FLEX-233L05/M5
Battery cabinet
User manual

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Change history			
Change date	**Change person**	**Change content**	**Version after change**
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Head record

1 About this manual

1.1 Applicable Products

Thank you for purchasing POWEROAD products. This manual is only applicable to POWEROAD battery cabinet energy storage products.

Product model: PR3034.

In this manual, unless otherwise specified, any mention of "energy storage system" refers to this product.

1.2 Applicable personnel

This manual is intended for staff who install and maintain this product.Only professional electricians or qualified personnel can perform various operations on the product. Readers must meet the following requirements:

- Have certain professional knowledge in electrical and mechanical installation and operation;
- Familiar with electrical, mechanical schematics and electrical safety knowledge of energy storage;
- Be fully familiar with the composition and working principles of the entire energy storage system ;
- Operators should be fully familiar with the relevant standards of the country/region where the project is located ;
- Be familiar with the installation, operation and other related contents described in this manual .

1.3 Manual use

In order to ensure the personal safety of users and to maximize the excellent performance of this product, please read this manual carefully before using this product. And store this manual together with other information for easy reference. This manual will be continuously updated with product development. The latest version of the manual can be obtained from POWEROAD.

1.4 Symbol usage

To ensure that users can use this product quickly and efficiently, appropriate symbols are used in this manual to highlight relevant information.

Danger	"Danger" indicates a highly potential hazard that, if not avoided, will result in death or serious injury.
Warn	"Warning" indicates a moderate potential hazard that, if not avoided, will result in death or serious injury.
Careful	"Caution" indicates a low-level potential hazard that, if not avoided, will result in moderate or minor personal injury.
Notice	"Caution" indicates potential hazards that, if not avoided, may cause the equipment to malfunction or cause property damage.
Illustrate	"Instructions" are additional information in the manual, an emphasis box supplement to the content, and may also provide tips for optimizing the use of the product, which can help you solve a certain problem or save you valuable time.

Please always pay attention to the danger warning signs on the machine body. The signs include:

logo	Logo definition
	This symbol indicates that there is high voltage inside the cabinet, which may cause danger to the motor.

	This symbol indicates that the temperature here is higher than the acceptable range of the human body. Please do not touch it arbitrarily to avoid personal injury.
	This symbol indicates that this is the protective earth (PE) terminal, which needs to be firmly grounded to ensure the safety of operators.

1.5 Explanation of professional terms

Abbreviation	Original	Chinese meaning
ESS	Energy Storage System	Energy storage system
EMS	Energy Management System	Energy management system
PCS	Power Conversion System	Bidirectional converter
BMS	Battery Management System	Battery management system
A -BMS	Array -BMS	Battery stack management system
C-BMS	Cluster-BMS	Battery cluster management system
M-BMS	Module-BMS	Battery module management system
HVM	High Voltage Monitor	High voltage monitor

2 Safety instructions

2.1 Safety instructions

The battery cabinet product protection level is IP54,and the operating altitude does not exceed 2000m.The battery cabinet is designed and tested in strict accordance with international electrical safety regulations.This section introduces the general safety principles that need to be paid attention to when installing,operating,and maintaining battery cabinets.Please read these safety instructions carefully before installation.For safety instructions in specific use and maintenance steps,please refer to the warning instructions in the corresponding chapters.

Danger	Non-professional technicians or unauthorized personnel are prohibited from operating the battery cabinet system . Non-professional technicians are prohibited from disassembling, repairing, or modifying the battery cabinet system by themselves . It is prohibited to perform installation, operation, maintenance, etc. other than the instructions in the user manual.

Danger	There is fatal high voltage inside the product! When the equipment is not powered off, it is prohibited to move or touch the inside of the electrical equipment while it is powered. Pay attention to and follow warning labels on the product. Observe the safety precautions listed in this manual and other documentation related to this equipment.

Danger	Touching the power connection contacts, terminals,etc. in the power grid or equipment may result in death from electric shock!

Danger	Energy storage battery module,battery cluster positive and negative poles are strictly prohibited from short circuit! Even when the power is turned off,there is still lethal high voltage in the battery pack inside the device!

warn	After maintenance,inspection and other work are completed,the equipment should be powered on in strict accordance with the steps in this manual.

Notice	Ensure that the machine body logo is always clear and readable. Once the machine body mark is damaged or blurred,it must be replaced immediately.

2.2 Precautions for safe use

This product must be used in strict compliance with the usage precautions and safety instructions provided by the company.The company does not assume any responsibility for any injury or loss caused by violation of safe operating requirements.Operators should abide by local safety regulations,and the safety precautions in the manual are only a supplement to local safety regulations.The "notes" and "warnings" in the manual do not represent all the safety precautions that should be followed,but are only supplementary to all safety precautions.

2.2.1 General safety precautions

This product should be used in scenarios that meet specification requirements (voltage, current, temperature and humidity,altitude,etc.).Product functional abnormalities or damage caused by use beyond specifications are not covered by the product quality guarantee.

Before touching any conductor surface or terminal,a multimeter must be used to confirm that there is no voltage at the contact point,or that the voltage is within a predetermined range.Special insulated tools must be used during the operation.

A certain margin must be reserved for the length of the input and output cables,and they must be tied and fixed nearby to avoid pulling the cables and affecting the reliability of the electrical connection .

When installing or removing power cables,make sure that the corresponding circuit is

disconnected to prevent arcs or sparks.

Do not use water to clean electrical parts inside or outside the device.

It is strictly prohibited to wear conductive or easily conductive objects on the wrist during operation, such as rings,watches,bracelets,etc.

Installation or maintenance operations must comply with the sequence of operating steps in the documentation,and do not change the sequence of operations at will.

It is forbidden to block the air inlet and outlet of the cabinet and keep the air circulation around the cabinet smooth.

Blockage of the air inlet and outlet of the cabinet will affect the heat dissipation of the cabinet,which may lead to automatic system protection,equipment damage, and even Personal injury.

It is prohibited to place anything unrelated to the system inside the cabinet .

2.2.2 Electrical Safety

When installing equipment,the protective ground wire must be installed first;when dismantling equipment,the protective ground wire must be removed last.

Before operating the equipment, ensure that the equipment is reliably grounded (the ground resistance is less than 4Ω).Poor equipment grounding may affect equipment performance and even endanger personal safety.

It is prohibited to install or remove the power cord while the power is on.Poor contact during live disassembly may produce arcs or sparks.

warn	The power supply voltage of this system is dangerous voltage,and direct contact may cause electric shock hazard. Irregular and incorrect operation may cause accidents such as fire or electric shock.

2.2.3 Battery safety

When handling batteries and selecting personal protective equipment, customers and their employees must consider the potential risks of accidental short circuiting resulting in arcing, explosion or thermal runaway.

Notice	Module safety precautions in this manual are only important reminders. For more safety precautions, please refer to the instructions provided by the battery module manufacturer. The battery module,the circuit must be kept disconnected.

Cable terminals should be tightened to the corresponding torque value.Poor contact may lead to excessive contact voltage drop.During high-current charging and discharging,the connection will generate a lot of heat, posing the risk of thermal runaway,and higher temperatures will be transmitted to the inside of the battery, which may Will affect battery life.

⚠ Warn	A short circuit of the battery will produce a large instantaneous current and release a large amount of energy, which may cause personal injury. Please pay attention to avoid this situation during operation. Excessive battery temperature will cause battery deformation and damage. If there is an odor or abnormal sound during the charging process of the battery pack, please stop charging immediately and contact the manufacturer. Do not disassemble it without permission. Battery packs that have been used for a long time and have serious bulges are not allowed to be used again.

3 Product presentation

3.1 Product description

Picture3-1Battery cabinet system appearance diagram

The outdoor battery cabinet is a system that completes storage and power supply. It integrates battery modules , control boxes, fire safety systems, power distribution systems, lighting systems, thermal management systems, dynamic environment monitoring and other modules. It has high environmental adaptability, short construction period, supports

parallel expansion, and is easy to install and transport. Features: It can be used in scenarios such as peak shaving and valley filling, power distribution expansion, demand response, etc. It can be widely used in shopping malls, communities, schools, factories, farms and other applications.

3.2 System Configuration

Sheet3-1System configuration list

serial number	name	Product description and quantity	unit	quantity	Remark
1	Battery cabinet structural parts	1350* 1300 * 2050mm	PCS	1	
2	Battery module	46.592kWh	PCS	5	
3	Control box	1000V250A	PCS	1	
4	Spare parts	---	PCS	2	See shipping list for details

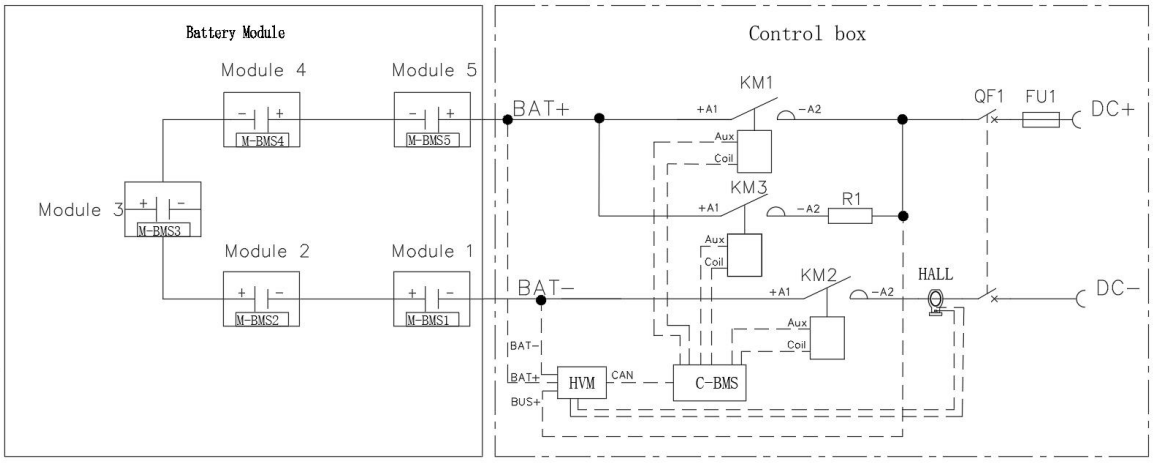
3.3 System parameters

Sheet3-2System basic parameters

category	Performance	Specifications
Battery cabinet	Nominal energy	233kWh
	Rated voltage	832V
	Maximum charging voltage	936V
	Minimum discharge voltage	702V
	Rated charging current	140A
	Rated discharge current	140A
	Maximum continuous charging power	166KW(0.5P)

	Maximum continuous discharge power	166KW(0.5P)
	Operating temperature	-20～45℃
	Energy storage temperature	-30～60℃
	Way of communication	Ethernet
	Relative humidity	5%~95% no condensation
	Altitude (m)	<2000m
	cooling method	liquid cooling
	Protection level	IP54
	Weight	About 2.5t
	Product Size	Width: D 1350±3mm
		Depth: W 1300±3mm
		Height: H 2050±3mm

3.4 System principle

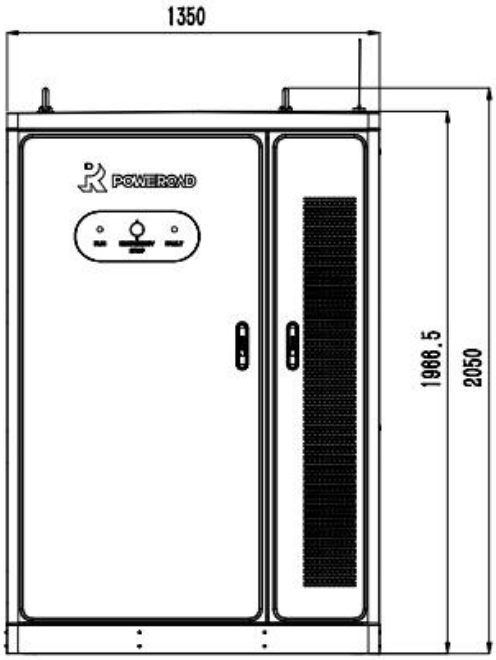


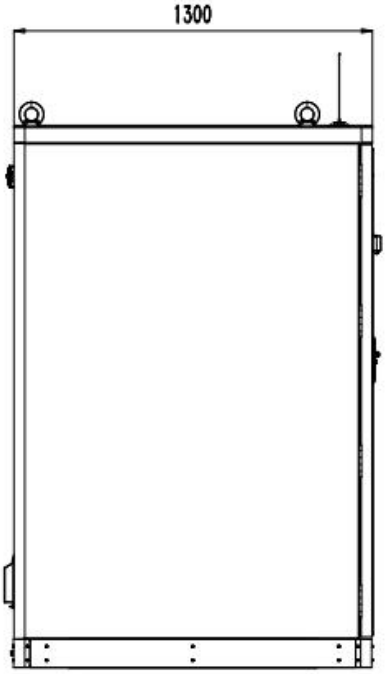
Picture3-2Battery cabinet power circuit schematic diagram

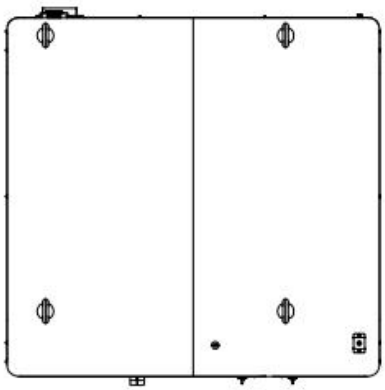
The battery cabinet system consists of 5 PACKs connected in series; the high voltage is connected to the PCS DC busbar through the control box; the control box integrates DC contactors, DC circuit breakers, C-BMS and other devices for the control and protection of

the battery cluster.

