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DG1000-268kWh-2H0
Liquid-cooled C&I storage unit
User Manual

DoGo Power Technology Co., Ltd.

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DoGo Power Technology Co., Ltd.

Address: Room 1717, Building B, Qingshan Headquarters Building, No. 2666 Longxiang Road, Yongzhong Street, Longwan District, Wenzhou City, Zhejiang Province, 325000, China

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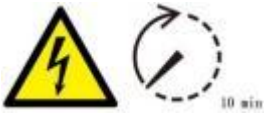
1. Safety Precautions

1.1 Safety Symbol Explanation

Safety symbols are used to remind operators of safety precautions to follow when installing, operating, and maintaining equipment. Commonly used symbols are as follows:

table 1-1 Safety Symbols

Safety symbol	meaning
	**Danger Voltage Warning:** Warning that a high voltage is present, which may cause personal injury or equipment damage.
	**General Warning :** Warning of non-electrical factors that may cause personal injury or equipment damage.
	**Electrostatic Sensitive Equipment Warning :** Warning: Electrostatic discharge (ESD) phenomena that can cause equipment damage.
	**Grounding External grounding markings indicate that** the machine must be securely grounded to ensure operator safety.
	**Delayed discharge warning:** After disconnecting the power 10 Do not touch them within minutes.
	**Waste disposal Do not** dispose of this product as household waste.
	**Prevent open flame Keep** this product away from open flames. Flammable materials should not be placed nearby .

	**Reading Manual Please** read the instructions before performing any operations on the product.

1.2 Safety Precautions

Read the manual!

➢ Before operating any electrical equipment, operators must carefully read the relevant precautions and operating instructions, and strictly follow the safety instructions to avoid accidents. The safety precautions in this manual do not represent all safety precautions that should be followed, but are only a supplement to the safety precautions for various operations .

➢ Operators must follow the instructions in the user manual when installing, operating, and maintaining the equipment . Power supply equipment can only be repaired by qualified personnel. Our company assumes no responsibility for any consequences arising from violations of safe operating requirements or safety standards for the design, manufacture , and use of the equipment.

If a situation arises where an effective solution cannot be found in the instruction manual. Please contact your supplier for technical support. Any operating methods not provided by our company will not be recognized.

High voltage danger!

➢ High-voltage power supplies provide electricity for the operation of equipment. Direct contact or indirect contact with high-voltage power supplies or mains power , whether through damp objects, is possible. This could pose a fatal danger.

➢ When performing high-voltage or alternating current operations, special tools must be used; ordinary or self-carried non- special tools must not be used .

➢ Always disconnect the power switch before installing or removing power cords. Installing or removing power cords while the circuit is live is extremely dangerous!

➢ Voltage can be generated on the battery side or the grid side. Always use a standard voltmeter to ensure there is no voltage before touching it.

➢ Before connecting the cables, you must confirm that the cables, cable markings and actual installation conditions are consistent before proceeding with the connection.

Delayed operation!

- When the energy storage system is disconnected from the power supply, the battery may still contain charge. Wait 10 minutes before operating to ensure the device is completely de-voltaged.

Please pay attention to safety during operation!

➢ When hoisting heavy objects, it is strictly forbidden to walk under the boom or the object being hoisted.

Lifting tools must be inspected and approved before they can be used.

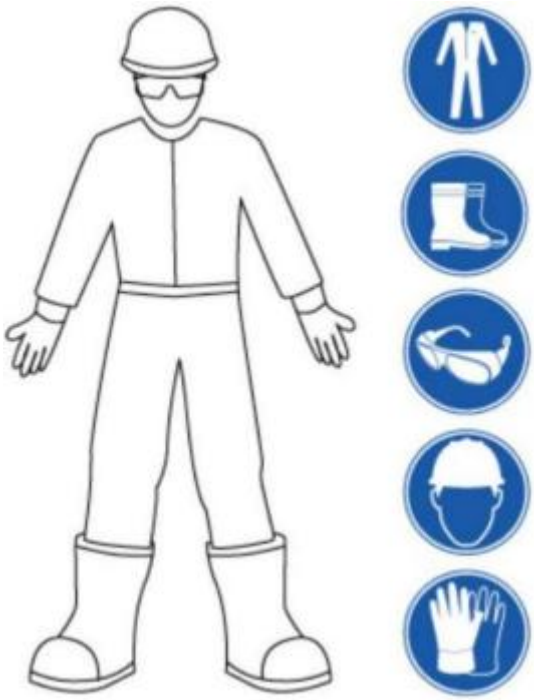
➢ Personnel performing hoisting operations must undergo rigorous training, master correct operating methods, understand various safety precautions, and possess hoisting operation qualifications.

Beware of static electricity!

➢ Static electricity generated by the human body can damage static-sensitive components on circuit boards. This can occur when in contact with devices such as plug-in boards, circuit boards, etc. Before handling IC chips, etc., to prevent static electricity from damaging sensitive components, an anti-static wrist strap must be worn, and the other end of the anti-static wrist strap must be properly grounded.

1.3 Operator requirements

Be carried out by qualified engineers in accordance with local regulations. Qualified personnel on site must wear appropriate protective gear to ensure personal safety and meet local engineering regulations. Personal protective equipment is shown below.



picture 1-1 Illustration of personal protective equipment

Qualified professional engineers should possess the skills and knowledge related to the construction, operation, and installation of energy storage systems, have received and passed safety training, and be able to identify hazards and avoid related risks. The following requirements must be met:

- Familiarize yourself with the composition and working principle of the entire energy storage system, and operate it according to the manual .

- Understand the relevant knowledge of power, electronics, electrical wiring and mechanical engineering, and be familiar with electrical and mechanical schematic diagrams.

- Have received professional training related to the installation, commissioning and trial operation of electrical equipment.

- Capable of quickly responding to dangers or emergencies that occur during

installation and commissioning. Possesses the emergency response capability to any dangerous or unexpected situations that arise .

- Be familiar with the relevant standards and specifications of the country/region where the project is located, and comply with the laws, regulations and relevant standards of the country/region where the project is located when carrying out operations such as transportation, transshipment, installation, wiring and maintenance .

- Avoid using skills and techniques that pose a risk of electric shock.

- During installation, operation, and maintenance, it is strictly forbidden to wear watches, bracelets, bangles, rings, necklaces, or other conductive objects to avoid electric shock.

2. Overview

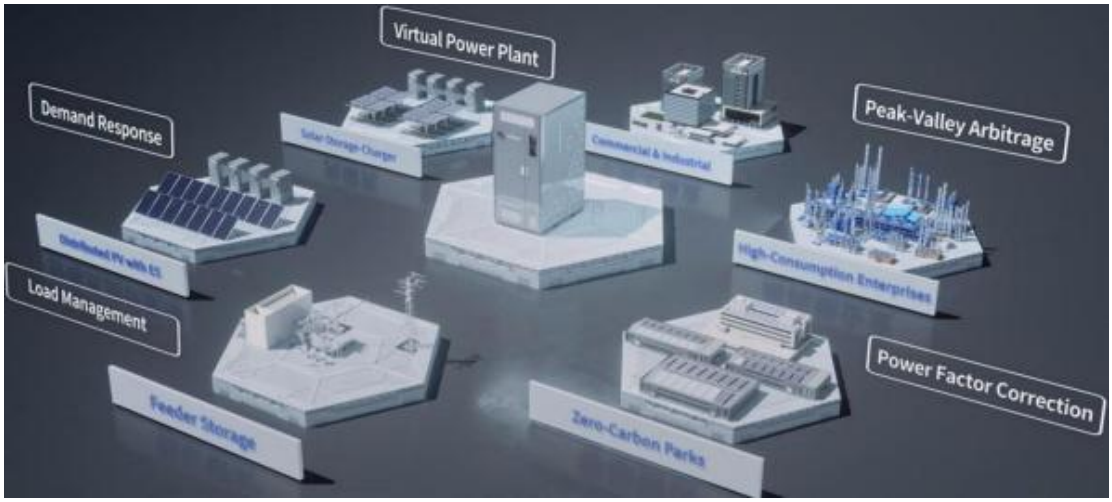
2.1 Scope of application

This manual applies to the liquid-cooled C&I energy storage integrated unit independently developed by DoGo Power Technology Co., Ltd. (hereinafter referred to as DoGo Power). The manual is primarily intended for operators of energy storage systems. This document specifies the operational procedures for the transportation, installation, wiring, and commissioning of this product. This applies to both trained energy storage system operators and untrained power plant personnel . Everyone should be fully familiar with the information contained in this manual.

DoGo Power reserves the right to the final interpretation of the contents of this document .

2.2 Product Introduction

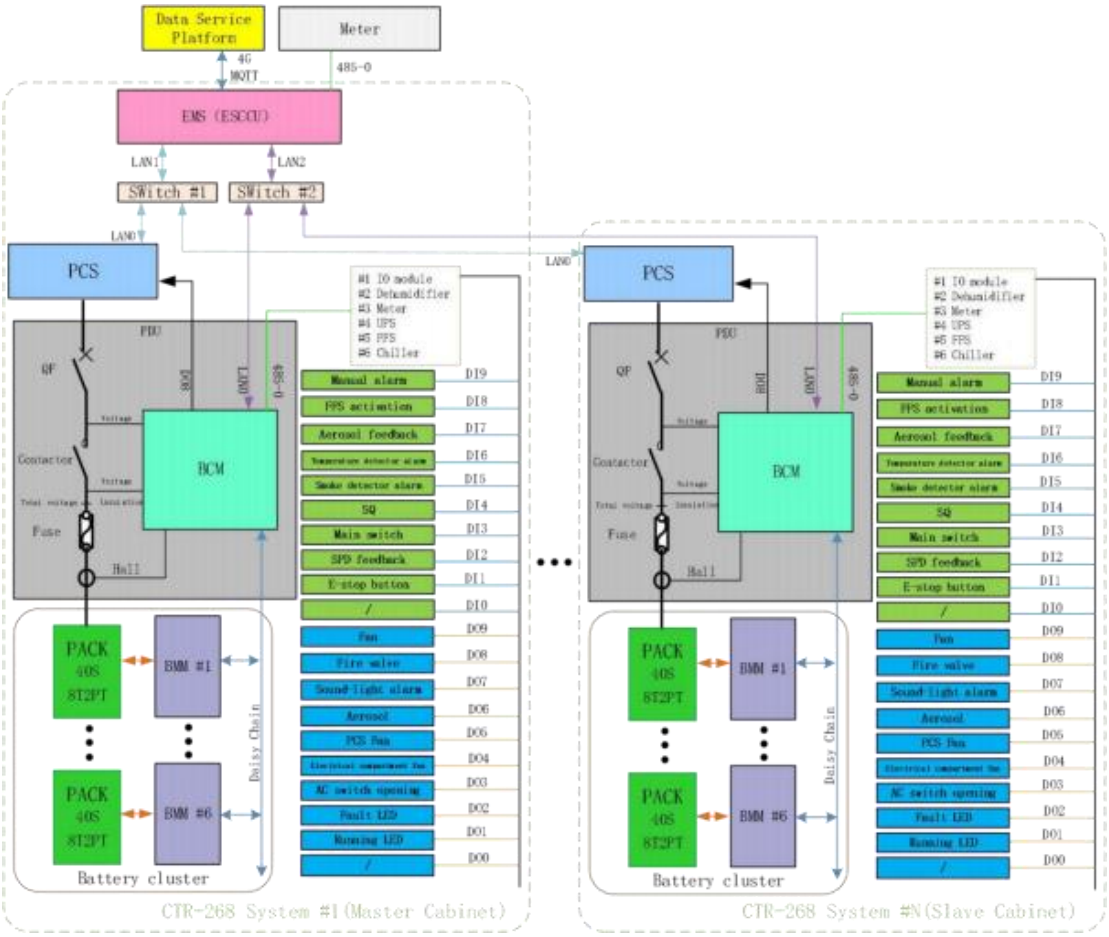
This energy storage system is suitable for smart buildings, industrial parks, photovoltaic-storage- charging and other scenarios, and can effectively complete peak shaving and valley filling, and demand response. It includes functions such as load management to improve power supply reliability, reduce electricity costs, and improve power grid quality.



picture 2-1 Typical applications of energy storage systems

This product is a 1000VDC platform 400VAC three-phase output integrated energy storage unit. The battery uses high-energy-density, long -cycle- life lithium iron phosphate 350A.h Short-blade cells, through the adoption of CTR direct integration technology, saving PACK design cost. System integration "All" In One The design concept incorporates battery clusters, BMS PCS, EMS, fire protection and thermal management systems, etc., integrated into a single standardized cabinet. This enables the integration of energy storage systems. The enclosure adopts an outdoor rack design. Transportation is more convenient.

The system topology diagram is as follows:



picture 2-2 Industrial and commercial integrated storage system topology

An integrated industrial and commercial storage machine are as follows:

1. Battery System: The energy source of the energy storage system, used for storing electrical energy. The battery clusters are combined and output through the combiner cabinet ;

2. Power distribution system: Provides electrical energy to the electrical appliances within the energy storage system. Includes mains power and emergency power;

3. Control System: Composed of EMS, A control system composed of BMS and other control components is used to control the normal operation and fault protection of the energy storage system.

4. Thermal Management System: Used to ensure that the battery cells operate at a suitable temperature, including the liquid cooling unit and piping components;

5. Fire protection system: Provides fire early warning and extinguishing functions;

6. Outdoor cabinet: Ensures the mechanical strength of the energy storage system and provides protection.

The control system of this product performs status monitoring, logic control, and data recording on the integrated unit. Together with the thermal management system, it can provide an environmental condition that meets the optimal operating conditions

of the battery, ensuring the efficient and reliable operation of the system. At the same time, it provides early warning and rapid location of faults .

2.3 System Specifications

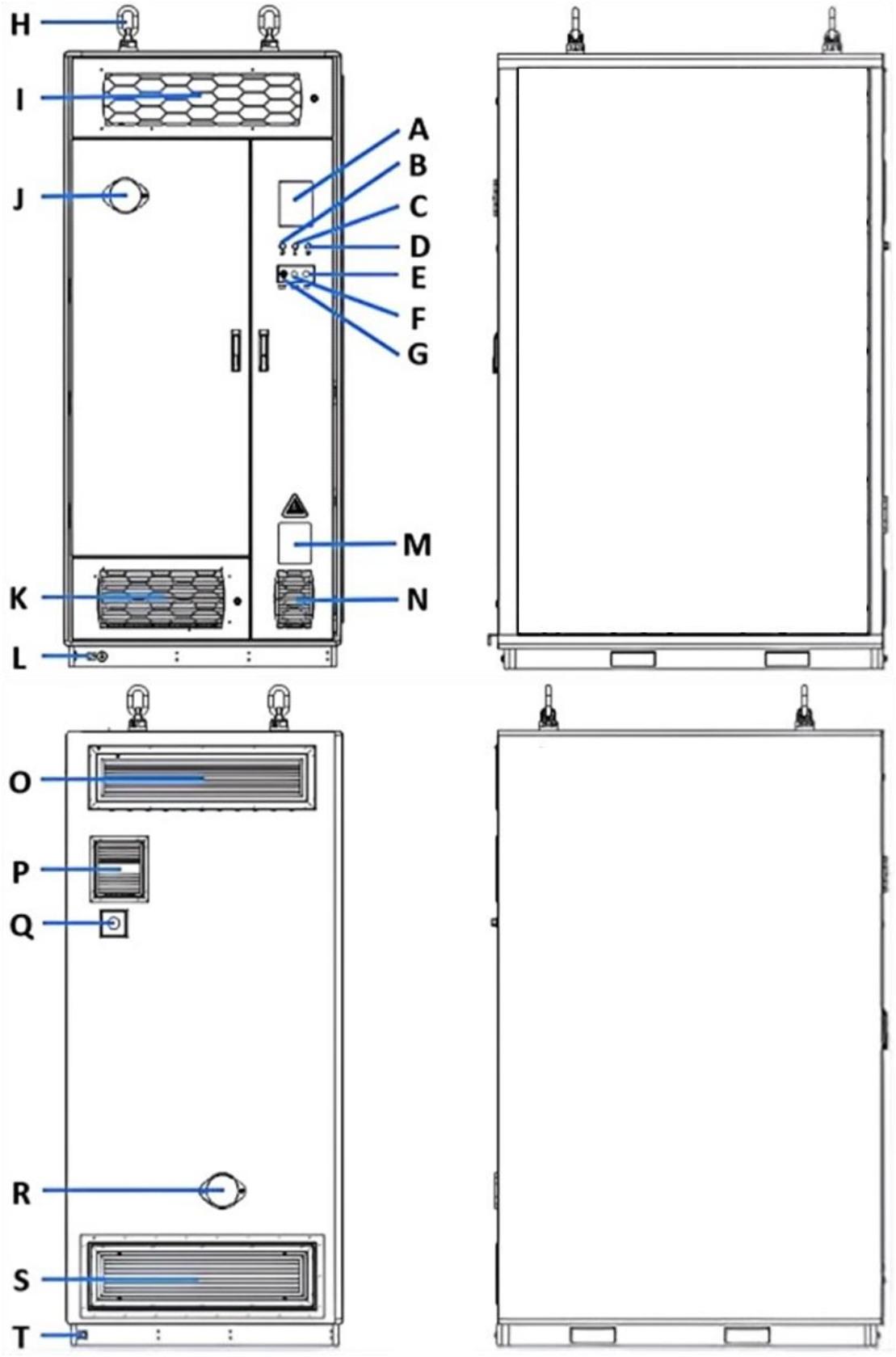
table 2-1 System Specifications Table

battery cells	**Parameters**	**Specifications**
	Cell type	LFP Short Blade
	nominal capacity	350 A h
	nominal voltage	3.2V
	Rated ratio	0.5 P
	Voltage range	2.5 ~3.65V (>0℃) 2.0 ~3.65V (≤0℃)
	Operating temperature	-20 ~60℃ (discharge) 0 ~60℃ (charging)
	size(W*D*H)	500*26*215 mm
	weight	≤6.6 kg

All-in-one PC	Parameters	Specifications
	Battery system configuration	1P240S
	Nominal battery voltage	768V
	Battery voltage range	DC 672V ~ 852V
	nominal power	268.8 kWh
	Rated output power	125 kW
	AC side output voltage	AC 400V
	AC side frequency	50 Hz / 60 Hz
	Wiring method	3 P4 L+ PE
	IP Level	IP55
	Corrosion resistance level	C5
	Operating ambient temperature range	-30 ~ 55℃
	Working environment humidity	0-95% RH (non-condensing)
	size(W*D*H)	1080*1500*2400 mm
	System weight	~3T

2.4 Product Appearance Description

The appearance of the integrated industrial and commercial storage machine is shown in the following figure:



picture 2-3 Industrial and commercial integrated storage machine appearance diagram

table 2-2 External Component Description

Serial Number	Component Name	Serial Number	Component Name
A	Audible and visual alarm	K	PCS cabin air intake louvers
B	Yellow warning indicator light	L	Front grounding point
C	Green operating indicator light	M	Nameplate
D	Red power indicator light	N	Electrical compartment air intake louvers
E	Emergency stop button	O	Water turbine compartment air louvers
F	Fire start button	P	Electrical compartment air louvers
G	Fire alarm button	Q	antenna
H	Rings	R	Fire air intake valve
I	Water turbine compartment air intake louvers	S	PCS cabin air vent louvers
J	Automatic fire exhaust valve	T	Back grounding point

Emergency stop button!

➢ In case of an emergency, press the emergency stop button on the panel of the integrated industrial and commercial storage machine to stop the system and exit

charging and discharging operation.

➢ After pressing the emergency stop button, internal The FSS power supply will remain on, so do not touch it!

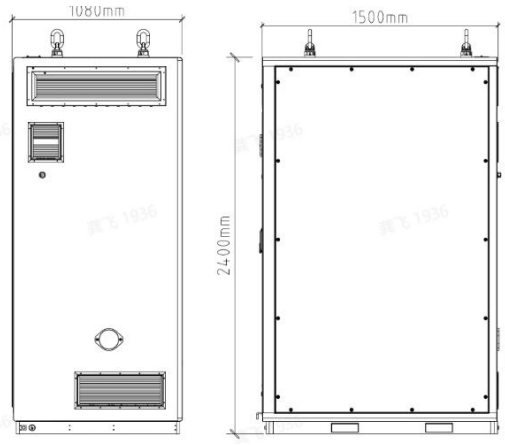
2.5 Product Structure Description

2.5.1 External structure

The system's overall structure adopts a compartmentalized design, including an electrical compartment, The PCS compartment, water turbine compartment, and battery compartment are independent of each other. The battery compartment is separated from other compartments. This ensures airtightness and compartment independence, effectively reducing the frequency of battery compartment openings and lowering the risk of condensation.

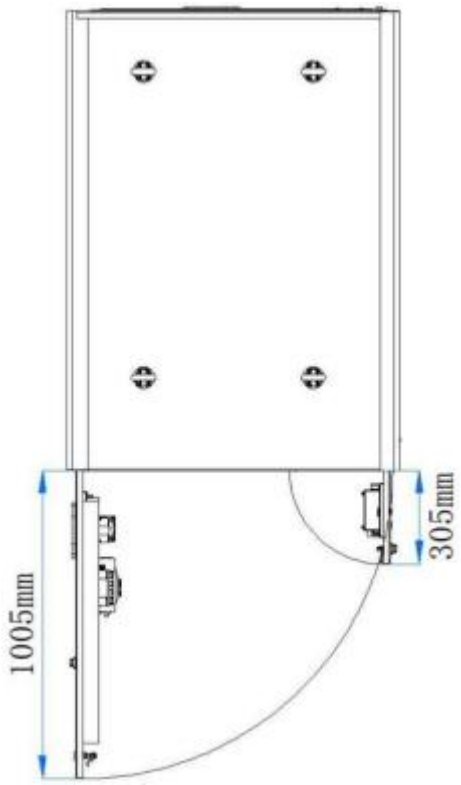
The cabinet doors and side panels are all sealed with sealing strips to achieve overall sealing. IP55 protection rating. The exterior of the cabinet is treated with C5 corrosion protection. This ensures high reliability and stability of the structure.

The dimensions of the integrated industrial and commercial storage machine are shown in the following figure:



picture 2-4 Dimensions of an integrated industrial and commercial storage machine

The door opening dimensions and space requirements of the integrated industrial and commercial storage machine are shown in the following diagram:



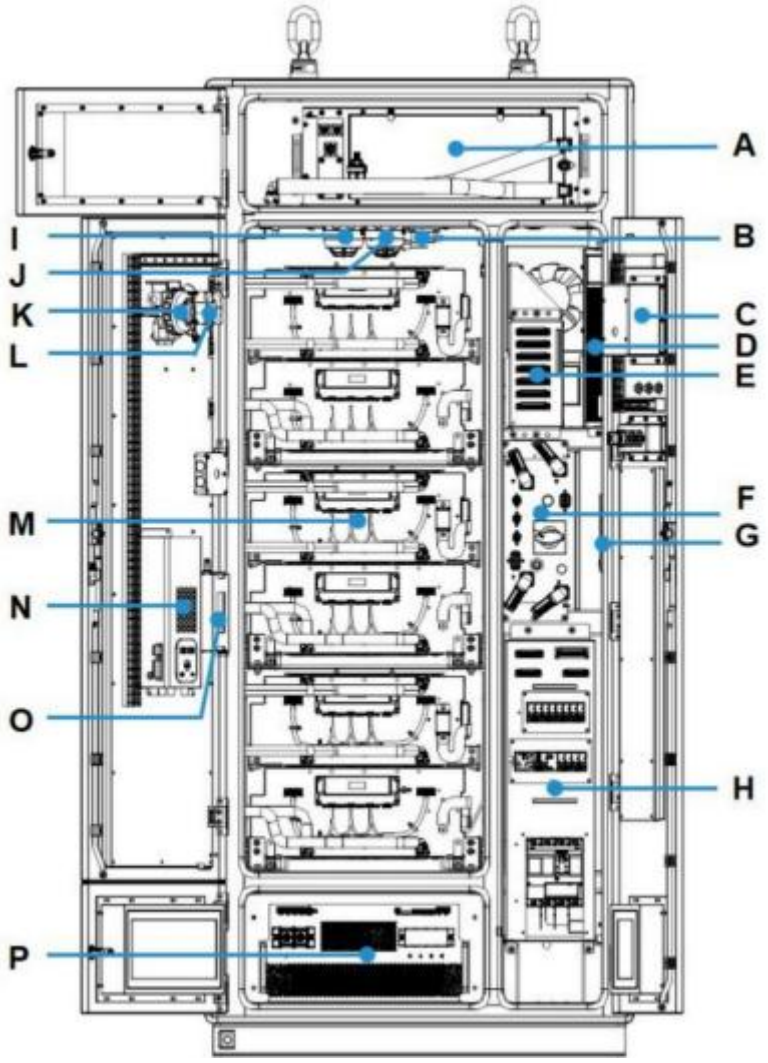
picture 2-5 Schematic diagram of the opening space of the integrated industrial and commercial storage machine

2.5.2 Internal structure

The integrated industrial and commercial storage unit is internally designed with battery clusters, a high-voltage box, a liquid cooling unit, a control box,PCS, EMS, UPS, fire protection systems, and dehumidifiers .

Internal structure of the cabinet adopts an independent compartment design: ① The top is the water turbine compartment, ②The battery compartment is on the left side of the middle section, ③The battery compartment is on the left side of the bottom section. PCS compartment, ④ the electrical compartment is on the right. The four compartments are independently separated. This design achieves separation of water, electricity, and heat, enhancing safety. The battery clusters are distributed within the battery compartment, comprising six battery modules. Each cluster connects to the high-voltage box in the right-side electrical compartment, with the output connected to the bottom PCS.

The internal layout of the integrated industrial and commercial storage machine is shown in the figure:



picture 2-6 Internal Equipment Composition of the Industrial and Commercial Storage Integrated Machine

table 2-3 Description of Main Internal Equipment

	Component Name	**Serial Number**	**Component Name**
A	Liquid cooling unit	I	Smoke Detector
B	Door limit switch	J	Temperature detector
C	Sound and light alarm mounting cover	K	Combustible gas detector
D	ups	L	Fire exhaust valve fan

E	control box	M	Battery clusters
F	High-voltage box	N	dehumidifier
G	EMS	O	aerosol
H	Distribution box	P	PCS

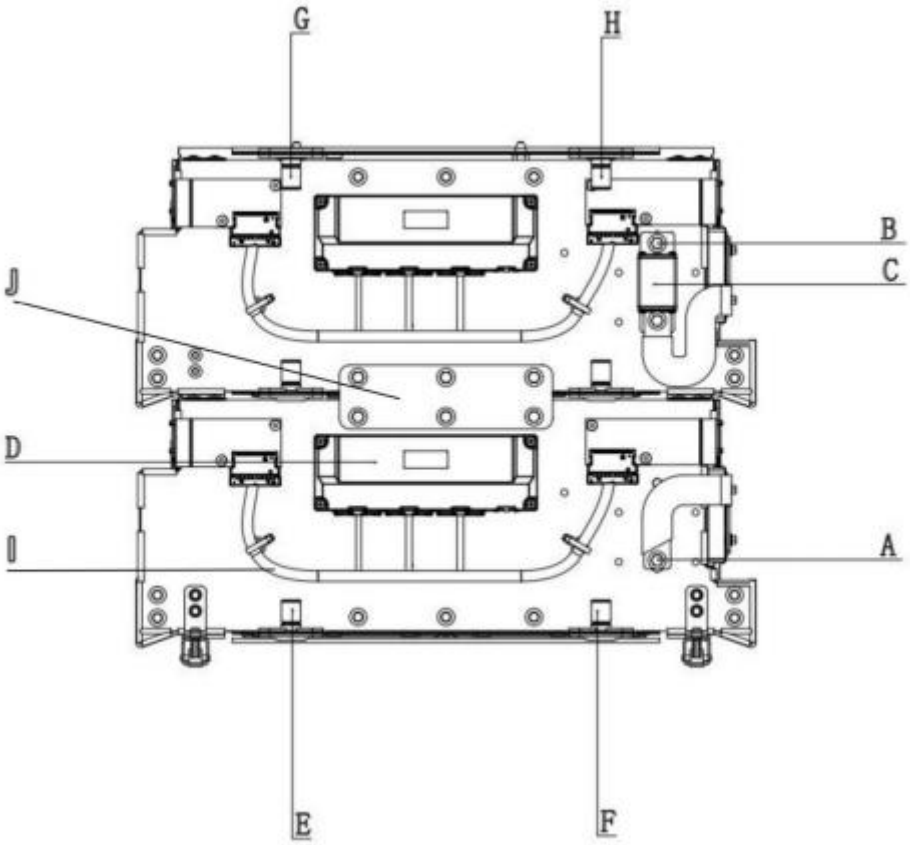
2.6 Product Components Introduction

2.6.1 Battery Module

The battery cluster inside the C&I integrated energy storage unit consists of 6 battery modules. The battery module is the basic energy unit of the battery system and is used for the charging and discharging energy exchange of the C&I integrated energy storage unit system.

Battery cluster internal integration Components such as the BMU and fuses are integrated, and the battery clusters are directly integrated using CTR technology to achieve double-sided liquid cooling of the battery. This double-sided cooling design doubles the heat exchange area of the cells, resulting in better temperature control. With liquid cooling on both the top and bottom sides, heat dissipation is more even, reducing the temperature difference within the cells and effectively extending the lifespan of the battery system.

