Containerized Energy Storage System

User Manual

Applicable Models：
BRES-1040-500
BRES-520-250

Version：V1.6

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Foreword

Dear customer,

Thank you for buying our BRES series products! We sincerely hope that our products can meet your needs and sincerely thank you for your comments and suggestions on our products and services. We will continue to improve to better serve our customers.

This manual systematically introduces the main components, appearance and structure, performance indexes and system principles of the BRES series products of prior-control energy storage systems, as well as providing transportation and storage, installation instructions, use and operation instructions and maintenance management.

Please keep this manual in a safe place for future use.

Before use, be sure to read this manual carefully and in detail and use the product after understanding the product precautions in it.

NOTES
● When using the product, you must complete the installation of the peripheral cable wires as specified and follow the contents of the manual. ● The illustrations in this manual are for illustrative purposes only and may differ from the product you ordered, users should refer to the actual product purchased. ● Our company is committed to the continuous improvement of the product, product features will be constantly upgraded, the information provided is subject to change without notice. ● The company provides customers with a full range of technical support, if you have questions or suggestions in the use, please contact the company's customer service center in a timely manner. ● The contents of the manual are owned by the Company, and the contents may not be publicly reproduced without written authorization by non-internal personnel of the company.

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Special Statement

Personal safety

1. The installation and commissioning of this product can be carried out according to the manual, if necessary, you can contact our technical staff for remote guidance.
2. Before installing and commissioning the product, be sure to read the product manual and safety matters in detail, otherwise it may lead to product failure or jeopardize personal safety.
3. This product cannot be used as a power source for any life support equipment.
4. It is strictly prohibited to put the built-in battery or external battery of this product in fire, in order to avoid explosion and jeopardize personal safety.

Equipment safety

1. If stored or left unused for a long time, the product must be placed in a dry, clean and specified temperature range of the environment.
2. This product should be used in a proper working environment (see the Environmental Requirements section of this product manual for details).
3. It is prohibited to use this product in the following working environments:
   - High temperature, low temperature or humid places beyond the technical specifications of this product.
   - Places with conductive dust, corrosive gases, salt spray or flammable gases.
   - Vibration, vulnerable to impact places.
   - Places close to heat sources or strong electromagnetic field interference.

Disclaimer

Our company is not responsible for defects or malfunctions caused by the following reasons:

- Exceeding the scope of use and working environment specified for the product.
- Unauthorized modification or repair, incorrect installation, improper operation.
- Encountering force majeure.
- Other violations of the provisions of this product manual.

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Safety Precautions

Safety Statement

Before installing, operating, or maintaining the equipment, please read and comply with these safety precautions.

To ensure personal and equipment safety, follow all safety instructions on the equipment and in the manual during installation, operation, and maintenance.

The [HAZARD]、[WARNING]、and [NOTE] notices in the manual do not represent all safety precautions to be followed; they serve only as supplements to all safety precautions.

This equipment must be used in an environment meeting its design specifications. Failure to do so may cause equipment malfunction. Functional abnormalities or component damage resulting from non-compliance with relevant regulations are not covered under the equipment warranty.

Our company shall not bear any legal liability for personal injury accidents or property damage caused by improper operation of the equipment.

Security Level Definitions

This manual uses the following safety symbols. Please comply with them!

Symbol	Description
Hazard	A hazard with a high level of risk that would result in death or serious injury if not avoided
Warning	A hazard with a medium level of risk that, if not avoided, could result in death or serious injury
Note	A hazard with a low level of risk that, if not avoided, could result in minor or moderate injury
Requirement	Used to communicate equipment or environmental safety warning messages. If not avoided, it may result in equipment damage, loss of data, degradation of equipment performance, or other unforeseen results. "Requirement" does not involve personal injuries.
Instruction	Additional explanations of key information in the main text. "Instruction" are not safety warnings and do not involve personal, equipment, or environmental damage.

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CONTENT

1. Product Series 1
1.1 Model 1
1.2 Product Series 1
1.3 Product Overview 2
2. System Introduction 5
2.1 System Topology Diagram 5
2.2 Appearance Introduction 5
2.3 Internal Composition 7
2.4 System Parameter 10
2.5 Key Components 11
2.6 Response Time 24
3. Storage, Transportation, & Positioning 25
3.1 Transportation Requirements 25
3.2 Environmental Requirements 28
2.3 Storage Requirements 30
4. Mechanical Installation 31
4.1 Safety Precautions 31
4.2 Tools and Usage 33
4.3 Foundation Recommendations 35
4.4 Equipment Installation 36
5. Electrical Installation 41
5.1 Safety Instructions 41
5.2 Cable Requirements 41
5.3 Pre-wiring Check 44
5.4 System Wiring 45
6. Power On/Off Procedure 49
6.1 Power-on Procedure 49
6.2 Power-off Procedure 53
6.3 Upper computer connection 54
7.Daily Maintenance Instructions 58
7.1 Scheduled Replacement Items 58
7.2 Scheduled Maintenance Items 58
7.3 Component Maintenance 59
7.4 Part Replacement 61
7.5 Battery SOC 65
Appendix 1: Version Update 67
Appendix 2: Recommended Bolt Torque Table 68
Appendix 3: Chinese and American wire gauge wire diameter comparison table 69

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1. Product Series

Instruction
The examples below (including text and illustrative images) are based on the highest-power model of this device; they will not be repeated in subsequent sections.

1.1 Model

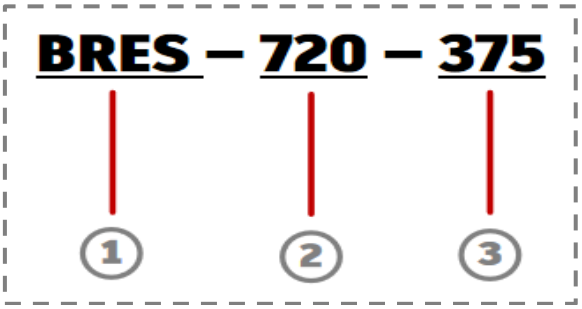


Figure 1-1 Model Marking of BRES

Table 1-1 Model Marking

No.	Code	Definition
1	BRES	Product Series Name
2	1040 / 520	Battery energy within BRES system (Unit: kWh)
3	500 / 250	PCS power in BRES system (Unit: kW)

1.2 Product Series

Models compatible with this manual:

- BRES-1040-500
- BRES-520-250

1.3 Product Overview

The containerized energy storage system (BRES) is an intelligent, modular power supply device that integrates lithium batteries and a multifunctional bidirectional energy storage converter (PCS). For different application scenarios, the lithium batteries and bidirectional DC/AC converter modules can be flexibly combined to achieve functions such as grid-connected power supply, off-grid power supply, seamless grid/off-grid switching, static reactive power compensation, and harmonic suppression. In addition, the system integrates renewable energy sources, the power grid, lithium batteries, and loads for scientific configuration and optimized utilization, providing users with a green, environmentally friendly, low-noise, highly reliable, and safe power supply service. The system also features easy installation, user-friendly operation, and broad application prospects.

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Figure 1-2 System Rendering Diagram

Instruction
The following illustrations, if not otherwise specified, 10-foot containers are based on the BRES-1040-500 (4 battery clusters) as an example. **10-foot container:** according to the size consideration and configuration can be applied to BRES-1040-500 (4 groups of battery clusters, full configuration); BRES-520-250 (2 groups of battery clusters).

| Safe & Reliable |

- The system utilizes high-quality lithium iron phosphate (LiFePO4) battery cells that are widely recognized within the industry.
- The battery uses an immersion liquid cooling design to extend the system's lifespan and keep things running smoothly.
- The system is designed with an IP54 protection rating, ensuring safe and reliable operation in harsh environments. The PCS (Power Conversion System) and battery string design eliminate circulation effects, thereby enhancing the system's reliability and maintainability.
- The system incorporates a Battery Management System (BMS) and multi-layer protection settings for both AC (Alternating Current) and DC (Direct Current) to ensure safe operation.
- The battery cells are separated using heat-insulating and insulating supports, and the module incorporates built-in fire protection mechanisms to guarantee the safety of battery system.

| Efficient & Convenient |

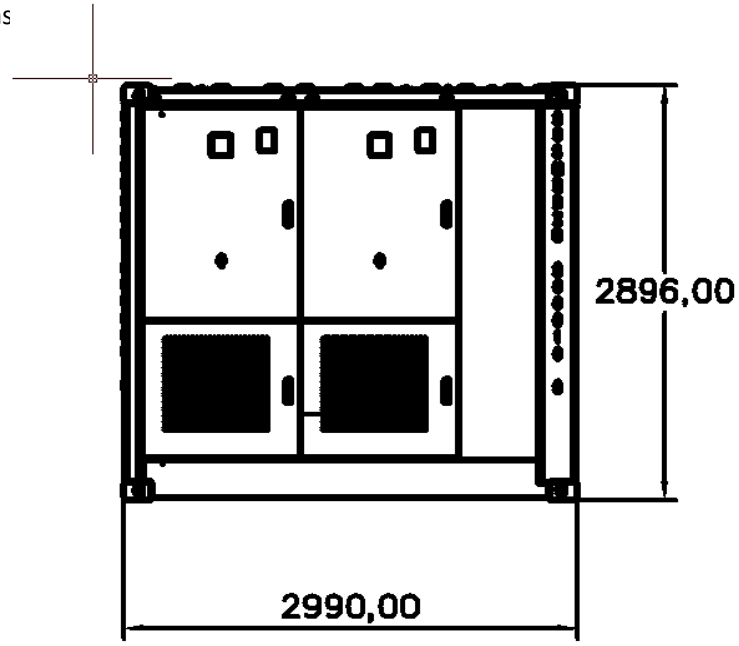
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- Both the PCS and battery system feature a modular design for easy installation, maintenance, and expansion.
- Direct connection of PV and diesel generators enables intelligent multi-energy management and control.
- The integrated unit can be installed as a fixed unit or customized into a vehicle-mounted version for easy mobility.
- Supports remote monitoring, equipment management, remote troubleshooting, and data analysis.

| Cost Optimization |

- Multi-functional capabilities: Grid-connected and off-grid uninterrupted power supply, dynamic capacity expansion, load shifting for optimized power usage, reactive power compensation, harmonic suppression, improvement of three-phase imbalance, enabling complementary use of multiple energy sources and scientifically configured operations.
- Compact size and lightweight design, resulting in reduced land occupancy and installation costs.
- Long service life and low failure rate, resulting in reduced operational and maintenance costs.
- Maximizing the utilization of green energy, leading to savings on electricity expenses.

Figure 1-3-1 Dimensions



2. System Introduction

2.1 System Topology Diagram

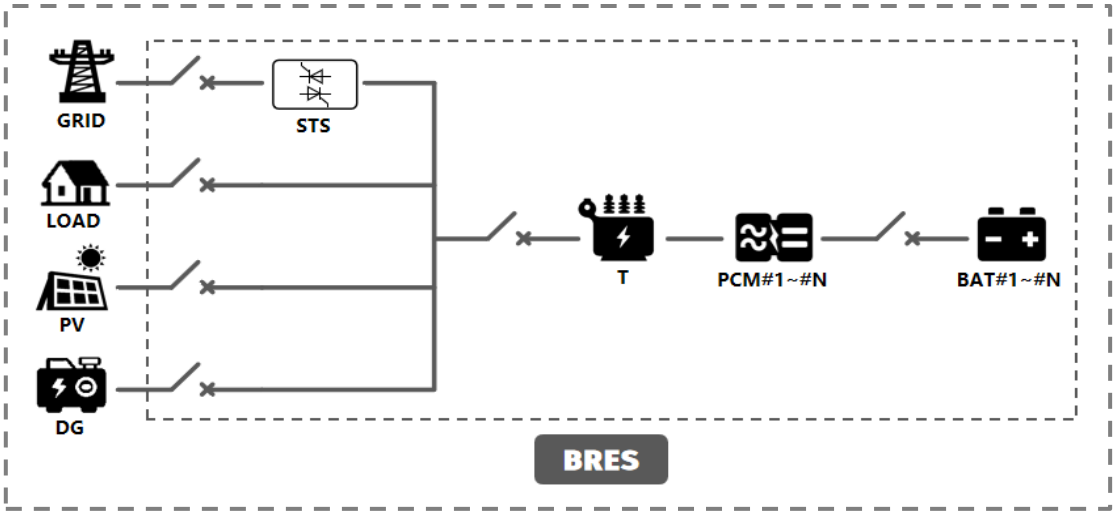


Figure 2-1 System Topology Diagram

2.2 Appearance Introduction

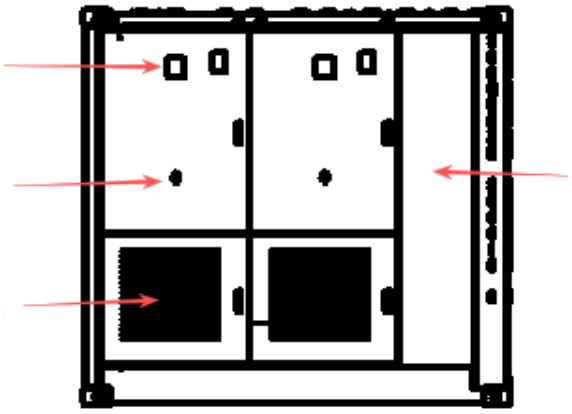


Figure 2-2-1 Exterior System Diagram (Front)

Table 2-1 Illustration of Appearance

No.	Name	No.	Name
1	Fire System	2	Indicator Lights (Run / Alarm / Fault / GRID)
3	Air Inlet Louvers (Dust filter built-in)	4	PDU

2.3 Internal Composition

Instruction
All examples shown are based on the max power fully configured unit (4 Battery clusters, 4 Switches) and will not be restated. If your equipment varies (e.g., fewer switches or battery clusters), please ignore the excess items. Thank you for understanding.

2.3.1 PCS Part

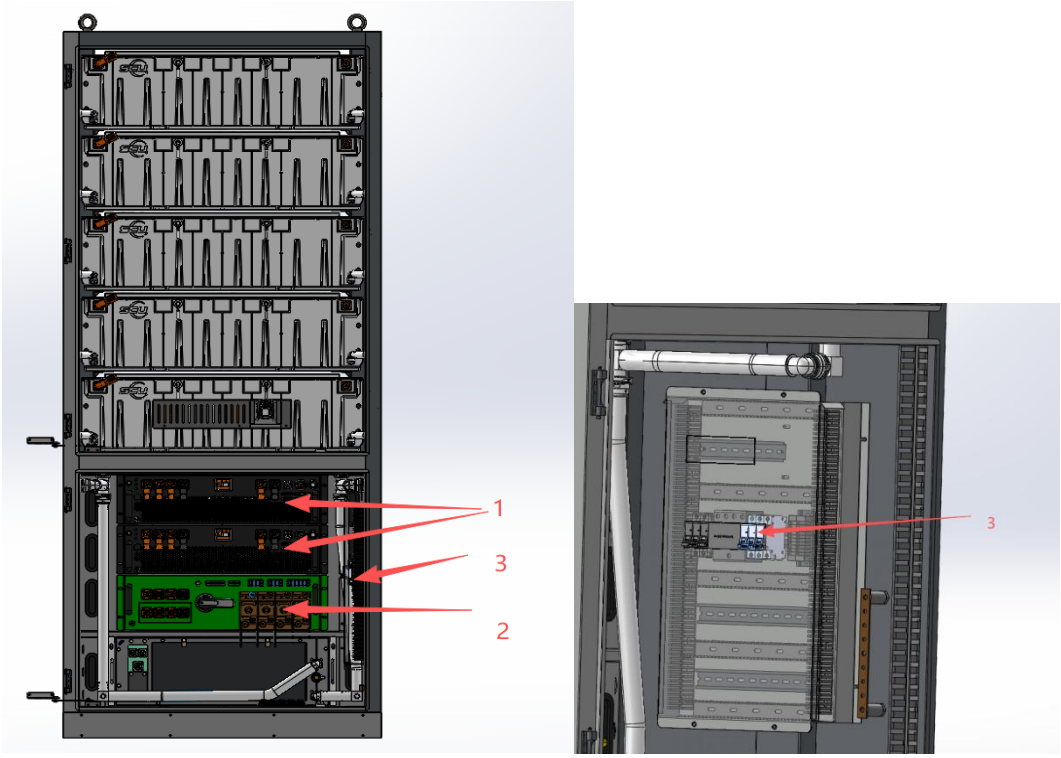


Figure 2-3 Internal System Diagram (Front)

Table 2-2 Exterior Illustration Description (Front)

No.	Name	No.	Name
1	PCM Module	2	AC Circuit breaker
3	SPD		

2.3.2 Battery Part

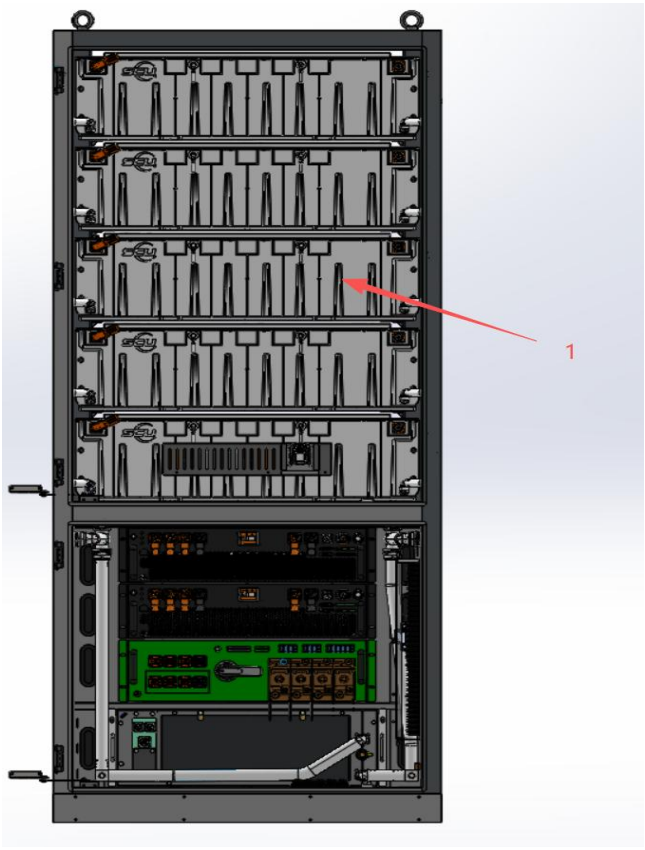


Figure 2-4 Internal System Diagram (Left)

