

User Manual

Liquid Cooling Containerized ESS



P1300-1H

P1313L1H-A-EU

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Preface

Dear user, thank you for choosing our product! Before using this product, please carefully read this User Manual.

By thoroughly reviewing this manual, you will gain a better understanding of the product features, how to use it correctly, and how to maintain it, ensuring safety during operation while maximizing the product performance and benefits.

The images provided in this manual are for demonstration purposes only. Specific details may vary depending on the product version and market region. This manual was compiled according to the status of the product at the time of production. Product appearance and technical specifications are subject to continuous evolution. Updates to the product will be reflected in subsequent revisions of this manual, which will be issued without prior notice.

If system failure occurs due to your negligence, improper use, unauthorized disassembly, or tampering with control programs, you will lose the right to warranty; any direct or indirect warranty claims arising from such issues will not be accepted by our after-sales service team.

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1. Overview

1.1 Safety precautions

Symbol	Notes
	Indicate a hazardous situation that, if not avoided, will result in death or serious personal injury.
	Indicate a potentially hazardous situation that, if not avoided, could result in death or serious personal injury.
	Indicate a potentially hazardous situation that, if not avoided, could result in moderate or minor personal injury.
	Convey safety-related information about a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. "Notice" does not involve personal injury.
	It emphasize additional information in the manual, tips, or techniques to optimize product use or solve issues or save you time efficiently.
	Indicate internal high voltage hazards, where contact may lead to electric shock.
	Indicate high-temperature hazards, where contact could cause burns.
	Mark the protective earthing (PE) connection point, requiring reliable earthing to earthing conductor for operator safety.

1.2 Intended use

- This is an electrical energy management system (e.g. electrical energy storage and release) for outdoor use.
- Please observe the regulations of the country where the energy storage system is installed and connected.
- For the intended use, please follow the specified environmental conditions in all cases.
- Please abide by relevant safety standards during development, production, inspection and filing. Hence, compliance with the instructions and safety precautions for the intended use may not, in normal case, result in property damage or health hazards.
- Please strictly follow the instructions in this manual. Otherwise, safety hazards or safety device failure may occur. Although there are relevant safety precautions in this manual, please observe the safety regulations and accident prevention regulations for proper use.
- Do not connect other devices (e.g. power tools and power distribution cabinets).

1.3 About this manual

- This manual is applicable to the following model: 20' 1C Prefabricated Cabin P1313L1H-A-EU
- This manual is intended for the following:
 - Terminal customers (outdoor cabinet users)
 - Debugging and service technicians

2. Product overview

2.1 System introduction

This product is a 1,313.28 kWh liquid-cooled energy storage system. It can manage the energy demand on the user's side. It can also be synchronized to the digital energy cloud management platform of ZOE in order to realize the all-round control of the energy storage site.

This energy storage system is mainly characterized by:

- Power grid support to meet user needs for peak-load shifting and frequency regulation;
- Power expansion for additional power supply in case of insufficient power distribution (e.g. charging stations);
- Smoothing of distributed or centralized photovoltaic power generation;
- Smoothing of the impact of high-power electrical equipment (such as charging stations) on the distribution network;
- Remote intelligent operation and maintenance.

It is applicable to industrial park energy storage systems, distributed energy storage stations, photovoltaic storage + charging integrated stations, and commercial/industrial energy storage stations.

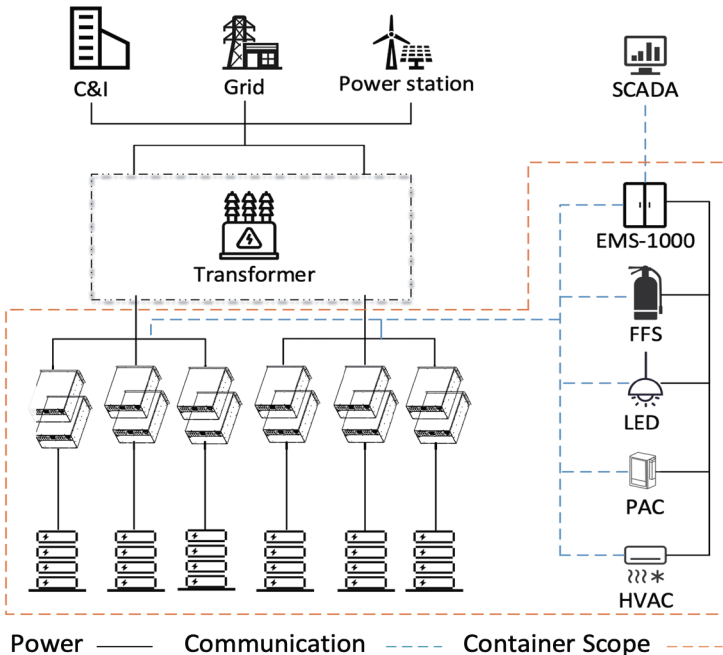


Fig. 2-1-1 System diagram

2.2 Model naming rules

P	1313	L	1H	-	A	-	EU
↑	↑	↑	↑	↑	↑	↑	↑
Code	Rated capacity	Cooling method	C-rate	Dash	Version number	Dash	Reserved code
P: 1C prefabricated cabin	1313: 1.313 MWh	L: Liquid cooling	1H: 1 hour		A: Version A B: Version B C: Version C		

Example: P1313L1H-A-EU indicates ZOE 20' 1C Prefabricated Cabin, Version A, Euro-standard.

2.3 Product structure

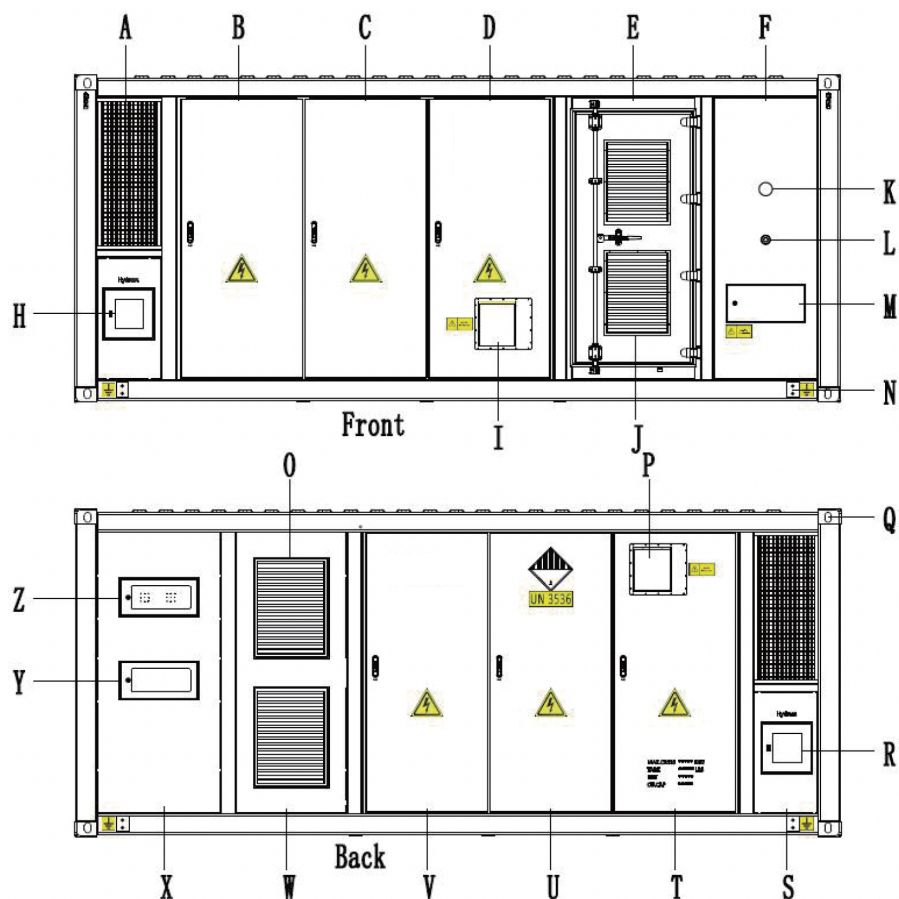


Fig. 2-3-1 Product external schematic

Table 2-3-1 Description of product external schematic

No.	Notes	No.	Notes
A/S	Chiller compartment	L	Emergency stop
B/C/D/V/U/T	PACK compartment	M	Debugging window
E/W	Electrical compartment	I	Air intake device
F/X	PCS compartment	P	Air exhaust device
H/R	Water based fire coupling	Z	Alarm device window
K	Light board	Y	Fire button window
Q	Lifting port	J/O	Cotton filter window
N	Earthing		

