



# User Manual

## PR3054

### 100kW/215kWh All-in-one

### Outdoor Battery Cabinet

Prepared by	Review	Approve	Implementation date
Yang Yantao	Wang Le	Zhang Xin	2024.3.28

POWERROAD ( Xiamen ) Renewable Energy Technology Co., Ltd.  
<http://www.poweroad-ess.com>

<b>Change history</b>			
<b>Change date</b>	<b>Change person</b>	<b>Change content</b>	<b>Version after change</b>
	Yang Yantao	First issue	VA0

# Catalog

<b>1 About this manual</b> .....	<b>5</b>
1.1 Applicable Products .....	5
1.2 Applicable personnel .....	5
1.3 Manual use .....	5
1.4 Symbol usage .....	6
1.5 Explanation of professional terms .....	7
<b>2 Safety instructions</b> .....	<b>8</b>
2.1 Safety instructions .....	8
2.2 Precautions for safe use .....	9
2.2.1 General safety precautions .....	9
2.2.2 Electrical Safety .....	10
2.2.3 Battery safety .....	10
<b>3 Product presentation</b> .....	<b>12</b>
3.1 Product description .....	12
3.2 System Configuration .....	13
3.3 System parameters .....	13
3.4 System principle .....	14
<b>4 Venue requirements</b> .....	<b>17</b>
4.1 Venue requirements .....	17
4.2 Open box to check .....	17
<b>5 Electrical connections</b> .....	<b>19</b>
5.1 Ground cable connection .....	19
5.2 Power cable connection between battery cabinet modules .....	20
5.3 Battery cabinet insulation test .....	23
5.4 External interface description .....	24
5.4.1 Cable instructions .....	24
<b>6 Touch screen introduction</b> .....	<b>26</b>
6.1 Backlight function .....	26
6.2 Battery cabinet system interface .....	27
6.2.1 IP address settings .....	27
6.2.2 Home Page .....	28

---

6.2.3 View battery information in the current cluster .....	31
6.2.4 View information of individual cells in a pack .....	32
6.2.5 View information of individual cells in a pack .....	33
6.2.6 Manual opening and closing control of contactor .....	33
6.2.7 Modify system operation threshold .....	36
6.2.8 Device Information .....	38
6.2.9 System mode switching .....	39
6.2.10 Event view .....	40
<b>7 Product operating instructions .....</b>	<b>41</b>
7.1 System starts with grid connection (internal power supply) .....	41
7.2 System emergency stop .....	45
7.3 Cluster control box DC circuit breaker tripping recovery and closing .....	46
<b>8 Failure analysis and handling .....</b>	<b>47</b>
8.1 Fault alarm content and response actions .....	47
8.2 Common fault analysis and treatment .....	49
<b>9 System maintenance .....</b>	<b>51</b>
9.1 Routine inspection .....	51
9.2 Regular maintenance .....	53
<b>10 Disclaimer .....</b>	<b>54</b>
<b>11 About POWERROAD Xiamen .....</b>	<b>55</b>

---

# 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 POWERROAD.


## 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.

 <b>Danger</b>	"Danger" indicates a highly potential hazard that, if not avoided, will result in death or serious injury.
--	--




 <b>Warn</b>	"Warning" indicates a moderate potential hazard that, if not avoided, will result in death or serious injury.
--	---

 <b>Careful</b>	"Caution" indicates a low-level potential hazard that, if not avoided, will result in moderate or minor personal injury.
--	--

 <b>Notice</b>	"Caution" indicates potential hazards that, if not avoided, may cause the equipment to malfunction or cause property damage.
--	--

 <b>Illustrate</b>	"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.



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.



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.



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





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!



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



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  $4\Omega$ ). 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 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



Figure 3-1 Battery cabinet system appearance diagram

Energy storage system is a system that can complete storage and power supply. The main loop of this system consists of 1 PCS, 1 cluster control box and 15 battery modules. The control loop includes modules such as power distribution system, fire protection system, lighting system, and thermal management system.

