261kWh
Energy Storage Liquid-Cooled DC Cabinet
Product User Manual V6.2

December 2025

Preface

Dear User:

Hello!

Thank you very much for purchasing the Energy Storage System product from Zhejiang Boshi New Energy Technology Co., Ltd. (hereinafter referred to as the product). To ensure your legal rights and to use this product safely and correctly, please read the entire user manual carefully before installation and operation.

This user manual contains a series of contents including installation, operating instructions, and common troubleshooting. During the compilation process, we have thoroughly verified the content of this manual. If you have any questions during use or find any deficiencies or errors, please feel free to contact our company directly. If you have any different interpretations of this user manual, the explanation provided by our company's Technical Department shall prevail.

Please keep this user manual properly for future reference.

The manual content will be continuously updated, corrected, and upgraded. If you find any discrepancies with the actual product, please refer to the product you purchased or obtain the latest version of the manual through the sales channel. Without written permission from our company, no one may copy or reproduce the content of this manual in any form; otherwise, it will be regarded as infringement.

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Table of Contents

Preface Speech 2

1. Introduction 5

1.1. Abbreviations 5

1.2. About the Manual 6

2. Safety Instructions 6

2.1. Safety Signs 6

2.2. Description 8

2.2.1. General Requirements 8

2.2.2. Personal Safety 12

2.2.3. Electrical Safety 14

2.2.4. Mechanical Safety 16

2.2.5. Product Safety 18

3. Product Introduction 21

3.1. Product Overview 21

3.1.1. Energy Storage System Appearance 23

3.1.2. High Voltage Cabinet 25

3.1.3. ESMU 26

3.1.4. Liquid Cooling Unit 27

3.1.5. Fire Protection System 29

3.1.6. Energy Storage System Electrical Topology Diagram 31

4. Packaging, Transportation and Storage 33

4.1. Packaging 33

4.2. Transportation 33

4.3. Storage Requirements 36

4.3.1. Energy Storage System Storage 36

5. Site Requirements 38

5.1. Site Selection Requirements 38

5.2. Space Requirements 43

5.3. Foundation Requirements 44
5.4. Forklift Requirements 47
5.5. Lifting Requirements 47
6. Unpacking Inspection 50
7. Equipment Installation 52
7.1. Preparation Before Installation 52
7.1.1. Tool Preparation 52
7.1.2. Pre-installation Inspection 53
7.1.3. Protective Ground Installation for the Energy Storage System 54
8. Install Wiring 56
8.1. AC Wiring of the Energy Storage System 58
8.2. DC Wiring of the Energy Storage System 59
8.3. Ground Wiring of the Energy Storage System 59
9. Power On/Off Procedures 62
9.1. Inspection Before Power On 62
9.2. System Power On 63
9.3. System Power Off 64
10. Fault Diagnosis and Maintenance 65
10.1. Precautions Before Maintenance 65
10.2. List of Safety Tools 65
10.3. Maintenance Tools 67
10.4. Key Points of Routine Inspection 68
10.5. Common Maintenance Items and Requirements 69
10.6. Common Faults and Solutions 71
11. Warranty 74
11.1. Warranty Terms 74
11.2. Disclaimer 75

1. Introduction

1.1. Abbreviations

AC Alternating Current

DC Direct Current

HV High Voltage

LV Low Voltage

ESMU Control and Management Host

BMS Battery Management System

BCU Battery Control Unit

BMU Battery Management Unit

ESS Energy Storage System

BOL Beginning of Life

EOL End of Life

CAN Controller Area Network

I/O Input/Output

MSD Maintenance Switching Device

IP Protection Level

UPS Uninterruptible Power Supply

1.2. About the Manual

This user manual provides detailed product information and installation instructions for the 261kWh (1P260S) energy storage liquid-cooled DC cabinet system. Hereinafter, “this manual” refers to the “261kWh (1P260S) Energy Storage DC Cabinet System Product User Manual,” and “Energy Storage System” refers to the “261kWh (1P260S) Energy Storage DC Cabinet System.” Please read this manual carefully before using this product.

This manual applies to personnel responsible for the installation, operation, maintenance, and related tasks of the Energy Storage System. Readers must have certain professional knowledge of electrical, electrical wiring, and mechanical fields, be familiar with the characteristics of electronic components, and have a thorough understanding of electrical and mechanical drawings.

2. Safety Instructions

2.1. Safety Signs

To ensure the personal and property safety of users during the installation of this product and to enable effective and optimal use, this manual provides relevant information and emphasizes important points with appropriate symbols.

The following is a list of symbols that may appear in our products or this manual to indicate potential hazards to equipment or personnel. Relevant procedures or practices must be followed. Failure to correctly implement or heed these symbols may cause partial or complete damage or destruction of the equipment, harm to other related devices, or even personal injury.

Safety Signs	Description
	This symbol indicates danger that, if not avoided, may result in risk of injury.
	This symbol indicates high voltage inside the equipment; contact may cause electric shock.
	This symbol indicates that the temperature at its location exceeds the acceptable range for the human body. Avoid touching to prevent personal injury.
	This symbol indicates the location of the Protective Earth (PE) point, which must be firmly grounded to ensure the safety of operators.
	This side up. This is the correct upright position for the distribution package during transport and/or storage.
	Read the operation manual. Indicates that the operation manual or instruction card must be read before proceeding.
	Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC). Indicates that when the end user intends to dispose of this product, it must be taken to an appropriate facility for recycling.
	Three chasing arrows recycling symbol. The battery must be recycled or disposed of properly.
	UN3536. Indicates the goods are Class 9 hazardous materials with UN number 3536.
	Forklift Prohibited. Forklift operation and transportation of containers (or container products) is prohibited.
	Overweight. The container (or container product) is heavy; operators are reminded to handle with care.

Definitions of “ Danger,” “Warning,” and “Caution” symbols:

Danger	
Danger indicates a hazardous situation that will result in death or serious injury if not avoided.	
Warning	
Warning indicates a hazardous situation that could result in death or serious injury if not avoided.	
Caution	
Caution indicates a hazardous situation that could result in minor or moderate injury if not avoided.	

For safety reasons, installers are responsible for familiarizing themselves with the contents of this manual and all warnings before the installation process.

2.2. Description

2.2.1. General Requirements

The “Danger”, “Warning”, and “Caution” statements in this manual are supplements to the safety instructions and do not cover all safety measures that must be followed. No responsibility is assumed for any consequences resulting from violations of general safety requirements or the safety standards for equipment design, manufacture, and use.

This product must be used in an environment that meets its design specifications. Otherwise, the equipment may malfunction. Equipment failures, component damage, personal injury, or property loss resulting from such use are not covered by the warranty.

During the installation, operation, and maintenance of the equipment,

local laws, regulations, and standards must be observed. The safety precautions in this manual serve only as a supplement to local laws, regulations, and standards.

No liability will be assumed for any consequences resulting from the following situations:

1) Operation beyond the conditions specified in this document.

2) Installation and usage environments that do not comply with relevant international and national standards.

3) Unauthorized disassembly, product modifications, or software code changes.

4) Operations conducted without following the product operating instructions, safety warnings, and related documentation.

5) Equipment damage caused by abnormal natural events (such as earthquakes, fires, typhoons, or other force majeure).

6) Transport damage caused by the customer’s failure to comply with transportation requirements.

7) Damage caused by storage conditions not meeting the product documentation requirements.

Danger	

General Safety:

1) Do not install, use, or operate outdoor equipment and cables under severe weather conditions such as lightning, rain, snow, or strong winds (including but not limited to handling equipment, operating equipment and cables, plugging and unplugging and connecting outdoor signal interfaces, working at heights, and outdoor installation).

2) Before touching any conductor surface or terminal, voltage must be measured to ensure there is no electric shock hazard.
   In the event of fire, you should evacuate the building or equipment area and activate the fire alarm or call the fire department. Under no circumstances should you re-enter a burning building.

3) Do not disable any protection devices.

4) It is strictly prohibited to manually alter, damage, or obstruct the labels and nameplates on the equipment.

5) Live work is strictly prohibited during installation.

6) Do not clean the electrical components inside or outside the cabinet with water.

7) Unauthorized changes to the structure and installation sequence of the equipment are not permitted.

8) You must not reverse engineer, decompile, disassemble, dismantle, adapt, implant, or otherwise derive from the device software. You must also not study the internal implementation, obtain the device software source code, steal intellectual property, or disclose any results of device software performance

tests.

Personal Safety:

1) If there is a possibility of personal injury or equipment damage during operation, you must immediately stop the operation, report the situation to the supervisor, and take feasible protective measures.

2) Do not touch live equipment to avoid electric shock and burns.

3) Do not power on the equipment until the installation process is complete or the equipment has been confirmed by Professional Personnel.

Warning

1) During installation, operation, and maintenance, to avoid electric shock and burns, do not wear conductive items such as watches, bracelets, anklets, rings, or necklaces.

2) Special protective equipment such as insulated gloves, goggles, protective clothing, safety helmets, and safety shoes must be worn.

3) Installation, operation, and maintenance must be carried out strictly according to the steps and sequence in the manual; never disregard any warnings, cautions, or precautions in the manual or on the equipment.

4) Danger labels that have become blurred due to long-term use must be replaced promptly.

5) During installation, unauthorized personnel are prohibited from entering. Tools used must have insulated handles or be an insulation tool.

6) All wiring holes must be sealed, and the sections containing wires must be sealed with fire-resistant sealant.

7) During installation, a properly rated torque wrench must be selected, and

screws must be tightened according to the torque specified in the manual.

8) Before using the tools, fully understand the correct operating procedures to avoid injury to personnel or damage to the equipment.

Caution	

1) After completing the equipment installation, promptly remove all empty packaging materials from the equipment area, such as cartons, foam, plastic, and cable ties. If these materials remain in the equipment area for an extended period, they may interfere with the equipment's normal operation and potentially create safety hazards.

2) Furthermore, paint scratches incurred during transportation and installation must be repaired immediately to prevent prolonged exposure to outdoor conditions, which could worsen the damage or cause corrosion of the equipment surface.

3) Before operating the equipment, always ensure the equipment is securely fixed to the floor or other stable object to prevent movement or tipping, ensuring operational safety.

2.2.2. Personal Safety

Caution	

1) Personal Protective Equipment Safety (PPE)

- Safety Boots:Select S1 safety boots compliant with BS EN

ISO 20345:2011 to ensure foot protection.

- Electrical Gloves: Choose low voltage or high voltage gloves based on voltage level, compliant with ASTM D120 specifications and NFPA 70E standards.
- Safety Glasses: Use impact-resistant safety glasses to prevent injury from splashes and debris.
- Helmet: Select an electric arc protective helmet with a fire resistance rating of 100 cal/cm².
- Face shield: Use an electric arc protective face shield with a fire resistance rating of 100 cal/cm² to protect the face and neck.
- High-visibility vest: Ensure operator visibility in low-light environments.
- Rescue rod: Use an insulated rod for rescue operations to ensure the safety of the rescuers.

2） Thoroughly familiarize yourself with the product's components and operating principles, as well as the relevant standards of the country or region where the project is located.

3） Personnel responsible for installation or maintenance must undergo comprehensive training, understand all necessary safety precautions, and be capable of correctly performing all operations.

4） Only qualified professional personnel or trained personnel are permitted to install, operate, and maintain the equipment.

5） Only qualified professional personnel are allowed to remove safety covers and inspect the equipment.

6） Personnel operating the equipment, including operators, trained personnel, and professional personnel, must possess the qualifications required by local national regulations for special operations such as high-voltage operation, work at

heights, and special equipment operation.

Only professional personnel or authorized personnel are permitted to replace the equipment or components (including software).

Professional personnel:Individuals who have received equipment operation training or have experience, and who are aware of the various potential hazards and their severity involved in the installation, operation, and maintenance of the equipment.

Trained Personnel: Individuals who have received technical training, possess the required experience, understand the potential hazards to themselves during certain operations, and are capable of implementing protective measures to minimize harm to themselves and others.

Operators: Personnel who may come into contact with the equipment during operation, excluding trained personnel and Professional Personnel.

2.2.3. Electrical Safety

Danger	

Lockout/Tagout:

1) Always adhere to the lockout/tagout procedures before performing maintenance on the ESS to ensure personnel are not exposed to accidents caused by unexpected energization or hazardous energy.

