

Jilipow Co., Ltd.

Specification of liquid cooled battery cabinet

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Model:JL-BC-5-768/280-L

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History of Specification

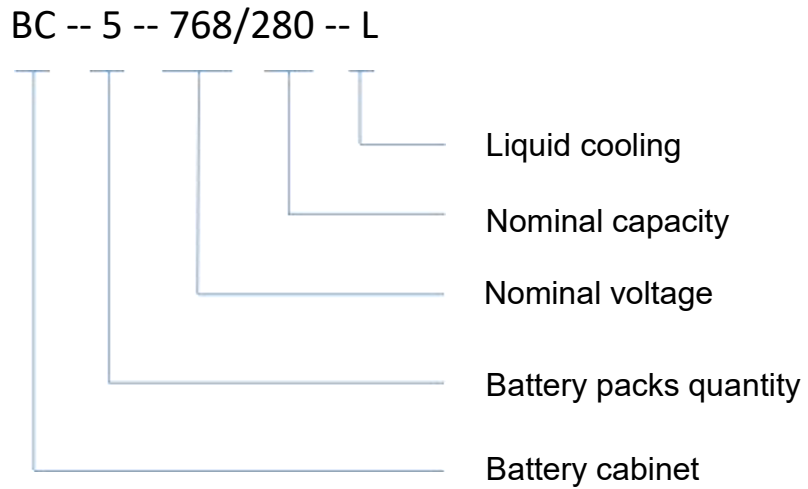
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1. Product Overview

The definition of product model is shown as follows



2. Application Instructions

The purpose of this document is to describe the specifications of the Liquid-cooled battery cabinets, and provide customers with information on the use of the product. The supply scope of this product is battery cabinet packs. Battery cabinet base mounting fastening screws, external power outlets, external communication outlets, and low voltage power supply cables are not included. The details are as follows:

Table 1 Components of battery pack

No.	Component	Model	Quantity
1	Battery packs	BP-43- 153.6/280L	5EA
2	High voltage packs	BMS inside	1EA
3	PCS	PWS1- 125M	1EA
4	EMS	Energy storage integrated centralized control unit ES-CCU	1EA
5	Fire fighting system	Perfluorohexanone, smoke detector	1EA
6	Liquid Cooling System	Energy Storage Thermal Management System Includes liquid-cooled units, liquid-cooled lines, and coolant.	1EA
7	Cabinet	SGCC+Q345_ 1300mm×1300mm×2300mm_spray RAL 7035Light gray	1EA
8	In-cabinet low voltage wiring harness	Contains low voltage and communication wiring harness, already connected to the device at the factory	1EA

9	In-cabinet high voltage wiring harness	Contains the connecting cables between PCS and high voltage box, battery and high-voltage box, and battery pack, which are already connected to the device at the factory.	1EA
10	Dynamic Ring Inspection System	Includes temperature and humidity, flood sensor, dehumidifier, travel switch, etc.	1EA
11	Auxiliary electrical system	Including UPS, micro circuit breaker, switching power supply, five-hole socket and other auxiliary electrical equipment	1EA
12	Accessory	Special tools, special accessories, etc	1EA
13	Test report	Test report	1EA
14	Product certificate	Key components and complete machines	1EA
15	Product packaging	Film + paper packaging	1EA

Note:The specific model,specification and quantity are subject to confirmation before delivery.

3. Product Specification

Table 2 Parameters of liquid-cooled battery cabinet

	Item	Specification
DC side	Cell type	LFP3.2V/280Ah
	Battery pack configuration	1P48S/43kwh
	Battery system configuration	1P240S
	Battery voltage range	DC672V~ DC864V
	Battery capacity range	215kwh
	Discharge rate	≤0.5P
AC side	PCS power	125KW
	PCS cooling method	Air-cooled
	AC side voltage	380VAC, -15%~+10%
	AC wiring method	three-phase four-wire
	Power factor	-1 (ahead) ~ 1 (behind)
	Inlet method	Ac bottom incoming cable
System parameter	Thermal management method	Liquid-cooled,liquid-heated
	Fire fighting system	Perfluorohexanone + smoke detector
	Protection class	IP65
	Corrosion-proof grade	C5H
	Allowable ambient temperature	0~ 55 °C (charge) -20 ~ 55° C (discharge)
	Allowable ambient humidity	0~95% RH (no condensation)
	Noise	≤70dB@1m
	Communication mode	LAN/CAN/ RS485
	Overall dimensions (L * W * H)	1300mm × 1300mm ×2300mm
	Weight	Approx. 2700kg
	Maximum working altitude	4000 meters(run at a reduced rate above 2,000 meters)
System service life	≥10 years	

