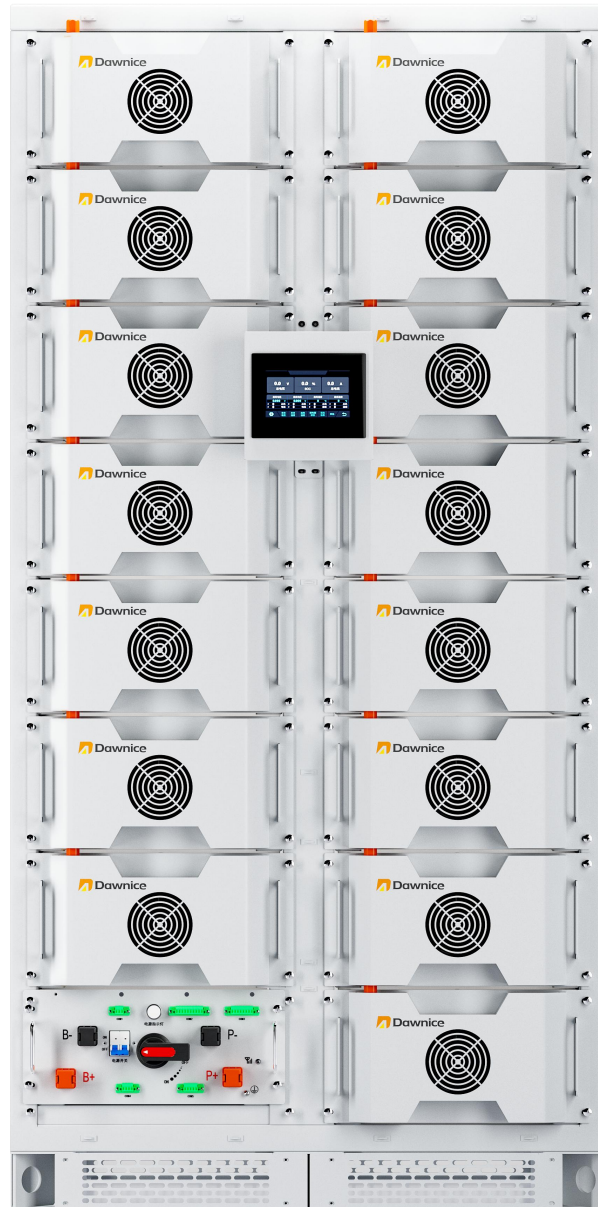




User Manual

Energy Storage Battery

BS09-R

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1. Foreword

Please read and follow all safety warnings, instructions, illustrations, and specifications provided in this product manual carefully. Failure to follow these instructions may result in electric shock, fire, or serious injury.

1.1 All Rights Reserved

This document is copyrighted by Yichun Dawnice Manufacture and Trade Co., Ltd.. No part of this document may be excerpted, copied, translated, annotated, or reproduced in any form or by any means without our company's prior written authorization.

Trademarks and Licensing

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Software License

Use of any data in the firmware or software developed by our company, in whole or in part, for commercial purposes is prohibited.

Reverse engineering, hacking, or any other operation that compromises the original programming of the software developed by our company is prohibited.

Disclaimer

The terms "Danger," "Warning," "Caution," and "Instructions" in this manual do not represent all safety precautions to be followed. You must also comply with applicable international, national, or regional standards and industry practices. The company assumes no liability for personal injury, property damage, product damage, or consequential damages arising from any of the following situations.

- * Equipment damage caused by force majeure events such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, and voltage fluctuations.

- * The product was not used in accordance with the instructions in this manual.

- * The installation, operation, and storage environment do not comply with relevant international, national, or regional standards.

- * Unqualified personnel are not allowed to install, use, maintain, dismantle, or perform other operations on the equipment.

- * Using unauthorized spare parts.

- * Unauthorized modification or technical changes to the product or software.

- * Damage caused by transportation conducted by you or a third party you have authorized.

- * The materials and tools you provided yourself do not meet international, national, or regional standards.

- * Damage caused by your own or a third party's negligence, intentional misconduct, fault, or improper operation.

1.2 About The Manual

This manual primarily describes product information, installation guidelines, and operation and maintenance instructions. In this manual, "equipment" or "device" refers to the relevant product, software, components, spare parts, or service; "manufacturer" refers to the equipment manufacturer, seller, or service provider.

This document applies to the following product models from our company:

BS09-64-R

BS09-80-R

BS09-96-R

BS09-112-R

BS09-128-R

BS09-144-R

BS09-160-R

BS09-176-R

BS09-192-R

BS09-208-R

BS09-225-R

BS09-241-R

Note: In this manual, unless otherwise specified, the terms "system" or "energy storage system" refer to this particular product model.

How to use this manual

Please read this manual carefully before using the product and keep it in an easily accessible place. To provide the best customer experience, the content of this manual may be updated and revised, therefore some errors or slight discrepancies may exist. Information may change without notice. Please obtain the latest manual from your sales channel.

Symbol Explanation: To ensure user safety and property security when using this product, and to ensure optimal and effective use of the product, this manual provides users with the following safety information highlighted by the symbols.

The following symbols may appear in this manual to highlight information; their meanings are as follows:

Table 1.2 Symbol Explanation

	This indicates a dangerous situation. Failure to take action could result in a high-risk situation such as death or serious injury.
	This indicates a potential for damage or injury. Failure to take precautions may result in minor or moderate injury or loss.

 Notice	This indicates a potential for damage or injury. Failure to take precautions may result in minor or moderate injury or loss.
 Illustration	This indicates a potential for equipment damage or property loss. Failure to take precautions may result in equipment damage, data loss, performance degradation, or other unforeseen consequences.

This product is designed as an integrated system and must be operated by trained and qualified personnel, including but not limited to:

- * Technical Support Engineer
- * Installation Engineer
- * Commissioning Engineer
- * Electrical Engineer
- * Maintenance Engineer

Operators should be familiar with the characteristics and safety requirements of lithium batteries. If you are unsure whether you possess the necessary skills to complete this integration, please do not use this product.

1.3 Product Application

This product is a high-voltage lithium-ion battery energy storage system. Its features include high integration, high reliability, and long service life. It can be applied to various private and commercial uses, such as energy storage, peak-valley arbitrage, and photovoltaic power generation in factories, supermarkets, schools, apartments, and farms. It can provide secondary utilization scenarios for renewable energy. Misuse or abuse may result in personal injury or property damage. In such cases, the user, not the manufacturer, shall bear the responsibility.

Revision History

The latest version in the "Revision history" contains updates from all previous versions of this Manual.

* V1.0.0.20251204

- First issue.

* V2.0.0.20251204

- Reset

* V2.1.0.20251219

- Product size and weight adjustment

2. Safety Precautions

2.1 Safety instruction

- * Before proceeding with any work, please read all safety instructions carefully and follow them when

operating the battery.

* Incorrect operation may result in:

1. Injury or death of operators or third parties.
2. Damage to the system hardware

* Skills that qualified personnel shall have:

1. Training in installation, debugging, and hazard handling of electrical system
2. Understanding of this Manual and other related documents
3. Understanding of local regulations and directives

2.2 Personnel Requirements

The lifting, loading, transportation, installation, wiring, operation, and maintenance of energy storage systems must be performed by qualified electrical technicians or other professionals. Professional technicians should meet the following requirements:

- * Operators should be thoroughly familiar with the structure and operating principles of the entire energy storage system.
- * Operators should be thoroughly familiar with this manual.
- * Operators should be thoroughly familiar with the relevant standards of the country/region where the project is located.
- * Operators should be able to respond quickly to hazards or emergencies that occur during construction and installation.

2.3 Electrical safety



- * Never touch terminals or conductors connected to the power grid circuit, as the power grid may cause electric shock; all circuit connectors must be disconnected during maintenance.
- * Both batteries and the power grid can generate voltage; you must use a standard voltmeter to ensure there is no voltage before touching them.
- * Working with live wires is strictly prohibited, as it may result in fire or personal injury.



- * The product contains a lethal voltage!
- * A lethal high voltage exists between the positive and negative terminals of the energy storage battery pack.
- * Damaged equipment or system malfunctions may cause electric shock and fire.
- * When maintaining the equipment, ensure that the connection between the energy storage inverter and the energy storage battery pack is completely disconnected.

- * Carefully observe and follow the warning labels on the product.
- * Follow all safety precautions listed in this manual and other relevant documents.
- * Comply with the usage, protection requirements, and precautions for lithium batteries.
- * Only operate the equipment if it is in a safe condition.



* All installation, wiring, operation, and maintenance must comply with the relevant laws and regulations of the location where the equipment is installed and the project is situated.

* This product must be used in accordance with the requirements of this manual; failure to do so may result in personal injury and equipment damage.



- * Avoid unnecessary contact with circuit boards.
- * Comply with electrostatic discharge (ESD) protection protocols, such as wearing anti-static wrist straps.



- * Set up warning signs or safety warning tape near the operating area.
- * After maintenance or repair operations are completed, be sure to remove the cabinet key and keep it safe.

2.4 Environmental Safety



* Do not place the equipment in flammable, explosive, or dusty environments, as this may cause fire or explosion hazards.



- * Do not place flammable or explosive materials around the battery pack.
- * Do not block or occupy escape routes with clutter or in any other manner.



- * Do not use the product in environments exceeding the specified temperature range.
- * Do not use the product in environments exceeding the specified humidity range.
- * Do not use the product in environments exceeding the specified altitude range.

2.5 Safety of Machiner



- * When performing work at heights, always wear safety helmets and other protective equipment, and secure yourself to stable structural components to prevent falls.
- * Before installing equipment, ensure it is properly secured to avoid tipping, which could cause injuries or damage to personnel and equipment.



- * When using a forklift, ensure the forks are in the center position before lifting to prevent tipping.
- * Before moving, secure the equipment to the forklift with ropes. During movement, assign a dedicated person to supervise.
- * Lifting personnel must complete and pass relevant training before being allowed to perform the work.
- * Place warning signs and barriers to isolate the lifting area.
- * The lifting conditions must meet the operational requirements
- * Do not allow personnel to walk underneath during lifting operations.
- * During lifting operations, ensure the angle of the lifting cables is less than 90°



- * Prepare for load-bearing before moving heavy objects.
- * When multiple people are involved in moving, distribute the load evenly to ensure balanced weight distribution.
- * Wear protective gloves, safety shoes, and other safety gear when moving heavy objects.
- * When working at height, use wooden or insulated ladders; do not use single-step ladders.
- * When using a ladder, ensure it is placed on a stable, flat surface, and have someone hold the ladder while you work.



- * During transportation and installation, any scratches must be promptly repaired. Do not allow scratched areas to remain exposed for extended periods.
- * Unauthorized welding, cutting, or any other operations to the equipment are prohibited.
- * Use tools correctly and ensure proper handling techniques.

2.6 Operation and Maintenance



- * The equipment contains high voltage; accidental contact may result in fatal electric shock.
- * When performing live measurements, take appropriate protective measures (such as wearing insulated gloves and shoes).
- * High-voltage work should be carried out by two people to ensure personal safety.



* Do not perform battery maintenance without prior instruction. Do not perform any maintenance other than those described in this manual, as this may damage the battery.

* Disassembling or repairing the battery may cause it to catch fire. Replacement of internal parts must be performed by a qualified professional.

* Do not paint the internal or external parts of the product.

* Do not clean the product with detergents or expose it to harsh chemicals.



When performing electrical measurements, connections, and trial runs on equipment:

* Select high-quality measuring equipment whose range and operating conditions meet the site requirements.

* Ensure that the measuring equipment is connected and used correctly and according to regulations to avoid hazards such as electric arcs.