Two battery modules are combined to form one battery unit. A connecting plate is used in the middle to reinforce and secure the upper and lower battery modules. The appearance of the battery unit is shown in the figure below:



picture 2-7 Battery Unit

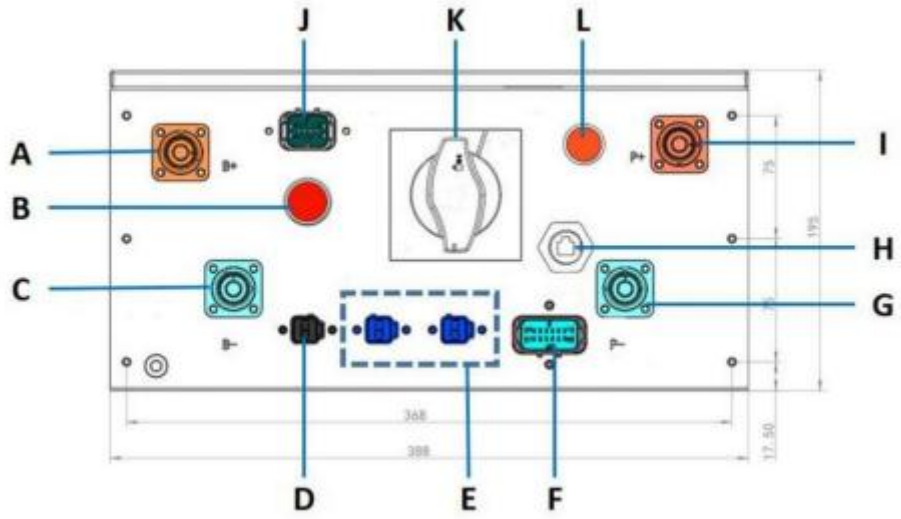
table 2-4 Battery Cell Component Description

Serial Number	Component Name	Notes
A	B-	Battery cell negative electrode
B	B+	Battery cell positive electrode
C	Fuse	fuse
D	BMU	Used for collecting voltage and temperature.
E	water outlet	Used for liquid cooling PACK water outflow
F	Inlet	Used for liquid cooling PACK water inlet
G	water outlet	Used for liquid cooling PACK water outflow

H	Inlet	Used for liquid cooling PACK water inlet
I	BMU adapter harness	For connection CCS and Cluster Control
J	Connecting plate	Used for connecting and fixing the upper and lower battery modules.

2.6.2 High-voltage box

The battery clusters inside the integrated industrial and commercial energy storage unit are connected to a high-voltage box. The high-voltage box is the control unit of the battery cluster system. It is used to monitor and control the battery pack and to complete signal exchange. The appearance of the high-voltage box is shown in the figure below:



picture 2-8 High-voltage box exterior view

table 2-5 High Voltage Box Panel Instructions

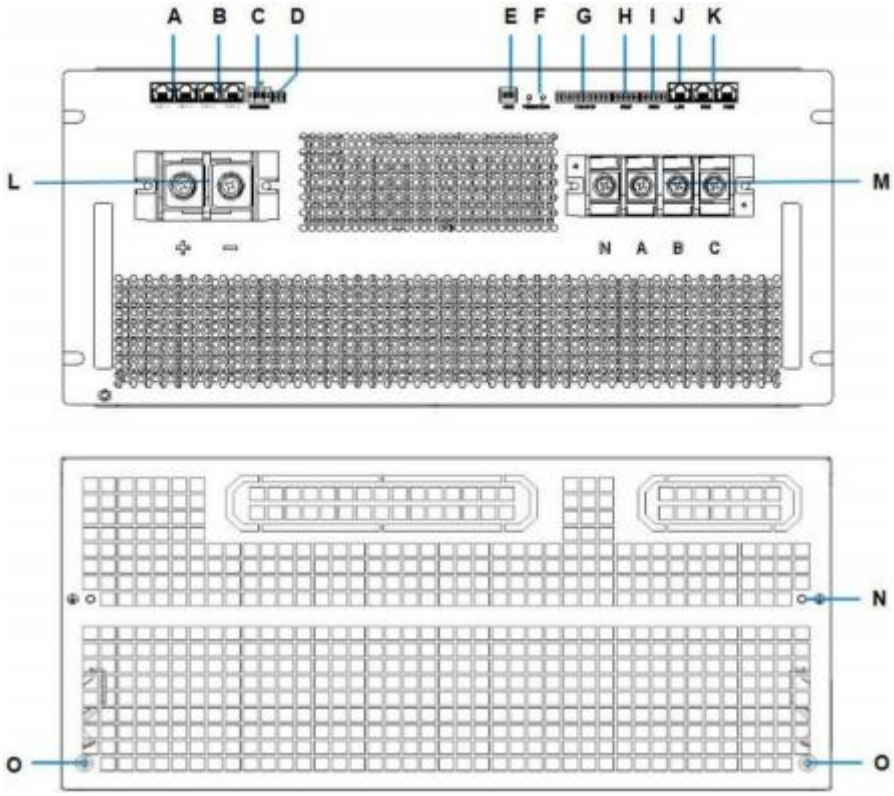
Serial Number	**Component Name**	**Notes**
A	B+	High voltage box input positive terminal
B	push button switch	Battery cluster auxiliary power supply button switch
C	B-	High voltage box input negative terminal

D	Power interface	220 VAC external power supply
E	CAN communication	foreign CAN communication
F	dry contact	External dry contact output
G	P-	High voltage box output negative terminal
H	LAN mouth	External communication network port
I	P+	High voltage box output positive terminal
J	Daisy Chain Communications	Internal communication links
K	switch handle	Disconnect switch handle, for maintenance
L	Operation indicator light	No faults, green light is on; There are two. Level 3 fault, red light illuminated.

2.6.3 PCS

A bidirectional energy storage converter is a conversion device between the power grid and batteries, capable of charging and discharging batteries. It can invert DC power from batteries into AC power that can be fed into the grid, and it can also rectify AC power from the grid into DC power that can be charged into batteries. Bidirectional energy storage converters can be used in grid-connected or off-grid modes.

The appearance of the PCS is shown in the following figure:



picture 2-9 PCS Appearance Drawing

table 2-6 PCS Panel Description

Serial Number	**Component Name**	**Serial Number**	**Component Name**
A	Multi-module parallel interface PARA 1	I	EMS communication matching resistor COM 4 (CAN)
B	Multi-cabinet parallel interface PARA 2	J	EMS communication interface (LAN 1)
C	Parallel DIP switch	K	EMS communication interface COM 1/2 (CAN /485)
D	Internal debugging port	L	DC primary port
E	Address DIP switch ADDR	M	Communication primary port
F	Indicator lights (red power	N	Grounding port

	light, green status light)		
G	dry contact interface DI / DO	O	Guide column
H	BMS communication interface COM 3 (CAN /485)		

2.6.4 UPS

The control cabinet contains a UPS power supply. UPS can protect your system . It provides reliable and high-quality AC power for critical equipment . It adopts a double-conversion online design. Unlike the backup UPS. When the mains power is normal, it adjusts and filters the mains power to provide better power to the equipment; when the mains power is abnormal or interrupted, it provides high-quality backup power to the equipment from the backup battery without interruption ; in case of overload or inverter failure, The UPS will switch to bypass mode . Powered by mains electricity; if the overload condition is eliminated, The UPS will automatically switch back to inverter power supply mode.

The UPS control panel is shown in the following figure:

picture 2-10 UPS control panel

The UPS power supply operation panel instructions are as follows:

table 2-7 ups Power Operation Panel Instructions

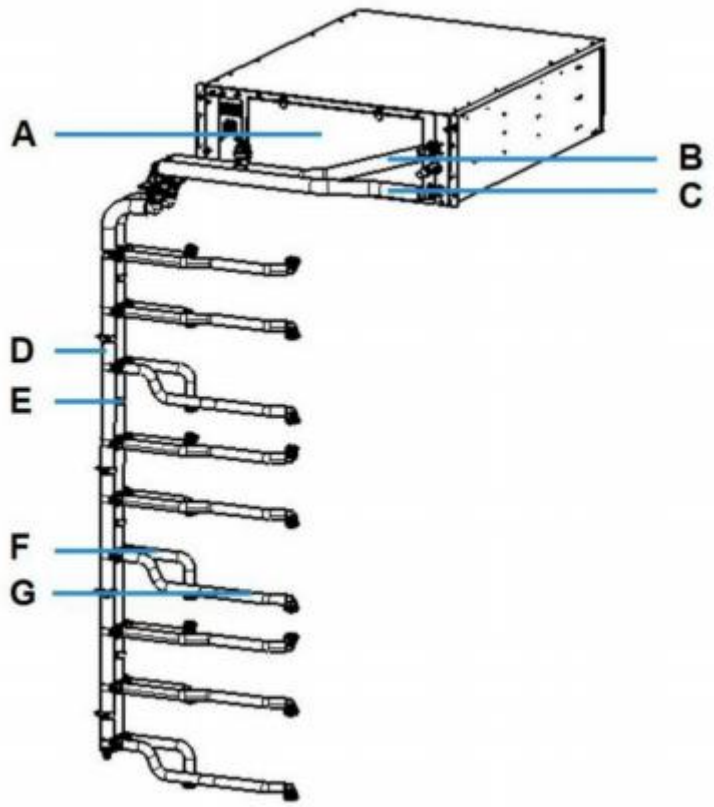
Serial Numb	**project**	**Function**

er		
green	Bright	The UPS is in normal online mode or high-efficiency mode.
yellow	Bright	The UPS is in battery mode.
yellow	Bright	The UPS is in bypass mode.
red	Bright	The UPS is experiencing an alarm or malfunction.
	Power button	1. When the battery is present but the AC power is not connected, press the button for a duration greater than [time period missing]. 100 milliseconds and less than It can be lit in 1 second. ups LCD screen but not powered on. 2. After the machine is powered on, press this key continuously. 1 More than a second can make UPS powered on. 3. Press this key continuously If it lasts more than 3 seconds, it can be turned off. UPS .
	Up arrow	Flip up menus, options, pages, dialog buttons, etc. Press this key to increase the value while setting it.
	Down arrow key	Flip down menus, options, pages, dialog buttons, etc. When setting a value, press this key to decrease the value.
	Confirm button	1. Press this key on the main page. You can access the menu list. 2. When the cursor selects a menu, option, etc. Press this key to access the submenu or edit the options. 3. Press this key after editing. You can save and modify your work. 4. After making your selections in the dialog box, press this button to confirm your selections.

ESC	Exit Menu	Exit menu/submenu/edit state/dialog box.
	Turn off the buzzer sound .	This key can temporarily mute the buzzer sound. , When the alarm/fault recurs The buzzer will sound again .

2.6.5 Thermal Management System

The primary function of the thermal management system is to maintain the battery system temperature within the permissible operating temperature range. The thermal management system mainly consists of a liquid cooler unit and three-stage liquid cooling piping. The layout of the thermal management piping is shown below.



picture 2-11 Liquid cooling system layout diagram

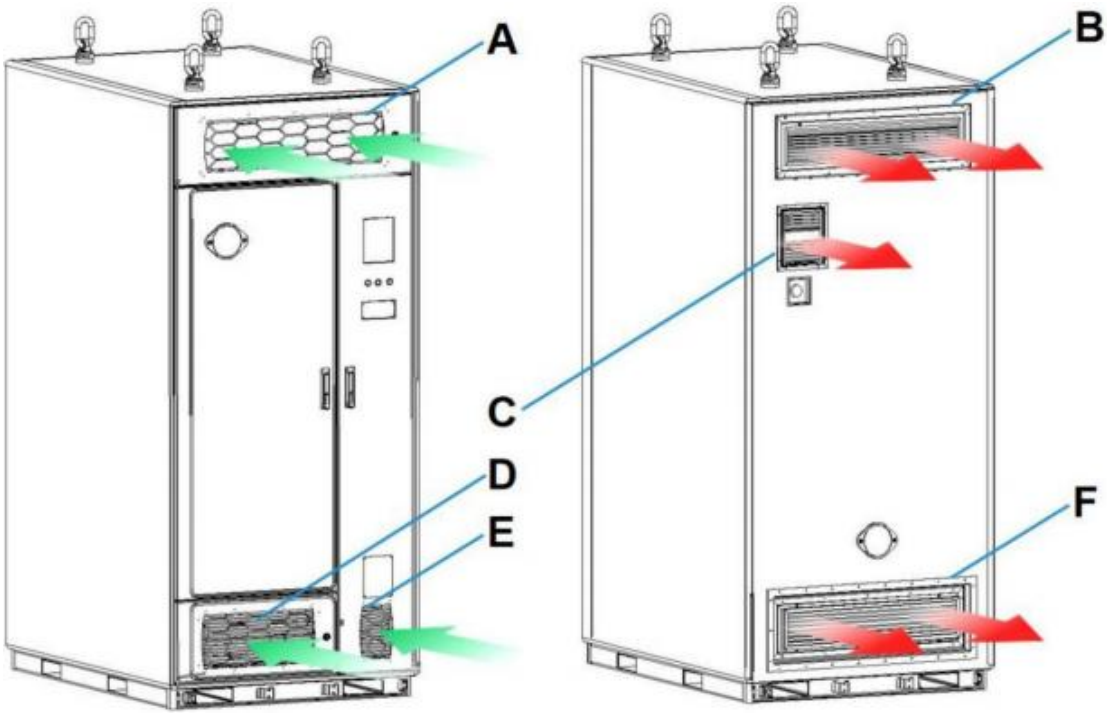
table 2-8 Liquid cooling system description

Serial Number	Component Name

A	water machine
B	Primary return pipe (water return from water purifier)
C	Primary liquid supply pipe (water outlet of the water purifier)
D	Secondary liquid supply pipe
E	Secondary return pipe
F	Three-stage return pipe (cold plate outlet)
G	Three-stage liquid supply pipe (cold plate water inlet)

The liquid cooling unit is located in the water tank compartment (top of the cabinet) of the integrated industrial and commercial water storage unit. The liquid cooling unit exchanges heat with the refrigerant system through coolant to provide a heat source and cooling source for the battery, ensuring that the battery operates within its optimal temperature range . The coolant, after heat exchange within the liquid cooling unit, is transported to the battery pack through cooling pipes to ensure uniform temperature distribution within the battery. The coolant in the liquid cooling system is 50% water. +50% ethylene glycol solution.

Liquid cooling units require heat exchange with the external environment during operation. Ventilation areas are designed on both the front and back sides of the cabinet . Product placement should ensure that these areas are not obstructed and that regular maintenance is performed to prevent blockage by foreign objects. A ventilation diagram is shown below:



picture 2-12 Schematic diagram of ventilation system for integrated industrial and commercial storage

table 2-9 Inlet and outlet air vent description

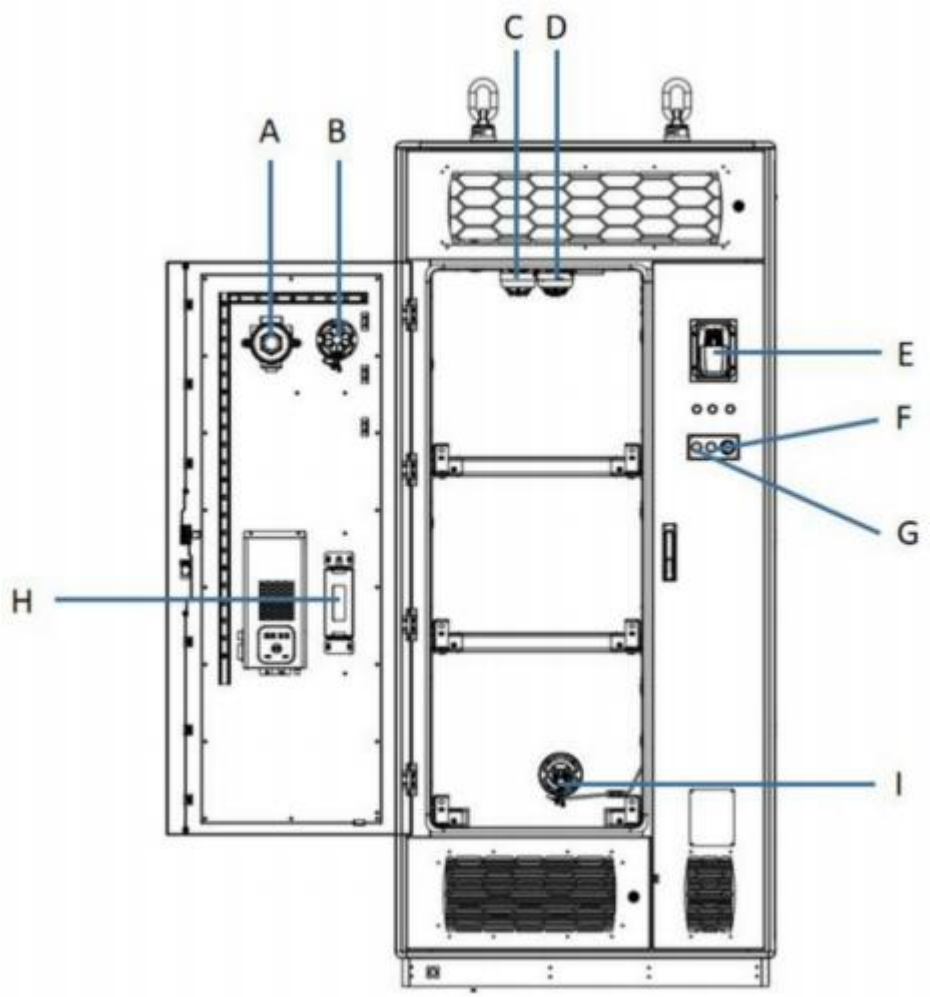
Serial Number	**Component Name**	**Serial Number**	**Component Name**
A	Water turbine compartment air intake	D	PCS compartment air intake
B	Water turbine compartment exhaust	E	Electrical compartment air intake
C	Electrical compartment air outlet	F	PCS cabin air outlet

2.6.6 Fire protection system

The integrated C&I storage unit, as an outdoor non-walk-in cabinet, provides a complete fire protection system solution. It has detection, alarm, and fire extinguishing functions. The fire protection system consists of three parts: a fire detection system, a fire extinguishing system, and a fire ventilation system .

Furthermore, the fire protection system is linked to the control system; if any abnormality is detected, the fire protection system will send an alarm signal to... EMS is used for alarm, shutdown control, and other related logic judgment and execution.

The main components are listed below.



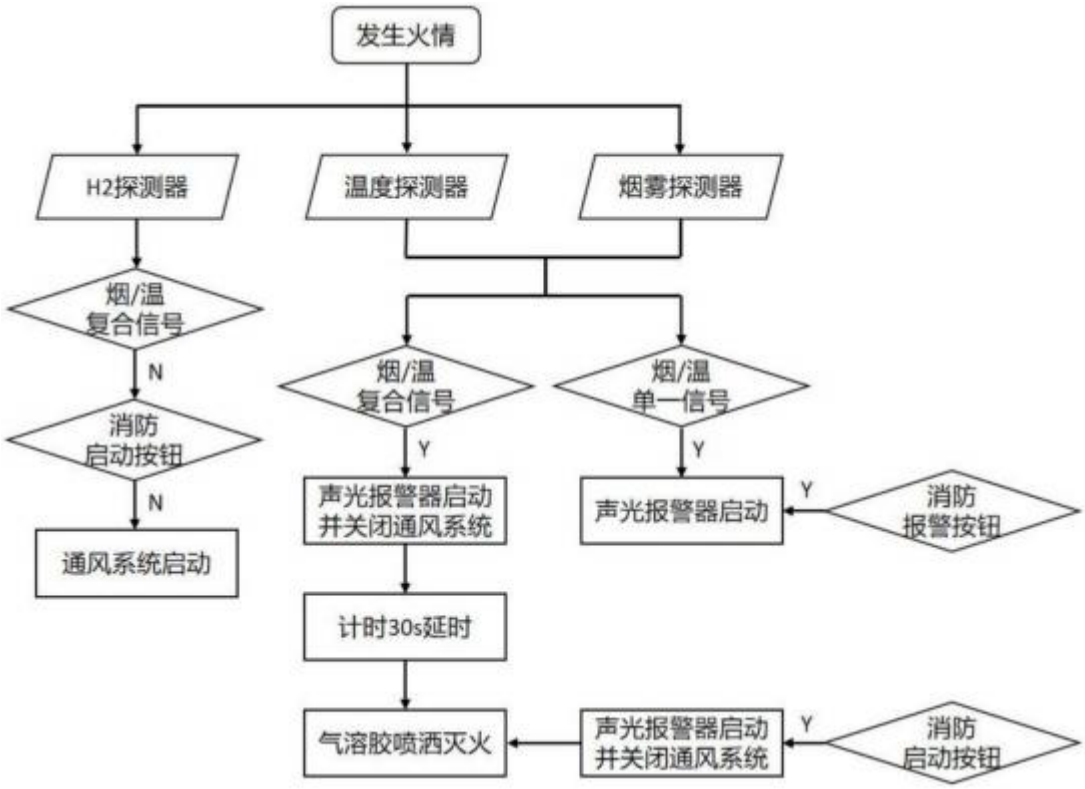
picture 2-13 Fire protection system layout diagram

table 2-10 Fire protection components description

Serial Number	**Component Name**	**Serial Number**	**Component Name**
A	H2 detector	F	Fire start button
B	Explosion-proof exhaust valve	G	Fire alarm button
C	Smoke	H	Aerosol fire extinguishing device

D	sense of warmth	I	Explosion-proof air intake valve
E	Audible and visual alarm		

The overall operation flow diagram of the integrated fire protection system is as follows.



picture 2-14 Firefighting Flowchart

(1) Fire detection system

The fire detection system mainly consists of smoke detectors and temperature detectors, and operates within the battery compartment to detect fire signals. When a fire occurs in the battery compartment, the detectors on top of the compartment will promptly detect the fire signal and send a notification. Additionally, the system includes an alarm system: an audible and visual alarm, used to transmit clear and visible fire signals to the outside world .

When either the smoke or temperature detector alarms, it will be classified as a Level 1 alarm and the audible and visual alarm installed on the front door of the electrical compartment will be activated. Fire alarm signal input. EMS The system is down.

When both smoke and temperature detectors are active, it will be flagged as a Level 2 alarm and trigger an audible and visual alarm. The 30-second countdown ends. Aerosol spraying, while simultaneously feeding back the aerosol activation signal to EMS;

In addition, there are two manual buttons on the cabinet door. Pressing the manual alarm button activates a level one alarm, and pressing the fire alarm activation button activates the fire alarm. This is considered a Level 2 alarm. The fire extinguishing action was initiated immediately.

To ensure the fire protection system can operate normally for at least 2 hours without external auxiliary power supply, a UPS power supply has been installed in the auxiliary power distribution system , and power is supplied from... UPS power supply connected to fire protection system To ensure reliable power supply.

(2) Gas extinguishing system

The integrated unit uses aerosol fire suppression. When the battery compartment detector detects a fire signal, it issues a fire alarm. When a level two alarm is triggered... The system shuts down, the fire extinguishing system is activated, and aerosols are released to extinguish the fire inside the cabin.

In addition, a fire alarm activation button is installed on the cabinet door, which can also be used to manually trigger the fire alarm. Pressing the fire alarm activation button will trigger a level two fire alarm and directly activate the aerosol fire suppression system.

There are two control methods for triggering fire suppression systems:

① Automatic control: All detectors in this system detect the fire and issue an alarm, confirming the fire (level 2 alarm triggered), and triggering fire extinguishing operations after 30 seconds.

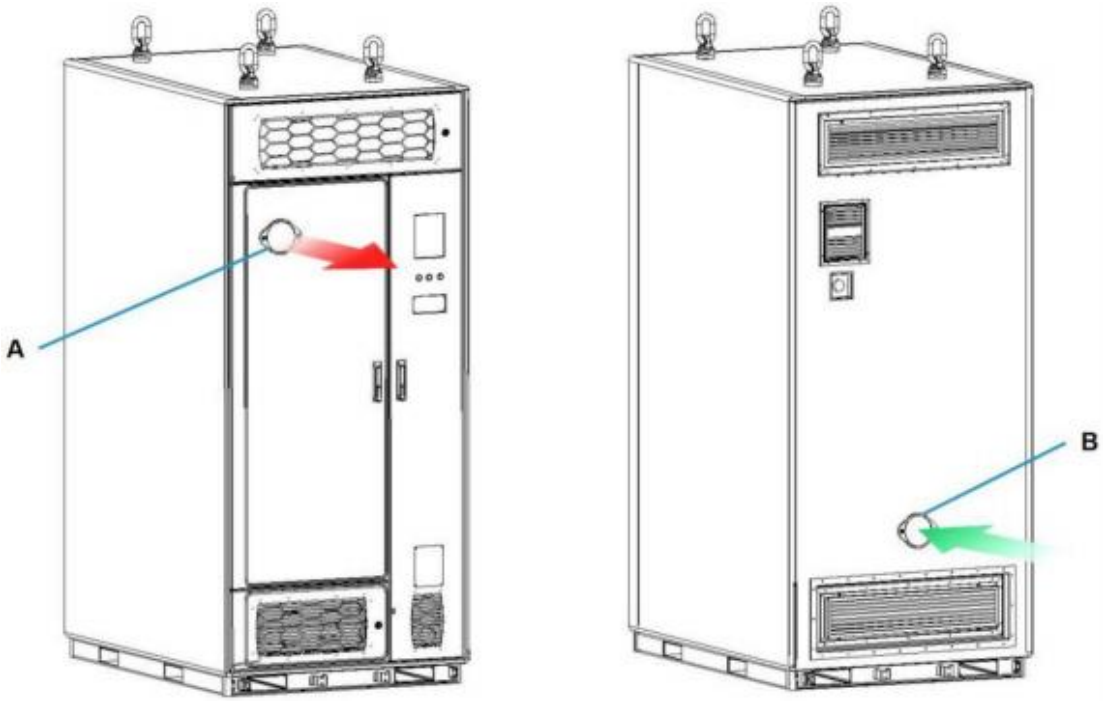
② Manual control: Press the fire start button on the outside of the unit to directly trigger the fire protection system.

During the fire suppression system's operation, no personnel are allowed to approach the energy storage system.

(3) Ventilation system

The integrated industrial and commercial storage machine is equipped with an emergency ventilation system, which can be used to ventilate the protected area in case of emergency. H2 concentration reached At 10% LEL, the combustible gas detector will alarm and control the exhaust ventilation system to open (intake and exhaust valves), with maximum exhaust volume . 107CFM.

The combustible gas detector transmits the alarm signal to the EMS. Upon receiving the signal, the entire system shuts down. This occurs during ventilation operation . If a level 2 alarm is triggered Activate aerosol fire extinguishing Turn off the ventilation system.



picture 2-15 Ventilation system layout

table 2-11 Exhaust system component description

Serial Number	**name**
A	Explosion-proof exhaust valve
B	Explosion-proof air intake valve

3. Transportation and storage

3.1 Transportation methods

C&I storage machines can be transported by land or sea. at present C&I storage integrated machines are not permitted for use in air transport, and there are no specific guidelines regarding rail transport.

3.2 Transportation requirements

The integrated industrial and commercial storage machine is highly integrated and easy to transport. During loading and unloading, handle the machine with care to avoid tipping, rolling, and subjecting it to excessive pressure; during transportationIt should be protected from external mechanical impacts.

The following basic conditions must be checked and met during transportation:

- Cbinet doors are locked and secured.
- Appropriate protective measures to ensure that the system does not allow foreign liquids (such as water, oil, etc.) to seep into it.
- On site conditions. The lifting equipment used should have sufficient load-bearing capacity, boom length, and turning radius.
- Product should be transported and moved under good weather conditions.

l Warning signs or warning zones must be set up during transportation and loading/unloading to prevent unauthorized personnel from entering the loading/unloading area and to avoid accidents .

l Do not drag the product when installing or removing the lifting device. Otherwise, the product may be damaged.

l Environmental requirements for transportation: temperature -30~60℃ Moderate concentration ≤95% (no condensation)

l State of charge (SOC) of transported products: It is recommended that the SOC be maintained at 30-50% during transport. And ensure that the system does not experience short circuits.

(1) Requirements for electricity transmission on land:

➢ When transporting by road, it is important to secure the bottom corner brackets of the cabinet to the transport vehicle to prevent excessive tilting during transport.

➢ The maximum speed of the vehicle (truck) shall not exceed 100 km/h And must comply with the relevant laws and regulations of the place of transportation ;

➢ Sudden braking and sharp turns are strictly prohibited while driving;

➢ If the product needs to be transported on a slope, additional traction and securing measures need to be considered ;

➢ Keep the vehicle in good condition, check its loading status regularly, and promptly identify and resolve any problems that arise;

➢ Remove all existing or potential obstacles from the road, such as tree branches and cables, to prevent uneven road tables from causing transportation difficulties or safety hazards;

➢ In most cases, the total weight of the truck and cargo exceeds the limits for general roads. In such cases, an overweight permit from the country or region of transport is required .

(2) Maritime transport requirements

➢ **All personnel engaged in port loading, unloading, and anchoring should receive relevant training, especially safety training.**

➢ **When at sea, the product is subjected to traction forces in multiple directions and dimensions, requiring additional reinforcement and fixation .**

3.3 Lifting

Please pay attention to safety during operation!

When using integrated industrial and commercial storage cranes, the crane must be operated in strict accordance with the crane's safety operating procedures during lifting, forklifting, or hoisting processes. Please pay attention to on-site operational safety. Lifting and forklift operations must comply with the relevant standards and regulations of the country/region where they are performed. No one may remain

within the operating area, especially standing under the lifting arm or the machine being lifted; maintain a distance of 5-10 meters from the lifting machinery to avoid injury or death.

Lifting and forklift operations must be conducted under the on-site guidance andoperation of professional personnel to ensure that at least the following requirements are met:

- All cabinet doors are locked and secured.

- When lifting from the top ring Ensure that the lifting rings are securely fastened and that on-site safety is ensured during the lifting process.

- Select appropriate lifting machinery based on site conditions. The selected lifting machinery should have a load capacity ≥ 5000. kg.

- The slings used should be strong enough to withstand the weight of the integrated machine.

- Ensure all slings are securely and reliably connected, and ensure that slings of equal length are connected to the lifting ring fittings.

- The length of the sling can be adjusted according to the actual site conditions; a length greater than 1.5m is recommended. Lifting angle > 45°.

- Take all necessary auxiliary measures To ensure the safe and stable improvement of products.

- When hoisting, the product should be lifted vertically and slowly. Never drag the product on the ground or on top of lower parts , and never push or pull the product on any surface.

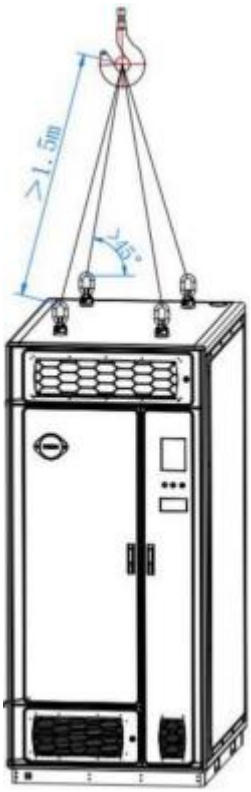
- During the lifting process, theoretically, the center of the hanger and the center of the top of the product must be perfectly aligned. In practice, the deviation between the two centers should be minimized. To prevent offset and skew.