4. Products Description

The new generation of industrial and commercial integrated energy storage cabinet launched by JILIPOW Energy integrates the design concept of "all-in-one", integrating battery clusters (5 packs in series), BMS, PCS, EMS, fire and thermal management systems in a single standardized cabinet. It has the characteristics of small land area, high reliability, easy installation, flexible expansion, convenient operation and maintenance, and high system efficiency. It is suitable for micro-electric network, backup power supply, peak cutting and valley filling, distributed new energy consumption, optical storage and charge and other application requirements.

4.1. Working principle diagram of the battery cabinet

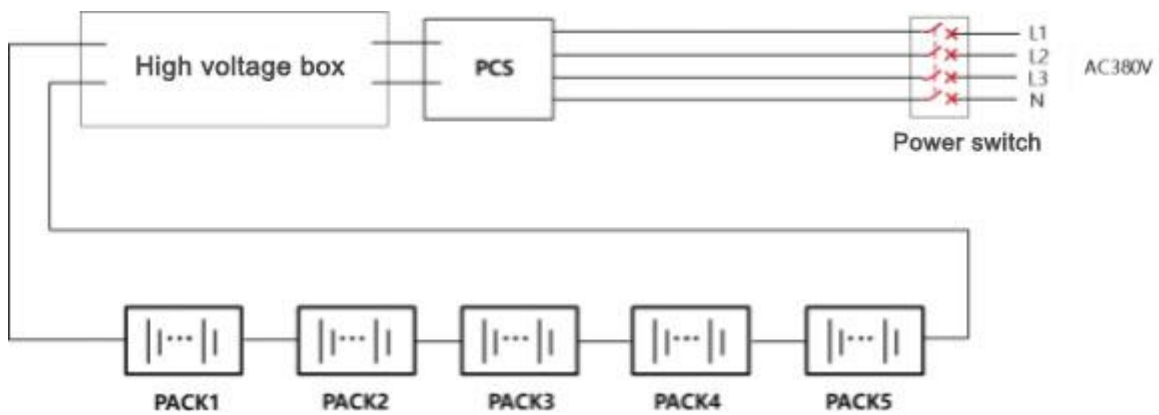


Figure 1 working principle diagram of the battery cabinet

Working mode

The all-in-one energy storage cabinet supports both on grid and off grid operation modes.

(1) Grid-connected operation: In the grid-connected state, the AC side of the energy storage cabinet is connected to the power grid, and the DC side is connected to the lithium battery. The lithium battery can be charged and discharged at constant voltage, constant current or constant power according to the appropriate operation mode selected for different application scenarios.

(2) Off-grid operation: In the off-grid state, the system can output a fixed frequency (matching the power grid) three-phase AC voltage to achieve continuous and stable power supply for the AC side load

4.2. Battery cabinet dimensions



Figure 2 Battery cabinet dimensions

4.3. Battery cabinet system layout

Battery Cluster Configuration: A single set of energy storage cabinet system comprises a total of 1 cluster, with 5 battery boxes per cluster and 4 modules per box. Each individual battery box contains 48 battery cells and 2 BMU (Battery Management Units) that monitor the voltage and temperature of the battery cells within the box. The battery boxes are physically separated from the electrical compartment and are not located in the same enclosed space. As a result, faults within the cluster cannot trigger a chain reaction, and issues such as thermal runaway and electrical fires can be effectively isolated. This enhances the overall safety of the system.