2) To prevent personal injury or death due to accidental operation, faults, maintenance-related conditions, or unauthorized personnel, do not touch any devices inside the enclosure and keep the enclosure doors closed unless you are an authorized employee meeting personal protective equipment (PPE) requirements and wearing suitable clothing and footwear. Ensure all equipment is properly grounded.

3) Unless authorized personnel unlock it when necessary, the ESS energy

device shall be isolated and kept in a locked or off position. These lockout measures cannot be removed without a key or by special means (such as using bolt cutters).

Grounding requirements:

1） For equipment that must be grounded, install the grounding cable first when installing the device, and remove the grounding cable last when removing the device.

2） Do not damage the grounding conductor.

3） Do not operate the equipment before installing the grounding conductor.

4） The equipment shall be permanently connected to protective ground. Before operating, verify its electrical connection to ensure secure grounding.

5） The equipment’s grounding resistance requirement is less than 4Ω.

General Requirements:

Before performing electrical connections, please ensure the equipment is intact. Otherwise, electric shock or fire may occur.

1) All electrical connections must comply with local electrical standards.

2) Permission from the local power authority must be obtained before grid connection operations.

3) The cables you prepare must comply with local laws and regulations.

4) Special insulation tools must be used when operating under high voltage.

5) Do not connect or disconnect power cables while the power is on. Instantaneous contact between the cable cores and conductors can generate an electric arc or spark, which may cause fire or personal injury.

6) Turn off the power switch before connecting or disconnecting power cables.

7) Before connecting the power cable, please verify that the label on the power cable is correct.

8) If the device has multiple inputs, disconnect all inputs and wait until the device is completely powered off before operation.

9) If component damage occurs, it must be replaced by professional personnel to avoid risks.

Cable selection, support, connection, and wiring must comply with local laws, regulations, and standards.

2.2.4. Mechanical Safety

Warning

Lifting:

1) Do not walk under the crane boom or the lifted object while lifting heavy loads.

2) Personnel performing lifting operations must receive relevant training and pass an assessment before conducting lifting.

3) Lifting equipment must be inspected. Only use lifting materials that are undamaged and complete.

4) Before lifting, ensure that the lifting equipment is securely fixed to the load-bearing fixture or wall.

5) During lifting, ensure the angle between the two ropes does not exceed 90°, as shown in the diagram below.

6) During lifting, do not pull on the steel wire ropes or slings, nor strike them against hard objects.

7) When installing or removing equipment from the cabinet, consider that the cabinet may be top-heavy. Avoid this area during lifting to prevent crush injuries.

8) When handling heavy objects, prepare adequately to avoid crush or sprain injuries.

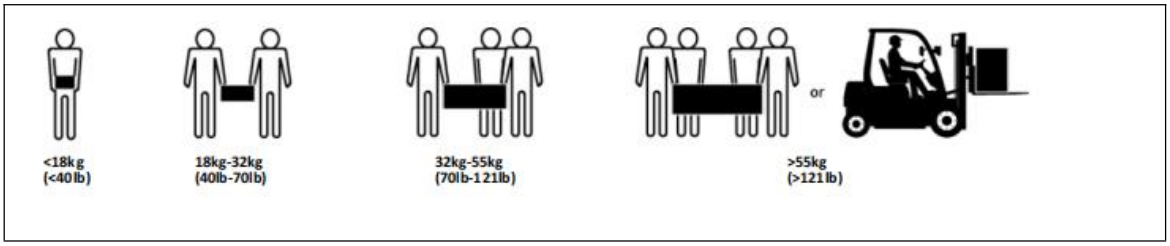
9) Select appropriate cranes or lifting tools according to onsite conditions. The lifting tool used shall possess sufficient load capacity, crane boom length, and rotation radius. Before moving, secure the equipment to the crane with a rope and ensure the process is supervised by a dedicated person.

Caution	

1) When manually handling heavy objects, protective gloves shall be worn to prevent injury.

2) During equipment handling, avoid scratches on the equipment surface as well as damage to components and cables.

3) The equipment must be handled with care to prevent damage caused by collisions, drops, or similar incidents.



2.2.5. Product Safety

Danger

1) Do not short circuit the product's positive and negative terminals, as strong current and high temperature may cause personal injury or fire. During the assembly and connection process of the battery system, adequate safety protection measures must be in place to prevent short circuit.

2) Do not overcharge or over-discharge the product. Otherwise, it may cause battery overheating within the module and result in fire accidents. Multiple hardware and software overcharge and over-discharge protection measures must be implemented during the installation and use of the product.

3) The product's positive and negative terminals must be connected strictly according to the markings and instructions. Reverse or series connections are prohibited.

4) The customer shall firmly fix the product on a solid and level surface. Power cables must be securely tied at appropriate positions to prevent electric arc and sparks caused by friction.

5) Protective measures should be taken during product use to prevent mechanical vibration, collision, and pressure impact. Otherwise, an internal short circuit may occur within the product, causing high temperature and fire. The product carries potential risks. Appropriate safety measures must be taken during operation and maintenance. Improper operation during safety performance testing may cause the battery inside the module to catch fire or explode. Safety performance testing must only be conducted by

professional personnel equipped with appropriate protective equipment in a professional laboratory. Otherwise, it may cause serious personal injury and property damage. Failure to comply with the above warnings may result in various serious accidents.

6) Customers should be aware that the following risks may occur during the use and operation of the product: operators may sustain injuries from chemicals, electric shock, or electric arc during operation. Although the human body's response to direct current and alternating current differs, both DC and AC voltages exceeding 50V can cause severe injury. Therefore, customers must take conservative measures during operation to avoid electrical injuries. During product operation and the selection of personal protective equipment, customers and their employees must consider the above potential risks to prevent accidental short circuits and the resulting electric arc, explosions, or thermal runaway.

Warning

1) Do not immerse the product in water.

2) Improper use and inappropriate storage of the product may pose risks of fire, explosion, and burns. Do not disassemble, crush, incinerate, or heat the product.

3) Do not expose the product to open flames or high temperatures exceeding the specified range for prolonged periods. Otherwise, fire may be caused. Under any normal operating conditions, the battery temperature inside the module must not exceed 50°C (122°F). If the temperature exceeds 50°C (122°F), the product should be powered off and operation stopped.

4) Keep the product out of reach of children. Do not remove the original packaging before use. Disposal of waste products should be carried out promptly in accordance with local recycling or waste regulations.

5) Do not disassemble, dismantle, or repair the product in any way without authorization.

6) Do not mix products of different specifications, brands, or batches.

7) If the product emits an unusual odor, generates heat, deforms, changes color, or exhibits any other abnormal condition, stop using the product and move it to a safe location.

8) Improper termination of charging may occur during the product’s charging process. If charging is terminated due to exceeding the allowed charging time, excessively high charging voltage, or overly strong charging current, this phenomenon is defined as 'improper termination of charging.'When any of the above phenomena occur, it may indicate battery system leakage or failure of certain components. Continuing to charge before the root cause is identified and fully resolved may lead to battery overheating or fire within the module.

9) In case of electrolyte leakage, protect skin and eyes from contact with the electrolyte. If contact occurs, rinse the affected area thoroughly with plenty of water and seek medical assistance. No part of the product should be ingested by any person or animal.

10) When the product's capacity reaches 70% or less of the nominal capacity, the customer should discontinue use of the product. Otherwise, our company is not responsible for any discrepancies in product parameters, quality issues, battery failures, or any related losses.

3. Product Introduction

3.1. Product Overview

The 261kWh (1P260S) energy storage DC cabinet is suitable for intelligent buildings, industrial parks, wind farms, residential users, and small to medium commercial centers. It effectively provides peak shaving and valley filling, load smoothing, backup power functions, improves power supply reliability, reduces electricity costs, and enhances grid power quality.

The energy storage system consists of a High Voltage Cabinet and liquid-cooled Battery modules, capable of storing and releasing electrical energy. Both the input and output ports of the energy storage system are high-voltage DC.

Battery Charging: The external energy storage converter (hereinafter PCS) connects to the cluster controller and, under PCS control, charges the Battery by storing surplus energy.

Battery discharge: When the grid cannot adequately supply power to the load, the system controls the battery to supply power, delivering the stored battery energy to the load through the PCS output.

Table 3-1 Main Parameters

	Name	Specification
DC Side	Battery Type	Lithium Iron Phosphate
	Combination Mode	1P260S
	Rated Capacity (Ah)	314
	Rated Energy (kWh)	261
	Rated Voltage (V)	832
	Rated Charge/Discharge Rate	0.5P
	Operating Voltage Range (V)	650～949
	StandardCharge/ Discharge Current (A)	157/157
	Cooling Method	Liquid Cooling

	Coolant	Ethylene Glycol: Water Solution (50%v:50%v)
	Number of Cycles	EOL 70% 6000 cycles, DOD 95%
	Fire Protection System	Aerosol, Temperature Sensor, Smoke Sensor. Pressure Relief Valve, Water-based Fire Protection
System	Storage Ambient Temperature	-20℃~45℃
	Operating Ambient Temperature	-20℃~55℃ (Derating above 45℃)
	Operating Ambient Humidity	0-95% (No Condensation)
	Noise	≤75dB
	Corrosion	C4-M
	Protection Rating	Battery Module: IP67; Battery Cabinet: IP54
	Permissible Altitude (m)	≤2000 (Derating above 2000)
	Communication Interface	CAN，Ethernet
	Communication Protocol	ModbusTCP/RTU, CAN2.0B

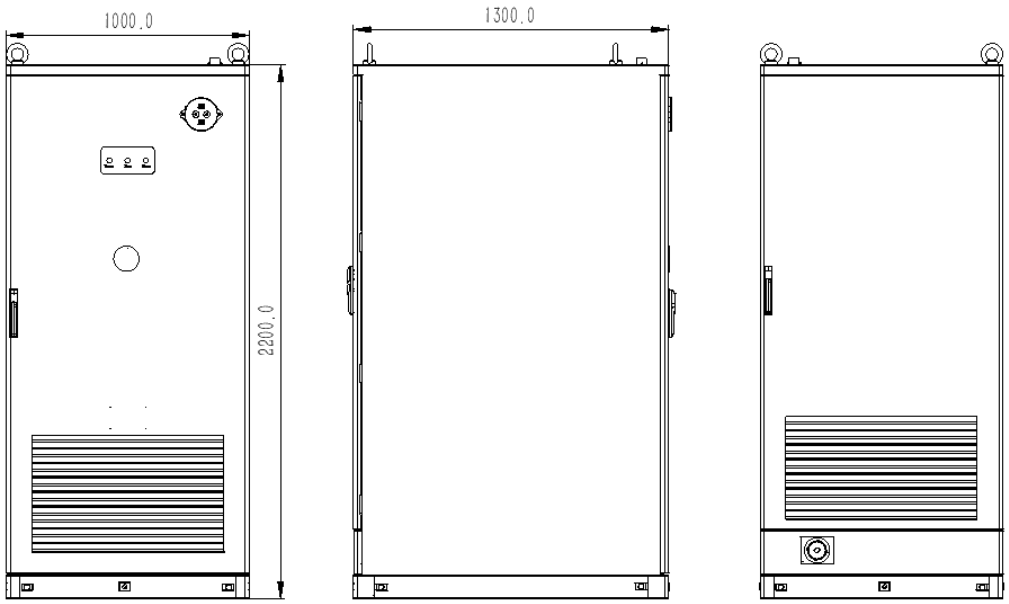
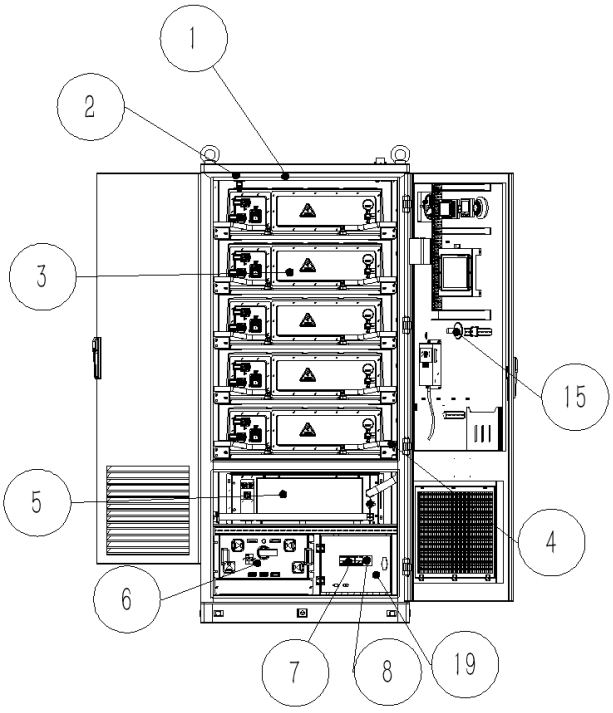
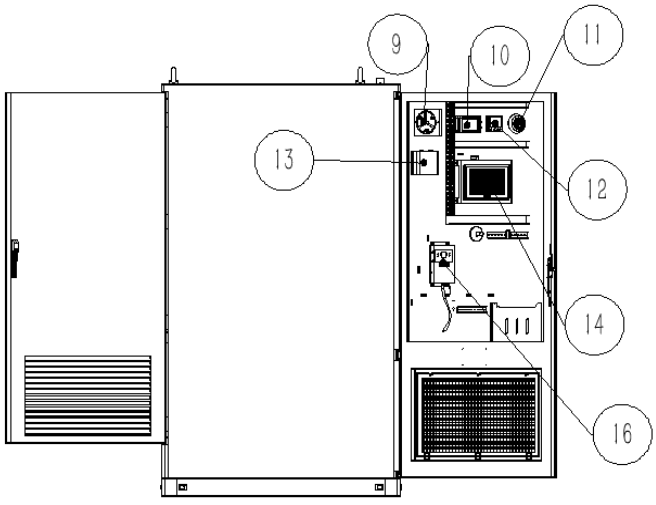