2.7 Battery Safety

Before installing or using the battery, please carefully read the instruction manual and follow all instructions and warnings in the document. Failure to do so may result in electric shock, serious injury, or death, or may damage the battery and render it unusable.

The battery must be charged within 48 hours of being fully discharged; otherwise, battery capacity will decrease or irreversibly damage it. If the battery needs to be stored for a long period, it must be charged at least once every 6 months.

* Do not store the battery with flammable or explosive materials.

* Do not connect the battery directly to the solar cable.

* Do not place any foreign objects in the battery compartment.

* Do not use this company's batteries with other batteries, including but not limited to batteries of other brands or capacities.

* Handle or process the battery with care to prevent damage, dropping, or leakage.

Please refer to this manual for battery use and maintenance

2.8 Product Disposal



*When disposing of the product, do not treat it as regular waste. Some parts can be recycled, while others may cause environmental pollution.

* Our company has priority in recycling end-of-life batteries.

* For end-of-life batteries not handled by our company, please contact your local authorized recycling agency or our company for disposal.

Note: This manual does not cover all possible situations during operation, maintenance, and repair. If you encounter any situations not explained in this manual, please prioritize following local regulations and standards and contact our company promptly.

3. Product Introduction

3.1 Energy storage system introduction

The BS09-R series is an energy storage battery system product independently developed and manufactured by our company. This series of products is a high-performance DC-side energy storage system designed for efficient and safe energy storage and management. The system adopts a modular architecture, with multiple battery packs integrated into a high-voltage box in series to ensure a stable and reliable power supply. The battery cells are based on lithium iron phosphate technology, featuring long lifespan, high safety, and excellent thermal stability, making them suitable for various application scenarios such as home energy storage, industrial and commercial backup power, and renewable energy integration.

This product requires a high-voltage inverter to convert DC power to AC power, enabling seamless connection to the grid or load. Please ensure that the inverter matches the system voltage and power parameters, and that installation and commissioning are performed by qualified personnel to guarantee safe operation.

3.2 Product characteristics

This product is a DC side energy storage system, which is designed in a simple indoor rack form and has the characteristics of low cost, easy installation, transportation, maintenance and expansion. In addition, it also has the following functions:

- * **Real-time Data Monitoring:** The display screen shows the overall operating status of the battery system, as well as fault alarm information, including overvoltage, undervoltage, and overtemperature, assisting in rapid diagnosis and maintenance.
- * **Intelligent Management:** The BMU and BMS work together to achieve precise battery protection (such as overcharge, over-discharge, and short-circuit protection) and dynamic balancing, improving system efficiency and reliability.
- * **High-Efficiency Heat Dissipation Design:** An independent fan module ensures efficient heat dissipation, extending battery life.
- * **Modular Expansion:** Supports flexible configuration with multiple battery packs, facilitating system expansion and maintenance.

3.3 Appearance & Size

3.3.1 Product Appearance

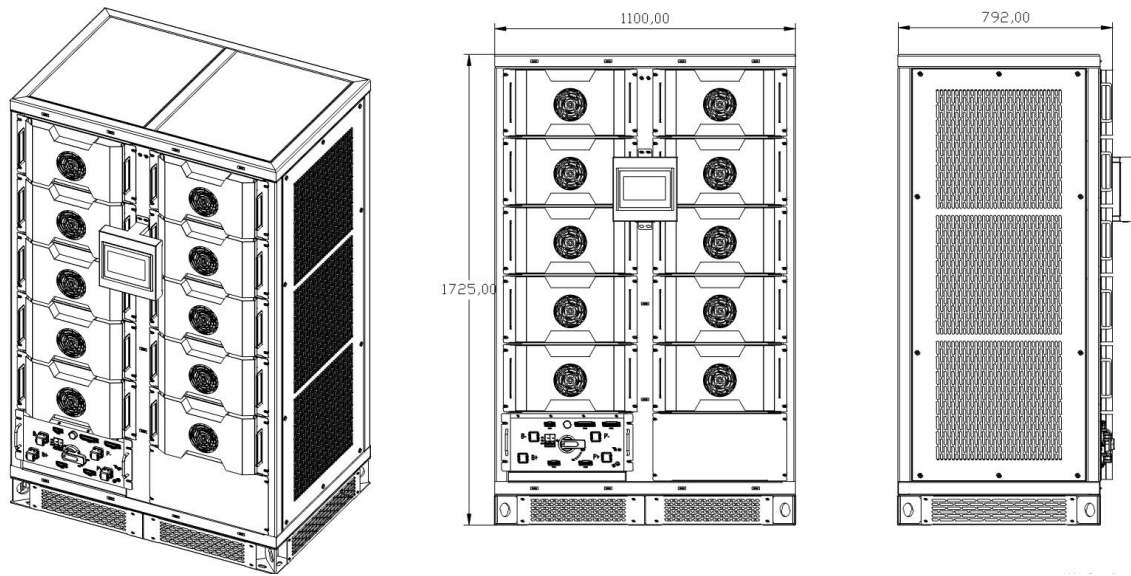


Figure 3.3.1 Product Appearance

Note: This example uses a 160.76 kWh product.

3.3.2 Product Dimensions

Table 3.3.2 Product Dimensions

Measure	Size
W (Width)	1100 mm
H (Height)	792 mm
D (Depth)	1725 mm

3.3.3 Battery pack appearance

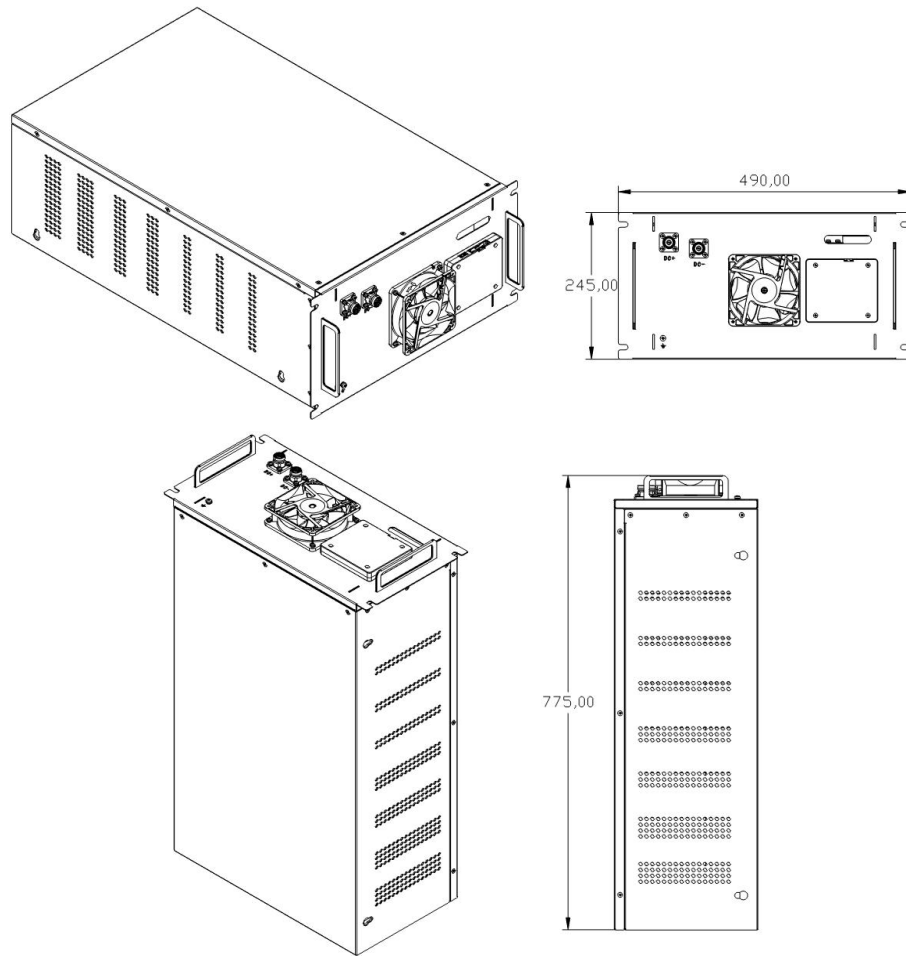


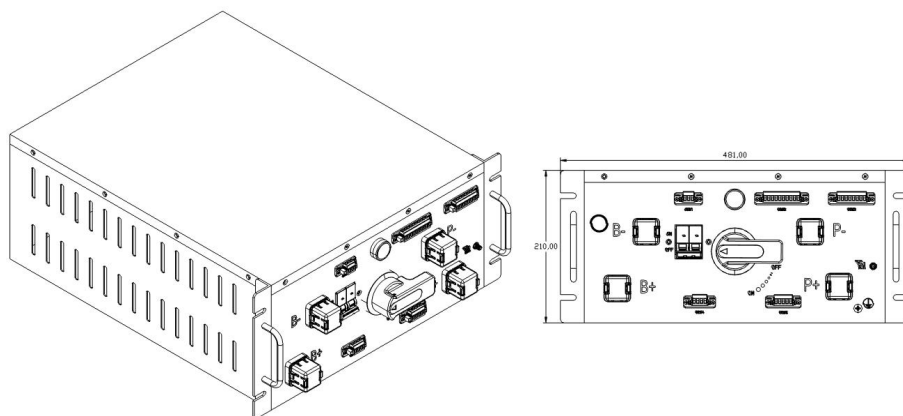
Figure 3.3.3 Battery pack appearance

3.3.4 Battery pack size

Table 3.3.4 Battery pack size

Measure	Size
W (Width)	490 mm
H (Height)	775 mm
D (Depth)	245 mm

3.3.5 High-voltage cluster control box appearance



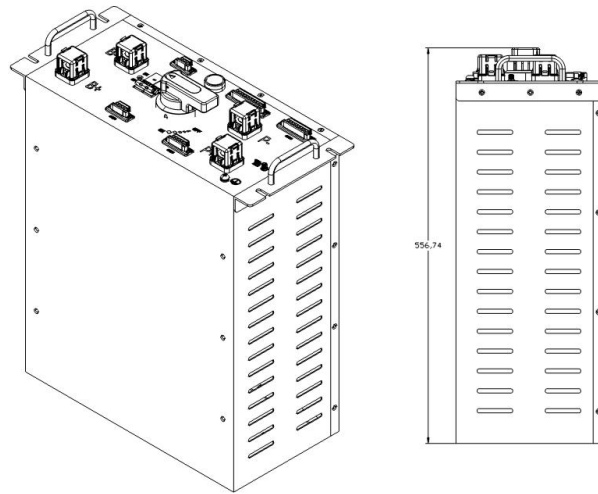


Figure 3.3.5 High-voltage cluster control box appearance

3.3.6 High-voltage cluster control box dimensions

Table 3.3.6 High-voltage cluster control box dimensions

Measure	Size
W (Width)	481 mm
H (Height)	557 mm
D (Depth)	214 mm

3.4 Appearance description

3.4.1 Product layout

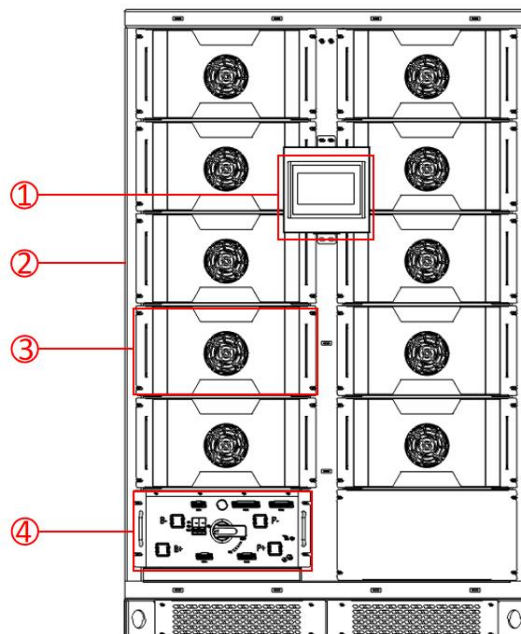


Figure 3.4.1 Product layout

Note: The product with a capacity of 160.76 kWh is used as an example.