Table 2-3 Exterior Illustration Description (Left)

No.	Name	No.	Name
1	Battery Module		

2.3.4 Fire Part

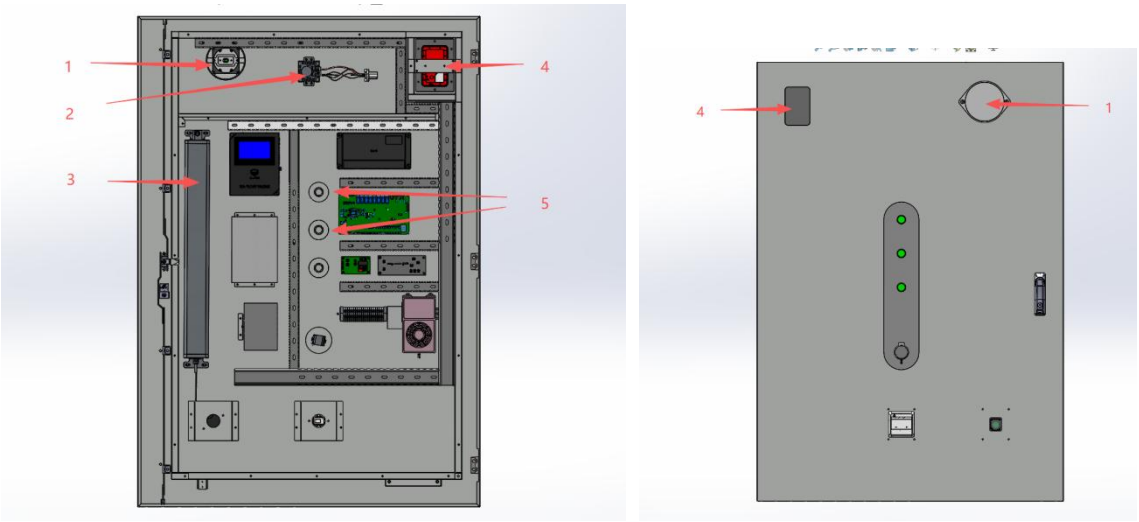


Figure 2-6 Fire System (Inside / Outside)

Table 2-5 Fire System Composition

No.	Name	No.	Name
1	Combustible gas exhaust	2	Combustible gas sensor
3	fire extinguisher tank	4	Audible / Visual alarm & Buzzer
5	Temperature and smoke sensors	6	

2.4 System Parameter

Table 2-6 System Parameter

Model	BRES-1040-500	BRES-520-250
AC Para (Grid-connected)		
Rated output power (kW)	500	250
Rated grid voltage (V)	3W+N+PE, 380 / 400	
Grid voltage range	-15% ~ +10%	
Rated grid frequency (Hz)	50 / 60	
Grid frequency range (Hz)	±2	
Output current harmonics	≤3% (Rated power)	
DC component	< 0.5%In	
Power factor range	-0.9 ~ +0.9	
AC Para (Off-grid)		
Rated output power (kW)	500	250
Maximum output power (kW)	525	262
Rated output voltage (V)	3W+N+PE, 380 / 400	
Output voltage harmonics	3% (linear full load)	
Rated frequency (Hz)	50 / 60	
Overload capacity	(110,120) : Running time 10 minutes 120% : Stop running after 1 minute	
Battery Para		
Cell type	LFP	
Capacity per battery cabinet (kWh)	261KWH	
Number of battery cabinets	4	2
Capacity of battery system (kWh)	1044	522
Rated operating duration (h)	2 (Duration is set by the number of battery modules.)	
Battery life	> 6000 cycles (0.5P , 25±2℃@100%DOD@80%SOH)	
Maximum efficiency	93% (0.5P)	
Basic Para		

Dimensions (W * D * H) (mm)	2991*2438*2896	2991*2438*2896
Weight (kg)	15000	10000
On-off-grid switching device	Electrical operation	
Protection Class	Outdoor type IP54	
Working Temperature Range (℃)	-20 ~ 55 (> 45℃ To be derated)	
Relative Humidity (no condensation)	0 ~ 95%	
Temperature Control Method	Battery cabinet : Immersion liquid cooling PCS cabinet : Air-cooled	
Maximum Working Altitude (m)	≤ 4000 (>2000 derated)	
Display	HMI	
Communication Interface	RS485、LAN	
Communication Protocol	Modbus-RTU、Modbus-TCP	

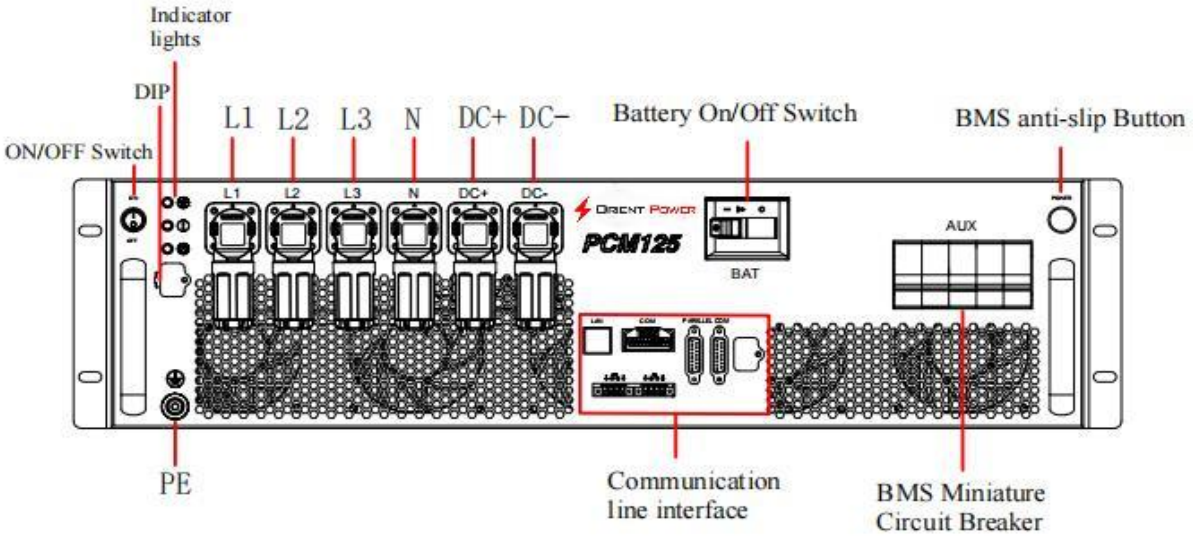
2.5 Key Components

2.5.1 PCM Module

The PCM series PCS power modules from our company facilitate the creation of small to medium-sized energy storage systems through effortless parallel connection of several units. They boast distinctive attributes such as adaptable module placement, user-friendly installation, and convenient maintenance. The modules employ a rack-mounted installation method, featuring compact size, lightweight design, and support for hot-swappable module replacement during operation. They offer a wide DC voltage range and exhibit strong grid adaptability and load adaptability.



Figure 2-7 PCM Module



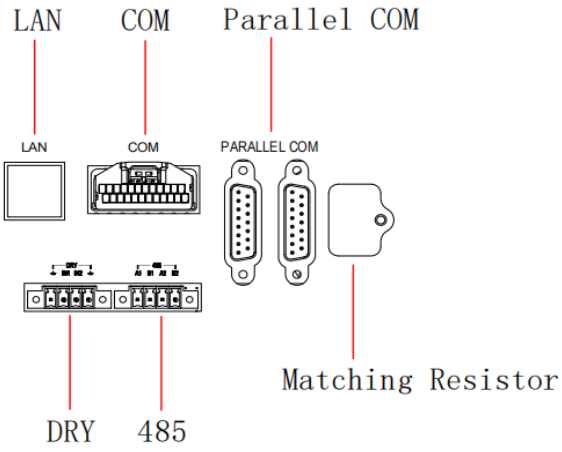


Figure 2-8 PCM Module Front Panel

Table 2-7 Module Front Panel Description

Interface Screen Printing		Implication
RS485	A1	485_A1
	B1	485_B1
	A1	485_A2
	B2	485_B2
DRY	⏚	Dry contact ground signal
	IN2	EPO detection signal Disconnect: Enable EPO, shut down module, disconnect AC relays, disconnect DC relays, open DC circuit breakers. After restoration, the module does not automatically power on. It can be powered on by command or by using the ready switch. Passive input dry contact, factory default is closed.
	IN1	When operating a single module, closing the off-grid enablement allows for off-grid startup to switch to off-grid mode. If the module is in off-grid mode and is disconnected, it shuts down. Passive input dry contact, factory default is disconnected.
	⏚	Dry contact input ground signal
Parallel operation interface	Parallel1 Parallel2	Module parallel operation interface
Net interface	LAN	/
Address bit	Addr	The module address is valid from 1 to 16, with a default factory setting of 1. When multiple modules are paralleled, each module must have a unique

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		address
Circuit breaker switch	BAT	/
Miniature circuit breaker switch	AUX	/
Shunt trip coil of circuit breaker	COM	BCU control Control voltage: 24 V, trip after energizing the coil.
Shunt trip coil of miniature circuit breaker		
24 V		24V power supply for BCU power
CAN		BCU communication
CAN Hall		1. +15 V 2. GND 3. CANH 4. CANL
Temperature sampling		Copper busbar and fuse sampling temperature
Start key	POWER	Key state: closed Pressing it will disable the BCU miniature circuit breaker switch
Switch button	ON/OFF	/
Ground terminal	⏚	Grounding
Indicator	/	Yellow, green, red

2.5.2 STS Module

The modular STS enables grid/off-grid switching within 20ms. Under normal grid conditions, the STS closes for grid-connected operation. During a grid failure, the STS opens instantly, switching to off-grid power from the battery. Built with semiconductor technology, the STS provides fast action, long life, and high reliability.

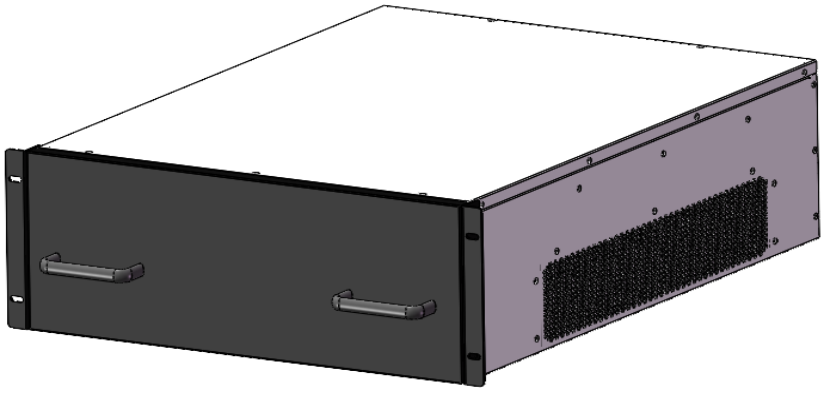


Figure 2-9 STS Module

2.5.3 Battery Module

The battery system in the containerized energy storage system belongs to the energy storage part, and it consists of a total of 1~4 independent battery clusters, with each battery room corresponding to 1 battery cluster. Each battery cluster is composed of 5 battery modules and 1 high-voltage control box.

The battery module consists of a 3.2V 314Ah single lithium iron phosphate cell, which constitutes a battery module. The module has a built-in BMU system, which collects the voltage and temperature of the single cell and manages cell equalization to ensure the normal operation of the whole module safely and efficiently.



Figure 2-10 Battery Module schematic

Table 2-8 Battery Module Parameter Table

Module	**EP314-1P52S**
Capacity (Ah)	314
Combination approach	1P52S
Rated voltage (V)	166.4
Energy rating (kWh)	52.25
Maximum continuous charging current	157A (0.5C)
Maximum continuous discharge current	157A (0.5C)
Voltage range (V)	145.6~ 182 (Cell:2.8 ~ 3.5)
Operating ambient temperature (℃)	-20 ~ 60
Weight (kg)	400kg
Size (W*D*H) (mm)	927*275*1055
Communication method	CAN
Cooling method	Immersion liquid cooling

2.5.4 **Liquid Cooling Unit**

The liquid cooling unit is the core of the liquid-cooled ESS for active thermal management. It removes battery heat via coolant circulation far more effectively than air cooling, preventing thermal runaway. Precise temperature control guarantees safe, efficient, and long system life.

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Figure 2-18 Liquid Cooling Unit Diagram

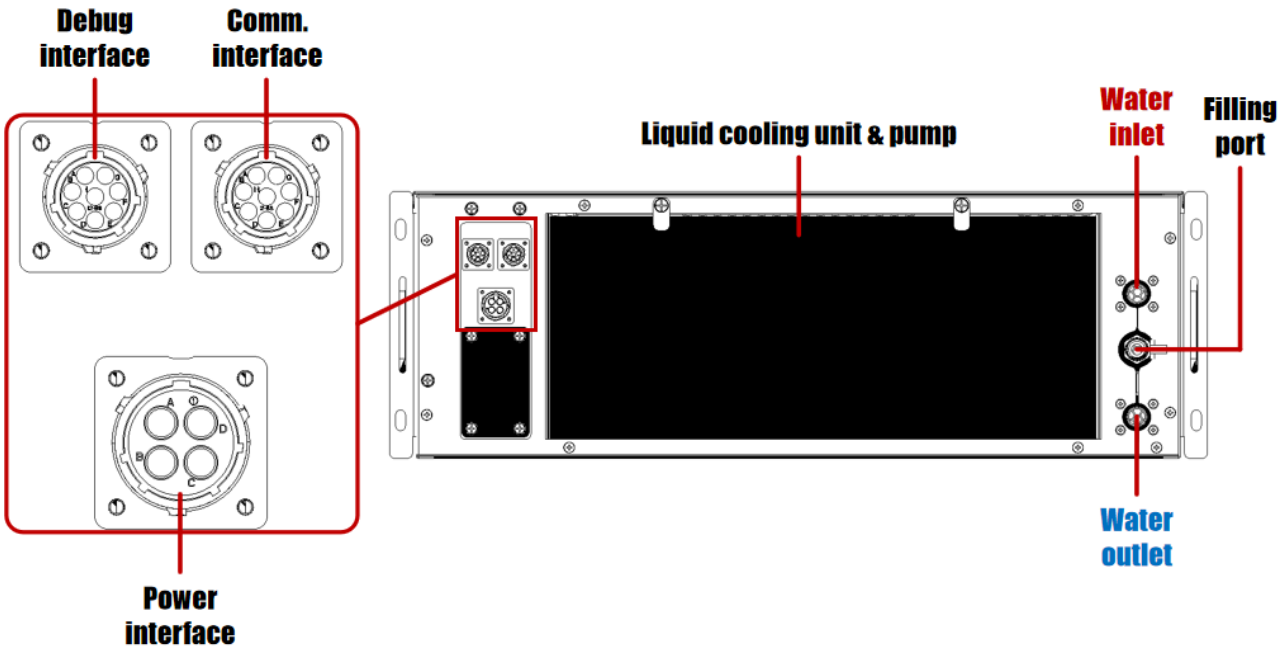


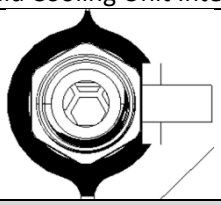
Figure 2-19 Liquid Cooling Unit Front Panel

Table 2-9 Liquid Cooling Unit Technical Specifications

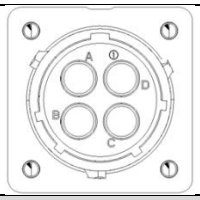
Item	Liquid cooling unit	Notes
Rated voltage (Vac)	220 ~ 240	
Rated frequency (Hz)	50 / 60	
Cooling capacity (kW)	5	Cooling input power @ L35/W18: 2.50 kW
Heating capacity (kW)	2	Heating input power @ Tu=10°C: 2.35 kW
Circulating water flow rate	46.5L/min@60kPa	
Max. power consumption (kW)	3.60	
Max. power consumption (kW)	Front inlet, front outlet	
Application environment	Outdoor type	
Dimensions (H*W*D) (mm)	245*700*900	
Weight (kg)	75	
Coolant	50% ethylene glycol/water solution	

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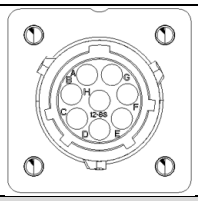
Figure 2-10 Liquid Cooling Unit Interface Definition



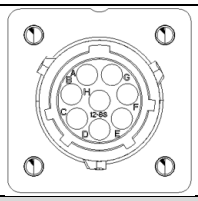
Silkscreen	Terminal	Function	Definition
/	/	Liquid filling port	Interface for coolant replacement (SAE18)



Silkscreen	Terminal	Function	Definition
/ (Power interface)	A	L	Power L
	B	N	Power N
	C	/	/
	D	/	/



Silkscreen	Terminal	Function	Definition
/ (Debug interface)	A	CANH	Debug device communication
	B	CANL	
	C	/	/
	D	/	/
	E	12V+	Debug device power supply
	F	12V-	
	G	/	/
	H	/	/



Silkscreen	Terminal	Function	Definition
/ (Communication interface)	A	CANH	Host computer CAN communication interface
	B	CANL	

	C	485A	Host computer RS485 communication interface
	D	485B	
	E	/	/
	F	/	/
	G	/	/
	H	GND	Communication isolated GND

2.5.5 **Dehumidifier**

The intelligent dehumidifier employs semiconductor cooling to actively remove moisture. A fan pulls humid air into the cooling duct, where vapor condenses and is drained out, delivering reliable dehumidification for enclosed spaces.