3.5 Product installation ruler







4 Venue requirements

4.1 Venue requirements

1、It is recommended to use expansion bolts, M12*80mm, when fixing the battery cabinet to the foundation;

2、The surrounding area of the battery cabinet must be open and unobstructed, with a safe escape passage; the safety passage must not be less than 1m;

3、The weight of the battery cabinet system including the battery is about 2t. The foundation construction site should be selected at the highest point of the surrounding terrain to prevent damage from water accumulation;

4、The load-bearing load on the bottom of the battery cabinet installation pier foundation shall not be less than 2000kg/square meter;

5、There should be a cable trench left, the grounding trunk line and grounding electrode should be made according to the conventional grounding grid of the substation, and the grounding resistance should be less than 4Ω;

6、The foundation should be kept level and the battery cabinet should be kept vertical to the foundation.

4.2 Open box to check

Unpacking and checking contents :

- ✧ Check the outer packaging for visible damage
- ✧ After unpacking, inspect the interior for visible damage.
- ✧ Refer to the delivery note to check whether the internal accessories are complete
- ✧ Check whether internal documents are complete

If any damage or missing parts are found on the product, please contact the manufacturer or supplier. It is recommended not to discard the original packaging, but to

store the product inside the original packaging ;

Use a screwdriver and hammer to remove the battery cabinet packaging material in sequence:

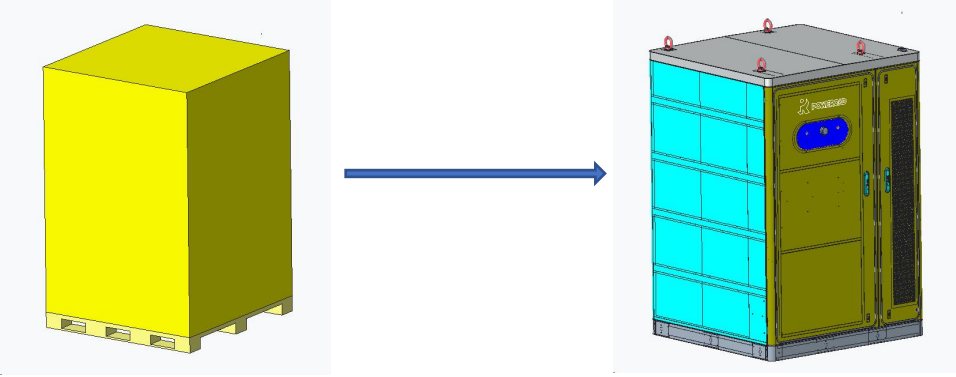


图 1-1Remove the battery cabinet wooden box

Take out the accessories and spare parts tied to the battery cabinet and check the contents:

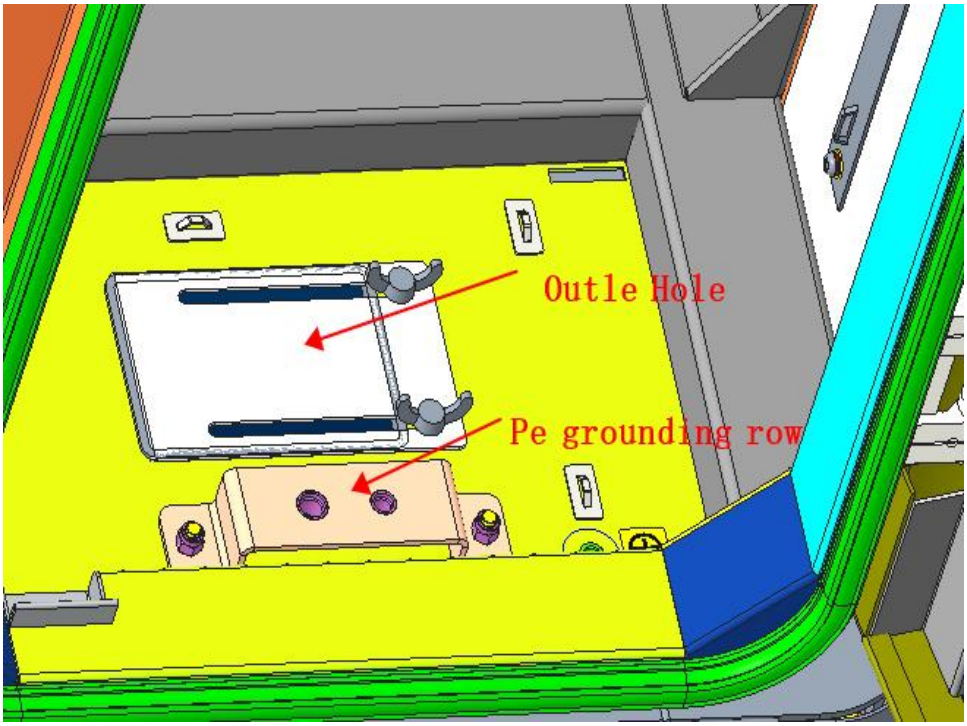
Sheet4-1Checklist

serial number	name	Product Description	unit	quantity	Remark
1	Battery cabinet	233kWh	PCS	1	
2	Parts List	Adapter cable|DC+power cable	PCS	1	
		Adapter cable|DC-power cable	PCS	1	
		Adapter cable|Module series power cable	PCS	2	
		Maintenance switch	PCS	5	
		Desiccant	PCS	1	
		Self-locking tie	PCS	30	
3	Spare parts list	Adapter cable|Module series communication cable	PCS	1	
		Fuse	PCS	1	
		CAN analyzer	PCS	1	
		PCBA module	PCS	1	
		Combination screw	PCS	4	
		Toolbox	PCS	1	

5 Electrical connections

5.1 Ground cable connection

1. Connect the PE grounding bar of the battery cabinet with a 25mm² cable from the outlet at the bottom of the cabinet to the earth grounding device;



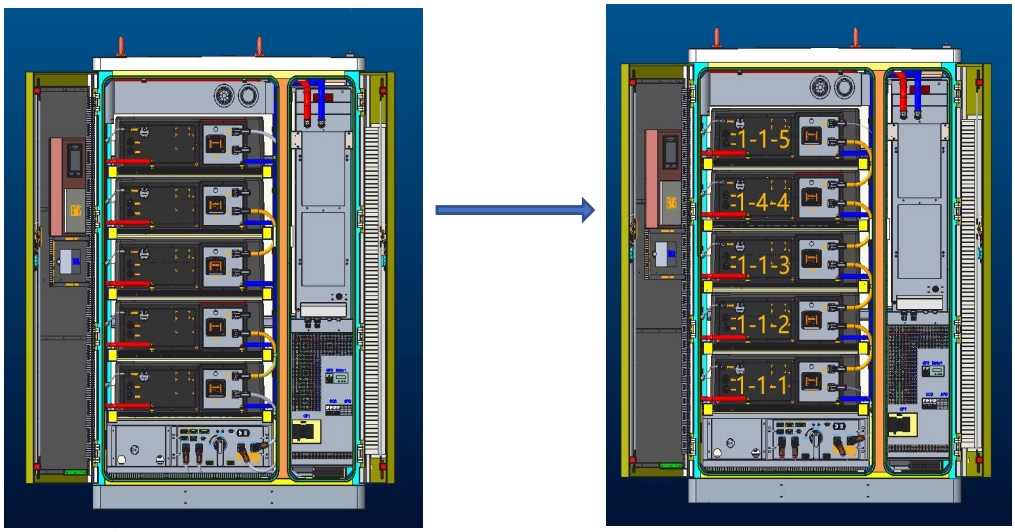
5.2 Power cable connection between battery cabinet modules

Before the battery cabinet is shipped, some module copper bars in the battery cabinet will

be removed for transportation to ensure safety;

Note: Be sure to wear insulating gloves for the following operations

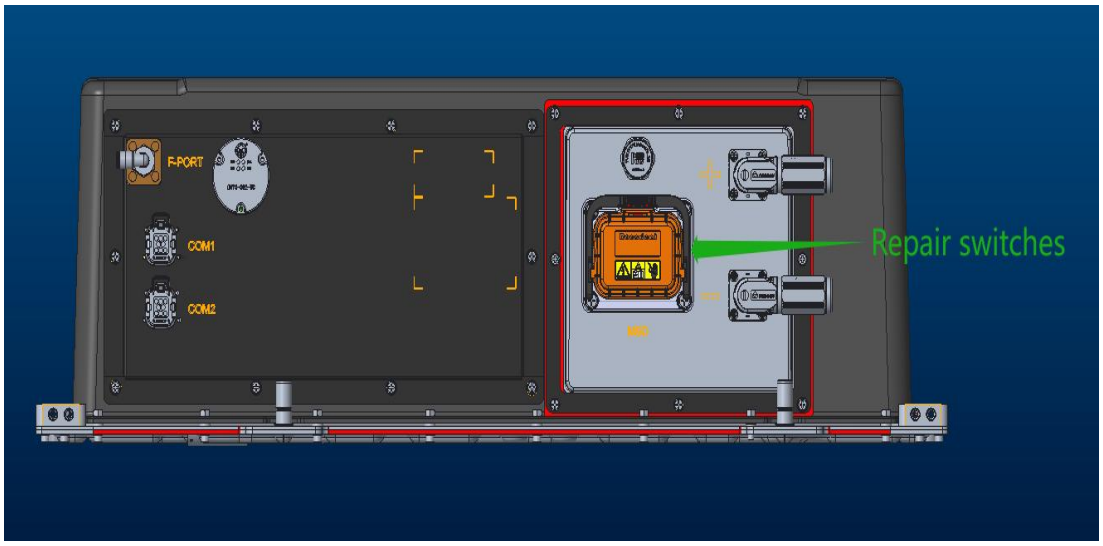
Step 1: Take out a module series power line from the accessory bag, and install it on the module serial numbers 1-1-2 and 1-1-3, 1-1-4 and 1-1-5 according to the label. In between, the connector must be plugged and unplugged quickly and neatly, and cannot be touched lightly, which will cause the connector to be in poor contact for a long time.



Picture5-1Schematic diagram of installing module series power cables in sequence

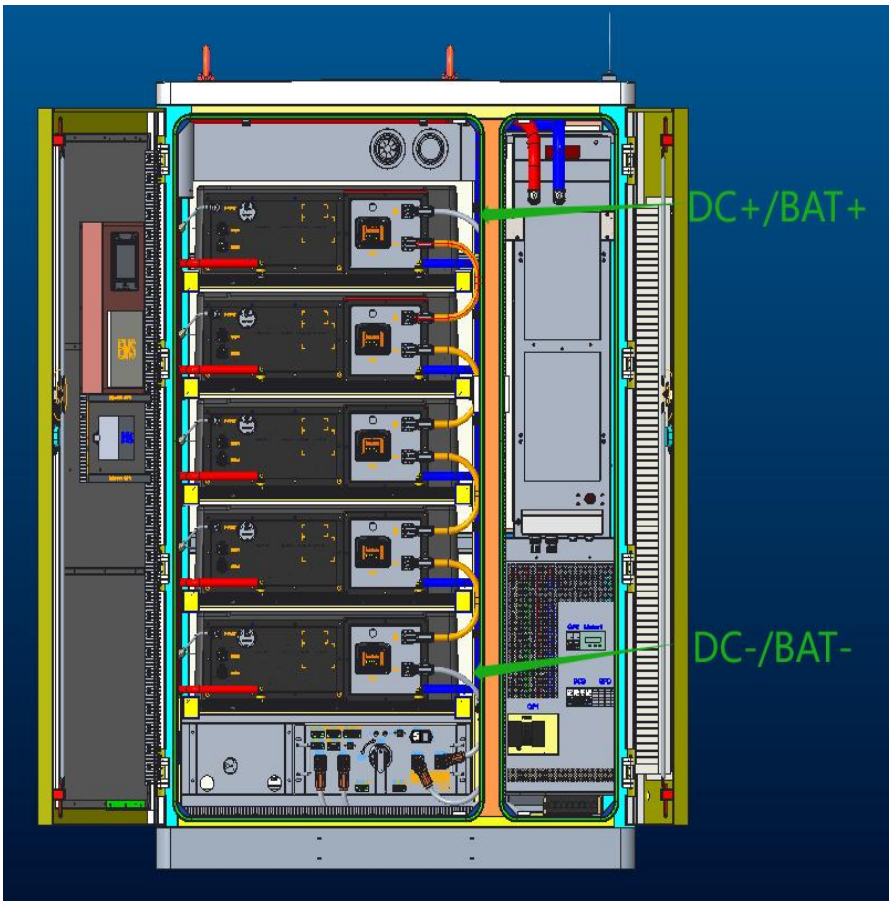
Step 2: Take out 5 module maintenance switches from the accessory bag, install them starting from 1-1-1, and install them in order to 1-1-5. During the installation process, it is required to be quick and neat. Do not leave the maintenance switches in a light position. touch state.