• Rack definition

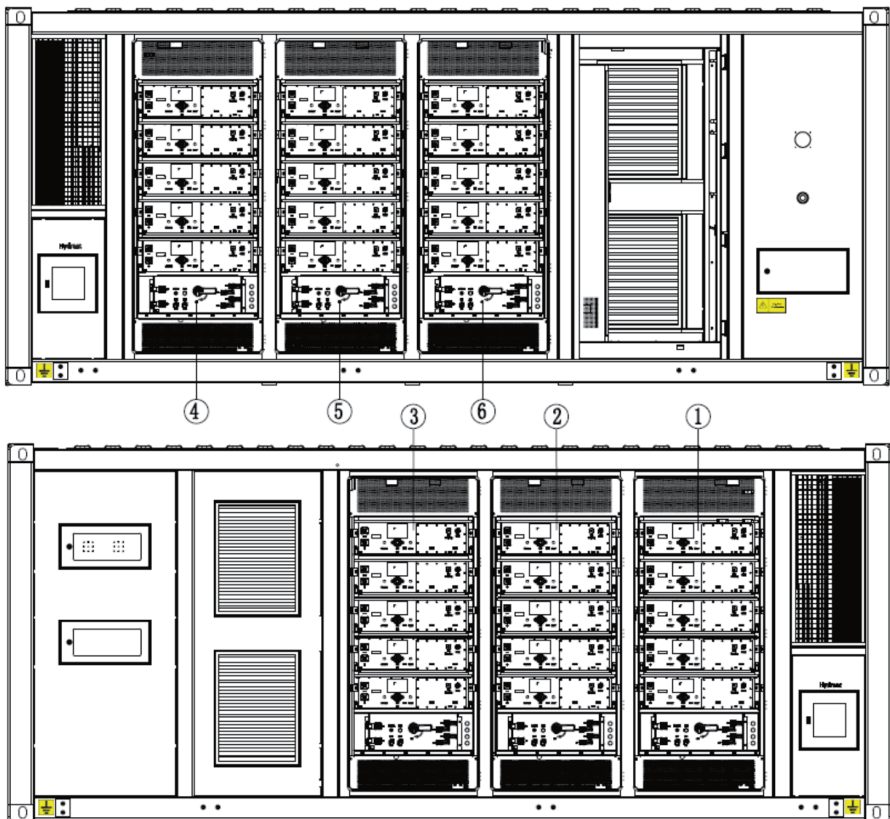


Fig. 2-3-2 Rack numbering

Table 2-3-2 Rack numbering

No.	Definition
①	Rack 1
②	Rack 2
③	Rack 3
④	Rack 4
⑤	Rack 5
⑥	Rack 6

- Definition of PCS number

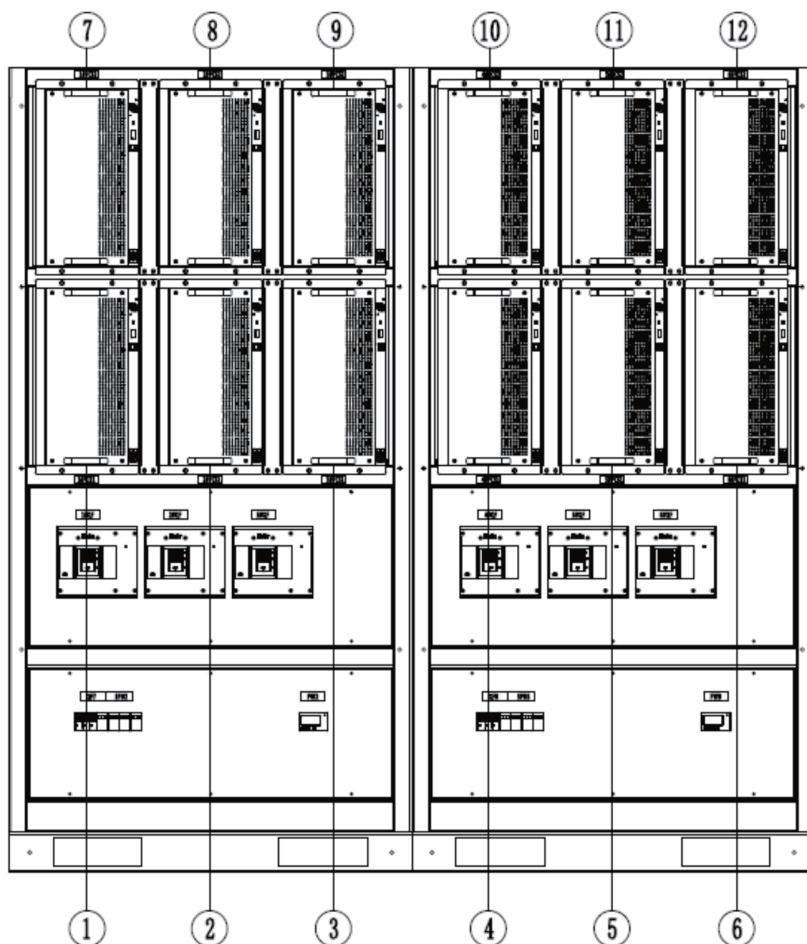


Fig. 2-3-4 PCS numbering

Table 2-3-4 PCS numbering

No.	Definition	No.	Definition
①	1#PCS1	⑦	1#PCS2
②	2#PCS1	⑧	2#PCS2
③	3#PCS1	⑨	3#PCS2
④	4#PCS1	⑩	4#PCS2
⑤	5#PCS1	⑪	5#PCS2
⑥	6#PCS1	⑫	6#PCS2

- Internal definition of Rack 1

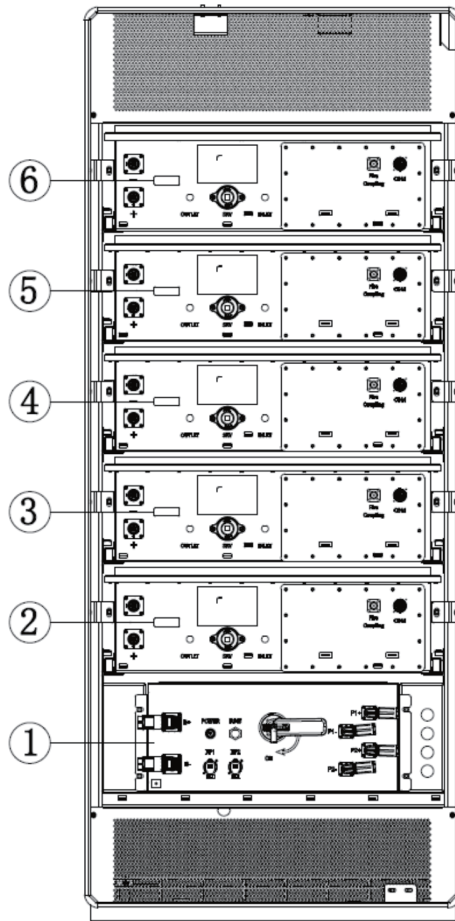


Fig. 2-3-5 Internal number of Rack 1

Table 2-3-5 Internal number of Rack 1

No.	Definition
①	1#HV BOX
②	1#PACK1
③	1#PACK2
④	1#PACK3
⑤	1#PACK4
⑥	1#PACK5

- For the internal definition of Racks 2-6, please refer to the internal definition of Rack 1, and so on

- Fire Control System

→ The container includes a water-based firefighting system, gas-based extinguishing system, automatic fire alarm and linkage control system, flammable gas detection system, and emergency ventilation system. It is an efficient fire extinguishing device. Fire detection is carried out using devices such as flammable gas detectors, smoke detectors, and heat detectors. Upon detection of an abnormality, signals are sent to the station-level alarm host for fire alarm.

→ Fire protection components

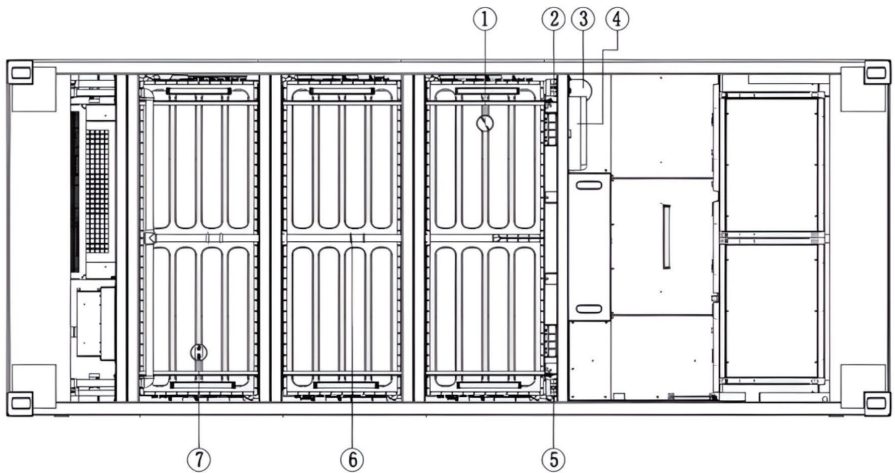


Fig. 2-3-6 Diagram of fire protection components

No.	Definition
①	Smoke detector
②	Gas detector
③	Perfluorohexanone fire extinguishing cylinder
④	Fire safety host
⑤	Gas detector
⑥	Water-based fire fighting pipeline
⑦	Heat detector

→ External fire fighting system

(1) Alarm device window

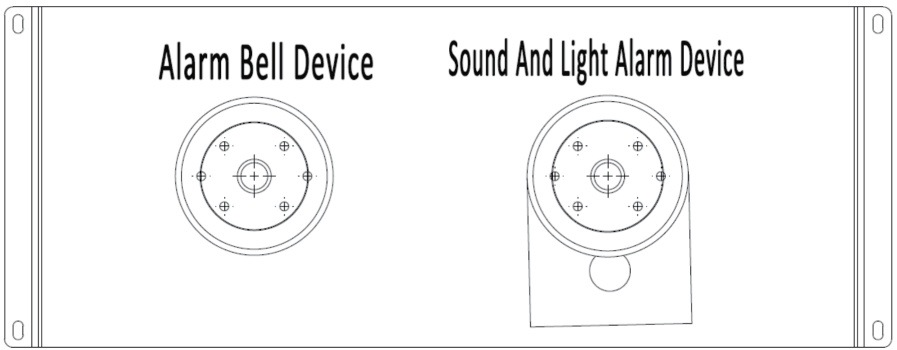


Fig. 2-3-7 Internal diagram of alarm device window

(2) Alarm device window

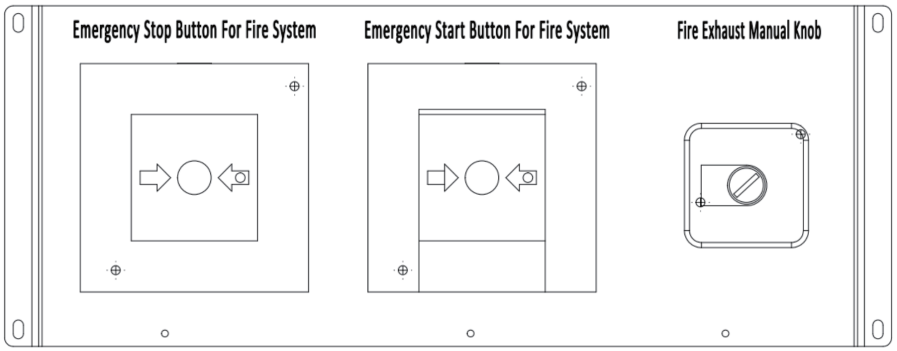


Fig. 2-3-8 Internal diagram of fire button window

(3) Water based fire coupling (DN 65 German-style connector)