Table 3.4.1 Component Explanation

No.	Name	Explanation
1	HMI	Displays system information
2	Battery Cluster Rack	Supports battery
3	Battery pack	Provides power
4	High-voltage cluster control box	Battery system primary circuit control box.

3.4.2 Battery pack instructions

Battery pack panel:

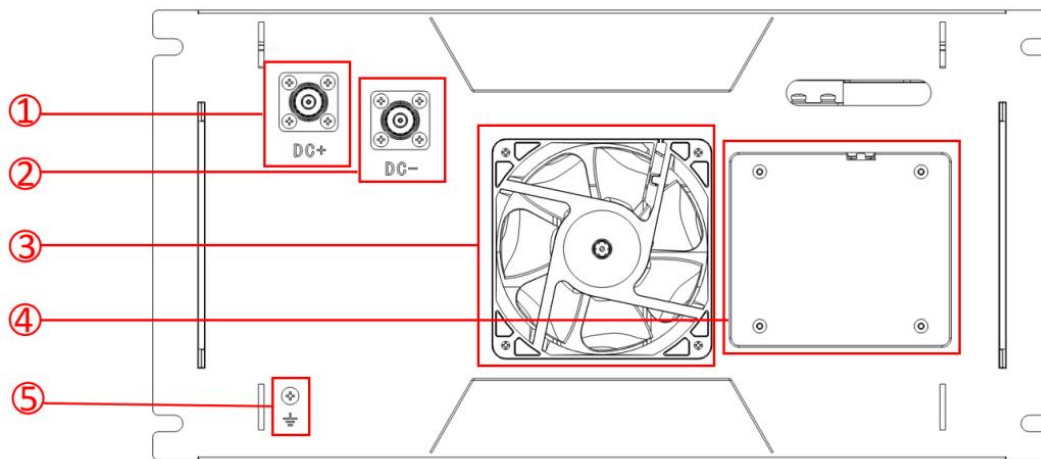


Figure 3.4.2 Battery Pack Panel

Table 3.4.2.1 Battery Pack Panel Explanation

No.	Name	Explanation
1	DC +	Battery interface positive terminal
2	DC -	Battery interface negative terminal
3	Fan module	Power supply
4	BMU	Battery management unit
5	Grounding point	Protective ground

Battery pack information:

Table 2.4.2.2 Battery pack information

Cell Type	LiFePO ₄
Voltage	51.2 Vdc
Rated Capacity	314 Ah
Rated Energy	16.076 kWh
Charge/Discharge Current	157 A
Charging Temperature	0~55 °C
Discharge Temperature	-20~55 °C
Storage Temperature	0~35 °C
Protection Rating	IP20

Dimensions (W*H*D)	490*775*245 mm
Dimensions (W*H*D)	117 kg

3.4.3 High Voltage Cluster Control Box Instructions

High-voltage cluster control box panel:

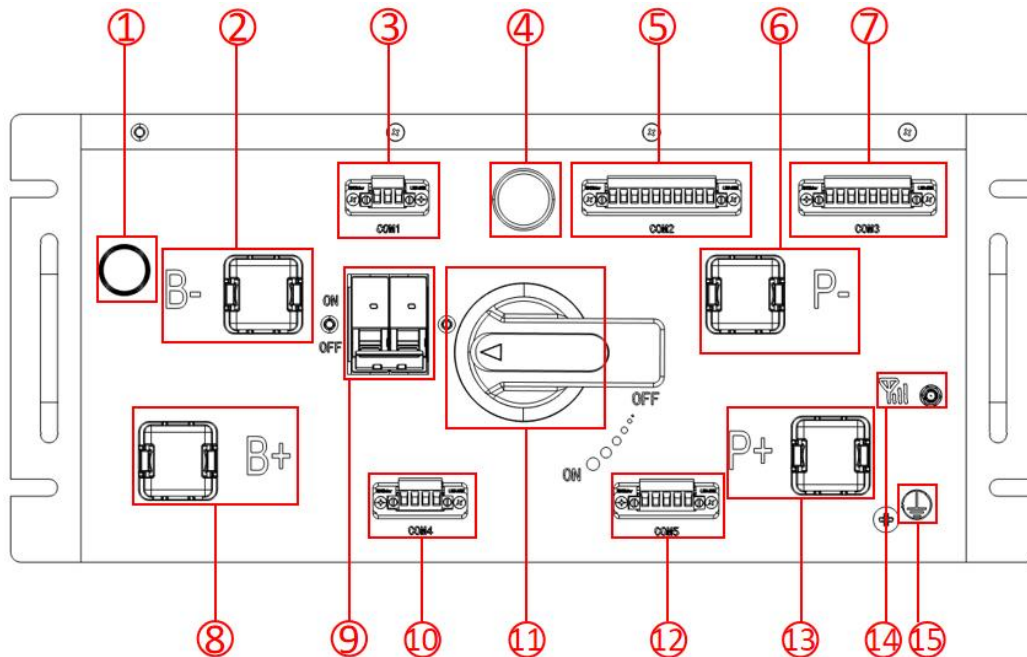


Figure 3.4.3 High-voltage cluster control box panel

High-voltage cluster control box information:

Table 3.4.3.1 High-voltage cluster control box information

No.	Name	Explanation
1	Start Switch	24V Power Start Switch
2	B -	Battery Cluster Interface Negative Terminal
3	COM1	220V Power Input Interface
4	Power Indicator	Battery Operation Fault Indicator
5	COM2	Communication with PCS or External Devices
6	P -	PCS Connection Interface Negative Terminal
7	COM3	Dry Contact Signal Interface
8	B +	Battery Cluster Interface Positive Terminal
9	Power Switch	Internal Power Circuit Breaker
10	COM4	Host Computer & External 24V Interface
11	Breaker	Battery Cluster and External Connection Controller
12	COM5	Battery Pack Communication & Fan 24V Power Supply Interface

13	P +	PCS Connection Interface Positive Terminal
14	Antenna Interface	Reserved Antenna Interface
15	Grounding Point	Protective Grounding

Communication port definition:

Table 3.4.3.2 Communication port definition

No.	I/O	COM Port	Name	Explanation
1	I	COM1 (3P)	AC220V-N	External 220V power input neutral wire
2	/		AC220V-PE	External 220V power input ground wire
3	I		AC220V-L	External 220V power input live wire
1	I/O	COM2 (10P)	CAN1R	Termination resistor
2	I/O		CAN1H	Isolated CAN, Connect to PCS or external device
3	I/O		CAN1L	
4	I/O		CAN1G	Isolated 485, Connect to PCS or external device
5	I/O		RS485-A1	
6	I/O		RS485-B1	
7	I/O		RS485-G1	Non-isolated 485, Connect to display screen or external device
8	I/O		RS485-A0	
9	I/O		RS485-B0	
10	I/O		RS485-G0	
1	O	COM3 (8P)	GND	Switching value detection, effective short circuit
2	O		SWITCH_IN	
3	/		SW2_IN	Dry contact 2 (0.1 A)
4	I/O		SW2_OUT	
5	I/O		SW1_IN	Dry contact 1 (0.1 A)
6	/		SW1_OUT	
7	O		24V+_OUT	Output 24 V+ (Rated 75 W)
8	O		24V-_OUT	Output 24 V- (Rated 75 W)
1	I/O	COM4 (4P)	DEBUG_CANH	Host computer debugging CANH
2	I/O		DEBUG_CANL	Host computer debugging CANL
3	I		24V+_IN	External DC input 24V+
4	I		24V-_IN	External DC input 24V-
1	I/O	COM5 (5P)	SPI-H	BMU Intranet daisy chain communication H
2	I/O		SPI-L	BMU Intranet daisy chain communication L
3	/		/	/
4	O		FAN+	Fan-powered AC output 24V+
5	O		FAN-	Fan-powered AC output 24V-

3.5 Screen Interface Description

3.5.1 Homepage Main Interface



Figure 3.5.1 Homepage Main Interface

Table 3.5.1 Main Interface Information Description

No.	Explanation
1	Current Battery Voltage
2	Current Battery Charge/Discharge Current
3	Current System Temperature
4	Current Battery State of Charge (SOC)
5	Fault Icon Display
6	Current System Time

3.5.2 Check battery status

Tap anywhere on the battery screen (Figure 3.5.1) to access the following interface:

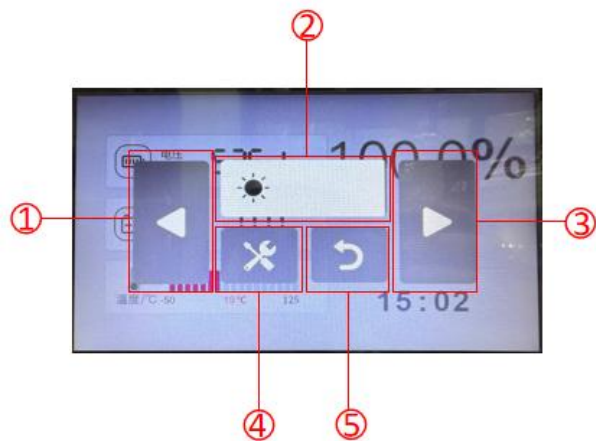


Figure 3.5.2.1 Switching interfaces

Table 3.5.2.1 Switching Interface Information Explanation

Serial Number	Explanation
1	Switch mode (light/dark)
2	Switch screen brightness
3	Switch mode (light/dark)
4	Enter information interface
5	Return to main interface

Clicking on position ④ in the switching interface (Figure 3.5.2.1) will take you to the main battery status interface:



Figure 3.5.2.2 Battery main status interface

Table 3.5.2.2 Battery main status interface information description

No.	Explanation
1	Current battery voltage
2	Current system time
3	Current battery SOC
4	Current battery charge/discharge current
5	Current maximum & minimum cell voltage and serial number
6	Current maximum & minimum cell temperature and serial number
7	Click to enter language & brightness & always-on settings interface
8	Click to view all current cell voltage information
9	Click to view current system temperature information
10	Click to view current system heating temperature information
11	Click to view current relay status information
12	Click to view current BMS operating status information
13	Click to enter other information viewing interface
14	Return to main interface

3.5.3 Check battery details

Clicking on cell voltage ⑧ in the battery main status interface (Figure 3.5.2.2) will take you to the battery cell voltage information interface, where you can view the current voltage of all cells for this battery:



Figure 3.5.3.1 Cell voltage information interface

Clicking on the individual cell temperature (⑨) on the battery main status interface (Figure 3.5.2.2) will take you to the battery cell temperature information interface, where you can view the current temperatures of all cells in the battery:

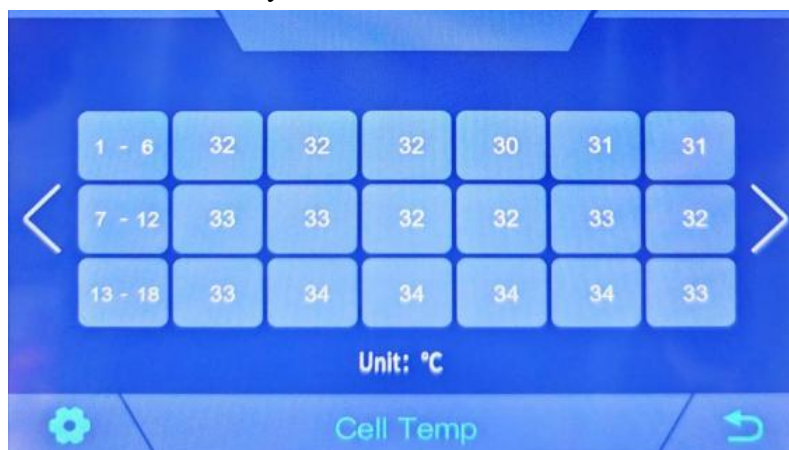


Figure 3.5.3.2 Cell temperature information interface

3.5.4 Check battery BMS status

Clicking on the status information (⑫) on the battery main status interface (Figure 3.5.2.2) will take you to the battery BMS operating status information interface, where you can view the battery's current operating status, charging/discharging status, and charging/discharging current information:



Figure 3.5.4 Cell voltage information interface

3.5.5 Check battery fault information

Clicking on the "Other Information" button (⑬) in the main battery status interface (Figure 3.5.2.2) will take you to the other battery information interface, where you can view the battery's current heating

information, insulation resistance value, diagnostic information, and cumulative time information:

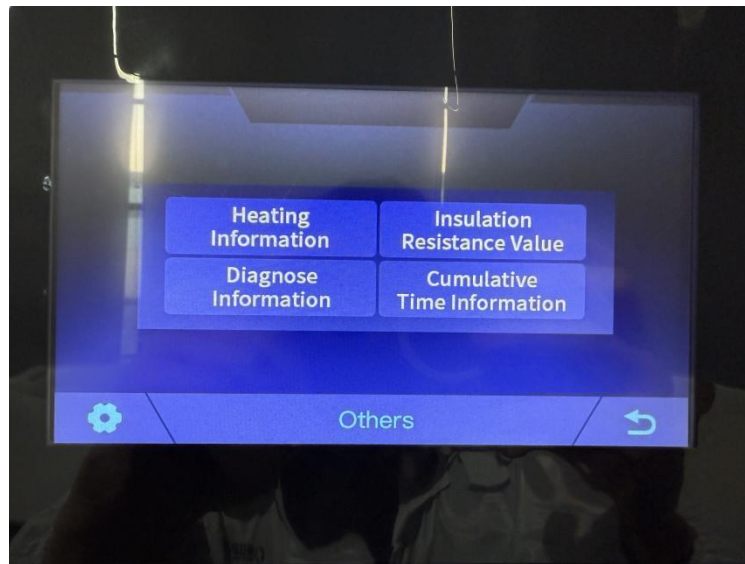


Figure 3.5.5.1 Cell voltage information interface

Clicking on the diagnostic information in the battery other information interface (Figure 3.5.5.1) will take you to the battery fault information interface, where you can view battery fault information:

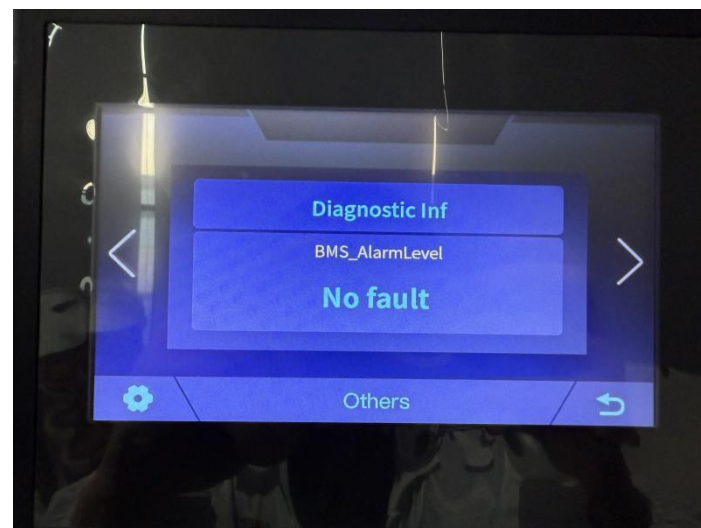


Figure 3.5.5.2 Battery fault information interface

Note: This interface is for fault diagnosis only. If the battery malfunctions, please check this interface and other information interfaces, take photos, and contact after-sales engineers immediately.

3.6 CAN Analyzer Connection

3.6.1 CAN box connection

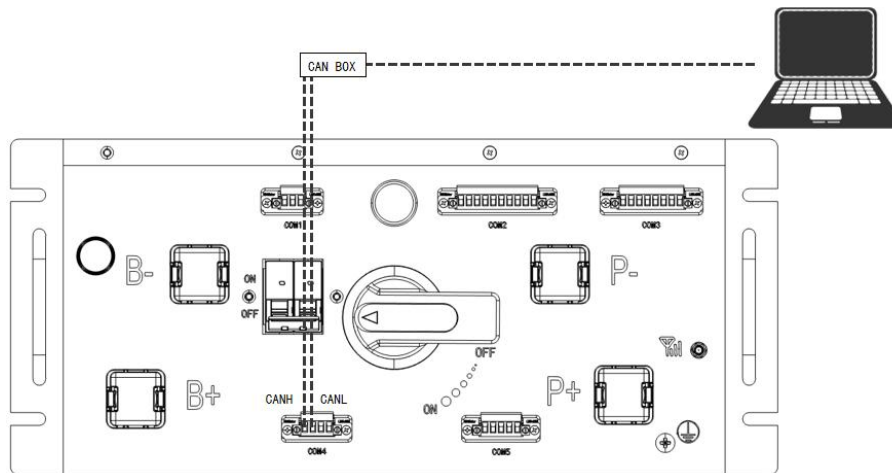


Figure 3.6.1 CAN box connection

Connect the CANH and CANL interfaces of the CAN box to the CANH and CANL interfaces of the COM4 of the high-voltage box, respectively, and connect the other end to the USB port of the computer.

3.6.2 upper computer use

After opening the host computer, the following interface will appear:

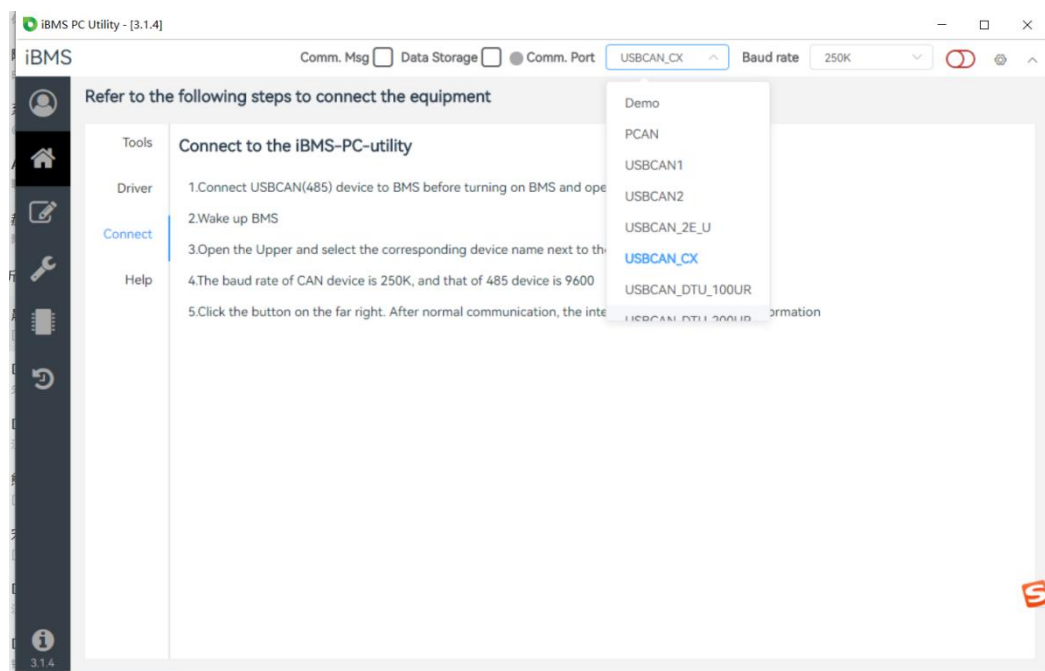


Figure 3.6.2.1 upper computer login

Click ① Communication Port Selection ② USBCAN CX, click ③ Open Host Computer, click ④ to enter the port and language modification interface.

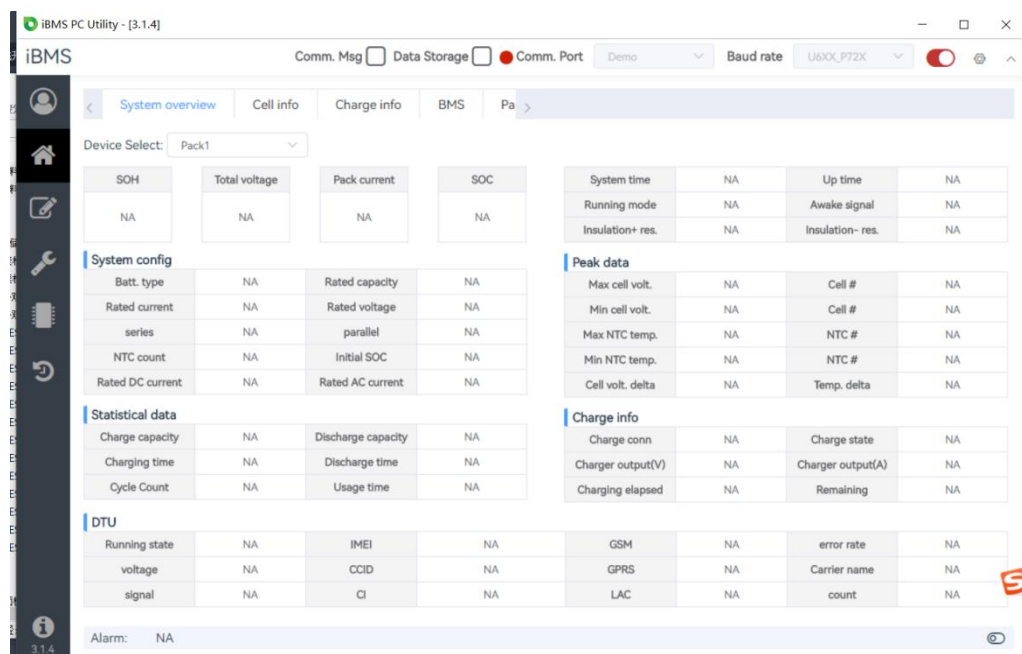


Figure 3.6.2.2 Battery information interface

Using the host computer, you can view the current battery status information, individual battery cell voltage and temperature information, and battery fault information, which is more conducive to data monitoring and fault diagnosis.

Note: The CAN analyzer is an optional product.