Figure 3-1 Battery Cabinet Outline Diagram

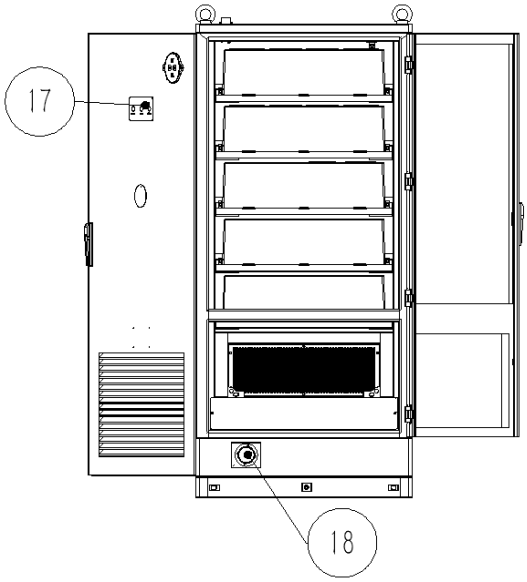
3.1.1. Energy Storage System Appearance



Front View



Left View



Rear View

Figure 3-2 Overall Dimension Layout Diagram

Table 3-2 Energy Storage System Component List

Serial Number	Name	Remarks
1	LED Metal Lamp	
2	Limit Switch	
3	Liquid-Cooled PACK Box	
4	Liquid Cooling Pipeline	
5	Liquid Cooling Unit	
6	BMS-High Voltage Cabinet	
7	2P Miniature Circuit Breaker	
8	Modular DIN Rail Socket	
9	Explosion-proof Valve	
10	IO Module	
11	Intelligent Photoelectric Smoke Detector	
12	Intelligent Temperature and Humidity Sensor	
13	Aerosol	
14	ESMU (Optional)	

15	Emergency Stop Button	
16	Dehumidifier	
17	Three-color LED	
18	DN65 Water Firefighting Interface	
19	Network Switch	

3.1.2. High Voltage Cabinet

The High Voltage (HV) cabinet is located at the bottom of the rack and contains the BCU (Battery Control Unit) and electrical units within the high voltage circuit; it is used to manage and control the entire BMS system. It mainly consists of high voltage connectors, the Battery Control Unit (BCU), contactors, Hall sensors, switching power supplies, pre-charge resistors, fuses, low voltage (LV) interfaces, and circuit breakers, as shown in the figure below.

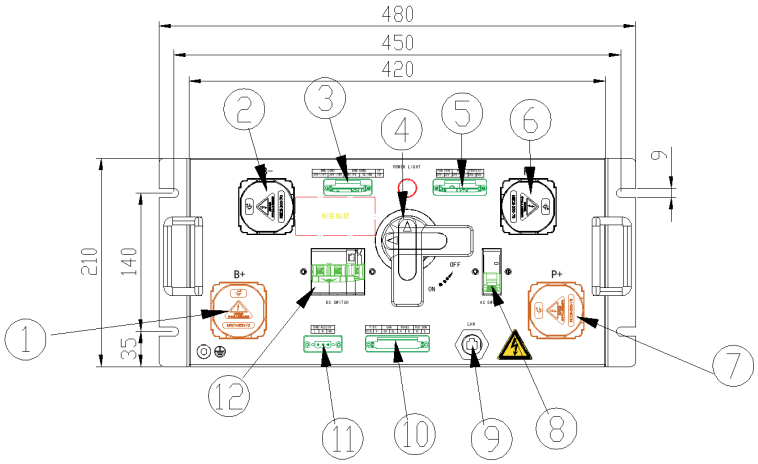


Figure 3-3 High Voltage Cabinet Component Description

Table 3-3 High Voltage Cabinet Component Description

Serial Number	Name	Remarks
1	Battery Positive Terminal	B+
2	Battery Negative Terminal	B-
3	Slave Power Supply and Communication Interface	
4	Main Circuit Breaker	

5	EMS Communication and Environmental Monitoring Equipment Interface	
6	Output Negative	P-
7	Output Positive	P+
8	AC Power Circuit Breaker	
9	LAN Port	External
10	CAN Communication Port	External
11	BMS Power Supply 230V	Input Power
12	DC Power Circuit Breaker	

3.1.3. ESMU

ESMU (BAU): Energy Storage Battery Management System main controller that collects all information of the battery array (system) in real-time, displays related information in real-time, stores operating data, features real-time alarms, controls the battery array (system) main circuit breaker with contact feedback, supports real-time communication with PCS, EMS, and local monitoring, and integrates environmental monitoring information such as air conditioning and fire protection for access and linkage protection.

Table 3-4 ESMU Core Data Parameters Table

Processor	ARM platform, quad-core processor, maximum frequency 2.0GHz
Memory	4GB LPDDR4
Storage	16GB eMMC 256GB SSD (actual capacity 240GB–256GB is within normal range) 32GB SD Card (optional)
Operating System	Linux
Number of Batteries Detected	Maximum 450 cells × 20 strings
LCD Screen	10.1-inch true color LCD screen
Data Recording Interval	≤1S
Event Log Database	>100,000 event records, including fault types, occurrence times, and protection actions
Query Methods	On-site panel query, remote computer query, data

	export/download
Alarm Methods	Audible and visual alarms, displaying alarm content, fault node output closed circuit
Communication Interface	3 LAN ports, communication speed LAN0/LAN1: 100M/1000Mbps, LAN2: 10M/100Mbps; 3 isolated CAN ports, CAN communication speed: 250Kbps~500Kbps, withstand voltage: 1530Vdc; 5 isolated RS485 ports, RS485 communication speed: 9600bps~19200bps, withstand voltage: 1530Vdc; 2 USB ports.
DO/DI interface	6 DIH IO inputs with optoelectronic isolation, 9~32 V valid, withstand voltage: 1530Vdc; 6 DIL IO inputs with optoelectronic isolation, 0~0.7 V valid, withstand voltage: 1530Vdc; 12 IO output/input channels use relay-type dry contacts, rated at 1A/30Vdc or 1A/250Vac, withstand voltage 1530Vdc;

3.1.4. Liquid Cooling Unit

The Liquid Cooling Unit mainly comprises a heater, compressor, condenser, water pump, and condenser fan. The parameters of the Liquid Cooling Unit are shown in the figure below.

- Cooling

The Liquid Cooling Unit parameters can be configured via the display: cooling start temperature and cooling stop temperature. Cooling activates when the cabinet temperature exceeds the cooling start temperature; Cooling stops when the cabinet temperature falls below the cooling stop temperature. Parameter setpoints are specified in the controller board specification.

- Heating

The Liquid Cooling Unit parameters can be set via the display: heating start temperature and heating stop temperature. When the room temperature is below the heating start temperature, heating starts; When the room temperature exceeds the heating stop temperature, heating stops. Parameter setting points are specified in the control board specification.

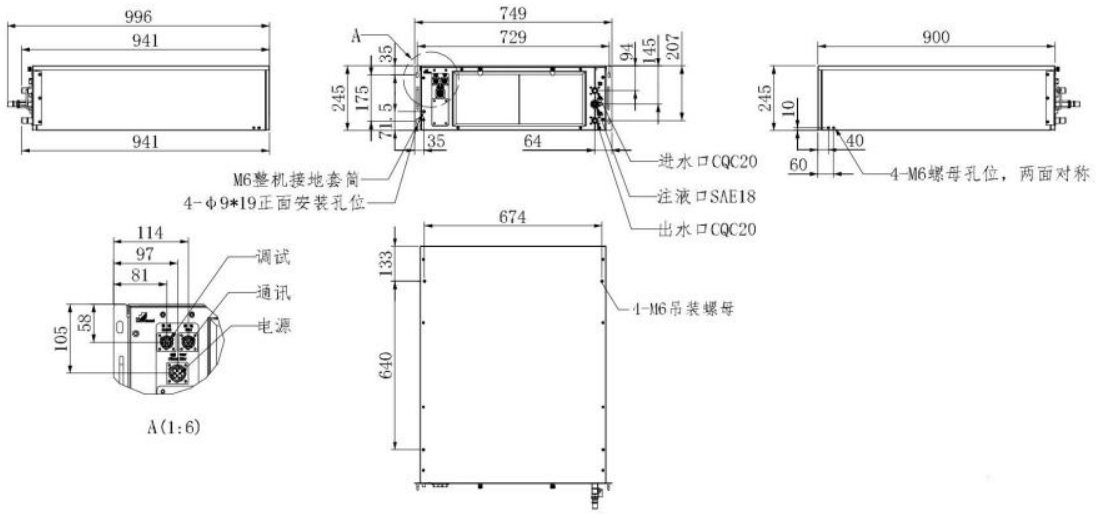


Figure 3-4 Liquid Cooling Unit Exterior Diagram

Table 3-5 Liquid Cooling Unit Parameters

Item	Unit	Parameter
Rated AC Input Power	V/Hz	220~240V 50/60Hz
Cooling Capacity @L35/W18	kW	5
Heating Capacity @Tu=10℃	kW	2
Water Outlet Temperature	℃	18
Rated Circulating Water Flow	L/min	46.5L/min
Rated External Circulation Head	kPa	60
Cooling Input Power @L35/W18	kW	2.50
Heating input power @Tu=10℃	kW	2.35
Inlet and outlet pipe interface type	/	DN20 quick connector
Operating environment range	℃	-30~+55
Storage environment range	℃	-40~+70
Noise level @1m distance	dB(A)	75
Corrosion	/	C3M
IP Protection Level	/	IPX5
Refrigerant	/	R134a
Coolant	/	50% ethylene glycol aqueous solution

3.1.5. Fire Protection System

The fire protection energy cube is designed with multiple fire protection systems, including cabinet aerosol, PACK-level aerosol devices, explosion venting design, composite detectors, and water fire suppression.

The PACK aerosol fire extinguishing device represents a new generation of high-tech, environmentally friendly fire suppression products, developed from the third-generation Type S aerosol technology. Upon fire detection, the thermal wire ignites when exposed to flame or when the ambient temperature reaches 170±10°C. The burning thermal wire activates the aerosol-generating compound within the unit. Through a redox reaction, this compound releases heat that decomposes the integrated chemical coolant. This process ensures the simultaneous participation of both the aerosol agent and the coolant in effective fire suppression.