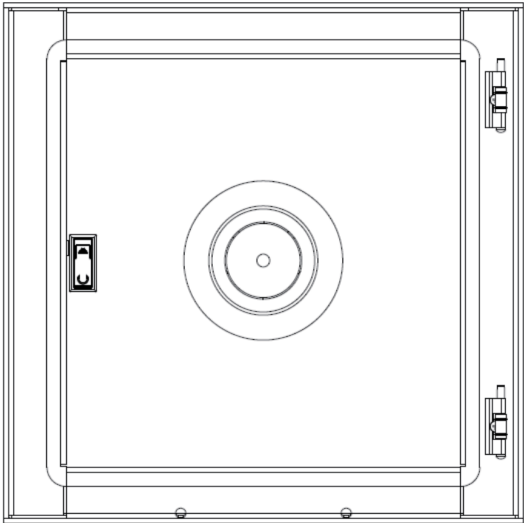


Fig. 2-3-9 Internal diagram of fire button window

(4) Air exhaust and intake device (see Fig. 2-3-1)

2.4 Product specifications



Fig. 2-4-1 External renderings

1.26MW/1.313MWh Rechargeable Li-ion Battery Storage System

Product Model	P1313L1H-A-EU
Battery Data	
Cell type	LFP
Rated capacity	6*285Ah
Serial-parallel type	6*1P240S
Rated capacity per pack	43.776kWh
Pack number	6*5
System rated energy capacity	1313.28kWh
Rated DC voltage	768V
DC voltage range	672~864V
Rated DC current	1710A
Max. DC current	1890A
AC Data	
Rated AC power	1260kW
Rated grid voltage	400Vac
AC voltage range	340Vac~460Vac
Rated grid frequency	50/60Hz
Max. AC current	2004A
AC wiring type	3W/N+PE
THDi	<3% (Rated AC power)
Power factor	0.85~1 leading or lagging
General Data	
DOD	90% DOD
Degree of protection	IP54
Cooling/Heating concept	liquid cooling/liquid heating
Fire suppression system	Aerosol
Operating temperature range	-30~55°C
Relative humidity	5~95%RH
Max. working altitude	2000m
Display	Web/LED/LCD
COM interfaces	RS485/Ethernet
Dimensions(W*D*H)	6058*2438*2591mm
Weight(T)	18±0.5



Specification 105KW

DC side

Working voltage range (V)	615~950 (3W+PE)/650~950 (3W+N+PE)
Full load voltage range (V)	615~950 (3W+PE)/680~950 (3W+N+PE)
Input paths	/
Max. current (A)	170

AC side

Rated voltage (V)	230/400
Voltage deviation	-10%~+10%
AC output type	(3W+PE) three-phase and three-wire/(3W+N+PE) three-phase and four-wire
Rated output power (kW)	105
Max. output power (kW)	116
Max. current (A)	167
Rated grid frequency (Hz)	50/60
Power factor	0.99
Power factor range	1 (leading)- 1 (lagging)
Distortion rate of current	<3% (rated power)
DC component	0.50%
Overload capacity	110% long-term
Max. discharge efficiency	98.50%

AC side (off-grid)

Rated output voltage	230/400
AC voltage harmonics	<3% (linear load)
Rated frequency (Hz)	50/60
Rated output power (kW)	105
Max. apparent power (kVA)	116
Max. output current (A)	167

Protection features	
Power factor	0.85~1 leading or lagging
Rated voltage (V)	230/400
Voltage deviation	-10%~+10%
AC output type	(3W+PE) three-phase and three-wire/(3W+N+PE) three-phase and four-wire
Rated output power (kW)	105
Max. output power (kW)	116
Max. current (A)	167
Protection features	
Functions	AC overcurrent, AC overvoltage, AC surge, AC short-circuit, anti-islanding, DC reverse connection, and DC surge protection
System parameters	
Dimensions (W × D × H, mm)	484×703×256.5*
Weight (kg)	50
Altitude (m)	5,000m (de-rated usage above 3,000m)
Operating temperature	-30°C to 55°C (de-rated usage above 45°C)
Storage temperature	-45°C~ 70°C
Humidity	0% RH to 95% RH, non-condensing
Cooling method	Intelligent forced air cooling
Protection degree	IP20
Communication Interface	CAN/RS485
Grid support	L/HVRT, active/reactive power control

- Cabinet specifications
- PCS technical parameters
- Technical parameters of chiller



Model		WET-C50H30-B01-380
Ambient conditions	Temperature range	-40°C~+55°C
Humidity range		≤95%
System features	Refrigerating capacity	≥ 50kW at ambient temperature 45°C
Heating capacity		≥ 30kW at (water inlet 0°C)
Refrigerant		R410a
Cooling system pressure resistance		> 4.5MPa
Coolant		50% glycol in water (1:1 by volume)
Water system pressure resistance		≥ 6 bar
Water flow rate		> 280 L/min @ 140kPa
Temperature control accuracy		≤1°C
Temperature display accuracy		0.1°C
Electrical features	High voltage input	AC 380V/50HZ
Rated power consumption		Cooling: <23kW
		Heating: <33kW
Insulation voltage resistance		2000VAC
Insulation resistance		≥20MΩ
Low fluid alarm		Yes
Communication protocol (Baud rate)		CAN2.0 (250kbps/500kbps)
Other	Noise	<75dB
Protection degree		Electrical components IP67
Flame retardant rating		UL94V-0
Unit net weight		≤ 480kg (excluding coolant)
Pipe connection		NW32 quick-connect plug



1P48S Battery Module (LFP)	
Product Model	P148285L-A
Battery Data	
Cell type	LFP
Rated capacity	285Ah
Serial-parallel type	1P48S
Rated capacity per pack	43.776kWh
Rated DC voltage	153.6V
DC voltage range	134.4~172.8V
Rated DC current	285A
Max. DC current	315A
General Data	
DOD	90% DOD
Degree of protection	IP67
Cooling/Heating concept	liquid cooling/liquid heating
Operating temperature range	-20~55°C
Relative humidity	5~95%RH
Max. working altitude	2000m
Dimensions(W*D*H)	807*1082*252mm
Weight	330±10kg

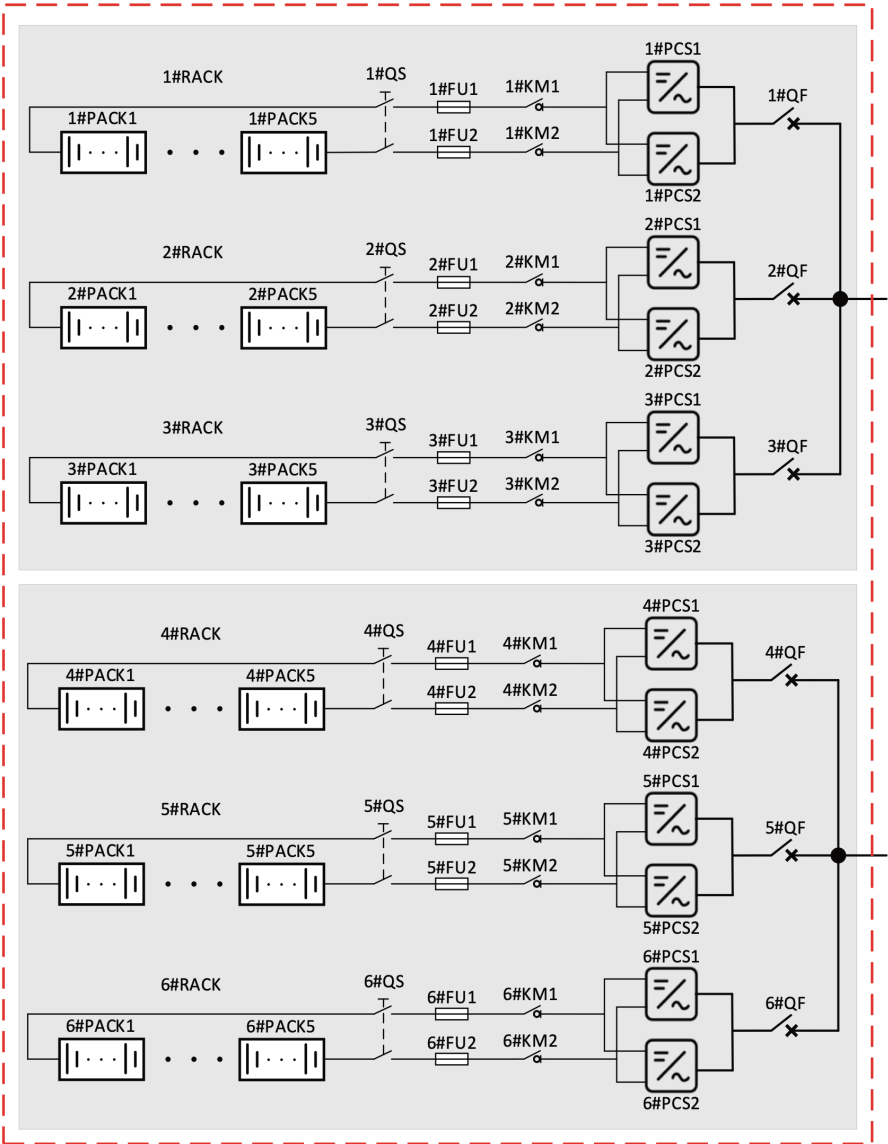
Rechargeable Li-ion Battery Rack	
Product Model	C218L1H-A
Battery Data	
Cell type	LFP
Rated capacity	285Ah
Serial-parallel type	1P240S
Rated capacity per pack	218.88kWh
Rated DC voltage	768V
DC voltage range	672~864V
Rated DC current	285A
Max. DC current	315A
General Data	
DOD	90% DOD
Degree of protection	IP54
Cooling/Heating concept	liquid cooling/liquid heating
Operating temperature range	-20~55°C
Relative humidity	5~95%RH
Max. working altitude	2000m