3.7 Specifications

Table 3.7 Specifications

Model	BS09-R					
Name	Rack-mounted energy storage battery system					
Main Parameters	BS09-64-R	BS09-80-R	BS09-96-R	BS09-112-R	BS09-128-R	BS09-144-R
Battery Type	LiFePO4					
Battery Pack Energy (kWh)	16.076					
Battery Pack Voltage (V)	51.2					
Battery Pack Capacity (Ah)	314					
Number of Battery Packs	4	5	6	7	8	9
Scalability	Up to 10 units in parallel					
Rated Voltage (V)	204.8	256	307.2	358.2	409.6	460.8
Operating Voltage (V)	179.2~230.4	224~288	268.8~345.6	313.6~403.2	358.4~460.8	403.2~518.4
Nominal Energy (kWh) ^[1]	64.30	80.38	96.46	112.53	128.61	144.69
Usable Energy (kWh@90%DOD)	57.87	72.34	86.81	101.28	115.75	130.22
Charge/Discharge Current(A) ^[2]	157					
Other Parameters						

Dimension (W*D*H/mm)	1100*792*969	1100*792*969	1100*792* 1221	1100*792* 1221	1100*792* 1473	1100*792* 1473
Weight (kg)	980	1103	1226	1349	1472	1595
Operating Temperature	Charging: 0~55°C/Discharging: -20~55°C					
Storage Temperature	0~35°C					
Display Mode	HMI Display (optional); Green light: system running / Red light: system alarm					
Communication Interface	CAN; RS485					
BMS Communication Mode	CAN					
IP Rating	IP20					
Cooling Method	Fan cooling					
Noise	Pending					
Relative Humidity	90%					
Altitude (m)	≤2000					
Cycle Life ^[3]	≥8000 Cycles(25°C) 0.5C/0.5C,90%DOD,70%EOL)					
Installation	Ground Mounted					
Warranty Period ^[4]	5+5 years					
Cumulative Discharge Energy (MWh)	103.2	129	154.9	180.7	206.5	232.3
Certifications	MSDS; UN38.3					

Model	BS09-R					
Name	Rack-mounted energy storage battery system					
Main Parameters	BS09-160-R	BS09-176-R	BS09-192-R	BS09-208-R	BS09-225-R	BS09-241-R
Battery Type	LiFePO4					
Battery Pack Energy (kWh)	16.076					
Battery Pack Voltage (V)	51.2					
Battery Pack Capacity (Ah)	314					
Number of Battery Packs	10	11	12	13	14	15
Scalability	Up to 10 units in parallel					
Rated Voltage (V)	512	563.2	614.4	665.6	716.8	768
Operating Voltage(V)	448~576	492.8~633.6	537.6~691.2	582.4~748.8	627.2~806.4	672~864
Nominal Energy (kWh) ^[1]	160.76	176.84	192.92	208.99	225.07	241.15
Usable Energy (kWh@90%DOD)	144.69	159.16	173.62	188.09	202.56	217.03
Charge/Discharge Current(A) ^[2]	157					
Other Parameters						
Dimension	1100*792*	1100*792*	1100*792*	1100*792*	1100*792*	1100*792*

(W*D*H/mm)	1725	1725	1974	1974	2226	2226
Weight (kg)	1718	1841	1964	2087	2210	2333
Operating Temperature	Charging: 0~55°C/Discharging: -20~55°C					
Storage Temperature	0~35°C					
Display Mode	HMI Display (optional); Green light: system running / Red light: system alarm					
Communication Interface	CAN; RS485					
BMS Communication Mode	CAN					
IP Rating	IP20					
Cooling Method	Fan cooling					
Noise	Pending					
Relative Humidity	90%					
Altitude (m)	≤2000					
Cycle Life ^[3]	≥8000 Cycles(25°C) 0.5C/0.5C,90%DOD,70%EOL)					
Installation	Ground Mounted					
Warranty Period ^[4]	5+5 years					
Cumulative Discharge Energy (MWh)	258.1	284	309.8	335.6	361.4	387.2
Certifications	MSDS; UN38.3					

[1] DC Available Energy: Tested at 25°C, 0.5C charge/discharge, 90% DOD; available energy may vary depending on system configuration parameters.

[2] Charge/Discharge Current: Current is affected by temperature and SOC.

[3] Cycle Life: Cell life standard; cells meeting this standard are used.

[4] Warranty Period: Applicable conditions are detailed in the warranty agreement.

4. Transportation and Storage



* Products not transported or stored in accordance with the manual requirements may void the warranty.

* Transportation methods: Can be transported by car, train, or ship.

4.1 Moving Requirements



During the moving process, comprehensive safety measures must be implemented. When moving items, handle them gently, avoid dragging or throwing them on rough surfaces.

* When moving heavy objects, be prepared to support the weight properly to avoid injury from being crushed or strained.

- * When two or more people are moving heavy objects together, one person should be in charge of directing the process. Everyone should lift or lower the equipment simultaneously and in unison.
- * When moving equipment manually, you should wear protective gloves and safety shoes, among other safety gear, to prevent injuries.
- * When manually moving equipment, approach the object, squat down, and use the strength of your straightened legs rather than your back to lift it. Lift slowly and steadily, avoiding sudden jerks or twisting of the torso.
- * When moving or lifting equipment, hold onto the equipment handles or support the bottom edge, rather than gripping handles attached to installed modules.
- * Avoid lifting heavy objects quickly above waist height. Place the object on a workbench or suitable surface at waist level first, adjust your grip, and then lift it.
- * When moving heavy objects, apply force evenly and steadily. Move at a consistent, slow speed and position the object carefully to avoid impacts or drops that could scratch the equipment surface or damage components and cables.
- * When moving heavy objects, be especially cautious around workbenches, ramps, stairs, and slippery areas. Ensure that doorways are wide enough to accommodate the equipment when moving through them to prevent injury or damage.
- * When transporting heavy objects, move your feet rather than twisting your waist. If you need to lift and move the object simultaneously, first point your toes in the direction you intend to move, then proceed with the lift.
- * When using a forklift, ensure the forks are positioned in the center to prevent tipping. Before moving, secure the equipment with straps, and assign a person to oversee the operation.
- * The placement angle should meet the requirements: with packaging, the tilt angle α should be $\leq 15^\circ$, and after removing the packaging, it should be $\leq 10^\circ$.
- * During the moving and transportation of air conditioners, keep the unit in an upright position at all times. Do not place the air conditioner flat or on its side.

4.2 Transportation Requirements

The following requirements must be met for system transportation:

- * Ensure all doors are locked and all electrical components and equipment within the system are securely fixed.
- * Select appropriate transportation and lifting tools based on site conditions. The lifting equipment used should have sufficient load-bearing capacity, boom reach, and turning radius. Sufficient additional traction force should be ensured for special installation angles. Obstacles such as bricks, branches, and cables should be removed during installation.
- * Transportation and installation should be carried out in good weather conditions. Warning signs and restricted areas should be set up during installation to prevent unauthorized personnel from entering the area.
- * The equipment should be secured with ropes during transportation, and excessive tilting should be

avoided.

- * The product should be packaged before transportation. During transportation, it should be protected from severe vibration, impact, and compression, and protected from direct sunlight and rain.
- * Applicable national and regional regulations should be checked before transporting lithium batteries.

4.3 Storage Requirements



If the battery pack is stored in a harsh environment for a long time, it may be over-discharged and damaged, which will lead to irreversible damage to the battery pack.

* Battery packs should not be stored for extended periods. Long-term storage of lithium batteries can lead to capacity loss, with an irreversible capacity loss of 3% to 10% typically occurring after 12 months at recommended storage temperatures.

* The battery should be stored in a clean, dry place, and should be protected from dust and moisture. Avoid exposure to rain or standing water.

* The environment must be free from corrosive or flammable gases.

* The battery should not be stored tilted or inverted.

* For equipment other than battery packs that has been stored for two years or more, it must be inspected and tested by a professional before use.

4.3.1 Battery pack storage

* Batteries should be stored indoors, away from direct sunlight and rain, in a dry and well-ventilated area. The surroundings should be clean, free from excessive infrared or other radiation, organic solvents, corrosive gases, and conductive metallic dust. Keep them away from heat and ignition sources.

* If a battery shows signs of fault (such as carbonization, leakage, swelling, or water ingress), it must be promptly transferred to a hazardous materials storage area, kept at least 3 m away from flammable materials, and disposed of as soon as possible.

* When storing batteries, place them according to the packaging labels. Do not store them upside down, on their side, or tilted. Ensure stacking complies with the requirements specified on the outer packaging.

* Batteries should be stored separately from other equipment and should be avoided stacking too high. Ensure that the site is equipped with appropriate fire safety measures, such as fire sand and extinguishers.

* After discharging, batteries may experience static power consumption of internal modules and self-discharge, which could lead to damage from over-discharge. Avoid storing batteries in a low-charge state and promptly recharge them. If a battery experiences permanent fault due to lack of recharging beyond the recommended period, the Company will not provide warranty services. Scenarios triggering low-charge storage include but are not limited to:

1. Battery power cables or signal lines are not connected
2. The battery cannot enter charging mode due to a system fault after discharging in an energy storage system

3. The battery cannot enter charging mode due to improper configuration of the energy storage system
4. The battery cannot enter charging mode due to prolonged loss of AC power
5. The battery cannot enter charging mode due to the control system, PCS (Power Conversion System), or main circuit components not being properly closed or engaged

4.3.2 Battery system storage

* Environmental temperature: $-10^{\circ}\text{C}\sim 50^{\circ}\text{C}$ (We recommend storing the battery at a constant temperature of 25°C . Long-term storage at temperatures exceeding 40°C may affect battery performance and lifespan.)

* Relative humidity: 5% RH–90% RH (recommended around 45% RH).

* Dry, ventilated, and clean.

* Avoid contact with corrosive organic solvents, gases, and other substances.

* Avoid direct sunlight.

* The distance from the heat source should be no less than three meters.

5. Installation Requirement

5.1 Location requirement

* This system is only suitable for indoor scenes.

* The installation environment horizontal surface should be elevated above the area historical highest water level and at least 300 mm above the ground. The installation site must not be in a low-lying area.

* The installation site and a 3-meter surrounding area of the energy storage system or energy storage station should be free of vegetation and flammable plants to prevent fires caused by wildfires during high summer temperatures.

* The safety distance between the energy storage system and buildings should comply with local fire safety regulations or standards.

* The safety distances for the energy storage system are as follows: at least 12 m from Class A production buildings, at least 10 m from Class B production buildings, at least 10 m from Class C, D, and E production buildings with a fire resistance rating of Grade I or II, at least 12 m from Class C, D, and E production buildings with a fire resistance rating of Grade III, and at least 12 m from residential buildings. If the exterior walls of adjacent buildings are non-combustible and have no doors, windows, or exposed combustible eaves, the fire safety distance can be reduced by 25% from the previously specified distances.

* If the specified safety distances cannot be met, a fire wall must be installed between the battery equipment room, energy storage room, or energy storage installation area and Class C, D, and E buildings. The fire wall should have a fire resistance rating of at least 3 hours and extend 1 m beyond the outer contours of the energy storage system in terms of length and height. Additionally, the fire wall design should consider space requirements for equipment transportation, installation, and maintenance.

* The energy storage system or energy storage station must be situated in an environment free from explosion or fire risk.

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

5.1.1 Description 1

* During the installation, commissioning, and operation phases of the energy storage system, the fire safety principle should be prioritized. At least two gas fire extinguishers, such as those using halon, perfluorohexane, or carbon dioxide, should be placed near each unit.

- *Please reserve a water fire extinguishing system interface for the energy storage system site.

*Ensure the site meets the immediate space requirements and provides additional space for future expansion based on the full lifecycle needs.

- *Choose a place with good ventilation

*The energy storage system should not be installed in areas prone to salt damage or pollution, as it will suffer from corrosion. It is suitable for use in the following or better environments:

1. The energy storage system is suitable for outdoor environments more than 2,000 m from the coast. It is not recommended for use within 500 m–2,000 m of the coast (if needed, confirm with the distributor or our engineers). The system should not be used within 500 m of the coast.

2. 1,500 m–3,000 m away from heavy pollution sources such as smelters, coal mines, and thermal power plants

3. 1,000 m–2,000 m away from moderate pollution sources such as chemical, rubber, and electroplating

4. 500 m–1,000 m away from light pollution sources such as food, leather, heating boilers, slaughterhouses, centralized garbage dumps, and sewage treatment plants

5.1.2 Description 2

If the safety distance at the selected site does not meet relevant national standards, it is advisable to choose a new location. The site should avoid scenarios not recommended by industry standards and regulations, including but not limited to the following areas, regions, and locations:

1. Areas with strong vibration, intense noise sources, and significant electromagnetic interference.
2. Places with dust, oil smoke, harmful gases, or corrosive gases.
3. Places where corrosive, flammable, or explosive materials are produced or stored.
4. Places with existing underground facilities.
5. Areas with poor geological conditions, such as rubber soil, soft soil layers, or surfaces prone to water accumulation and subsidence.