- Ensure the product remains stable and does not tilt during the lifting process; the

sway angle must be ≤10°. The tilt angle is ≤5°.

➢ Once the product is in place, place it gently and steadily. Do not throw it outside the designated vertical landing point.

➢ If the weather is bad Such as heavy rain, dense fog, gusts of wind, etc. Crane operation should be stopped. The hoisting operation time needs to be reassessed.

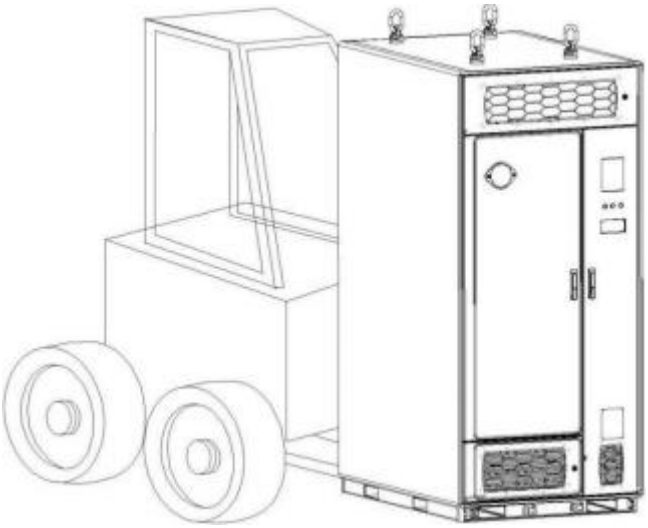


picture 3-1 Lifting diagram

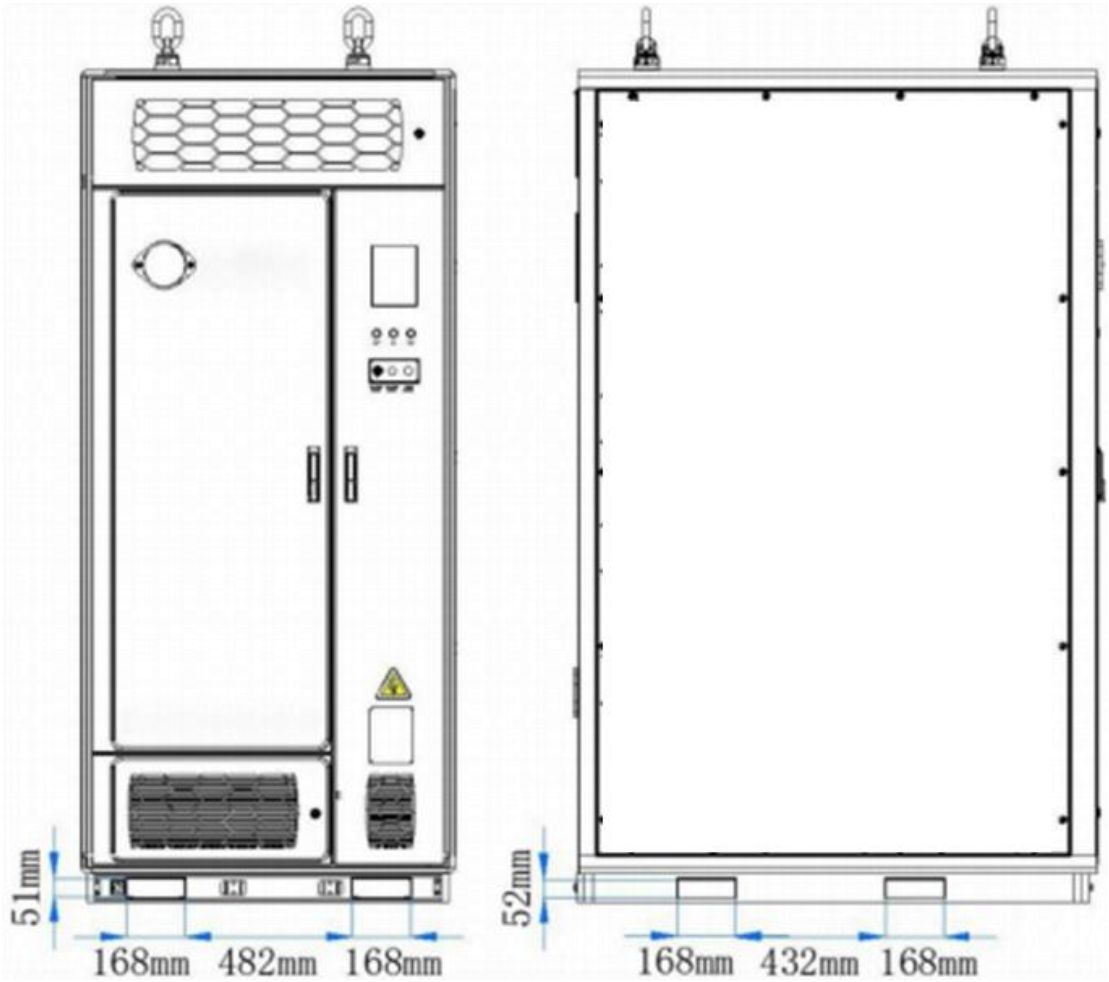
3.4 Forklift

During the forklift operation of the integrated industrial and commercial storage machine, strict adherence to forklift safety operating procedures is mandatory, and on-site safety must be paramount . Lifting operations must comply with the relevant standards and regulations of the country/region in which they are performed. No one may remain within the operating area, especially not behind the forklift, behind the goods, or near blind spots such as the area around the forked items being

transported. Keep away from forklifts by 5-10 meters to avoid injury or death



picture 3-2 Forklift diagram



picture 3-3 Diagram of the fork hole (horizontal and vertical)

Forklift operations must be conducted under the on-site guidance and operation of professionals to ensure that at least the following requirements are met:

- All cabinet doors are locked and secured.

- Lift the forklift through the bottom forklift ports, ensuring on-site safety during transport. A test lift should be performed before forklift operation; if unsatisfactory, adjust the forklift feet position.

- Select a suitable forklift based on site conditions. It is recommended that the selected forklift have a load capacity ≥ 5000. kg.

- When the lifting height of the forklift is ≥0.5m, it is recommended to use the hoisting method.

- The forks of the forklift used should be inserted to the full depth of the forklift hole of the integrated machine, that is, the length of the forks should be ≥1500mm.

- The forklift used should be strong enough to withstand the weight of the integrated machine.

- Take all necessary auxiliary measures To ensure the safe and stable improvement of products.

- The product should be lifted vertically and slowly. Never drag the product on the ground or on top of lower parts, and never push or pull the product on any surface .

- During the lifting process, theoretically, the center of the forklift and the center of the product bottom must be perfectly aligned. In practice, minimizing the deviation between the two centers and preventing misalignment is crucial. The tilt angle must be less than [value missing]. 10°.

- Once the product is in place, place it gently and steadily. Do not throw it outside the designated vertical landing point.

- If the weather is bad Such as heavy rain, dense fog, gusts of wind, etc. Forklift operations should be stopped. Reassess forklift operation time.

3.5 Storage requirements

C&I storage units should be stored in elevated locations to prevent potential condensation or water damage to their bottom during the rainy season . The storage table should be dry, flat, stable, have sufficient load-bearing capacity, and be free of any vegetation cover.

Storage is recommended to be placed indoors. If, due to site conditions, the all-in-one unit must be stored outdoors, please elevate its base. The specific height should be determined reasonably based on the site's geological and meteorological conditions. table flatness should not exceed 5 mm.

Storage areas must not contain harmful gases, flammable or explosive products, or corrosive chemicals. Protect batteries from mechanical shocks , heavy pressure, strong magnetic fields, and direct sunlight.

Before storing, ensure the cabinet door is locked. This will effectively protect the air inlet and outlet of the all-in-one unit, preventing rainwater, sand, and dust from seeping into the system.System storage temperature: -30℃ ~55℃ Recommended storage temperature 0℃ ~35℃ The relative humidity for storage should be between 0% and 80%.

Inspect the equipment regularly during storage. Check it at least every two weeks to see if it is damaged, ensure that the outer packaging or surface is not damaged in any way, and prevent any damage that may be caused by pests and animals.

Long-term storage of batteries is not recommended, as it may lead to a decrease in battery capacity and a dispersion in battery consistency. This applies even when batteries are stored at the recommended storage temperature. Irreversible capacity decay and dispersion will still occur during this period. The longer the time, the greater the capacity decay and dispersion.

Under the above conditions, systems stored for more than 3 months should be charged and discharged once, with a maximum storage period of no more than 6 months, so that the system SOC reaches 20%~40%.

4. System installation

4.1 Pre-installation inspection

Before installing the system, please perform a product inspection to ensure that the system is free of problems or damage. If any abnormalities are found or the energy storage model is incompatible, do not disassemble the system and contact your supplier as soon as possible .

(1) Inspection of delivered goods

- Check the delivered items and accessories are complete.

(2) Product inspection

- Check if the received product is the correct model and style.
- Inspect the product's external and internal components for any damage.

4.2 Pre-installation preparation

It is recommended to contact a professional construction team or design institute for product installation and engineering construction to handle complex on-site installation situations and environments. An environmental survey should be conducted before installation to accurately assess the installation location and construction plan.

4.2.1 Installation location

When selecting an installation site, the climate and geological conditions should be fully considered, and areas with stress wave emission, groundwater levels , and low-lying terrain should be avoided .

The environment around the installation site should be dry and well-ventilated .

There should be no trees around the installation site to prevent branches and leaves from being blown away by strong winds and blocking the doors or air inlets of the energy storage system.

The installation location should be far away from areas with concentrated toxic and harmful gases, dust, and smoke, and free from flammable, explosive, and corrosive substances.

The installation location should be far away from residential areas to avoid noise.

Avoid installing the equipment in environments with vibration and strong electromagnetic fields. The magnetic field strength should not exceed 30 A/m.

Determine the installation location and cabinet orientation of the integrated industrial and commercial storage unit based on the site conditions .

The steps are as follows:

Step 1: Confirm The installation reference point for ESS on the concrete platform . Mark the reference point with a marker.

Step 2 Based on the ref erence points , mark the installation positions of the ESS base fittings using a chalk line and a soft measuring tape.

When marking the position of the corner piece The four lines should form a rectangle.

4.2.2 infrastructure

The foundation of an integrated industrial and commercial storage unit must be designed and constructed according to certain standards to meet the requirements of mechanical support, cable wiring, and subsequent maintenance and repair.

The foundation construction should at least meet the following requirements:

at the installation site should be compacted. It is recommended that the relative density of the soil at the installation site be no less than 98%. If the soil is loose , take appropriate measures or necessary engineering construction to compact and fill the foundation pit to ensure foundation stability and provide sufficient and effective support for the cabinet .

Industrial and commercial energy storage unit should be constructed with reference to the foundation plan provided by DoGo Power or confirmed by both parties. The flatness of the top table of the foundation should be less than 5mm. The construction requirements should not be lower than those recommended by DoGo Power.

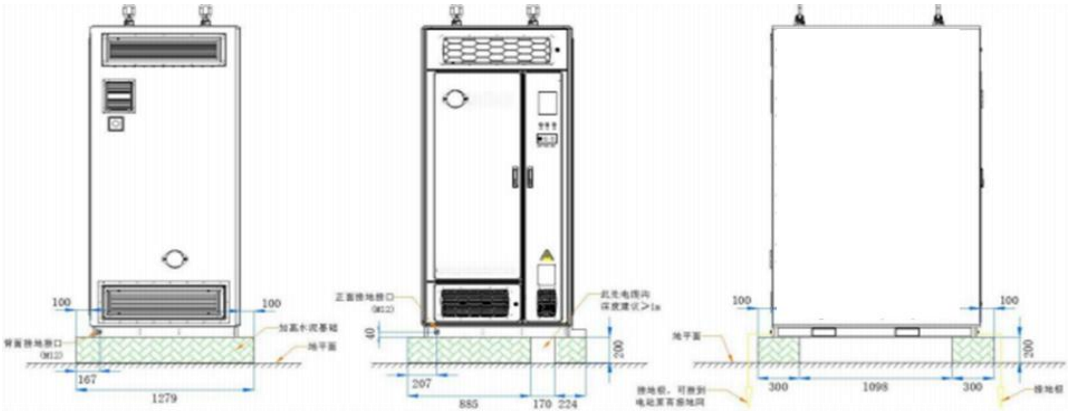
integrated C&I water storage unit should comply with local design specifications. It is recommended that the foundation height be higher than the historical highest water level to prevent rainwater erosion of the unit's bottom and interior. The specific height will be determined by the construction team based on site conditions.

Use a laser level to test the height of each base; the height difference between each base should be less than 5mm.

Construct a concrete foundation or other non-combustible surface with sufficient cross-sectional area. The installationsurface must be level, firm, flat, dry, stable, and have sufficient load-bearing capacity to support the weight of the product, without any risk of collapse or slippage . Depressions or tilts are prohibited. There must be no standing water.

Construct a suitable drainage system based on local geological conditions . Ensure the drainage capacity meets the local historical maximum rainfall requirements. During the rainy season or heavy rain, prevent the bottom and internal components of the all-in-one machine from being submerged in water .

The industrial and commercial storage integrated machine uses 8 M12 expansion screws are used for screwing and fixing. It is recommended that the expansion bolts and corresponding locking flat spring washers and nuts be made of 304 stainless steel.

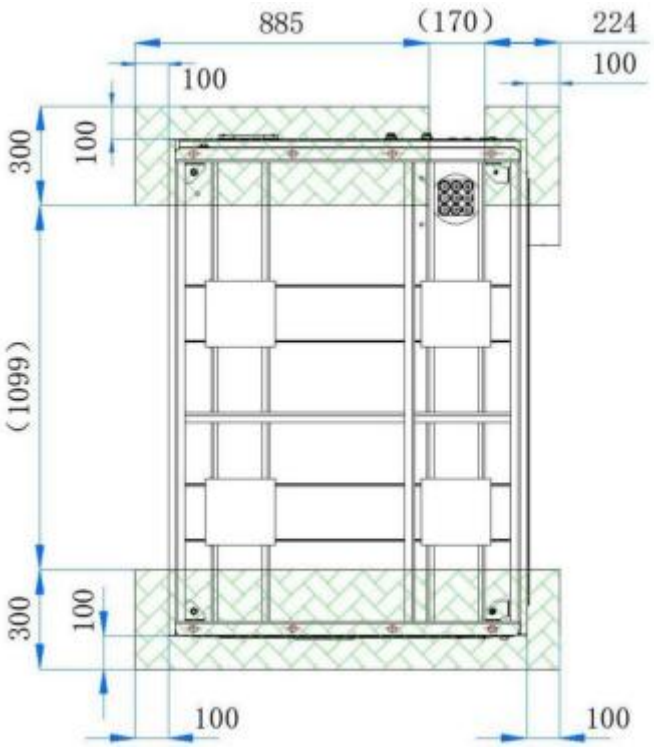


This section is not for foundation construction. The following foundation drawings should not be used as final construction drawings. This is for basic design reference only . Final engineering drawings must be prepared by professional

Figure 4-1 Basic schematic diagram of the all-in-one machine

The overall foundation construction effect is shown in the image above for reference.

For the all-in-one unit, it is recommended to configure at least three foundation support platforms to support the front and rear installation areas of the cabinet, avoiding the bottom cable routing holes. The relative positions of these platforms are shown in the diagram below. On-site planning and construction must meet this standard. The height of the foundation platforms should be adjusted according to site conditions and actual needs, ensuring that the bottom of the equipment is above the local historical highest water level, with a minimum recommended height of 200 mm . The recommended width of the foundation platforms is... 300 mm . Under the condition that the steel structure base of the foundation platform is subjected to uniform stress. Ensure that the minimum load-bearing capacity of the minimum foundation platform is not less than 50,000 kg.



picture 4-2 Reference Scheme for Bottom Foundation (Bottom View of a Single Cabinet)

4.2.3 trench construction

The integrated industrial and commercial storage machine uses a bottom-entry cable method. To prevent foreign objects from entering, the machine does not have a cable inlet hole on the side, and the cable must enter through a trench. Therefore, a trench needs to be pre-installed on site.

- foundation . To facilitate subsequent electrical wiring, it is recommended to pre-install cable trenches or troughs, cable entry and exit holes, and maintenance channels on the foundation according to the location and size of the cable entry and exit holes of the all-in-one machine , and to pre- embed conduits.
- The construction of cable trenches or cable trays and maintenance passages must include necessary dust and rodent-proof designs to prevent foreign objects from entering.
- Necessary waterproof and moisture-proof designs are required to prevent cable aging and short circuits from affecting the normal operation of energy storage products.
- needs to be considered to prevent water accumulation during rain and snow, which could lead to cable immersion and corrosion.

- If using a pre-embedded conduit solution Both ends of all buried pipes should be temporarily sealed to prevent impurities from entering and affecting subsequent wiring.
- The cross-sectional area of the cables must be fully considered when designing the cable trench . The inner diameter of the protective conduit should not be less than the outer diameter of the cable (including the protective layer). 1.5 times.

4.2.4 Pre-embedded grounding

The integrated cabinet must be reliably grounded on site, and a reliable grounding network should be planned for the site.

The recommended solution is as follows: Bury the grounding grid underground, and reserve a grounding wire or grounding bar at the corresponding grounding point on the outside of the integrated machine. Connect one end of the grounding wire or grounding bar to the buried grounding grid, and connect the other end to the grounding point of the integrated machine cabinet after the integrated machine is installed and fixed. When embedding the grounding wire or grounding bar, estimate and reserve a sufficient and appropriate length so that the grounding wire can be connected to the grounding point of the integrated machine.

The grounding resistance of the all-in-one machine should not exceed 0.1 Ω .

4.3 System installation

4.3.1 Installation spacing

To ensure the normal operation of the integrated unit and the proper opening of the equipment door, and to meet the required space distance between the air inlet and outlet, and to avoid the influence of hot air between adjacent systems, sufficient clearance should be maintained around the equipment. The equipment layout spacing is shown in the diagram below; the distances marked are the minimum distances considering installation, operation, heat dissipation, and maintenance. Customers can increase the distance according to local fire regulations, main road traffic requirements, and overall site construction needs; firewalls can be added if necessary.

Note: The following distance requirements refer to the distances between integrated server racks. It is not the distance between the foundations .

(1) Single system distance requirements

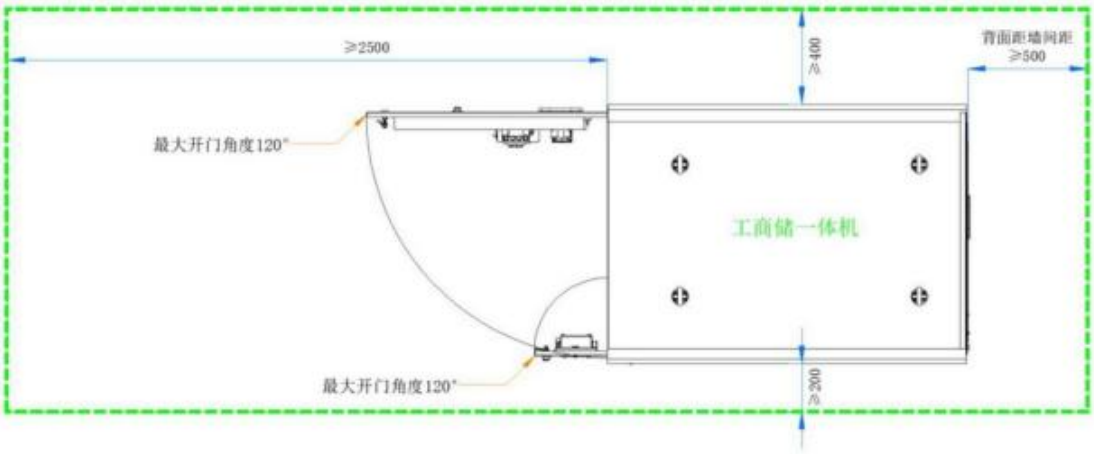


Figure 4-3 Installation of a single all-in-one machine

(2) Distance requirements for multiple systems

a. Install side by side

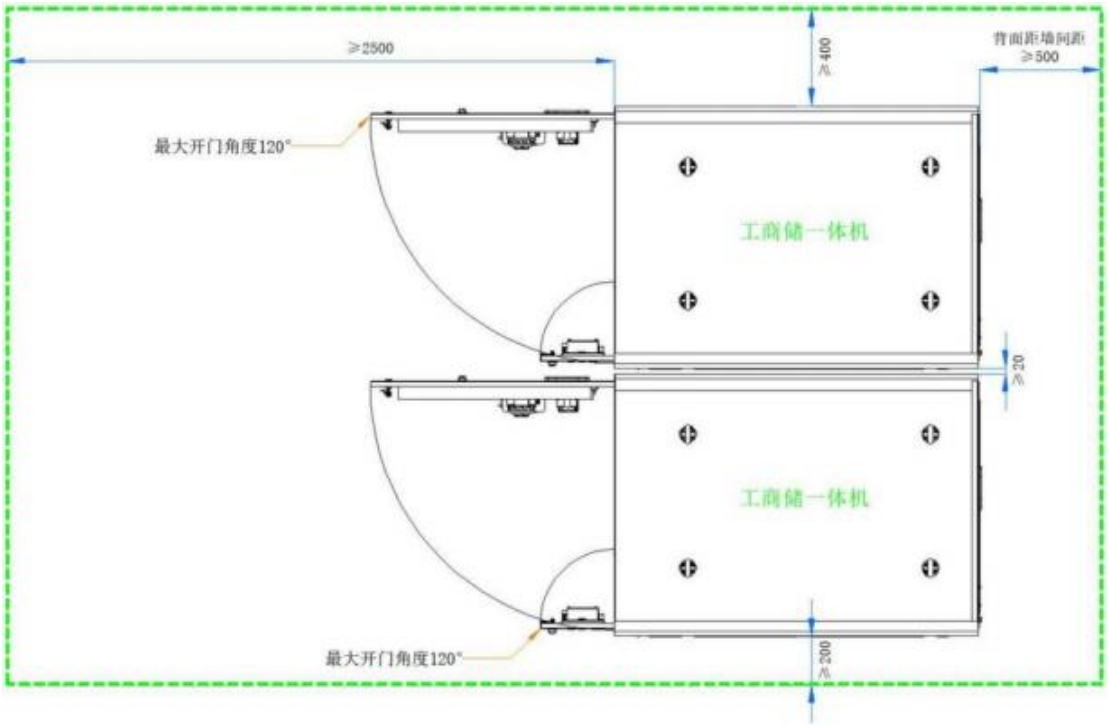


Figure 4-4 Multiple all-in-one machines side by side

b. Face-to-face installation

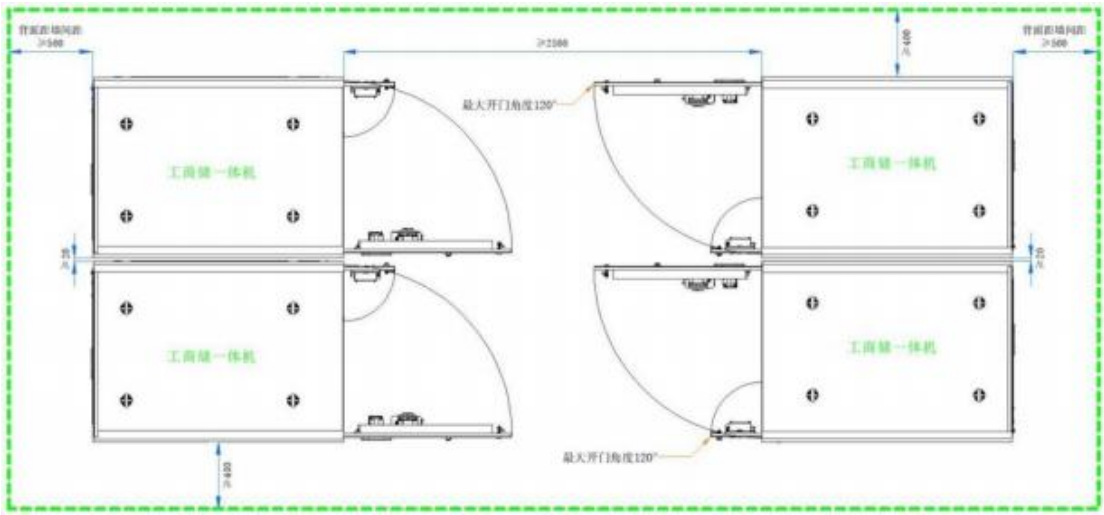


Figure 4-5 Multiple all-in-one machines facing each other

c. Back-to-back installation

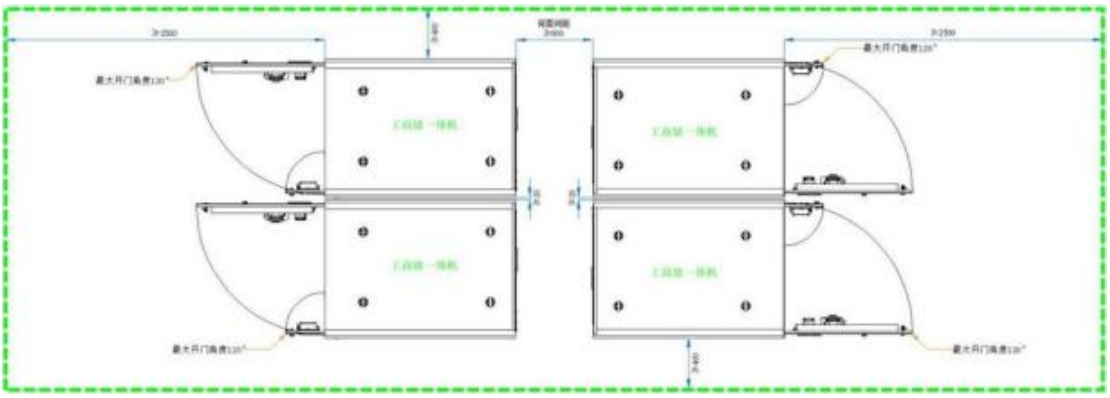
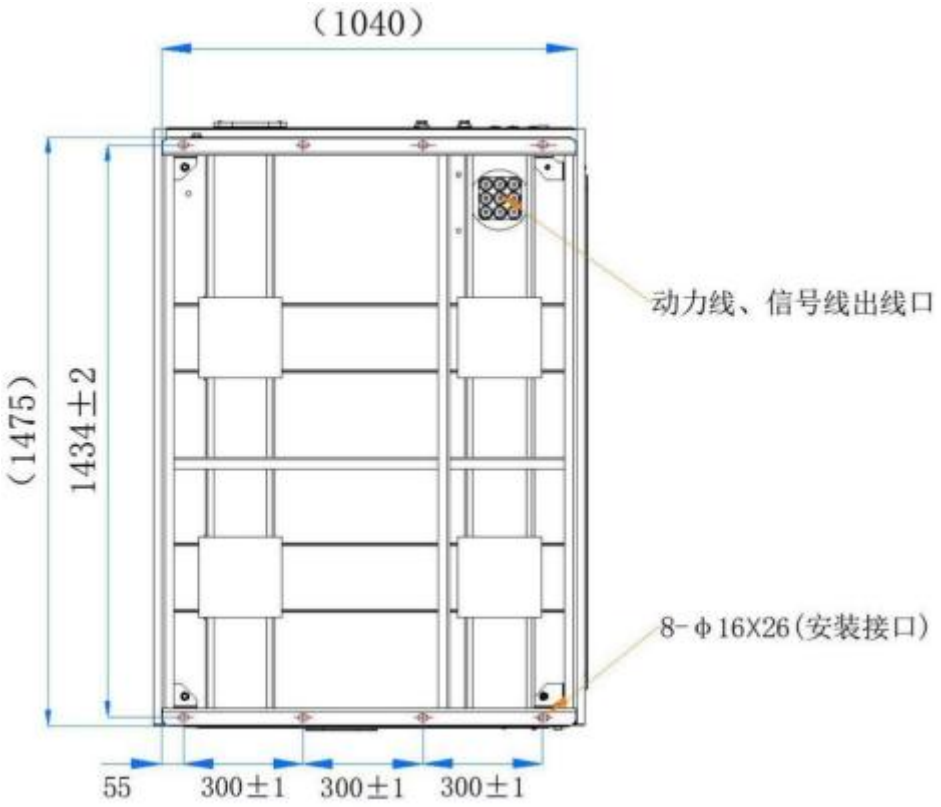


Figure 4-6 Multiple all-in-one machines back to back

4.3.2 Installation and fixing

After the all-in-one machine is transported and installed in the designated location It should be fixed.

The recommended fixing solution is a bolt hole fastening scheme: the bottom of the product has 8 oblong fixing holes with a specification of ф16*26, which can be used with 8 bolt holes. For M12 expansion bolts used for screw-in fixing, it is recommended that the expansion bolts, corresponding locking flat spring washers, and nuts be made of 304 stainless steel.



picture 4-7　Diagram of bottom mounting holes (bottom view)

4.4　Post-installation check

After installation, review and check the installation work. To ensure that the work is up to standard and meets product requirements.

(1) Whether it is installed in the designated or pre-designed location, if there is any deviation, adjustment is required.

(2) Does the flatness of the product's bottom mounting surface meet the requirements? If the requirements are not met , repairs or adjustments to the pads can be made.

(3) Does the surrounding space for product placement meet the requirements? Can maintenance vehicles travel and turn normally? If not, the obstruction position or the route needs to be adjusted.

(4) Check whether the grounding location is compatible with the product's grounding point. If not, the grounding location needs to be adjusted or the layout modified .

(5) Are there any foreign objects or blockages in the reserved cable trench/groove? Will this affect subsequent wiring? If so, it needs to be cleaned up promptly.

5. Electrical wiring

5.1 Wiring Precautions

Before wiring, please pay attention to the following points, ensure safe operation, and avoid potential safety hazards.

➢ When performing electrical wiring operations, personal protective equipment must be worn as required.

➢ Before wiring, check and ensure that all wire harnesses and cables are correctly polarized.

➢ During electrical wiring If you encounter drag resistance, do not forcibly pull any wires or cables. Otherwise, the insulation layer may be damaged and the insulation performance may be compromised.