The product appearance is as follows:

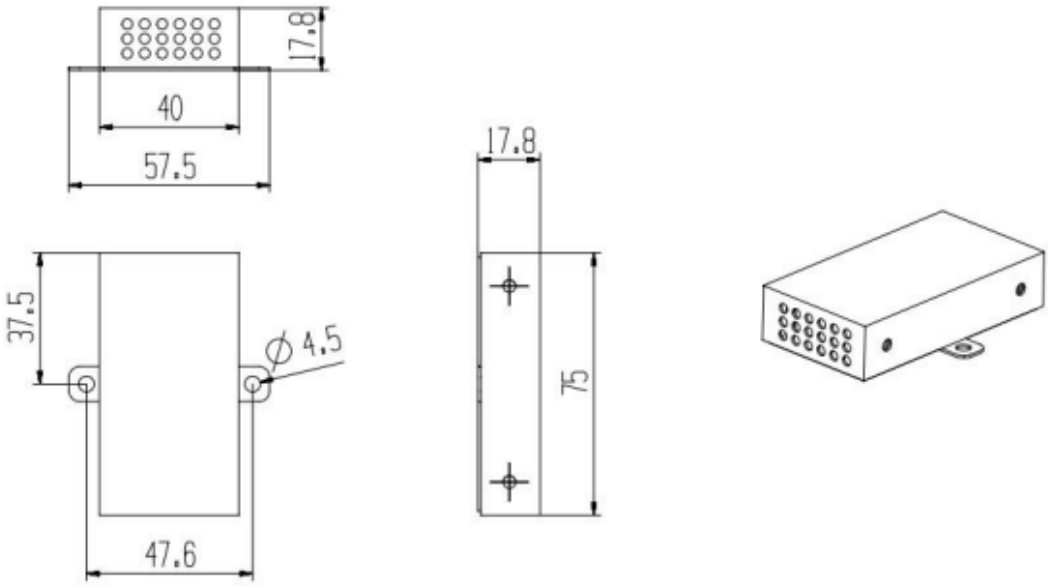


Figure 3-5 Schematic Diagram of PACK Aerosol Unit

Table 3-6 Core Parameters of PACK Aerosol Unit

Item	Parameter	Item	Parameter
Model Specification	QRR0.01GW/S-CFLC	Agent Weight	1 kg

Operating Temperature Range	-50°C ~ +90°C	Dimensions	49 × 48 × 20 mm
Operating Relative Humidity	≤95% RH	Activation Modes	Thermal, Electrical
Discharge Time	≤30 s	Coverage Volume	0.1 m³
Service Life	10 years	Thermal Wire Activation Temp.	170±10°C

The new thermal aerosol fire extinguisher inside the cabinet is a breakthrough product in the fire protection field, featuring ultra-high extinguishing efficiency and reliability. It has a compact size, pressure-free storage, requires no piping or maintenance, is highly efficient and fast in extinguishing, non-toxic and harmless, safe, reliable, and environmentally friendly, making it particularly suitable for relatively enclosed spaces such as communication equipment rooms, battery compartments, engine compartments, and battery boxes.

The fire suppression effects of the new type of thermal aerosol are mainly reflected in the following aspects: the fire extinguishing mechanisms of common extinguishing agents primarily include isolation, suffocation, cooling, and chemical inhibition, with different agents exhibiting different mechanisms. The fire extinguishing mechanisms of thermal aerosol mainly involve two aspects: firstly, the cooling effect caused by endothermic decomposition, and secondly, the chemical inhibition in both the gas and solid phases, which work synergistically. Moreover, the gas phase components present in the products of aerosol extinguishing agents also provide a certain auxiliary effect.

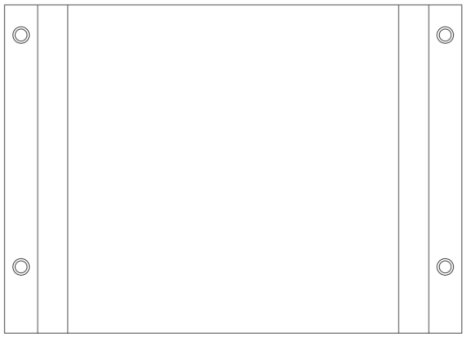
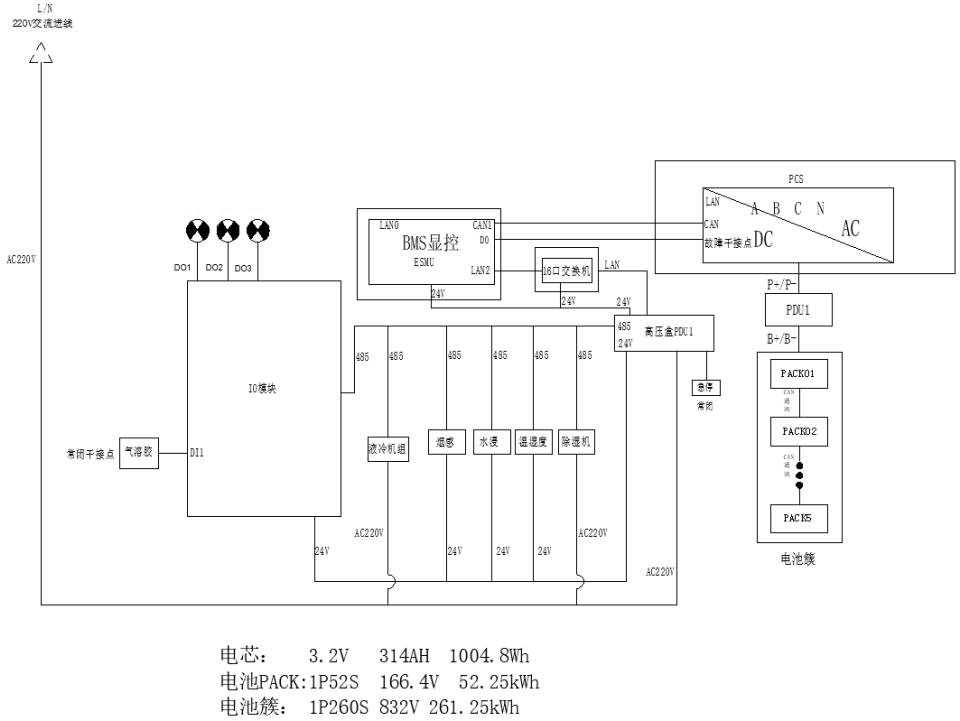


Figure 3-6 Schematic Diagram of Aerosol Appearance

Table 3-7 Core Parameters of Firefighting System

Compliance Standards	S-Type Thermal Aerosol Production Execution Standard XF499.1 'Aerosol Fire Extinguishing System Part 1: Thermal Aerosol Extinguishing Device
Service Life	10 Years
Startup Method	Thermal Activation
Activation Temperature	160℃→180℃
Operating Ambient Temperature	-50℃→+90℃
Protected Space	≤ 2 m³
Discharge Time	≤30s
Nozzle Temperature	≤200℃ at 5mm from the nozzle
Passive Switch Feedback Signal	Normally Open

3.1.6. Energy Storage System Electrical Topology Diagram



电芯： 3.2V 314AH 1004.8Wh
电池PACK:1P52S 166.4V 52.25kWh
电池簇： 1P260S 832V 261.25kWh

Figure 3-7 Energy Storage System Electrical Topology Diagram

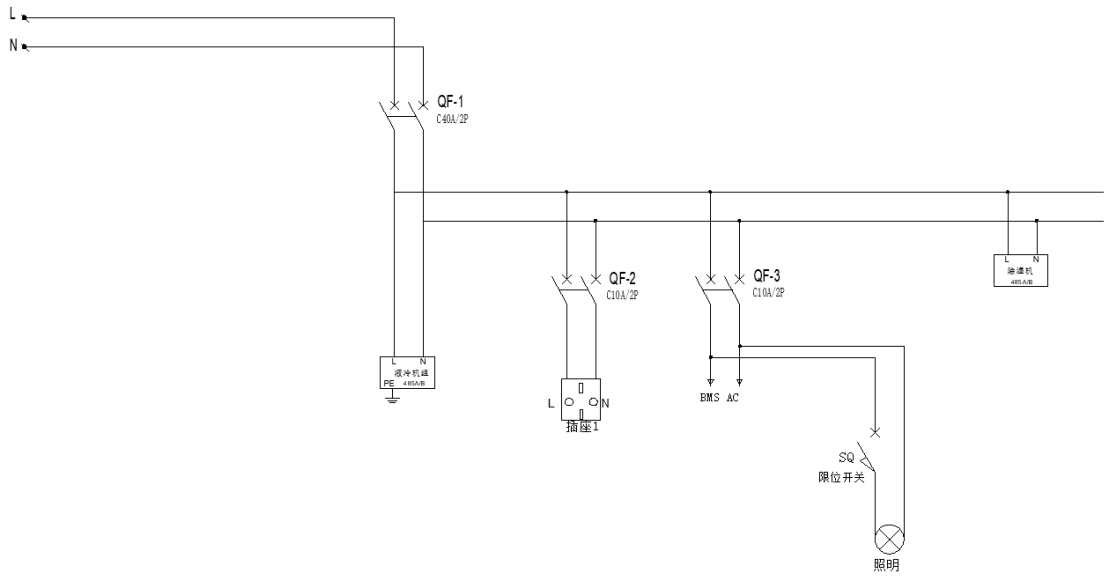


Figure 3-8 AC System Primary Power Supply Diagram

4. Packaging, Transportation and Storage

4.1. Packaging

Packing Steps:

- Place the product onto the wooden box pallet;
- Place wooden foot pads around and at the corners of the battery, then wrap 3 to 4 layers of stretch film;
- Install all side panels and the top panel of the wooden crate;
- Wrap the outside of the wooden crate again with stretch film.

4.2. Transportation

Danger
Brutal or rough loading and unloading is prohibited, as it may cause battery short circuit, damage (leakage, rupture, etc.), fire, or explosion.

Warning
When handling, do not carry by the battery terminals, bolts, or wires to prevent battery damage. During handling, comply with the battery's required orientation; inversion, tilting, dropping, mechanical impact, exposure to rain or snow, and immersion in water are prohibited. Batteries must be transported separately. For cabinets with batteries installed, transporting with the batteries inside is prohibited; if the cabinet needs to be transported or moved, the batteries must be removed first.

According to the United Nations 'Recommendations on the Transport of Dangerous Goods Model Regulations' (referred to as TDG or the Orange Book) classification standards for dangerous goods, the battery is classified as Class 9 dangerous goods and has passed the relevant tests required by Section 38.3 of Part III of the United Nations 'Manual of Tests and Criteria for the Transport of Dangerous Goods.'

- Both transportation and storage service providers must possess the dangerous goods operational qualifications required by the regulations and standards in force at the business location.

Transportation must employ rigid box vehicles; the use of open-top vehicles is strictly prohibited.

- The battery cabinet can be shipped directly to the site, meeting transportation requirements for vehicles, ships, and other modes.

- Comply with the latest international and domestic regulations related to the transportation and storage of dangerous goods, including but not limited to the International Maritime Dangerous Goods Code (IMDG Code), the Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), and the People's Republic of China Transportation Industry Standard for Road Transport of Dangerous Goods (JT/T617), while also fulfilling the regulatory requirements of transport authorities in the countries of origin, transit, and destination. Before transportation and storage, properly package, label, and mark the product in accordance with the local laws and standards of the country where the business operates, and complete all relevant product and packaging testing in advance.

- Sea transport or roads with good conditions should be selected for transportation; rail and air transport are not supported. Vibration and tilting should be minimized as much as possible during transport.

- Before transportation, compliant and accurate declaration must be made. Battery packaging and label markings must be checked for completeness and integrity, and there must be no abnormal odors, leakage, smoking, or fire; otherwise, transportation is prohibited.

The transport packaging box must be secure. Attention should be paid to careful handling during loading, unloading, and transportation. Side placement and inversion are prohibited. Moisture protection measures must be implemented, the packaging must be firmly fastened to prevent displacement, and hazardous material labels should face outward.

- Unless otherwise specified, dangerous goods must not be loaded in the same vehicle or container with goods containing food, medicine, animal feed, or their additives.