If the middle maintenance switch is removed later, all maintenance switches should be disassembled again and installed in sequence according to step 2.



Picture5-2Schematic diagram of battery module maintenance switch

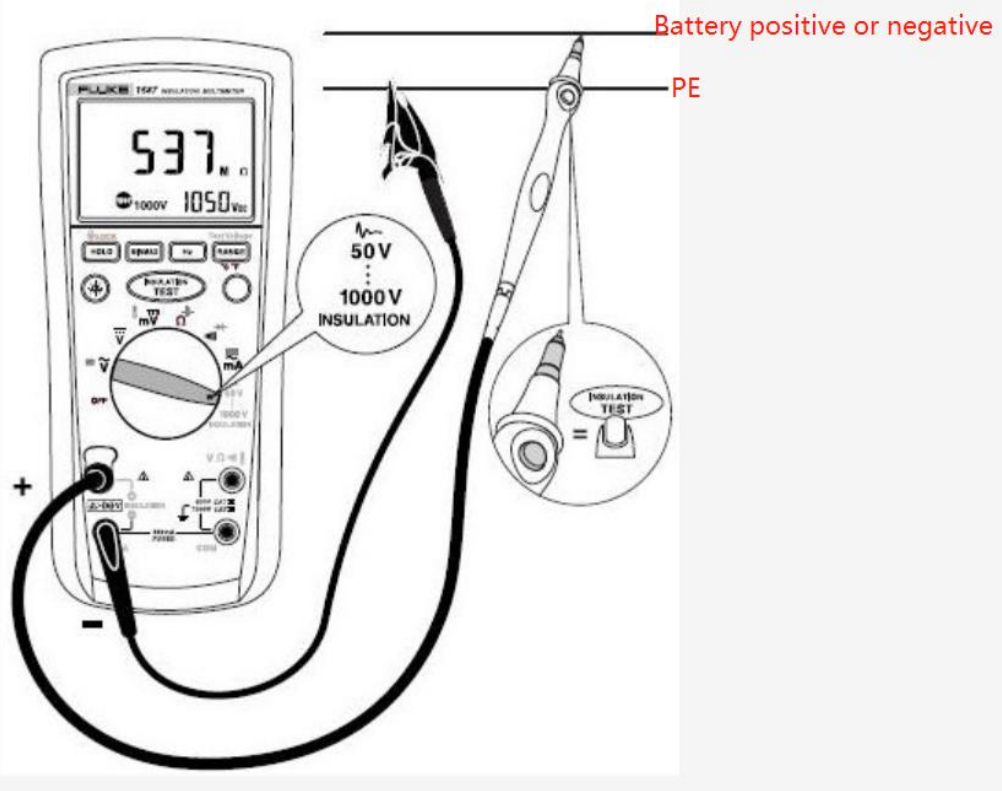
Step 3: Finally, connect the total positive and total negative power cables from the control box end to the battery module end, and insert them into the energy storage connector sockets of the module and control box according to the cable labels.



Picture5-3Module serial number 1-1-1, 1-1-5 total positive and total negative power cable installation diagram

5.3 Battery cabinet insulation test

1. After the module is installed, the insulation test method needs to be retested: Adjust the voltage of the insulation meter to DC1000V, clamp the red meter head to the positive BAT + copper bar, clamp the black meter head to the PE ground terminal of the battery cabinet, and press the test button;
2. Judgment criteria: Insulation resistance ≥1MΩ;
3. Adjust the voltage of the insulation meter to DC1000V, clamp the red meter head to the total negative BAT-copper bar, and clamp the black meter head to the PE ground terminal of the battery cabinet. Judgment standard: insulation resistance ≥ 1MΩ;



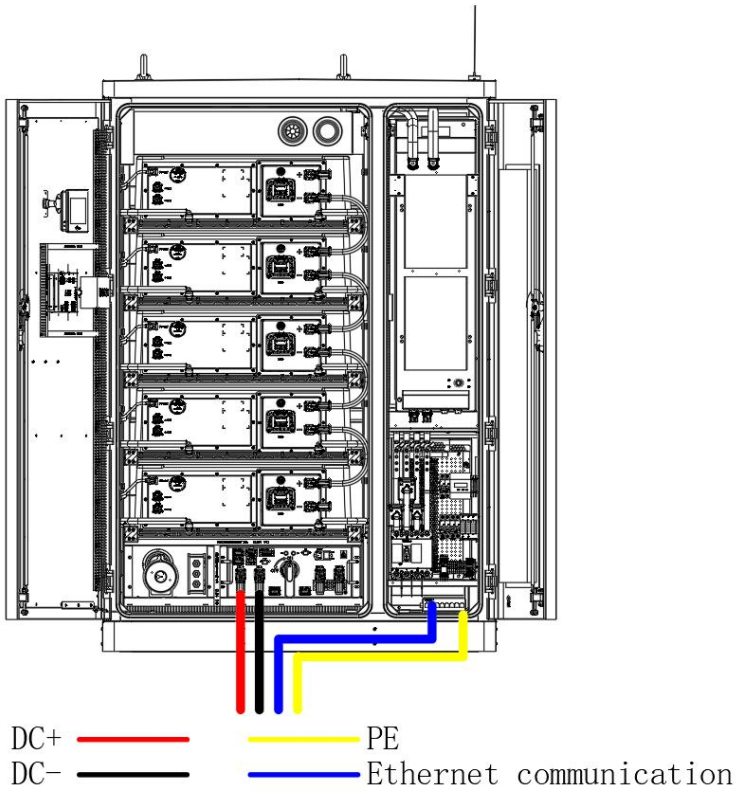
Picture5-4Battery cabinet insulation test

5.4 External interface description

5.4.1 Cable instructions

Sheet5-1External connection cable instructions

Cable name	Starting point	End point	Recommended cables	Remark
Communication line	1# battery cabinet-Switch-LAN5	Client communication terminal	Shielded network cable	
Ground wire	1# battery cabinet-grounded	Geodevice	25mm²	
DC+power line	Control box DC+	External load+	70mm²	
DC-power line	Control box DC-	External load -	70mm²	



Picture5-5Schematic diagram of external cable connection of battery cabinet

6 Touch screen introduction

The LCD touch screen is located on the upper side of the comprehensive control cabinet door, making it convenient for users to view data and related operations. The touch screen is designed with an ESS function section, which is used to display information related to the energy storage system and perform related controls.

Note: In order to facilitate users to operate the touch screen, this document configures a large number of touch screen interface pictures. The parameter values and other specific details in the pictures are for illustrative purposes only. Users should refer to the actual touch screen display of the product received. Upon request, the system Two permissions are set, namely ordinary user permissions and administrator user permissions. Except that ordinary user permissions cannot modify the threshold, other permissions are the same as administrator user permissions. The user names and login passwords of the two permissions are as follows. Show:

User name	User password
User	6666

warn	The touch screen contains a large number of parameters related to the operation of the energy storage system. All parameter modifications and other settings must be completed by designated professionals. Do not modify parameters whose meanings are unclear without authorization. Please refer to this manual or consult the relevant staff of our company.

6.1 Backlight function

If the user does not perform any click operation on the touch screen within a certain period of time, then

If the inactive time reaches 5 minutes, the touch screen will enter the screen saver display;

If the inactive time reaches 10 minutes , the touch screen backlight will turn off;

When the user performs any click operation, the touch screen backlight lights up.

6.2 Battery cabinet system interface

6.2.1 IP address settings

When the energy storage system is powered on, the touch screen will start automatically. After successful startup, it will automatically enter the main page. Please first enter the "System Settings" interface to set up the system and determine the energy storage device to be connected . Wait for the communication connection between the touch screen and the energy storage system to be successful before proceeding to the next step.

1. The touch screen automatically enters the home page when it is powered on.

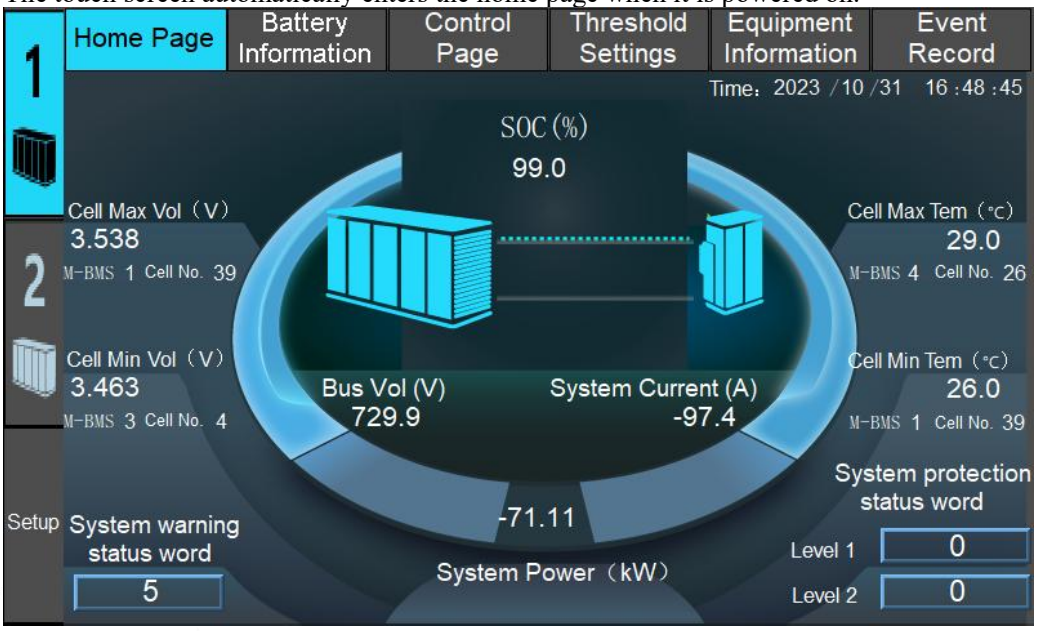


Figure 6-1 Home Page

2. Click the "System Settings (Setup)" button in the lower left corner, and the interface as shown below will pop up.

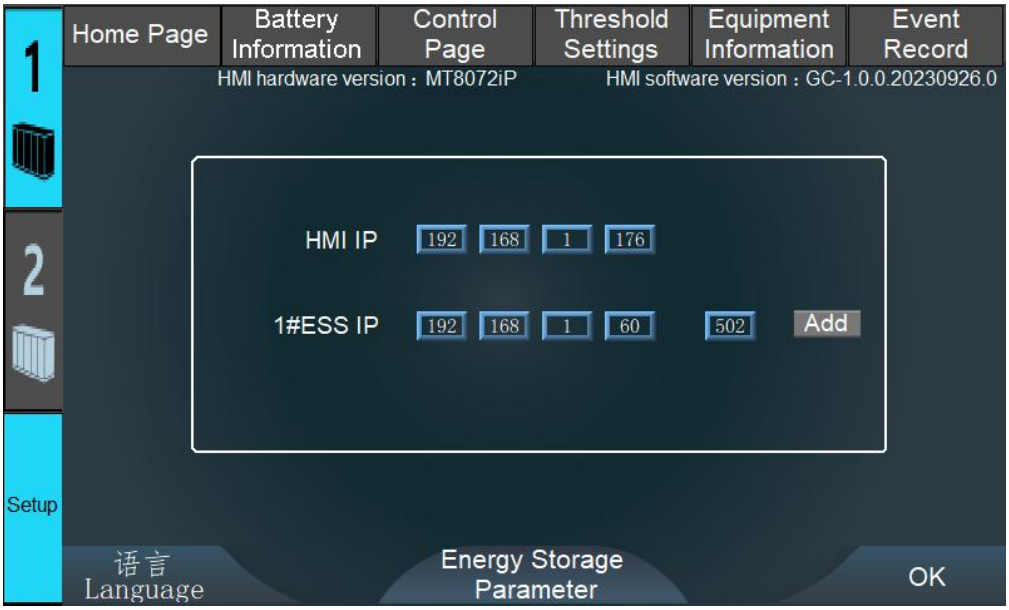


Figure 6-2 IP settings

3. This page is the setting page for the touch screen to connect to the energy storage system. Enter the corresponding IP to connect to the corresponding energy storage cabinet ; "1#ESS" is the energy storage system No. 1. Click Add, and "2#ESS" will appear . "2#ESS" is the No. 2 energy storage system, and No. 2 is currently a reserved item .
4. Since the screen of the battery cabinet is connected to C-BMS, the default IP of C-BMS is 192.168.1.60. To ensure that the computer IP and the default IP are in the same network segment, select "1#ESS" and enter " 192.168.1.60 " After clicking Finish, it will automatically return to the home page and the connection is successful (it should be noted that if the IP of C-BMS has been modified, just connect to the modified IP) .
5. Click the "Language" button in the lower left corner to switch languages. Currently, only "Chinese" and "English" are supported.
6. Click on the energy storage parameters on this interface to view some parameter settings of the energy storage system, as shown in the figure below.