➢ Ensure all cables and wires have sufficient room to bend. Do not force or bend cables in confined areas . And only when conditions permit. Necessary auxiliary measures should be taken to reduce the stress applied to cables and wires.

➢ After each electrical connection operation is completed, it must be carefully checked to ensure that the connection is correct and safe.

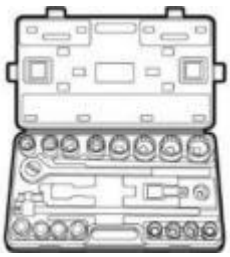
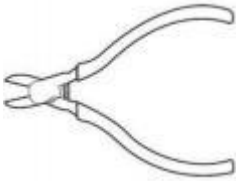
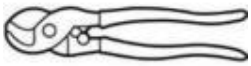
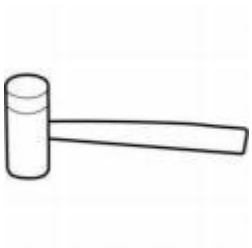
➢ Wiring work should be performed in sunny and dry weather. Avoid electrical connections during inclement weather such as rain, snow, sandstorms, or when the relative humidity of the surrounding environment exceeds 95%. Dust, sand, and moisture penetration may damage the electrical components of the product. This could affect its operating performance!

5.2 Preparation before wiring

5.2.1 Prepare tools

The wiring personnel must be professionals who are thoroughly familiar with the manual. In addition to wearing the necessary personal protective equipment, they must also have at least the following tools to assist in the wiring work.

table 5-1 Wiring tool list

 Torque screwdriver	 torque wrench	 Wire strippers	 Hydraulic clamps
 Torque socket wrench	 Diagonal pliers	 Cold-press terminal crimping pliers	 Wire cutters
 rubber mallet	 utility knife	 tape measure	 spirit level
 multimeter	 heat gun	 heat shrink tubing	 Cable ties

5.2.2 Cable selection

- Select a cable with an appropriate diameter based on the maximum load or

maximum current. Ensure that the current-carrying capacity of the cable meets the requirements.

- Select the appropriate cable length based on the beginning and end of the wiring location.

- All AC cables must have the same specifications and materials ; multi-core AC cables are recommended.

- Communication harnesses must be shielded harnesses, and if network cables are involved, they must be CAT 5e or higher.

- Flame-retardant cables should be used, and the cables used should comply with local laws, regulations, and standards .

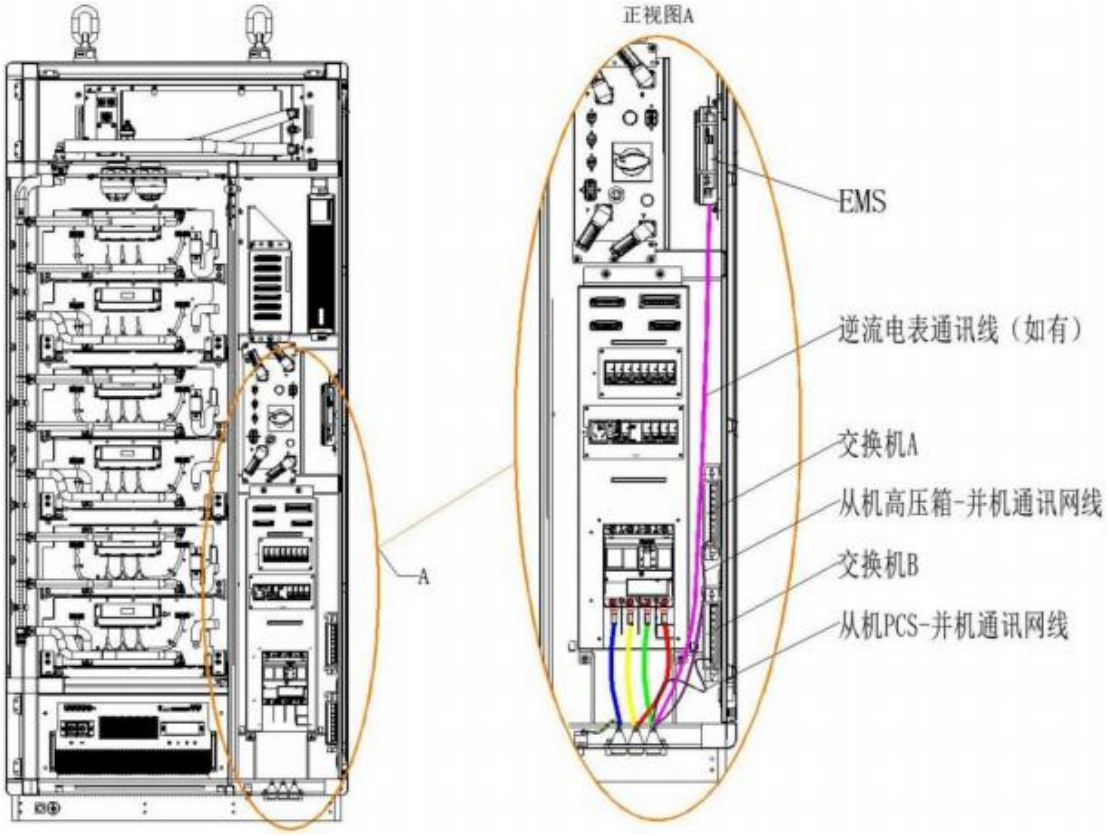
Recommended cable specifications are shown in the table below:

table 5-2 Energy storage system connection cable specifications

Cable Name	**Cable specifications (mm²)**	**Connection terminals**
power grid Phase A	ZRC - YJV 22-0.6/1 kV 4 ×70+ 1 × 35	SC 70-8
power grid Phase B		SC 70-8
power grid C Mutually		SC 70-8
power grid N phase		SC 70-8
Grounding PE		SC 35-6
Communication line	RVSP 2*1.5	E1508
network cable	CAT 6e	RJ45

5.2.3 Wiring area

The wiring area of the all-in-one machine is concentrated in the electrical compartment, which is located on the right side of the machine. Wiring can be performed by opening the compartment door through the surface lock. PCS wiring is at the bottom of the cabinet. On PCS equipment.



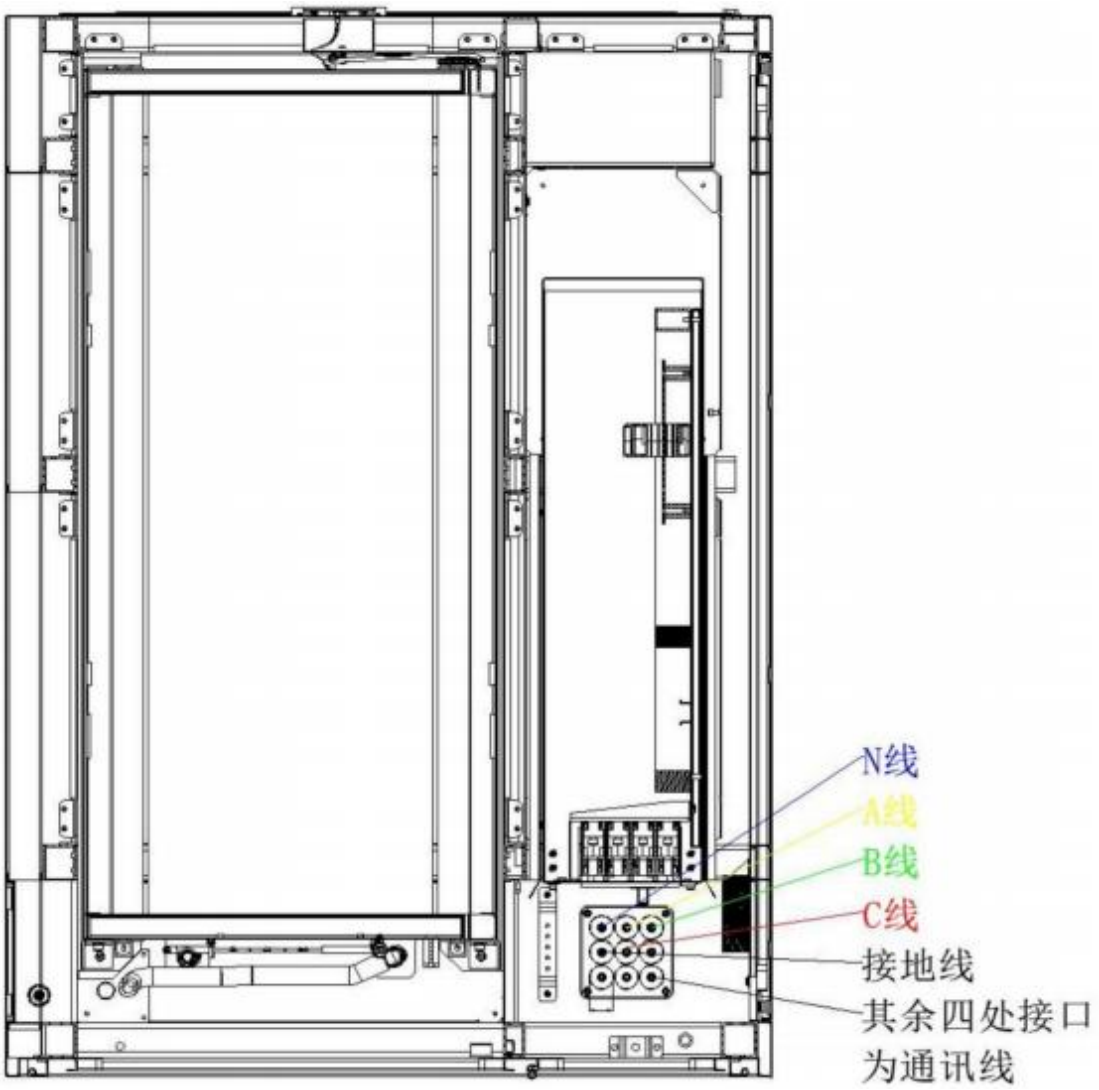
picture 5-1 Schematic diagram of wiring locations in the electrical compartment

Wiring is mainly divided into AC cable main wiring and communication lines. AC main wiring is primarily connected to the terminals of the external AC circuit breaker ; communication lines are divided into parallel communication lines and other external communication lines : the master-slave cabinet parallel communication line is mainly connected to the switch, used for information exchange between the master and slave units; the PCS off-network parallel line is mainly connected to... On PCS, run offline. PCS operation synchronization; other external communication lines (if needed) are mainly connected to the EMS terminal block. It is used for external communication or for connecting and disconnecting information from meters such as those preventing backflow. The specific wiring area is shown in the diagram above .

5.2.4 Cable entrance

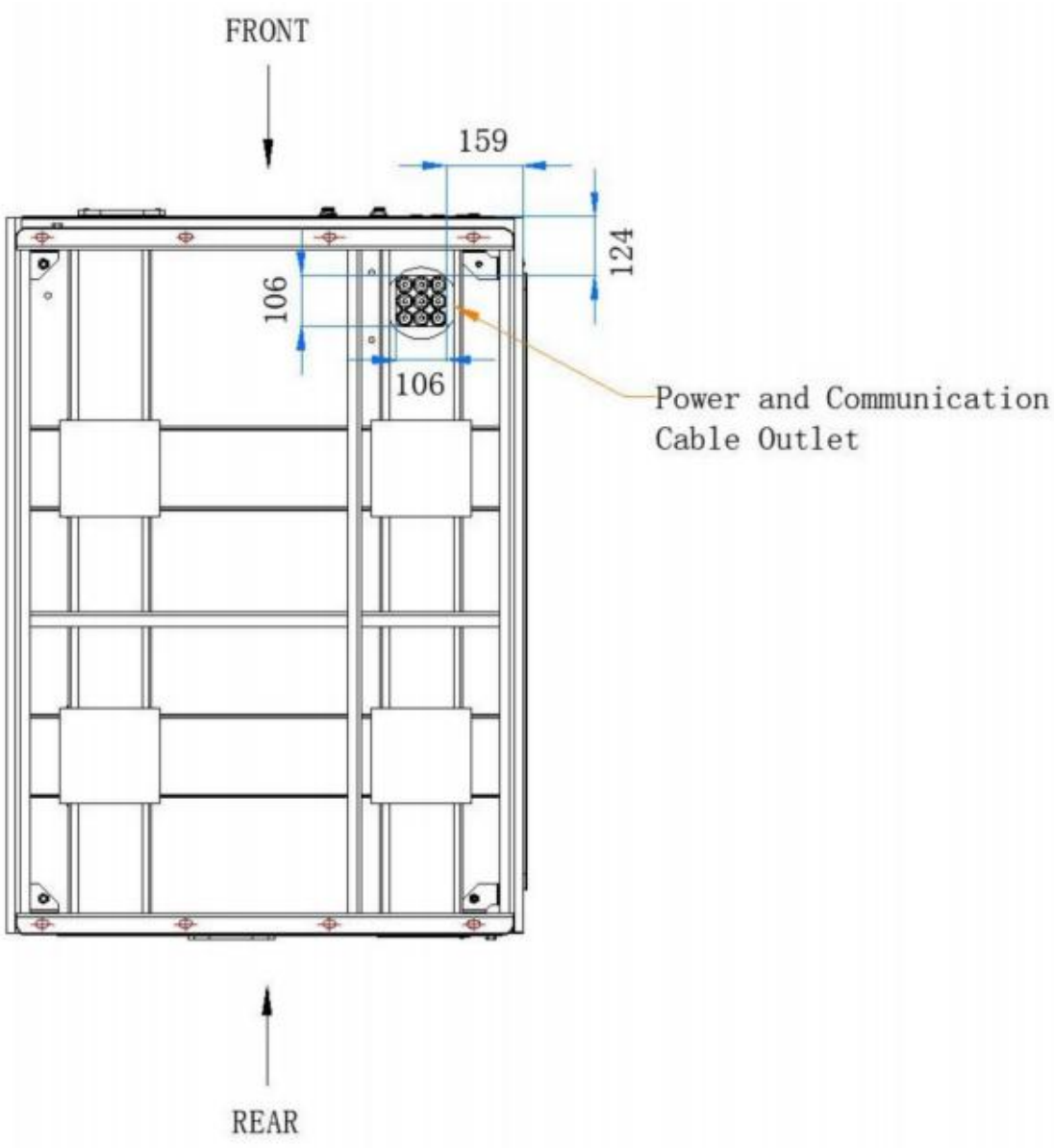
The cable harness between the all-in-one unit and external devices is routed from the bottom of the all-in-one unit. Measures should be taken to protect all cables and harnesses of the all-in-one unit, such as laying cable protection conduits or installing

dedicated cable trays , to prevent rodent damage . The cable inlet and outlet holes at



the bottom of the all-in-one unit are shown in the diagram below.

picture 5-2 Schematic diagram of cable inlet/outlet at the bottom of the all-in-one machine (top view)



picture 5-3 Dimensions of the cable inlet/outlet at the bottom of the all-in-one machine (bottom view)

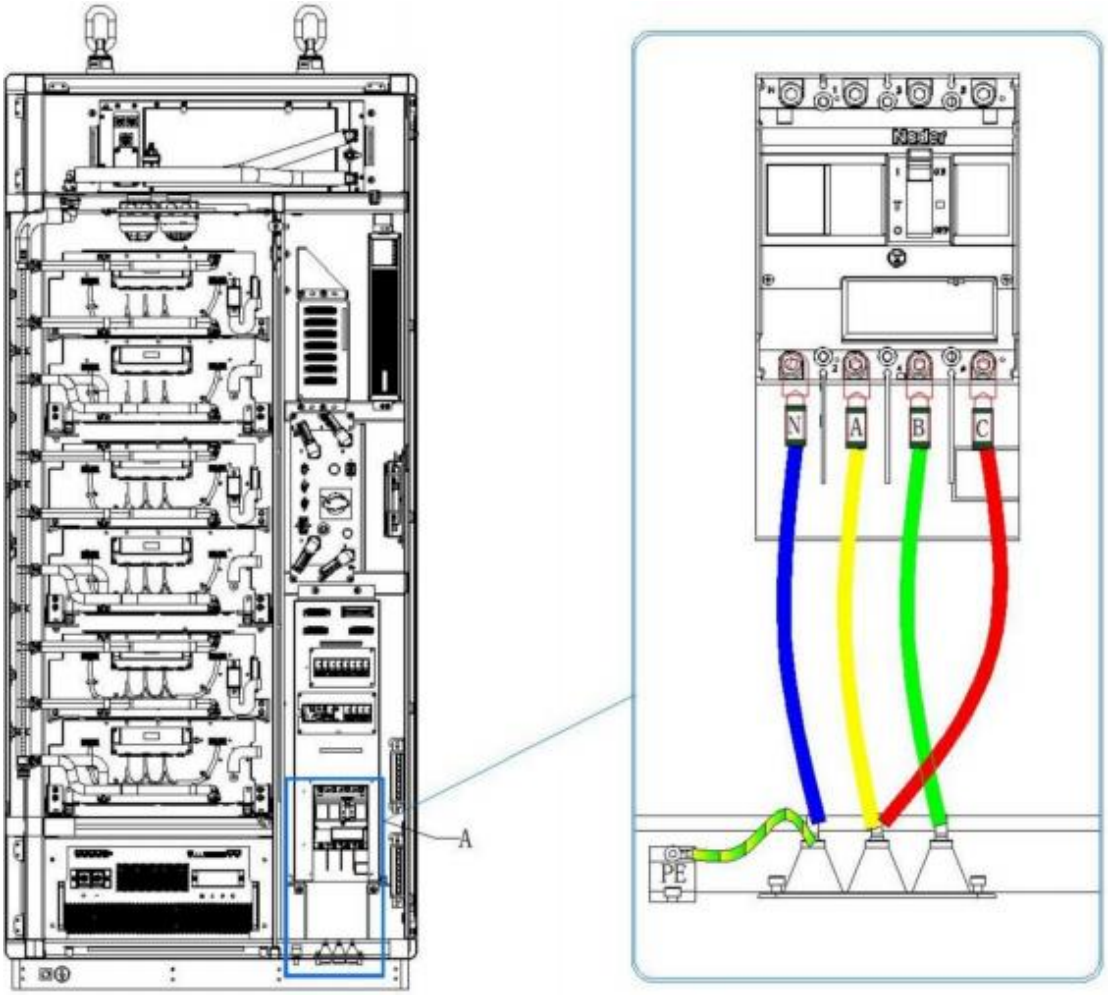
The bottom of the all-in-one unit uses a 9-hole cable tray for cable entry and exit. All cables or wire harnesses should be threaded through each hole into the compartment for wiring. One wire per hole should be maintained as much as possible to avoid excessive compression or gaps when multiple wire harnesses pass through the same hole. The maximum elastic deformation of the inner diameter of a single hole is 30mm. It is recommended that the maximum outer diameter of the cable or terminal be within [specific range missing]. Between 13.5-30mm .

After wiring is completed Fireproof/waterproof materials such as fireproof putty must be used to seal the gaps between cables and openings to prevent foreign objects or moisture from entering and affecting the normal operation of the product in the long term!

5.3 AC cable wiring

5.3.1 Wiring position

The AC cable connection of the integrated unit, as the only interface for external energy exchange of the system, is located at the terminal block below the AC circuit breaker in the electrical compartment. Points N~4, as shown in the diagram below. This is the auxiliary power supply for the all-in-one system ; it draws power from this internal circuit within the product. Internal wiring has been designed and completed. Customers do not need to connect auxiliary power supply wires.



picture 5-4 AC cable connection location

table 5-3 AC cable connection port instructions

Location	port	PIN definition	Cable specifications	Recommended cable	Wiring hole diameter	Torque

Circuit breaker QF 1	N(8)	N	1 * 70 mm 2	copper cable	M8	15 N·m
	2	A	1 * 70 mm 2	copper cable	M8	15 N·m
	4	B	1 * 70 mm 2	copper cable	M8	15 N·m
	6	C	1 * 70 mm 2	copper cable	M8	15 N·m
groundi ng busbar	PE	PE	1 * 35mm 2	copper cable	M6	9 N·m

5.3.2 Cable wiring

When wiring cables, first thread the cable through the bottom outlet hole, pull it to the corresponding wiring position, and mark the polarity. To avoid polarity errors, ensure the OT terminal is tightened after wiring, and then follow the steps below for wiring instructions .

step 1. Confirm that all output switches in both the pre- and post-stages are in the off state.

Step 2: Strip the insulation from the cable end to expose the copper core. The length of insulation stripped from the cable end should be the depth of the copper lug crimp hole plus... Approximately 5mm. Heat shrink tubing should be pre-applied at this point.

Step 3: Apply heat shrink tubing.

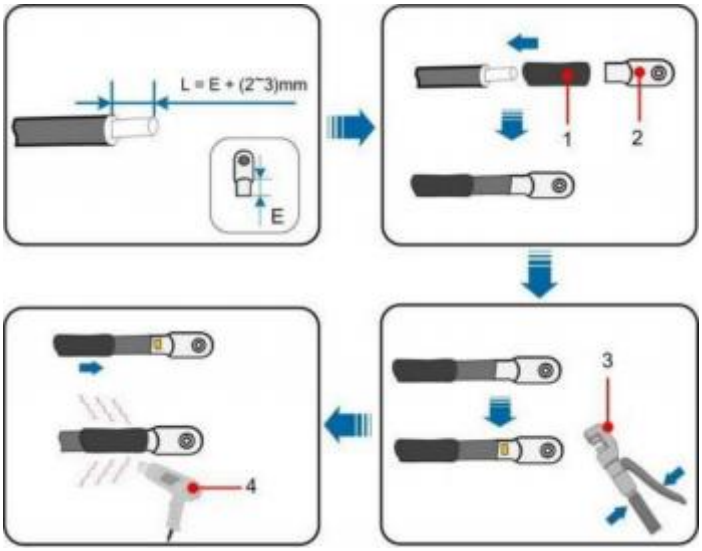
- Select heat shrink tubing that matches the cable size, with a length extending approximately 2cm beyond the copper lug crimping tubing.
- l Pre-fit the heat shrink tubing onto the cable.

Step 4: Crimp the connector lugs. Select the appropriate connector lugs based on the chosen cable specifications.

- stripped wire end, with the exposed copper core, into the crimp hole of the connector lug. Ensure there is no exposed copper.
- cable or wire harness to be crimped and its matching terminals, select the appropriate crimping tool and crimp the copper lugs tightly. The number of crimps should be at least two.

Step 5: Tighten the heat shrink tubing.

- Place the heat shrink tubing over the copper lug of the connector, ensuring it completely covers the crimping hole of the copper lug.
- Use a hot air blower to tighten the heat shrink tubing.



picture 5-5 Cable crimping diagram

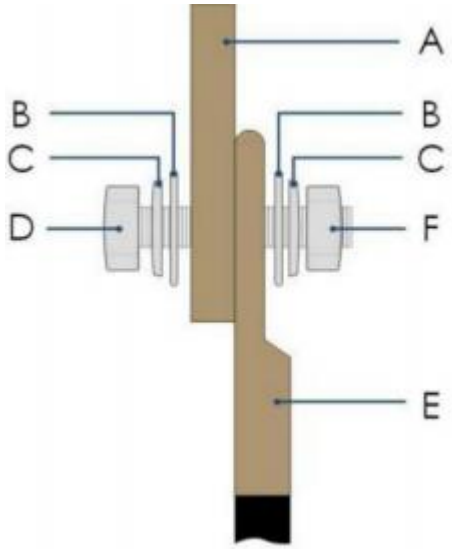
table 5-4 crimping instructions

Serial Number	**Component Name**	**Serial Number**	**Component Name**
1	Heat shrink tubing	3	crimping tools
2	OT / DT terminals	4	heat gun

Step 6 : wiring

- Select terminal blocks that match the busbar holes; single-hole terminal blocks are recommended.
- Press the copper lug of the connector onto the designated wiring position. When making contact, the maximum contact area should be used. After contact, the surface should be flat and without any lifting.

- Select bolts that match the wiring terminals and busbar wiring holes. Ensure that the bolts are securely and reliably tightened.



picture 5-6 Cable Wiring Reference Diagram

table 5-5 Wiring Locking Instructions

Serial Number	illustrate
A	copper busbar
B	flat gasket
C	Spring Washer
D	bolt
E	Copper terminal blocks (OT)
F	Nut

5.4 Communication harness wiring

5.4.1 Wiring area

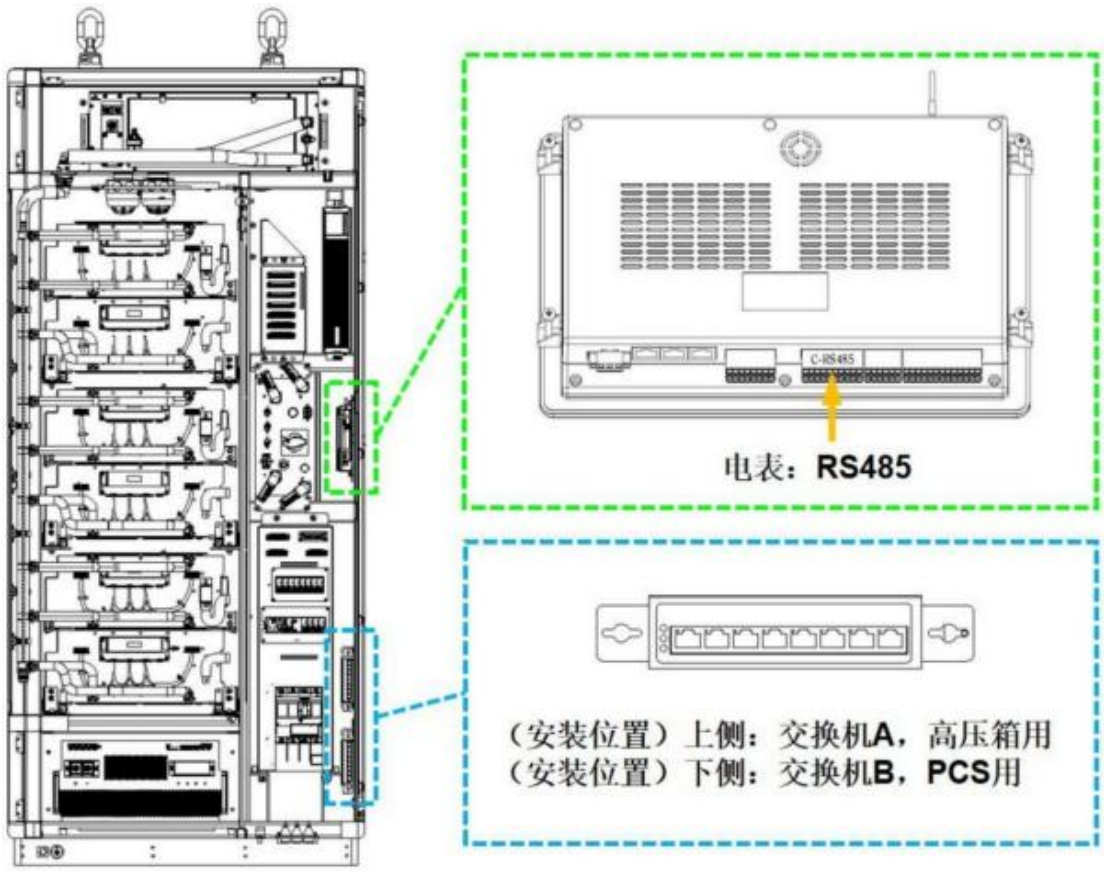
(1) Regular grid connection

The all-in-one machine is equipped with a 3S control system. It can independently complete the operation, control , protection and data monitoring of the system without

relying on any external devices .

When the all-in-one machine is a standalone/standard machine No communication cable connection is required. When multiple all-in-one machines are configured as master and slave , the slave machines need to connect their communication cables to the master. Parallel communication uses network cables, and the wiring area is located at the two switches below the electrical compartment inside the master . Switch A, installed on the upper side, connects to the high-voltage box of the slave machine for communication; Switch B, installed on the lower side... , connect to the PCS communication of the slave device.