6. Areas beneath water reservoirs, water landscapes, or water intake rooms.

5.1.3 Description 3

*If placement in a potentially water-accumulating area is unavoidable, install barriers, drainage facilities, or elevate the ground.

*Cable trenches should not be used as drainage pathways. Penetrations for cables through walls or floors must be fire-stopped.

- *Areas with seismic fault lines or seismic zones with a risk level higher than magnitude 9.

- *Areas prone to direct hazards such as mudslides, landslides, quicksand, or sinkholes.

- *Within the boundaries of mining subsidence (displacement) zones.

- *Within the blast danger zones.
- *Areas that could be submerged if a dam or levee were to fail.
- *Important sanitary protection zones for water supply sources.
- *Historical and cultural heritage protection zones.
- *Crowded places, high-rise buildings, and underground structures.
- *Intersections of arterial street and heavily trafficked areas.

Site selection for flood and drainage control:

- * For large-scale electrochemical energy storage system (with a power rating of ≥ 100 MW), the site design elevation should be higher than the 1% flood level or the highest historical flood level.
- * For medium and small-scale electrochemical energy storage system (with a power rating of <100 MW), the site design elevation should be higher than the 2% flood level or the highest historical flood level.
- * If the site design elevation cannot meet the above requirements, choose an alternative site or implement various flood and drainage measures based on different conditions.
- * For energy storage stations along rivers, lakes, or coastal areas affected by wind and waves, flood protection facilities should be designed to accommodate a 2% wave height plus an additional 0.5 m for safety.
- * When there is significant runoff entering or crossing the site perimeter, it is advisable to install ditches or drainage (cut-off) channels to manage surface water drainage systematically.

Fence against illegal entry:

- * It is recommended to use solid walls or fences for isolation and protection around the energy storage area. The fence should have a lockable gate, and its height should be greater than 2.2 m. Firewalls may replace part or all of the fencing, depending on the design considerations.

5.2 Foundation requirements



When designing and constructing the infrastructure, design requirements such as the environment of the project site, the bearing capacity of the foundation, geological adjustments, and natural disasters should be considered.

5.2.1 Foundation design requirements

- * The energy storage system must be installed on a concrete or other non-combustible surface. Ensure that the installation plane is level, stable, and even, with sufficient load-bearing capacity. Installation on surfaces with depressions or inclines is prohibited.
- *The equipment foundation should be designed based on a load-bearing capacity of 2,750 kg per unit. If the foundation load-bearing capacity is insufficient, it must be reassessed.
- *The bottom of the equipment foundation pit must be thoroughly compacted and levelled.
- *After excavation of the equipment foundation, avoid water exposure and disturbance. If water

exposure occurs, continue excavation and replace the disturbed material.

- *The horizontal deviation between the equipment foundation and the equipment contact surface must not exceed 3 mm.

- *The foundation must be higher than the local historical highest water level and at least 300 mm above the ground.

- *Construct drainage facilities based on local geology and municipal drainage requirements to prevent water accumulation at the equipment foundation. The equipment foundation must meet the drainage requirements for the area's historical maximum rainfall, and the discharged water should be treated in accordance with local laws and regulations.

- *When constructing the equipment foundation, consider the routing of energy storage system cables by reserving trenches or entry holes.

- *The reserved holes in the equipment foundation and the entry holes at the bottom of the equipment should be properly sealed.

- *Users must verify the foundation design parameters of the energy storage system based on the project's installation environment, geology, and seismic requirements.

5.2.2 Cable trench requirements

- * Cable trenches should have sufficient space to accommodate the bending radius of cables.

- * To prevent rodents from entering and damaging the lines, cable trenches should be treated for dust and rodent control.

- *To prevent cable aging and short circuits, cable trenches should be waterproofed and moisture-proofed.

- * Cable trenches should not be used as drainage channels, and all openings for cable routing (such as holes through partition walls or floors) should be fire-resistant sealed.

5.3 Installation Requirements

5.3.1 Space requirements

- * The installation should be done indoors in a well-ventilated area, in a dry and well-ventilated environment, away from toxic, harmful, flammable, explosive gases, and corrosive environments.

- * The installation site should be far from residential areas to avoid noise pollution.

- * The installation surface should be flat, firm, and free from tilting or subsidence.

- * The water level in the installation environment should be at least 300mm above the historical highest water level of the area. The installation location should not be in a low-lying area.

- * Sufficient space should be reserved for the laying and routing of AC and DC cables during construction.

- * The installation site of the energy storage system or energy storage power station and its surrounding 3m radius should be free of vegetation and flammable plants to prevent wildfires caused by high summer temperatures from igniting the energy storage system.

5.3.2 Wiring requirements

- * When laying cables, communication lines and power lines must be laid separately.

* DC circuits and AC circuits must be laid separately, with a distance of more than 300mm between different cables.

* When control cables must cross power cables, ensure that the angle between the two types of cables is maintained at approximately 90°.

* Recommended minimum spacing between parallel shielded data cables and power cables, and their corresponding field conditions.

Table 5.3.2 Spacing between communication lines and power lines

Parallel line length (m)	Minimum spatial distance (m)
200	0.3
300	0.5
500	1.2

Note: The wiring harness should be routed as close as possible to ground supports, such as support beams, steel channels, and metal rails.

6. System Installation

6.1 Pre-Installation Inspection

Before signing for the product, please carefully check the following:

* Check the outer packaging for damage, such as deformation, holes, cracks, or other signs that may damage the equipment inside. If damaged, do not open the packaging and contact your dealer.

* Check that the equipment model is correct. If it is incorrect, do not open the packaging and contact your dealer.

* Check that the type and quantity of delivered parts are correct and that there is no damage to the appearance. If damaged, contact your dealer.

6.1.1 Opening the Packaging

When opening the packaging, please refer to the following steps:

* Step 1: Open the securing buckles.



Figure 6.1.1.1 Instructions for securing the wooden crate

* Step 2: Remove the top panel and the four bottom panels.



Figure 6.1.1.2 Removal of the top plate and the four bottom plates

* Step 3: Remove the mesh panels at the bottom of the rack around its perimeter.

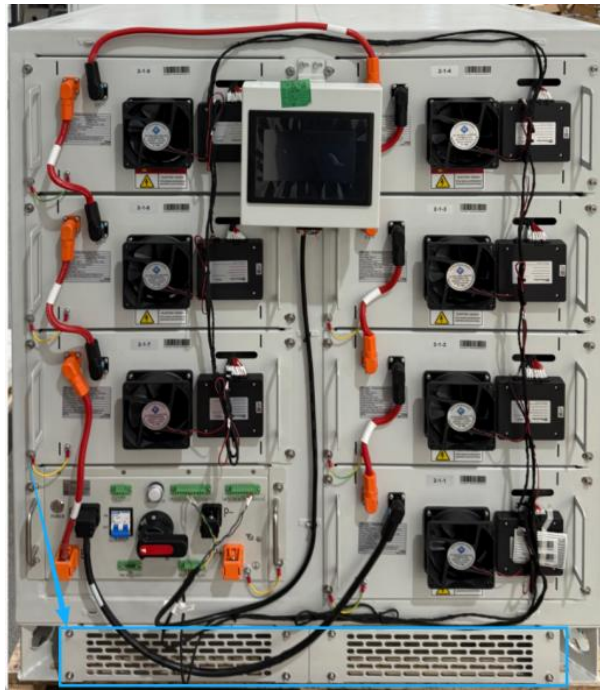


Figure 6.1.1.3 Removing the bottom baffle of the rack

* Step 4: Remove the fixing screws on the bottom of the frame.



Figure 6.1.1.4 Removing the four fixing screws on the left and right sides.

Remove the parts:



Figure 6.1.1.5 Location of spare parts

Note: All accessories for the BS09-R series products are placed inside the mesh baffle at the rear or bottom of the high-voltage box.

6.1.2 Accessory Inspection

Before product installation, please carefully inspect the following accessories:

Note: This example uses a 241 kWh product.

Table 6.1.2.1 Parts List

Serial Number	Accessory	Appearance	Explanation	Quantity
1	Battery		Power Supply	1
2	High-voltage box/battery power cable		35 sq mm Red (310mm) & Black (820mm) Power Cable	1 each
3	Power cable between batteries		35 sq mm Red Power Cable A (220mm)/B (260mm)	Line A 7, Line B 6
4	A/B box jumper wire		35 sq mm Red (610mm) Power Cable	1
5	Power cable between high-voltage box/PCS		50 sq mm Red (6m) & Black (6m) Power Cable	1 each
6	External wiring		Main Power Supply Cable from AC to Mains	1
7	Communication cable		RJ45 to CANH/L (6m) Cat6 Network Cable	1
8	Shunting power cable (Optional)		25 sq mm Red (1.5m) & Black (1.5m) Power Cable	2 each
9	Busbar (optional)		4-Way M8 Terminal Busbar 300A 48V Red/Black	1 each

10	Display screen		Battery Information Display	1
11	User manual		Product Manual	1

Table 6.1.2.2 Number of AB type power lines

Model	BS09-64-R	BS09-80-R	BS09-96-R	BS09-112-R
Power line A between batteries	1	2	2	3
Power line B between batteries	1	1	2	2
Model	BS09-128-R	BS09-144-R	BS09-160-R	BS09-176-R
Power line A between batteries	3	4	4	5
Power line B between batteries	3	3	4	4
Model	BS09-192-R	BS09-208-R	BS09-225-R	BS09-241-R
Power line A between batteries	5	6	6	7
Power line B between batteries	5	5	6	6

Note: Except for the optional wiring harness, the only difference between the models of the BS09-R series products is the number of AB type power wires.

6.2 Pre-installation equipment

6.2.1 Required tools



Note:

Use properly insulated tools to prevent electric shock or short circuits. If insulated tools are unavailable, cover all exposed metal surfaces with electrical tape and remove all tools (except for sharp points).

The following tools are required for battery installation:

Table 6.2.1 Required tools

Serial Number	Accessory	Appearance	Explanation
---------------	-----------	------------	-------------

1	Hammer		Unboxing
2	Utility knife		Unboxing
3	Screwdriver		Securing the battery assembly
4	Handheld electric drill		Securing the battery assembly
5	Insulated torque wrench		Installing cables and busbars
6	Insulated torque wrench		Installing cables and busbars
7	Multimeter		Measuring battery voltage

6.2.2 Safety Equipment

The following safety equipment is recommended when handling battery packs:

Table 6.2.2 Required equipment

Serial Number	Accessory	Appearance	Explanation
1	Insulating gloves		Prevent electric shock
2	Safety shoes		Prevent impact inj
3	Safety helmet		Protect head

4	Reflective vest		Improve visibility
5	Dust mask		Prevent dust
6	Goggles		Protect eyes

6.3 Rack Installation

6.3.1 Forklift Transportation

After removing all packaging baffles and the bottom pre-drilled hole baffles, forklifts can be used for operation. Forklifts can be used to move the equipment from underneath.

Note: Operation from the front and back is only permitted.