Figure 2-20 Dehumidifier Diagram

Table 2-11 Dehumidifier Specifications

Item	Dehumidifier	
Input specifications	1-channel temperature and humidity input module	
Input specifications	Temperature (℃)	0 ~ 100 (±0.1℃)
	Humidity (%RH)	0%RH ~ 99.9%RH (±0.1%RH)
Output specifications	1-channel relay output , 250 Vac / 3 A or 30 Vdc / 3 A	
Operating power supply (V)	AC/DC 80 ~ 265	
Product power (W)	Power at startup: approx. 60 W	
Operating environment	-25℃ ~ 60℃, humidity ≤ 95% RH, non-corrosive environment	
Storage environment	-25℃ ~ 60℃, humidity ≤ 95% RH, non-corrosive environment	
Basic error	Temperature (℃)	±5 (10℃~50℃) ; ±1 (0℃~100℃)
	Humidity (%RH)	±3 (10%RH~90%RH) ; ±5 (0%RH~99%RH)

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Basic error	360 mL/day (at 35℃, 85% RH)

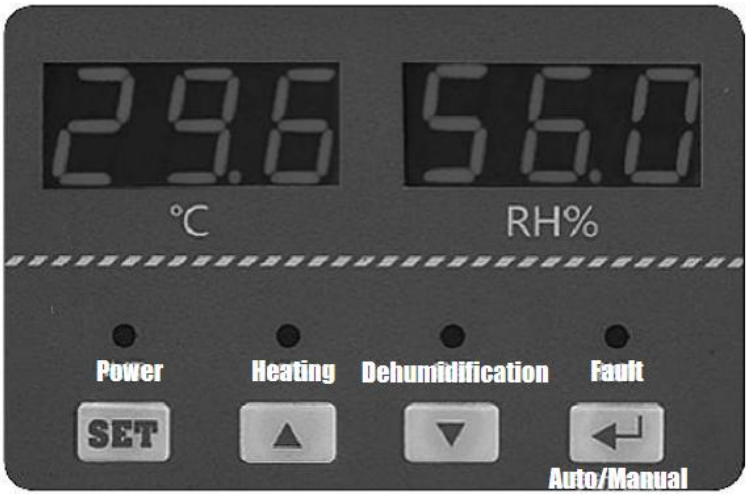


Figure 2-21 Dehumidifier Operation Panel Diagram

Table 2-12 Dehumidifier Panel Button Description

Item	Description
SET	Select key / Confirm key
▲	Up key
▼	Down key
↵	Save key / Return key

Note:

1 Hold key SET for 3s to enter password page (F00-000 = 000). Use key ▲ to input password. Press ▲ once to change to F00-001 (001).

2 Menu access requires password. Press key SET to enter settings (single-cycle, down-scroll only).

Table 2-13 Dehumidifier Menu Description

No.	Item	Default	Modification method	Notes
1	Temp. control mode	F01-0 (0)	Press ▲ to change to F01-1; press ▼ to change to F01-0.	F01-0：Cooling type F01-1：Heating type
2	Temp. setpoint	F02-040 (40℃)	Press ▲ to increase the value by 1; press ▼ to decrease it by 1.	F02-000 ~ F02-100 (0 ~ 100℃)
3	Temp. hysteresis	F03-005 (5℃)		F03-000 ~ F03-040 (0 ~ 40℃)
4	Humidity setpoint	F04-085 (85RH%)		F04-020 ~ F04-090 (20% ~ 90%RH)
5	Humidity hysteresis	F05-05 (5%RH)		F05-00 ~ F05-40 (20% ~ 90%RH)
6	Comm. address	F06-001 (1)	No change required	F06-001 ~ F06-255 (1 ~ 255)
7	Baud rate	F07-3 (3)	No change required	F07-1 ~ F07-3 (1 ~ 3)
Note:				

1 Press the key ↵ to automatically save the settings. After saving, the device will return to the main monitoring page. To continue setting other parameters, press the key SET directly to enter the next settings menu.

2 The hysteresis value is the allowable deviation for temperature/humidity. If the hysteresis is set to 5, in heating mode, the relay will stop when the temperature rises or falls by ≥5°C; for humidity, the dehumidifier will stop when the humidity drops by ≥5%RH.

3 Baud rate: 1: 2400 bps; 2: 4800 bps; 3: 9600 bps.

2.5.6 Fire Protection System

The ESS fire interlock system consists of a fire suppression system and an explosion-proof exhaust system. In case of gas leakage from thermal runaway, the exhaust system activates to ventilate. During a fire, the suppression system rapidly detects, alerts, and extinguishes the fire.

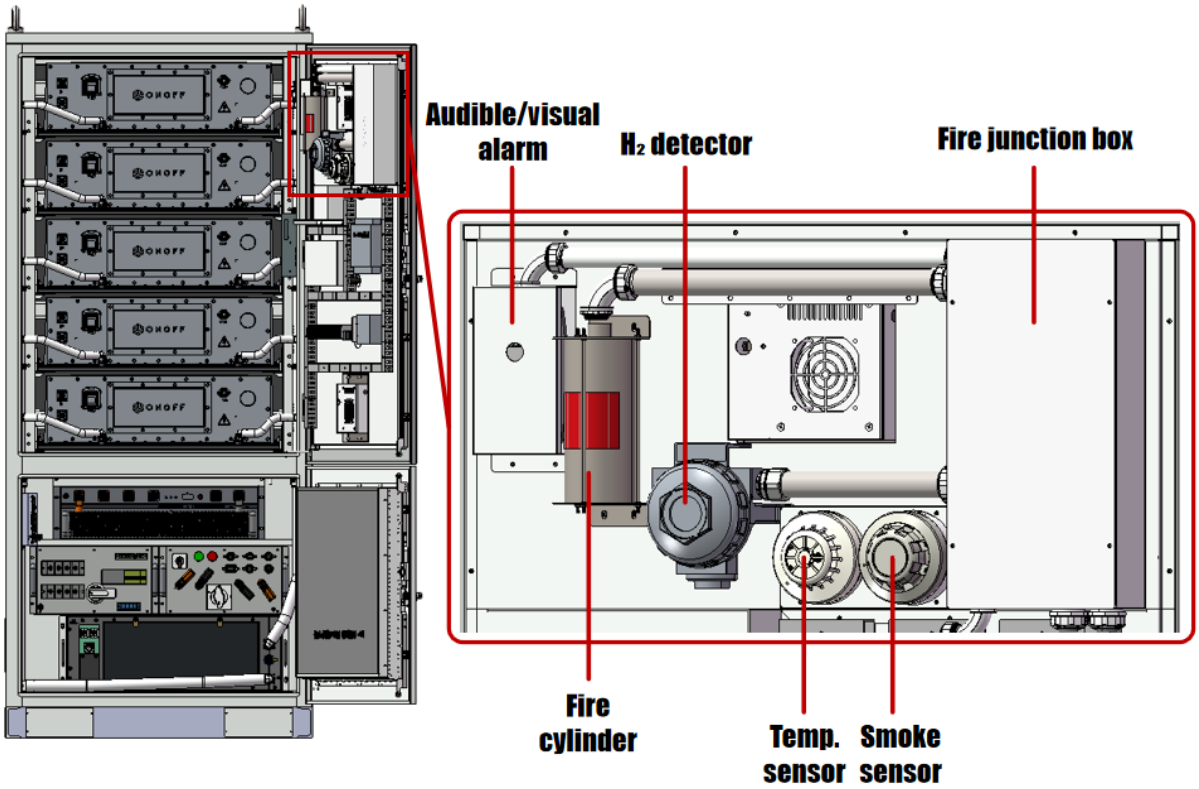


Figure 2-22 Fire Suppression System Diagram

1. When the smoke detector reaches the alarm threshold, Level 1 fire alarm is triggered. The audible/visual alarm is activated and a feedback signal is sent to the BMS. When both the smoke and temperature detectors reach their alarm thresholds simultaneously, Level 2 fire alarm is triggered. A feedback signal is sent to the BMS, and the air intake and exhaust systems are shut down. The fire suppression device is then activated to extinguish the fire. After the aerosol is discharged, a feedback signal is sent to the BMS.

2. When the combustible gas detector reaches the alarm threshold, the ventilation system is activated to rapidly exhaust the combustible gas and reduce its concentration, while a feedback signal is sent to the BMS.

Fire logic diagram: Refer to Appendix 3 (PDF).

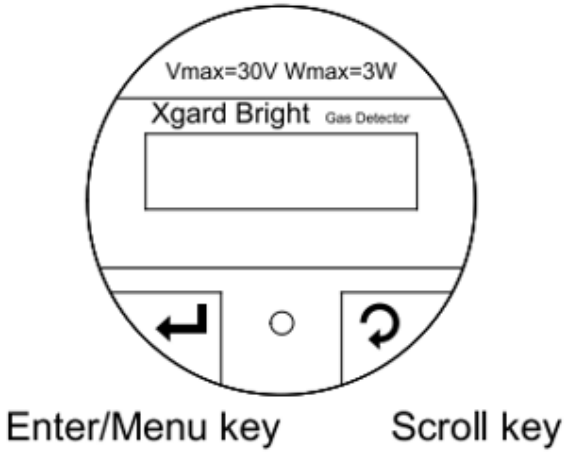


Figure 2-19 Hydrogen Detector Panel Diagram

1) Monitoring interface

The main monitoring interface displays four status screens, which can be switched by pressing the key"↻": concentration value, current value, statistics, and system information. In the "concentration value" display mode, the display format varies depending on the gas type: combustible gas, toxic gas, and oxygen.



2) LED status indication

- **Normal detection:** The LED on the display is green.
- **Alarm:** At Level 1 alarm (low alarm threshold), the LED is red, and the display alternates between the current concentration value and 【ALARM 1】. At Level 2 alarm (high alarm threshold), the LED is red, and the display alternates between the current concentration value and 【ALARM 2】.
- **Fault:** The LED is yellow.

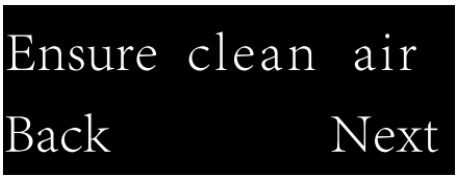
3) Password

To enter the main menu from the detection interface, the user password 【0000】 is required. Use the 【Cursor】 key to cycle through the digit positions, and the 【Scroll】 key to change the value of each digit. Finally, press and hold the 【Confirm】 key. The detector will then display the password verification result. If successful, the main menu will appear; if incorrect, it will return to the detection interface.

4) Zero

1. In the main menu, select 【2. Zero Calibration】. Briefly press the 【Confirm】 key to enter the zero calibration operation, which should be

performed in a clean environment. The detector will first display the prompt: "Maintain clean air and start zero calibration."



2. Select 【Back】 to return to the main menu, or select 【Next】 to proceed with the zero calibration. The detector will then monitor the gas concentration stability for 10 seconds.



3. After 10 seconds, the stability detection result will be displayed.

4. Zero calibration success screen: returns to main menu after 3 seconds ; Zero calibration failure screen: returns to main menu after 3 seconds.

Instruction
Purge sensor with the appropriate gas before zeroing.

5) Calibration

1. In main menu status chose 【Cal gas】, the calibration level screen will be displayed.



2. To cancel the calibration, long press the right key 【Roll/Back】, The Main menu will be displayed. Adjust the value shown to match the calibration gas concentration, to continue, long press left key 【Cut/OK】 to accept the calibration level.

3. Connect the calibration cap to the Hydrogen Detector and then connect the appropriate gas cylinder to the adapter. When the gas reading is stable press the right key 【Mark】. To complete calibration press left key 【DONE】.



4. If the calibration was successful the success symbol will be displayed and return to the main menu.

Instruction
Note 1: Combustible gas calibration follows the same steps as toxic gas. Unit: %LEL, range: 0 ~ 100% LEL. Note 2: Oxygen calibration follows the same steps as toxic gas. Unit: %VOL, range: 0 ~ 25% VOL.

2.6 Response Time

The power response time of an energy storage system is a key indicator of its dynamic performance, referring to the time it takes for the system to go from receiving a charge/discharge command to actually outputting the target power.

Scope of application:

Energy storage products: GRES series, BRES series, response time within ***600ms***.

Precautions:

When the EMS communicates with the energy storage system in the background, the interval time between issuing the target power value should be greater than **600ms**.

3. Storage, Transportation, & Positioning

3.1 Transportation Requirements

Series Product Models	Default Shipping Method	Lifting supported	Forklift pocket provided
BRES	Integrated Transportation	Yes (Top lifting)	No

- Implement necessary auxiliary measures to ensure the safety of transport personnel.
- The system cabinet is an integrated unit and must not be disassembled during transportation or installation. Failures resulting from unauthorized modifications by third parties are not covered under warranty.
- When moving the cabinet, pay attention to its weight and center of gravity. Ensure the transport equipment has sufficient load-bearing capacity and arrange support or lifting points appropriately.
- During movement, avoid subjecting the system cabinet to mechanical impact, such as violent shaking or abrupt drops. Ensure slow, steady handling and place the system only on solid, level ground.
- Avoid transporting battery cabinets during rain or adverse weather conditions. If unavoidable, implement necessary protective measures.

To ensure the system and internal modules remain well-protected during transportation, please transport them to the final installation site in their original packaging whenever possible. Follow all instructions indicated on the packaging labels. The packaging label illustrations are described as follows:

Icon	Symbol
	**Keep upright.** Do not place the energy storage converter horizontally, tilt it, or turn it upside down.
	**Handle with care.** Avoid excessive impact or friction during transport that may damage the equipment.
	**Protect from moisture.** Do not expose the equipment to rain or damp conditions.
	**Do not stack.** Goods must not be stacked to prevent crushing damage.
	**Do not roll.** Goods must not be rolled to avoid damage.
	**UN 3480.** Equipment containing lithium-ion batteries (including rechargeable batteries)
	Class 9 Miscellaneous Dangerous Substances and Articles label

Additionally, several important parameters are marked on the packaging box:

Name	Instruction
MODEL NO	Model Name
SIZE	Outer Packaging Dimensions
N.W	Net Weight
G.W	Gross Weight

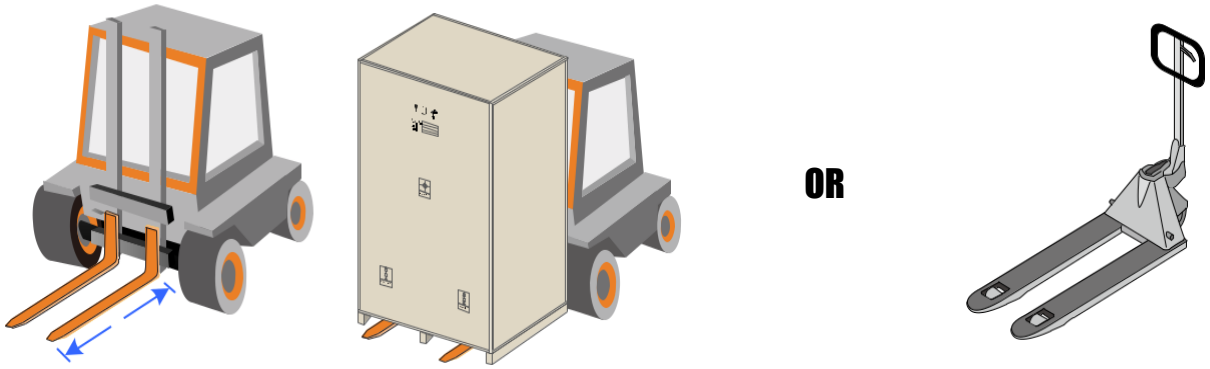
1) Forklift

Transporting system cabinets using forklifts or pallet trucks is the standard method. During transport, the cabinet's center of gravity must be positioned between the forklift's two forks, and a test lift must be performed. The fork length must not be less than 1.2 meters.

Throughout the entire forklift transport process, strict adherence to forklift safety operating procedures is mandatory. Due to the large size of system cabinets potentially obstructing the driver's view, an assistant must provide guidance.

⚠ Note
Forklifts may only be used when equipped with wooden pallets. Do not transport system cabinets directly with forklifts unless the equipment itself is designed with forklift pockets!