- If the regulations or standards of the country of operation permit consolidated transport of certain categories of dangerous goods and of dangerous goods with general goods, separation must be carried out in accordance with local regulations and standards; If the country of operation has no explicit requirements, when dangerous goods packages are loaded in the same vehicle or container as general goods, separation may refer to the following:

- Use barriers at least as high as the packages.

- Maintain a clearance of at least 0.8 meters on all sides.

- Before handling faulty batteries (carbonized, leaking, swollen, water ingress, etc.), insulation must be applied to the battery positive and negative terminals. After packaging, place them as soon as possible into an insulated explosion-proof box, and record on the outer box the site name, address, time, and observed condition.

- When transporting faulty batteries away from the site, avoid combustible material storage areas, residential zones, or other places where people gather, such as public transport or elevators.

- Handle batteries carefully by lifting and placing them gently; avoid collision and pay attention to personal safety.

4.3. Storage Requirements

General Requirements

Instructions

During storage, it is necessary to retain relevant proofs that meet the product storage requirements, such as temperature and humidity log data, storage environment photos, and inspection reports.

- Store in a clean and dry place, and prevent dust and moisture corrosion. Exposure to rainwater or ground water is prohibited.
- The ambient air must not contain corrosive or flammable gases.
- Do not store in an inclined or inverted position.
- When equipment other than the Battery Pack is stored for two years or more, it must be inspected and tested by Professional Personnel before use.

4.3.1. Energy Storage System Storage

- During long-term storage, removal of packaging is prohibited.
- Stacking is prohibited.
- The ground for storage (long-term or temporary) must be level.

- Storage environment temperature: -40℃ to +60℃, relative humidity: 5% RH to 95% RH.

5. Site Requirements

5.1. Site Selection Requirements

NOTE

The site selection and fire safety of the Energy Storage System shall comply with local laws and regulations. Reference standards include, but are not limited to, GB 51048 Electrochemical Energy Storage Power Station Design Specification, GB 50016 Code for Fire Protection Design of Buildings, and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.

- The installation surface shall be higher than the region's historical highest water level and at least 300mm above ground level; the installation location must not be in low-lying areas.

- The Energy Storage System or Energy Storage Power Station must be located in an environment without fire or explosion hazards.

- The site should have convenient transportation access and reliable fire suppression system equipment.

Instructions

- During installation, commissioning, and operation of the Energy Storage System, the priority of fire safety must be ensured: at least two gas fire extinguishers—such as heptafluoropropane, perfluorohexanone, or carbon dioxide—should be placed near each unit.

- The Energy Storage System site should reserve interfaces for a water-based fire extinguishing system.

- The Energy Storage System shall be installed at a distance greater than 30 meters from third-party wireless communication facilities.
- Select a well-ventilated location.
- Site selection shall avoid locations disfavored by industry standards and regulations, including but not limited to the following sites, areas, and places:
  - Areas with strong vibration, strong noise sources, and strong electromagnetic field interference.
  - Locations generating or containing dust, oil fumes, harmful gases, corrosive gases, and similar substances.
  - Sites where corrosive, flammable, or explosive materials are produced or stored.
  - Sites with existing underground facilities.
  - Grounds with poor geological conditions such as rubber soil, weak soil layers, prone to water accumulation and subsidence.
  - Beneath reservoirs, water features, or water intake structures.

Instructions

- If it is unavoidable to install in locations prone to water accumulation, water-blocking, drainage facilities, or ground elevation measures shall be implemented.
- Cable trenches shall not be used as drainage channels, and any cable passage openings (such as holes where cables pass through partition walls or floors) shall be fire-stopped.
- Seismic fault zones and areas with a design seismic intensity higher than degree nine.

- Locations subject to direct hazards such as mudslides, landslides, quicksand, or karst caves.
- Within the boundary of mining subsidence (displacement) zones.
- Within blasting hazard zones.
- Areas that may be flooded after dam or dike failure.
- Important water supply source sanitary protection areas.
- Historical cultural relic protection areas.
- Areas with dense populations, high-rise buildings, and underground structures.
- Intersections of urban main roads and sections with heavy traffic.

- Installation of energy storage cabinets indoors is prohibited; general requirements for outdoor site selection of energy storage systems are as follows:
  - Within the installation site of the energy storage system or energy storage power station and within a surrounding 3-meter range, there shall be no combustible materials to prevent fire spread hazards. (Exemption clause: individual specimens of trees, shrubs, or ground cover that are unlikely to propagate fire spread, such as green grass, ivy, succulent plants, or similar ground cover plants, shall be exempted.)

  It is recommended not to add coverings on top of the energy storage system; if coverings must be added due to special scenarios, the following conditions shall be met:

  - The distance between the covering and the top of the energy storage system shall be greater than 3 m.
  - The covering shall be non-combustible.

- The safety distance between the energy storage system and buildings shall comply with applicable local fire protection regulations or standards.

China Region:

- Energy storage power stations with a rated power of 500 kW and rated energy of 500 kWh or above shall comply with the overall site layout requirements of GB 51048 Electrochemical Energy Storage Power Station Design Code.
- For energy storage power stations with a rated power less than 500 kW or rated energy less than 500 kWh, the distance between battery equipment and buildings as well as external roads shall not be less than 3 m. The distance between the battery equipment and the building may be reduced to 1m if any of the following conditions are satisfied:
  - A firewall with a fire resistance limit of no less than 3 hours shall be installed between the battery equipment and the building, and the firewall shall protrude no less than 1m beyond the equipment's outer profile.
  - The exterior wall of the building shall have a fire resistance limit of no less than 3 hours. Energy storage systems located outdoors shall maintain a safety distance of 3m from parking spaces.

For regions outside China:

- Energy storage systems located outdoors shall maintain a minimum distance of 10 feet (3.048m) from boundaries, public roads, buildings, flammable materials, harmful substances, high stockpiles, parking spaces, and other hazards unrelated to power grid infrastructure.

- When any of the following conditions are met, the distance between the energy storage system and the production building may be reduced to 0.914 m, while also considering space requirements for equipment transport, installation, and maintenance.
  - The energy storage system has a separate firewall with 1-hour fire resistance, and the firewall's length and height should exceed the system's outer contour by 1.5 m in each direction.
  - Non-combustible exterior walls without openings or combustible exterior finishes are installed on walls near the energy storage system, and the fire resistance rating of the exterior walls meets a 2-hour fire rating per ASTM E119 or UL 263.
- The distance between the energy storage system’s exhaust devices and heating, ventilation, air conditioning intakes, windows, doors, loading platforms, or sources of ignition in other buildings or facilities shall be greater than 4.6 m.
- The Energy Storage System may suffer corrosion when installed in areas affected by salt damage and pollution. Do not install the Energy Storage System in such areas. The Energy Storage System can be used in the following or better environments:
  - Outdoor environments located more than 5000m from the coast; Use of the Energy Storage System is not recommended within 5000m of the coast (if use is required, confirmation must be obtained from the distributor or company engineers).
  - More than 3000m from heavy pollution sources such as smelters, coal mines, and thermal power plants;
  - More than 2000m from moderate pollution sources such as chemical plants, rubber factories, and electroplating facilities;

- More than 1000m from light pollution sources such as food processing plants, leather factories, heating boilers, slaughterhouses, centralized waste yards, and sewage treatment plants.

Instructions

When the safety clearance at the selected site cannot meet the relevant national standard requirements, it is recommended to choose a different site.
Fence for preventing illegal intrusion:
It is recommended that the energy storage equipment area be isolated and protected by a solid wall or fence. The fence should include a lockable gate and preferably have a height greater than 2.2 meters. A firewall may replace part or all of the fence, as determined by the designer’s comprehensive assessment.

5.2. Space Requirements

NOTE

The figure below illustrates the minimum space requirements for installation and maintenance. The equipment space requirements must also comply with the site selection requirements (see 5.1 Site Selection Requirements).

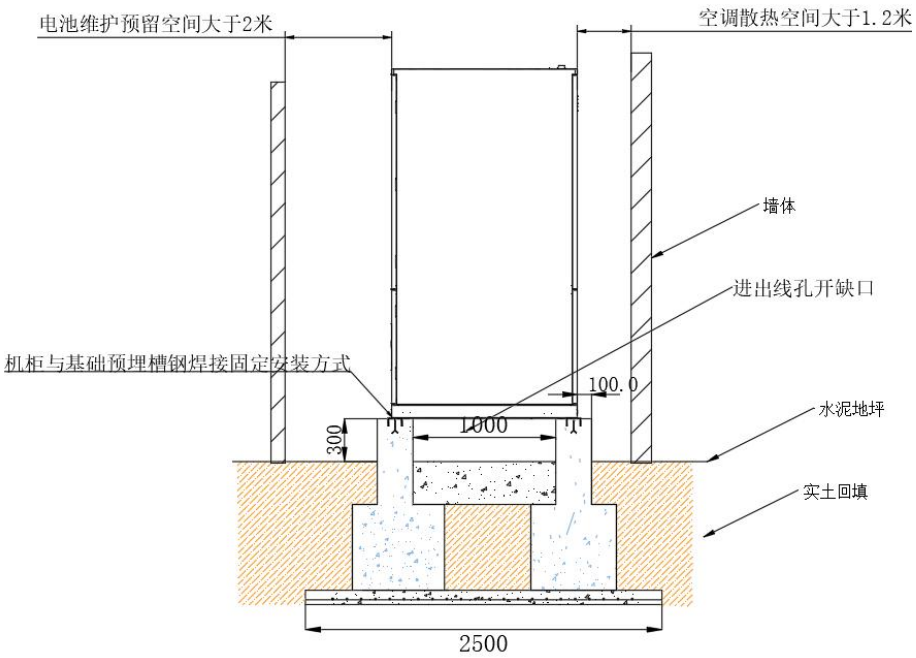


Figure 5-1 Installation space diagram

5.3. Foundation requirements

Foundation design requirements: Figure 5-2 Foundation Requirements Diagram

- The Energy Storage System must be installed on concrete or other non-combustible surfaces, ensuring the installation surface is level, stable, smooth, and has sufficient bearing capacity. No depressions or tilting are permitted.
- The equipment foundation shall be designed according to the total weight of the equipment. If the foundation bearing capacity is insufficient, a re-evaluation is required.
- The bottom of the equipment foundation pit must be compacted and leveled.

- Waterlogging or disturbance of the equipment foundation excavation is strictly prohibited. If waterlogging or disturbance occurs, further excavation and backfilling must be carried out.
- The horizontal deviation between the equipment foundation and the cabinet contact surface must be ≤3mm.
- The foundation must be above the local historical highest water level and at least 300mm above the ground level.
- Construct drainage facilities in accordance with local geological and municipal drainage requirements to ensure no water accumulation occurs at the equipment foundation. The foundation construction shall meet the local historical maximum rainfall drainage requirements, and discharged water must be treated in compliance with local laws and regulations.
- When constructing the equipment foundation, consider the Energy Storage System cable egress by reserving trenches or entry holes. Reserved holes in the foundation and the equipment base cable entry holes shall be sealed.
- The foundation diagram cannot be used as the final construction drawing and is for reference only. For details, please contact the product manager of our company. Users shall verify the Energy Storage System foundation design parameters according to the installation environment, ground bearing capacity, geological conditions, and seismic requirements of the project site.