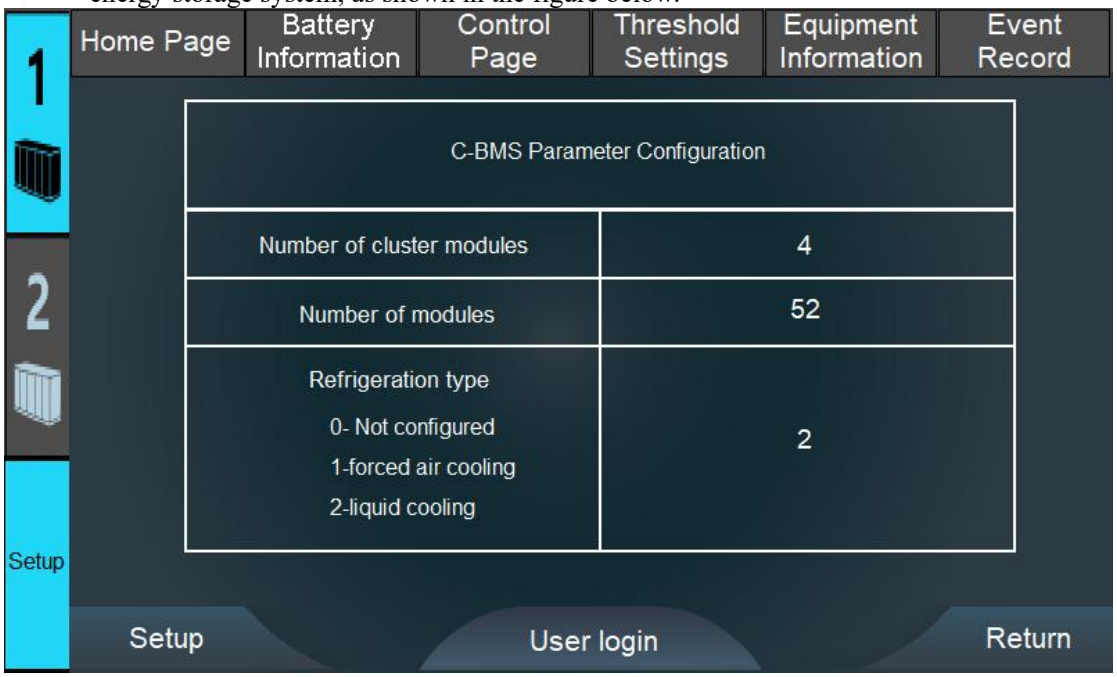


Figure 6-3 Parameter configuration

7. Also log in as a user (user name: admin, password: 3366) to configure parameters, as shown in the figure below.

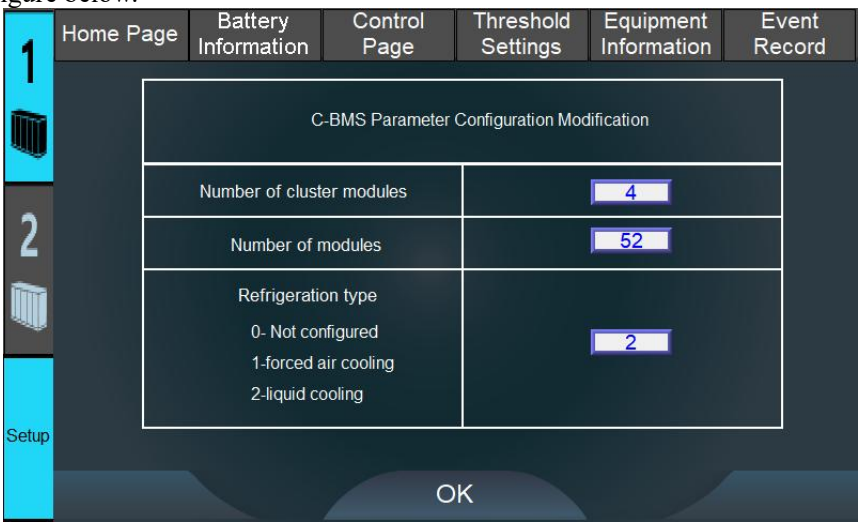


Figure 6-4 Parameter configuration modification

6.2.2 Energy storage page

1. Click on the right  to enter the energy storage home page , as shown in the figure below . This page displays the more important operating information in the energy storage system.

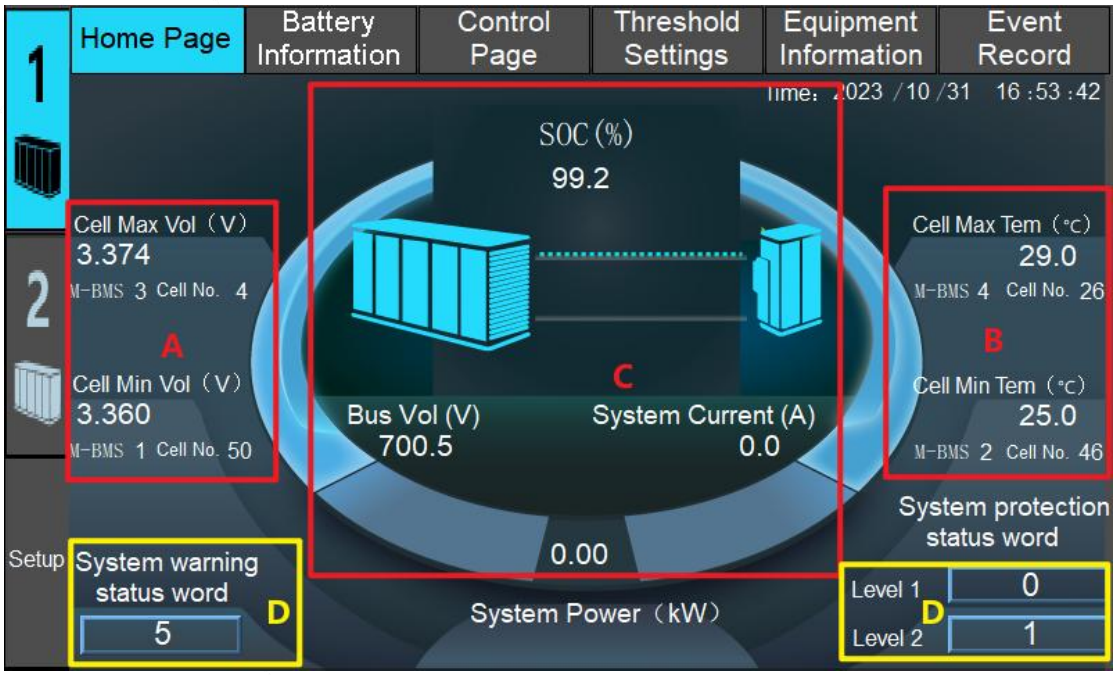


Figure 6-5Home page information _

2. A is the "maximum voltage of the cell", "minimum voltage of the cell" and "position" in the current energy storage system.
3. B is the "maximum temperature of the battery core", "minimum temperature of the battery core" and "position" in the current energy storage system.
4. C is the "SOC", "total voltage", "total current" and "total power" of the current energy storage system.
5. D indicates whether the current energy storage system has "alarm status" and "protection status". Click the status to view details, as shown in the figure below.

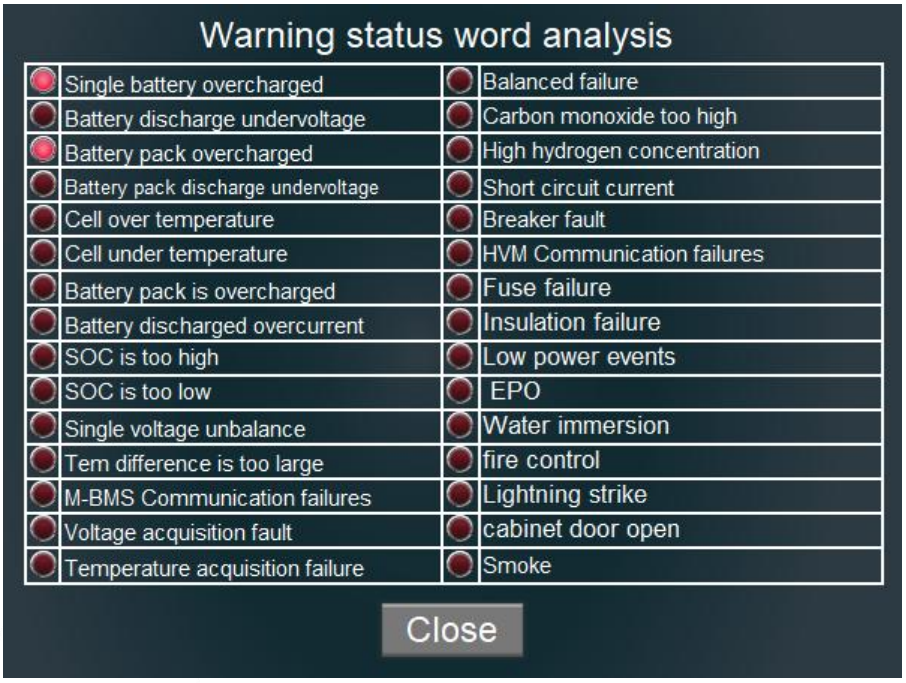


Figure 6-6 Alarm status word analysis

6.2.3 View battery pack information in the current battery cluster

1. Enter the "Energy Storage Home Page".
2. Click the "Battery Information" button above to enter the battery information interface, as shown in the figure below .

M-BMS	1	2	3	4
Module Vol	174.70	174.68	174.69	174.64
Umax(V)	3.363	3.362	3.369	3.362
Umin(V)	3.357	3.357	3.356	3.356
Tmax(℃)	27.0	27.0	27.0	29.0
Tmin(℃)	26.0	25.0	26.0	27.0
M-BMS	5	6	7	8
Module Vol	0	0	0	0
Umax(V)	0.000	0.000	0.000	0.000
Umin(V)	0.000	0.000	0.000	0.000
Tmax(℃)	0.0	0.0	0.0	0.0
Tmin(℃)	0.0	0.0	0.0	0.0

Figure 6 - 7 Battery information

1. This page displays the information of the battery cluster in the battery cabinet .  The data below is the data of battery  pack 1, the data below is the data of battery pack 2, and so on, which means  online and  offline.

2. The displayed data includes " battery pack voltage ", " maximum cell voltage in the battery pack ", " minimum cell voltage in the battery pack ". " Maximum cell temperature in the battery pack ", " Minimum cell temperature in the battery pack "

6.2.4 Check the information of individual cells in the battery pack

1 . Click any "  " button to pop up the interface as shown below.

M-BMS 1					
Cell NO	Vol (V)	Tem(℃)	Cell NO	Vol (V)	Tem(℃)
1	3.360	27.0	11	3.358	26.0
2	3.359	26.0	12	3.359	26.0
3	3.359	26.0	13	3.359	26.0
4	3.361	26.0	14	3.359	26.0
5	3.359	26.0	15	3.360	26.0
6	3.360	26.0	16	3.359	26.0
7	3.359	26.0	17	3.357	26.0
8	3.360	26.0	18	3.360	26.0
9	3.360	26.0	19	3.359	26.0
10	3.360	26.0	20	3.359	26.0

Figure 6 - 8 Single unit information under the package

2 . This page displays the information of the battery cells in the battery pack . The displayed data includes "voltage of 1~ 52 single cells" and "temperature" (Note: The number of single cells and the number of temperatures are adapted according to the battery module.)

