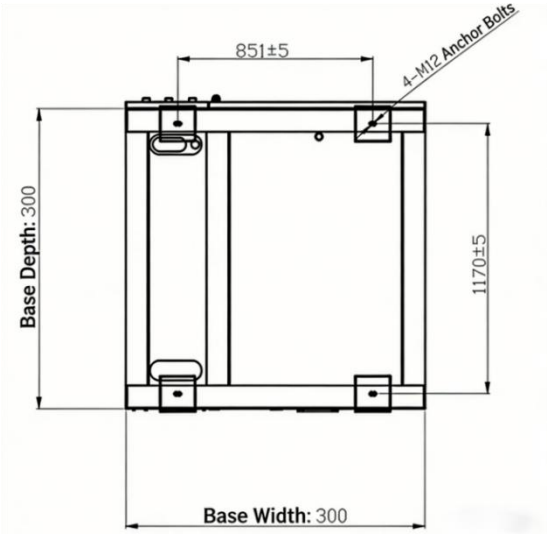


Figure 5-3 Base fixing hole size

6. Electrical Connection

6.1 Safety Precautions

danger

●All operations during electrical connection, including cables and component specifications, must comply with local laws and regulations.

●Ensure all upstream switches of the energy storage system are disconnected before connecting electrical cables.

●Before making electrical connections, disconnect the AC switch and battery switch of the energy storage system to ensure the equipment is powered off. Do not operate under power, as it may cause electric shock or other hazards.

●Cables of the same type should be bundled together and arranged separately from those of different types, with no mutual entanglement or cross-laying allowed.

●Excessive tension on the cable may cause poor wiring. Always leave a safe length of cable before connecting it to the energy storage system's terminal.

●When crimping terminal blocks, ensure full contact between the cable conductor and the terminal block. Never crimp the insulation layer with the terminal block, as this may cause equipment failure or, after operation, generate heat from unreliable connections, potentially damaging the energy storage system's terminal block.

●Cables exposed to high temperatures may experience insulation aging or damage. The distance between cables and the periphery of heat-generating components or heat sources must be at least 30mm.

pay attention to
●When performing electrical connections, wear personal protective equipment such as safety shoes, protective gloves, and insulating gloves as required. ●Only authorized personnel are permitted to perform electrical connection operations. ●The specific cable specifications must comply with local regulations. ●The user manual recommends copper wire specifications for communication cables. ● Copper wire is recommended for communication link.

6.2 Preparation of Installation Tools

The tools used for connecting cables in the energy storage cabinet are as follows:

Table 6-1 Installation Tool List

NO.	Tool name	Legend
1	Insulating Gloves	
2	Eye Shield	
3	Insulant Shoe	
4	Coverall	
5	Safety Helmet	
6	Bolt Driver	
7	Connection Over Cutting Pliers	
8	Hydraulic Wrench	
9	Heat Gun	
10	Multimeter	
11	Torque Spanner	

6.3 Cable and Connector Requirements

The following cable and connector specifications apply to energy storage cabinets:

Table 6-2 Cable and Connector Models

NO.	Type	Wiring specifications	Connector model
1	protective ground	hot-dip galvanized flat steel	/
2	power line	conductor cross-sectional area is ≥70 mm².	Positive: 10-781523-0000 Orange Anode: 10-781523-1002 Black
3	accessory power supply	conductor cross-sectional area is ≥6 mm².	GR61604PAHEC-U
4	Communication line	conductor cross-sectional area is ≥2 mm².	USCM008-018 USCM008-010

6.4 Cable Installation

6.4.1 Protection Area Connection

As shown in Figure 6-2, the energy storage cabinet's rear base features three protective grounding points. Select one point for connection based on actual conditions. For cable, terminal, and torque requirements, refer to Section <6.3 Cable and Terminal Requirements> in this chapter.



Figure 6-1 Protective Grounding Point of Energy Storage Cabinet

Warning

- To improve the corrosion resistance of terminals, it is recommended to apply silicone sealant or paint as a protective coating on the exterior of grounding terminals after the flat steel grounding connection is completed.
- The energy storage cabinet features three protective grounding points, allowing users to connect any one according to their specific needs.
- The specifications of grounding flat steel must be determined by the design institute's calculations, and the flat steel must be provided by the user.