If other electricity meters are communicating with externally, access can be made. C below EMS Terminal blocks. The specific wiring area is shown in the figure below.



picture 5-7　Schematic diagram of communication harness wiring area

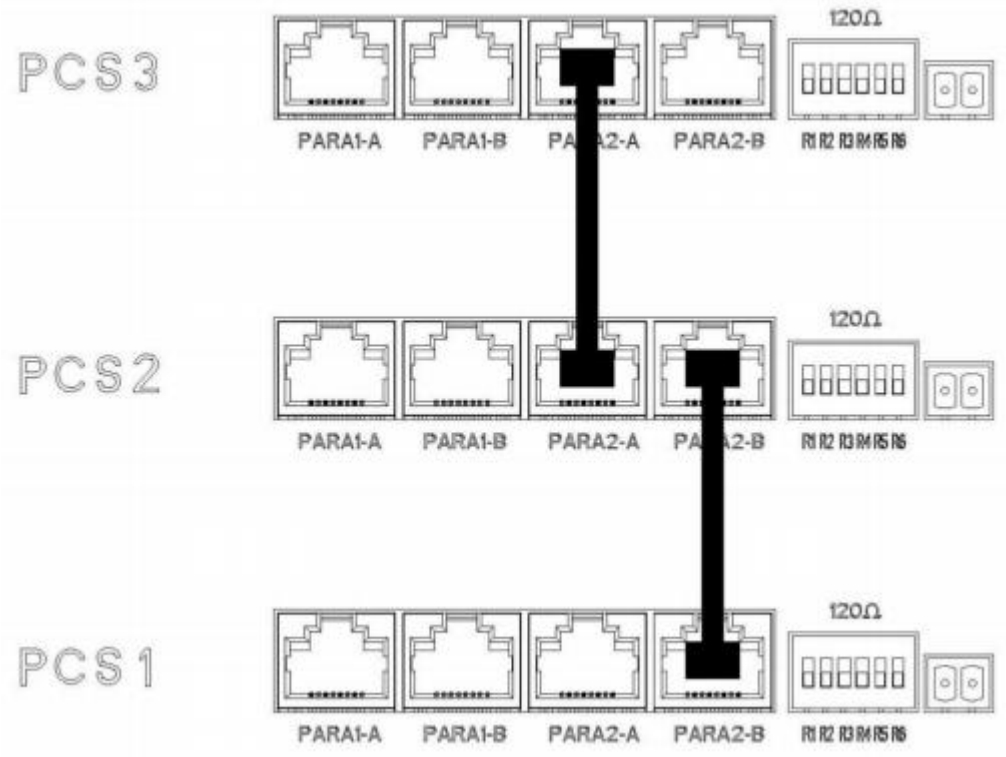
table 5-6　Communication harness connection port instructions

Port	Port Description	Recommended wiring harness	Interface definition	Interface
host Switch A	High-voltage	CAT -6e	Slave high-	RJ45

	box parallel operation LAN		voltage box: LAN	
host :switch B	PCS parallel operation LAN	CAT -6e	slave machine PCS : LAN 1	RJ45
host EMS : C- RS 485	Anti-backflow meter 485 (If any)	RVSP 2*1.5	10 :485-A 9:485-B 20 :485-G	E1508
host EMS : C- RS 485	Electricity meter 485 (If any)	RVSP 2*1.5	8 :485-A 7:485-B 18 :485-G	E1508

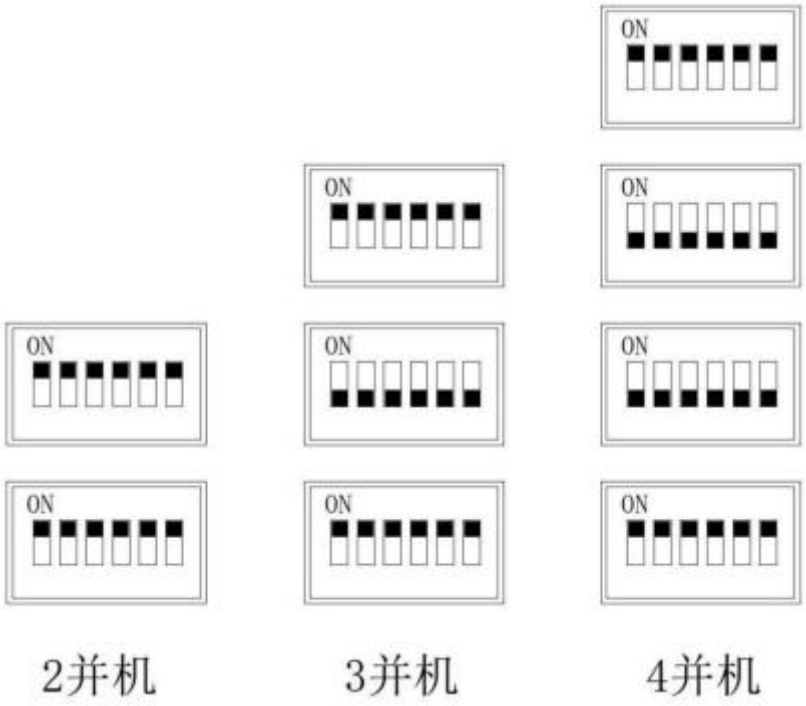
(2) Off grid

Master-slave parallel operation If used in an off-grid environment, in addition to the above-mentioned parallel communication line wiring... It also requires connecting a PCS parallel communication line. PCS parallel communication uses network cable connection. The wiring harness connection area is located The multi-cabinet parallel operation interface area on the PCS panel . Each parallel operation interface consists of two network ports (interfaces 3 and 4 in the diagram below). When paralleling with other modules, the wiring must correspond precisely to each port. See Figure 2-9 for location. B.



picture 5-8 PCS Off-grid parallel communication wiring diagram

In addition to connecting each module's interface to the same interface of another module using a parallel cable, it is also necessary to configure the matching resistor DIP switch (box 5 in the diagram above). Example of parallel DIP switching:



picture 5-9 Parallel DIP switch diagram

When paralleling All DIP switches for the first and last racks must be switched to ON. Turn the others to OFF!

When four modules are connected in parallel, the first and fourth modules are switched to ON, while the second and third modules are switched to OFF.

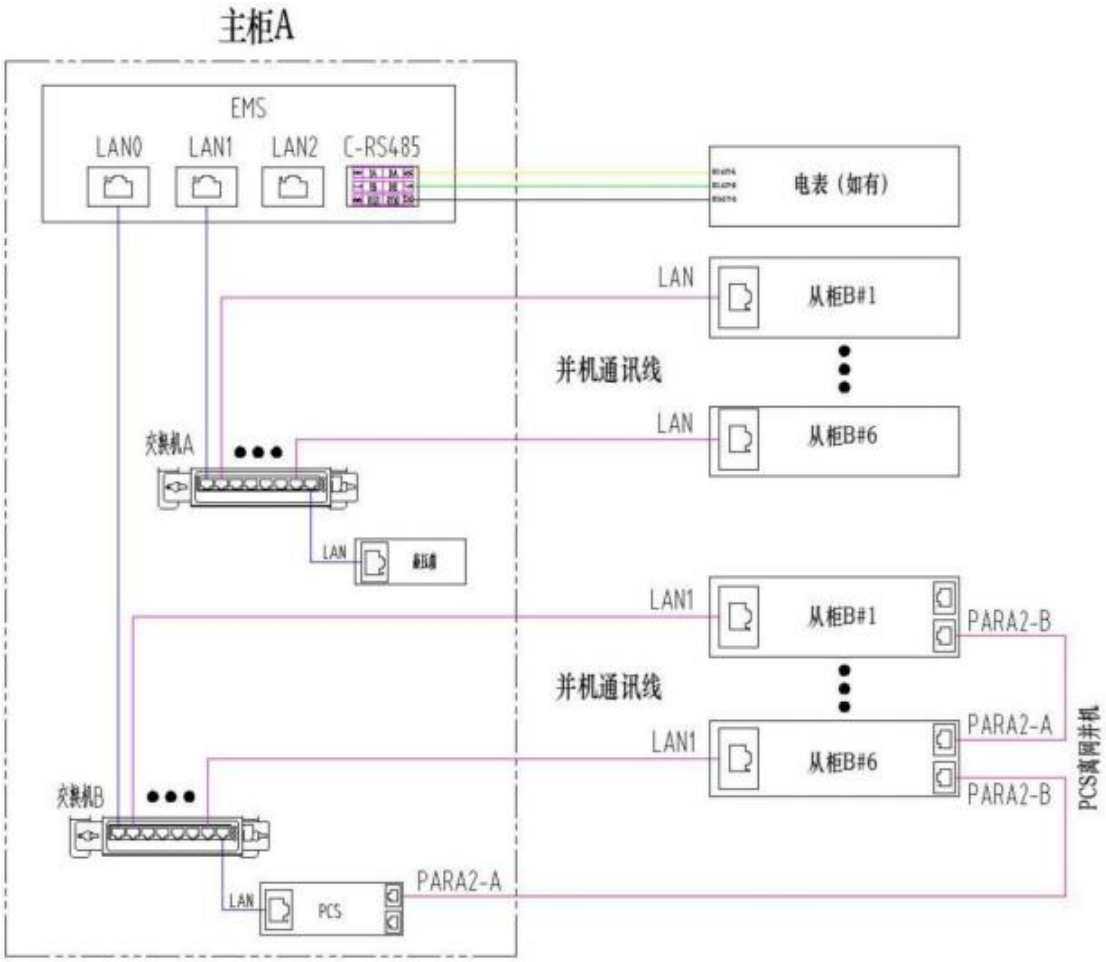
table 5-7 Off-grid usage requirements

Off-grid operating parameters	**project**	**parameter**
	AC off-grid voltage	AC 400V
	AC voltage range	AC 400V±3%

	Off-grid frequency	50 Hz / 60 Hz
	Offline output THDU	≤ 3% (linear load)
	Unbalanced load capacity	100% (Three-phase) 100% and single phase 15% ~ 20%
	Load current	Motor load inrush current < PCS rated current 1.2 times
	Number of parallel machines	Maximum number of offline parallel machines: 4 tower

5.4.2 Wiring harness connection

When wiring the harness, the communication cable must first be threaded through the lower outlet hole and pulled out to the corresponding position in the electrical compartment for wiring. And clearly label the wire harness to avoid wiring errors. After wiring, ensure the communication cable connectors are secure . The RJ45 is securely locked and will not loosen. When wiring through holes, structural corner brackets inside the electrical compartment can be used to bind and secure the wire harness for aesthetically pleasing and secure wiring. The specific wiring diagram is as follows:



picture 5-10 Communication wiring diagram

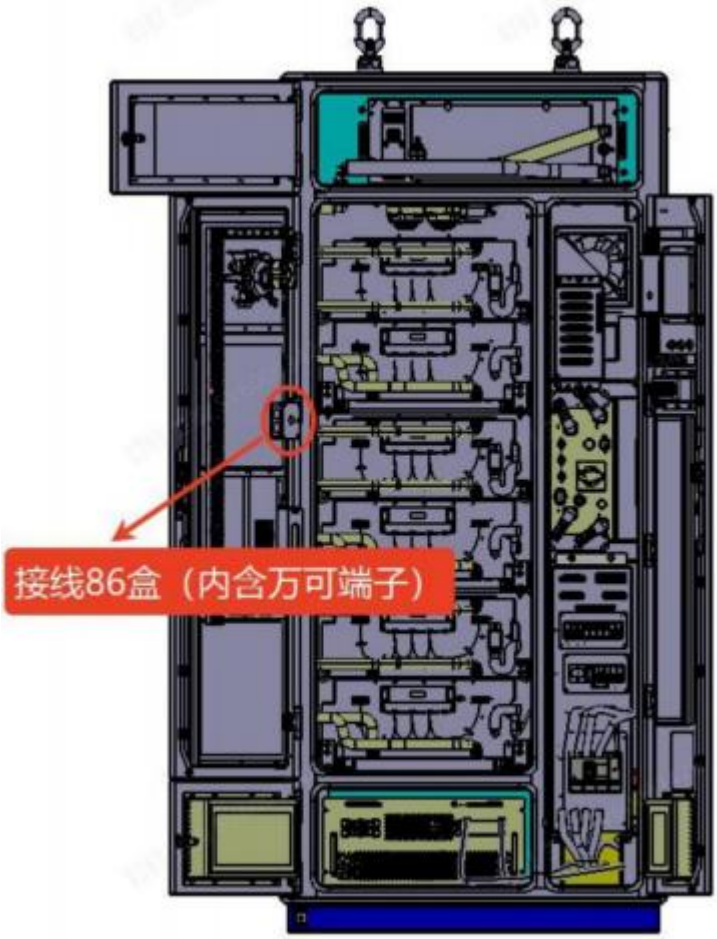
5.5 Fire protection wiring harness

5.5.1 Wiring area

To prevent the fire protection system from malfunctioning during transportation and installation, To facilitate on-site acceptance and commissioning , the fire protection wiring was disconnected. Complete wiring will be performed only after all installation, commissioning, and acceptance work is completed on-site .

The wiring area is located inside the battery compartment door panel, box 86. When wiring, first open the 86 box, remove the insulating tape from the reserved wiring harness connection point , and insert the corresponding universal terminal.

The wiring positions are shown in the diagram below:



picture 5-11　Fire wiring location diagram

5.5.2　Wiring harness connection

The wiring for fire-fighting aerosol systems consists of a 24VDC power supply line and a feedback line. When wiring, carefully identify the pin definitions to ensure correct connection. The wiring diagram is as follows:

table 5-8　Communication harness connection port instructions

port	Port Description	Recommended wiring harness	Interface
FES:COM	Feedback points public points	RVVSP :2*1.0	Pin-type terminals
FES: NO	Feedback point always open	RVVSP :2*1.0	Pin-type terminals
FES :V+	24V Power supply +	RVV : 1.0	Pin-type terminals

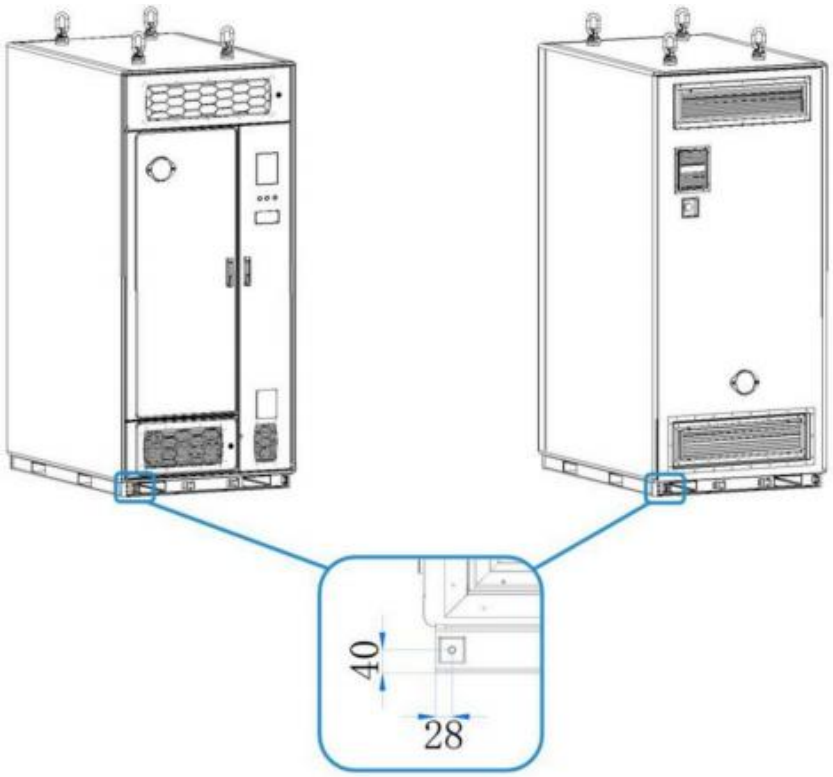
FES :V-	24V powered by-	RVV : 1.0	Pin-type terminals

5.6 Grounding cable wiring

5.6.1 Grounding position

The integrated unit is grounded via an external grounding point. To facilitate on-site cable connections, two grounding points are designed at diagonal positions on the bottom of the unit, located at the lower left corners of the front and back of the cabinet , as shown in the diagram below. These points are used to connect to the pre- installed grounding grid at the work site . The grounding grid construction should refer to "4.2.4 Pre-embedded Grounding".

The product must be double grounded. Both grounding points must be reliably grounded. The product must be grounded strictly in accordance with local standards and regulations .



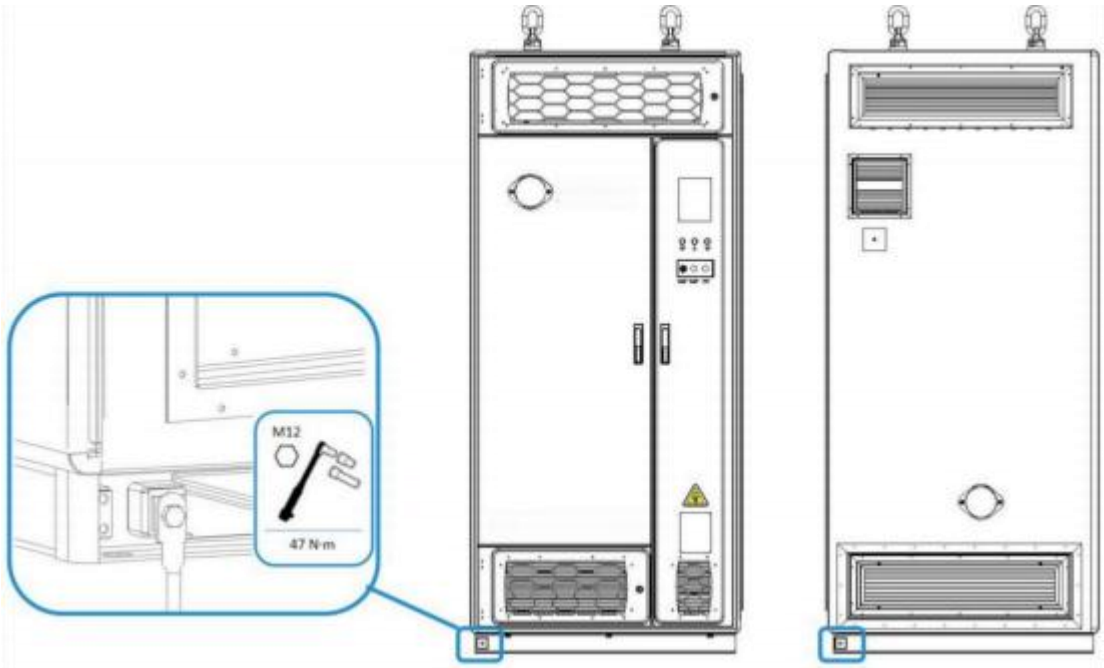
picture 5-12 Grounding hole location

5.6.2 Grounding method

After grounding work, the exposed metal at the connection point must be properly

protected against corrosion.

The recommended size of the grounding cable is half the cross-sectional area of the phase conductor, and the grounding cable must be the same as the phase conductor. The grounding resistance should be measured after the grounding connection is made, and the resistance value should not exceed 4Ω . For the product grounding point, use a standard grounding cable and secure it using an OT locking method with a torque of 47 Nm to ensure a reliable connection between the grounding point and the system grounding point.



picture 5-13 Cable grounding diagram

table 5-9 Cable grounding specifications

Port	Number of grounding	Specification	Grounding	Wiring hole diameter	Torque
Grounding	2	2 * 35 mm 2	grounding cable	M12	47 N·m

5.7 Check after wiring

After all electrical connections are completed, a thorough and careful inspection of the system and wiring is required to prevent damage to products or personnel caused by incorrect wiring or improper operation.

- Check if the phase sequence of the AC cable is correct. Are the wiring terminals secure? Check if the cable markings are correct. Inspect the AC cable terminals for short circuits between phases and between phase and ground.

- Check that the grounding cable is secure, that the cable markings are correct, and that the grounding continuity is good.

- Confirm that the cable connection is reliable, with no signs of aging, breakage, insulation damage, or abnormal bending .

After confirming correct wiring and completing the inspection, the wiring holes at the bottom of the system must be sealed, blocking the gaps around the cable entry holes (fireproof putty can be used). After completion, close and lock the cabinet door. Ensure that closing the door and blocking the entrance do not interfere with each other.

If the all-in-one machine is not properly sealed, there is a risk that moisture, rodents, insects, and other foreign objects may enter.

6. Power-on and power-off operation

6.1 Pre-power-on checks

Before powering on the all-in-one machine, the device status and wiring must be checked and verified. Confirm that the system is in a safe and suitable power-on state. At the same time... Confirm that the external devices are in normal condition. The system or project is ready for grid connection or startup.

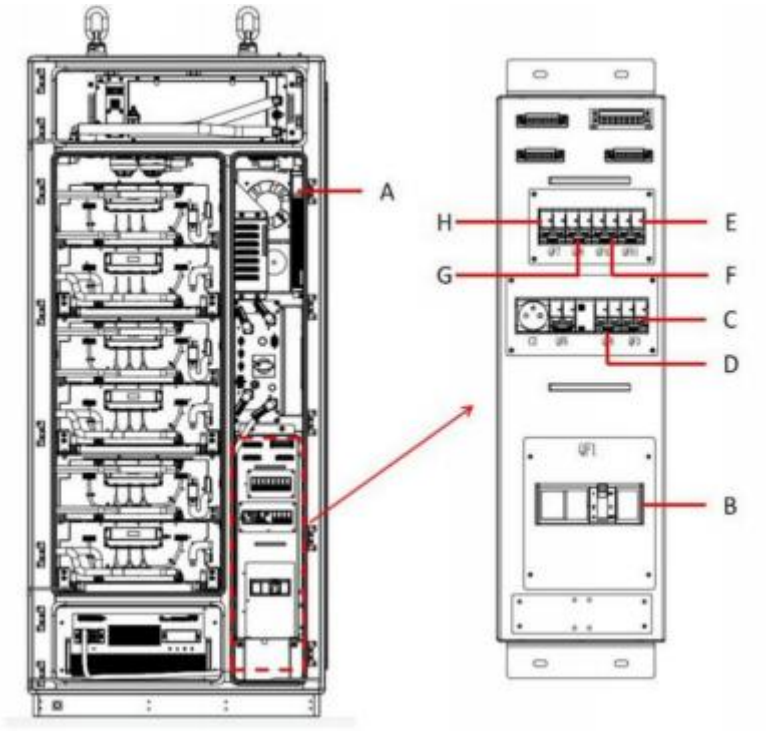
At least check the following:

- Check if the wiring is correct.
- Check if the protective cover inside the equipment is securely installed.
- Check if the emergency stop button is released.
- Check and ensure there are no grounding faults.
- Check communication and Check if the DC voltage meets the startup conditions and ensure that the multimeter does not have overvoltage.
- Check and ensure that no tools or parts are left inside the equipment.
- Check all air inlets and outlets for blockages.

6.2 Power-on operation

The distribution box is equipped with various switches for circuit switching and protection control. Powering on requires following the correct procedure to close each switch. The electrical switches in the distribution box are shown in the diagram below.

After operating each switch according to the steps, the all-in-one machine completes the DC side closing and power-on and outputs DC power, then power is applied again. PCS For the PCS power-on procedure, please refer to the corresponding operation manual for each machine model.



picture 6-1 Internal layout diagram of the all-in-one machine

table 6-1 All-in-one machine electrical switch instructions

Serial Number	**Component Name**	**Serial Number**	**Component Name**
A	ups Start button	E	QFA 1 High Voltage Box Power Supply Switch
B	QF 1 AC main switch	F	QFA 2 24V Control power switch
C	QF 3 Auxiliary Power Switch	G	QF 6 Fan switch
D	QF 4 Water machine switch	H	QF 7 UPS power supply switch

Please follow the steps below to power on the device.

1. Confirm that the emergency stop switch is in the open position;
2. AC main incoming line switch QF1 Close the circuit breaker;
3. Switch the auxiliary power switch QF3 closed;
4. Turn on the UPS power supply switch QF7, then press and hold the UPS power button for 1 second. After the UPS turns on, proceed to the next step.

5. Close the water turbine power supply switch QF4 and the fan power supply switch QF6 in sequence;

6. Close the power button switch of the high-voltage box, then close the power supply switch QFA1 of the high-voltage box. After the power indicator light of the high-voltage box turns red and the status indicator light turns green, proceed to the next step.

7. Close the 24V power supply switch QFA2. Power on and enter standby mode;

Note The EMS is powered on in this step, and an alarm may be triggered because the isolating switch in step 6 was not closed.

h. After the system check confirms there are no problems, close the high-voltage box isolating switch.

i. After confirming the settings are correct on the EMS operation page, click "One-Click Power On" to complete the power-on process for the all-in-one machine.

Note When the energy storage cabinet malfunctions The system's self-protection mechanism prevents it from being powered on.

6.3 Power-down operation

6.3.1 Normal power-down

Performed during commissioning, maintenance, and repair of facilities . This is a planned power outage.

Please follow the steps below to power off.

Before powering off, ensure that the all-in-one system has no power fluctuations.

1. Confirm exit from charging/discharging state ,set up PCS shutdown Wait 5 seconds , EMS click to power off; contactors and other components inside the high-voltage box disconnect.

2. Manually disconnect the high-voltage box isolating switch;

3. Open the 24V power supply switch QFA2 inside the cabinet;

4. Open the high-voltage box power supply switch QFA1, and then open the high-voltage box power button switch;

5. Turn off the UPS power supply switch QF7, then press and hold the UPS power button for 3 seconds to shut down the UPS;

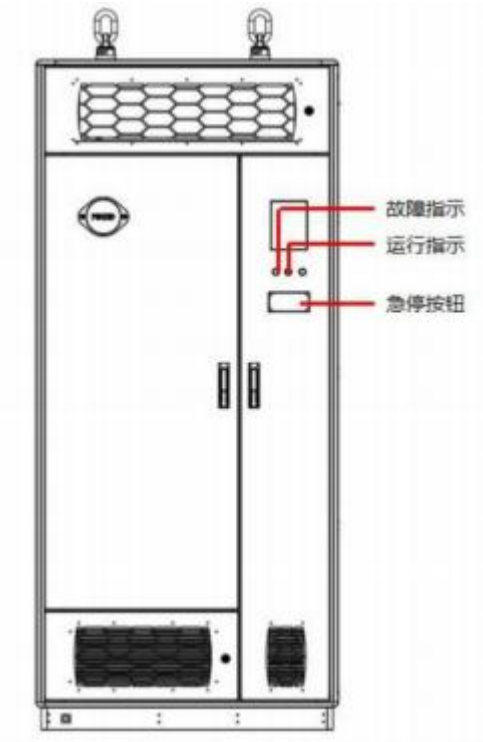
6. Turn off the water turbine power supply switch QF4 and the fan power supply

switch QF6 in sequence;

7. Open the auxiliary power supply switch QF3;
8. Open the main incoming line switch QF1 and power off .

6.3.2 Emergency power outage

In case of an emergency requiring immediate power-off and shutdown Press the emergency stop button on the electrical compartment door of the integrated machine. The system will shut down immediately. The operation indicator light will turn off, and the fault indicator light will remain solid yellow. See the diagram below for the location



of the emergency stop button on the all-in-one machine.

picture 6-2 Emergency stop button location

7. Interface Operation Instructions

7.1 System Homepage

Connect the EMS power supply and power on. The system homepage interface is shown in the figure. As shown in 7-1:

picture 7-1 System homepage interface

(1) Energy storage system status

- **Centralized control switch:**

Shutdown process: Settings The PCS control power is 0 and enters standby mode. The PCS is then turned off, and the BMS is then turned off to control the trip.

Power-on procedure: Central control unit powers on, controls... PCS and BMS power-on, fault detection, no level 2 or higher faults found, then enters standby mode.

- **Control source:**

Local: Local operation mode.

Remote: Commands can be issued via a cloud platform.

- **Control Mode:**

It allows you to quickly jump to the power settings page under the energy management function.

(2) Power curve

Exhibit Power curves for 1 hour and 24 hours.

- **Target power:**

The total active power is specified below.

- **Control power:**

actual Total power output by PCS.

(3) Heap system topology diagram

- **System status**

Operating status: A certain pile/cabinet The PCS is in a charging or discharging state;

Standby status: All stacks/cabinets are in standby status;

Shutdown status: All stacks/cabinets are in a shutdown state;

Fault status: All stacks/cabinets are in a fault state;

(4) Electricity meter

It includes displays of electricity meters and anti-backflow meters.

- **Electricity meter**

This displays the total active power and total active energy of the meters in the system. Clicking on a meter will display more data.

- **Anti-backflow meter**

Display the total active power and total active energy of the anti-backflow meter (if any) in the system. You can click to view more data for this anti-backflow meter.

(5) Stack/Container Information

This displays basic data for all stacks/cabinets under the centralized control equipment management system. Clicking on the corresponding stack/cabinet will take you to its information page .

state: Displays the on/off network status in PCS;

temperature: The average of the highest temperatures in each cluster;

Voltage: The average voltage of each cluster;

Current: Each cluster of currents;

power: Active power per cluster.

(6) Alarm information

The alarm information is displayed; you can click to view details.

7.2 Information Inquiry

7.2.1 Stack/Container Information

- stack /cabinet information: The corresponding stack/cabinet in the homepage topology diagram. The system topology has been explained.
- The display shows the telemetry information of the PCS. Click "More" to enter the PCS device information page.
- The system status displays BMS information;
- The topology diagram of the stack/cabinet is displayed . Click below to enter the stack/cabinet real-time information entry and enter the stack/cabinet real-time information page;
- The display shows the alarm information for this stack/cabinet.

picture 7-2　Stack/Container Information Interface

7.2.2　Real-time information on stacks/containers

- . Clicking "View More" will show more telemetry and telesignaling information of the main control equipment.
- Access the auxiliary control information page by clicking on "Auxiliary Control Information " .
- The display shows the cluster balance. In the case of a group with multiple clusters, it can show the balance of the remaining power and voltage of the multiple clusters.
- The display shows the alarm information for this stack/cabinet;
- The stack system topology diagram shows the operating mode of the stack/cabinet;
- The stack system topology diagram displays all clusters under this stack/cabinet. Clicking on the corresponding cluster will take you to the cluster's information page.

picture 7-3 Real-time information on stacks/containers

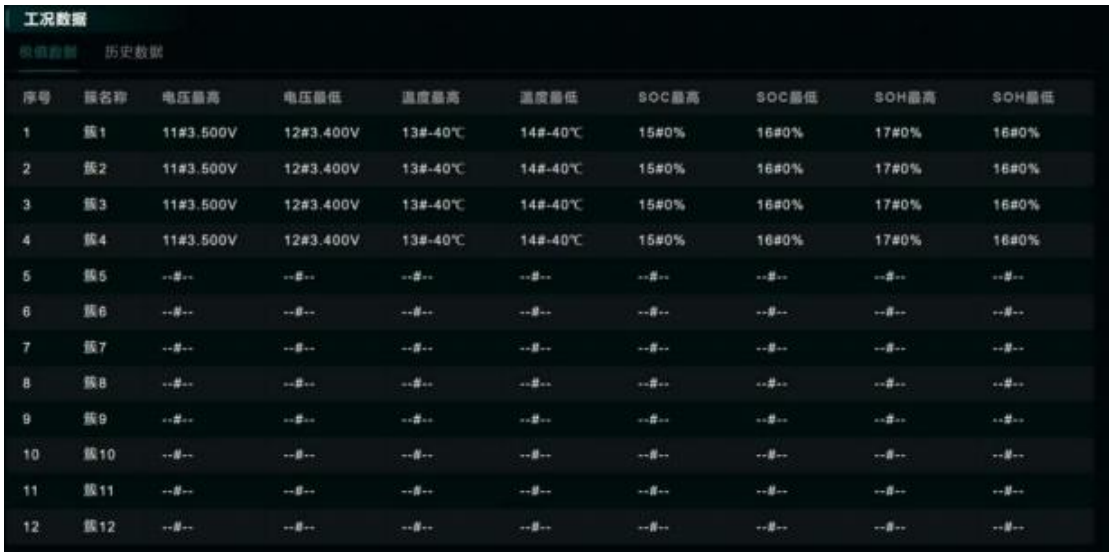
7.2.3 Cluster details

- The display shows real-time information about the cluster: Cluster state Cluster information Cluster power information Cluster extremum information;
- The cluster system topology diagram shows the status of the main switch (if any) and the main positive and main negative contactors for this cluster . Displays basic information about the cluster . Click the cluster icon to enter the individual cluster information page;
- " disconnect main switch" operation disconnects the main electrical control switch for this stack.
- The closing contactor operation involves sending a closing command for the main positive and main negative contactors to the main controller of the cluster.
- The fault reset operation involves sending a master control fault reset command.
- The display shows the alarm information for this cluster. .

picture 7-4 Cluster information interface

7.2.4 Cluster extreme data

- l -cluster extreme value data entry: More operations >> Operation monitoring >> Operating condition data;
- The extreme value data displays the highest/lowest voltage and cell number of the cluster , the highest/lowest temperature and cell number, the highest/lowest SOC and cell number, and the highest/lowest SOH and cell number.



picture 7-5 Extreme value data interface

l Click anywhere in the above image for that cluster to enter the extreme value data curve page for that cluster.

picture 7-6 Cluster extreme curves

7.2.5 Individual information

- The PACK list displays information about all PACKs under this cluster;

picture 7-7 Individual Information Interface

- Each PACK diagram frame displays the PACK terminal voltage, highest/lowest individual cell voltage, and temperature. Displays electrode temperature, etc.
- " All Monomers" section displays information about all monomers.
- The individual cell chart displays the voltage, SOC, and temperature of each

cell in the cluster in graphical form, and also shows the average voltage, average SOC, and average temperature of the cells in the cluster .