3 . Click the connector temperature on the battery information interface to view the temperatures of the individual total positive and total negative connectors of each pack. As shown below.

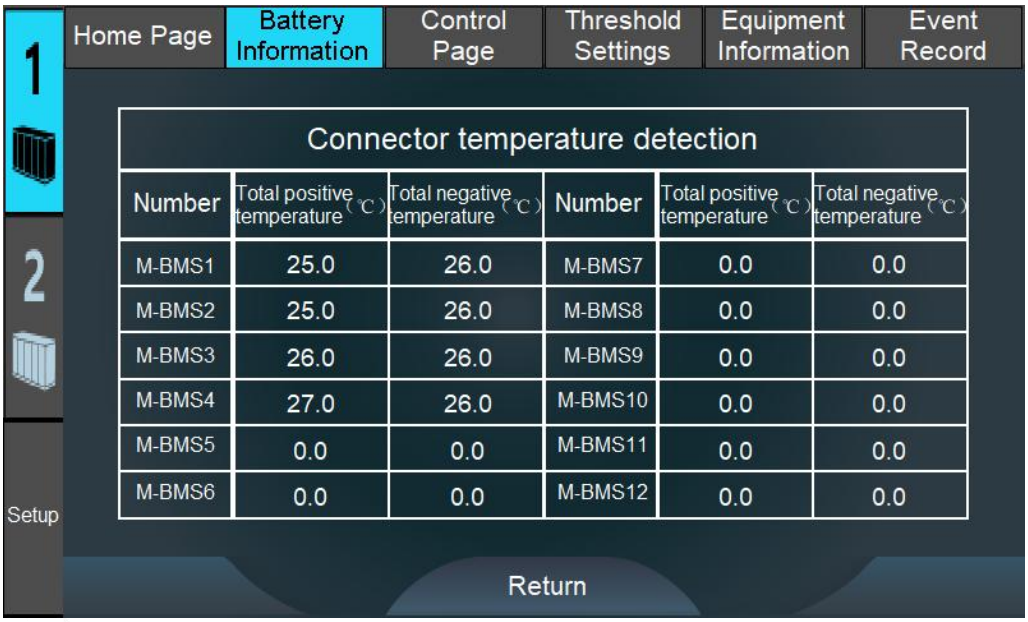


Figure 6 - 9 Connector temperature

6.2.5 Control page

1. Click the control page to enter the interface as shown below.

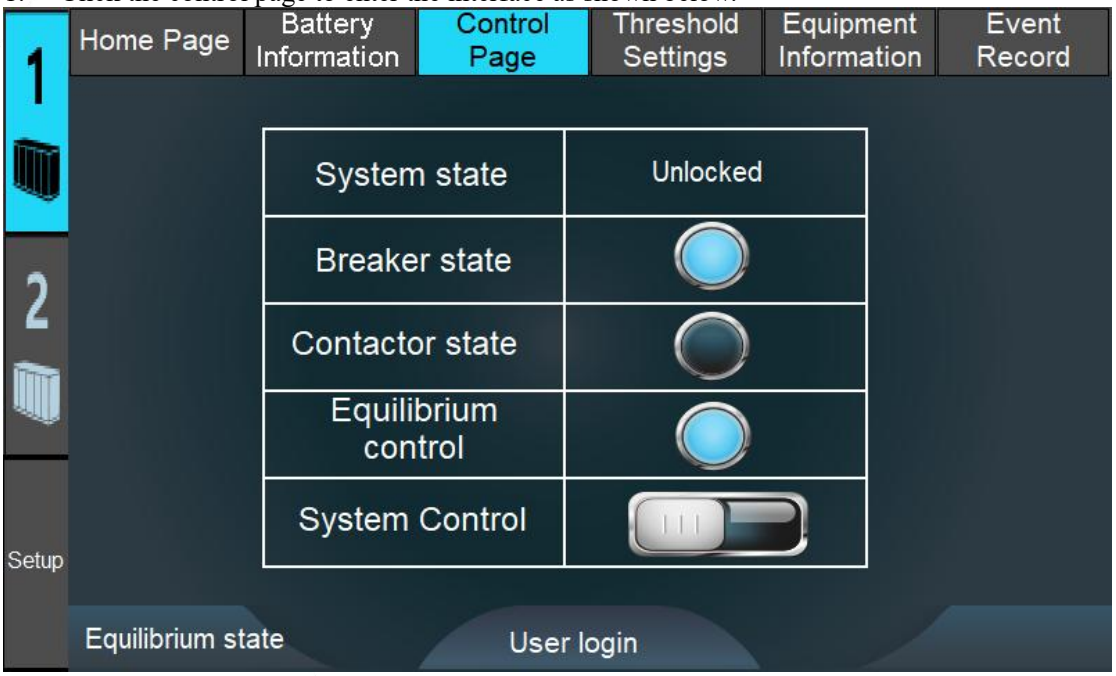


Figure 6-10 Control page

2. This interface can check whether the system status is locked. If the system is locked, the system cannot be closed, charging and discharging and other operations cannot be performed. Secondly, you can check the status of the circuit breaker, contactor and equilibrium status. If the circuit breaker contactor is closed, the light will be on. Otherwise, the light will be off. The same applies to the balance control. If the balance is on, the light will be on, otherwise the light will be off.
3. Click User Login , select user permissions to log in, username: user, password: 6666. After logging in, click  the button next to System Control to enter the system control interface. As shown in the figure below, this interface can assign addresses to the system and perform contactor closing operations.

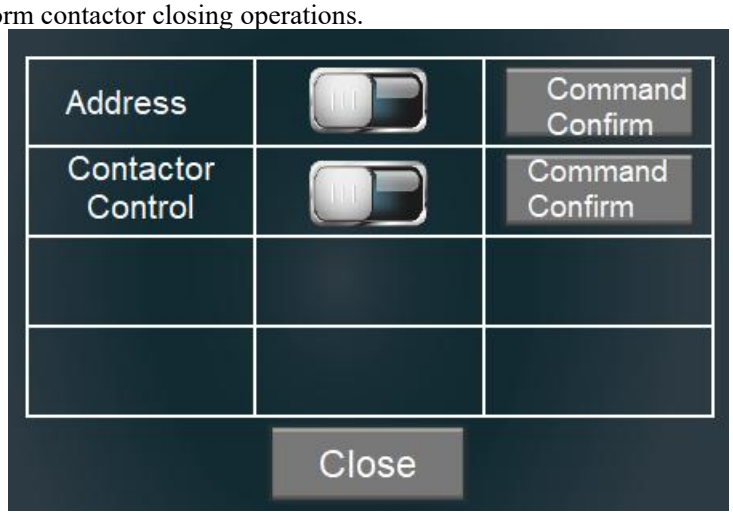


Figure 6-11 System Control

4. Select the balancing state on the control interface to view the battery pack balancing information under the battery cluster, as shown in the figure below.

Figure 6 - Battery pack balancing information under 12 battery clusters

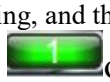
5. This interface  indicates which module the corresponding module is balancing, and  whether the current during balancing is charging or discharging. The blue light indicates discharging, and the orange light indicates charging.
6. Continue clicking  on this interface to view which modules under the battery pack have equalization enabled, as shown in the figure below.

Figure 6-13 Single unit equilibrium state

6.2.6 Modify and set the energy storage system operation threshold

1. Click Threshold Settings to enter the threshold setting interface, where you can view threshold-related information, as shown in the figure below.

Figure 6-14 Threshold interface

2. If you need to modify the threshold, click the " 用户登录 " button below, select the admin user to log in, enter the password 3366, click the " 设置 " button, and the interface as shown below will pop up.

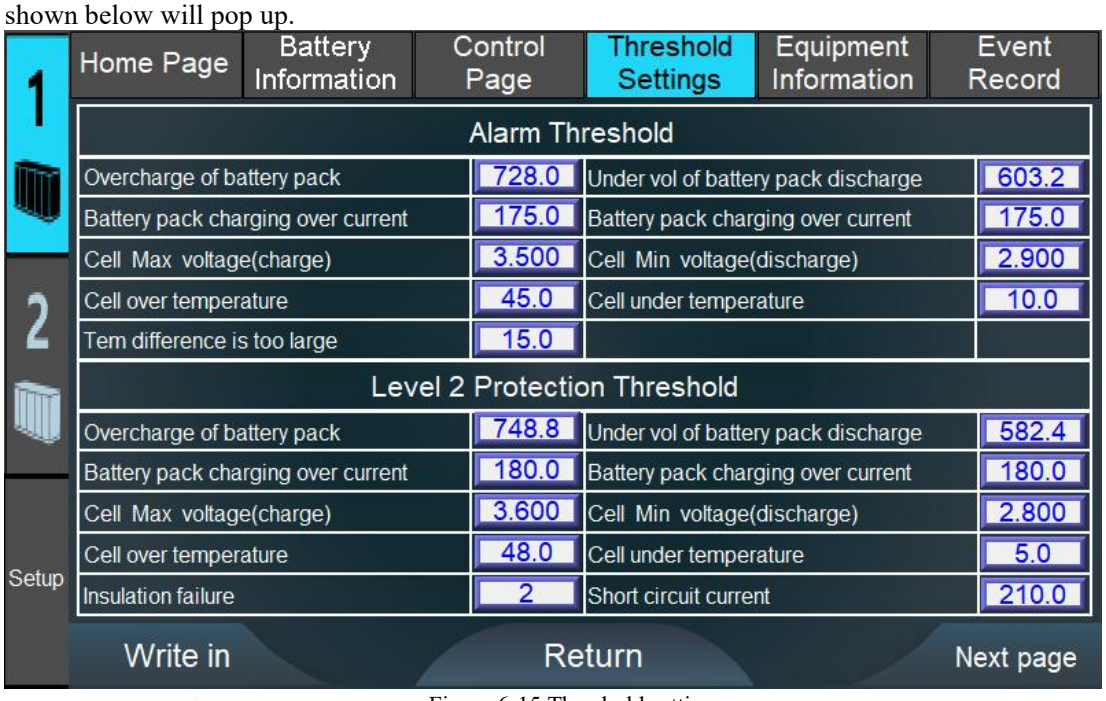


Figure 6-15 Threshold setting

1. Select the threshold option box that needs to be modified and enter the value.
2. After entering the values, click the "Write" button in the lower left corner to complete the modification.

warn	The system default thresholds include a large number of parameters related to the operation of the energy storage system. All parameter modifications and other settings must be completed by designated professionals. Do not modify parameters whose meanings are unclear without authorization. For detailed information, please refer to this manual or consult the relevant staff of our company.

6.2.7 Device Information

2. Click Device Information to enter the device information interface, as shown in the figure below. This interface allows you to view information related to the water cooler.

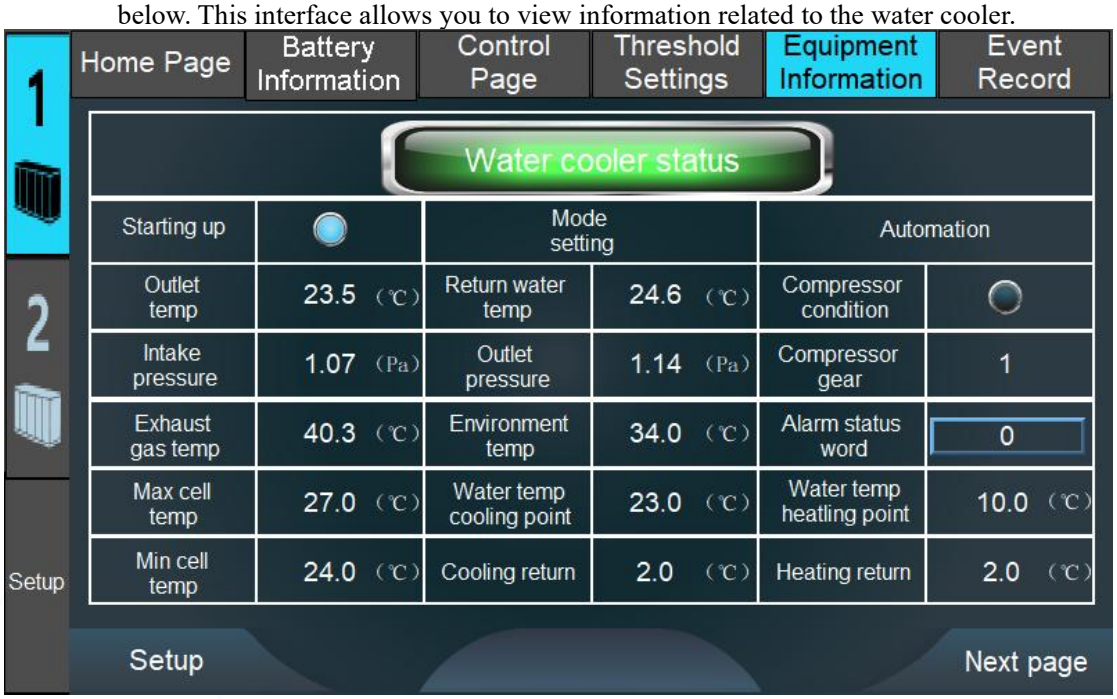


Figure 6-16 Water cooler information

2. Click the "Settings" button below to enter the settings of relevant parameters of the liquid cooling machine, as shown in the figure below, select the value to be set, and select write after setting .