6.4.2 Power cables,auxiliary power supply,and communication cable connections

As shown in Figure 6-3, connect the power line (red-marked), auxiliary power line, and communication line (blue-marked) from the electrical compartment inlet of the energy storage system to the junction box.

1. The neutral and live wires of the auxiliary power supply are connected to the "1x" terminal in each group.

2. The positive and negative power lines (P+/P-) of both groups are secured using M8 terminals to the positive terminal 2 and negative terminal 3 of the junction box's busbar.

3. A set of PCS communication cables can be connected to the communication interface in the junction box using RJ45 crystal connectors.

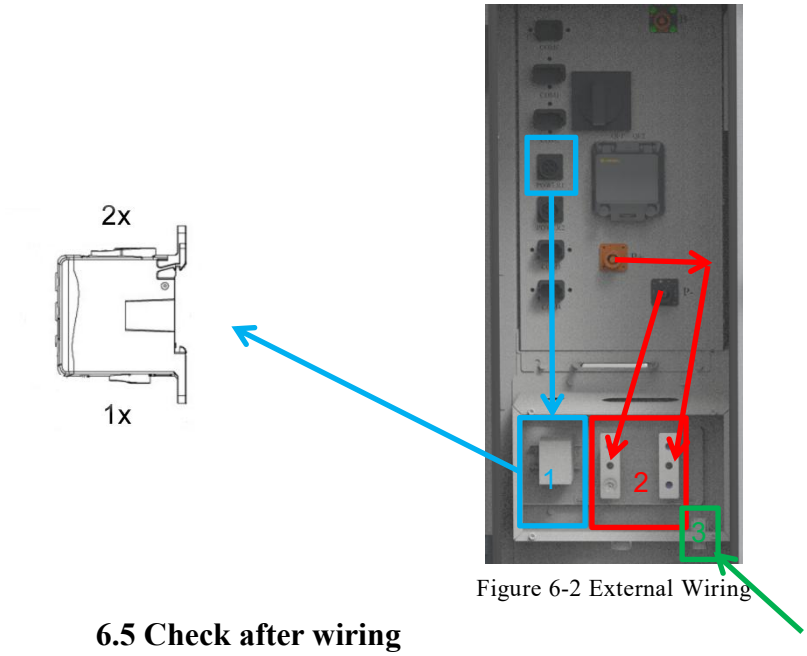


Figure 6-2 External Wiring

6.5 Check after wiring

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

Table 6-3 Installation Checklist

NO.	Inspection Item
1	The positive and negative connection between the battery pack and the high-voltage box, and the communication cable harness sequence are correct and fastened.
2	The external control cable, grounding wire and communication cable have been fastened.
3	Clean the installation area to ensure no tools or foreign objects are left behind.
4	Fireproof mud seals cable gaps to prevent small animals from entering.

7. Power-on Procedure

7.1 Pre-power-on Check

1. Check whether the circuit breaker in the electrical compartment of the integrated energy storage battery cabinet is open.

2. Inspect 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 and power supply harnesses, along with the power cables, are properly connected on the high-voltage box panel.

7.2 Power-on Steps

1. Verify that the communication lines, power lines, and auxiliary power supply lines on the high-voltage box are properly connected and free from looseness.

2. Connect the auxiliary power and close the micro-breaks QF1 and QF2 in the high-voltage box. The equipment will then be powered on, with both the power and fault indicators lighting up, and the liquid-cooled machine will start.

3. The BMS will automatically close the contactor in the High-Voltage Box, turning off the FAULT indicator, closing the isolating switch and extinguishing the fault indicator light.