• PACK technical parameters



C-EMS1000-A	
Product Model	C-EMS1000
Main Data	
Core	Multi-coreCortex-A53
Max. working frequency	1.1GHz
DDR3	2GB
Ethernet	19x10/100/1000Mbps
RS485	5
Can	3
RS232	3
DI	44
DO	24
Working voltage	24V
Rated power	25W
General Data	
Operating temperature range	-40~+60°C
Relative humidity	5~95%RH
Max. working altitude	<2,000m
Dimensions(W*D*H)	113*232*59mm
Max. working altitude	2000m
Dimensions(W*D*H)	807*1082*252mm
Weight	330±10kg

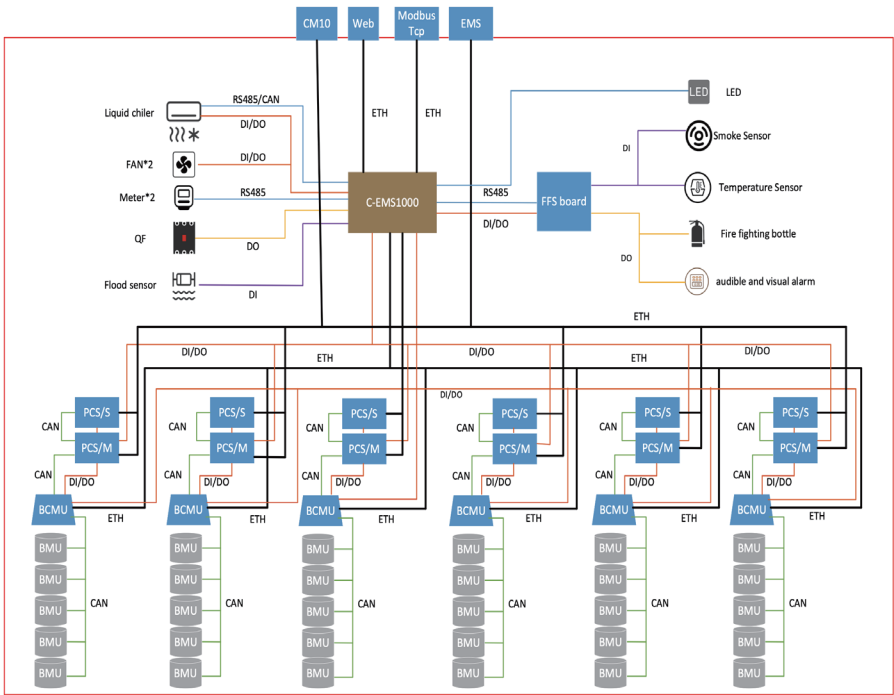
- Technical parameters of rack



- Technical parameters of control cabinet

2.5 System principles

Fig. 2-5-1 System principle diagram



2.6 Communication architecture

Fig. 2-6-1 Communication architecture diagram

3. Transportation, Storage and Safety

3.1 Transportation

It is adapted to trucks and ships, and should be covered with canopy, protected from sunshine, and loaded and unloaded safely in transportation. In the process of loading and unloading, the energy storage cabinet should be gently moved and put down, and strictly prevented from falling, rolling and heavy loads. It should also be prevented from rain, snow and mechanical impact in transportation.

- Environmental requirements for transportation

→ According to the battery characteristics, the prefabricated cabin should meet the following requirements in storage and transportation to maximize the protection of battery performance: Average daily storage temperature: $\leq 20^{\circ}\text{C}$; allowable storage temperature: $-20\sim 55^{\circ}\text{C}$; Humidity: less than 95% RH, non-condensing.

- Pre-shipment preparations

- (1) Seal any gaps on the exterior of the container with seal plates and sealing strips before shipping to ensure that internal equipment is unaffected during transport;
- (2) To avoid potential damage from impacts and prevent scratches to the paint, add a rainproof canvas cover can be optionally for each container, based on the client's selection, to provide enhanced protection for the box body during transport;
- (3) When shipping by sea, add relevant markings certified by the classification society, including: container owner code, container number, weight and other related markings;
- (4) For sea transport, the product must comply with MSDS certification and display the Class 9 hazardous materials markings.

- Road transportation

- (1) Adhere to traffic rules;
- (2) Since the container equipment contains batteries, speeding is prohibited. On flat asphalt roads, the speed limit on highways is 70 km/h, with a reduced speed of 50 km/h on curves. In urban areas, the speed limit is 40 km/h, and sudden acceleration or braking should be avoided;
- (3) On non-flat asphalt or other road surfaces, exercise extra caution and limit the speed to 50 km/h.
- (4) Strictly prohibit transporting goods over rough, bumpy roads.
- (5) Ensure the cargo is securely fastened; before departure, check the tie-downs once and

check it every 4 hours during transit to ensure they remain secure.

3.2 Storage

The energy storage cabinet should be stored in a dry warehouse, without exposure to sunlight or rain. Harmful gases, flammable/explosive products and corrosive chemicals are not allowed in the warehouse. The cabinet should be prevented from mechanical shock, heavy pressure, strong magnetic field or exposure to direct sunlight. It should be at least 2m away from heat sources and 50cm away from walls, windows or air inlets.

Average daily storage temperature: ≤20°C; allowable storage temperature: -20~55°C; Storage humidity: less than 95% RH, non-condensing.

Under the conditions of these regulations:

At least one supplemental charge to 50% SOC is required within 6 months after the product is shipped from the factory. Capacity verification tests and re-inspections are required every 12 months.



During storage, ZOE Energy Storage is not responsible for any system damage caused by the user’s failure to follow the storage methods and requirements outlined in this manual.

3.3 Safety

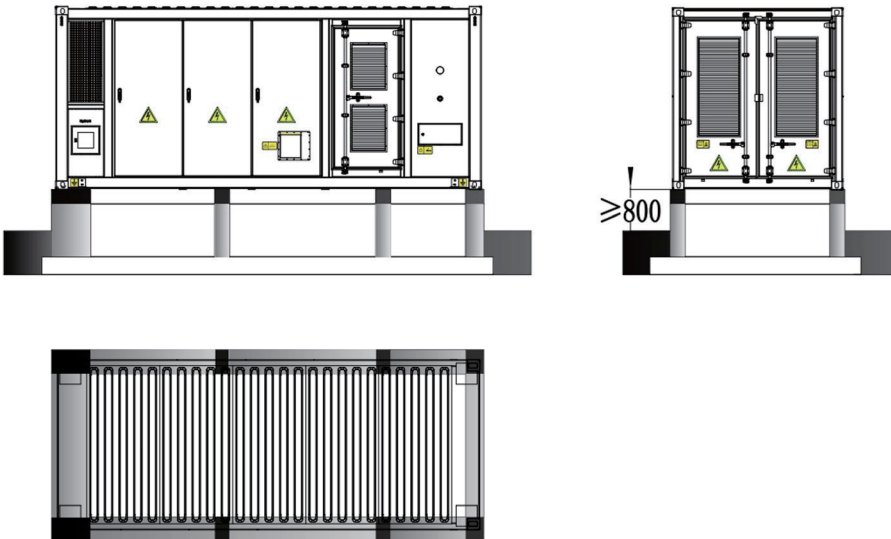
- Only qualified electricians (including professionals and trained personnel) are authorized to operate and maintain this product. They must use appropriate professional equipment for these tasks;
- Personnel must be capable of assessing tasks and identifying potential hazards.
- Immediate rescue for injured personnel is required;
- Personnel must be familiar with the product’s maintenance standards;
- Local laws, regulations, and standards must be followed;
- Special operations, such as electrical work, working at heights, and handling specific equipment, require personnel to hold the necessary certifications as per national or regional requirements.

Wear protective gloves	Wear head protective	Wear Safety footwear
		
Refer to Instruction Manual	No Smoking	Warning: Electricity
		

- Maintenance personnel need to prepare the following tools:

4. Foundation Construction

- When selecting a site for the foundation, the following principles must be considered:
 - (1) Consider the climate and soil conditions (e.g., potential seismic activity, groundwater level, etc.) of the installation location for the liquid-cooled energy storage system.
 - (2) The surrounding environment should be dry, well-ventilated, and distant from flammable or explosive areas.
 - (3) The foundation soil must have adequate compaction. The recommended compaction degree of the soil for the installation site should be no less than 98%. If the soil is loose, measures must be taken to ensure the stability of the foundation.
- Reference foundation drawing (Design details should follow the actual design plan from



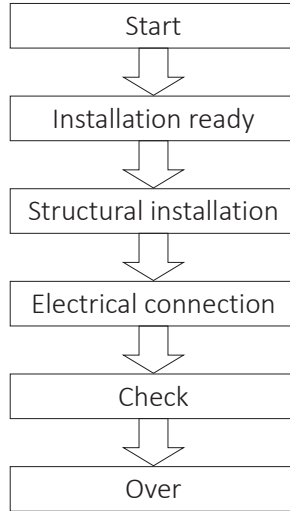
the engineering design institute)

Fig. 4-1-1 Reference foundation drawing

5. Equipment Installation

5.1 Installation instructions

Before delivery, the internal components of the liquid-cooled energy storage system have been reliably connected and tested. On-site work includes fixing the container body, connecting the PCS AC side power cables, external signal cables, external auxiliary power



cables, and earthing the container. The installation processes are outlined in Fig. 5-1:

Installation procedures	Installation description
Pre-installation preparation	Check the appearance of the container and all functional cabinets for any damage Check the component damage or falling within the container and all functional cabinets Confirm that all components are intact and no items are missing Confirm the installation environment meets the requirements Confirm whether the lifting equipment for the container is available on site
Structural installation	Use a crane to move the liquid-cooled energy storage system container onto the pre-fabricated foundation Secure the container as per the project requirements
Electrical connection	Connect the earthing points Connect the PCS AC side cables Connect the external communication and power cables

Fig. 5-1-1 Installation process flow

Table 5-1-1 Details of installation process flow

5.2 Pre-installation preparation

- Check delivery documents

Compare the equipment delivery list with the actual delivery to ensure that quantities match.