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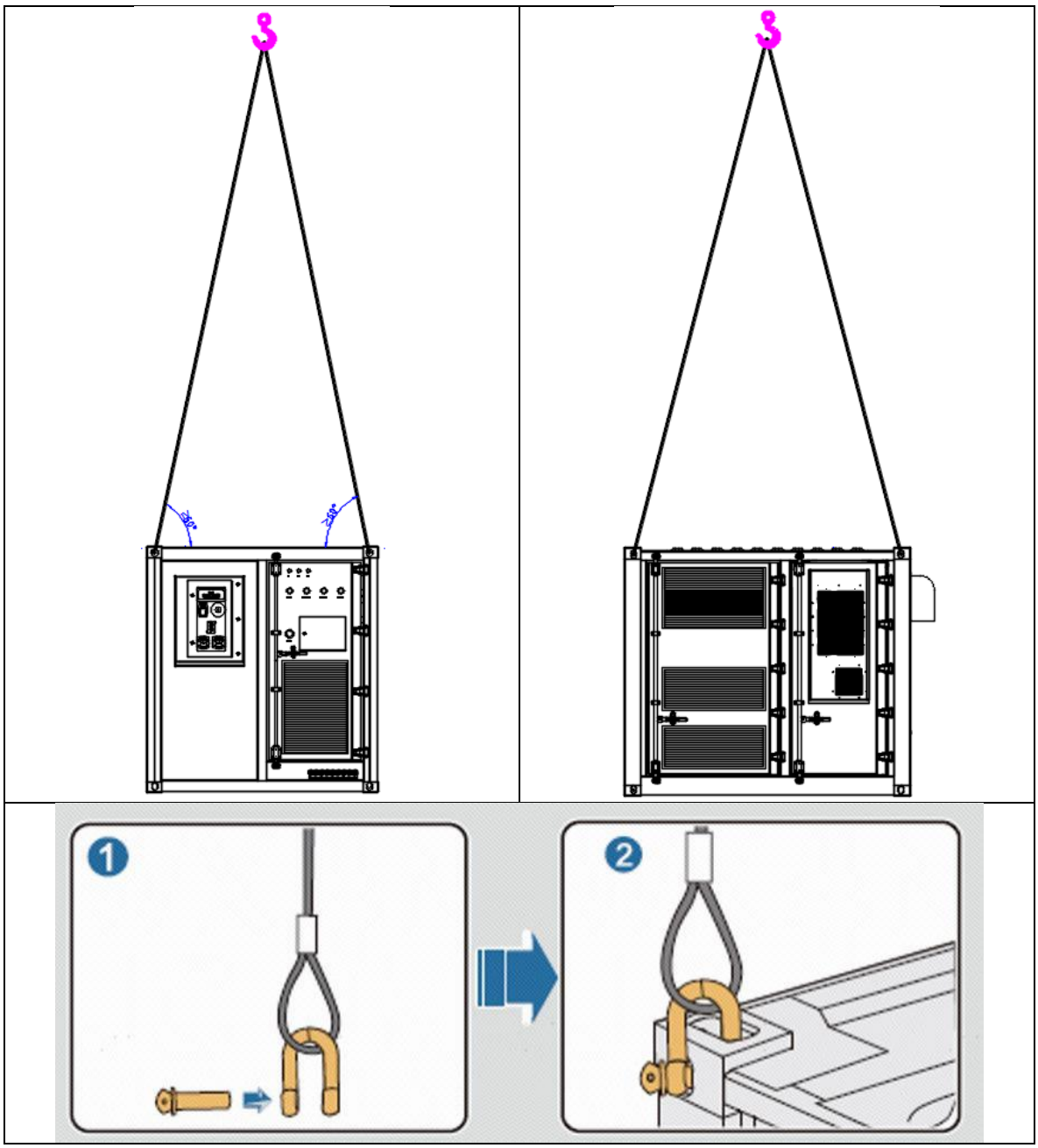
2) Lifting

This system supports lifting operations. A test lift must be conducted prior to the actual installation to ensure that the lifting points are applied to the main load-bearing beams. This is necessary to prevent localized stress concentrations that could cause permanent deformation of the enclosure, thereby affecting its seal, appearance, or structural integrity.

During the lifting process, no personnel are permitted to stand beneath the equipment, and a safety zone must be established. Lifting operations must be directed by qualified lifting personnel and conducted only when environmental conditions (wind speed, weather) permit.

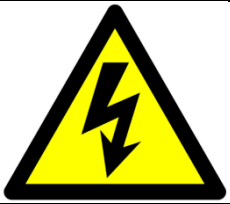
⚠ Note
Wind Speed: Lifting operations should cease in high winds (typically > Force 4). Large containers have significant lateral wind exposure, making them prone to uncontrolled swaying. **Weather:** Avoid working during rain or snow to prevent slippage of lifting equipment, impaired visibility, and water ingress into electrical systems.

Top Lifting (Front View)	Top Lifting (Side View)



3.1.1 Cabinet Labels

Table 2-1 Cabinet Labels

Icon	Name	Meaning
	Electric shock hazard warning sign	High voltage is present when the equipment is powered up. All operations on the equipment must be carried out by trained and specialized electrical technicians.

	No Open Flames	All open-flame working is prohibited.
	Battery Charging Area	Battery charging area, please pay attention to safety.

3.2 Environmental Requirements

3.2.1 Site Selection Requirements

- Installation sites must not be located in low-lying areas. The installation level must exceed the historical highest water level in the region and be at least 300mm above ground level.
- To prevent wildfires caused by summer heat from igniting the energy storage system, the installation site and surrounding 3m radius must be free of vegetation and flammable plants.
- The distance between the top of the energy storage system and any combustible materials must be ≥2m.

- For safety, the distance between the energy storage system and residential buildings must be ≥12m, and the distance from densely populated structures such as schools and hospitals must be >30.5m. If these safety distances cannot be met, a firewall must be constructed between the energy storage system and the buildings.
- The safety distance between the energy storage system and industrial buildings must comply with local fire regulations or standards.

1 The safety distance between energy storage systems and Class A production buildings shall be ≥12m; between Class B production buildings, ≥10m; between Class C, D, and E production buildings with fire resistance ratings meeting Grade I or II, ≥10m; and between Class E production buildings with Grade III fire resistance rating, ≥12m. If the exterior walls of adjacent buildings are non-combustible materials with no doors, windows, or exposed combustible eaves, the fire separation distance may be reduced by 25% from the 3m baseline.

2 When the above 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, or E buildings. A fire wall with a fire resistance rating of no less than 3 hours shall be installed for safety protection. The length and height of the fire wall shall extend 1 meter beyond the outer perimeter of the energy storage system. Space requirements for equipment transportation, installation, and maintenance must also be considered.

- The energy storage system is enclosed by a 1-hour fire-rated independent firewall, with the firewall extending 1.5 meters beyond the outer perimeter of the energy storage system in both length and height.
- Walls adjacent to the energy storage system feature non-combustible exterior cladding without openings or combustible finishes, and the exterior wall meets a 2-hour fire rating per ASTM E119 or UL 263.
- The energy storage system installation or power station site selection shall be located in an environment free from combustion or explosion hazards.

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

Instruction
When the safety clearance at the selected site fails to meet relevant national standards, it is recommended to relocate. Site selection should avoid scenarios not recommended by industry standards and regulations, including but not limited to the following locations, areas, and premises: 1 Areas subject to strong vibration, intense noise sources, or strong electromagnetic field interference. 2 Premises generating or containing dust, oil fumes, harmful gases, corrosive gases, etc. 3 Locations producing or storing corrosive, flammable, or explosive materials. 4 Sites with existing underground infrastructure. 5 Areas with poor geological conditions such as rubber soil or weak soil layers, prone to water accumulation or subsidence. Locations beneath reservoirs, water features, or water intake structures.

2.2.2 Space Requirements

The equipment door width is shown in the figure below. After the equipment doors are fully opened, a clearance of at least 1.5 m shall be reserved around the equipment to facilitate subsequent wiring and future maintenance work.

2.3 **Storage Requirements**

- Please note that this system cannot be stacked!
- The total storage and transportation time for the energy storage system must not exceed 6 months (calculated from the date of shipment). Storage environment requirements:
  1 Ambient temperature: -20°C to 40°C. Recommended storage temperature: 20°C to 30°C.
  2 Relative humidity: ≤ 95% RH (non-condensing).
  3 Dry, ventilated, and clean environment.
  4 Avoid contact with corrosive organic solvents, gases, and similar substances.
  5 Avoid direct sunlight.
  6 Maintain a minimum distance of two meters from heat sources.
  7 When storing the energy storage system, completely power down the equipment and organize all related cable harnesses. Ideally, store in a secure, dry, and well-ventilated warehouse.

Requirement
In principle, long-term storage of batteries is not recommended (no longer than 6 months). They should be used promptly. After extended storage, it is advisable to perform a full charge and discharge cycle before use.

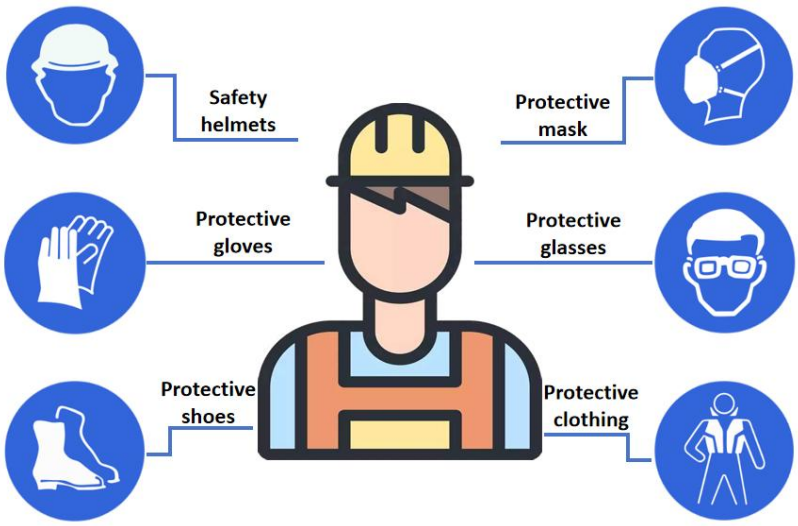
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4. Mechanical Installation

4.1 **Safety Precautions**

4.1.1 Standard Requirements

- Strictly prohibit installing, using, or operating outdoor equipment and cables during severe weather conditions such as thunderstorms, rain, snow, or winds exceeding force 6.(Including but not limited to moving equipment, operating equipment and cables, plugging/unplugging outdoor signal interfaces, working at heights, outdoor installations, etc.).
- Wearing conductive objects such as watches, bracelets, rings, or necklaces during installation, operation, or maintenance is strictly prohibited to prevent electric shock burns.
- Specialized protective gear must be worn throughout installation, operation, and maintenance, including insulated gloves, safety goggles, protective clothing, hard hats, and safety shoes, as shown below.



- Installation, operation, and maintenance must follow the step sequence outlined in the instruction manual.
- Before touching any conductor surface or terminal, measure the voltage at the contact point to confirm there is no risk of electric shock.
- After installing the equipment, remove all packaging materials from the equipment area, such as cardboard boxes, foam, plastic, and cable ties.
- Personnel other than those operating the equipment must not approach this device.
- All cable entry holes must be sealed. Use fire-resistant sealant to block holes where cables have been routed.
- When installing the equipment, use a torque wrench with the appropriate range to tighten screws to the torque specified in the manual.
- Do not perform any operations while the equipment is energized during installation.
- Do not use water to clean electrical components inside or outside the cabinet.
- Do not modify the equipment's structure, installation sequence, or other aspects without authorization.
- Before the fan power is disconnected and it stops rotating, never allow fingers, components, screws, tools, or circuit boards to come into contact with the running fan to prevent injury or equipment damage.
- Reverse engineering, decompiling, disassembling, modifying, implanting, or performing other derivative operations on the device software is prohibited. You may not study the internal implementation of the device, obtain the device software source code, or steal intellectual property in any manner. You may not disclose any results of device software performance testing.

4.1.2 Personnel Requirements

- Be thoroughly familiar with the entire energy storage system's configuration, operating principles, and relevant standards of the project's country/region.
- Personnel responsible for installing and maintaining our company's equipment must first undergo rigorous training to understand all safety precautions and master correct operating procedures.
- Only qualified professionals or trained personnel are permitted to install, operate, and maintain the equipment.
- Only qualified professionals may dismantle safety facilities or perform equipment maintenance.
- Personnel operating equipment—including operators, trained personnel, and professionals—must possess special operation certifications required by local regulations, such as high-voltage operation, elevated work, or special equipment operation licenses.
- Replacement of equipment or components (including software) must be performed by professionals or authorized personnel.

—Professional personnel: Individuals possessing training or operational experience with equipment, capable of clearly identifying potential hazards and their severity levels during installation, operation, and maintenance.

—Trained personnel: Individuals who have undergone relevant technical training and possess necessary experience, capable of recognizing hazards that may arise during specific operations and taking measures to minimize risks to themselves and others.

—Operators: Personnel other than trained personnel or professional personnel who may come into contact with the equipment.

4.2 **Tools and Usage**

4.2.1 Prepare Tools

Please prepare the following professional tools, including but not limited to:

Table 4-1 Tool Recommendation List

Name	Image	Name	Image
Electric drill		Wrench	
Flathead screwdriver		Phillips screwdriver	
Stepladder		Forklift	
Hammer drill		Wire stripper	
Sledgehammer		Diagonal cutters	
Insulated boots		Anti-static gloves	
Electrician's knife		Cable ties	
Electrical tape		Insulated gloves	
Wire strippers		Heat shrink tubing	

Insulated torque wrench		Torque screwdriver	
Multimeter		Clamp meter	

4.2.2 Safety in Use

1) Ladder Use Safety

- When electrical work at height is possible, use wooden or fiberglass ladders.
- When using a stepladder, the pull rope must be secure, and someone must hold the ladder during operation.
- Before using a ladder, ensure it is undamaged and meets weight capacity requirements. Overloading is strictly prohibited.
- Position the ladder on stable ground. Maintain an optimal incline angle of 75°—verify using a square as shown below. When in use, ensure the wider foot faces downward or implement protective measures at the base to prevent slipping.



- When climbing ladders, observe the following actions to minimize hazards and ensure safety.

  1 Keep your body steady.

  2 The highest point where the worker's feet stand should not exceed the fourth step from the top of the ladder.

  3 Ensure your body's center of gravity does not shift beyond the edge of the ladder frame.

2) Drilling Safety

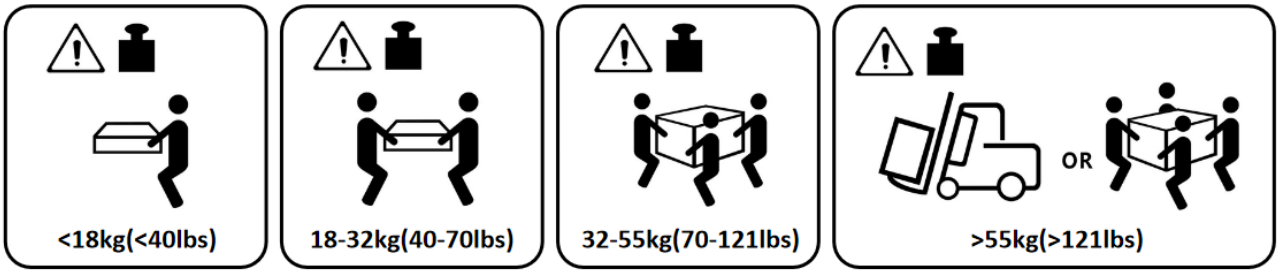
When drilling holes in the ground, the following safety precautions must be observed:

Requirement	

Drilling holes in the equipment is strictly prohibited. Drilling will compromise the equipment's electromagnetic shielding performance, damage internal components and cables, and allow metal shavings to enter the equipment, potentially causing circuit board short circuits.

3) Lifting Heavy Objects Safety

Hazard
When pulling equipment out of the cabinet, be cautious of devices that may be unstable or heavy when mounted on the cabinet to avoid being crushed or struck.



- When moving heavy objects, be prepared for the weight to avoid being crushed or sprained by the load.
- When manually moving equipment, wear protective gloves to prevent injury.
- During equipment transport, avoid scratching surfaces or damaging components and cables.
- When using a forklift, position the forks at the center to prevent tipping. Secure the equipment to the forklift with ropes before moving; assign a dedicated supervisor during transport.
- Move equipment with care to prevent damage from impacts, drops, or other mishaps.

4.3 Foundation Recommendations

Must be installed on concrete or other non-combustible surfaces. The installation surface must be level, secure, and smooth, with sufficient load-bearing capacity. No depressions or tilting are permitted. Conduct a site survey prior to construction. If the actual foundation bearing capacity fails to meet design requirements, promptly notify the design unit to modify the foundation.

- Materials: C30 waterproof concrete with P6 impermeability rating; Class II waterproofing.
- Reinforcement cover thickness: 50mm for foundation slab; 30mm for slab, wall, and other surface-type components.
- Equipment foundations/channel steel bases shall be configured based on the maximum total weight of the equipment. Verification is required when local foundation bearing capacity is insufficient.
- Horizontal deviation between equipment foundation/channel steel base and cabinet contact surface ≤ 3mm.
- The foundation/channel steel base must be elevated above the local historical maximum water level and at least 200mm above the horizontal ground level.
- Construct drainage facilities in accordance with local geological conditions and municipal drainage requirements to prevent water accumulation at the equipment foundation. Foundation construction must meet 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 energy storage system cable routing and reserve trenches or entry holes.
- All reserved holes in the equipment foundation and entry holes at the equipment base must be sealed.

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

It is important to note that before pouring concrete, threaded sleeves or anchor plates must be embedded to accommodate conduit for future energy storage power lines.
Additionally, the installation site must be equipped with compliant firefighting facilities (such as gas extinguishers, water-based fire suppression systems, etc.).