Energy storage systems have the characteristics of simplified infrastructure construction costs, short construction period, high degree of modularity, strong environmental adaptability, and easy transportation and installation. It can be used in

scenarios such as peak shaving and valley filling, power distribution expansion, demand response, etc., and can be widely used in shopping malls, communities, schools, factories, farms and other applications.

## 3.2 System Configuration

Sheet 3-1 System configuration list

serial number	name	Product description and quantity	unit	quantity	Remark
1	PCS	Rated 100kW	PCS	1	
2	Battery module	14.336kWh	PCS	15	
3	Control box	1000V	PCS	1	
4	Spare parts	---	PCS	1	See shipping list for details

## 3.3 System parameters

Sheet 3-2 ESS AC Parameters

Performance	Specifications
Rated power	100kW
Max power	110kW
Rated Grid voltage	AC400V
Allowed Grid voltage range	400V(-10% ~ +15%)
Rated Grid Frequency	50Hz/60Hz
Power factor	1(leading) ~ 1 (lagging)

Sheet 3-3 ESS DC parameters

category	Performance	Specifications
Battery	Nominal energy	215kWh

cabinet	Rated voltage	768V
	Maximum charging voltage	864V
	Minimum discharge voltage	648V
	Rated charging current	140A
	Rated discharge current	140A
	Maximum continuous charging power	107.5KW(0.5P)
	Maximum continuous discharge power	107.5KW(0.5P)
	Operating temperature	-20~45°C
	Energy storage temperature	-30~60°C
	Way of communication	Ethernet
	Relative humidity	5%~95% no condensation
	Altitude (m)	<2000m
	cooling method	Air cooling
	Protection level	IP54
	Weight	About 2.2t
Product Size	Width: D	1600±3mm
	Depth: W	1132±3mm
	Height: H	2150±3mm

### 3.4 System principle

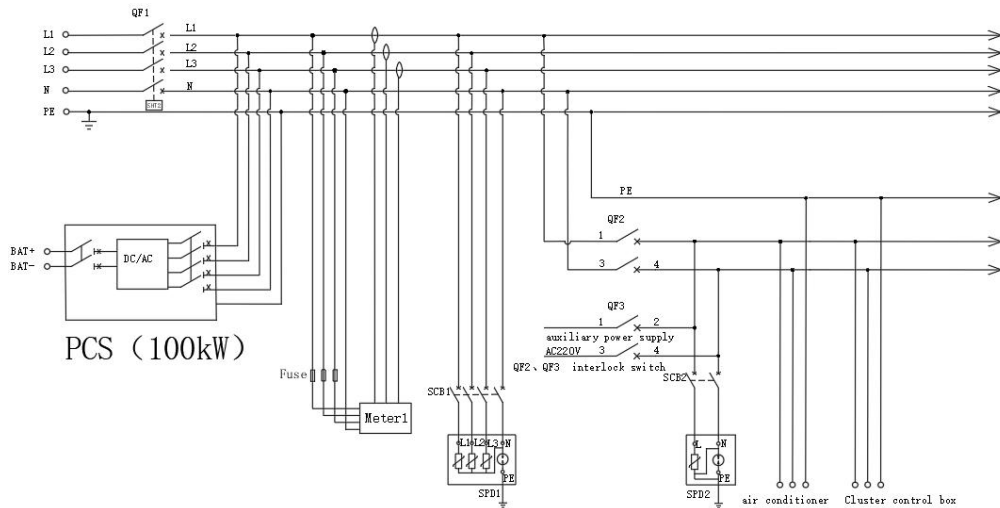


Figure 3-2 Energy storage system AC schematic diagram

The system power distribution is connected from the mains and converted into DC power through the bidirectional converter PCS. The DC system consists of 15 PACKS connected in series; the high voltage is connected to the PCS DC busbar through the control box; the control box integrates DC contactor and DC circuit breaker device, C-BMS and other devices for the control and protection of battery clusters.