7.2.6 PCS equipment

- PCS information entry: Homepage stack icon >> More PCS information in the stack information page;

The PCS information page displays telemetry, remote control, and remote signaling information . Remote control and remote adjustment can be assigned data. The specific information displayed depends on the actual PCS protocol.

- Once the energy management function in EMS is activated, it will take over the control of PCS . When a level 2 or higher fault exists in the system, energy management will set the PCS to 0 power, and the power setting manually configured in remote control will not take effect. When a level 3 fault exists in the system... Energy management will issue a shutdown command to the PCS, and you can manually set the power-on function to be ineffective in the remote control information.

picture 7-8 PCS Information

7.2.7 Auxiliary control equipment

- Commonly used auxiliary control equipment in routine projects includes electricity meters, air conditioners, fire protection systems, and liquid cooling systems . I/ O modules, temperature and humidity, etc.;

- auxiliary control devices: Homepage stack icon >> Stack icon in stack information page >> Auxiliary control information button in actual information page;

- The auxiliary control information page displays all auxiliary control devices for this stack. The device's telemetry, telesignaling, and remote control/adjustment settings are displayed according to the specific protocol .

picture 7-9 Auxiliary control information interface

7.3 System Operation

7.3.1 Power control

Energy management power control modes include total power mode, subsystem mode, and planned power mode (24-hour planned mode, demand-side response mode, and peak-valley arbitrage mode). The total power mode , subsystem mode, and planned power mode are mutually exclusive. Enabling one mode disables the others by default. The planned power mode has 24... The 24-hour planning mode , demand-side response mode, and peak-valley arbitrage mode respond according to priority, with the priority order being: demand-side response > peak-valley arbitrage > 24-hour planning.

It should be noted that in the multi-machine parallel mode, the subsystem configuration is not effective. The power can be set through the total power mode and the planned power mode.

In parallel mode, the main The power setting in EMS will vary depending on the individual The maximum charge and discharge power of the EMS is allocated proportionally. The maximum charge and discharge power of the EMS is affected by temperature protection strategies, voltage protection strategies, etc. (when temperature/ voltage protection strategies are enabled).

If you need to restore to single-player mode Simply disconnect the network; each

EMS control mode interface can be configured with its own power settings.

After reconnecting by plugging in the network cable, it can be used with other devices. When communicating via EMS, it will still operate according to the previous power allocation .

(1) Total power mode

- Power mode setting entry:
- 1. Homepage Control Mode >> Total Power;
- 2. More options >> Energy Management >> Power Control Mode >> Total Power.
- Local users can directly set the total power of the EMS management system;
- Function Enable: When this mode is enabled, the "Enable" button will be highlighted in green. When this mode is not activated, the " Enable " button will be grayed out;
- Total Active Power: Input total active power. This power control measures the total power of the EMS . The power value is positive for discharge and negative for charging. The total power mode is set after this . Energy management will distribute the power evenly to each stack/cabinet. For example, if it is set to 100kW and the system has 2 stacks/ cabinets, energy management will allocate 50kW of active power to each stack under the PCS .
- The power value is controlled to two decimal places.

Figure 7-10 Total power setting interface

(2) Subsystem pattern

- Subsystem mode settings entry:
- 1. Homepage Control Mode >> Subsystem;
- 2. More operations >> Energy Management >> Power Control Mode >>

Subsystem;

- Function Enable: When this mode is enabled, the "Enable" button will be highlighted in green. When this mode is not activated, the " Enable " button will be grayed out;
- each stack indicates whether PCS is allowed to send power. If not checked The power data in the input box will not be sent and will remain at 0 power. The power data in the input box will only be sent if the box is checked. For example , if the power of stack 1 is set to 66kW, the box in front of that stack will be checked. The PCS has a power rating of 66kW. If this is not selected... If not, the PCS is not allowed to send power, and the power value of the stack PCS will remain 0.
- Each stack/cabinet has its own power setting. Energy management assigns corresponding active power values to the PCS of each stack/cabinet based on the power settings of each stack. Power values for positive discharge and negative charge;
- l subsystem mode is not affected by demand, reverse current and other control strategies and parallel operation strategies, but is affected by limiting strategies such as PCS limiting and individual unit voltage limiting.
- The power value is controlled to two decimal places.

Figure 7-11 Subsystem power settings

(3) 24 Hourly planning mode

- 24 -hour schedule mode settings entry:
- 1. Homepage Control Mode >> Scheduled Automatic;
- 2. More options >> Energy Management >> Power Control Mode >> 24-Hour Plan
- Function Enable: When this mode is enabled, the "Enable" button will be

highlighted in green. When this mode is not activated, the " Enable " button will be grayed out. The three modes of planned power respond according to priority. If a mode does not respond but is enabled, the "Enable" button will be displayed in yellow.

- Set command A and command B. You can set the start month for season A and the start month for season B. Each season can have a planned power output for one day, with the minimum granularity set to 15 minutes.
- l Seasonal settings:

◆ The effective months for Season A are from the starting month of Season A to the month preceding the starting month of Season B. The effective months for Season B are from the starting month of Season B to the month preceding the starting month of Season A. The starting months of Season A and Season B can be set to any month.

◆ For example, season A is set to start from January, and season B is set to start from April. Then the effective months for season A are January to March , and the effective months for season B are April to December;

◆ For example, season A is set to start in June, and season B is set to start in February. If the effective months for season A are from June of the current year to January of the following year, then the effective months for season B are from February of the following year to May of the following year.

- Season A and Season B start with a month of 0 (0 is the initial default value), or both start with the same month. At this point, only the schedule for season A is used by default. For example, if both Season A and Season B start in January, then only Season A's setting will be effective;
  - l Command A: Set the 24-hour power schedule for Command A. Each regulation is valid for 15 minutes. Power value positive discharge negative charge . For example, if season A is valid, it will be set to -30 kW starting from 00:00 . 00: If 15 is set to 25 kW , then 00:00-00:15 is -30kW and 00:15-00: 30 is 25kW.
  - Season B: Simultaneously let A;
  - The power value is controlled to two decimal places.

picture 7-12　24-hour schedule settings

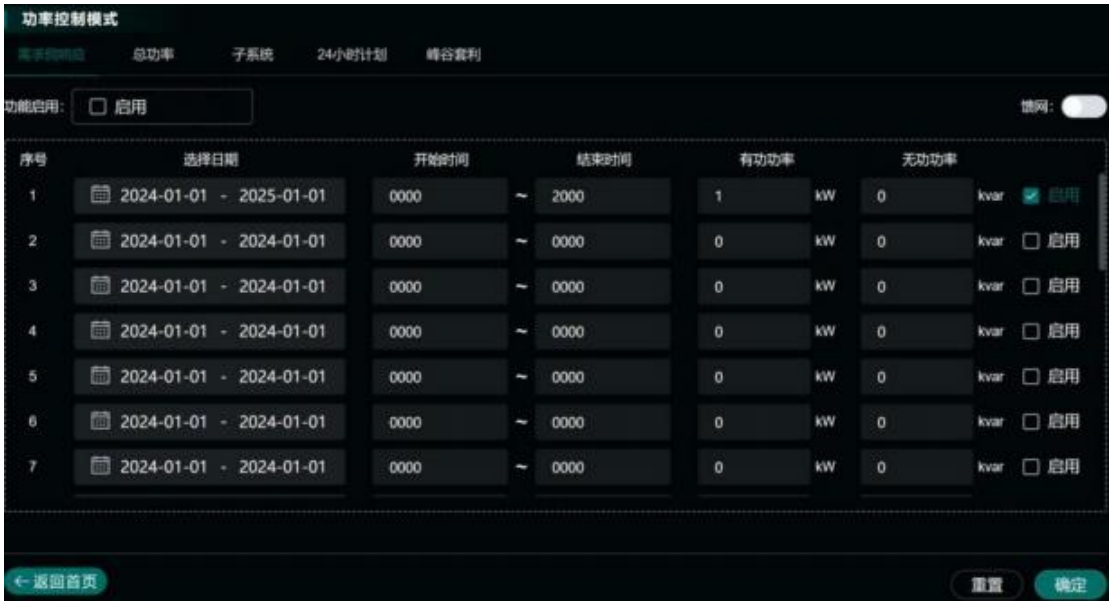
(4) Demand-side response mode

- demand -side response mode settings: More Operations >> Energy Management >> Power Control Mode >> Demand-Side Response
- Function Enable: When this mode is enabled, the "Enable" button will be highlighted in green. When this mode is not activated, the " Enable " button will be grayed out. The three modes of planned power respond according to priority. If a mode does not respond but is enabled , the "Enable" button will be displayed in yellow.
- Feedback network: Not supported at this time;
- l Select dates: e.g., 1970-1-1 to 1970-2-1 , The power value of this line was executed daily from 8:00 to 10:00 between January 1, 1970 and February 1, 1970 ;
- l Start time: e.g. 08:00~10:00, means that the power value of this row will be executed from 8:00 to 10:00 every day;
- Active power: positive power is discharging, negative power is charging;
- Reactive power: Setting invalid, fixed reactive power distribution 0kvar
- each rule: Check the box to enable the planned power for that line.
- Note :

◆ Each regulation cannot overlap in time;

◆ If configured correctly, In principle, all regulations can take effect, and multiple regulations can be activated simultaneously;

◆ Power value accuracy is controlled to two decimal places.



picture 7-13 Demand-side response settings

(5) Peak-valley arbitrage model

- Peak -valley arbitrage mode settings entry: More operations >> Energy Management >> Power Control Mode >> Peak-valley arbitrage;
- Function Enable: When this mode is enabled, the "Enable" button will be highlighted in green. When this mode is not activated, the "Enable" button will be grayed out. The three planned power modes respond according to their priority. If the mode is not responding but is enabled. The "Enable" button is displayed in yellow;
- Feedback network: Not supported at the moment;
- Scene settings:

Recurring by year: The set valid time period corresponds to the specified valid year. For example, select the scenario as annual cycle. Select the dates as 2024-2025, the weekday as Monday, and the start and end times as 0000-0100: this refers to every Monday 00:00 in 2024 and 2025. :00-01 The regulation will take effect upon its implementation.

- Monthly Recurring: The set effective month corresponds to the time period, meaning it is valid from the start month to the end month of each year. The start month must be earlier than the end month. For example, if you set it to monthly recurring, select the date as 09-12, select Saturday as the weekday, and set the start and end times to 00:00-01:00, it means that every Monday from 00:00 to 01:00 in September to December of each year will be effective.

◆ Time period validity: The set start time to end time period is valid. For example, set it to be valid for a time period. Select date as 2024-09-02 - On September 6, 2024, the weekday was selected as Monday, and the start and end times were set to 00:00. :00-01 :00: refers to the 00 of every Monday from September 2, 2024 to September 6, 2025. :00-01 The regulation will take effect

upon its implementation.

- Charging settings: Set the start and end times for each day. During this period, the charging will operate at the set power. If the actual SOC is greater than or equal to the cutoff SOC, charging will stop. The power value will be used for positive discharge and negative charge. For example, set the power to -10kW and the cutoff SOC to 95%. Therefore, the actual SOC is only <95%. Only then can it be charged . No need to recharge after ≥95%;
    - Discharge settings: Start and end times for each day. During this period, the set power will be applied. If the actual SOC is less than or equal to the cutoff SOC, discharge will cease. Power values are positive for discharge and negative for charge. For example, if the power is set to 10kW, the SOC will be 15%. Therefore, the actual SOC is only >15. Only then can it discharge electricity. ≤ 15. No longer discharging;
    - Enable after each rule: Checking the box will enable the planned power for that row ;
- Note :
    - Each regulation cannot overlap in time. If they overlap, Prioritize the implementation of the regulations that appear first.
    - If configured correctly, In principle, all regulations can take effect. Supports the simultaneous activation of multiple regulations;
    - The power value is controlled to two decimal places.

picture 7-14 Peak-Valley Arbitrage Setup

7.3.2 Power control strategy

(1) Anti-backflow control

- Anti -backflow control settings entry: Homepage, top right corner, more

operations - Energy Management - Power Control Strategy - Anti-backflow control .

- l Function Enable: Enable button for reverse current detection function. When this mode is enabled, the enable button will be highlighted in green.
- When this mode is not enabled, the "Enable" button will be grayed out. The protection policy will take effect once the feature is enabled.
- Enable reverse power: When this mode is enabled, the button will be highlighted in green; when this mode is not enabled, the button will be gray. Enabling reverse power is on, allowing charging.
- Explanation of parameters in anti-backflow protection :

◆ Critical value: This value represents the minimum allowable power for the reverse current meter. When the reverse current meter value is lower than this value, the energy storage system will reduce the discharge power.

◆ Power hysteresis value: The reverse current meter is within the range of (critical value + power hysteresis value) The power output of the energy storage system remains the same as the previous calculation result.

◆ Adjusting the time step: the calculation time for output power. When this value is too low, it is easy to control it frequently. The actual power has not been adjusted to the correct level since the last power adjustment . Then, control is restarted, and the power of the energy storage system is prone to fluctuations. A reasonable time step can be set according to the system 's response time.

◆ For example, the current reverse current meter is 5kW. The critical value is 10kW The actual power at this point is 100kW (positive sign represents discharge), so the discharge power needs to be reduced by 5kW. The power rating is set at 95kW. If the hysteresis value is 20kW, the power remains constant when the reverse current meter reading is within 30kW.

- Anti -backflow control is divided into MEMS, The three-level control of LEMS and AEMS needs to be determined based on the actual wiring situation. If a single EMS unit is running That's MEMS. If EMS is under a transformer... That is LEMS. If EMS needs to control the main transformer of multiple transformers, then AEMS is used.

picture 7-15 Anti-backflow control settings

(2) Static demand control

- static demand control strategy settings: More operations in the upper right corner of the homepage - Energy Management - Power Control Strategy - Static Demand Control.
- l Function Enable: This button enables the demand detection function. When this mode is enabled, the enable button will be highlighted in green. When this mode is disabled, the enable button will be grayed out. Enabling this function activates the protection policy.
- l Enable reverse power: Enable reverse power to turn on, allowing discharge.
- Demand protection requires a connected meter in the system (or it can be shared with an anti-backflow meter). .

picture 7-16 Static demand control settings

- Explanation of parameters in demand protection :

◆ Demand limit setting: This value is the maximum power value of the meter at the cut-off point. When the meter reading exceeds this value, the energy storage system will reduce its charging power. Demand limits can be set for 12 months separately.

◆ Power hysteresis value : (Demand limit setting value - power of the meter at the cut-off point) Within the hysteresis value range, the power of the energy storage system remains the same as the previous calculation result.

◆ Adjusting the time step: the calculation time for output power. When this value is too low, it is easy to control it frequently. The actual power has not been adjusted to the correct level since the last power adjustment. Then, control is restarted, and the power of the energy storage system is prone to fluctuations. A reasonable time step can be set according to the system 's response time.

◆ For example, if it's currently April, and the current real-time total active power reading on the meter is 1240kW, while the current demand limit is 1200kW, then the charging target power needs to be reduced by 40kW, resulting in a target power of -760kW. When the current real-time total active power on the meter drops to 1180kW... The power hysteresis value is 30kW. Within the hysteresis range, the target power of -760kW remains unchanged.

- Static demand control is divided into MEMS, The three levels of control for LEMS and AEMS need to be determined based on the actual wiring configuration. If a single EMS unit is operating, then it is a MEMS; if the EMS is connected to a single transformer... It's L EMS. If the EMS needs to control the main transformer of multiple transformers, then AEMS is used.

(3) Dynamic demand control

- dynamic demand control strategies is: More operations in the upper right corner of the homepage - Energy Management - Power Control Strategy - Dynamic Demand Control.
- l Function Enable This is the button to enable the demand detection function. When this mode is enabled, click "Enable". The button will be highlighted in green.
- When this mode is not enabled, the "Enable" button will be grayed out. Once the function is enabled, the protection strategy will take effect. Allow Reverse Power Enable: Enables reverse power, allowing discharge.
- demand protection is that there is a meter in the system (it can also be shared with the anti-backflow meter).

- Explanation of parameters in demand protection :

➢ **Demand control:**

- Branch transformer capacity: The branch transformer capacity needs to be set according to the actual transformer capacity. The maximum demand value of the meter cannot exceed this value. If it exceeds this value If so, the branch transformer capacity is used as the current maximum demand value.

  - The dynamic demand source is a centralized control and statistics system. The CCU will record the demand value for 15 minutes. If the demand value for 15 minutes exceeds the current demand value, the dynamic demand will be used as the current demand value. The dynamic demand source is the meter's statistics , and the demand meter supports the current maximum demand value. When the maximum demand value of the electricity meter exceeds the initial maximum demand value for the month, the maximum demand value of the electricity meter is used as the current demand value. Currently, only electricity meter statistics are supported.

  - Adjustment frequency: Calculation duration of output power When this value is too low, it is easy to control it frequently. The actual power has not been adjusted to the correct level since the last power adjustment. and regained control The power output of energy storage systems is prone to fluctuations. A reasonable time step can be set based on the system's response time, typically every few seconds.

➢ **Demand settings:**

- Demand margin: Target demand - Demand margin = Demand threshold It will be triggered before the required quantity is reached.

  - u Demand margin hysteresis: Within the range of demand critical value and demand hysteresis, the power output of the energy storage system remains the same as the previous calculation result.

➢ **Mode Selection: Currently, only monthly demand meter mode is supported. Demand limits can be set for 12 months. This value is the maximum power value of the meter at the cut-off point. When the meter reading exceeds this value The energy storage system will reduce charging power after real-time demand exceeds the maximum monthly demand. Current real-time demand value It is used to store the maximum monthly demand as a local record .**

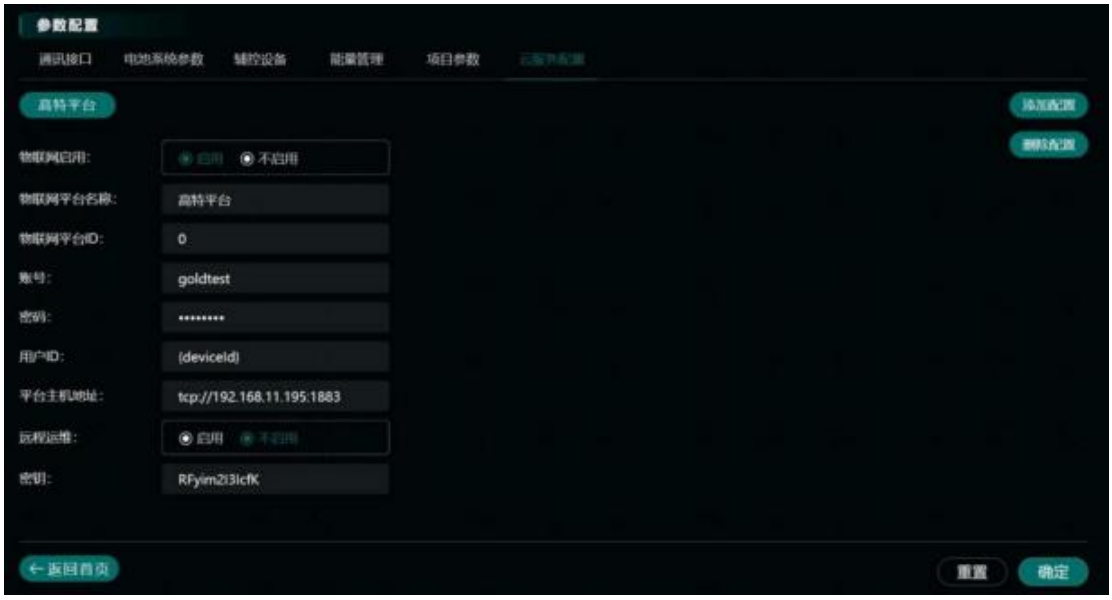
- Dynamic demand control is divided into MEMS, The three levels of control for LEMS and AEMS need to be determined based on the actual wiring configuration. If a single EMS unit is operating, then it is a MEMS; if the EMS is connected to a single transformer... It's called L EMS. If the EMS needs to control the main transformer of multiple transformers, then AEMS is used.

picture 7-17 Dynamic demand control settings

7.4 Cloud platform functions

7.4.1 Cloud server configuration

- Cloud server configuration entry: More operations >> Parameter configuration >> Cloud service configuration;
- all -in-one machine platform is: tcp://192.168.11.195:1883, and the key is RFyim2I3IcfK.
- The cloud service supports multiple configurations. You can add or delete configurations using the "Add Configuration" and "Delete Configuration" buttons on the right. After making the changes, click "Confirm".



picture 7-18 Cloud Service Configuration

7.4.2 Centralized control platform

(1) Site Details

The centralized control station details page displays daily charging and discharging information, fault alarms, and other data, including system topology.

picture 7-19 Centralized control platform homepage

(2) Electricity Revenue Report

The Pinggu electricity consumption and revenue report allows you to view the revenue generated from charging and discharging at different time periods , and you can also export it by clicking the "Export" button in the upper right corner.

picture 7-20 Electricity Revenue Report

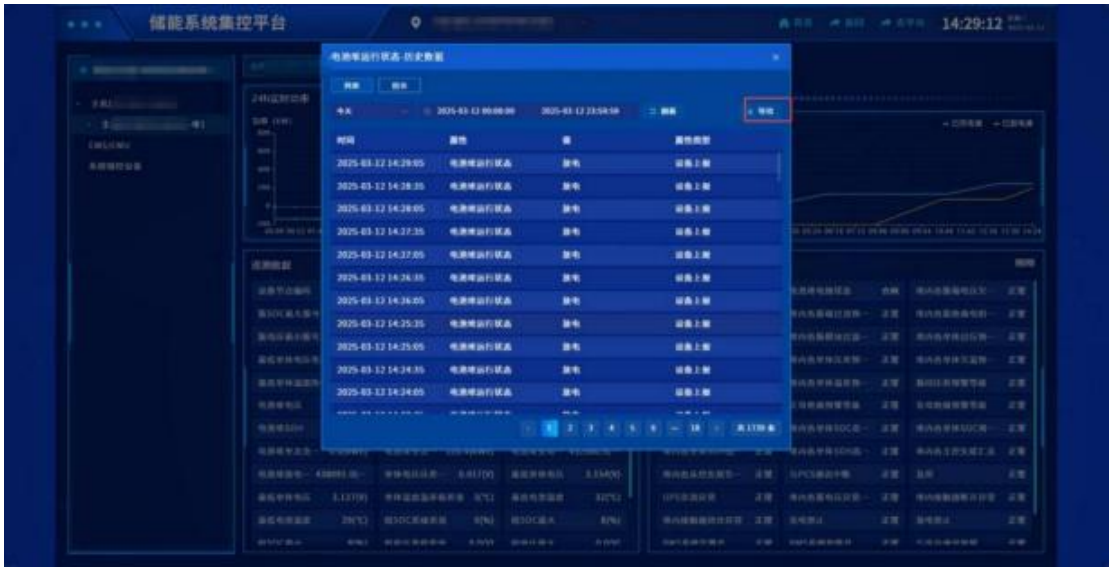
(3) Equipment Details

The device details page can be accessed by clicking the topology map in the site details (this redirection needs to be configured when drawing the topology map). This interface displays detailed real-time and historical data for the device, and allows exporting data for a specific location. .

picture 7-21 Device details page

(4) Exporting equipment location data

Clicking on a specific location in the device details section allows you to export the location data. .



picture 7-22 Historical Data Export Interface

8. Troubleshooting and handling

8.1 All-in-one system troubleshooting

When the all-in-one machine malfunctions or breaks down, the fault information can be read on the current alarm interface of the display screen (the icon in the upper right corner of the main interface is explained as follows: the alarm status is when the system is normal).

When the system fails, it becomes

(Click this icon to enter the current alarm interface). Please first check and troubleshoot according to the methods in Table 8-1 . If the problem persists, please contact the supplier for technical support. If you need to report a fault to our company or distributor, please be sure to record and provide the device code (see device nameplate for details).

table 8-1 System Faults and Troubleshooting

Fault Name	**processing method**
AC overvoltage	Check if the mains voltage is within the range.
Communication undervoltage	Check if the mains voltage is within the range.
Excessive communication	Check if the mains frequency is within the range.
Infrequent	Check if the mains frequency is within the range.

communication	
Power grid reverse order	Check if the phase sequence of the power grid is reversed.
Power grid phase-locking failure	Please contact your supplier.
Auxiliary power supply failure	Please contact your supplier.
High bus voltage	Please contact your supplier.
Low bus voltage	Please contact your supplier.
Bus voltage imbalance	Please contact your supplier.
Output overload timeout	Check if the load is within the specified range.
Inverter overload	Please contact your supplier.
DC input overvoltage	Check if the DC side voltage is higher than the battery voltage upper limit protection value.
DC input undervoltage	Check if the DC side voltage is lower than the battery voltage lower limit protection value.
AC soft start fault	Please contact your supplier.
DC soft start failure	Please contact your supplier.
DC overcurrent fault	Check the battery port for short circuits.
Communication failure	Check communication cable and parameter settings
Low discharge temperature -	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the

minor alarm	BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
Slight alarm due to excessive discharge temperature	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
Insulation too low, minor alarm	Insulation failure or system leakage
Slight alarm for excessive individual differences	Check for broken wires in the battery sampling harness or unreliable connections in the sampling plug-in; check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Slight alarm for excessive temperature difference	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
SOC too low minor alarm.	the SOC is below the protection value is normal. The alarm is cleared according to the control strategy . If the voltage does not match the SOC , then the SOC is... Uncalibrated or SOC Error accumulation requires a complete charge-discharge cycle of the system.
Low charging temperature - minor alarm	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
Minor alarm for overheating during charging	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
Minor overcurrent	The system charging and discharging current is higher than

alarm	the protection value. ,examine Is the PCS running normally?
Group terminal undervoltage minor alarm	An alarm triggered when the voltage is below the protection value is normal; the alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Individual undervoltage minor alarm	An alarm indicating that the voltage is below the protection value is normal. , Eliminate alarms according to control strategies. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace it.
Minor overcurrent alarm	The system charging and discharging current is higher than the protection value. ,examine Is the PCS running normally?
Minor overvoltage alarm at the group terminal	An alarm indicating that the voltage is higher than the protection value is normal. The alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Minor overvoltage alarm for individual cells	An alarm indicating that the voltage is higher than the protection value is normal. The alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Low discharge temperature, moderate alarm	Check for broken temperature sampling harness or unreliable sampling plug connection; check for abnormal BMU operation; check if the water purifier is operating normally, and if not, please contact your supplier.

High discharge temperature alarm	Check for broken temperature sampling harness or unreliable sampling plug connection; check for abnormal BMU operation; check if the water purifier is operating normally, and if not, please contact your supplier.
Insulation too low, moderate alarm	Insulation detection failure or system leakage should be shut down remotely from the back end. PCS BMS Relay and contact your supplier.
Low charging temperature moderate alarm	Check for broken temperature sampling harness or unreliable sampling plug connection; check for abnormal BMU operation; check if the water purifier is operating normally, and if not, please contact your supplier.
High charging temperature alarm	Check for broken temperature sampling harness or unreliable sampling plug connection; check for abnormal BMU operation; check if the water purifier is operating normally, and if not, please contact your supplier.
Discharge overcurrent moderate alarm	The system charging and discharging current is higher than the protection value. ,examine Is the PCS running normally?
Moderate undervoltage alarm at the group terminal	An alarm triggered when the voltage is below the protection value is normal; the alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Individual undervoltage moderate alarm	An alarm triggered when the voltage is below the protection value is normal; the alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Overcurrent alarm	The system charging and discharging current is higher than the protection value. ,examine Is the PCS running normally?

Moderate overvoltage alarm at the group terminal	An alarm indicating that the voltage is higher than the protection value is normal; the alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Individual overvoltage moderate alarm	An alarm indicating that the voltage is higher than the protection value is normal. The alarm should be cleared according to the control strategy. If the problem persists , check for broken battery sampling harness wires or unreliable sampling plug-in connections; also check for any abnormalities in the BMU's operation . Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Low discharge temperature triggers severe alarm	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
High discharge temperature triggers severe alarm	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.
Low insulation alarm	Insulation detection failure or system leakage, remote shutdown in the background. PCS BMS Relay and contact your supplier.
High pole temperature alarm	Are the connectors in the high-voltage box reliable? Check if the water purifier is operating normally. If the device is not working properly, please contact your supplier.
Low charging temperature severe alarm	Check for broken wires in the temperature sampling harness or unreliable connections of the sampling plug-in. Check if the BMU is malfunctioning; check if the water purifier is operating normally. If it is not operating normally, please contact your supplier.

Overheating during charging triggers severe alarm.	Check for broken temperature sampling harness or unreliable sampling plug connection; check for abnormal BMU operation ; check if the water purifier is operating normally, and if not, please contact your supplier.
Discharge overcurrent severe alarm	The system charging and discharging current is higher than the protection value. ,examine Is the PCS running normally?
Group terminal undervoltage severe alarm	Voltage below protection value check Does the PCS shut down during a moderate alarm? Check for broken battery sampling harness wires or unreliable sampling plug connections; check for any abnormalities in BMU operation; Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Individual undervoltage severe alarm	Voltage below protection value check Does the PCS shut down during a moderate alarm? Check for broken wires in the battery sampling harness or unreliable connections in the sampling plug-in; BMU Is there any abnormality in the work? Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Overcurrent alarm	The system charging and discharging current is higher than the protection value. ,examine Is the PCS running normally?
Group terminal overvoltage severe alarm	Voltage higher than protection value check Does the PCS shut down during a moderate alarm? Check for broken wires in the battery sampling harness or unreliable connections in the sampling plug-in; BMU Are there any abnormalities in the work? Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.
Individual overvoltage severe alarm	Voltage higher than protection value check Does the PCS shut down during a moderate alarm? Check for broken wires in the battery sampling harness or unreliable connections in the sampling plug-in; BMU Is there any abnormality in the work? Check system battery voltage If the battery cell is damaged, please contact your supplier to replace the damaged battery cell.