Requirement
The site foundation requires the client to contact local engineers for **independent design**, which can be planned and laid out based on the relevant materials provided by our company. If necessary, our technical personnel can be contacted for assistance.

4.4 **Equipment Installation**

4.4.1 Pre-installation Check

1) **Delivery and Unpacking Check**

Table 4-2 Mechanical Check-1

Item	Content
Packaging Container Inspection	Inspect the outer packaging for severe deformation, damage, water immersion, or impact marks.
Cargo Information Verification	Verify that the cabinet model, specifications, and quantity match the purchase order and shipping list.
Safety and Lifting Markings	Confirm that the packaging bears clear markings for lifting, moisture protection, anti-tipping, and stacking layers, and strictly adhere to them.
Documentation Check	Inspect and securely store relevant paper documents such as certificates of conformity, factory test reports, instruction manuals, and lists of included accessories/spare parts.
Accessories and Spare Parts Inventory	Using the checklist, count all installation bolts, brackets, keys, grounding wires, communication cables, etc., to ensure completeness with no omissions.

2) Cabinet Exterior and Internal Structure Check

Table 4-3 Mechanical Check-2

Item	Content
Cabinet Structure	Inspect the cabinet housing for dents, scratches, deformation, or rust.
Surface Coating	Check whether the powder coating or paint finish is uniform, and whether there is any peeling or bubbling.
Sealing and Protection	Inspect the cabinet door gasket for integrity and elasticity to ensure proper sealing (IP rating).
	Check the ventilation grille dust filter for integrity and absence of blockages.
Battery Section	Inspect the battery module for any dents, cracks, or traces of electrolyte leakage.
	Check the battery terminals for oxidation, looseness, or damage.
	Confirm that the module's mounting brackets or rails are free from deformation.

PCS Section	Check the main circuit copper busbars or busways for any deformation or burrs, and ensure that the insulation (where present) is intact.
	Check that all electrical connectors (high-voltage, low-voltage and communication) are in good condition, and that the pins and sockets are free from bending or pin shrinkage.
	Check that the internal wiring harness is neat and undamaged, and that the wire number labels are clear and legible.
Air-Cooling System (Air Conditioning)	Check if the air conditioner is in good working order and free of obstructions.
Mechanical Moving Parts Inspection	Ensure cabinet doors open and close smoothly, and verify that the door lock functions properly.

3) Processing of Inspection Results

- Qualified: Mechanical installation may proceed only after all items have been inspected and found to be in order.
- Issues Found: If any problems are discovered (such as damage, missing parts, or non-conformities), subsequent work must be stopped immediately.

1 Take photographs/videos to preserve evidence.

2 Document in detail any issues encountered during inspection.

3 Promptly contact the supplier or manufacturer representative for confirmation and resolution; installation must not proceed until the issue is resolved.

Requirement
If any items are missing or damaged, please contact our customer service team immediately.

4.4.2 Unpacking

Table 4-4 Unpacking Procedure

No.	Item	Content	Notes
1	Unloading	Upon arrival of the goods, use a forklift to move the boxes to a location convenient for unpacking.	This step requires the use of a forklift/electric pallet truck capable of supporting the equipment's weight, or bottom lifting. It is recommended that transportation operations be performed by qualified personnel.
2	Unpacking	**Paper Box:** 1 First ensure the equipment base is stable and will not tip over. 2 Cut the straps securing the paper box and carefully dismantle it. 3 Inspect the exterior of the equipment for any dents, deformations, or damage. 4 After dismantling, clean the work area and properly dispose of the straps and cardboard boxes.	This step requires preparing tools for removing packaging, such as wire cutters and gloves. After removal, promptly clean the work area and conduct pre-installation inspections of the equipment according to *Table 4-2* and *Table 4-3*.
		Wooden Box: 1 First ensure the equipment base is stable and will not tip over.	

		2 Use tools to pry open the wooden crate fasteners, then disassemble the wooden panels in a top-to-bottom sequence (the top must be removed first). 3 Inspect the exterior of the equipment for any dents, deformations, or other damage. 4 After disassembly, clean the work area and dispose of the wooden panels appropriately.	
3	Equipment Moving	After disassembly, verify whether the equipment supports overhead lifting: 1 If overhead lifting is supported (equipped with lifting rings, lifting ports, or lifting columns), use overhead lifting to move the equipment to the installation site. 2 If overhead lifting is not supported, use an electric forklift to move the equipment.	The equipment must be placed in a location that does not obstruct ventilation and heat dissipation, ensuring it rests on a level surface. It must not be tilted or placed in areas with poor ground conditions or where the equipment is susceptible to damage.
		Install the equipment on a level surface or temporarily store it in a warehouse that meets storage requirements.	Please ensure the item is transported smoothly without any bumps or impacts. We recommend having it handled by professional transport personnel.

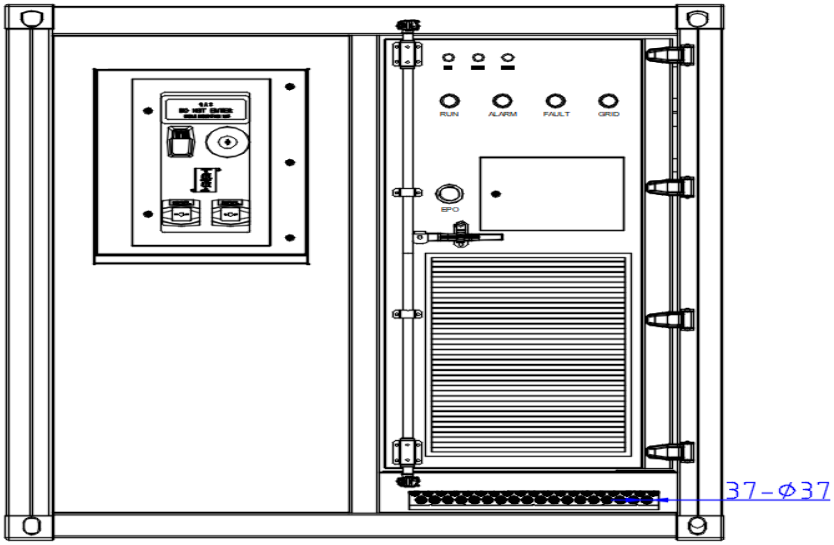
Notes:

- Avoid forceful removal of packaging to prevent irreversible damage to the equipment.
- Upon unpacking, inspect the equipment inside and out for any dents, deformation, or other damage. Contact the manufacturer immediately if significant damage is found.
- Prepare appropriate transportation and installation tools. Professional installation of electrical equipment is recommended.

Prioritize personal safety during all operational procedures!!!

4.4.3 Cabinet Installation

The system cabinet base is shown in the diagram below (unit: mm).



(The above is just a schematic diagram)

Figure 4-1-1 Cabinet Base Size Diagram (Front cable inlet / outlet)

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5. Electrical Installation

5.1 Safety Instructions

Throughout the entire process of making electrical connections to battery cabinets and system cabinets, as well as during all other operations performed on system cabinets, the following safety rules must be strictly adhered to:

- Disconnect all external connections to the battery cabinet, as well as connections to the internal power supply of the equipment.
- Ensure the battery cabinet cannot be accidentally re-energized.
- Use a multimeter to verify that the battery cabinet is completely de-energized internally.
- Implement necessary grounding and short-circuit connections.
- Cover adjacent components that may be energized in the operational area with insulating material.

Warning

- All electrical connections must comply with the electrical connection standards of the country or region where the project is located.
- Only professional electricians or qualified personnel may perform electrical connections on this product.
- Strictly follow the wiring labels on the equipment when performing wiring operations.

5.2 Cable Requirements

The requirements for cable selection are as follows:

- Selected cables must possess sufficient current-carrying capacity. The conductor's current-carrying capacity is determined by factors including environmental conditions, insulation material type, installation method, conductor material, and cross-sectional area.
- All cable diameters must be selected based on the maximum charging/discharging current of the system cabinet, with sufficient margin reserved.
- Connecting wires on the same side should use conductors of identical specifications and types.
- Use flame-retardant cables.

Warning

Do not overload cables ！

5.2.1 Power Cable Fabrication

a. Verify that both the circuit breaker and the circuit breaker of the downstream connected equipment are in the open position.

b. Strip the insulation from the cable end. The stripped length should be equal to the depth of the crimping hole in the copper terminal plus approximately 5mm.

c. Crimp the copper terminal.

- Insert the exposed copper core of the stripped wire into the crimping hole of the copper terminal.
- Use a terminal crimping tool to firmly crimp the copper terminal, ensuring at least two crimp lines are formed.

d. Install heat-shrink tubing.

- Select heat-shrink tubing that closely matches the cable size, with a length extending approximately 2

cm beyond the crimped copper terminal.

- Slide the heat-shrink tubing over the crimped copper terminal, ensuring it fully covers the terminal's crimping hole.
- Use a heat gun to shrink the heat-shrink tubing.

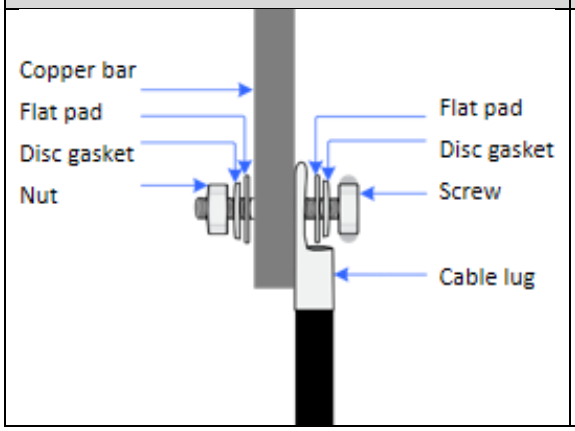
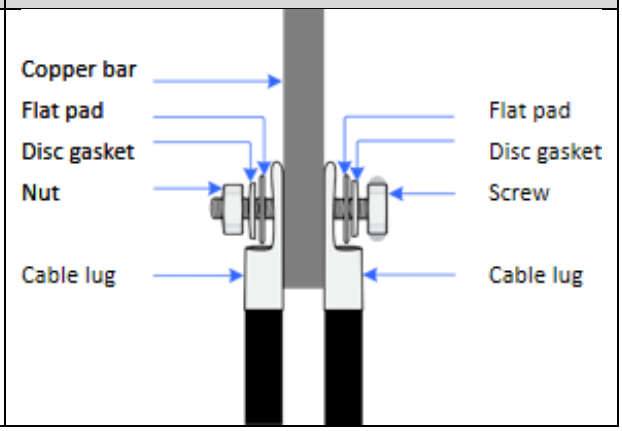
⚠ Note
When using multi-core cables, it is recommended to add cable protection sleeves at branch points to prevent cracking of the outer insulation.

e. Wiring.

- Select screws compatible with the copper lugs.
- Crimp the copper lugs onto the DC bus bars, installing them in the sequence shown below.
- Tighten the screws using a screwdriver or wrench.

The size and number of cables should be selected appropriately based on site conditions. Up to four cables can be connected. If more than two cables are used, they must be connected in the sequence specified in Scenario 2 below.

If aluminum cables are selected, copper-to-aluminum transition plates or copper-to-aluminum transition connectors must be used.

Scenario 1	Scenario 2
	

⚠ Warning
• Observe all safety specifications listed by the equipment manufacturer at the site. Incorrect wiring sequence may cause fire or combustion. Pay attention to the connection order of wiring components. • When connecting, ensure all connectors are securely fastened. Insufficient connection or oxidation of contact surfaces may also generate excessive heat, potentially leading to fire or combustion.

⚠ Warning
• Ensure terminal screws are appropriately sized, protruding slightly beyond the busbar mounting holes. Excessively long screws may compromise insulation integrity or cause short circuits.

- Inspect the connection between terminal lugs and busbars for any partially pinched heat-shrink tubing. Immediately remove any pinched sections, as they may cause poor contact or overheating damage.
- Confirm all connections are secure.

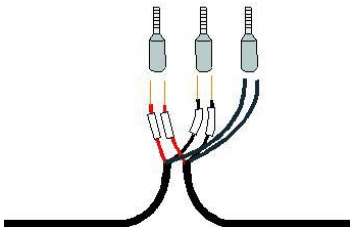
5.2.2 Communication Cable Fabrication

a. Strip the insulation from the ends of the two cables that need to be connected to the same terminal.

b. Insert the exposed copper wire sections into the cold-pressed terminals and crimp them tight with crimping pliers.

c. Connect the cold-pressed terminals to the communication terminals.

d. Twist the shielding layers of both cables into a single bundle, cover with heat shrink tubing, insert into the cold-pressed terminal, and crimp securely.



Warning

Please strictly follow the wiring labels inside the equipment when performing wiring operations.

5.3 **Pre-wiring Check**

Table 5-1 DC Side Check

Item	Content
Port Visual Inspection	Inspect the positive and negative DC terminals for physical damage such as cracks, burn marks, severe oxidation, or deformation.
	Check the interior of the terminals for metal debris, dust, foreign objects, or other contaminants. Any conductive foreign matter may cause a short circuit.
	Verify that the [+] and [-] polarity markings are clear and accurate.
Internal Wiring Inspection	Inspect the busbar or cable connections from the DC input port to the internal module (PCM module) for tightness and absence of looseness.
	Ensure fire extinguisher cylinders show no deformation, displacement, or detachment.
Ground Insulation Test	Verify that the DC circuit inside the equipment has adequate insulation to ground (housing). This ensures the device itself has no internal insulation faults before connecting an external battery. (Resistance value typically >1MΩ)
Voltage Verification	Confirm that no residual voltage remains on the internal DC bus (capacitor) to ensure safe wiring.

Table 5-2 AC Side Check

Item	Content
Port Visual Inspection	Check the L1, L2, L3, N and PE terminal blocks for damage, charring or loose connections.
Ground Insulation Test	Check that the AC output circuit inside the equipment has good insulation to earth.

Internal Check	Check that the connections on the AC copper busbars are secure.
	Check that the EMS screen is undamaged.

Table 5-3 Commonality Check

Item	Content
Machine Status	Ensure the equipment is securely and stably anchored to the ground without any wobbling.
Hazard Identification and Protective Measures	Verify that [Danger: High Voltage] warning signs are prominently displayed.
Tool Inventory	Confirm no tools or components are left inside the equipment.
Power Disconnection Verification	Before connecting any wiring, ensure the equipment is completely de-energized and all switches are in the off position.

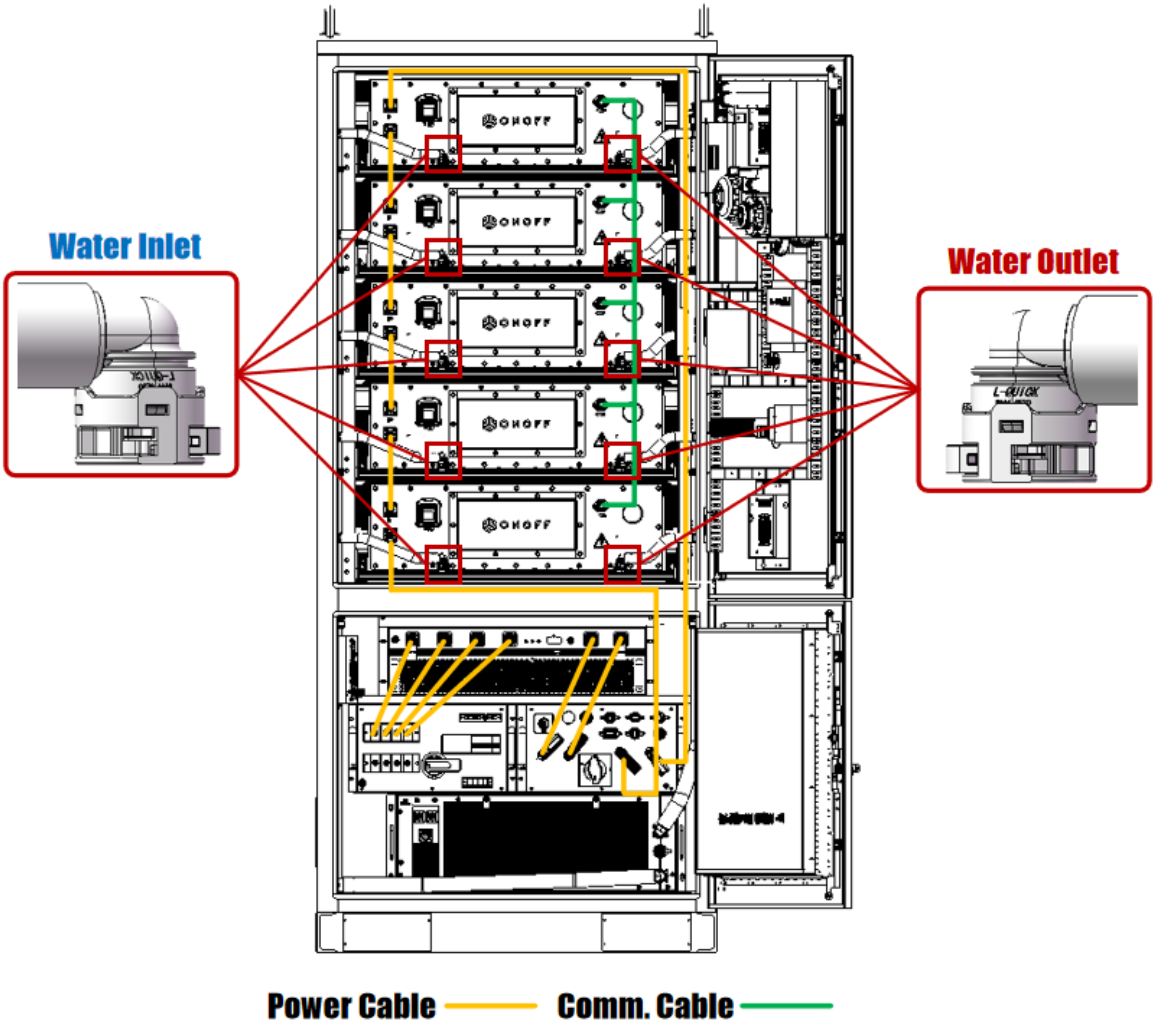
5.4 **System Wiring**

5.4.1 Battery Side Connections

1 Before delivery, all battery-related wiring harnesses (including power and communication cables) have been connected at the factory. Please check that all connections are secure and correct.