- Equipment inspection

Check whether the received equipment matches the ordered models; check both the interior and exterior of the equipment for any damage; keep any documentation or instructions found in the packaging box in a safe place.

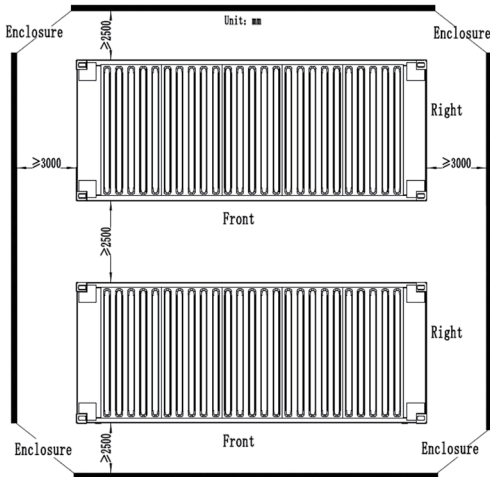
Ambient conditions	Recommended Range
Ambient temp.	-20°C ~ 55°C
Humidity	≤95%RH, non-condensing.
Dustiness	≤1mg/m3
Corrosive substance	No contaminants, such as salt, acid, smoke, etc.
Vibration	≤1.5m/s2
Insects, pests, vermin, termites	None
Mold	None
Damp	No rain
Fire protection	No flammables at the top and bottom of cabinet

- Requirements on installation environment

Table 5-1-1 Environmental requirements

- Requirements for container installation space

When installing, ensure that the container must have a clearance of above 2,500 mm



reserved in front and back for maintenance access, and a minimum of 3,000 mm of

ventilation space on both sides of the container as shown in the following figure.

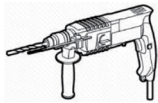
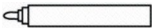
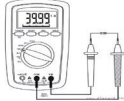
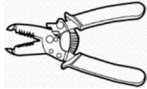
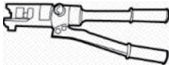
S/N	Name	Purpose	Diagram
1	Electric drill with 16 mm drill bits	Open holes for expansion bolts	
2	Expansion bolts (SUS316 stainless steel M16X100)	Connect the foundation to the container fastener	
3	Socket assembly + screwdriver set	Installation of earthing cables, power cables, rubber conduit, forklift hole sealing plates	
4	Torque wrench	Confirmation of torque wrenches for fastening	
5	Marker list	Torque mark	
6	Tie	Cable fixture	
7	Level gauge	Container leveling	
8	Multimeter	Continuity test	
9	Wire stripper	Stripped cable head insulation	
10	Hydraulic pliers	Crimp terminals and cables	
11	Wire cutter	Shear cables	
12	Tape measure	Dimension measurement	
13	Heat gun	Heat-shrinkable bushing shrinkage	
14	Heat-shrinkable pipe	Protection for connection between electrical ine and wiring terminal	
15	Crimping pliers	Crimp terminals and cables	

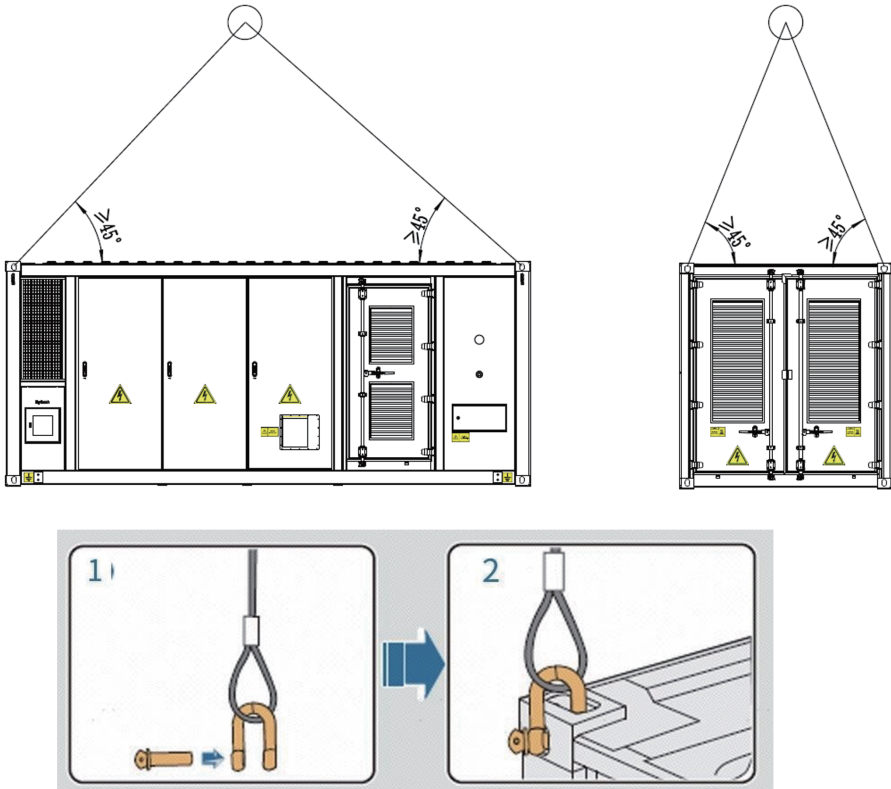
Fig. 5-2-1 Requirement on installation space

- Preparation of installation tools

5.3 Installation steps

- Installation and fixture

→ A crane (recommended capacity: 30-80 tons) should be used on site to carefully lift the

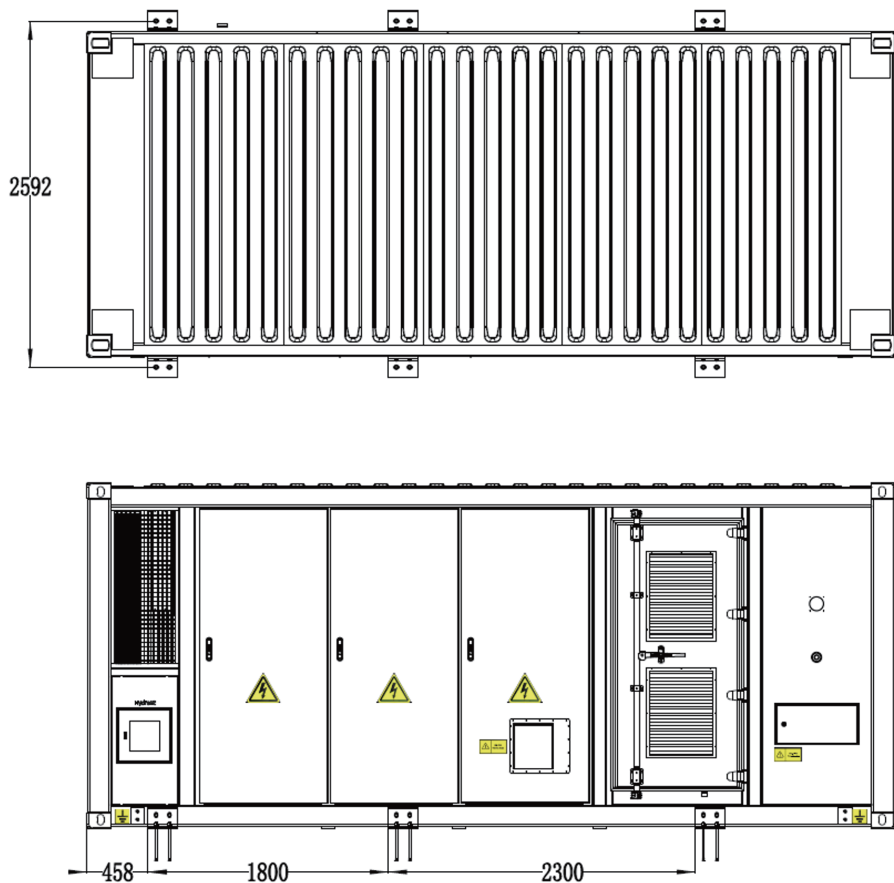


entire liquid-cooled energy storage system onto the pre-fabricated foundation. The specific

lifting instructions are shown in the following figure.

Fig. 5-3-1 Lifting diagram

→ After the container is set onto the foundation, mark, with a fastener, where holes are to be drilled and then drill holes by using an electric driller for embedding screws



→ Use M16 nuts, spring washers and flat washers (for a total of 12 screws) to lock the

container and fixtures

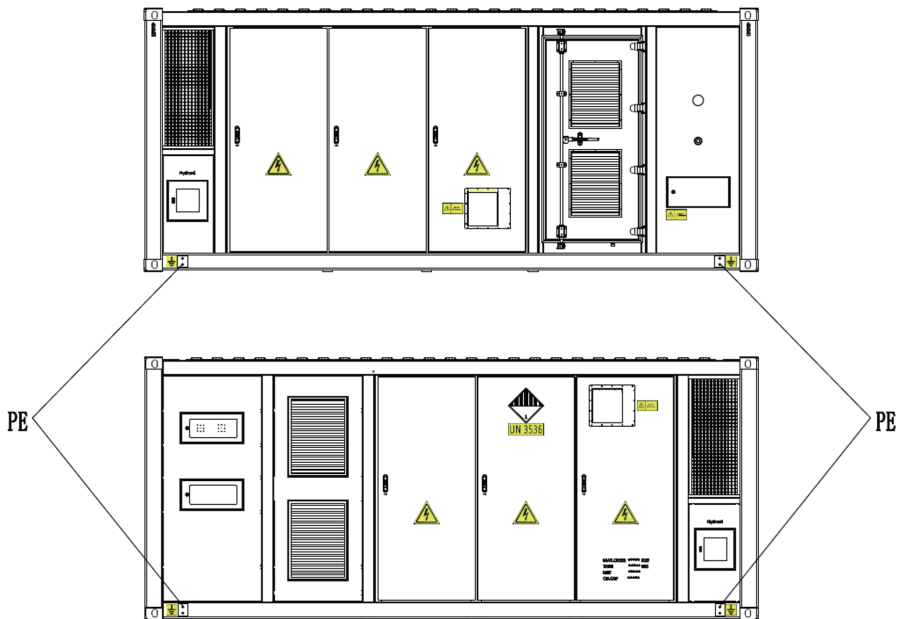
Fig. 5-3-2 Location plan of embedded screws

- Container earthing

→ The bolt fixing points of the container must be reliably connected to the non-functional conductive components of the entire container. Additionally, the container should provide 4 earthing points via an earthing busbar, ensuring that the earthing points provided to the user are reliably connected to the non-functional conductive components of the container, forming an equipotential connection. The effective cross-sectional area of the earthing system should be no less than 250 mm². The earthing resistance must be $\leq 4 \Omega$, and the connection impedance should not exceed 0.1 Ω .