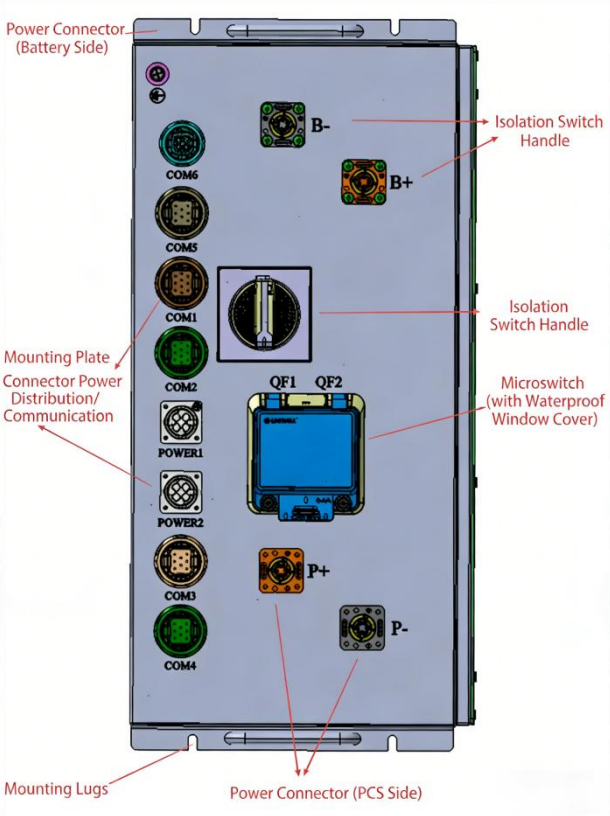


Figure 7-1 Schematic diagram of high-voltage box

Note:

1. After power-on, the cabinet power indicator remains constantly lit, and the operation indicator will light up when charging or discharging is in progress.

2.The fans of the liquid-cooling unit operate normally, with normal return water flow and a water level not lower than the minimum value.

3.After the system self-check passes, and there are no alarms in the internal BMS communication or liquid-cooling unit communication, charging and discharging can be performed.

Warning

●During the entire mechanical installation process, strict compliance with the relevant standards and requirements of the project location is mandatory.

●The product cabinet and its equipment are intact and undamaged.

●Inspect the internal accessories of the packaging box and verify the completeness of items according to the checklist.

8. System Usage Requirements

8.1 Requirements for Normal Operation of the System

●Perform battery maintenance every 12 months to prevent damage.

●The system shall be inspected every 12 months, and inspection records shall be maintained.

●When the battery cannot operate under long-term full charge and discharge conditions without SOC calibration, perform periodic SOC calibration based on actual operating conditions.

8.2 System Usage Requirements for Extended Use

The recommended SOC range for energy storage batteries is 20% to 50%. Avoid storing cells below 15% SOC for extended periods, and disconnect power-consuming devices when batteries are idle.

●Conduct a monthly inspection of the energy storage system and document the findings.

●Perform battery maintenance every three months to prevent damage.

●Before the first use of the long-term storage system, the battery must undergo at least one full charge to restore its performance to optimal levels.

Warning

●Prolonged disuse of energy storage systems can cause irreversible damage to batteries. Please ensure regular maintenance.

8.3 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 provided for reference purposes. Actual maintenance cycles should be determined based on the specific environmental conditions at the site. For energy storage equipment 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, if the equipment is installed in desert areas, it is recommended to conduct thorough inspections and clean both the interior and exterior after each sandstorm. For installations in coastal or high-precipitation areas, it is advisable to place the energy storage cabinet under a rain shelter.