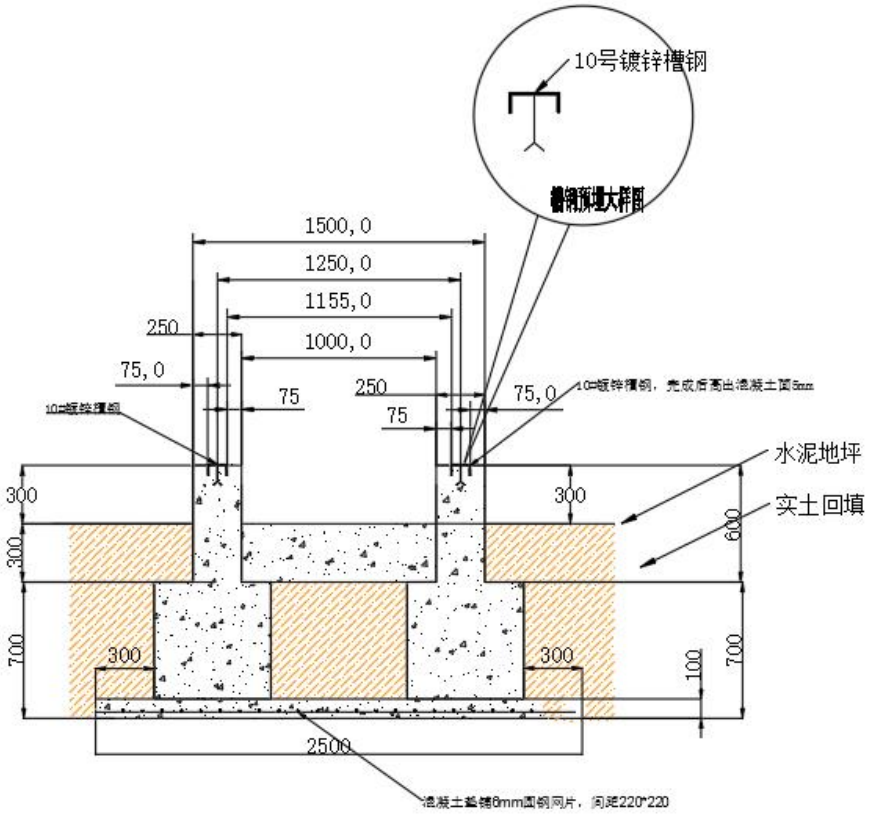


Figure 5-2 Foundation Requirements Diagram

Instructions

1. The energy storage cabinet foundation pedestal shall be cast with C25 concrete, with a foundation depth of 700mm and a width of 2500mm, extending 700mm below the floor and 300mm above it. After casting, backfill with solid soil, apply cement plaster, and provide cement drainage on the front and back to facilitate water discharge and subsequent maintenance. The finished foundation height shall be 300mm above the floor level. Ensure to properly establish foundation settlement observation points.
2. Therefore, embedded iron parts must be galvanized, and after welding, both sides shall be coated with anti-rust paint.

3. The grounding resistance must be less than 4Ω; if resistance is insufficient, add grounding electrodes or use grounding resistance reduction modules.

5.4. Forklift Requirements

- If a forklift is used for cabinet installation, its load capacity must be ≥3t.
- If a forklift is used for battery pack installation or maintenance, its load capacity must be ≥1t.
- Recommended fork length: 1200mm to 1500mm; width: 80mm to 160mm; thickness: 25mm to 80mm.
- Forklift lifting height requirements: when the local foundation height is ≤0.3m, the lifting height must be ≥2m; when above 0.3m, the lifting height should be increased accordingly.

5.5. Lifting Requirements

- During the lifting process of the outdoor energy storage cabinet, all operational steps must comply with the following requirements:
- The energy storage outdoor cabinet shall be lifted vertically; during lifting, it shall not be dragged on the ground, nor shall it be dragged or pushed across any surfaces;
- When the energy storage outdoor cabinet is lifted 300mm above the supporting surface, lifting shall be paused to inspect the connection between the lifting apparatus and the cabinet; lifting may only continue after confirming the connection is secure;
- After positioning, the energy storage outdoor cabinet shall be placed gently and lowered steadily; it is strictly forbidden to place the cabinet outside of a vertical descent by swinging the lifting apparatus;

- Before lifting, ensure that the crane and lifting ropes meet the load-bearing requirements;
- When installing and dismantling lifting equipment, do not drag it on the cabinet to avoid scratching the cabinet;

Warning	When lifting the energy storage outdoor cabinet, be sure to keep the outdoor cabinet level during lifting to avoid tilting,and maintain a uniform speed during both ascent and descent, otherwise it will cause damage to the equipment inside the cabinet. Boostess does not assume responsibility for safety incidents or equipment damage caused by violations Of this instruction or improper lifting.

Table 5-1 Lifting Requirements

Lifting Process	Precautions
Before Lifting	The crane lifting capacity ≥ 5t, working radius ≥ 2m. If the onsite working conditions do not meet the requirements, professional personnel must be consulted for evaluation.
	Personnel engaged in lifting operations must undergo relevant training and be qualified before assuming their duties.
	Lifting tools must be inspected and verified to be complete and in proper condition before use.

	Ensure that lifting tools are firmly secured to load-bearing fixtures or walls.
	For outdoor use, it is recommended to perform lifting when the weather is clear and windless.
	Verify that the crane and steel cables meet the required specifications before lifting.
	Ensure the equipment doors are fully closed and locked.
	Ensure the steel cable connections are safe and reliable.
	It is recommended to adopt a lifting sequence from left to right or right to left to ensure smooth operation.
During the lifting process	Unauthorized personnel are strictly prohibited from entering the lifting area; standing under the crane boom is strictly forbidden.
	Ensure the crane is positioned correctly; long-distance lifting is prohibited.
	Maintain stability; the cabinet diagonal tilt must be ≤5°.
	Ensure the angle between the two cables does not exceed 90°.
	Handle the lifting equipment with care when raising and lowering; the cabinet should descend slowly and smoothly to prevent impact to internal components.
	When the cabinet contacts the base, wait until the base is evenly loaded before removing the lifting steel cables.
	Dragging steel ropes or lifting gear is forbidden, and equipment collisions must be avoided.
	The subsequent cabinet lifting can only proceed after securing the first lifted cabinet.

6. Unpacking Inspection

- To prevent the equipment from tipping over, secure the box containing the equipment to the forklift with rope before moving. Handle the equipment carefully, as impacts or drops may cause damage.
- Once the equipment is placed, carefully remove the packaging to avoid scratching it. Keep the equipment stable throughout the unpacking process.
- After opening the packaging, inspect whether fastened components and detachable parts are loose. If any looseness is found, immediately notify the carrier and the manufacturer.
- If the installation environment is poor, after unpacking, implement dust and condensation protection measures (such as using dust covers, plastic films, or fabric coverings) to prevent internal battery condensation or dust corrosion failure.

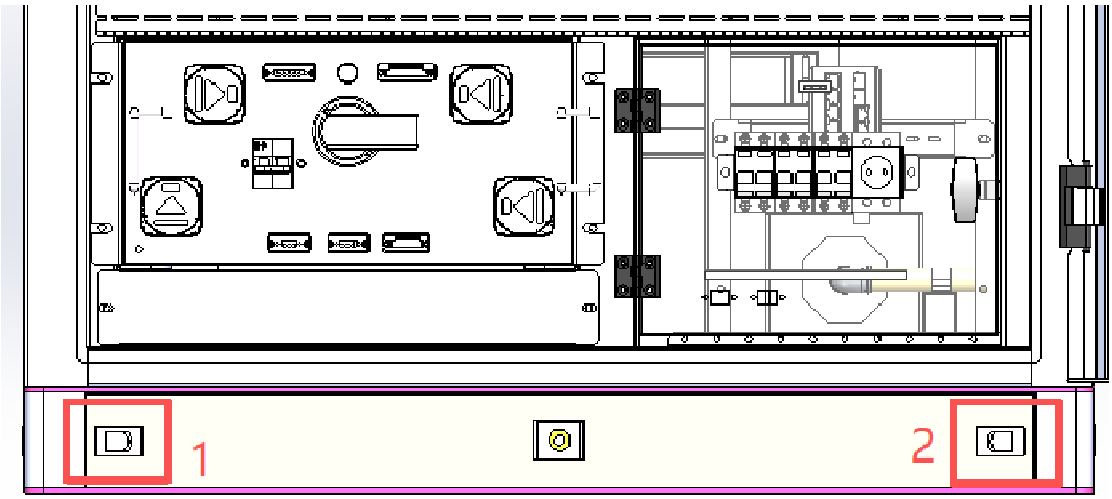


Figure 6-1 Buckle Position Diagram

- Open the buckles indicated in Figure 6-1 and remove the sealing plate (if this is the first installation, the sealing plate is located inside the cabinet).

Figure 6-2 Forklift Hole Position Diagram

- Use a forklift (forklift requirements refer to 5.4 Forklift Requirements) to safely transport the Energy Storage System to the site using the forklift hole positions indicated in Figure 6-2 (see 5 Site Requirements).

7. Equipment Installation

7.1. Preparation Before Installation

7.1.1. Tool Preparation

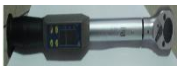
Instructions

The illustrated tools are for reference only; please use the actual tools as the standard.

- Due to varying onsite conditions, this tool list does not fully cover some rarely used tools; installation personnel and users should prepare any additional tools as required by the actual situation.

Table 7-1 Tool Preparation List

Tool	Image	Primary Function
Multimeter		Check electrical connections and electrical parameters
Megohmmeter		Check insulation resistance
Phillips Screwdriver		Connect wires, tighten screws
Socket Wrench		Tighten bolts
Adjustable Wrench		Tighten bolts

Torque Wrench		Verify torque
Crimping Pliers		Crimp cold-press terminals of 10mm ^{2} and below
Wire Stripper		Wire stripping
Diagonal pliers		Cutting wire
Claw hammer		For striking and for installation or removal of components
Heat shrink tubing		Electrical insulation
Heat gun		Blowing heat shrink tubing
Labor protection gloves		Protect the operator’s hands
Insulating gloves		Insulation
Hydraulic pliers		Crimping OT terminals of 10mm² and above
Cable tie		Wire tie
Impact drill		Punching, Drilling

7.1.2. Pre-installation Inspection

Inspect Outer Packaging

Before unpacking the device outer packaging, please check for any visible damage such as holes, cracks, or other signs that may indicate internal damage, and verify the device model. If there is any abnormality in the packaging or the device model does not match, do not unpack and contact your dealer as soon as possible.

Instructions

It is recommended to remove the outer packaging within 24 hours before preparing the device for installation.

This cabinet is over 2 meters tall; please take appropriate safety protection measures for working at height when removing the outer packaging.

Check Delivery Items

After unpacking the device outer packaging, please check whether the delivery items are complete and intact, and confirm there is no visible external damage. If any item is missing or damaged, please contact your dealer.

Instructions

For the quantity of delivery items included in the package, please refer to the Packing List inside the box.

7.1.3. Protective Ground Installation for the Energy Storage System

Instructions

The equipment grounding impedance complies with the national standard GB 50054 and local electrical standards.

- Cable requirements, product standard: GB12706·2-91 rated voltage 35KV and below copper core, aluminum core plastic insulated power cables. It is preferable to choose ZRVV PVC insulated cables or YC rubber insulated flexible cables. Due to limited space, flexible cables are easier to install.
- Recommended external cable specification for the DC cabinet: single core 1*70mm ^{2}

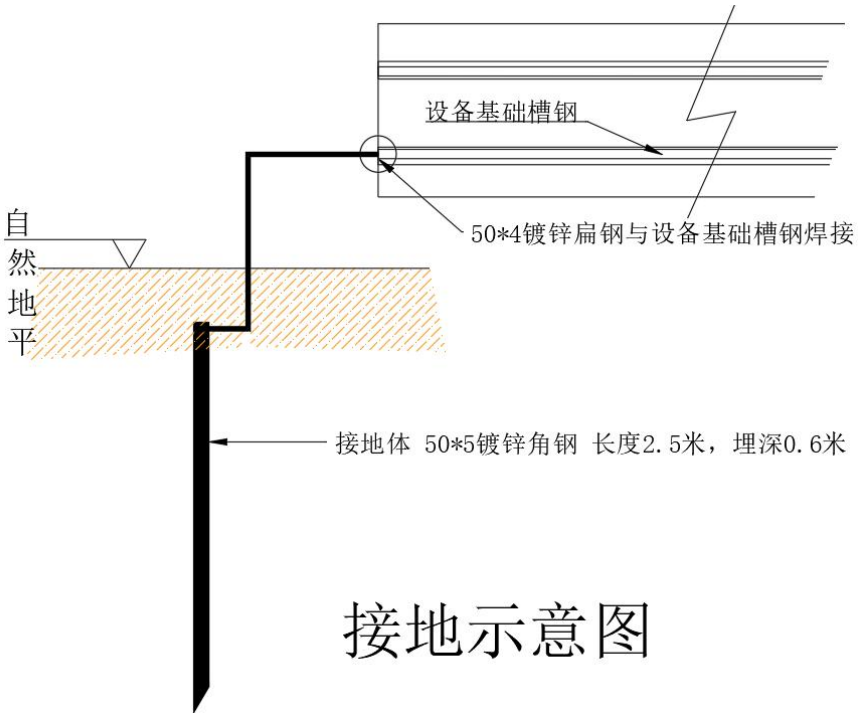


Figure 7-1 Grounding Diagram

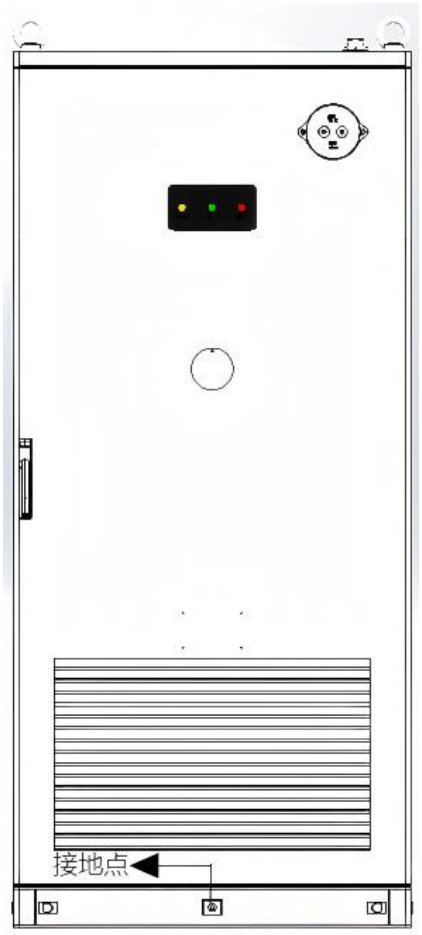


Figure 7-2 Grounding Location

8. Install Wiring

Dangerous

During the installation of AC wires, ensure the AC side is measured for absence of voltage; live work is strictly prohibited.