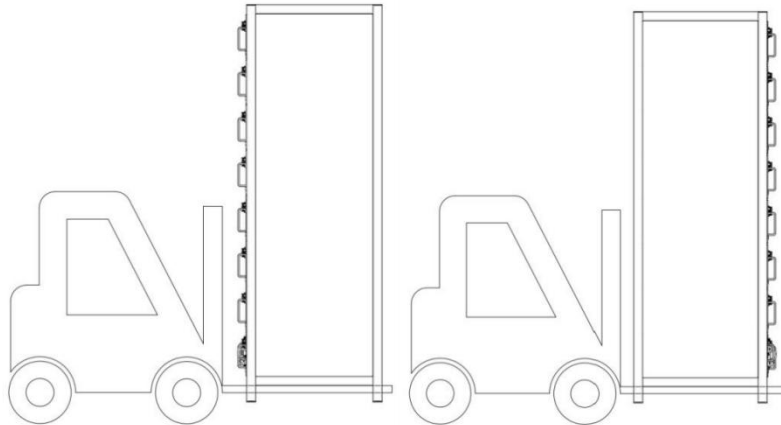


Figure 5.3.1 Forklift Transportation

Precautions:

- * Operators must hold a valid forklift operator's license and have undergone specialized training in handling heavy, precision, and electrical equipment, understanding the battery rack's structure, weight, center of gravity, and lifting/forklift points.

- * Ensure the forklift is in good working order, especially the brakes, steering, lights, and alarms. The forklift's rated load capacity must significantly exceed the battery rack's weight (a safety margin of at least 20% is recommended).

- * Fork inspection: Forks should be free of cracks and deformation, and their length and thickness should be suitable for pallet slots or forklift bays. Use fork covers (such as soft-pack fork covers) if necessary to prevent scratching the rack or damaging the battery.

- * Clean the transport path of obstructions, oil, and water stains. Ensure the aisle is wide enough, the ground is level and firm, and the slope meets safety requirements (generally not exceeding 10%). Fully insert the forks into the pallet or forklift bay, ensuring the rack's weight is evenly distributed on both forks.

- * During transport, the forks should be 15-30 cm off the ground, the mast should be tilted back appropriately, and the battery frame should have a relatively high center of gravity. Slow down especially

when turning to prevent tipping. Then, place the frame slowly and steadily in the designated location, ensuring the placement surface is level, stable, and free of obstructions.

6.3.2 Equipment Fixing

The diagram shows the mounting position of the equipment frame. Expansion bolts are usually used for fixing. In practice, the appropriate method should be adopted to fix the equipment cabinet based on the ground material, drilling progress, and other site conditions.

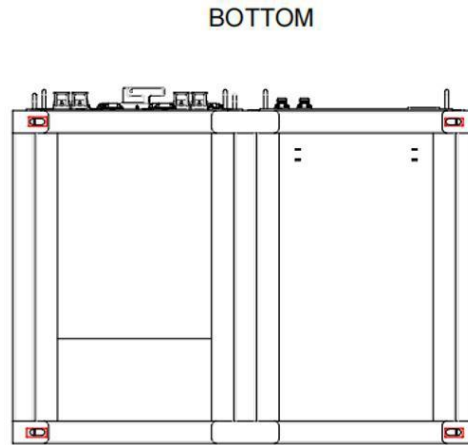


Figure 6.3.2 Bottom of the frame

6.4 Electrical Installation

6.4.1 Battery Pack Sequence

Note: Taking a 160.76 kWh product as an example

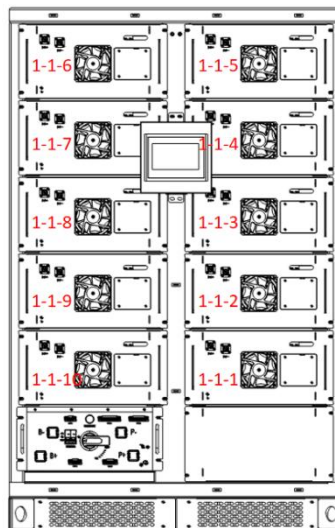


Figure 6.4.1.1 Battery Pack Sequence

Battery pack label explanation:

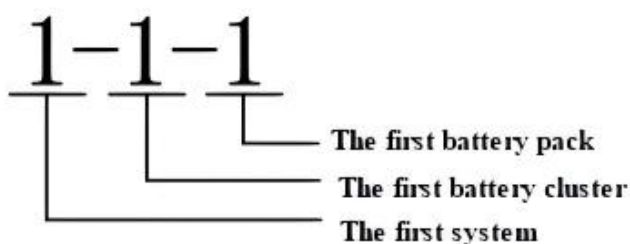


Figure 6.4.1.2 Label Explanation

6.4.2 Prepare the wiring harnesses

All wiring harnesses are sourced from equipment accessories.

Table 6.4.2 Preparing the wire harness

Model	Explanation	Quantity
50 sq mm US Standard Silicone Cable (Red) 6000mm Length (Corrugated)	Power lines between high-voltage box and PCS	1
50 sq mm US Standard Silicone Cable (Black) 6000mm Length (Corrugated)	Power lines between high-voltage box and PCS	1
35 sq mm Silicone Cable (Red) 220mm Length	Power line A between batteries	4
35 sq mm Silicone Cable (Red) 260mm Length	Power line B between batteries	4
35 sq mm US Standard Silicone Cable (Red) 610mm Length	A/B box jumper wire	1
35 sq mm Silicone Cable (Red) 310mm Length	Power lines between high-voltage box and batteries	1
35 sq mm Silicone Cable (Black) 820mm Length	Power lines between high-voltage box and batteries	1
4AWG 25 sq mm US Standard Silicone Cable (Red) 1500mm Length	Shunting power lines	2
4AWG 25 sq mm US Standard Silicone Cable (Black) 1500mm	Shunting power lines	2
RJ45 to CAN (Blue CANH, Blue/White CANL) 6m Length, Cat6 Network Cable	Communication lines between battery system and PCS	1
Standard Cabinet Wiring Harness	External AC power to main power supply harness	1

6.4.3 Power line installation

The left side is for box B to connect to line B, and the right side is for box A to connect to line A. All wire harnesses are labeled.

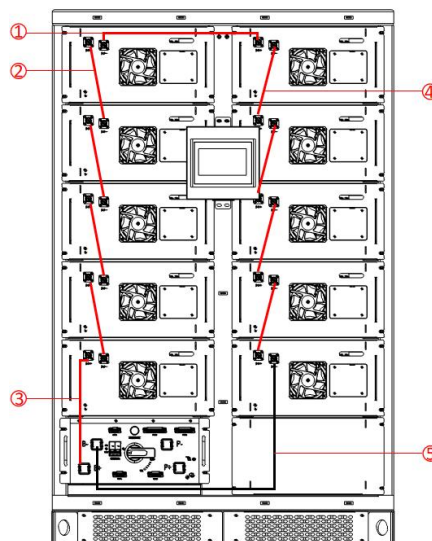


Figure 6.4.3 Power line connection

Table 6.4.3 Explanation of Dynamic Lines

Serial Number	Explanation
1	Jumper wire/35 sq mm US standard silicone wire/Red/Length 610mm
2	Power wire B/35 sq mm silicone wire/Red/Length 220mm
3	Positive power wire/35 sq mm silicone wire/Red/Length 310mm
4	Power wire A/35 sq mm silicone wire/Red/Length 260mm
5	Negative power wire/35 sq mm silicone wire/Black/Length 820mm

6.4.4 Internal wiring harness connection

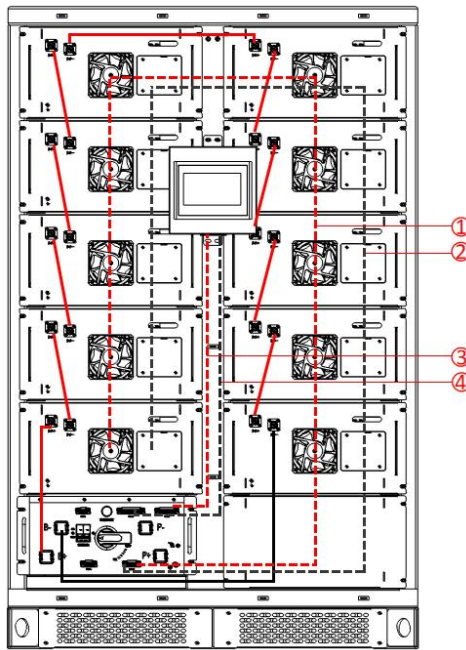


Figure 6.4.4 Internal wiring harness connection

Table 6.4.4 Explanation of Internal Wiring Harnesses

Serial Number	Explanation	Wiring Harness Label	High Voltage Box Location
1	Fan power cable	FAN +	COM5~FAN +
		FAN -	COM5~FAN -
2	BMU communication cable	IP-OUT	COM5~SPI-H
		IM-OUT	COM5~SPI-L
3	Screen power cable	DC24V	COM3~24+0
		GND	COM3~24-0
4	Screen communication cable	RS485A	COM2~A-0
		RS485B	COM2~B-0

Note: Under normal circumstances, the internal wiring harness of the battery system is connected to one end of the high-voltage box. The connection is completed before leaving the factory. After delivery, you only need to use screws to fix the four holes at the top and bottom of the screen to the rack, and then use the screen wiring harness and the interface at the bottom of the screen to plug and match.

6.4.5 External wiring harness connection

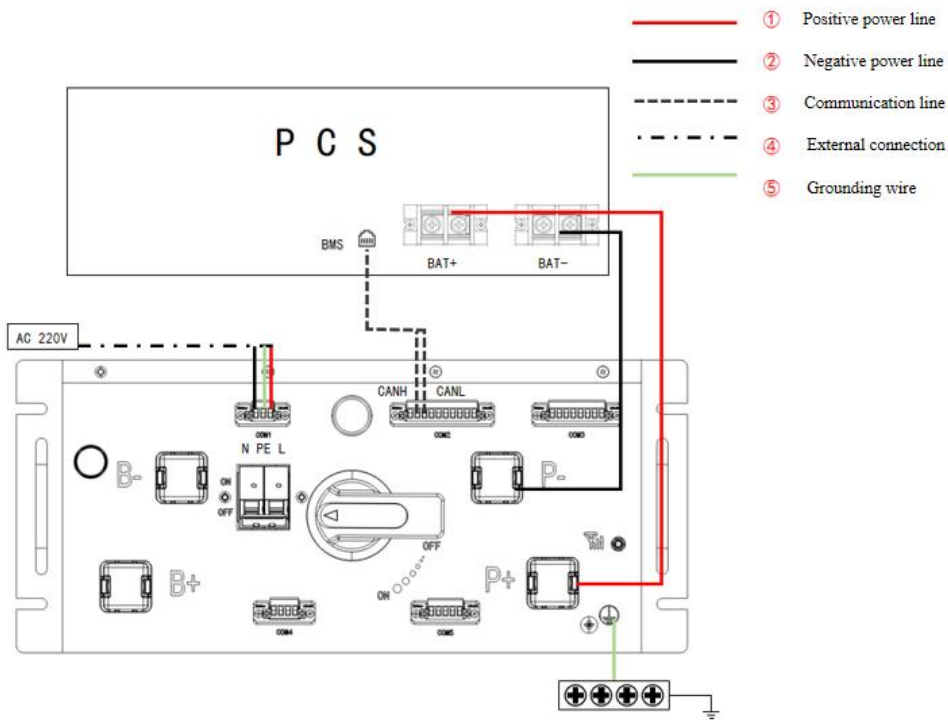


Figure 6.4.5 External wiring harness connection

Table 6.4.5 Definition of External Wiring Harness

Serial Number	Explanation	Wiring Harness Label	High Voltage Box Location	PCS Location
1	Battery system and PCS power line	Positive power line	P +	BAT +
2		Negative power line	P -	BAT -
3	RJ45 to CAN communication line	CAN_H (blue)	COM2~C1H	BMS network port
		CAN_L (blue-white)	COM2~C1L	
4	External wiring	N	COM1~N	/
		PE	COM1~/	
		L	COM1~L	
5	Grounding wire	/	/	/

Note: The grounding wires of all devices in the system must not be connected in series, but must be connected separately in parallel to the main grounding busbar.

7. System Operation



Energy storage systems must be verified by professionals and approved by relevant authorities in accordance with local regulations before they can be put into operation.