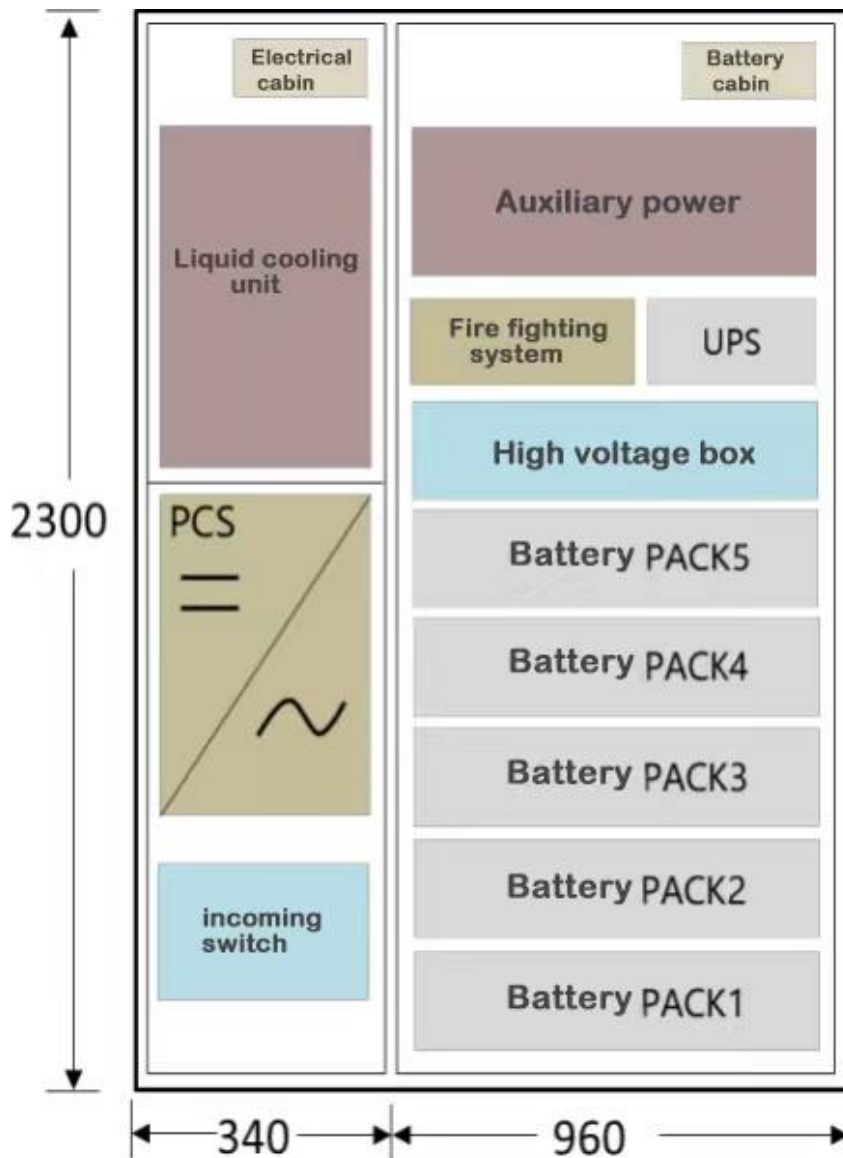


Figure 3 Layout of the battery cabinet system

Table 3 Batter cabinet system components

No.	Part name	Remarks Content
1	Liquid cooling unit	It is used to adjust the temperature of the battery pack in the energy storage system to ensure that it always works within the appropriate temperature range to maintain the best working condition of the system. For details, please refer to "47 Liquid cooling Units".
2	PCS	Bi-directional energy storage converter, realizes the electric energy conversion between the grid and the battery, and monitors and manages the exchange process. For details, please refer to "46 pcs".
3	Main incoming switch	Circuit breaker at the inlet of the main circuit power supply.
4	Temperature and humidity sensor	A sensor device for collecting and measuring environmental parameters such as temperature and humidity in the cabinet.
5	Fire fighting system	The fire signal in each battery pack/battery compartment is detected. According to the detected fire signal, the fire extinguishing agent perfluorohexanone is sprayed into the corresponding battery pack and the fire spot in the cabin and atomized to suppress and eliminate the fire. For details, see 4.8 Fire Extinguishing System.
6	Auxiliary electrical system	A general term for power, control, and signal circuits outside the main loop.
7	UPS	The uninterruptible power supply(UPS) ensures that important devices in the auxiliary power system can work normally when the power supply is abnormal.
	Explode-discharging apparatus	Ensure that even if there is a fire and explosion, the pressure generated is discharged through the explosion plate to avoid the accumulation of combustible gas and further detonation, and the energy storage cabinet will not disintegrate
9	Smoke detector	Detect the fire signal in the cabinet, including but not limited to smoke, temperature, gas (CO, H ₂ , etc.) concentration.
10	EMS	Energy storage cabinet system component information access summary, local display, local monitoring and energy management unit, centralized monitoring and management of the energy storage system. For details, see "4.10EMS."
11	Indicator light	Signal indication equipment for displaying different states of operation and faults inside the energy storage cabinet.
12	High voltage box	The high-voltage power loop management unit is an intermediate unit connecting battery cluster and PCS. The high-voltage control box has the functions of battery cluster voltage and current collection, loop contactor control and protection. For details, see "4.5 High Pressure Box".
13	Battery PACK	It is composed of 48 lithium iron phosphate cells, 2 BMUs (battery slave control unit) and box structure, which can store and release 43kwh of energy. For details, see "44 Battery Box".
14	Liquid cooling line	A network of pipes that carries the coolant of a liquid-cooled unit.
15	Power cable	Connect the cable harness between PCS, high pressure box, and battery box.
16	Flood sensors	A sensor device that accurately distinguishes whether or not flooding has occurred by using an alternating current to collect inductive parameters of standing water.
17	Dehumidifier	By condensing the moisture in the air out of the cabinet, quickly reduce the humidity inside the cabinet, effectively lifting the condensation trouble, keep safe operation of the barrier equipment.

4.4. Battery box

The liquid-cooled battery box consists of 48 LF280K cells grouped by 1P48S, and integrates BMU, fuse, and MSD components as shown in the following figure:

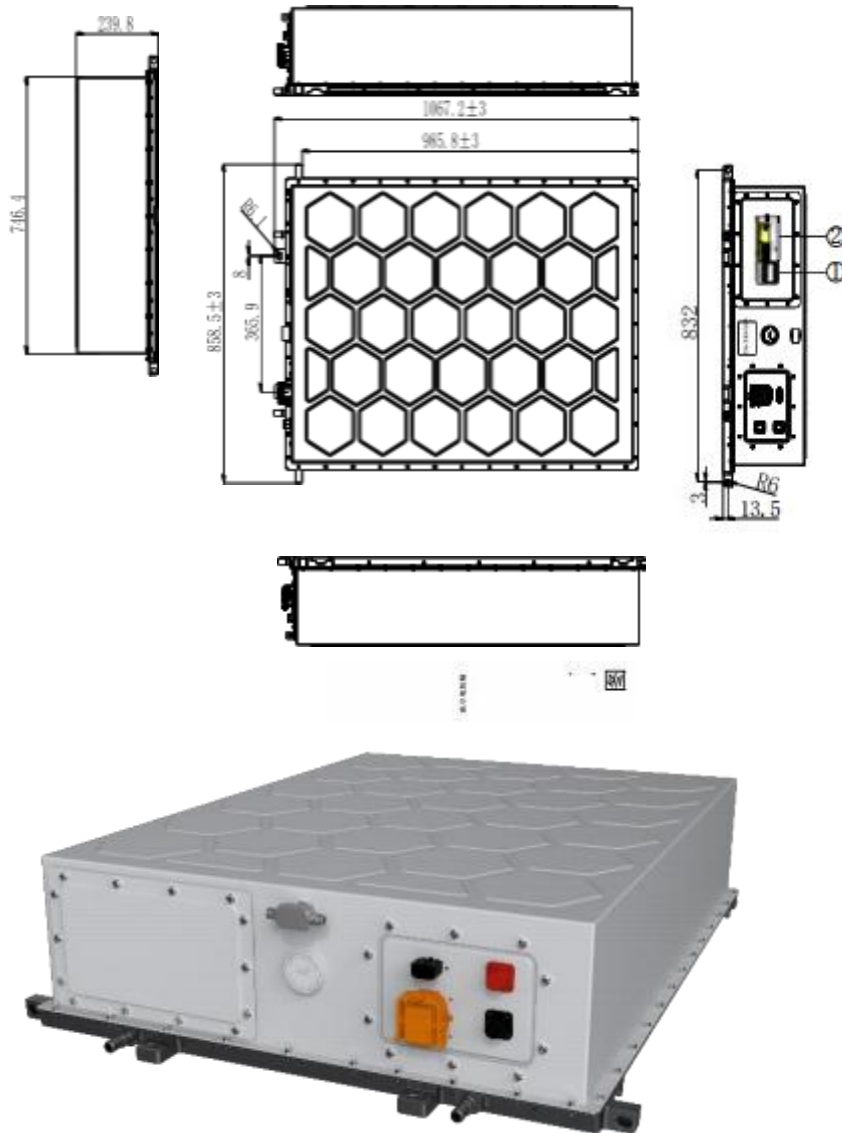


Figure 5 Appearance of a liquid-cooled battery box

The external interface of the liquid cooled battery box is shown in the following figure, and the fire interface is optional

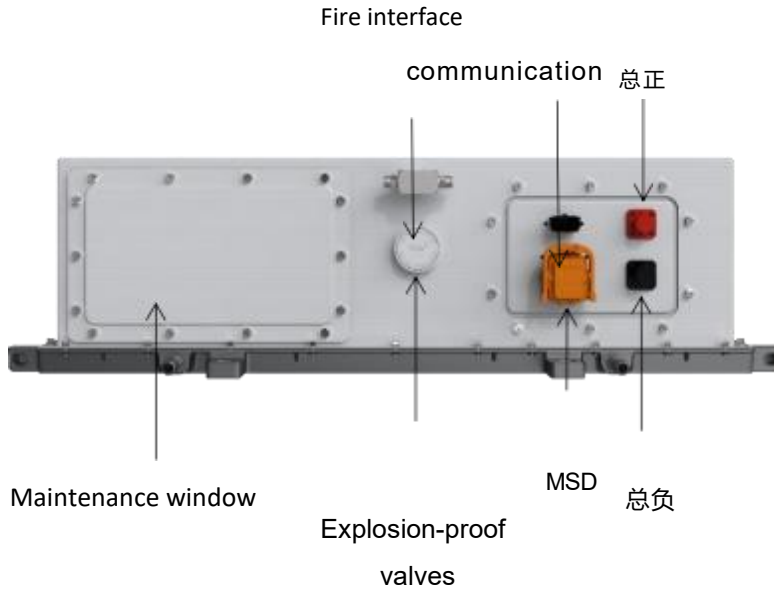


Figure 6 Interface diagram of a liquid-cooled battery box

4.5. High Voltage Box

The high-voltage control box for energy storage batteries is a high-voltage power circuit management unit specially designed for energy storage systems. It is an intermediate unit that connects the battery cluster and PCS. The high-voltage control box has functions such as battery cluster voltage and current collection, battery cluster circuit contactor control, and protection. The built-in energy storage battery cluster control main control unit (BCMU) in the high-voltage control box has CAN, daisy chain, and 485 communication bus interfaces, which can achieve communication functions between the high-voltage control box, the energy storage battery management module, the energy storage battery management system host, and the energy storage high-voltage box, and achieve control, protection, and data communication functions of the energy storage battery cluster.

4.5.1. Product function

- (1) The standard working voltage of the auxiliary power supply of the product is AC220V, which meets the needs of various energy storage occasions;
- (2) The product supports CAN communication between the battery management slave module and the main control module of the energy storage system, achieving the summary of battery cluster information and management to achieve information exchange;
- (3) Support communication control and dry contact control with energy storage inverters, and support CAN communication mode;
- (4) Support manual opening and closing control function for external DC circuit breakers;
- (5) Supports digital signal input detection, can detect switch status signals, etc;
- (6) Supports battery cluster terminal voltage detection, terminal current detection, and battery cluster

insulation status detection;

(7) The product has accurate battery cluster terminal voltage detection, terminal current detection and battery cluster insulation status detection functions.