Dangerous

- Smoking or using open flames near the battery is strictly prohibited.

- The site must be equipped with compliant firefighting equipment, such as fire sand and carbon dioxide fire extinguishers.
- Use dedicated protective equipment and specialized insulation tools to prevent electric shock injuries or short circuit faults.

⚠ 警告

- Tighten the fastening screws of copper bars or wires according to the specified torque. Regularly inspect if they are fully tightened and free of rust, corrosion, or other foreign substances, and clean as necessary. Loose screws will cause excessive contact resistance, resulting in severe heating under high current that can damage the battery.
- During battery installation, it is strictly forbidden to place installation tools, metal parts, or miscellaneous items on the battery. After completion, promptly remove any items on and around the battery.

⚠ 警告

- When tightening connecting wires, ensure the screw spring washers are properly compressed, the terminals' protruding parts on the wires face outward, and the wires are free of damage.
- When preparing wires, always keep away from the equipment to prevent wire debris from accidentally entering the device, which may cause sparking, personal injury, and equipment damage.

🕮 说明

All cable color indications shown in the electrical connection diagrams in this chapter are for reference only. Cable selection must comply with local cable standards (yellow-green bi-color wires may only be used for protective grounding).

8.1. AC Wiring of the Energy Storage System

- Before wiring, perform power quality measurement on the AC supply voltage; only when it meets grid requirements may it be connected to the AC side of the Energy Storage System

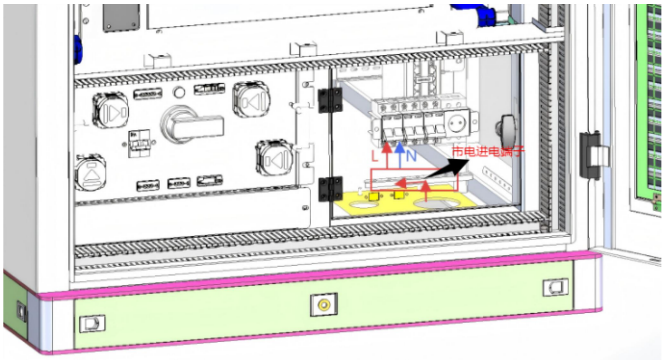


Figure 8-1 Diagram of AC wiring positions

- The AC side wiring is used to connect L, N. The Energy Storage System reserves mounting holes for its wiring (the exact number and size of wiring terminals shall be subject to the purchased Energy Storage System). The inbound wiring position and specific wiring locations are shown in Figure 8-1:
  - Confirm that all switches related to equipment connected to the Energy Storage System are in the OFF state.
  - The phase sequence of the Energy Storage System AC input from left to right is L, N.

Table 8-1 Recommended connection cable table

Purpose	Cable specification	Material	Quantity
Live wire L	6mm ^{2} or AWG9-10	Copper	1 cable
Neutral line N	6mm ^{2} or AWG9-10	Copper	1 cable
Ground line PE	4mm ^{2} or AWG11-12	Copper	1 cable

8.2. DC Wiring of the Energy Storage System

The wiring method between the Energy Storage System and the external energy storage inverter (PCS) is as follows: locate the positive (P+) and negative (P-) output terminals of the High Voltage Cabinet respectively, connect DC cables to these P+ and P- terminals, route the DC cables through the cable outlet slot at the bottom of the cabinet, and connect them to the DC input terminals (DC+ and DC-) of the external energy storage inverter (PCS).

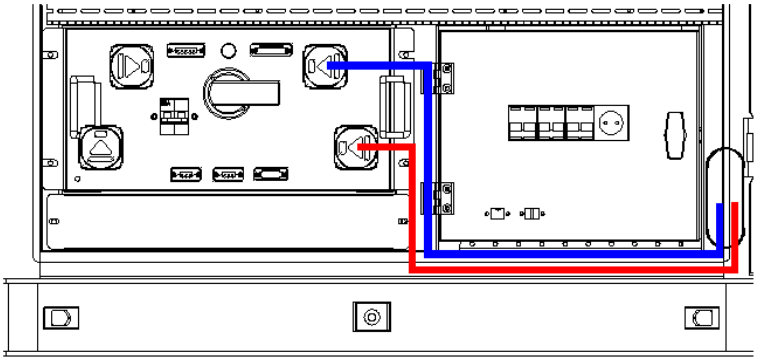


Figure 8-2DC wiring diagram

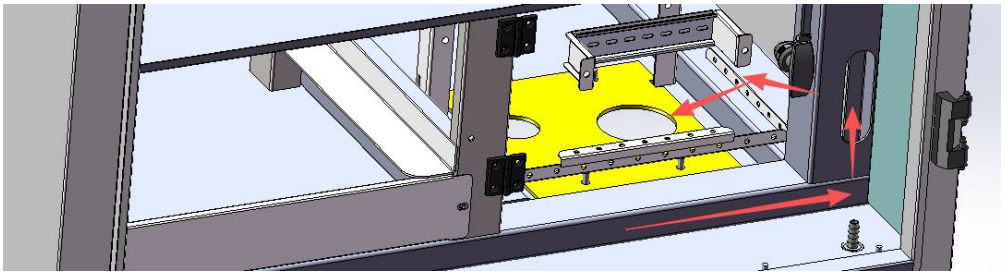


Figure 8-3 DC input wiring diagram

8.3. Ground Wiring of the Energy Storage System

The enclosure of the Energy Storage System and components inside the cabinet requiring grounding shall be reliably connected to the grounding terminal of the Energy Storage System. The grounding terminal must be securely connected to the equipotential bonding device at the installation site

or control room, which then connects to earth or the grounding grid via the equipotential bonding device. When reliably connecting the energy storage system grounding copper busbar to the equipotential bonding device of the installation site or control room, a grounding cable of at least 16mm² is required.

Before wiring the ground cable, an inspection must be performed, and cable connections must proceed according to the following steps:

1) The grounding connection must comply with the grounding standards and regulations of the country or region where the project is located!

2) The grounding connection must be securely tightened!

3) After grounding is completed, the grounding resistance must be measured, and the resistance value must not exceed 4Ω!

4) Ensure a reliable connection!

5) Cables must have adequate bending space; do not pull forcefully!

8.4. Energy storage system communication wiring

Wiring specifications for communication between the Energy Storage System and the external energy storage inverter (PCS) are as follows:

1. Communication method: CAN communication and fault dry contact.

2. Wiring location: designated cabinet door XT3 terminal block; connect CAN communication to terminals 1 and 2, and fault dry contact to terminals 3 and 4, as shown in Figure 8-4.

3. Adapter connectors: use tubular wire terminals.

Wiring operations must strictly comply with the equipment technical manual and relevant industry standards to ensure stable and reliable communication links.

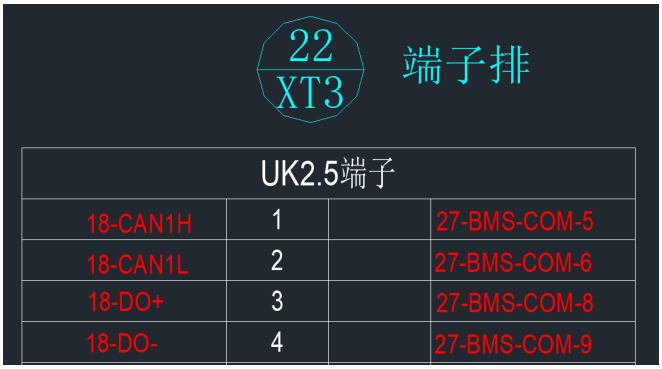


Figure 8-4 Communication terminals

9. Power On/Off Procedures

9.1. Inspection Before Power On

Before starting the Energy Storage System after installation is complete, the following conditions must be satisfied:

a) The surfaces of all internal components of the Energy Storage System are clean, dry, and free of foreign objects.

b) The operating mechanisms, switches, and other movable elements are flexible, reliable, and precise: For equipment equipped with temperature display, temperature control, fans, and other devices, inspections should also be performed according to electrical performance requirements and the equipment installation and operation manual.

c) The connections of the main circuit, control circuit, and grounding circuit are securely fastened.

d) The mounting screws of electrical components and equipment are tightened.

e) Electrical components exhibit no anomalies. Any issues identified during inspection must be resolved immediately; if resolution on site is not possible, promptly contact and notify our company.

f) The AC side wiring sequence for L and N is correct and complies with wiring standards.

g) All switches inside the Energy Storage System are turned off.

h) Check the grounding condition of the circuit, ensuring it meets insulation matrix requirements.

i) Grounding resistance ≤4Ω.

j) The DC side voltage must not exceed or fall below the allowable DC side voltage (≤DC1000V).

Attention!

1) If powering on in high humidity weather, the internal electrical components of

the device must be inspected and dried before energizing.

2) Powering on the Energy Storage System must only be performed by professional electrical personnel!

9.2. System Power On

a）Use a power meter to measure 220V at the miniature circuit breaker on the distribution cabinet door; confirm it is correct before closing the circuit breaker;

b）Power-on procedure for the High Voltage Cabinet:

1、Switch the circuit breaker handle to the "ON" position;

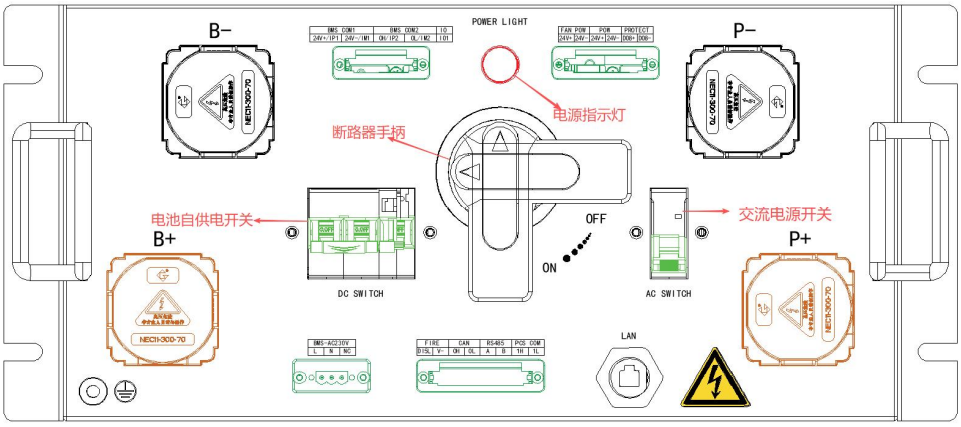
2、Turn on the High Voltage Cabinet “AC Power Supply” circuit breaker and “DC Power Supply” circuit breaker separately (circuit breaker is “ON” when pushed up, “OFF” when pushed down); the High Voltage Cabinet powers on, and the power indicator light stays on (the power indicator light illuminates immediately after the “AC Power Supply” circuit breaker is closed);

3、Wait about 30 seconds for the main positive and negative contactors inside the High Voltage Cabinet to close, resulting in total voltage output across the “P+” and “P-” terminals;

4、High voltage power-up is complete.

c）In the environment monitoring part, the Liquid Cooling Unit enters self-check mode, and the operation indicator lights of other devices turn on.

d）At this point, the system power-up is complete.