→ The container is equipped with an earthing busbar, to which the earth wires of the battery cabinet, PCS cabinet, control cabinet, etc., are connected. The earthing busbar then leads to the external earthing system.

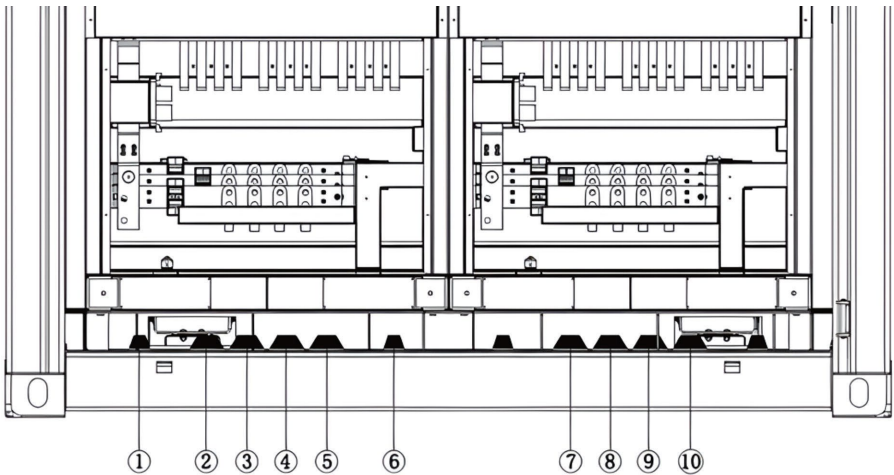
→ The container is also fitted with a high-quality, reliable lightning protection system. The lightning protection system connects to the main earthing network through earthing



flat steel or round steel at four different points. The effective cross-sectional area of the

conductor in the earthing system will be determined in subsequent drawings.

Fig. 5-3-3 Distribution of container grounding points



5.4 Electrical connection

S/N	Definition	Recommended cable (copper)	Recommended quantity
1	Communication inlet cable	/	/
2	Power grid inlet cable	AWG 3*#250/300MCM	1 pcs
3		AWG 3*#250/300MCM	1 pcs
4		AWG 3*#250/300MCM	1 pcs
5		AWG 1*#250/300MCM	1 pcs
6	External power supply inlet cable	AWG 4*#4	1 pcs
7	Power grid inlet cable	AWG 3*#250/300MCM	1 pcs
8		AWG 3*#250/300MCM	1 pcs
9		AWG 3*#250/300MCM	1 pcs
10		AWG 1*#250/300MCM	1 pcs

- External wiring access points for container

Fig. 5-4-1 Distribution of external wiring access points

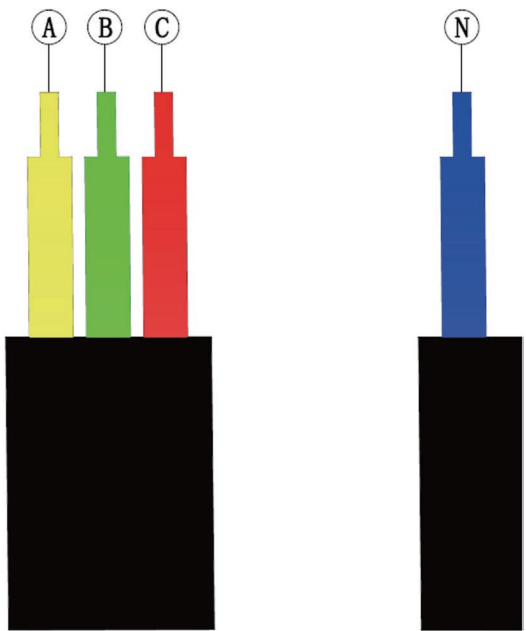
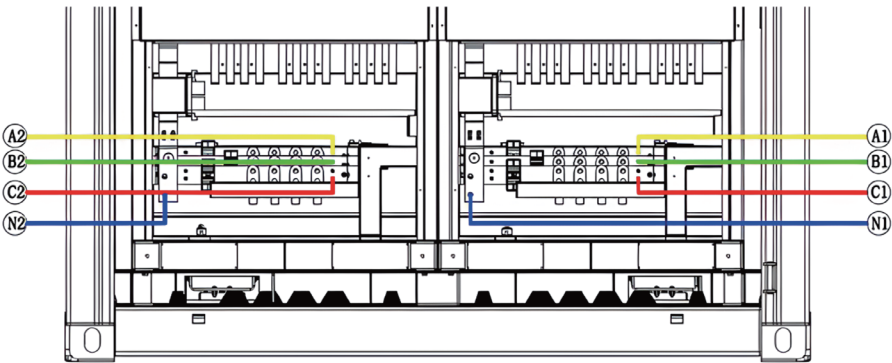


Table 5-4-1 Comparison of external wiring points

- Cable definition

Fig. 5-4-2 3-core cable definition 1-core cable definition



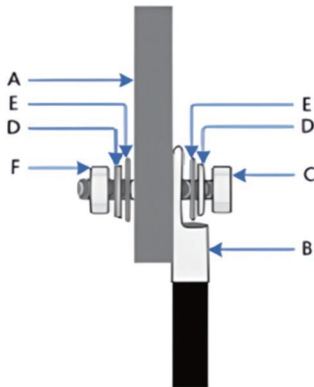
→ Input power cable connection

PCS#1 wiring definition	PCS#2 wiring definition
A1	A2
B1	B2
C1	C2
N1	N2

Fig. 5-4-3 Diagram of input power access point

Table 5-4-2 Definition of wiring for power input

- Cable runs from the bottom of the container through the tower-shaped bushing (Fig. 5-4-1,



A	B	C	D	E	F
Copper busbar	Wiring terminal	Screw	Butterfly washer	Flat washer	Nut

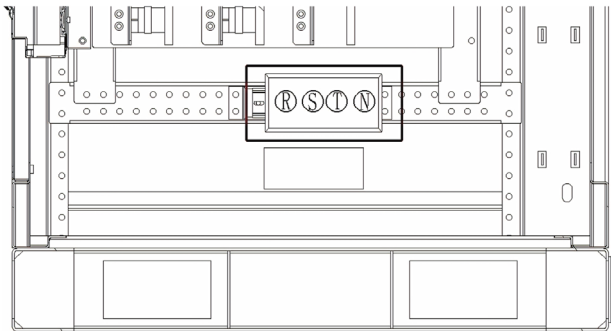
ports No. 2, 3, 4, 5, 7, 8, 9 and 10) into the PCS cabinet

- The connection between the cable and the copper busbar is as shown in the follow figure

Fig. 5-4-4 Connection between the cable and the copper busbar

- External power supply cable connection

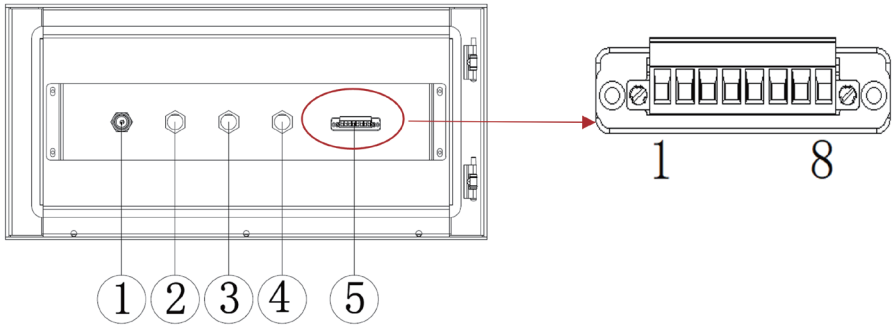
→ For external power supply, it is recommended to use AWG 4*#4 power cable, which



should run from the bottom of the container through the tower-shaped bushing (Fig. 5-4-1,

port 6) into the PCS cabinet

Fig. 5-4-5 Diagram of access point location for external power supply



• Communication cable connection

S/N	Definition	Remarks
①	START/STOP	Button
②	FFR/FCR	Network port
③	EMS	Network port
④	WEB	Host debugging network port
⑤	XP7	Terminal