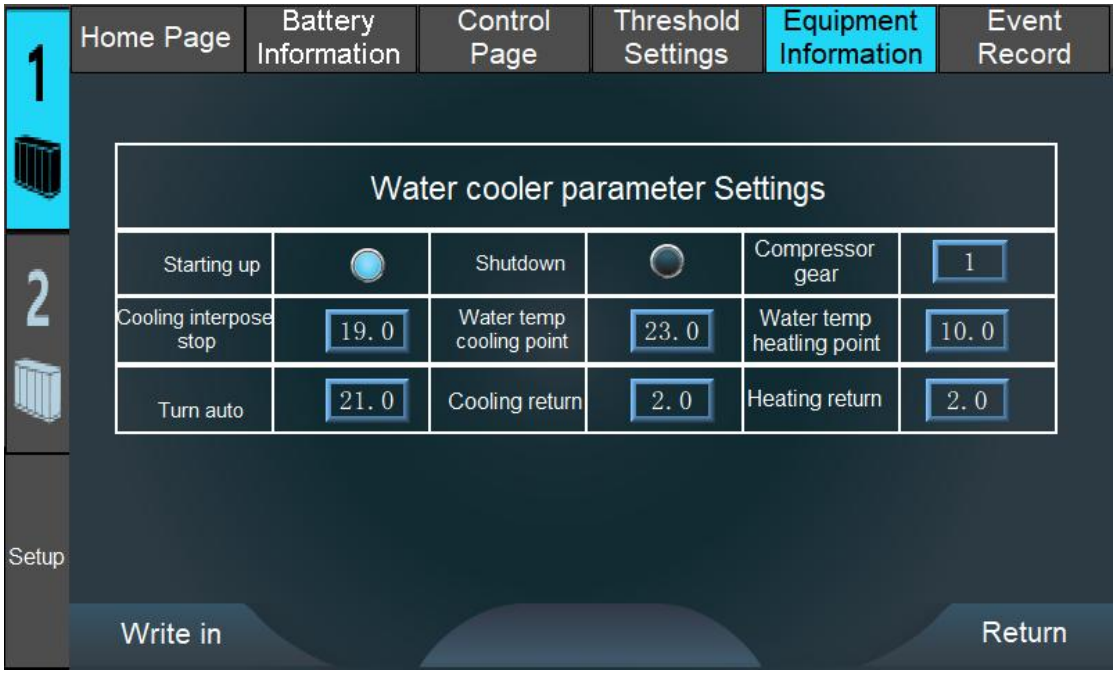


Figure 6-17 Water cooler parameter setting

3. Select the next page in the device information interface to view fire-related information, as shown in the figure below.

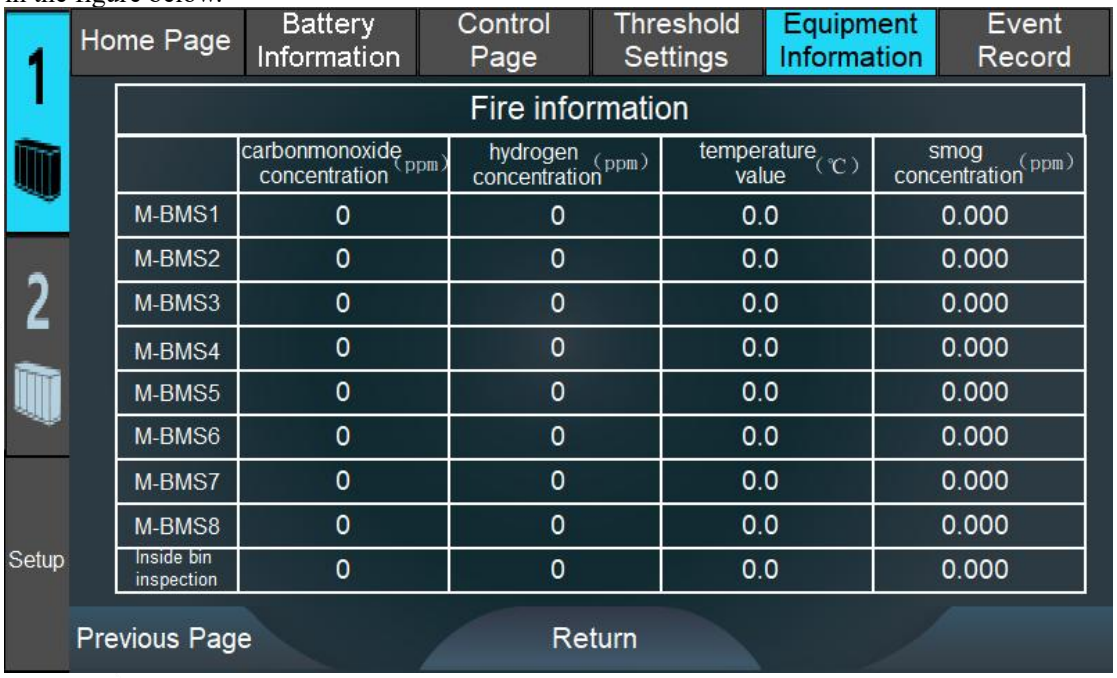


Figure 6-18 Fire information

6.2.8 Event view

1. Click Event Record to enter the event recording interface, as shown in the figure below.

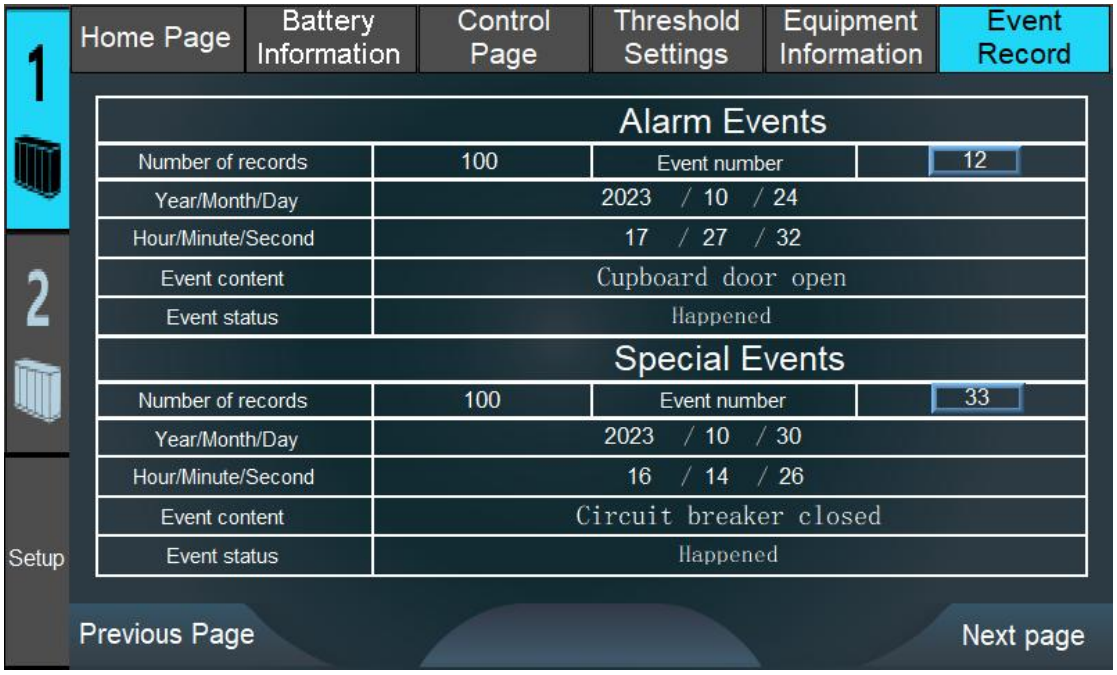


Figure 6-19 event record

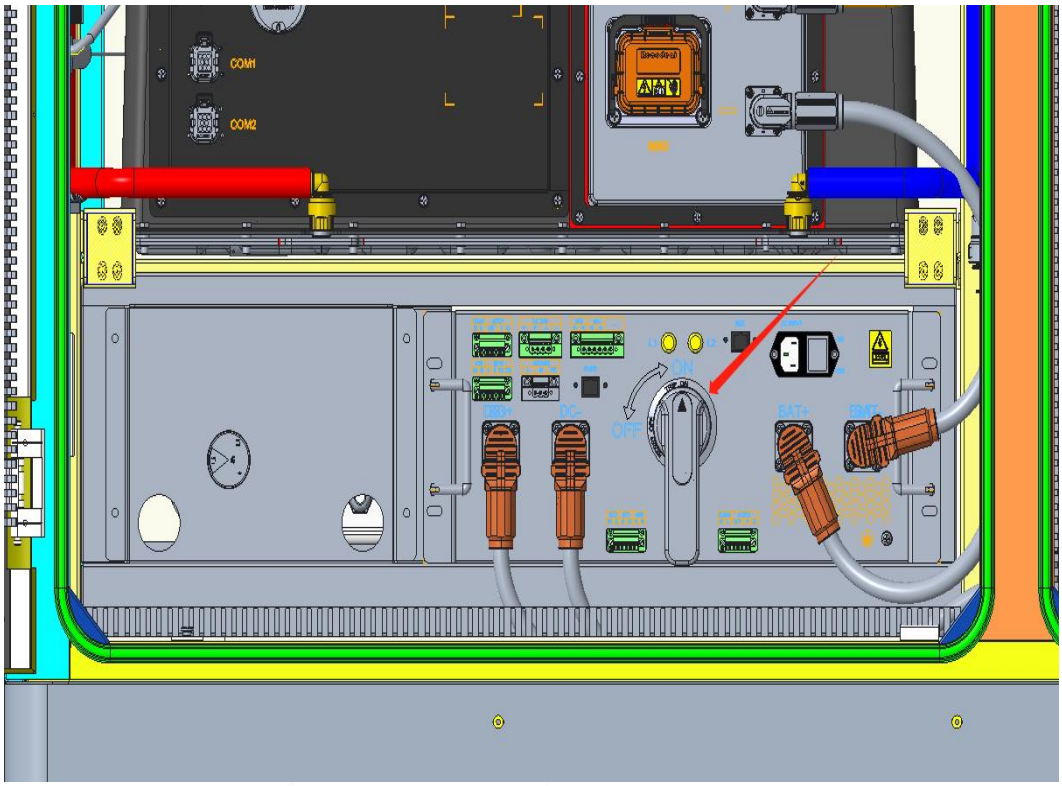
2. On this interface, you can view the total number of events that occurred. Only 100 events can be retained for all event records (the latest one will be saved). You can view the corresponding event through the time number on the right. After selecting, the time, content and status of the event will appear below.