9.3. System Power Off

a）High Voltage Cabinet power-down procedure:

1、Turn the circuit breaker handle to the “OFF” position;

2、Turn off the circuit breakers for the High Voltage Cabinet 'AC Power Supply' and 'DC Power Supply' respectively (breaker is 'ON' when up, 'OFF' when down); the power indicator light will turn off.

3、The power-down of the High Voltage Cabinet is complete.

b）Turn off the three miniature circuit breakers on the door.

c）At this point, the system power-down is complete.

10. Fault Diagnosis and Maintenance

10.1. Precautions Before Maintenance

To ensure the safety of maintenance or repair personnel, before any maintenance or repair, it is essential to ensure that the system is shut down, all power supplies to each part are disconnected, and the necessary short circuiting and grounding are performed, with appropriate maintenance signage placed to prevent others from powering the system during maintenance.

10.2. List of Safety Tools

The specific types, quantities, and specifications of safety tools and equipment at the Energy Storage Power Station should be configured according to the system's voltage level, installed capacity, and operating conditions.

Table 10-1 List of Safety Tools

Serial Number	Device Name	Purpose	Inspection Cycle
1	Insulation Rod	An insulation tool used for short-duration operation or measurement on live equipment	1 year
2	Grounding Line	A temporary grounding device used to prevent sudden energization of equipment or lines, eliminate induced voltage, and discharge residual charges	5 years
3	Voltage Tester	A device that detects whether high-voltage electrical equipment or lines carry operational voltage by measuring current through stray capacitance to ground via the tester	1 year
4	Insulation Clamp	A tool primarily used in power systems of 35kV and below for installing and removing high-voltage fuses or performing similar operations	1 year
5	Insulation Operating	Insulation tool used for short-duration operations on live equipment, such as opening or closing	None

	Rod	high-voltage isolating switches and drop-out fuses	
6	Ground Knife Operating Handle	Opening and closing the ground knife switch	None
7	Isolating Switch Operating Handle	Opening and closing the isolating switch	None
8	Box Transformer High-voltage Operating Rod	Used for box transformer operations	None
9	Insulating Rubber Mat	Rubber mat used to enhance personnel insulation from the ground	1 year
10	Temporary Safety Fence or Warning Rope	Site Enclosure	None
11	Safety Helmet	Helmet used to protect personnel head from external impact injuries	1 year
12	Safety Belt	Personal protective equipment to prevent falls and fatalities when working at heights	1 year
13	Insulating Clothing	Clothing with electrical insulation properties	Six Months
14	Insulating gloves	Electrically Insulating Gloves	Six Months
15	Insulating Boots	Boots used to insulate the human body from the ground	Six Months
16	Identification Signs	Prompt signs, warning signs, caution signs, warning tapes, equipment labels, etc.	None
17	Cotton	General Operational Protection	None

	Gloves		
18	Reflective Vest	Warning in Low-Visibility Conditions	None
19	Positive Pressure Respirator	Prevents exposure to toxic gases, dust, bacteria, or harmful vapors Protective Equipment Against Harm from Toxic Substances	1 year

10.3. Maintenance Tools

Table 10-2 List of Maintenance Tools

Serial Number	Device Name	Remarks
1	Digital Megohmmeter	
2	Grounding Resistance Tester	
3	Multimeter	
4	Clamp Meter	
5	Spot Infrared Thermometer	
6	Voltage Tester	
7	Flashlight	
8	CAN Box	
9	485 to USB Interface	
10	Multifunctional Network Cable Tracer	
11	Cordless Drill Charging Electric Screwdriver	
12	Torque Wrench	
13	Socket Set Box	
14	Screwdriver Set	
15	Crimping Pliers	
16	Wire Stripper	
17	Adjustable Wrench	
18	Hex Key Wrench Set	

Serial Number	Device Name	Remarks
19	Forklift	

10.4. Key Points of Routine Inspection

Table 10-3 Daily Patrol Inspection Checklist

Serial Number	Inspection Items	Requirements
1	Battery and Battery Management System (BMS)	1) Equipment operation number identification and phase sequence markings are clear and identifiable; factory nameplate is complete and clearly identifiable; 2) No abnormal smoke, vibration, or noise; 3) Connections of the battery system main circuit and secondary circuit are secure, without rust or dust accumulation; 4) Battery pack appearance is intact with no damage, swelling, deformation, or leakage; 5) Battery rack grounding is intact, grounding busbar free of rust, and grounding connection bolts are not loose; 6
2	Energy Storage Monitoring System	1) The server operates normally, and function interface switching is normal; 2) The monitoring system communicates normally with the BMS, fire protection, Liquid Cooling Unit, and other systems; 3) The monitoring system reports no abnormal alarms.
3	Fire Protection System	1) The indicator lights of each detector flash normally, communication is normal, and none are offline; 2) The fire alarm controller and all detectors are securely installed with intact appearance; operational indicator lights are normal; 3) The edge UI interface - fire monitoring telemetry

		data is normal, LED display indicators are normal, and no alarm signals are present; 4) Fire gas extinguishing pipelines and water fire protection pipelines have no rust or corrosion; 5) No missing external connectors for the water fire protection system; 6) Explosion-proof pressure relief valve without damage; 7) Thermal aerosol sensing cable installed securely, without damage; 8) Fire alarm sound and light indicators show no abnormalities, alarm operates normally.
4	Liquid Cooling System	1) Liquid Cooling Unit operates normally, without abnormal noise or vibration, indoor temperature and humidity remain within the set range; 2) Air filters (screens) inside and outside the Liquid Cooling Unit radiator must be clean and intact; 3) Liquid Cooling Unit condensate drain pipe flows normally;
5	Extreme Weather	1) Inspect whether the battery operating environment’s temperature and humidity are within normal ranges; 2) Inspect the battery for any signs of overheating; 3) During extremely cold weather, inspect wires for over-tightening and connectors for cracking; 4) During high-temperature weather, increase the frequency of infrared temperature measurements and inspect the battery compartment for condensation; 5) Inspect grounding integrity before and after the thunderstorm season.

10.5. Common Maintenance Items and Requirements

Table 10-4 Common Maintenance Items and Requirements

Serial Number	Maintenance Items	Requirements	Recommended Maintenance Cycle
1	Battery and Battery Management System	1) Perform a thorough cleaning of the battery and the DC cabinet.	Maintenance interval not exceeding 12 months
2		2) Inspect and tighten all connection bolts of the energy storage system.	Maintenance interval not exceeding 12 months
3		3) Check that the smoke, temperature, and humidity detectors in the DC cabinet are functioning properly.	Interval not exceeding 6 months
4		4) Perform regular balancing maintenance on lithium-ion batteries.	Maintenance interval not exceeding 12 months
5		5) Regularly charge and discharge batteries stored with low charge.	Interval not exceeding 6 months
6		6) Regularly read and save data from the battery management system.	Interval not exceeding 6 months
7	Liquid Cooling System	1) Regularly check and replenish the cooling medium of the liquid cooling unit.	Interval not exceeding 6 months
8		2) Regularly clean the heat sink fin filters.	Maintenance interval not exceeding 12 months
9		3) Inspect and clean the condenser.	Maintenance interval not exceeding 12 months

10		4) Check that assembly parts are secure.	Maintenance interval not exceeding 12 months
11		5) Remove dust and dirt inside and outside the liquid cooling unit.	Maintenance interval not exceeding 12 months
12		6) Test the insulation resistance of the power input line phase to ground; insulation resistance ≥ 5MΩ.	Maintenance interval not exceeding 12 months
13		7) Check the grounding resistance of the Liquid Cooling Unit chassis; grounding resistance ≤ 4Ω.	Maintenance interval not exceeding 12 months

10.6. Common Faults and Solutions

Table 10-5 Common Faults and Solutions

Serial Number	Common Faults	Possible Causes	Solutions
1	Indicator light off or flashing	1) Power supply failure or poor contact; 2) Indicator light burned out.	1) If the power supply fails, replace the input power; if contact is poor, retighten the terminal screws; 2) Replace the indicator light.
2	Three-phase meter cannot communicate normally	1) Power supply failure or poor contact; 2) RS485 ports A and B are reversed; 3) Three-phase meter malfunction.	1) If the power supply fails, replace the input power; if contact is poor, retighten the terminal screws; 2) Check the terminal block and reconnect wiring; 3) Replace the meter.

3	Cabinet fan not operating normally	1) Power supply failure or poor contact; 2) Fan unit malfunction.	1) If power supply failure occurs, confirm whether the input voltage is normal; if there is poor contact, retighten the wire; 2) Replace the fan.
4	Miniature Circuit Breaker cannot be closed normally	1) Circuit breaker trips due to overload or short circuit; 2) Circuit breaker malfunction.	1) Reduce the load usage and check for short circuit faults in the wiring; 2) Replace the circuit breaker.
5	AC surge protector failure	1) AC surge protector fault detection line is loose; 2) AC surge protector failure.	1) Check whether the fault detection line connector is loose; if so, re-secure the detection line; 2) Replace the AC surge protector.
6	Touch screen display abnormal or inoperable	1) Power supply failure or poor contact; 2) Touch screen failure.	1) If power supply failure is confirmed, replace the switching power supply; if poor contact, rewire and tighten connections; 2) Replace the touch screen according to the touch screen manual.
7	BCM is not functioning properly	1) Power supply failure or poor contact; 2) BCM malfunction.	1) If there is a power supply failure, replace the input power source; if there is poor contact, retighten the wires; 2) Replace the BCM.
8	The contactor cannot engage or disengage properly	1) The High Voltage Cabinet fuse is blown; 2) Control circuit wiring is loose; 3) Contactor malfunction.	1) Replace the fuse with one of the same model; 2) Retighten the wires; 3) Replace the contactor.

9	BMU is not functioning properly	1) Power supply failure or poor contact; 2) BMU malfunction.	1) If there is a power supply failure, replace the input power source; if there is poor contact, retighten the wires; 2) Replace the BMU.

11. Warranty

11.1. Warranty Terms

Within the warranty period, BOSHI will provide warranty services for any failures caused by battery system quality defects in BOSHI-recognized products.

For products beyond the warranty period, paid services will be provided.

The following faults are not covered by the warranty and are excluded from warranty services:

1) Expired warranty period.

2) Failure to provide the product ID.

3) Flooding, collisions, or other damages beyond the product's tolerance range.

4) Failures resulting from improper use, maintenance, or repair of the product contrary to the manual.

5) Failures caused by abnormal conditions, such as extreme temperatures or incorrect installation.

6) Failures not caused by the product itself, but resulting from the user's equipment or software.

7) Damage caused by the customer repairing battery system failures without permission from Bosh or the distributor.

8) Quality issues caused by not using components required by Bosh.

9) Damage caused by the customer moving or reassembling the product, or failures caused by unauthorized maintenance personnel.

10) Damage caused by natural disasters such as fire, earthquakes, or floods.

11.2. Disclaimer

The contents of these documents should be regularly reviewed and updated as necessary.

No guarantee is made for the completeness or absolute accuracy of these documents. Please obtain the latest version by visiting our website or contacting the distributor.

During the project design phase, design work shall be based on drawings specifically provided by Boshi engineers for this project.

Boostess shall not be liable for any personal injury, property damage, product damage, or subsequent damages caused by any of the following reasons:

1) Non-compliance with this manual.

2) Improper use of the product.

3) Maintenance, opening, or other operations performed by unauthorized and/or unqualified personnel.

4) Use of unapproved spare parts.

5) Any unauthorized modifications or technical changes to the product.

Note: This user manual will be updated and revised continuously as the product is upgraded.