(8) The product supports the environmental temperature detection in the high pressure box to ensure the safety of the system operation.

(9) The operating status indicator is designed on the product panel to intuitively identify the current operating status.

(10) The product is selected with high-reliability devices and adopts multiple redundant protection measures. Fully considering the possible harsh electromagnetic environment as well as high temperature, vibration and other environments in the energy storage system, the product has high reliability, high stability and high anti-interference performance.

4.5.2. Port Definition Explanation

Table 4 Definition of power interface of high pressure box

Interface definition	Function Description	Model	Remarks
B+	Battery cluster input positive end	SS1-W50Y-AF(orange)	Circular Connector Socket - Connected to the Positive Terminal of the Battery Cluster
B-	Battery cluster input negative end	SS1-W50Y-BF(black)	Circular Connector Socket - Connected to the negative Terminal of the Battery Cluster
PCS+	PCS input positive end	SS1-W50Y-AF(orange)	Circular Connector Socket - Connected to the Positive Terminal of the PCS
PCS-	PCS input negative end	SS1-W50Y-BF(black)	Circular Connector Socket - Connected to the negative Terminal of the PCS

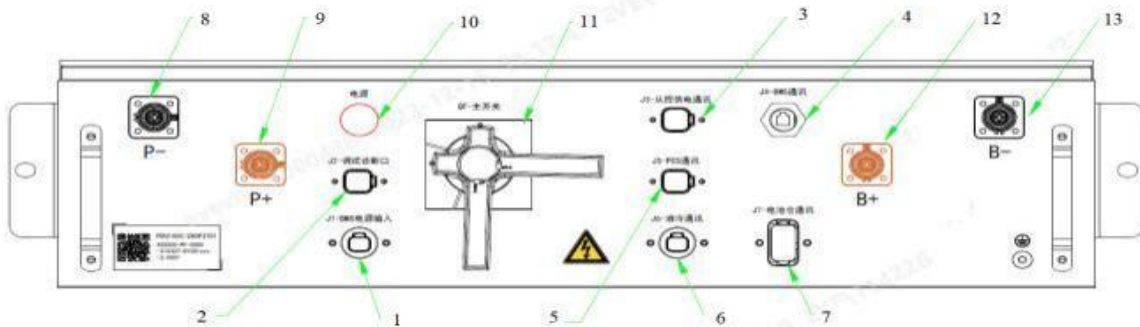


Figure 7 schematic diagram of high-voltage box panel

Table 5 Names of High-Voltage Box

No.	Name
1	BMS Power input
2	Debug diagnostic port
3	Slave control power supply communication interface
4	BMS communication interface
5	PCS communication interface
6	Liquid cooling communication interface
7	Battery Compartment Communication Port
8	Power connector positive (battery side)
9	Power connector negative (battery side)
10	Power indicator light
11	Manual mechanism
12	Power connector positive (PCS side)
13	Power connector negative (PCS side)

4.6. PCS

A bidirectional energy storage converter is a conversion device between the power grid and the battery, capable of charging and discharging the battery. It can invert the direct current (DC) from the battery into alternating current (AC) that can be merged into the power grid, and it can also rectify the AC from the power grid into DC that can be charged into the battery. The bidirectional energy storage converter can be used in both grid-connected mode and off-grid mode.

This energy storage system employs a 125KWPCS power converter with a single-stage topology. The input range of the DC voltage is between 600 and 1000V.