2 Confirm that the inlet/outlet water pipes on the battery packs are properly locked; otherwise, there is a risk of leakage!!!

Figure 5-1 Battery Wiring Diagram Inside Cabinet



5.4.2 PCS Side Connections

Requirement
Wiring instructions are provided separately: EL (without STS cabinet) and DEL (with STS cabinet). Please follow the section that matches your system configuration.

1) EL system wiring

For systems without STS cabinet, only mains power connection is required. Follow the silkscreen labels on the unit for proper wiring.

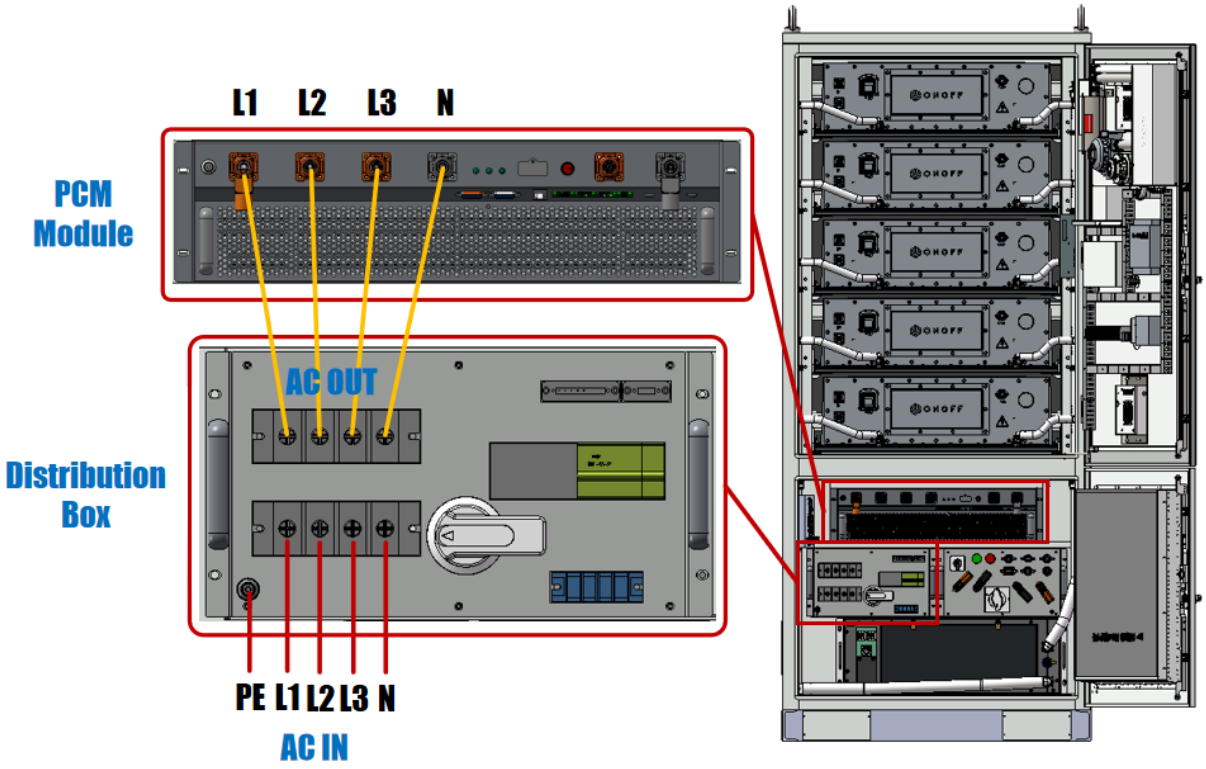


Figure 5-2 EL System Power Wiring

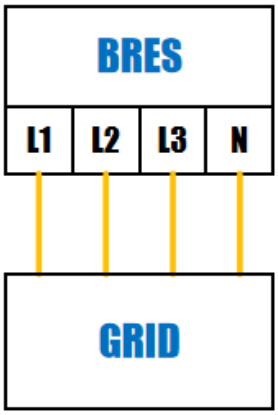


Figure 5-3 Simplified EL System Power Wiring Diagram

Table 5-4-1 Recommended AC Input Power Cable Sizes

Item	A/B/C	N	PE

AC IN	70mm^2 / 95mm^2	70mm^2 / 95mm^2	50mm^2

Table 5-4-2 Recommended Screw Sizes

Item	Busbar hole diameter	Recommended screw size
AC IN /OUT	/	Connection points come with M8 screws.

Table 5-4-3 AC Input Cable Reserve Length

Item	A/B/C	N	PE
AC IN	550	550	550

Note

Above cable sizes are suggested values. Actual selection should consider distance, installation method, and environment; have a professional engineer verify on site.

6. Power On/Off Procedure

Hazard

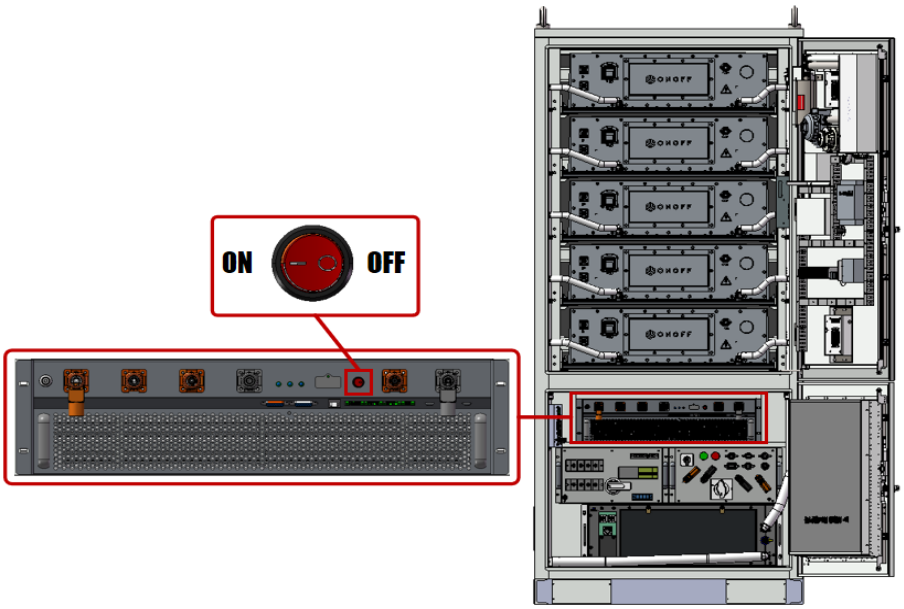
At any time, the DC input and AC grid output terminals of the containerized energy storage system carry dangerous voltage.
Before starting the system:

1. Ensure that the system input switch at the site is in the off state.
2. Ensure all power connections are correct.
3. Check that the communication cable is connected correctly.

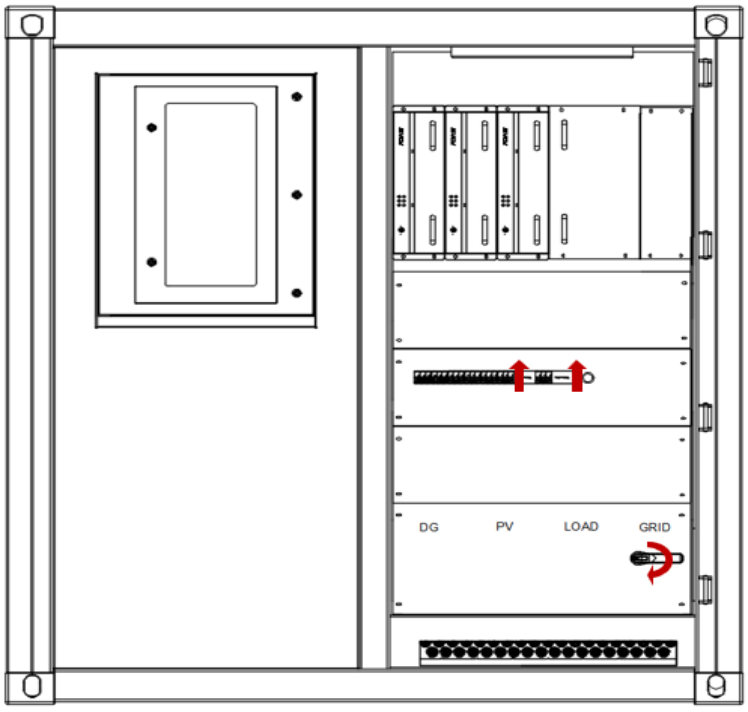
6.1 Power-on Procedure

1. Check that all wiring (grounding, power cables, communication cables, etc.) has been completed and that all connections are correct and secure. Verify that all MSDs are properly installed on each battery pack.
2. Open the BRES cabinet door and set the switch on the PCM module to [ON].

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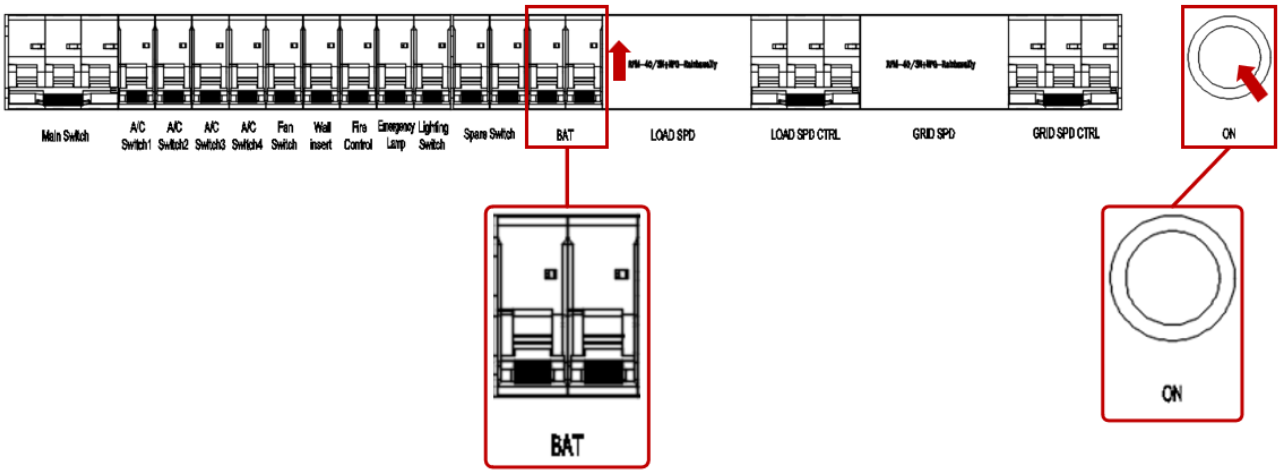


3. Power on the miniature circuit breakers, surge protection switches and the mains input circuit breaker. Power up the system; once this is successful, the EMS screen should display the user interface. After closing the mains circuit breaker, the system will start up; at this point, the main control cabinet will issue a start-up command to the battery system, and the battery system will start up. Check the display and data for each unit on the screen to ensure they are normal.

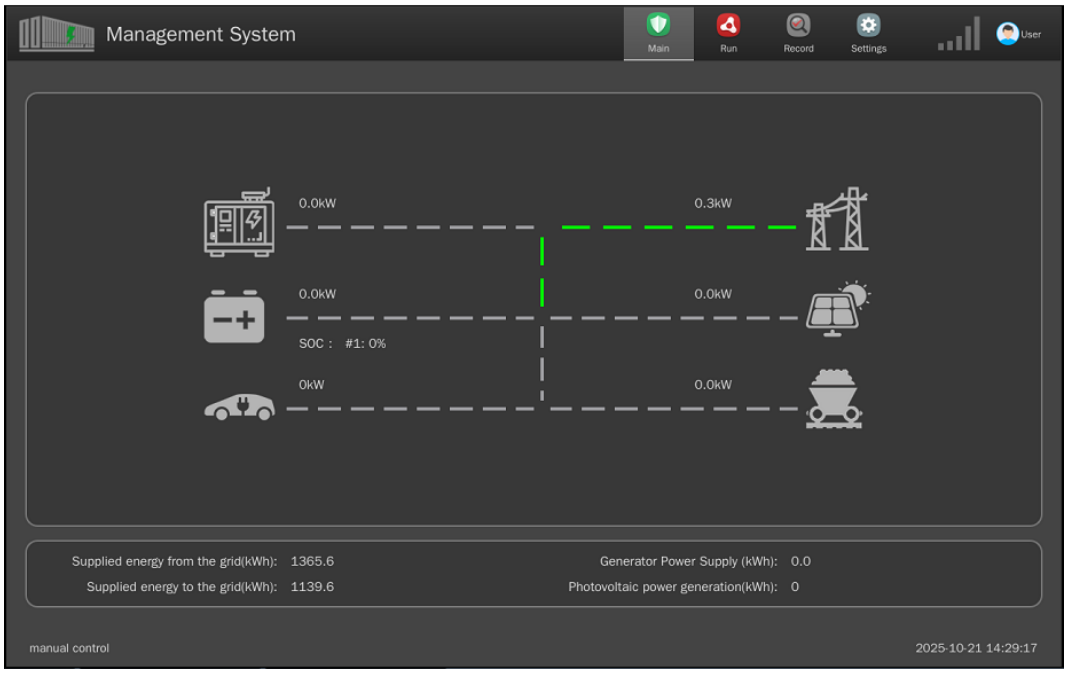


4. For the auxiliary power switch, the 【BAT】 button must be turned on first, then the adjacent [ON] button can be pressed.

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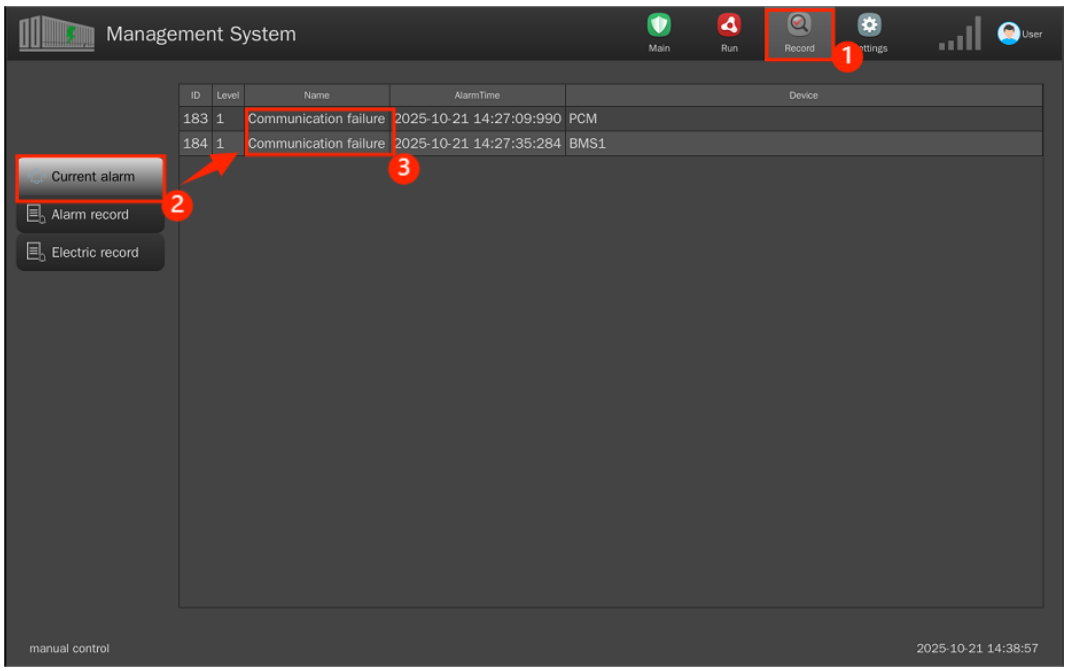


Requirement
If only the DC battery switch is closed, the system will issue a normal alarm indicating 【Grid Alarm】; if only the mains input switch is closed, the system will issue a normal alarm indicating 【DC Battery Alarm】.



Main screen

5. Check the system for any fault alarms.



Current Alarm

6. If no other abnormalities are observed 3~5 minutes after powering up, the device has booted up successfully.

Warning
When two or more battery systems are connected in parallel, all battery circuit breakers must be closed before normal charging and discharging can take place; otherwise, this will result in inconsistent capacity across the battery banks.