Communication failure with central control	Check communication and power lines
Communication failure with slave controller	Check communication and power lines
Slave device malfunction	Please contact your supplier.
Main positive disconnection fault	Please contact your supplier.
Main positive closure fault	Please contact your supplier.
Main-to-negative disconnection fault	Please contact your supplier.
Main negative closure fault	Please contact your supplier.
Sensor failure	Please contact your supplier.
High and low voltage alarms	Check the AC power supply or voltage; Try calling back or turning on the power, or contact your supplier.
High and low temperature alarm	Check if the system air ducts are unobstructed. Is the ambient temperature within the permissible range ? Clean the condenser regularly; Please have a professional inspect and repair the equipment, or please contact your supplier.
High and low pressure alarms	Please contact your supplier.
Compressor alarm	Clean the condenser regularly; Users also need to check if the voltage is stable. It meets the design requirements; Or please contact your supplier;

For the faults detected by the system Abnormal states are divided into three levels to differentiate the severity of the fault. The system 's actions and severity for each level of fault determination are illustrated in the table below .

table 8-2 Handling measures for different levels of failure

Alarm Level	**Severity**	**Fault output status**
Level 1	Mild	Alarm Only
Level 2	moderate	No charging or discharging
Level 3	serious	The all-in-one machine cuts off the charging and discharging circuit. The system is down (manual recovery required).

For common faults and troubleshooting, please refer to the "Troubleshooting Methods". If you are unable to resolve the issue using this manual, please contact your supplier. At least the following information is required to provide better assistance.

1) The equipment's manufacturer, model, and configuration information; product nameplate;

2) Project information corresponding to the product Project location and environment;

3) The product's on-site operation status, operating methods, procedures, and steps;

4) The system serial number and device software version read by the display screen;

5) Fault Description The symptoms of the fault;

6) Photos from the scene.

8.2 Thermal Management System Troubleshooting

The table below shows common faults and troubleshooting methods for thermal management systems. If the problem persists, please contact your supplier.

table 8-3 Handling measures for fan malfunctions

Phenomenon	**Possible reasons**	**Inspection items or handling methods**

The external circulation fan is not running.	The chiller unit is not powered on.	Check if there is power at the power input terminal of the chiller unit.
	Struck by lightning , Circuit breaker tripped	Check if the internal circuit breaker of the chiller unit is closed.
	The chiller unit has an abnormal power input (such as over/under voltage).	Determine if there are any alarms in the chiller unit.
	The chiller unit is in standby mode.	Normal scenario. After powering on and standing still for 30 seconds Enter automatic control logic
	Fan stuck	Check if any foreign objects are stuck in the fan.
	Terminal loose	Check if the fan connection terminals are loose.
	External fan drive failure	Replace the outdoor fan drive
	Control board failure	Replace the control board
	Fan failure	Replace the fan
abnormal noise from external circulation fan	Fan bearing wear	Replace the fan
	Fan impeller cracked	Replace the fan
	Fan blades scrape other objects	Check for any cables or other objects that may interfere with the fan blades.

table 8-4 Refrigeration system treatment measures

Phenomenon	**Possible reasons**	**Inspection items or handling methods**
The	Power off	Check the main power switch and the operation

compress or does not start	(standby)	display interface to see if the machine is powered on.
	Loose circuit connection	Fasten circuit connectors
	Open circuit or short circuit	Check for open circuits or short circuits in the circuit. and repair the main power supply.
	Inverter failure	Replace the frequency converter
	Control board damaged	Replace the control board
	Compressor motor failure	Replace the compressor
The compress or is not working.	No cooling required	Check if the outlet water temperature has reached the cooling state. Check if the cooling setpoint is reasonable.
	Downtime	The compressor has a minimum shutdown time under normal conditions. If the temperature rises back to the starting point during this period, the compressor will still delay starting.

Table 8-5 Handling Measures for Cooling Medium Circulation System Faults

Phenomenon	**Possible reasons**	**Inspection items or handling methods**
The internal circulating water pump does not start.	Power off (standby)	Check the main power switch and the operation display interface to see if the machine is powered on.
	Loose circuit connection	Fasten circuit connectors
	Water pump frequency converter	Replace water pump frequency converter

	failure	
	Pump body failure	Replace water pump
The electric heating element is not working .	No heating required	Check if the outlet water temperature and heating setpoint are set reasonably.
	Loose circuit connection	Fasten circuit connectors
	Electric heater overheat protection	Restart the electric heating after waiting for a period of time. Observe whether the electric heater is working properly.
	Electric heater malfunction	Replace electric heater

8.3 Fire protection system troubleshooting

The table below shows common fire protection system malfunctions and troubleshooting methods. If the problem persists, please contact your supplier.

table 8-6 Handling measures for fire protection system malfunctions

Phenomenon	**Possible reasons**	**Inspection items or handling methods**
The detector does not alarm during testing.	Detector damaged	Replace the detector.
	Power loss	24V power supply is not available. Check the power supply harness and power module.
Detector false alarm	The detector was contaminated	Contact the service provider to clean the detector.
	The detector was damaged	Replace the detector.

	Detector or wiring flooded	Water ingress into the detector or wiring can cause the fire control panel to malfunction; replace the detector.
gas Physical examination measuring instrument The LED indicator light flashes yellow.	Line fault contamination	Check the wiring of the combustible gas detector.
	Calibration is required.	The indicator shows that calibration is required. Then it is calibrated.
	other	Replace the detector.
Intake safety valve malfunction	Electrical control malfunction	The valve does not open when the equipment is started; Replace the electronic control/intake valve.
	Wiring error	Incorrect wiring caused damage to the internal electrical control system. Replace the electronic control/intake valve.
Exhaust safety valve malfunction	Electrical control malfunction	The valve does not open when the equipment is started; Replace the electronic control/intake valve.
	Fan malfunction	The fan does not turn when the equipment is started. Furthermore, the fan tested abnormally when connected to a 24V power supply alone; the fan was replaced.
	Wiring error	Incorrect wiring caused damage to the internal electrical control system. Replace the electronic control unit/fan/exhaust valve.
Safety valve with visible damage	Falls, collisions, etc.	Replace the whole machine

9. Operation and maintenance

9.1 System operation

9.1.1 Firefighting operation

(1) Level 1 alarm

When the system is in normal monitoring mode, the fire detection is in automatic mode. Use a smoke gun to trigger any smoke detector or temperature detector and observe the system status: the fire protection system enters the first-level alarm state, the audible and visual alarms are triggered and a fault signal is reported.

picture 9-1 Detector sensing test

(2) Level 2 alarm

When the system is in normal monitoring mode, the fire detection is in automatic mode. Disconnect the aerosol wiring to avoid triggering false discharges . Use the smoke and temperature gun to trigger the smoke detectors and temperature detectors simultaneously. Observe the system status: the fire system enters the level two alarm state, the audible and visual alarms are triggered and a fault signal is reported, and the aerosol extinguishing system enters a 30-second gas release countdown (due to the premature disconnection of the aerosol wiring). (The countdown will not trigger aerosols when it ends).

This operation is used for fire simulation testing. Before starting, it is essential to ensure that the aerosol extinguishing agent is disconnected.

(3) Manual alarm

When the system is in normal monitoring mode, the fire detection is in automatic mode. Press the fire alarm button on the panel and observe the system status: the system enters the first-level alarm state, the audible and visual alarm is triggered and a fault signal is reported.

(4) Manual start

When the system is in normal monitoring mode, the fire detection is in automatic mode. Disconnect the aerosol wiring to avoid triggering false sprays. Press the fire start button on the panel and observe the system status: the system enters fire extinguishing mode, the audible and visual alarm is triggered and a fault signal is reported, and aerosol is sprayed (because the aerosol wiring was disconnected in advance, the aerosol will not be triggered when the countdown ends).

This operation is used for fire simulation testing. Before starting, it is essential to ensure that the aerosol extinguishing agent is disconnected.

picture 9-2 Fire manual button

9.1.2 Liquid chiller operation

(1) Standby screen

The unit is equipped with a controller. The control panel uses a touch screen display. Users can easily perform operations such as querying, setting, and monitoring via the touchscreen. This ensures that the unit is in normal operating condition.

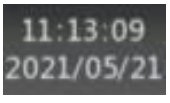
After closing the power switch to power on the unit The control system is initialized,

and then the main interface of the control system is entered. The main interface of the water-cooled unit in standby mode is shown in the figure below.

picture 9-3 Control system main interface

The meanings of the various function icons in the standby interface of the water-cooled unit are shown in the table below.

table 9-1 Water-cooled unit standby screen icons

	icon	**illustrate**
1		Power button icon Clicking this button will change the current operating status of the chiller unit.
2		Show language icon , Clicking allows you to switch the language of the current interface between Chinese and English.
3		Work status icon , The current operating status of the chiller unit is displayed in the form of indicator lights.
4		The outlet temperature icon displays the current outlet temperature of the chiller unit (unit: ...). ° C).
5		The date and time icon displays the current date and time for the crew.
6		Water system side outlet pressure icon The current water system pressure of the water purifier is displayed on a dial (unit: Bar).

7		System mode icon This displays the current system operating mode. Operating modes include... :stop, Self - circulating , cooling, heating, and fully automatic. , Click the current mode to switch to the next mode.
8		System main interface icon.
9		System status icons.
10		System operation log icon.
11		Run the curve icon.
12		System alarm icon.
13		System settings icon.
14		System maintenance icon.
15		More system function icons.
16		Water cycle icon This indicates that the unit is in water circulation mode and the circulation pump is in operation.
17		The cooling icon indicates that the unit is in cooling mode and the compressor is working .
18		The heating icon indicates that the unit is in heating mode and the water heater is in operation.

19		The water replenishment icon indicates that the unit is in a water replenishment state.
20		Alarm icon This indicates that an alarm has occurred in the current unit.

(2) Power on/off

Each time the "ON/OFF" button is clicked, the control system switches the current operating status of the chiller unit. The dialog box that pops up when the system starts up is shown in the figure below.

picture 9-4 System boot

After startup, the chiller unit changes from the off state to the running state. If there is no keyboard input for 180 seconds on any interface , the control system automatically returns to the main interface.

When shutting down Power is cut off via the power distribution switch. Simply turn it off.

Do not use a handheld device to shut down the liquid chiller. If you use a handheld device to shut down the liquid chiller, the EMS will be unable to control the chiller via communication afterwards!

(3) Status Interface

Click "Status" on the main interface of the control system to view the current environmental and operational status of the unit.

picture 9-5 “Environmental Status” "interface

picture 9-6 "Operating Status" "interface

(4) Record information

Click “Records” on the main system interface to view the current operating records and logs of the unit .

table 9-7 “Running Log” “interface

table 9-8 “Running Log” “interface

(5) Curve

Click “” on the system’s main interface The “curve” option allows you to view the curve formed by the cooling point temperature. The operating curve consists of the outlet temperature curve, the inlet temperature curve, and the return pressure curve.

Figure 9-9 Running Curve Interface

The system defaults to displaying the set temperature (cooling setting). curve, Outlet water temperature (coolant outlet temperature) Curves for: return water temperature (coolant return temperature), outlet water pressure (coolant supply pressure), and return water pressure (coolant return pressure). Curve. Users in " The "Curve" interface allows the following operations:

- by unchecking the checkboxes before the curve type.
- " Options > Clear Curve" Clear the curve currently displayed on the interface. After clearing the curve... The control system automatically regenerates the curves based on the unit's operating conditions.
- Click to view the temperature and pressure values around the curve display area. The temperature and pressure ranges can be modified according to the actual plan .

picture 9-10 Curve settings interface

(6) Alarm Interface

Click "Alarms" on the main system interface to view the current and historical alarm information of the unit .

picture 9-11 Current alarm "interface

Figure 9-12 "Historical Warning" " interface

(7) Maintenance

Click "Maintenance" on the system's main interface. The system displays the interface shown in the image below.

picture 9-13 Maintenance Interface

For advanced maintenance of the unit, please contact product after-sales service for more information and professional guidance. The meanings of the parameters in the maintenance interface are shown in the table below.

table 9-2 Maintenance Interface Description

	Parameter name	**illustrate**
1	System water replenishment	When adding liquid to the chiller unit, set it to "on". ". Set to "Off" after fluid infusion or replenishment is complete. ".
2	Delayed start of circulation pump	During fluid infusion or replenishment The delay time for the internal circulating water pump to start after the replenishment pump. The internal circulating water pump will start after the replenishment pump has run for the specified time. coolant when the return pressure reaches a certain value. By delaying the start of the circulation pump to circulate the coolant, the return pressure can be reduced, allowing the replenishment pump to continue pumping coolant in. Please adjust the values according to the size of the coolant circulation system. Default value: 30s

3	Delayed shutdown of water replenishment	Total duration of fluid infusion or replenishment. After the set time is reached, The chiller unit shuts down its internal circulating water pump and replenishment pump. Please adjust according to the size of the cooling medium circulation system. Default value: 180s
4	Water pump venting	After the unit completes the liquid injection You can turn on this switch, and the circulating water pump will run intermittently for a period of time to quickly expel the gas in the water system.

9.1.3 UPS operation

(1) Display screen

The UPS display screen is backlit. The backlight will turn off after 10 minutes of inactivity. Press any key to restore the backlight.

picture 9-14 UPS display screen interface

table 9-3 UPS Interface Description

	Running status	**reason**	**illustrate**
1		Standby mode	The UPS has no output.

2		AC power mode	UPS in AC power mode The load is in a protected state.
3	 buzzer 4 Once per second	Battery mode	Mains power loss or abnormality UPS protects the load through batteries; however , be aware that the load may lose power due to insufficient battery capacity.
4	 buzzer 1 Once per second	Battery mode and low battery capacity	When the alarm occurs The load may be cut off at any time due to insufficient battery capacity .
5		High-efficiency mode	When mains power is lost or abnormal , The UPS will switch back to AC or battery mode to continuously protect the load.
6		Fixed output frequency mode	ups Output at a fixed frequency (50 Hz or (60 Hz), no longer tracking mains frequency and phase And the rated power is dated to 60%.
7		Bypass mode	When overload or certain faults occur, or when a bypass command is received. The UPS will switch to bypass mode, and the load will be directly powered by the mains .
8		Battery self-test	The UPS is performing a battery self-test.
9		Battery failure	The UPS detected a damaged battery or a battery that is not connected.

10		Overload	Some unnecessary loads can be removed to clear the alarm.
11		Fault status	A serious malfunction has occurred.

(2) Buzzer

When an alarm or fault occurs ,according to The ESC key can temporarily mute the buzzer sound when the alarm or fault recurs. The buzzer will sound again.

table 9-4 UPS buzzer logic

Serial Number	**Running status**	**Buzzer status**
1	Battery mode	Every A beep every 4 seconds
2	Bypass mode	Every It rings once every 2 minutes
3	Overload	Every Two beeps per second
4	Alarm occurred	Every One ring per second
5	Malfunction	A continuous blast (sounding continuously)
6	Button activation	Only one sound

9.2 System maintenance

Throughout the product's lifecycle, abnormal operation must be avoided, and regular maintenance must be performed according to specifications to ensure the system operates safely and reliably and achieves optimal performance.

Comprehensive annual preventative maintenance is the minimum requirement for integrated energy storage systems. It is recommended to perform two system preventative maintenance checks annually : a basic semi-annual inspection and an annual comprehensive inspection. Maintenance should cover all equipment and components within the integrated energy storage system. Includes, but is not limited to, battery clusters, liquid cooling units, PCS, fire protection system, etc.

Laws and regulations provide otherwise for preventive maintenance. According to its

regulations.

If it is necessary to open any of the compartment doors during the process, the door operation is shown in the diagram below. It is important to note that after the door is opened, it should be secured with door panels or pull strips to prevent it from moving.

picture 9-15 Integrated cabin door illustration

9.2.1 Electrical maintenance

Electrical maintenance of the electrical compartments and equipment wiring needs to be performed every six months.

Delayed operation!

- Even though the system is not running, there may still be dangerous voltages inside. After disconnecting the power, There may be undischarged charge on the internal busbar. The energy storage converter needs to be left to stand. Internal repairs should only be performed after 10 minutes or more. A voltmeter should be used to check the voltage before any maintenance is performed. Ensure that the power is off and in a safe condition.

- Do not wear conductive objects such as rings or watches during electrical maintenance operations .

1) Equipment cleaning

a) When cleaning the equipment, the power should be turned off and equipment with ventilation holes should be covered.

b) Use a vacuum cleaner to remove dust, debris, etc. It is forbidden to blow compressed air onto the equipment;

c) After cleaning, check if the wiring is loose. Problems need to be repaired promptly.

2) Wiring inspection

a) Check the cable connectors for blackening of the wire ends. Check for signs of melting at the contacts; if any problems are found, repair them promptly .

b) Inspect the appearance of the copper busbar for any discoloration. Problems need to be repaired promptly;

c) Inspect cables and heat shrink tubing for damage. Problems need to be repaired promptly;

3) Insulation and grounding tests

a) Test system insulation and check the insulation of equipment and cables. Problems need to be repaired promptly;

b) Measurement grounding Measure whether the grounding resistance is within the normal range . Problems need to be repaired promptly.

4) Power-on test

a) Is the relay clicking sound normal, with no noise after clicking? Problems need to be repaired promptly.

b) After power-on, the indicator lights, relays, switching power supplies and other components should light up normally. If there are any problems, they need to be repaired in time.

c) Use a multimeter to check if the voltage is within the normal range. Problems need to be repaired promptly;

5) UPS Battery Maintenance Requirements

charge the UPS battery at least every 6 months .

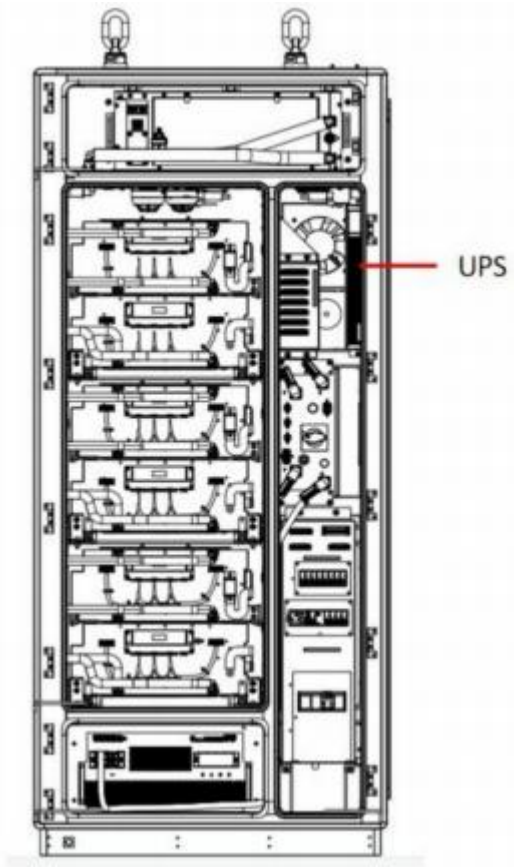
b) Do not use if the battery has not been charged for more than 6 months.

c) When replacing the battery or EBM, please verify the UPS operating status. In battery mode... Do not plug or unplug the battery terminals.

d) Under normal circumstances, UPS batteries have a lifespan of 3 to 5 years, but the actual lifespan depends on battery usage frequency and ambient temperature. If problems are found... If the battery is faulty, it must be replaced. Battery replacement must be performed by a professional; please contact your supplier if necessary . It is recommended to replace the battery at least every 4 years to ensure reliable UPS operation.

If you need to replace the UPS, you must first stop charging and discharging and power off the machine . Follow these steps:

- Disconnect the UPS load miniature circuit breaker QFA1 in the distribution box. ~ QFA2 ;
- Press and hold the UPS power off button to turn off the UPS;
- Disconnect the miniature circuit breakers QF3 ~ QF7 in the distribution box;
- Use a multimeter and visual inspection to check whether each component is electrically neutral.
- Remove the screws from the front mounting plate ;
- Gently pull out the UPS;
- Unplug the AC input and output cables from the back of the UPS . Do not move or misalign the wire harness. This is for wiring when the UPS is replaced ;
- Disconnect the battery input cable connector from the back of the UPS . Do not move or misalign the wiring harness; it will be used for wiring when replacing the UPS.
- Unplug the communication cable connector on the back of the UPS. Secure the cable harness to prevent it from shifting or becoming misaligned. This will be used when replacing the UPS.
- Disassemble the UPS;
- Insert half of the new UPS into the control cabinet;
- UPS AC input/output cable plug into the new UPS;
- Insert the UPS communication cable plug into the new UPS ;
- The new UPS has been installed.
- Secure the new UPS with screws .
- Complete the UPS replacement.



picture 9-16　UPS Location Map

6) Maintenance of auxiliary electrical appliances

Check the working status of the water dispenser and other electrical components inside this product. If there are any problems... If any product is damaged or damaged, it should be replaced promptly. When replacing a product, please follow the spare parts list. The replacement process must be carried out by professionals. If necessary, please contact your supplier.

9.2.2　Battery system maintenance

(1) Normal operating system

Each month, at least one full charge-discharge cycle must be ensured. The batteries in the system should be maintained according to the following plan to prevent battery discrepancies and control system calculation errors.

① plan 1 (when the battery system) (When SOC is low)

Step 1. Discharge the battery system to the cut-off state at a power not exceeding the rated power, and then let it stand for 1 hour after completion.

Step 2: Charge the battery system to the cut-off state at a power not exceeding the rated power, and let it stand for 1 hour after completion.

Step 3: Discharge the battery system to the required SOC for operation, and continue operation according to the project's operational needs.

② Option 2 (when the battery system) (When SOC is high)

Step 1. Charge the battery system to the cut-off state at a power not exceeding the rated power, and then let it stand for 1 hour after completion.

Step 2: Discharge the battery system to the cut-off state at a power not exceeding the rated power, and then let it stand for 1 hour after completion.

Step 3: Charge the battery system to the required SOC for operation and continue operation as required by the project.

(2) Unused systems are left unused.

Recommended battery energy storage capacity range 30% to 50%.

If the battery system remains idle for an extended period, it should undergo a charge-discharge cycle every 3 to 6 months. The operation method is the same as described in the previous section. This ensures the system's power and consistency.

When restoring the system from idle mode to operating state, a full charge and discharge cycle is required to perform a battery state of charge (SOC) calibration. This is to prevent SOC deviations during storage from affecting operation.

(3) Spare batteries

If a spare battery is configured as a backup, it should be used every Perform maintenance on the spare batteries every 12 months . Refer to the previous section for maintenance methods. This ensures the system's power and consistency.

During storage BMS load balancing function is not working. Furthermore, due to the long maintenance intervals for spare batteries, consistency issues may exist. It is necessary to consider single-cell balancing for cells with inconsistencies. When discharging the battery, the battery consistency should be evaluated according to the OCV curve. If there is inconsistency among individual battery cells , the SOC imbalance (i.e., the difference between the SOC of the corresponding average voltage and the SOC of the corresponding lowest cell voltage) will be greater than [the difference between the SOC of the lowest cell voltage and the SOC of the lowest cell voltage]. If it reaches 5%, then a leveling maintenance is required first (the equipment used). (Battery pack level charge/discharge machine, equalizer). After the equalization work is completed, continue with the remaining maintenance steps.

(4) Battery module replacement

① Preparation stage

1. Ensure all batteries are ready, and prepare tooling, equipment, cranes, sliders, etc., according to site conditions. Ensure personal protective equipment is complete. When operating, protective measures must be taken, such as wearing insulating gloves or insulating shoes.

② System power off

Power off the system before replacement For system power-down procedures, please refer to "6.3". Power off operation.

③ Open the door

Open the hatch to the locked position and secure the hatch.

④ Remove cables

Disconnect the communication harness connecting the high-voltage box and the battery module to be replaced.

Disconnect the positive and negative cables connecting the high-voltage box and the battery module to be replaced.

Disconnect the power supply cable connecting the battery module.

⑤ Drainage

Visually inspect the appearance of the battery module and close the inlet/outlet located on the side of the battery cluster. Outlet branch pipeline valve.

Complete tasks such as draining the coolant. Please refer to "9.2.4" for the draining procedure. Thermal management system maintenance.

⑥ Remove battery module

Move the lifting platform tooling to the front of the hatch and adjust the height of the forklift to align with the battery module.

Pull the battery module onto the forklift. The battery module is heavy, so be careful when handling it.

⑦ Battery module lifting

Lifting and transferring battery modules: Secure the top safety clamp to the crane hook , and connect the hook to the side lifting hole of the battery module for lifting and transportation.

picture 9-17 Schematic diagram of battery module lifting points

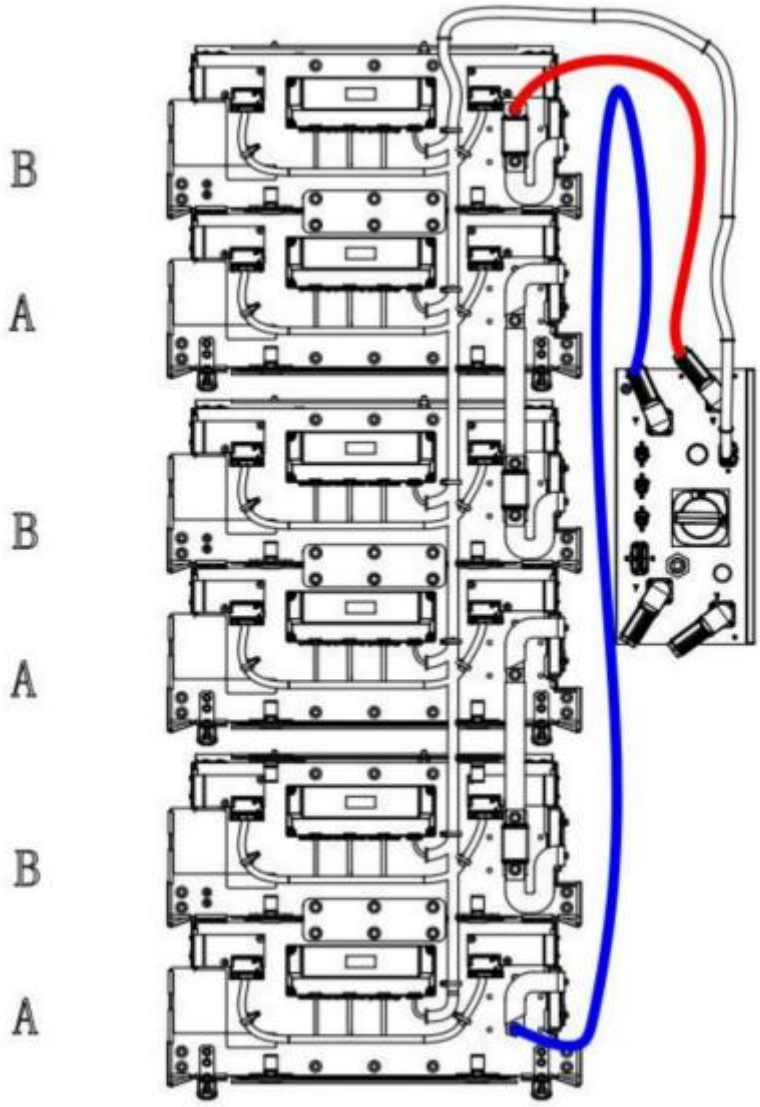
⑧ Battery module replacement

Perform the above steps in reverse order, lifting the new battery module to the position to be replaced and pushing the new battery module into the empty slot to complete the replacement.

picture 9-18 Tooling for disassembling and assembling battery modules

After replacement, the liquid cooling pipes, cable harnesses, etc., must be reinstalled in the reverse order of the above steps, and the liquid filling process must be completed. Refer to "9.2.4" for the liquid filling steps. Thermal management system maintenance.

The battery wiring diagram for the battery cluster is shown below:



picture 9-19 Schematic diagram of a single-row battery cluster

(5) Replacement of high-voltage box

Replacement steps:

Step 1. Turn all switches in the control box and the high-voltage box circuit breaker to the "OFF " position;

Step 2: Disconnect the DC cable, power cord, and communication cable;

Step 3: Unscrew the fixing screws (as shown in the red box in the picture);

Step 4: Pull out the high-voltage box forcefully.

Step 5: Replace with a new high-voltage box and secure it tightly, then reinstall the removed cable harness.

Recommended tools: tightening gun, socket wrench (10mm, 13mm), torque gun QXXD5AT040PS08 (8- 40N.m).

picture 9-20 High-voltage box fixed position

9.2.3 Fire protection maintenance

(1) Regular maintenance should include the following:

- l The equipment's appearance showed no abnormal changes;
- l The signs and markings are intact;
- Equipment should be free from collision deformation and other mechanical damage, and the surfaces should be free from rust. The protective coating should be intact, the nameplate should be clear, the manual operating device should be in the correct position, and the protective cover, lead seal and safety signs should be complete;
- There should be no abnormal alarm information for fire communication on the display screen .
- Extinguishing agent storage containers and all system components, such as container valves, connecting pipes, Valve actuators, nozzles, signal feedback devices, etc. No mechanical damage such as collision deformation. The table is free of rust, and the protective coating is intact. The nameplates and signs are clear, and the protective devices, sealing devices, and safety signs of the manual operating devices are intact.
- The supports and hangers between the equipment, fire extinguishing agent delivery pipelines and storage units should be securely fastened without any

looseness .

- The connecting pipe should be free from deformation, cracks, and aging. If necessary, it should be sent to a legally authorized quality inspection agency for testing or replacement.
- Each nozzle orifice should be free of blockages.
- the fire extinguishing agent delivery pipeline is damaged or blocked, a sealing test and air blowing should be carried out in accordance with relevant regulations.