For equipment that has been stored or not in operation for a long time, a comprehensive and careful inspection should be conducted before powering it on to ensure that all operating conditions meet the requirements.

7.1 Inspection before powering on

Tabl 7.1 Inspection content

No.	Inspection Items	Inspection content
1	Equipment appearance	1. The equipment appearance is intact and undamaged. If there is paint peeling, please repair the paint. 2. The equipment labels are clear and visible, and damaged labels should be replaced in time.
2	Cable appearance	1. The cable protection layer is wrapped intact without obvious damage. 2. The conduit cable and hose are intact.
3	Cable connection	1. The cable connection position is the same as the design. 2. The terminal production meets the specifications and the connection is firm and reliable.
4	Cable routing	1. Cut the wire buckle joints neatly without any exposed spikes or other phenomena. 2. Leave a margin as required at the turning point and do not tighten it.
5	Switch	1. The external distribution cabinet switch is in the OFF state. 2. The battery cluster switch is in the OFF state.

7.2 System Power-On

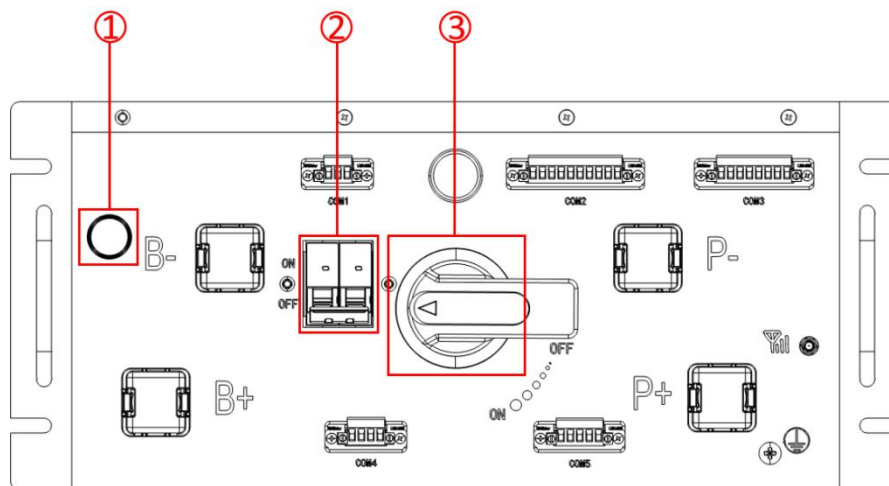


Figure7.2 High-voltage cluster control box panel

After confirming that the wiring harness connection is correct, please follow these steps to power on the battery system:

Step 1: Close the manual circuit breaker ③.

Step 2: Close the internal power circuit breaker ②.

Step 3: Press the power button ①.

7.3 System Power Off

To shut down the battery system, please follow these steps in sequence:

Step 1: Press the button switch ① and confirm that the indicator light is off.

Step 2: Disconnect the power circuit breaker ②.

Step 3: Disconnect the manual circuit breaker ③.

8. Inspection, Cleaning, and Maintenance



* If any issues are found that may affect the battery or the battery and energy storage inverter system, please contact after-sales personnel. Do not attempt to disassemble the battery yourself; any damage caused by unauthorized disassembly will be the sole responsibility of the disassembling party.

* If exposed copper wires are found inside the conductive wires, do not touch them. There is a high voltage hazard. Please contact after-sales personnel. Do not attempt to disassemble the battery yourself.

* In case of any other emergencies, please contact after-sales personnel immediately. Operations should be performed by qualified personnel under the guidance of after-sales personnel.

8.1 Routine/Inspection Level Inspection

Table 8.1 Routine/Inspection Level Inspection

Maintenance Frequency	Maintenance Purpose	Visual Inspection	Operating Parameter check	Environmental Inspection
Daily or weekly	Detect any obvious anomalies and ensure the system is operating normally online.	1. Check the rack casing for deformation, damage, or rust. 2. Check the display screen for alarm messages. 3. Check if the operating status indicator lights are functioning properly.	1. System total voltage, total current, power, and SOC (State of Charge). 2. Whether the voltage and temperature of each battery cluster/module are balanced (whether the maximum pressure difference and temperature difference are within the threshold). 3. Whether the insulation resistance value is normal (typically required to be $> 1M\Omega$).	1. Check if the ambient temperature and humidity of the battery system are within the specified operating range. 2. Check if the air conditioner/cooling fan is operating normally and if the air inlet and outlet are blocked. 3. Check for any abnormal odors (burnt smell) or abnormal sounds (hissing, fan noise).

Note: Routine/inspection level inspections can be performed visually without power interruption.

8.2 Regular preventative maintenance

Table 8.2 Regular preventative maintenance

Maintenance Frequency	Maintenance Purpose	Connection Inspection	Cable Inspection	Internal Inspection
Quarterly	Systematically check connection status, clean and maintain the system, and prevent malfunctions.	Tighten terminals: After power is off and no voltage is confirmed, a professional should check and tighten the main electrical connection points such as AC input/output terminals, DC bus terminals, and grounding terminals (a torque wrench must be used).	Check all cables for signs of wear, aging, overheating discoloration, rodent bites, etc.	1. Battery Module: Inspect the battery module for bulging, leakage, and corrosion of the terminals. 2. Electrical Components: Check the BMU, circuit breakers, power switches, etc., for signs of arcing. 3. BMS/Controller: Check the indicator light status of the control board and back up the operation log 4. Cooling System: Check the internal fan for smooth rotation and clean dust from the fan blades.

Note: Regular preventative maintenance requires planned power outages for inspection.

8.3 Deep maintenance and testing

Table 8.3 Deep maintenance and testing

Maintenance Frequency	Maintenance Purpose	BMS Function Verification	Insulation Resistance Test	Torque Verification
Every six months or every year	Performance calibration, health assessment, and potential hazard identification.	1. SOC Calibration: Perform a complete charge and discharge test on the battery system to assess the actual capacity and determine the battery's degradation status. 2. Verify the accuracy of voltage and temperature sampling, and confirm the correct operation of protection logic (overvoltage, undervoltage, overtemperature, overcurrent, etc.).	A professional insulation tester was used to conduct a detailed test on the insulation of the DC positive and negative busbars to ground.	Perform a systematic torque check on all bolts of critical electrical connections.

Note: Deep maintenance requires contacting our company or a professional service team.

8.4 Clean

* Tools: Vacuum cleaner (anti-static type), dry compressed air, lint-free soft cloth, insulated tools.

* Use dry compressed air or a soft brush to carefully remove dust from the cooling fan, air ducts, dust filters, and module surfaces. Never use a damp cloth or liquid cleaning agents.

* Ensure the system is completely powered off during cleaning to prevent dust from entering live parts or causing a short circuit.

* Prohibitions:

1. Never spray or wipe the inside of electrical equipment directly with water, alcohol, or other solvents.
2. Never use metal tools or vacuum cleaners with metal parts to directly contact the internal circuitry.
3. Avoid applying tension to cables and connectors during cleaning.

* Key areas: Dust filters, fans, air convection channels, top surface of the battery module.

8.5 Records and Reports

Every inspection and maintenance must be meticulously recorded and reported, including:

* Maintenance date and personnel.

* Maintenance type (routine inspection, periodic, in-depth).

* Items and data inspected (voltage, temperature, insulation value, etc.).

* Any anomalies found and their corrective actions.

* List of replaced parts.

* Comparison of key system parameters before and after maintenance.

9. Troubleshooting

To determine the status of the battery system, users can check the protection mode through the alarm/protection information interface on the battery screen or additional battery status monitoring software. Once the user understands the protection mode, please refer to the table below for solutions.

Table 9 Troubleshooting

Fault Type	Fault condition	cause of fault	troubleshooting
Communication failure	1. Inverter communication failure 2. Intranet communication failure 3. Equipment data not displayed	1. Incorrect or loose communication interface with the inverter; incorrect protocol or baud rate selection. 2. Incorrect or loose connection of the high-voltage box to the battery pack wiring harness. 3. Incorrect or loose communication wiring harness with the equipment; incorrect protocol or baud rate selection.	Check the wiring harness connections and device settings. If the problem persists, please contact an engineer.
Battery failure	1. Battery voltage too high	1. Battery damage caused by overcharging, resulting in the	Repair and replacement

	2. Battery voltage too low 3. Battery leakage	battery voltage consistently exceeding the maximum voltage. 2. Battery damage caused by over-discharging or prolonged storage, resulting in the battery voltage consistently falling below the minimum voltage. 3. Damage caused by external impacts, such as short circuits, punctures, or other damage.	
Overvoltage protection	The battery triggered a 3.65V overvoltage protection circuit breaker during charging, causing power failure.	An inverter communication or settings malfunction prevented the inverter from stopping charging.	If the battery does not recover automatically, please contact an engineer for assistance.
Undervoltage protection	When the battery discharges, it triggers the 2.5V voltage protection of a single cell to cut off the power.	An inverter communication or settings malfunction prevented the inverter from stopping charging.	If the battery does not recover automatically, please contact an engineer for assistance.
High temperature protection	Maximum single-cell temperature exceeds 55 degrees Celsius	Ambient temperature is too high or there is a heat source near the battery.	If the battery does not recover automatically, please contact an engineer for assistance.
Low temperature protection	Minimum single-unit temperature below 0 degrees Celsius	Battery temperature too low	If the battery does not recover automatically, please contact an engineer for assistance.
Discharge low temperature protection	Minimum single-unit temperature below -20 degrees Celsius	Battery temperature too low	If the battery does not recover automatically, please contact an engineer for assistance.
BMS failure	Sampling failure	1. Sampling point is loose or disconnected 2. Sampling temperature sensor malfunction 3. Sampling circuit malfunction	Contact an engineer for repair or replacement.

10. Battery Recycling

Advanced hydrometallurgical processes are used to recover aluminum, copper, lithium, iron, and other metals from discarded LiFePO₄ batteries, achieving a comprehensive recovery efficiency of up to 80%. The specific process steps are as follows:

10.1 Cathode material recycling process and steps

Aluminum foil, used as a collector, is an amphoteric metal.

* First, it is dissolved in an alkaline NaOH solution, allowing aluminum to enter the solution as NaAlO_2 . After filtration, the filtrate is neutralized with sulfuric acid solution, followed by precipitation to obtain $\text{Al}(\text{OH})_3$. Most of the aluminum precipitates when the pH is above 9.0, and the resulting $\text{Al}(\text{OH})_3$ achieves chemical purity upon analysis.

* The filter residue is dissolved with sulfuric acid and hydrogen peroxide, allowing lithium iron phosphate to enter the solution as $\text{Fe}_2(\text{SO}_4)_3$ and Li_2SO_4 , separating it from the carbon black and carbon coating the lithium iron phosphate surface. After filtration, the pH of the filtrate is adjusted with NaOH and ammonia. First, the iron is precipitated with $\text{Fe}(\text{OH})_3$, and the remaining solution is precipitated with a saturated Na_2CO_3 solution at 90°C .

* Since FePO_4 is slightly soluble in nitric acid, the filter residue is dissolved in nitric acid and hydrogen peroxide to directly precipitate FePO_4 , separating impurities such as carbon black from the acidic solution. $\text{Fe}(\text{OH})_3$ is then leached from the filter residue, and Li_2CO_3 is precipitated at 90°C using a saturated Na_2CO_3 solution.

10.2 Anode Material Recycling

The recycling process for anode materials is relatively simple. After separating the anode plates, the purity of copper can reach over 99%, which can be used for further purification of electrolytic copper.

10.3 Diaphragm Recycling

Diaphragm materials are harmless and have no recycling value.

10.4 List of Recycled Equipment

Automatic dismantling machine, crusher, wet metal pool, etc.



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※ The product information and parameters are subject to change without prior notice.