Table 6-1 Some common alerts that may occur

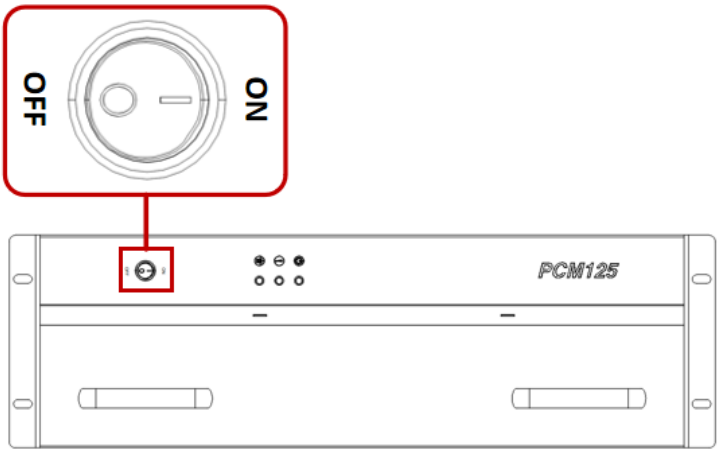
Abnormal situations	Possible scenarios
Wiring fault	Loose or incorrectly connected power cables in the battery cabinet
	Loose communication cables in the battery cabinet, or loose terminal connectors
	Loose or incorrectly connected wiring at the mains input interface in the PCS cabinet
Mismatched resistors	Matching resistor not inserted / missing
PCM module indicator light fault	The switch on the PCM module is not set to [ON]
Failed to parallel units (where multiple units need to be paralleled)	Parallel connection cable not connected / Parallel connection cable not connected correctly
	Conflict in PCM module address dip switches; adjustment required
Battery control box display fault Battery system not started	The duration after turning the rotary switch to the [1]/[ON] position is too short
	The circuit breaker in the battery control box has not closed
System power-up failure	The mains circuit breaker has not been closed
EMS screen not lighting up	Check whether power has been successfully supplied to the DC and AC sides

EMS screen display fault (e.g. snow-like pattern, lines obstructing the display)	There is a fault with the EMS display itself; we recommend replacing the display
EMS screen freezing or unresponsive	The display has overheated due to direct sunlight; please shield it from the sun and allow it to cool naturally

6.2 **Power-off Procedure**

6.2.1 Normal Power-Off Procedure

1. Open the front door of the PCS cabinet, flip the mains switch downwards, and the system will disconnect the AC power supply.
2. Power on the switch on the PCM module so that it is in the 【OFF】 position.



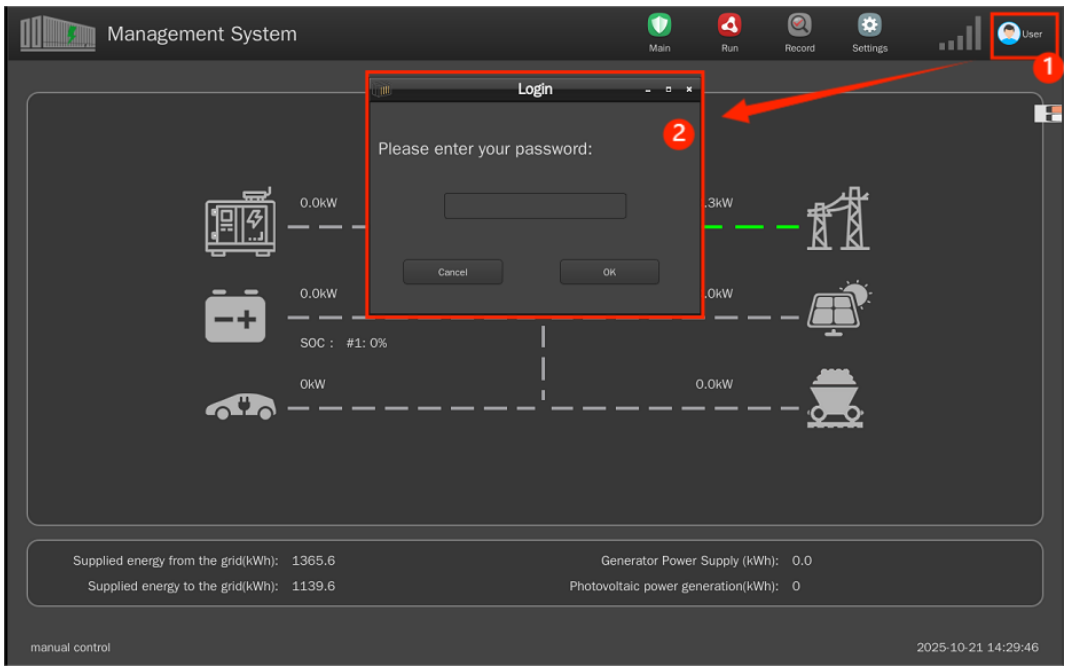
3. If the equipment is not going to be used for an extended period, we recommend switching off all physical switches on the equipment.

Warning

If you will not be using the storage and charging equipment for an extended period, be sure to disconnect the battery circuit breaker. It is best to turn off all switches to ensure the safety of the energy storage equipment!

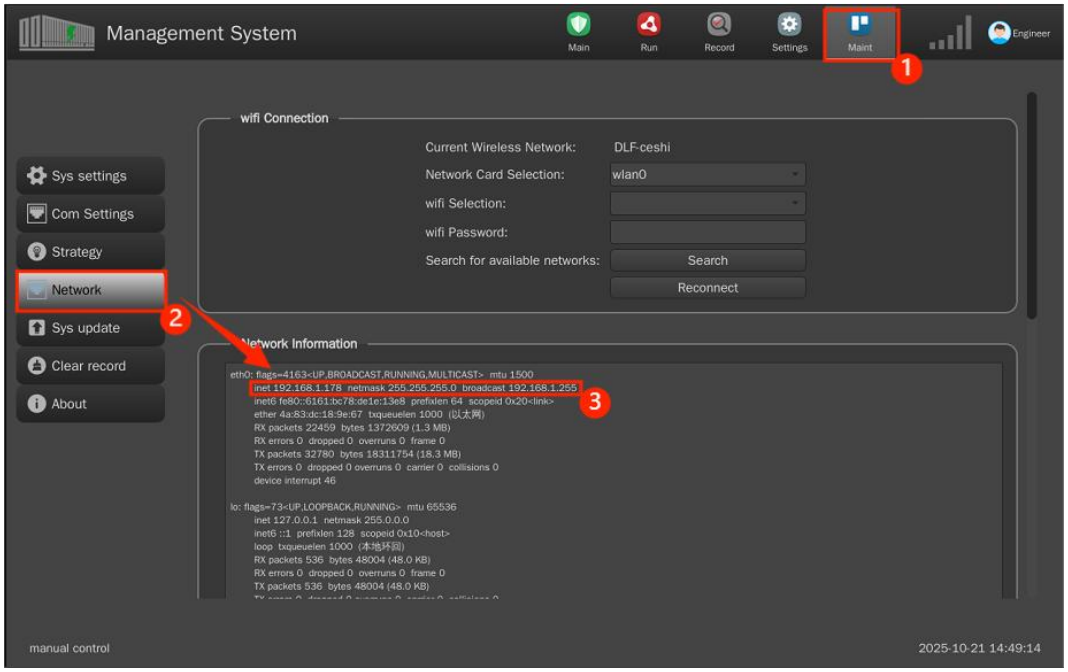
6.3 **Upper computer connection**

1. Please locate the LAN port on the underside of the energy storage unit’s electrical enclosure, take a sufficiently long network cable, and connect the energy storage unit to the host computer.
2. Tap the energy storage device screen and switch the system permissions to [Engineer] mode.



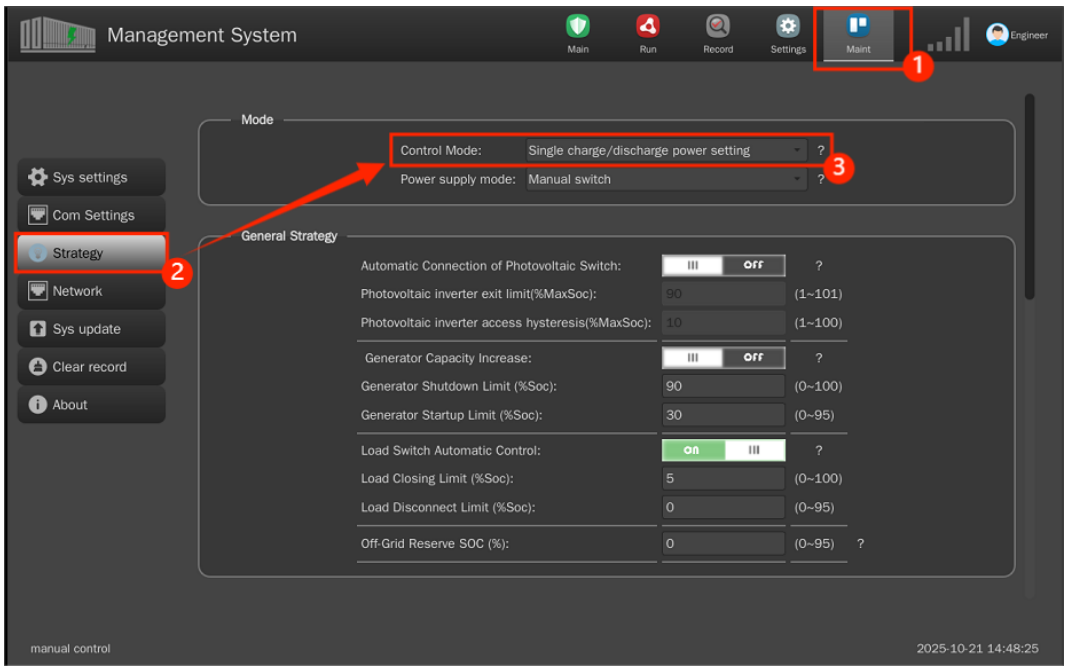
Mode Switch

3. Select 【Maint.】→【Network】, then locate the network address at the bottom of the screen. You will need to modify your address range based on the address displayed, ensuring that the address range on the host computer matches that on the screen, and that there are no address conflicts.



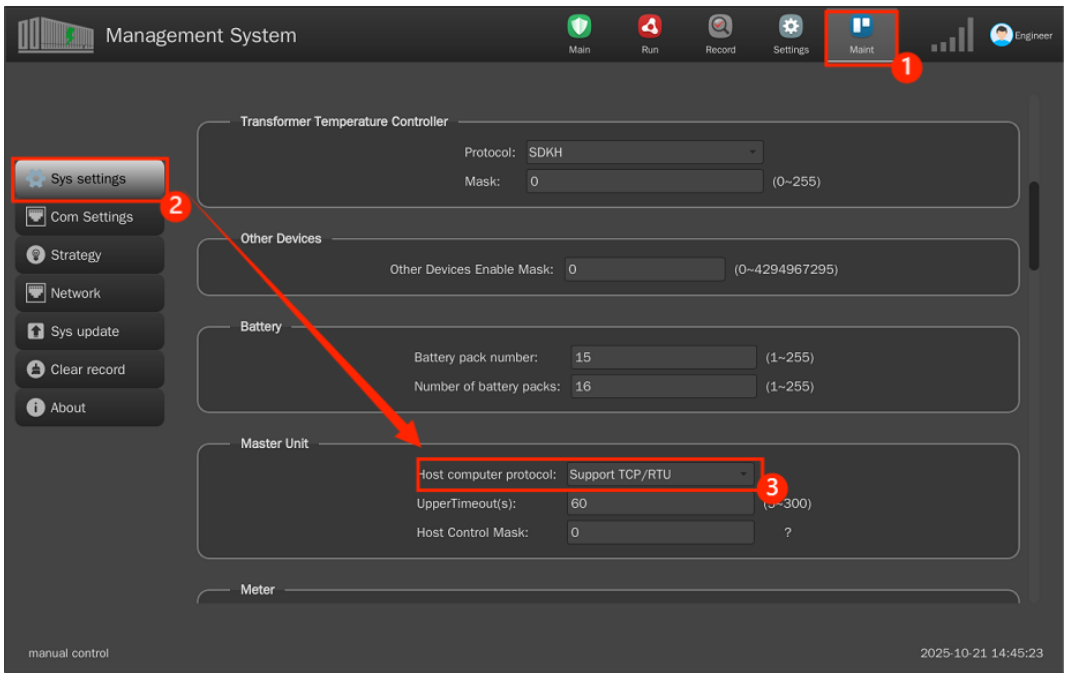
Check device IP

4. Select【Maint.】→【Strategy】→【Control Mode】and change it to【Upper Computer】mode.



Set control mode

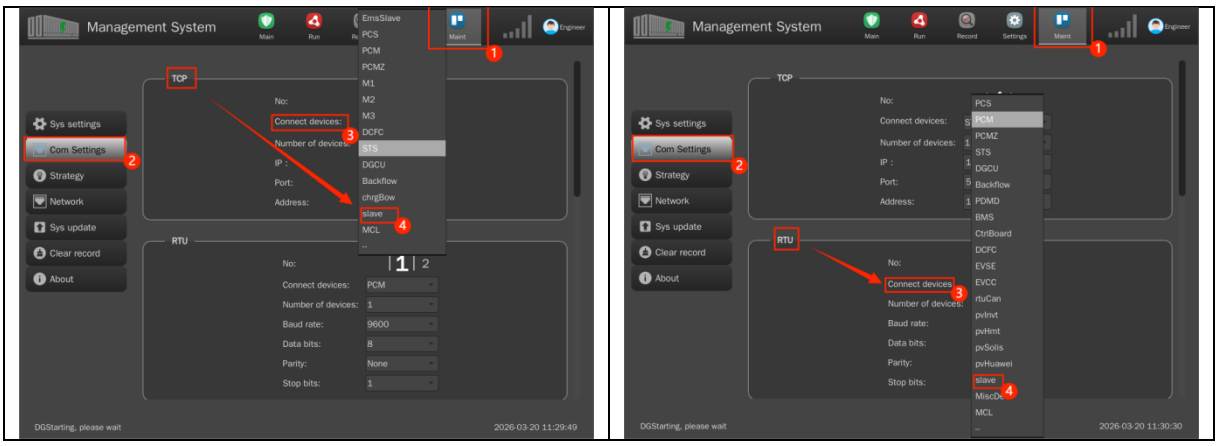
5. Navigate to 【Maint.】 → 【Sys settings】 → 【Host computer protocol】 and change the setting to 【Support TCP/RTU】 mode. Similarly, in the communication settings, select the interface actually used by the host computer (TCP/RTU), and choose 【Slave】 for the required port. Once all settings have been configured, restart the display and confirm the changes.



Select the host computer communication protocol

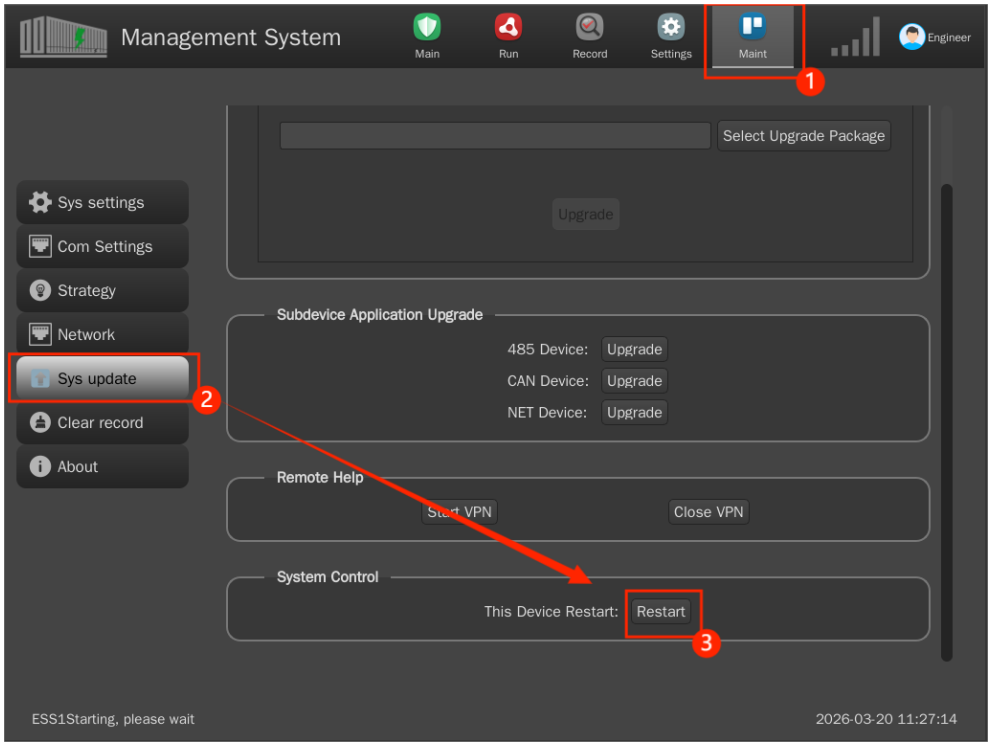
TCP	RTU

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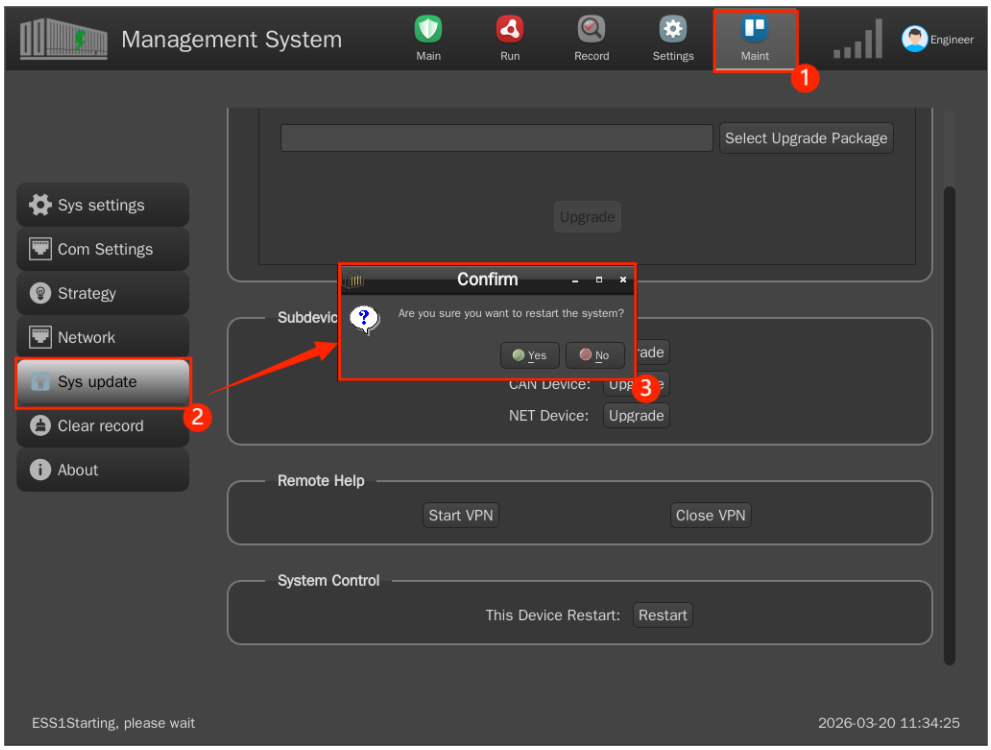


Two communication modes

Requirement
All equipment is configured by our company prior to dispatch; please follow this procedure to check for any omissions.