→ Communication box device definition

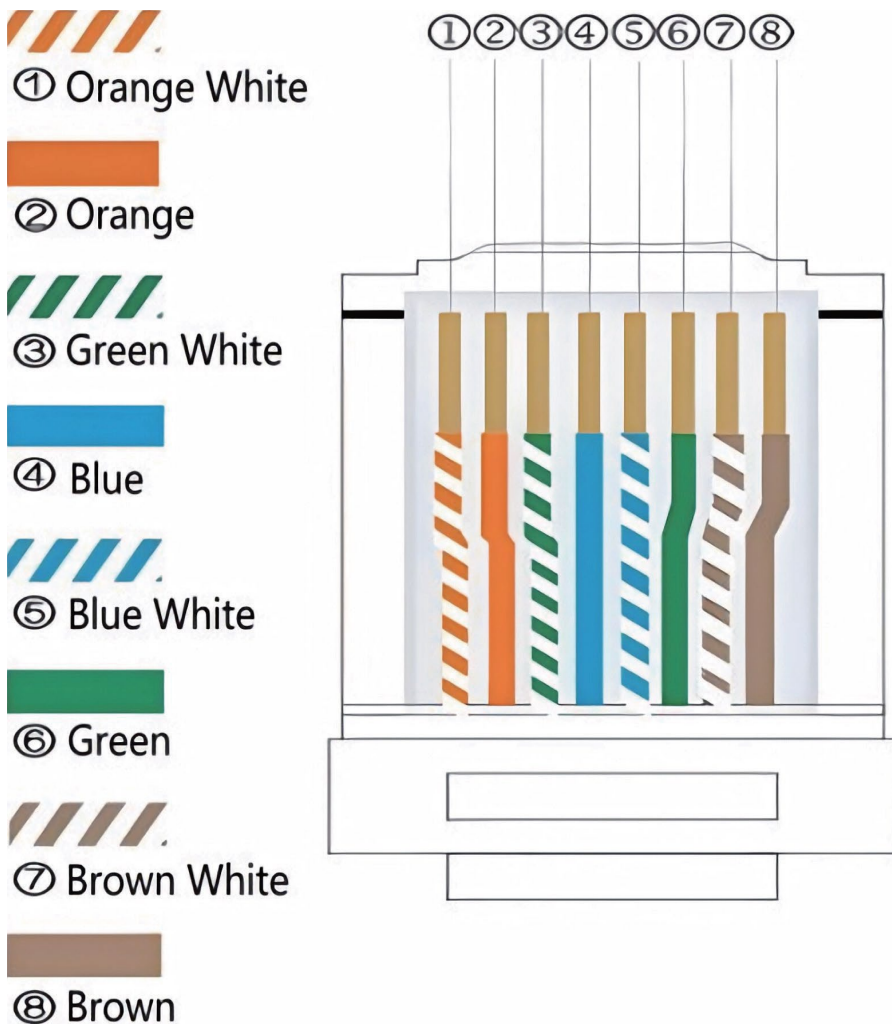
Fig. 5-4-6 Diagram of access point location for communication cable

Table 5-4-3 Definition of communication cable wiring point

Device No.	Location No.	Definition	Notes
XP7	1	485A	METER
	2	485B	
	3	485G	
	4	/	
	5	DO1	Third-party EMS output
	6	DO2	
	7	DI1	Third-party EMS input
	8	DI2	

→ XP7 terminal definition

→ For communication cables No. 2, 3 and 4 of the communication box, it is recommended to use network cable of category 6, which should run from the bottom of the container



through the tower-shaped cable bushing (Fig. 5-4-1, port No. 1), ending with crimped RJ45

connectors. The general wiring is shown below

Fig. 5-4-7 Wiring diagram of 8-core network cable

5.5 Check after installation

- Tightness

→ According to the design and protection level requirements, the joint between the bottom of the cabinet and the base must be tight to prevent insects or dirt.

- Cleaning

→ Dispose of all shipping and packaging materials properly in accordance with local regulations.

→ Clean up debris inside and around the equipment, such as short cables, tapes, screws and nuts. Do not leave any installation tools on site or inside the equipment (record the types and quantities of tools to avoid missing).

→ Wipe the insulation with antistatic cloth. Do not use any corrosive solvent.

- Check

→ Check whether the equipment is secured. Shake the equipment from different directions to check it for no obvious loosening and shaking.

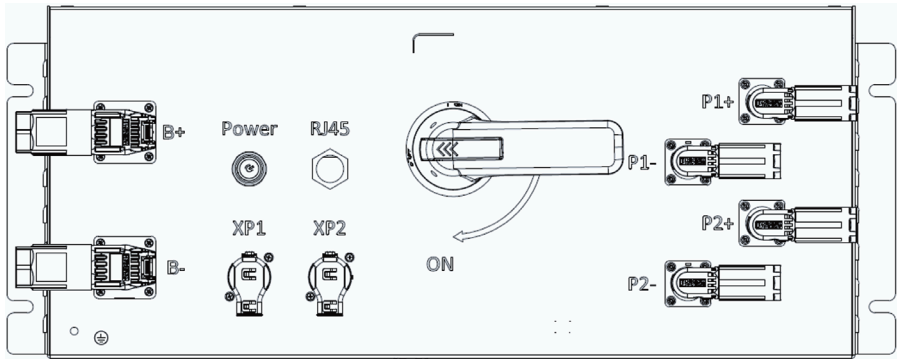
→ Check whether the internal components are fastened securely.

→ Check whether electrical connections and wires are connected correctly, completely and securely. Check whether ground cables are grounded reliably.

→ Check whether the protection level of the equipment meets the requirements, especially the cable entrance at the bottom of the equipment, and whether the cable holes in the

equipment are sealed.

→ Check the appearance, marking, integrity and cleanliness.



6. System Operation Instructions

6.1 Inspection before power-on

→ Check whether the isolation switch on the high-voltage box is in the OFF position

Fig. 6-1-1 Isolation switch OFF of the high-voltage box

→ Check whether the power cables between each battery packs and between battery pack and the series power line of the high-voltage box are securely connected;

→ Check whether connection terminals of all communication cables and power supply cables are connected tightly and reliably;

→ Check the communication, power supply harness, and power cables on the high-voltage box panel are correctly connected;

→ Check whether there are issues with the LAN connection inside the control cabinet;

6.2 Power-on steps

• Step 1

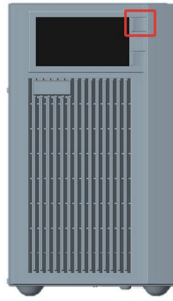
(1) Close the circuit breakers QF7 and QF8 in the PCS cabinet (for lightning protection);

(2) Close the main circuit breakers QF1, QF2, QF3, QF4, QF5, and QF6 in the PCS cabinet;

(3) Close the circuit breaker 2QF (for lightning protection) in the control cabinet;

(4) Close the main circuit breaker 1QF1 (for grid power) or 1QF2 (for PCS power supply) in the control cabinet;

(5) Close the circuit breaker 3QF (for the chiller) in the control cabinet;



- (6) Close the circuit breaker 4QF (for UPS input) in the control cabinet;
 (7) Press and hold the UPS power-on button in the control cabinet (for more than 1 second) to start the UPS;

Fig. 6-1-2 UPS power-on button

- (8) Close the circuit breaker 7QF (for lighting) in the control cabinet;
 (9) Close the circuit breaker 10QF (for EMS power) in the control cabinet;
 (10) Close the circuit breaker 11QF (for fire protection power) in the control cabinet;
 (11) Close the circuit breaker 5QF (for cooling fans) in the control cabinet;
 (12) Close the circuit breaker 6QF (for air conditioning) in the control cabinet;

S/N	Circuit breaker code	Function introduction
1	1QF1	PCS power supply
2	1QF2	Grid power supply
3	2QF	Lighting protection power supply
4	3QF	Chiller power supply
5	4QF	UPS power supply
6	5QF	Cooling fan power supply
7	6QF	Air conditioner power supply
8	7QF	Lighting
9	8QF	Maintenance socket power supply
10	9QF	Standby power supply
11	10QF	EMS and DIDO power supply
12	11QF	Fire protection power supply

- (13) Close the circuit breaker 8QF (for maintenance socket) in the control cabinet;
 (14) Close the circuit breaker 9QF (for standby power) in the control cabinet;
 Circuit breaker codes and functions of the control cabinet

Table 6-1 Circuit breaker codes and functions of the control cabinet

• Step 2

- (1) Close the isolation switch OFF (to ON status) of the high-voltage box in each rack;
(2) Press the control power button on the high-voltage box. The red indicator of the

Color		Status	Control Logic	Description	Cycle
Off		Always off	Abnormal power supply to the indicator board		
White		Always on	Abnormal communication of the indicator board		
Green		Always on	Standby		
		Breathing	Charge		2s/time
Blue		Breathing	Discharge		2s/time
Yellow		Constantly flashing	System self-test		Power-on self-test time: about 2min
		Twinkling	Level 1 alarm (L1)	Conditioner fault	0.5s on/3s off
			Level 1 alarm (L2)	Chiller or EMS1000 communication fault	0.5s on/2s off
				Lightning protection fault	
			Level 1 alarm (L3)	BMS Level 1 alarm	0.5s on/1s off
				Cooling fan fault	
			Level 2 alarm (L1)	BMS Level 2 protection	0.5s on/0.5s off
			Level 2 alarm (L3)	Cabin-level fire alarm	0.25s on/0.25s off
Red		Twinkling	Level 2 alarm (L2)	Chiller fault	
				PCS, BMS and EMS1000 communication fault	
			Level 3 fault (L1)	Water immersion alarm	0.5s on/3s off
			Level 3 fault (L2)	PCS fault	0.5s on/2s off
			Level 3 fault (L3)	BMS Level 3 fault, maintenance fault	0.5s on/1s off
		Always on	Level 3 fault (L4)	PACK-level fire fault, cabin-level fire fault	0.5s on/0.5s off
			Level 3 fault (L6)	PACK-level fire alarm, cabin-level fire alarm	0.25s on/0.25s off
			Level 3 fault (L5)	Switching power supply fault	
				Emergency stop	

corresponding secondary circuit button will light up, indicating that the system is powered

Tips
When the operational status indicator is in the status of Level 1 alarm (L2), Level 2 alarm (L2) and Level 3 fault (L3), the hydraulic system may be heated. The specific heating duration depends on the current ambient temperature. The lower the ambient temperature, the longer the heating duration.

on;

- Operation indicator light status after power-on

Table 6-2 Operation indicator light status after power-on

6.3 Power-off steps

- Step 1:

→ Set the container to the standby status and stop charging and discharging;

- Step 2:

→ Press the control power button on the high-voltage box in each rack. The red indicator of the corresponding secondary circuit button will be off;

> Disconnect the isolation switch (to OFF status) of the high-voltage box in each rack;

- Step 3:

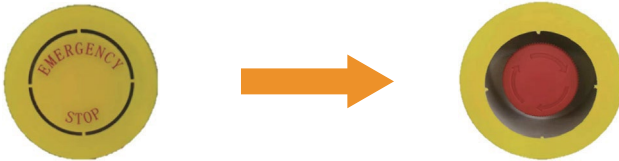
→ Press and hold the UPS power-on button in the control cabinet (for more than 1 second) to shut down the UPS;

→ Disconnect all circuit breakers and air switches in the control cabinet;

→ Disconnect all circuit breakers and air switches in the PCS cabinet, and the system will be powered off

6.4 Emergency stop steps

- Step 1:



→ Confirm the fire alarm (Level 3 fault L6).