Before conducting a fire alarm simulation test Ensure that the starting wires of all detectors are disconnected from the fire extinguishers.

table 9-5 Fire protection maintenance checklist

	object	**Inspection items**	**Recommended cycle**
1	Aerosol fire extinguishing device	1. Check if the aerosol fire extinguishing device itself is damaged. (Appearance inspection) ,include (If there is severe wear, rust, corrosion , or other factors that may affect its functionality, such as damaged nozzle stickers) 2. Check if the aerosol fire extinguishing device has expired. 3. Check if the mounting brackets of the aerosol fire extinguishing device are loose. 4. Inspect the battery compartment structure protected by the aerosol fire suppression system to eliminate any adverse effects that could lead to changes in the fire suppression volume.	6 Months
2	Smoke detector	1. Check if the working status is normal.	6 Months
3	Temperature	1. Check if the working status is normal.	6

	detector		Months
4	Gas detector	1. Check the appearance for deformation, rust, aging, etc. 2. Check if the installation is safe.	6 Months
5	Audible and visual alarm	1. Check the appearance for signs of deformation, rust, aging, etc. 2. Check if the installation is safe.	6 Months
6	Fire alarm/activation	1. Check the appearance for deformation, rust, aging, etc. 2. Check if the installation is safe.	6 Months
7	Inlet and exhaust safety valves	1. Check the appearance for deformation, rust, aging, etc. 2. Check if the installation is safe.	6 Months

(2) Fire extinguishing agent should be replaced regularly.

Aerosol lifespan is 15 years. During use If any of the following conditions are found in the aerosol, it should be replaced following the manufacturer's instructions:

l is severely corroded or damaged, or there are doubts about its safety and reliability.

l Not used more than 15 years.

l The appearance is abnormal.

9.2.4 Thermal management system maintenance

(1) Daily maintenance instructions for liquid chiller

- strictly forbidden to operate the liquid cooling equipment without coolant.
- strictly forbidden for personnel to touch or maintain the equipment while it is running.
- Disassembly is strictly prohibited for non-professionals .
- This unit must not be squeezed by heavy objects.

table 9-6 Fire protection maintenance checklist

	Maintenance items	Maintenance Standards	Inspection method	Exception handling
1	Running data	Current during unit operation Voltage, inlet/outlet liquid temperature /pressure, and other data should conform to the following ranges: l Current The operating current is less than the maximum operating current indicated on the nameplate. l Voltage: 220V±15%. l Coolant operating temperature range: -30°C ~55°C.	Visual inspection	The inlet and outlet liquid temperatures and pressures can be viewed in the graph. 5-4 Obtain. When data is abnormal, please locate the fault and take appropriate action according to the fault list.
2	Running sound	The unit operated without abnormal vibration or noise. The operation of the following components is mainly observed : l compressor l Fan l Circulating water pump	Judging by sight and hearing	If there is an operational error, please refer to the fault list for troubleshooting.
3	Pipeline reliability	There is no refrigerant leakage in the refrigeration system.	Visual inspection	Please contact after-sales service for repair.
		There are no leaks in the coolant circulation system.		After repairing the pipeline, refer to the fluid replenishment procedure to add coolant.
4	unit Appearan	The unit table is clean,	Visual inspecti	At least After 1 minute, use a brush or cotton cloth to remove dust

	ce	dust-free, and free of dirt.	on	and dirt from the unit.

(2) Regular maintenance instructions for liquid chillers

Regular maintenance of water purifiers mainly includes the filter, fan, power cord, condenser, coolant, and piping . The maintenance intervals are recommendations and should be adjusted according to the actual site conditions and local regulations .

table 9-7 Thermal Management System Maintenance Checklist

	Mainten ance items	**Maintenance Standards**	**recomm end cycle**	**Detecti on Way**	**Exception handling**
1	Reliabilit y of power cables and power terminal s	The power plug, electrical cables, and terminals are not loose.	6 months	Visual inspect ion	At least Reconnect the loose power plug after 1 minute ; Use a screwdriver to tighten the loose cable.
2		The electrical cables showed no signs of aging, damage, abnormal heating, or other abnormalities.	6 months	Visual inspect ion	At least Replace the power cable after 1 minute .
3		There was no dust on the wiring panel.	6 months	Visual inspect ion	At least Clean off the dust with a brush after 1 minute .
4	Filter cleaning	The filter screen is free of dust accumulation, foreign objects, and damage.	1 month	Visual inspect ion	At least After 1 minute, use a brush to remove dust and other dirt. Alternatively, rinse with clean water and let it air dry in a cool place.
5	Unit exterior	The unit is clean and dust-free. No dirt	6 months	Visual inspect ion	/
6	Fan operatio n	Dust-free fan There were no obstructions at	6 months	Visual inspect ion	At least power outage Clean the dust off the fan with a brush after 1 minute. . Remove

	reliability	the air vent.			any foreign objects from the air vents.
7		The fan blades were undamaged. The fan rotates smoothly without any abnormal noise.	6 months	Visual inspection	At least After 1 minute, tighten the fan and check for any internal cables or other components that may interfere with the fan's rotation. If the fan malfunctions, please replace it.
8	Condenser cleaning	The condenser is free of dust and foreign objects.	6 months	Visual inspection	At least Clean the condenser with compressed air or a vacuum cleaner with a brush head after 1 minute .
9		The fins showed no severe bending or deformation.	6 months	Visual inspection	At least After 1 minute, use tools such as a fin comb to correct it.
1 0	coolant	l Concentration meets the required range l PH And the concentrations of each electrolyte meet the requirements. l No dirt, sediment, or algae will form .	6 months	l detector l Visual inspection	At least Replace the coolant after 1 minute .
11	Pipe appearance	The exterior is free from damage, deformation, and corrosion.	6 months	Visual inspection	At least After 1 minute, drain the coolant and replace the corresponding piping.
12	Pipeline reliability	Pipes are securely fixed and connections are not loose.	6 months	Visual inspection	At least After 1 minute, tighten the loosened area.
13	Valve	No valve failure	6 months	Commi	At least power outage

	reliability	or damage		ssioning	After 1 minute, drain the coolant and replace the corresponding valve.

(3) Coolant maintenance instructions

Coolant has a limited lifespan and should be replaced every five years. Coolant should be replaced if its quality falls below any of the following indicators .

- The pH value is between 7.5 and 8.5;
- Color : The coolant has darkened significantly;
- Appearance : Turbid coolant containing obvious impurities such as precipitated particles or flocculent impurities.

table 9-8 Coolant Replacement Instructions

Coolant type	**Evaluation indicators**	**Maintenance cycle**	**tool**
50% ethylene glycol	pH value at 7.5 ~8.5 between	5 years	Water pump, hose, hose clamp, flathead screwdriver Notice For replacements, please contact the supplier.
	color The coolant has become noticeably darker.		
	Appearance : Cloudy coolant It contains obvious impurities such as precipitated particles or flocculent impurities.		

pH value testing steps:

Step 1: Shut down the system and disconnect the AC power supply and DC switch;

Step 2: Wait ten minutes. Open the battery compartment door.

Step 3: Open the drain valve at the end of the main pipe, and gently turn the valve (do not open it completely). It releases approximately 10 mL of coolant.

Step 4: Test coolant samples using pH test strips or a pH meter. This is to obtain the current pH value of the coolant. When the coolant pH value exceeds the range of 7.5~8.5 , coolant replacement and maintenance (system draining + system top-up) are required.

Only use coolant of the specifications provided by approved suppliers. Mixing different types of coolant is not recommended. Please contact the manufacturer for coolant information.

Safety precautions for changing liquid coolant

- Any personal injury caused by misoperation should be dealt with immediately. They must receive immediate emergency first aid or medical care.
    - Please strictly abide by the safety regulations of your area to prevent accidents. The safety precautions outlined in this manual do not cover all safety matters. This is only as a supplement to local safety regulations.
    - modifications beyond those specified in the instruction manual may be made to the equipment without prior consent and agreement .
    - not allowed to operate, maintain, clean, or use the equipment as a toy.
    - Do not install or remove the power cord while it is energized. Turn off the power switch before installing or removing the power cord.
    - Please perform maintenance operations after turning off the power. Do not turn the power on during the operation. For certain operations that require operation while the unit is running (such as operating a chiller unit), ensure that all equipment wiring is correct before turning on the power .
    - operation , such as wearing insulating gloves or insulating shoes.
    - The coolant in the liquid-cooled energy storage system is toxic. Avoid ingestion or prolonged skin contact. If it gets into eyes, rinse immediately with water and seek medical attention.
    - l Coolant recovery and treatment
    - Do not discard coolant and packaging materials indiscriminately. Please refer to the relevant regulations and requirements of your local area for disposal methods.

(4) Battery cluster electrolyte discharge instructions

When only one module of the battery system needs to be replaced First, drain the fluid.

The operation steps are as follows:

1. The system power-off is complete;

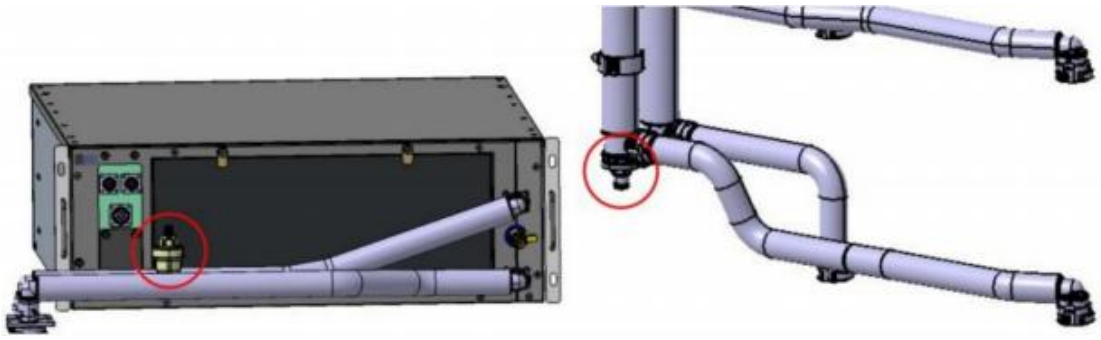
2. Open the automatic air vent valve located at the highest point of the connecting pipe;

3. Connect one end of the drain pipe to the external reservoir. Then connect the other end of the drain pipe to the lowest drain port of the liquid cooling pipe (note the connection order, as an incorrect order will cause coolant to flow outside the reservoir).

4. If no fluid flows out of the drainage tube within 30 seconds, the drainage system is considered complete .

5. After the drainage is completed To disconnect the drain hose from the drain valve, close the automatic/manual air vent valve at the highest point of the connecting pipeline, push up the locking mechanism, and simultaneously pull out the drain hose.

6. Drainage work on a single branch road is complete.



picture 9-21　Cluster exhaust valve and drain valve

(5) Instructions for system injection

The overall steps of vacuum liquid injection are: **pressure holding — Vacuuming one Tooling emptying one Injection — test.**

Pressure holding: Test the airtightness of the system (liquid chiller plus the entire liquid cooling pipeline) to ensure smooth operation in subsequent operations ;

Vacuuming: Removing air from the system To avoid affecting cooling and heating efficiency;

Tooling purging: The purpose is to remove the air inside the liquid injection tooling and fill it with coolant;

Coolant injection: Injecting coolant into the system;

Test: Power on the liquid chiller and run it in exhaust mode to remove residual gas (if there is an exhaust valve on the pipeline). And test whether the liquid chiller is functioning properly.

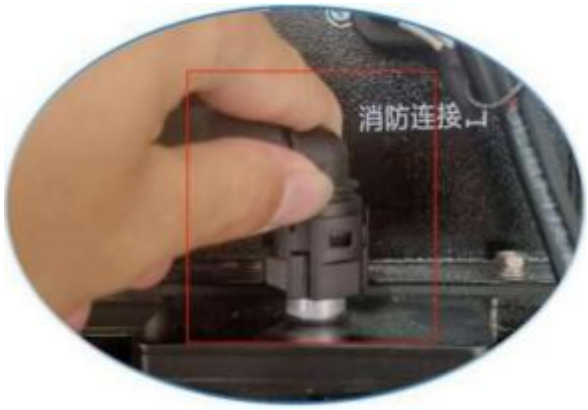
Figure 9-22 Injection Instructions

The tools required for injection are as follows:

picture 9-23 Tool Description

① Pre-operation inspection

1. Connect pipes and cables, and ensure the water dispenser and pipes are secure. Cable and conduit connections are in place. Pull the connector back by hand. Confirm that the clips are locked: a full inspection is required after installation.



Perform pull-out tests at each pipe joint to ensure tightness and confirm correct inlet and outlet pipe connections.

Figure 9-24 Inspection Diagram

2. Check if the plug of the drain valve in the pipeline is properly sealed. If there is an air vent, it should be in the closed position.

3. Open the upper maintenance screen of the unit and open the blue ball valve at the liquid injection port.

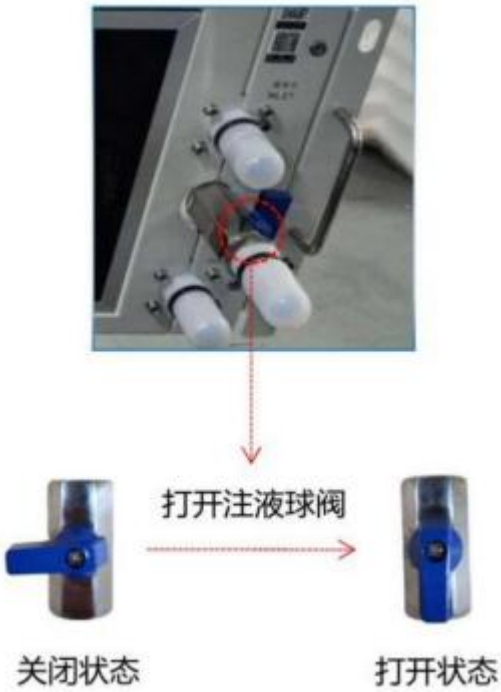


Figure 9-25 Schematic diagram of injection ball valve

The interface locations of the liquid cooling unit are shown in the figure below;

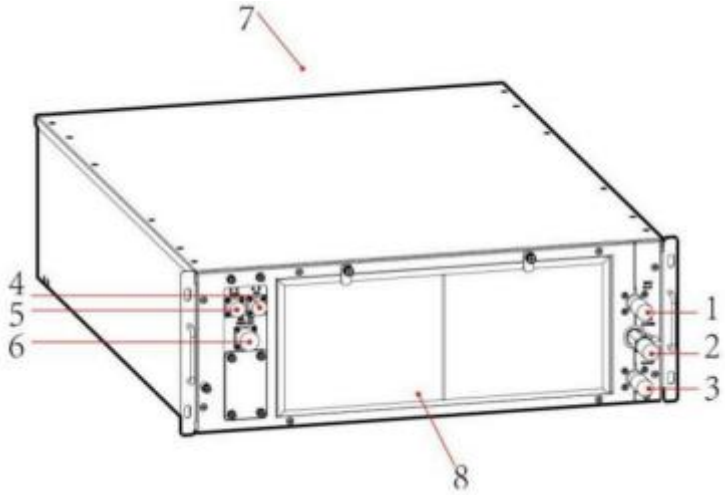


Figure 9-26 Water turbine and its components

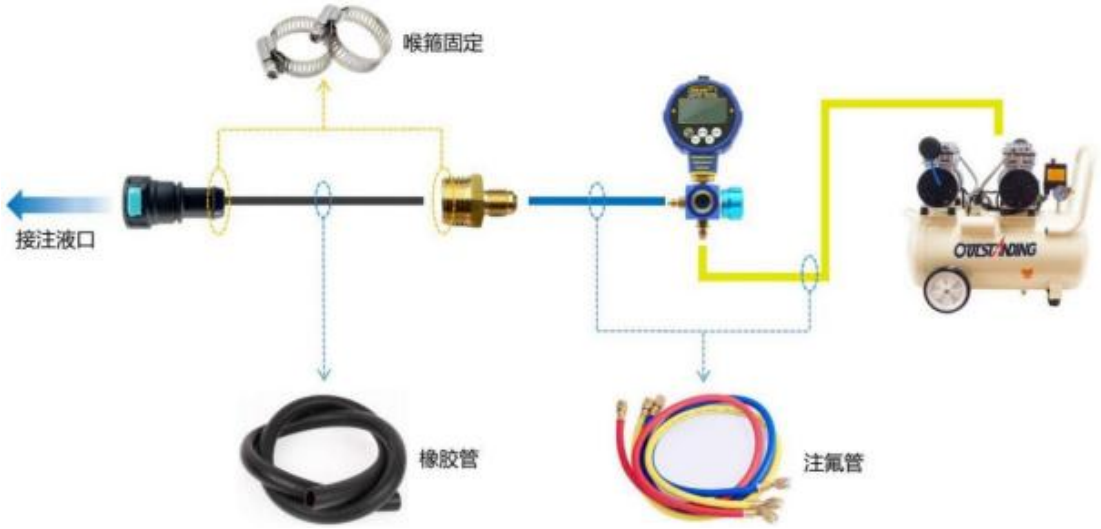
table 9-9 Water purifier parts description

1	Inlet	5	Fill/drain port
2	water outlet	6	Communication interface

3	Debugging interface	7	Power interface
4	air vent	8	air inlet

② Overall pressure holding

Connect the pressure-holding fixture and perform the following operations:



picture 9-27 Pressure holding fixture

1. Open the pressure gauge valve and turn on the air compressor to start pressurizing the system;

2. Observe the pressure gauge data. After pressurizing to 250 kPa, close the gauge valve first, and then turn off the air compressor.

3. Wait Record the pressure data displayed on the instrument panel after 10 minutes (until the internal pressure stabilizes);

4. Wait for the system to hold pressure. Record the data again after 120 minutes and compare the pressure data before and after. A pressure drop of <10 kPa indicates that the pressure holding is qualified.

picture 9-28 Pressure holding process diagram

Perform pressure holding steps After confirming that the pressure holding is qualified Release the gas from the system.

If the quality is substandard, the leak point needs to be investigated. The next step can only be carried out after the leak is resolved (leak detection method: use soapy water foam to check all pipe joints). (Check for leaks).

③ Complete evacuation

Connect the vacuuming fixture and perform the following operations:

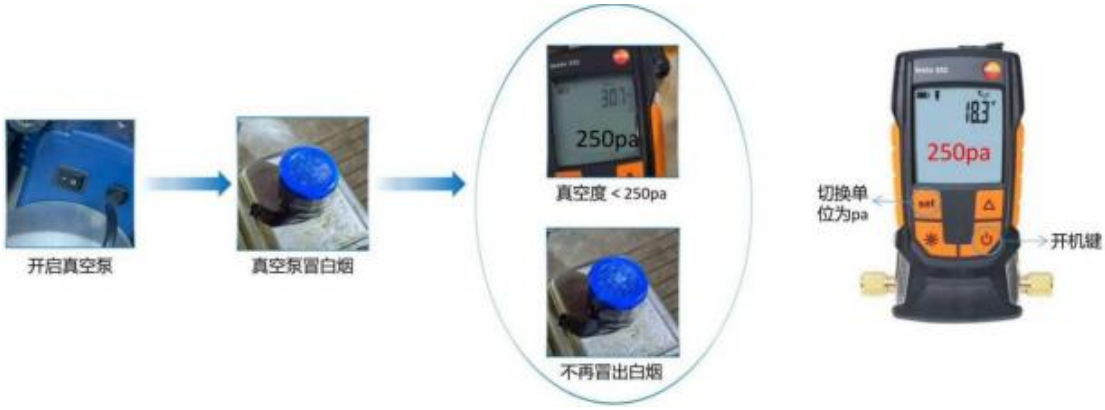
picture 9-29 Vacuuming fixture

1. Turn on the vacuum gauge Switch its measurement unit to pa;

2. Turn on the vacuum pump to evacuate the system. The vacuum pump will start to remove air from the system and emit white smoke.

3. Observe the vacuum gauge data. When the vacuum level is <250pa and remains unchanged for 30 seconds and the vacuum pump stops emitting white smoke, the vacuum pump is turned off and the evacuation is complete.

4. First, close the blue ball valve at the liquid injection port of the unit, then disconnect the hose connected to the liquid injection port, and finally turn off the vacuum pump.



picture 9-30 evacuation process diagram

④ The injection fixture was emptied.

Connect the injection fixture and prepare to empty the liquid:

picture 9-31 Injection fixture (fixture emptied)

1. Turn on the diaphragm pump so that the coolant in the tank enters the injection device and then flows back into the tank;

2. Observe the coolant flowing out of the outlet. When the flow rate is stable and there are no air bubbles, the purging is complete.

3. At this time, the pipes are filled with coolant. Turn off the diaphragm pump Hold the drain pipe vertically. The drain outlet faces upwards;

4. Simply connect the quick connector to the injection port.

picture 9-32 Schematic diagram of the liquid injection tooling emptying process

⑤ Formal injection

After connecting the quick connector to the injection port, the injection process can begin:

picture 9-33 Injection Fixture (Formal Injection)

1. Connect the handheld controller to the unit's commissioning port and power it on. Then operate the handheld device to turn off the machine;

2. Double-check that the tooling is emptied and the connections are correct. Once everything is in order, open the blue ball valve at the unit's liquid injection port.

3. Due to the vacuum inside the system Coolant will be drawn into the system from the tank. At this time, turn on the diaphragm pump. This can accelerate the injection of coolant;

4. Observe the status of the handheld device. Page, pending outflow/return water pressure At approximately 1.0-1.3 Bar, first close the blue ball valve at the injection port. Then turn off the diaphragm pump;

5. Open the automatic air vent valve on the pipeline.

picture 9-34 Schematic diagram of formal injection process

Note: It is recommended not to remove the injection pump and connecting pipelines at this time. If fluid replenishment is needed during the commissioning phase, it can be added directly.

⑥ Operation and debugging (exhaust mode)

This assumes there is an air vent valve on the pipeline:

1. Power on using the handheld controller. Change the mode to fully automatic, then go to the "More" page and enter the password "0001";

2. Go to the "Maintenance" page and turn on "Water Pump Air Venting". The unit will automatically run in air venting mode.

3. After the exhaust mode ends, use the handheld device to turn off the machine. Observe the inlet/outlet water pressure If lower If the concentration is 1.0 Bar, continue injecting until... Around 1.0-1.3.

picture 9-35 Schematic diagram of commissioning and exhaust process

Note: The logic of the venting mode is that the water pump runs for 30 seconds, stops for 60 seconds, and repeats this cycle three times . (Judgment criterion: if the pressure remains unchanged before and after multiple venting modes, the venting process ends).

(6) Instructions for systemic fluid replacement

Coolant replenishment refers to adding coolant when the coolant level is insufficient during the operation of the liquid cooling unit. The operation steps are as follows:

a. Open the exhaust valve at the highest point of the pipeline connecting the unit and the client.

b. Connect the outlet of the replenishment pump to the replenishment port of the chiller unit using a pipe. The inlet is connected to an external storage tank.

c. Power on the chiller unit and start the coolant replenishment device to flush in coolant.

picture 9-36　Systemic fluid replacement

d. Observe the return pressure; when it reaches the state shown in the figure, the replenishment pump will start. It can be observed that the pressure sensor reading at the water system inlet gradually increases. When the pressure sensor is increased to 0.9 bar Stop intravenous fluid administration immediately.

Note It is normal for gas and liquid to flow out of the exhaust valve at the same time. If only liquid continues to flow out , the lower valve of the exhaust valve should be closed. Manually unscrew the exhaust valve Rinse the inside with clean water 2-3 times, then reassemble.

(7) Instructions for draining coolant

The coolant draining operation is applicable during unit maintenance and requires all coolant to be drained (including the pipeline section).

a. Connect one end of the pipe to the outlet of the chiller unit. The other end is connected to the storage container (the ethylene glycol aqueous solution cannot be directly discharged into the environment).

b. The coolant inside the unit flows through pipes into the storage container under the influence of gravity.

c. Remove the pipes.

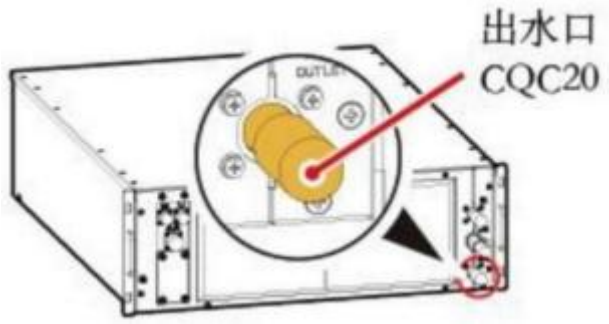


Figure 9-37 Schematic diagram of water outlet of water pump

9.2.5　Cabinet repair

(1) Coating touch-up measures

Inspect for external damage and select the appropriate procedure based on the degree of damage.

Degree of damage 1: Surface stains caused by water and dust can be removed.

1. Wet a cleaning cloth (or other scrubbing tool) with water and scrub the dirty parts of the surface.

② If the dirt cannot be washed with water, wipe it with 97% alcohol. Continue until the surface returns to normal. (Or, if possible, use a non-corrosive detergent commonly used locally).

table 9-10 Cleaning materials (condition) 1)

	Maintenance materials	**source**
1	Cleaning cloth	Customer preparation
2	water	Customer preparation
3	Alcohol or other non-corrosive detergents	Customer preparation

Damage level 2 surface **dirt and** damaged surfaces It cannot be cleaned.

1. Use sandpaper to smooth out any bubbly or scratched painted surfaces .

2. Dampen a cleaning cloth with water or 97% alcohol and scrub the damaged parts to remove surface stains again.

3. After the surface dries, use a soft brush to repair the scratched parts with paint. Apply the paint as evenly as possible .

picture 9-38 Sanding and paint repair diagram

table 9-11 Sanding and touch-up paint materials (condition) 2)

Serial Number	**Maintenance materials**	**source**

1	Cleaning cloth	Customer preparation
2	water	Customer preparation
3	Alcohol or other non-corrosive detergents	Customer preparation
4	sandpaper	Customer preparation
5	brush	Customer preparation
6	paint	Customer preparation

Damage level 3 Damaged **primer** The substrate is exposed.

① Use sandpaper to polish the damaged parts, remove rust and other burrs, and make thesurface smooth .

② Dampen a cleaning cloth with water or 97% alcohol and scrub the damaged parts to removesurface stains and dust.

③ After the surface dries, spray the parts with the exposed zinc primer to provide protection. Ensure that the spray completely covers the exposed substrate.

④ After the primer dries, use a soft brush to repair the damaged parts with paint and apply the paint evenly.

picture 9-39 Sanding and painting diagram

table 9-12 Sanding and painting materials (condition) 3)

	Maintenance materials	**source**
1	Cleaning cloth	Customer preparation
2	water	Customer preparation

3	Alcohol or other non-corrosive detergents	Customer preparation
4	sandpaper	Customer preparation
5	brush	Customer preparation
6	paint	Customer preparation
7	Zinc primer	Customer preparation

9.2.6 System Inspection

The energy storage system should develop an inspection plan according to the requirements of the site and keep inspection records as required. Routine inspection items should be carried out according to the following points:

table 9-13 Recommended routine inspections

	Inspection items	**cycle**
1	The input and output voltage and current, as well as the operating status of the energy storage system, need to be monitored in real time. And designated personnel to observe at designated locations If any abnormalities are found in operation or voltage/current, maintenance should be carried out promptly.	daily
2	Listen for any abnormal noises inside or outside the energy storage system.	daily
3	Smell the energy storage system for any unusual odors, both inside and outside.	daily
4	Read the internal temperature of the system The temperature was observed to be within the normal range.	daily

Regular inspections should be conducted according to the following key points:

table 9-14 Regular inspection recommended

	Inspection items	**confirm**
1	Inspect the exterior of the energy storage system equipment for any damage. ,rust, Signs of paint peeling or oxidation . Clean the table with water or alcohol, and touch up any damaged paint areas.	6 Months
2	Check the ventilation around the energy storage system equipment. Ambient temperature ,humidity, Dust and other environmental conditions meet requirements Are there any flammable materials nearby ?	6 Months
3	Inspect the cable for signs of aging or damage to the insulation layer. If this occurs, appropriate insulation measures should be added or the cable should be replaced.	6 Months
4	The wiring bolts showed no signs of aging or burning. And shake it by hand to confirm that it is tightened .	6 Months
5	Check the condition of the external sealant of the energy storage system cabinet to see if it is aged or damaged. Apply glue promptly.	3 Months
6	Check if the sealing performance of the weatherstripping on the energy storage system doors has deteriorated. If any damage is found... Please replace it immediately. (It is recommended to check one day after the rain stops.) (At least once every three months)	3 Months
7	Check if the door lock hinges of the energy storage system open, close, and lock smoothly. . If necessary, lubricate the lock hole and hinges appropriately.	3 Months
8	Check the air inlet and outlet of the system and liquid chiller unit for blockages. . If necessary, use a brush or cotton cloth to remove dust and dirt from the unit , or replace the air filter. (Note: Power off) 10 (Operate in minutes)	3 Months
9	Check the condenser of the liquid cooling unit for dust and foreign objects that may cause blockage. Check if the fins are severely bent or deformed.	6 Months
10	Check if the fan is working properly. Check if the fan blades are damaged or deformed , and if there is any abnormal	6

	noise.	Months
11	Check the cluster rack and internal equipment for any damage or deformation.	6 Months
12	Check the bottom of the battery compartment for water accumulation. Is there any accumulated dust inside the cabin?	3 Months
13	Troubleshooting is required for uninterruptible power supplies that have not been used for a long time. Uninterruptible power supplies need to be charged every six months.	6 Months
14	Check if the grounding is good and reliable. It is free from corrosion and loosening.	6 Months
15	Check all fasteners for signs of loosening.	6 Months
16	Check that all cable inlets at the bottom of the system are properly sealed.	6 Months
17	Check that warning signs, labels, and nameplates are clear and clean. If necessary Replace them.	6 Months
18	Check if the unit has sufficient coolant. Check if the pH value meets the requirements, and whether there is any dirt, sediment, or algae.	6 Months

Please note that maintenance and inspection must meet the following conditions:

- Avoid opening the cabinet door in high humidity conditions such as rain, snow, or fog, and ensure that the seals around the cabinet door do not curl when the door is closed.
- When maintaining the battery pack, ensure that the locking mechanism of the aviation connector is unlocked before disconnecting the power cord to avoid damaging the battery pack by forcefully pulling it out.

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