7 Product operating instructions

7.1 Battery cabinet starts

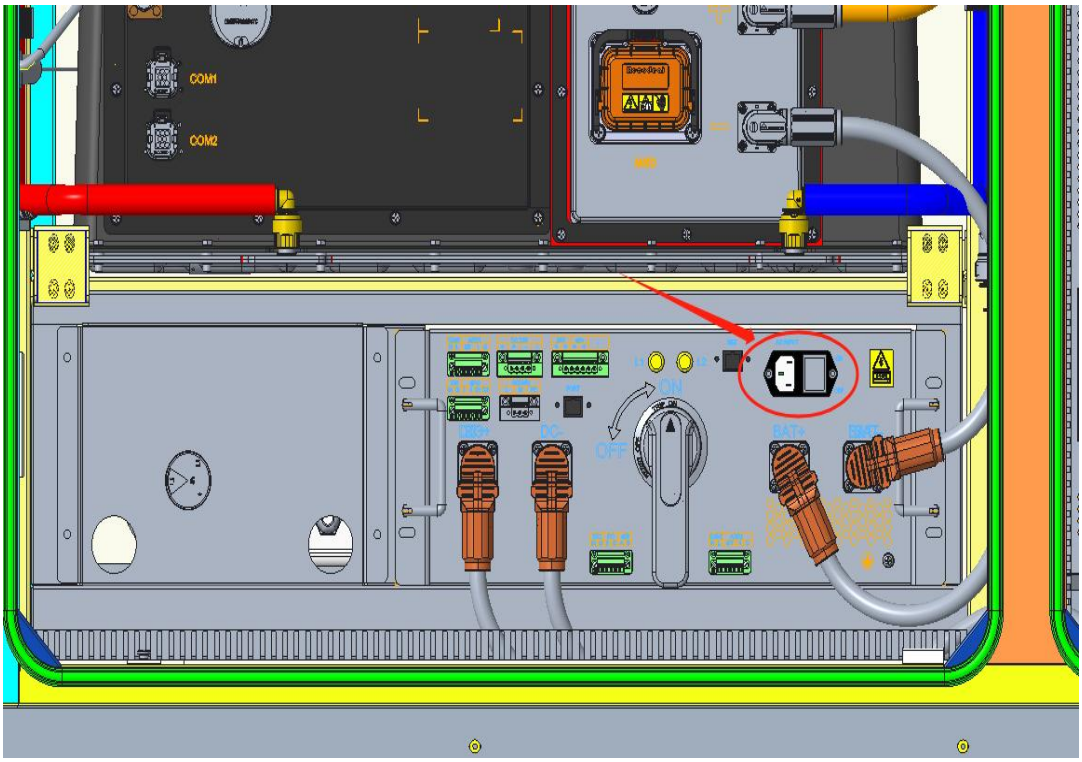
Step 1. Check before starting: Confirm that all connections are made according to the installation instructions: the control box circuit breaker QF1 is in the OFF state;

Step 2. Close the control box circuit breaker Q F 1 :



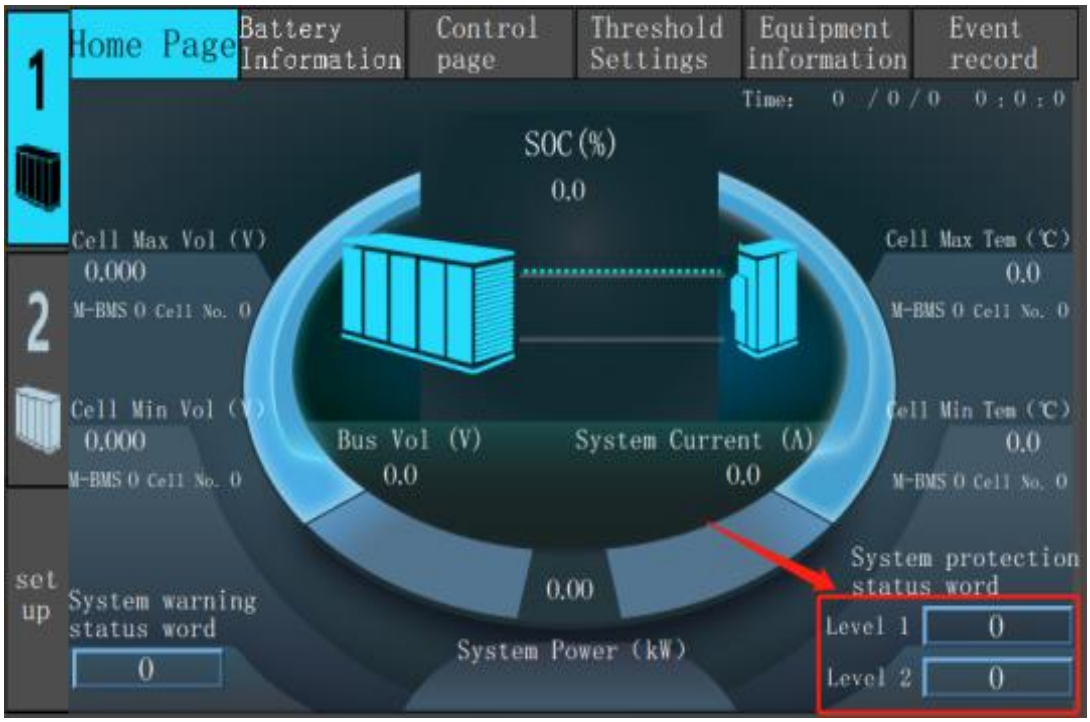
Picture7-1Step 2 Schematic diagram of closing circuit breaker QF1

Step 3. Close the boat-shaped switch on the front panel of the control box in the lower left corner of the battery cabinet , and power on the battery cabinet system;

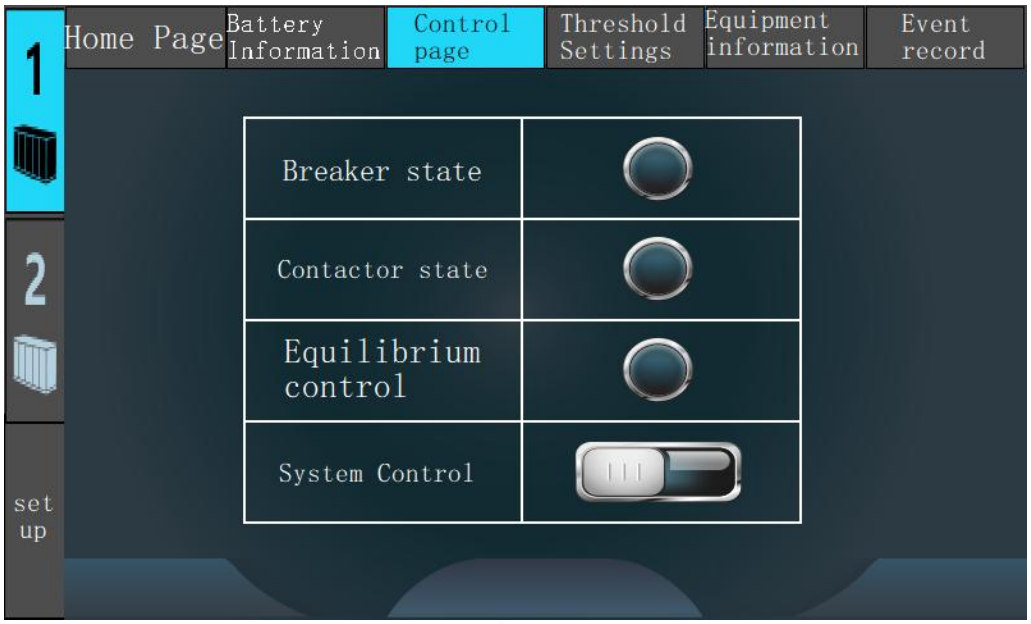


Picture7-2Step 3 Schematic diagram of closing the ship switch

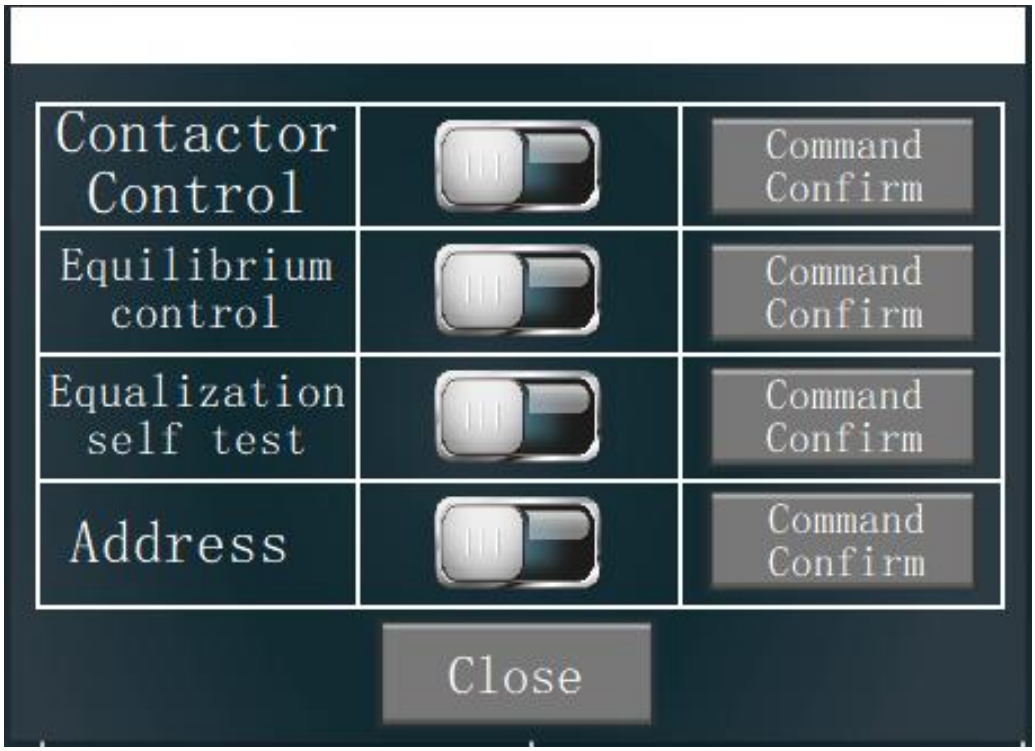
Step 4. Confirm the system settings on the home page of the display screen on the battery cabinet door panel and confirm the IP address; confirm whether there is protection information on the home page. If it displays "0", it means that the system auxiliary wiring is normal ;



Step 5. Close the control box contactor, click the "Control Page" button, and the following interface will pop up .



1 Click the "  " "Contactor Control" button below, and after entering the password, the interface as shown below will pop up.



2. Click the " " button of the desired control  .

3.  Click the button to turn off the light to open the contact,  click the button to turn on the light to close the contactor.

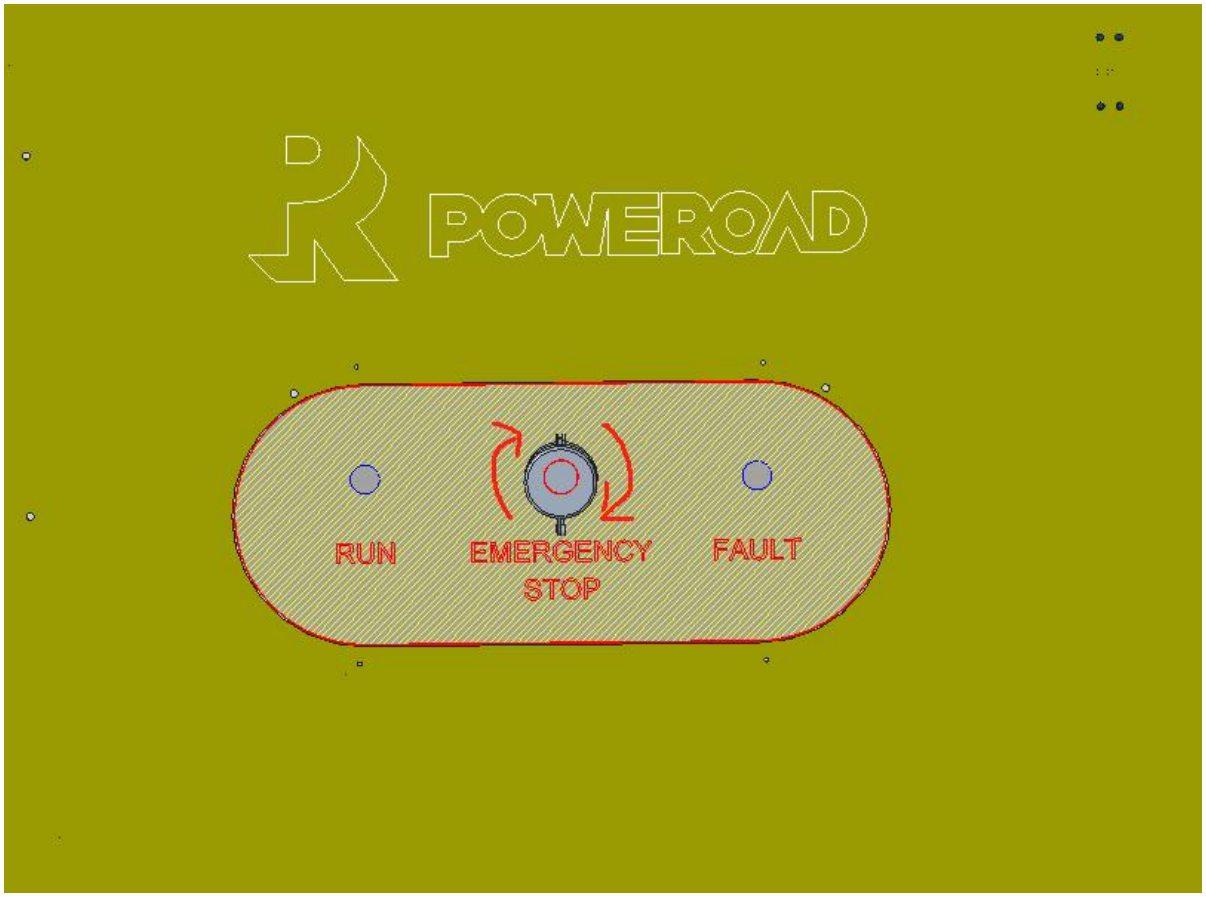
Step 9: Check the data reported on the home page. If there is no fault, the user EMS can charge, discharge and power schedule the system;

7.2 System emergency stop

The system emergency stop button is located on the door of the battery cabinet control cabinet. When the system operation is abnormal, take a photo of the emergency stop button (as shown below), the system will disconnect the DC circuit breaker inside the battery cabinet control box , and then the software will control the disconnection of the DC circuit breaker inside the control box. DC contactor completely cuts off the external connection of the battery.