- Step 2:

→ Squeeze the emergency stop button panel with hands or break it with a hard object.

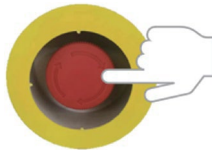


Fig. 6-4-1 Diagram of Emergency Stop button panel

Fig. 6-4-2 Emergency Stop button panel after pressing

- Step 3:

→ Press the emergency stop button.

Fig. 6-4-3 Pressing the Emergency Stop button

6.5 HMI monitoring screen

Faults	Possible Cause	Solution
Status indicator light is not illuminated	No power supply	1. Check if the line terminal connections are loose or detached 2. Check if the line voltage is normal
Communication failure	Communication line fault	1. Check the power supply. 2. Check the communication line for open circuit or short circuit, etc. 3. Check if the address setting is correct
Water immersion alarm	Energy storage compartment water infiltration	1. Check the compartment for any water accumulation 2. Confirm that the equipment inside the compartment is intact
Door limit switch/access control	The door is opened	1. Check if the compartment door is fully closed 2. Check if the wiring of the access control sensor is disconnected. 3. Check if the access control sensor is misaligned
Lightning protector fault	Lightning protector damage	1. Check if the signal wire of the AC lightning protector is loose or disconnected. 2. Check if the indicator of the AC lightning protector changes color. 3. Please replace the AC lightning protector.
Switching power supply fault	Switching power supply fault	1. Check if the signal wire of the switching power supply is loose or disconnected. 2. Check the switching power supply voltage is normal. 3. Please replace the switching power supply.
Conditioner fault	Conditioner fault	Please contact your service partner.
Low liquid level of water-cooled battery water tank	Coolant evaporation	1. Check if the exhaust valve is closed 2. Check if the liquid level of the water tank is too low 3. Refill the tank
Low-voltage pressure fault	Lower cooling system pressure	Please contact your service partner.
Main relay sticking fault	Contacting sticking	Please contact your service partner.
Water pump fault	Water pump abnormality	Please contact your service partner.
Under-voltage fault of high-voltage device	Excessively under-voltage fault of TMS device	Please contact your service partner.
Exhaust overheat alarm	Compressor overheat	1. Check whether the fan is running properly 2. Check whether the condenser is blocked
High discharge temperature fault	Cell temperature beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low discharge temperature fault	Cell temperature lower than the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
High single-cell voltage fault	Cell voltage beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low single-cell voltage fault	Cell voltage lower than the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Large single-cell voltage difference fault	Cell voltage difference beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Large charge current fault	Charge current beyond the threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Large discharge current fault	Discharge current beyond the threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner

Large temperature difference fault	Temperature difference beyond the threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low insulation fault	Too low insulation	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
High total voltage fault	Rack voltage beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low total voltage fault	Rack voltage lower than the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
High charge temperature fault	Cell temperature beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low charge temperature fault	Cell temperature lower than the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
High PACK voltage fault	Pack voltage beyond the set threshold	1. Turn off the power supply of the high-voltage box of the affected rack and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Low PACK voltage fault	Pack voltage lower than the set threshold	1. Recharge within 48 hours to prevent permanent battery damage. Batteries that fail to recharge within this period will not be covered under warranty. 2. If the alarm persists after recharging for 1 hour, please contact your service partner
Extremely low individual voltage	Cell voltage lower than the set threshold	1. Recharge within 48 hours to prevent permanent battery damage. Batteries that fail to recharge within this period will not be covered under warranty. 2. If the alarm persists after recharging for 1 hour, please contact your service partner
QF breaker fault	QF breaker fault	Check whether the manual load switch is closed.
Invalid collection of total voltage	Invalid collection of total voltage	Check whether the B+, B- and battery pack cables are damaged or disconnected.
Extremely high individual voltage	Single-cell voltage beyond the set threshold	Please contact your service partner.
Extremely high temp.	Cell temperature beyond the set threshold	Please contact your service partner.
SBMU hardware fault	SBMU hardware fault	Please contact your service partner.
AC over/under-frequency	Grid fluctuation	1. Turn off the AC and DC side switches of the entire cabinet, and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
AC over/under-voltage	Grid fluctuation	1. Turn off the AC and DC side switches of the entire cabinet, and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
AC overcurrent	Grid fluctuation	1. Turn off the AC and DC side switches of the entire cabinet, and wait for 5 minutes. 2. After rebooting, issue the operational command again 3. If the alarm persists, please contact your service partner
Fire protection fault	Fire protection fault	Please contact your service partner.

→ For specific HMI monitoring screen operation, please refer to the Operation Instructions for HMI of 1C Prefabricated Cabin.

7. Troubleshooting
8. Routine maintenance

- No use for a long time
- Keep SOC at 40% to 50% if the cabinet is not in use for a long time. Do not keep the system below 15% SOC for a long time. In case of long-term no use, disconnect the AC/DC

Tips
If the energy storage system is unused for a long time, it will cause irreversible damage to the battery. Please make sure to carry out regular maintenance.

circuit breakers and component-level circuits in time. Check the energy storage system every 3 months, charge it to 50% SOC every 6 months, and perform capacity verification tests and re-inspections every 12 months.

- Distribution switch check
- Check the power supply voltage of the distribution box.
- During the annual inspection, disconnect the corresponding distribution switch for further maintenance of the energy storage system.
- Cable
- Check whether cables are secured without heating, damage or external stress on a quarterly basis.
- Every year, check whether cables and switches are connected securely and grounded reliably, whether cables are hot and damaged, whether the insulation resistance of cables meets relevant requirements, whether cable inlet seals are in good condition, and whether holes are tightly sealed.
- Check of air inlet and outlet
- Check all inlets and outlets for blockage on a quarterly basis.
- Electrical grounding system
- Every quarter, check the grounding system for poor contact arising from rust and oxidation or increase in the grounding resistance. Check whether grounding signs are complete and legible, without any loss or damage.
- Check the grounding of electrical equipment every year. Check whether ground cables and terminals are in good condition. Check the grounding resistance with a multimeter for conformity to the grounding requirements.
- Visual inspection
- Check the cabinet for stains each quarter. Clean the whole cabinet. Check the sheet metal

for deformation, rusting or paint peeling. Conduct painting in time to prevent rusting of the exterior surface.

- Check of liquid cooler

→ In case of any leakage inside the cabinet, turn off the distribution box in time, and contact operation and maintenance personnel.

→ During annual maintenance, check water-cooling pipes. In case of any damage, contact operation and maintenance personnel immediately to replace them.

- Check of fire protection system

→ Check the photoelectric smoke detector each quarter. It should flash every a few seconds during normal operation.

→ Check the point type temperature-sensitive fire detector each quarter. It should flash

Constant voltage charging	
Recycling	At 25°C (77°F), the maximum charging current is 4.25A, the charging voltage is set within 14.1V-14.4V, and the voltage temperature compensation coefficient is -30 mV/°C. When the charging current drops below 0.102A and then maintains the charging state for 3 hours, the battery is considered to be full.
Floating charge	At 25°C (77°F), the maximum charging current is 4.25A, the charging voltage is set within 13.6V-13.8V, and the voltage temperature compensation coefficient is -18 mV/°C.
Notes: For the stock battery, it is recommended to replenish it every three months (maximum no more than six months) according to the cycle of the charging parameters, otherwise it will affect the capacity and service life of the battery.	

every a few seconds during normal operation.

Inspection items	Quarterly	Semiannually	Annually	Solution
Cabinet appearance	√	√	√	Cleaning
Air outlet	√	√	√	Cleaning
Cable	√	√	√	Test
Distribution switch	√	√	√	Visual inspection
Grounding system	√	√	√	Test
Liquid cooler	√	√	√	Visual inspection
Smoke detector	√	√	√	Visual inspection
Temperature-sensitive fire detector	√	√	√	Visual inspection
Damage to water cooling pipe	√	√	√	Visual inspection
Fire extinguishing system within the validity period	√	√	√	Visual inspection
Presence of peculiar smell of PACK compartment	√	√	√	Smelling
Presence of irritating smell in the electric cabinet	√	√	√	Smelling
Presence of burning smell in the high-voltage connection area	√	√	√	Smelling

Abnormality alarm in the alarm bar	√	√	√	Control cabinet touchscreen
Completeness of single-cell voltage data	√	√	√	Control cabinet touchscreen
Completeness of single-cell temperature data	√	√	√	Control cabinet touchscreen

→ For the battery of the fire engine every quarter, please replenish the battery according to the recycling charging parameters.

- Maintenance frequency

9. After-sales service

Users can get access to your services by sending email to our service mailbox.

Service e-mail box: service@zoeess.com

Refer to the contract for the years of free warranty service.

The following conditions are not covered by our free warranty service:

System damage or failure arising from nonconformity to the requirements in the user manual.

Failure of wiring and power supply in accordance with relevant electrical safety regulations, or damage caused by poor site conditions or consequent faults.

Private modifications made by the user, resulting in damage to the system or consequent faults.

System damage or failure caused by irresistible natural factors such as typhoons, earthquakes, floods, fires or harsh environments (high temperature, low temperature, high humidity, acid rain, etc.).

The user fails to maintain the initial fault status after a fault occurs, and fails to notify the manufacturer in time but handles the problem on his/her own, making it impossible to make a realistic fault identification of the cause of the fault.