8.4 Maintenance of Outdoor Cabinets

Maintenance cycle	Maintenance type	inspecting item	test method
15 years	fire extinguisher system	aerosol fire extinguishing device	Replace with a new aerosol fire suppression device
10 years	fire extinguisher system	heat and smoke detector	Replace the temperature and smoke detectors
3 years	liquid cooling device	coolant replacement	Change the coolant
		Compressor inspection	The compressor is operating normally. High and low pressure sensors and temperature sensors are functioning normally
		insulation inspection of unit	Check whether the insulation, voltage resistance, and waterproof sealing of the electrical components have aged. If aged, replace the sealing strips with new ones.
1 year	Cabinet and structural components	System status and cleaning	1. Inspect the cabinet and internal equipment for damage or deformation 2. Check for abnormal noise during the operation of internal devices 3. Check if the temperature in the cabinet's electrical compartment is too high 4. Check if the air inlet and outlet filters in the cabinet's electrical compartment are clogged 5. Check for water accumulation inside the cabinet
		Warning label	Check if warning signs and labels are clearly visible and free of stains. If damaged, replace with a new label
	Electrical components	equipment maintenance	Maintenance of Circuit Breakers/Isolators, Contactors and Surge Protectors 1. Perform routine inspection of corrosion on all metal components 2. Conductors/Isolating Switches and Contactors shall undergo annual inspection (including auxiliary switches and micro switches) to ensure proper mechanical operation. 3. Inspect insulation and voltage withstand capability on both AC and DC sides 4. Inspect the surge protector for cracks, deformation, or physical damage. Check the wiring for integrity, ensuring cable joints and terminals are free from oxidation. Verify the grounding wire is securely fastened and the installation surface is clean, free from dust, oil stains, or other contaminants. 5. Maintain cleanliness in the electrical compartment area, ensuring it is free from dust and standing water.
	liquid cooler	Clean and tidy up	1. Clean the plug, terminals, and mesh holes. 2. Clean the ventilation baffle 3. Inspect the fan for abnormal noises, dust accumulation, or foreign object obstructions. 4. Check that the connector is securely inserted and not loose.

		Check of compressor unit	1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise. 1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise.
		Pipeline assembly inspection	1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage. 1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage.
		coolant inspection	Viewing the water supply pressure of the liquid cooling machine through the manual control panel
6 months	Cabinet and structural components	safety function	1. Check the warning signs and other equipment labels. Replace them if they are blurred or damaged. 2. 2. Check the emergency stop button's functionality 3. Inspect and clean the air inlet and outlet filters 4. Inspect the cabinet exterior for any rust spots
	BMS	BMS module	1. Check that the connector is properly inserted and not loose. 2. Verify that the power supply voltage falls within the specified range 3. Check whether the contactor operates normally
		Connectors	Check and confirm that the wire and connectors are free from damage, needle loss, rust, or corrosion.
	liquid cooler	Clean and tidy up	1. Clean the plug, terminal, and mesh. 2. Clean ventilation flap 3. Check for any abnormalities in the fan, including dust or foreign object blockage. 4. Ensure the connector is securely inserted and not loose
		Check of compressor unit	1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise. 1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise.
		Pipeline assembly inspection	1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage. 1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage.
		coolant inspection	Viewing the water supply pressure of the liquid cooling machine through the manual control panel
3 months	fire extinguisher system	Check the detection device	1. Make sure they are installed in the correct position 2. Make sure they are not damaged. 3. Make sure they are clean and not covered with grease, dust, paint, or any other dirt. 4. Test the sensitivity of each detector according to the manufacturer's instructions.

		Check all alarm devices	1. Check for dust accumulation 2. Inspect for corrosion 3. Check for damage
		Check all components	1. Look for signs of damage 2. Locate the disconnected components and reconnect them to the system 3. Identify loose connections and tighten them 4. Check for corrosion 5. Identify twisted or dented components
		Check fire extinguisher condition	1. Check whether the fire extinguisher is securely installed 2. Inspect for corrosion 3. Check for damage 4. Check for missing parts
	liquid cooler	Clean and tidy up	1. Clean the plug, terminal, and mesh. 2. 2. Clean the ventilation baffle 3. 3. Inspect the fan for abnormalities, and check for dust or foreign object blockage. 4. Check that the connector is securely inserted and not loose.
		Check of compressor unit	1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise. 1. The condenser must be thoroughly cleaned and free of obstructions. 2. Monitor the compressor's operation and the liquid cooler's performance without detecting any noticeable noise.
		Pipeline assembly inspection	1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage. 1. Inspect the liquid cooling pipeline and vent valve for damage. 2. Ensure the pipeline is securely fastened without looseness and no liquid leakage.
		coolant inspection	Viewing the water supply pressure of the liquid cooling machine through the manual control panel
1 month	BMS	System Alarm and Fault Troubleshooting	View system alarm information and troubleshoot corresponding faults via the BMS host computer
	cell	SOC demarcate	A standard full charge and discharge cycle test must be performed. The software will automatically calibrate based on the actual application site to determine the maintenance frequency. It is recommended to perform a full charge and discharge cycle every 3 months if daily operation is not feasible, or once a month if daily operation is not possible.