4.6.1. PCS Module appearance



Figure 8 Bidirectional energy storage converter

Table 6 Description of PCS interfaces

No.	Name	Description
1	Power wiring terminal	Direct current positive (DC+)/negative (DC -)and alternating current A (L1)/B (L2)/C (L3)/N
2	Multifunctional panel	Communication and dry contact panel
3	Handle	Unbearable

4.6.2. PCS technical specifications

Table 7 PCS Technical Parameters

AC parameter	
Normal AC Power Output	125KVA
Wiring method	three-phase four-wire
AC overload capacity	137.5KVA
Allowable grid voltage	380/400 (- 15%~ 15%) vac
Allowable grid frequency	50/60 (-2.5~2.5) HZ
Total current harmonic distortion rate	≤3%
Power factor	0.99/- 1~ 1
DC parameter	
Maximum DC power	137.5kw
DC voltage range	600~ 1000 (650~ 1000 full load) vdc
Maximum DC Current	212A
Stable voltage accuracy	≤±1%
Stable current accuracy	≤±1%
System parameter	
Maximum conversion efficiency	99%
Dimensions (width × height × depth)	520×220×680mm
Weight	70kg
Noise	<75dB
Protection level	IP20
Allow ambient temperature	-40~60 ° C (derating greater than 50 ° C)
Cooling method	Intelligent air cooling
Allow relative humidity	0~95% (No condensation)
Allow altitude	3000m(Derating greater than 3000m)
Communication parameters	Communication interfaceRS4 8 5,Ethernet,CAN
Communication protocol	ModbusTCP/RTU,CAN2.0
BMS access	Support

4.7. Liquid Cooling Unit

The liquid cooling unit is used to adjust the temperature of the battery pack in the energy storage system to ensure that it always works within the appropriate temperature range to maintain the best working condition of the system.

4.7.1. Working principle of liquid cooling unit

The liquid cooling unit is mainly composed of compressor, condenser, throttling element, evaporator, water pump, expansion tank, PTC liquid heater and necessary control components.

The unit has four modes, including cooling mode, heating mode (optional), standby mode and fault mode.

The unit can intelligently switch between the four modes according to the parameters fed back by the battery during work.

4.7.2. Technical parameters of liquid cooling unit

The technical parameters of the liquid cooling unit are as follows:

Table 8 Parameters of Liquid Cooling Unit

No.	Technical projects	Parameter
1	Refrigeration capacity@L45/W18	5.6kw
2	heating capacityW10 °C	2.5kw
3	Refrigeration input power@L45/W18	2.34kw
4	Water outlet temperature	18 °C
5	Rated circulating water flow	40/ min@ 160kpa
6	Coolant type	50%Ethylene Glycol Aqueous Solution
7	Refrigerant type	R134a/1.8kg
8	Communication interface	RS485
9	Power range	AC220V50HZ/60HZ
10	Overall dimensions (depth,width and height)	1084*250*723mm
11	Quality (without refrigerant)	≤100kg

4.8. Fire Fighting System

A set of inspiratory perfluorhexanone fire fighting system is set up in the energy storage cabinet, which has a better detection and suppression effect on the fire risk of the battery cabin and the electrical cabin, and ensures the safe and stable operation of the battery system

4.8.1. Working principle of fire fighting system

The fire fighting system is a pack-level fire fighting system. A single energy storage cabinet is equipped with a 5kg pump group of perfluorhexanone fire extinguishing equipment for controlling the spraying of fire extinguishing agents, and a TC05 composite detector (H₂\CO\VOC smoke \ temperature). There are a total of 6 eruption pipes: 1-5 for the pack battery fire extinguishing, the sixth for the cabin eruption fire extinguishing. The fire fighting system CAN communicate with BMS to determine the location of the fire, accurately extinguish the fire, and alarm itself.

4.8.2. Fire protection system functions

The main functions of the fire protection system are as follows:

Detect fire signals within each battery pack/battery compartment, including but not limited to smoke, temperature, gas (CO, VOC, etc.) concentration;

According to the detected fire signal, the extinguishing agent is sprayed into the corresponding battery pack and atomized Perfluorhexanone with good cooling effect was selected as fire extinguishing agent

Supports at least 2 spray strategies to achieve sustained cooling of the target battery