Restart the device



Second confirmation

6. Once all settings have been configured, please configure the remaining operating parameters on the host computer and check that the energy storage system is operating correctly.

7. Daily Maintenance Instructions

Requirement
If any maintenance or replacement items do not exist in your actual device configuration, please disregard the corresponding operations.

7.1 Scheduled Replacement Items

Table 7-1 Scheduled Replacement Form

No.	Items	Cycle	Notes
1	Dust Control Net	Every 3 months	Depending on the on-site conditions
2	Desiccant	Every 60 days	For storage use only
Note: For any replacement of parts beyond the warranty period, please contact our after-sales personnel for further instructions.			

7.2 Scheduled Maintenance Items

Table 7-2 Scheduled Maintenance Form

No.	Items	Cycle	Notes

1	Cabinet Exterior / Paint Surface Corrosion Protection	Every year	
2	PCM Modules and Wiring Harness	Every 3 to 6 months	
3	Battery Module and Wiring Harness	Every 3 to 6 months	
4	Fire Protection System Maintenance	Every year	
5	HVAC System Maintenance	Every 6 months	
6	EMS Screen & PMS Screen	Every year	
Note: Location and environmental conditions may affect maintenance intervals. Depending on the installation site conditions, more frequent cleaning and anti-corrosion measures may be required.			

7.3 Component Maintenance

7.3.1 Cabinet Enclosure Maintenance

Table 7-3 Enclosure Maintenance

Name	Maintenance Conditions	How to Maintain
System Cabinet	Suffers from peeling, chipping paint, etc.	Repair the detached sections
Note: Required tools must be provided by the user (sandpaper, cloth, water, alcohol, zinc-rich primer, brush, etc.). Protective paint can be purchased independently based on color requirements or procured through our company.		

7.3.2 PCS Cabinet Maintenance

Table 7-4 PCS Cabinet Maintenance

Name	Maintenance Conditions	How to Maintain
PCM Modules STS Module	• Heavy dust accumulation impedes equipment heat dissipation and ventilation. • Loose screws and wiring harnesses on the module.	① Clean using professional cleaning tools. ② Tighten screws and other fasteners at connection points.
PCS Cabinet Wiring Harness	Loose wiring harness	Screws and other fasteners at the connection points.
Note: All inspection operations listed above must be performed after power has been disconnected.		

7.3.3 Battery Cabinet Maintenance

Table 7-5 Battery Cabinet Maintenance

Name	Maintenance Conditions	How to Maintain
Battery Module Control Box	• Heavy dust accumulation impedes equipment heat dissipation and ventilation. • Loose screws and wiring harnesses on the module.	① Clean using professional cleaning tools. ② Tighten screws and other fasteners at connection points.

Battery Module Cable	Loose wiring cables	Screws and other fasteners at the connection points.
Match Resistor	Lost or damaged	Please contact the manufacturer for a replacement.
Note: All inspection operations listed above must be performed after power has been disconnected.		

7.3.4 Fire System Maintenance

Table 7-6 Fire Protection System Maintenance

Name	Maintenance Conditions	How to Maintain
Heat-sensitive / Smoke-sensitive	● Is the sensor securely installed? ● Is there anything obstructing the sensor?	Regular inspection and cleaning
Fire Extinguisher Cylinder	Is there any physical damage (such as cracks, dents, deformation, or corrosion)?	Regularly inspect the condition of gas cylinders; decommission after 15 years
Fire Alarm Indicator Light	Does it affect emergency response operations?	Regularly wipe and clean
Note: If irreversible damage occurs to the above components, please promptly contact our after-sales service personnel. Should replacement be necessary, please contact our company to arrange for replacement.		

7.3.5 HVAC System Maintenance

Table 7-7 Air Conditioning System Maintenance

Name	Maintenance Conditions	How to Maintain
Air Conditioner	● Check whether the electronic control system is operating normally ● Check for abnormal noises during air conditioning system operation	Check the current air conditioner status on the charging display screen.
Note: The above content must be observed while the device is powered on. If replacement is necessary, please contact our company for assistance.		

7.3.6 Screen Maintenance

Table7-8 Screen Maintenance

Name	Maintenance Conditions	How to Maintain
EMS Screen	/	① Clean and dust regularly by gently wiping with a clean cloth. ② Avoid prolonged exposure to direct sunlight, as this may cause screen lag. ③ Avoid heavy impacts to prevent screen breakage.
PMS Screen		
Note:		

7.4 Part Replacement

7.4.1 PCS Cabinet Modules & Cables

Table 7-9 Parts of PCS Cabinet Replacement

Name	Replacement Conditions	How to Replace
PCM Modules	● Module malfunction or damage ● Fan inside the module malfunctions or is damaged	Follow these steps for replacement: ① First, ensure all switches are turned off to guarantee safe operation; ② Press the switch on the front panel of the PCM module to 【OFF】. At this point, the green indicator light on the module status indicator will turn off, and the red indicator light will illuminate; ③ Confirm that the red indicator light on the PCM module status indicator remains lit. Remove the mounting screws on both sides of the front panel of the main power module and extract the module from the cabinet; ④ Install the new module, ensuring its switch is in the 【OFF】 position; ⑤ Slide the module into the cabinet (allowing at least 15 seconds between each module installation), then tighten the screws on both sides; ⑥ Press the module switch to the 【ON】 position to power it on. The module will automatically join the system and begin operation.
STS Modules		Follow these steps for replacement: ① Disconnect the DC output switch, module output switch, grid tie switch, and load switch; ② Press the switch on the front panel of the STS module to the 【OFF】 position; ③ Remove the mounting screws on both sides of the STS module's front panel and the terminal screws connecting the static switch module to the system, then extract the module requiring replacement; ④ Reinsert the new module into its original position and use a tool to check and tighten the mounting screws; ⑤ Press the module's Ready switch to the 【ON】 position. All switches disconnected in Step 1 are now closed. The main LCD interface of the system monitoring unit displays the power status information. The STS module is operating normally, and the grid supplies power to the load through the STS module.
PCS Cabinet Cables	● External damage, broken connectors, or risk of disconnection ● Has already affected the normal operation of the equipment.	**Power Cable:** After powering down the device, manually disconnect the faulty power cable and replace it. When reconnecting, pay attention to the wiring sequence to avoid reverse or incorrect connections. **Communication Cable:** After powering down the device, manually disconnect the faulty communication cable and replace it.

Note: All inspection and replacement operations must be performed after power has been disconnected.

7.4.2 Battery Cabinet Modules & Cables

Table 7-10 Parts of Battery Cabinet Replacement

Name	Replacement Conditions	How to Replace
Battery Module	The module is malfunctioning or damaged, with the screen displaying abnormal data for a specific battery module. The aerosol fire suppression device within the battery module has been activated due to firefighting operations or other reasons.	First, determine the nature of the module's malfunction (you may contact our after-sales personnel for assessment). If the issue is significant, we recommend replacing the module directly. If the problem is determined to be minor, consult our after-sales personnel for appropriate handling. Follow these steps for replacement: ① Ensure the equipment is completely powered down. ② Remove the faulty module. Due to the module's weight, assistance is required during removal. ***Warning! Any exposed metal terminals on power cables not connected to the module must be wrapped with insulating tape to prevent contact with the metal chassis or other objects, which could cause a hazard.*** ③ Replace the module with a new one and reconnect the power and communication cables.
Control Box	The system is not functioning properly; the battery system is inoperable.	
Inter-Module Cable	1. External damage, broken connectors, or risk of disconnection 2. Has already affected the normal operation of the equipment	It is recommended that professional engineers perform the replacement or contact the manufacturer directly. After powering down the equipment, manually remove the faulty power cable and replace it. When reconnecting, pay close attention to the wiring sequence to avoid reverse or incorrect connections. While connecting one end, wrap the other end with insulating tape to prevent direct contact with the metal chassis or other conductive objects, which could cause hazards.
Match Resistor	Lost or damaged	Please contact the manufacturer for a replacement.
Note: All inspection and replacement operations must be performed after power has been disconnected.		

7.4.3 Screen Replacement

Table 7-11 Screen Replacement

Name	Replacement Conditions	How to Replace

EMS Screen	Failure to power on normally, display issues (excluding operational data problems), failure to function properly, screen cracks, or other malfunctions preventing normal operation.	① First, completely power down the device. ② Open both the front and rear doors of the charging compartment to expose the screen. ③ Disconnect all cables connected to the screen. ④ After disconnecting all cables, remove the screws shown in the figure below in sequence. ***Please note! When removing the screen, one person must support the screen from the front to prevent it from falling and getting damaged or causing secondary damage while unscrewing!*** ⑤ Store the removed screws securely to prevent loss! Avoid letting them enter the system or fall into internal modules during operation, which could cause hazards! ⑥ After completely removing the screen for replacement or maintenance, reinstall it in its original position and secure it firmly with screws. ⑦ Finally, reconnect the corresponding wiring harness and power on the device to verify normal operation.
PMS Screen		
Note:		

7.4.4 Dust-proof Net Replacement

Table 7-12 Dust-Proof Net Replacement

Name	Replacement Conditions	How to Replace
Dust-proof Net	Significant dust accumulation impairs the equipment's normal ventilation and heat dissipation.	Follow these steps to replace the dust filter: ① Open the equipment cabinet door to locate the dust filter on the inside of the front door. ② Release the clips and remove the inner filter. ③ Take out the dust filter for cleaning or replacement. ④ After cleaning, reinstall the filter in its original position and secure the inner filter with the clips.
Note:		

7.4.5 Desiccant Replacement

Table 7-13 Desiccant Replacement

Name	Replacement Conditions	How to Replace
Desiccant	● After the product arrives at its destination (transportation time > 60 days), it still needs to be stored in the warehouse for a period of time. ● Warehouse storage time > 60 days.	Open the system, locate the desiccant packets attached to various modules and placed in other areas, and remove them for replacement.
Note:		

7.5 Battery SOC

7.5.1 Battery Maintenance

Table 7-14 Battery Maintenance Plan

Option 1: This option is recommended when the battery system SOC is at a low level (<50%).
1 Discharge the battery system to the cut-off condition (minimum voltage < 2.8V), then stop discharging and let it rest for 1 hour. 2 Automatically fully charge the battery system (maximum cell voltage > 3.6V). After charging is complete, let it rest for 1 hour. 3 Discharge the battery system to 40% and then stop.
Option 2: This option is recommended when the battery system SOC is at a high level (>50%).
1 Automatically fully charge the battery system (maximum cell voltage > 3.6V). After charging is complete, let it rest for 1 hour. 2 Discharge the battery system to the cut-off condition (minimum voltage < 2.8V), then stop discharging and let it rest for 1 hour. 3 Charge the battery system to 40% and then stop.

7.5.2 Battery Recharge

Long-term battery storage or transportation is not recommended (ideally ≤6 months). The maximum recharge interval is shown below. Please recharge and calibrate SOC promptly. Failure to do so may affect battery performance and lifespan.

Table 7-15 Max. Battery Storage Time Limit

Storage Temperature (T)	Maximum Recharge Interval[1]
T < 0℃	1 months
0℃ ≤ T < 35℃	6 months
T > 35℃	1 months
Note [1]: Calculated based on the time indicated on the factory report as the most recent charge.	

7.5.2 Other Notes

- Batteries exceeding storage duration must be promptly recorded and reported.
- Batteries exhibiting deformation, damage, or leakage shall be scrapped immediately, regardless of storage duration.
- Storage duration is calculated from the most recent charge date indicated on the factory report. After a successful supplemental charge, update the supplemental charge label with the most recent charge time (recommended format: xx / xx / xxxx xx : xx) and the next charge time (Next Charge Time = Most Recent Charge Time + Supplemental Charge Cycle).
- A maximum of five supplemental charges is permitted during storage. Batteries exceeding this limit should be scrapped.

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Appendix 1: Version Update

Version	Update Data	Update Details
V1.0	2026.08	First Edition

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Appendix 2: Recommended Bolt Torque Table

The two tables are for reference only, please ask the operator to be flexible according to the situation.

Bolt Strength Grade	Yield strength (N/mm²)	Nominal bolt diameter (mm)							
		6	8	10	12	14	16	18	20
		Tightening torque (N·m)							
4.6	240	4-5	10-12	36-45	55-70	90-110	90-110	120-150	170-210
5.6	300	5-7	12-15	70-90	70-90	110-140	110-140	150-190	210-270
6.8	480	7-9	17-23	93-124	93-124	145-193	145-193	199-264	282-376
8.8	640	9-12	22-30	124-165	124-165	193-257	193-257	264-354	376-502
10.9	900	13-16	30-36	180-201	180-201	280-330	280-330	380-450	540-650
12.9	1080	16-21	38-51	209-278	209-278	326-434	326-434	448-597	635-847

Bolt Strength Grade	Yield strength (N/mm²)	Nominal bolt diameter (mm)						
		22	24	27	30	33	36	39
		Tightening torque (N·m)						
4.6	240	230-290	300-377	450-530	540-680	670-880	900-1100	928-1237
5.6	300	290-350	370-450	550-700	680-850	825-110	1120-1400	1160-1546
6.8	480	384-512	488-650	714-952	969-1293	1319-1759	1694-2259	1559-2079
8.8	640	512-683	651-868	952-1269	1293-1723	1759-2345	2259-3012	2923-3898
10.9	900	740-880	940-1120	1400-1650	1700-2000	2473-3298	2800-3350	4111-5481
12.9	1080	864-1152	1098-1464	1606-2142	2181-2908	2968-3958	3812-5082	4933-6577

Appendix 3: Chinese and American wire gauge wire diameter comparison table

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The actual wire diameter will have deviation, please calculate according to the actual needs before choosing the appropriate cable.

CWG	Diameter mm	—	—	9.00	8.00	7.10	6.30	5.60	5.00	4.50	4.00
AWG	Number	4/0*	3/0*	2/0*	1/0*	1	2	3	4	5	6
	Diameter mm	11.684	10.404	9.266	8.252	7.348	6.543	5.827	5.189	4.620	4.115
	Diameter inch	0.4600	0.4096	0.3648	0.3245	0.2893	0.2576	0.2294	0.2043	0.1819	0.1620
Cross-sectional area	mm^2	107.2200	85.0100	67.4300	53.4900	42.4100	33.6200	26.6700	21.1500	16.7700	13.3000

CWG	Diameter mm	3.55	3.15	2.80	2.50	2.24	2.00	1.80	1.60	1.40	1.25
AWG	Number	7	8	9	10	11	12	13	14	15	16
	Diameter mm	3.665	3.264	2.906	2.588	2.304	2.052	1.829	1.628	1.450	1.290
	Diameter inch	0.1443	0.1285	0.1144	0.1019	0.0907	0.0808	0.0720	0.0641	0.0571	0.0508
Cross-sectional area	mm^2	10.5500	8.3700	6.6300	5.2600	4.1700	3.3320	2.6270	2.0750	1.6460	1.3180

CWG	Diameter mm	1.12	1.00	0.90	0.80	0.71	0.63	0.56	0.50	0.45	0.40
AWG	Number	17	18	19	20	21	22	23	24	25	26
	Diameter mm	1.151	1.024	0.912	0.813	0.724	0.643	0.574	0.511	0.455	0.404
	Diameter inch	0.0453	0.0403	0.0359	0.0320	0.0285	0.0253	0.0226	0.0201	0.0179	0.0159
Cross-sectional area	mm^2	1.0260	0.8107	0.5667	0.5189	0.4116	0.3247	0.2588	0.2047	0.1624	0.1281

CWG	Diameter mm	0.355	0.315	0.28	0.25	0.244	0.20	0.18	0.16	0.14	0.125
AWG	Number	27	28	29	30	31	32	33	34	35	36
	Diameter mm	0.361	0.320	0.287	0.254	0.226	0.203	0.180	0.160	0.142	0.127
	Diameter inch	0.0142	0.0126	0.0113	0.0100	0.0089	0.0080	0.0071	0.0063	0.0056	0.0050
Cross-sectional area	mm^2	0.1021	0.0804	0.0647	0.0507	0.0401	0.0316	0.0255	0.0201	0.0169	0.0127