After the fault is eliminated, if you want to restart the energy storage system, you must turn the emergency stop button clockwise to release the locked state (see the figure below);

Put the control box switch in the tripping position Turn it to OFF and turn it to ON (see the figure below), confirm that the main switch is closed, and then restart the energy storage system.

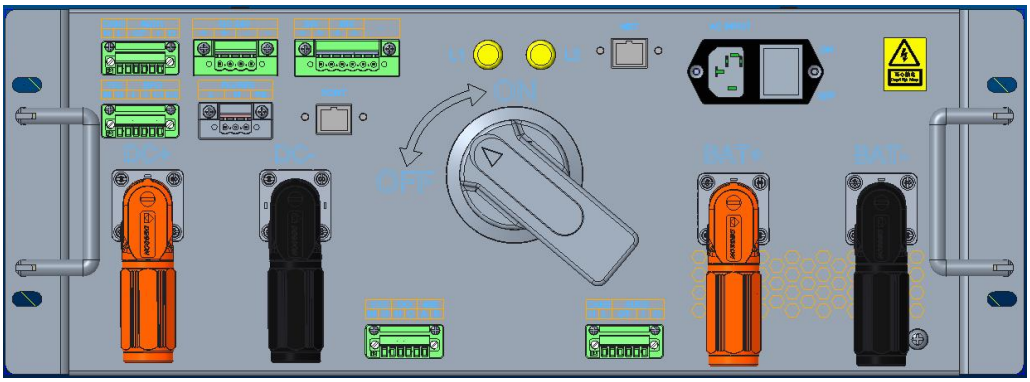


Picture7-3Turn button clockwise

7.3 System decoupling and recovery closing

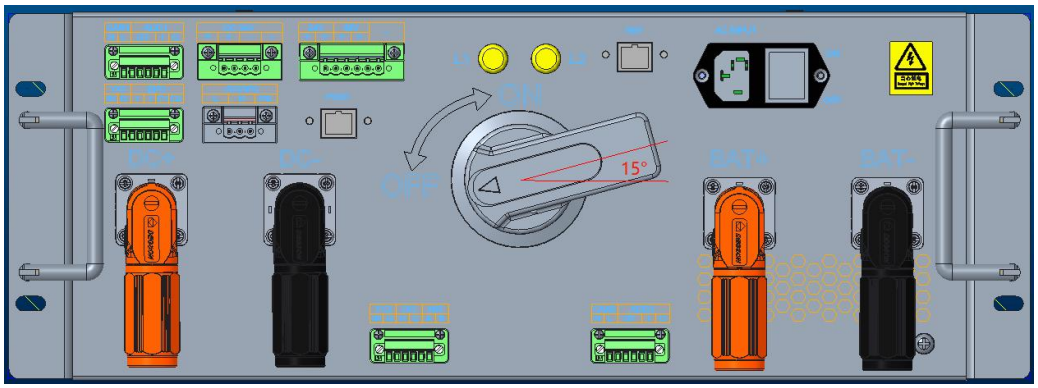
When a serious fault occurs in the system or the emergency stop button is pressed, the system will disconnect the circuit breaker for protection. After the fault is eliminated , it needs to be manually restored and closed, and then the energy storage system can be restarted.

Closing process:



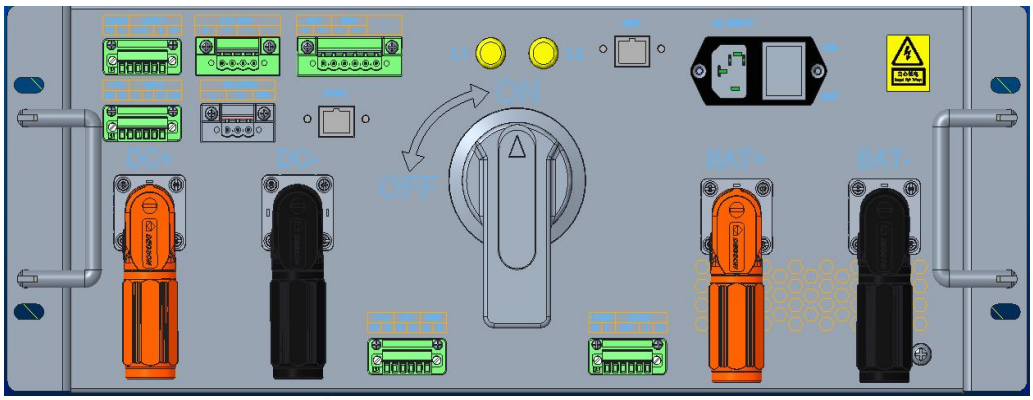
Picture7-4Circuit breaker uncoupled status

Step 1: Turn from the tripping position to OFF and level 15°C and hear the recovery sound



Picture7-5Schematic diagram of circuit breaker recovery and decoupling

Step 2: Turn the button clockwise to the ON position



Picture7-6Circuit breaker recloses

8 Failure analysis and handling

8.1 Fault alarm content and response actions

Serial number	Fault alarm content	Response action
1	Insulation failure	1. Cut off the contactor and the control box cannot be closed.
2	Cell overvoltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
3	Cell undervoltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
4	Overtemperature	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
5	Not warm	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
6	Cluster total voltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power

Serial number	Fault alarm content	Response action
	overvoltage	Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
7	Cluster total voltage and undervoltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
8	Cluster current charge overcurrent	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
9	Cluster current discharge overcurrent	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the power Secondary protection: cut off the control box contactor First level protection: cut off the control box circuit breaker
10	Communication failure	1. System shutdown power 2. Cut off the cluster contactor
11	Contactor failure	System shutdown power
12	short circuit fault	1. System shutdown power 2. Cut off the control box contactor first and then the control box circuit breaker.
1 3	Emergency stop occurs	1. Cut off the control box contactor 2. Turn off the control box circuit breaker

8.2 Common fault analysis and treatment

Serial number	Fault alarm status	Cause Analysis	Troubleshooting
1	Insulation failure	1.The insulation strength of the cable is reduced due to damage or aging. 2.There is a foreign object in contact with the power circuit and the conductive part of the cabinet.	1.Check whether the power cable insulation is normal 2.Check whether there are foreign objects in the power circuit 3.Replace the power cable
2	Cell overvoltage	1.Overcharging 2.Sampling anomaly	1.Stop charging 2.Check the wiring harness
3	Cell undervoltage	1.Excessive discharge 2.The system has been idle for a long time and the battery has self-consumption, resulting in battery shortage. 3. Sampling anomaly	1.Stop discharging 2.Trickle charging 3.Check the wiring harness
4	Overtemperature	1.Liquid cooling machine failure 2.Fan failure 3.The air inlet or outlet of the cabinet is blocked 4.Abnormal sampling line	1.Check the cooling function of the liquid cooler 2.Check whether the fan rotates normally 3.Clean the air inlet and outlet of the cabinet 4.Check the wiring harness 5.After the system is left standing for 24 hours, wait for the temperature to return to normal and then restart it.
5	Not warm	1.Liquid cooling machine failure 2.Abnormal sampling	1.Check the cooling function of the liquid cooler 2.Check the wiring harness

Serial number	Fault alarm status	Cause Analysis	Troubleshooting
		line	
6	Cluster total voltage overvoltage	1.Overcharging	1.Stop charging
7	Cluster total voltage and undervoltage	1.Excessive discharge 2.Abnormal sampling line	1.Stop discharging 2.Check the wiring harness
8	Cluster current charge overcurrent	1.System charging power setting is higher	2.Reset system power
9	Cluster current discharge overcurrent	1.The system is set to have a higher discharge power	2.Reset the system power
10	Communication failure	1.Communication or power supply cable is loose 2.BMS failure	1.Check communication and power supply cables 2.Replace BMS
11	Short circuit fault	1.External short circuit occurs	1.Check whether there is an external short circuit and eliminate the short circuit point.
14	Circuit breaker failure	1.Circuit breaker failure 2.Circuit breaker control and wires are loose	1.Check the circuit breaker cable 2. Replace the circuit breaker
1 7	Emergency stop failure	1.Press the emergency stop switch 2.Emergency stop switch failure	1.Check whether the emergency stop switch is pressed 2.Check whether the emergency stop switch wiring is loose 3.Replace the emergency stop switch

9 System maintenance

9.1 Routine inspection

System routine inspection items and cycles:

Check content	cycle	Problem solving measures
Complete machine cabinet and environmental inspection	Every 3 months	Clean and replace problem parts
Liquid cooling machine maintenance and inspection	Every 3 months	Clean and overhaul
Fire protection system inspection	Every 3 months	Replace or repair
Inspection of power circuit and circuit main switch	Every 6 months	Fasten
Fan check	Every 3 months	Replace problem parts
System cleaning	Every 3 months	Clean

- Complete machine cabinet and environmental inspection

The inspection of the complete machine cabinet and environment mainly includes the following contents:

1. Cabinet door tightness.
2. Is the fan impeller making any abnormal noise?
3. Dirt inside the fan.
4. Dust on the dust filter.
5. Whether the cable inlet of the cabinet is well sealed;
6. Check whether the structural parts are damaged or deformed;

- Liquid cooling machine maintenance and inspection

The liquid cooling machine mainly includes the following contents:

1. Check the heating and cooling functions of the liquid cooling machine .

2. Check the radiator fins of the liquid cooling machine for dirt.

- Fire protection system inspection

Fire protection system inspection mainly includes the following contents:

1. Check the pressure value of the fire tank.

2. Check the feedback signal of the fire tank.

- Inspection of power circuit and circuit main switch

The power loop and loop main switch inspection contents are as follows:

1. Tighten the bolts of the power grid and battery connecting cables.

2. Fasten the ground wire (PE) and other ground wires of the cabinet.

3. Check various switches in the main circuit, including main circuit breaker and main contactor.

4. Check the insulation condition (use a meter to test).

- Control circuit check

The control circuit and software inspection contents are as follows:

1. Check whether the control circuit board and components are loose, and clean them if necessary.

2. Check whether the control software is normal.

- Fan check

The parts inspection content is as follows:

1. Check whether the fan is running normally.

2. Check whether the fan is loose, shaking, or vibrating violently.

- Signal circuit check

The signal circuit inspection content is as follows:

1. The installation of terminals, plug connections and cables inside the device must be tightened once a year.

9.2 Regular maintenance

During the operation of the energy storage system, dust will cover the air inlet of the cabinet and the heat exchanger fins of the liquid cooler , causing thermal resistance that affects the air convection of the cabinet and the cooling efficiency of the liquid cooler . Severe cases may cause system shutdown. It is recommended to clean and maintain the cabinet air inlet and liquid cooling machine heat exchanger every 3 to 6 months. The maintenance interval depends on the air pollution level and operating time in different regions. Do not use hot water when cleaning. Or clean with organic solvents such as gasoline.

10 Disclaimer

This product must be used in strict compliance with the usage precautions and safety instructions provided by the company. The company does not assume any responsibility for any injury or loss caused by violation of safe operating requirements. Operators should abide by local safety regulations, and energy storage system manufacturers are not responsible for any losses that may arise from equipment failure.

See disclaimers below.

- Shipping damage
- Incorrect installation, use, modification and other operations
- Operation outside the environment specified in this manual
- Ignoring safety warnings and cautions used
- Encountering force majeure (for example: lightning, heavy rain, flood, fire, earthquake, etc.)

11 About POWEROAD Xiamen

If you have any questions about this product please contact us, thank you for using it!

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