Send system operation status signals to BMS via CAN

4.9. Auxiliary Electrical System

4.9.1. Operation mode description

When the integrated cabinet is in charging operation mode, the battery is charged by an external 380V power supply, and the liquid cooling unit, fire protection, and auxiliary power supply are also powered by external mains power. When the integrated cabinet is in discharge mode, the electrochemical energy storage is converted into AC380V by the lithium battery for external power supply. At this time, the power supply for the liquid cooling unit, fire protection, and auxiliary power is supplied by the battery system. When the external power supply fails or the battery system reaches a protective state and stops discharging, important equipment of the auxiliary power system is powered by UPS for data storage or switching operations

4.10. EMS

4.10.1. Product description

The integrated centralized control unit of the energy storage system is the local monitoring and management unit of the container energy storage system or distributed energy storage cabinet system. It has the functions of real-time integrated aggregation, display, and joint control of the information of all components of the energy storage system. It also has the functions of local monitoring and protection and energy management. Support IEC6180, MODBUS, 104, MQTT and other communication protocols with energy storage system equipment and battery system safety and health and other operating conditions of advanced diagnosis function, with local intelligent operation and maintenance function, is the energy storage system intensive, intelligent, integrated low-cost local centralized control management equipment.

4.10.2. Module appearance



Figure 9 EMS appearance

5. Product Certification

This product has been commissioned by a third party with appropriate qualifications to conduct testing and certification according to a number of domestic and foreign laws and regulations.

The certification or test status is referred to the following table.

Table 9 The definition of communication terminal

No.	Product	Certification regulations	Status
1	Cell	UN38 .3	Be certified
2		GB/T36276	Be certified
3		UL1973	Be certified
4		UL9540A	Be certified
5		UL1642	Be certified
6		IEC62619	Be certified
7	Battery box	UN38 .3	Be certified
8		GB/T36276	Be certified
9		UL9540A	Be certified

6. Product Instructions

- (1) . The battery cabinet can be used alone or in parallel with multiple machines, supporting up to 10 parallel cabinets. When using battery cabinets in parallel, please refer to the customized multi machine parallel scheme;
- (2) The battery cabinet must be used under the specified charging rate or power conditions, and the upper charging limit voltage must not exceed the product technology requirement, to prevent overcharging of the battery and avoid affecting the charging and discharging performance, mechanical performance, and safety performance of the battery;
- (3) The battery cabinet must be used under the specified discharge rate or power conditions, and the lower limit voltage of discharge must not exceed the product technology requirement, to prevent overcharging of the battery and avoid affecting the charging and discharging performance, mechanical performance, and safety performance of the battery;
- (4) The battery cabinet must be used under specified environmental conditions, as high or low temperature environments can affect the performance and safety of the battery Complete;
- (5) The battery cabinet must be used or stored in a clean and ventilated environment, avoiding contact with corrosive substances, and kept away from fire Source and heat source;
- (6) The battery cabinet is prohibited from being used and stored in areas with strong static electricity and strong magnetic fields to avoid safety hazards;
- (7) Before installing or wiring the battery cabinet, it is prohibited to remove the dust covers that connect the positive and negative poles to the communication socket, in order to avoid contact short circuits and grounding Mouth ash accumulation;
- (8) Without the permission of JILIPOW, it is not allowed to disassemble or modify this product without authorization. Otherwise, the warranty will terminate. If a safety accident occurs, our company is not responsible;
- (9) Do not mix the battery box with metal objects to avoid short circuits and safety risks;
- (10) The battery cabinet must be installed or stored upright according to the design state, and it is strictly prohibited to place it on the side or upside down.

The use of battery cabinets must strictly comply with the above requirements, otherwise the warranty will terminate, resulting in product performance damage and safety accidents, Our company is not responsible.

7. Product Maintenance and Upkeep

- (1) When the battery cabinet is left unused or stored for a long time, it should be maintained at a state of charge of 30% to 50%.
- (2) When the battery cabinet is left unused or stored for a long time, it is recommended to replenish the battery every 3 months to prevent over discharge and loss of power A charging and discharging cycle should be conducted once a

year.

Disclaimer:

This device should be used within the scope specified in the product specifications. Due to improper behavior by the product demand unit during installation, debugging, maintenance, use, etc., or non compliant use outside the specified scope of product use, etc, the manufacturer shall not be liable for any damages caused to personnel, animals, or property beyond the terms of the contract.