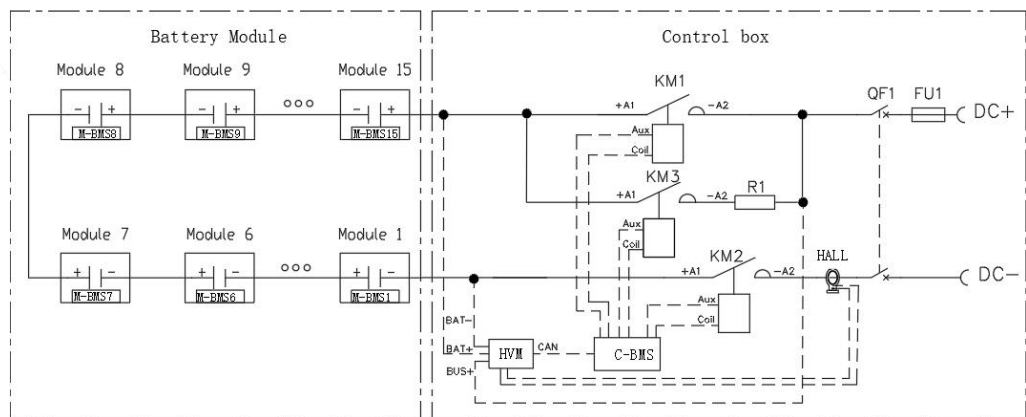
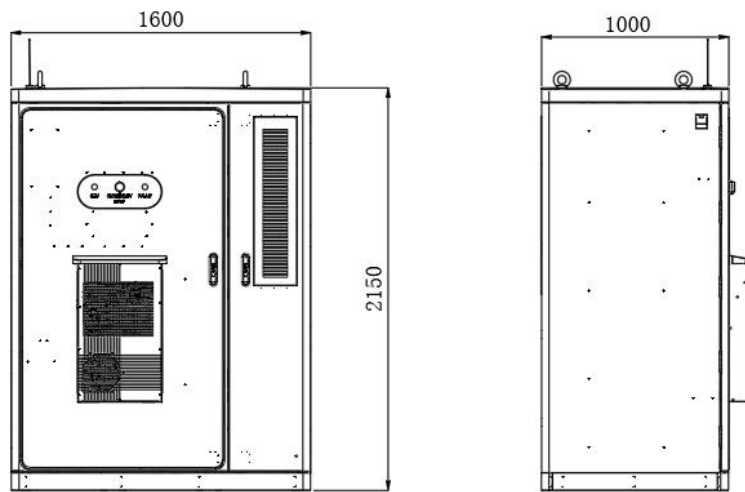


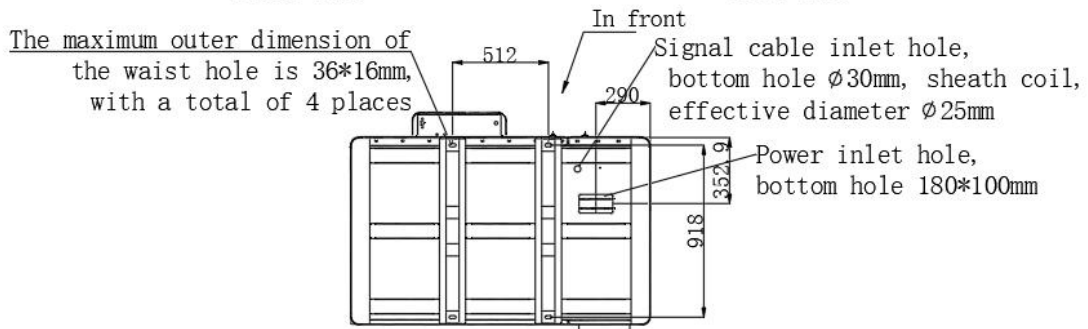
Figure 3-3 Energy storage system DC schematic diagram

### 3.5 Product installation dimensions



Front view

Left view



Unit:mm

Bottom view



# 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 2.2t. 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 2200kg/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:

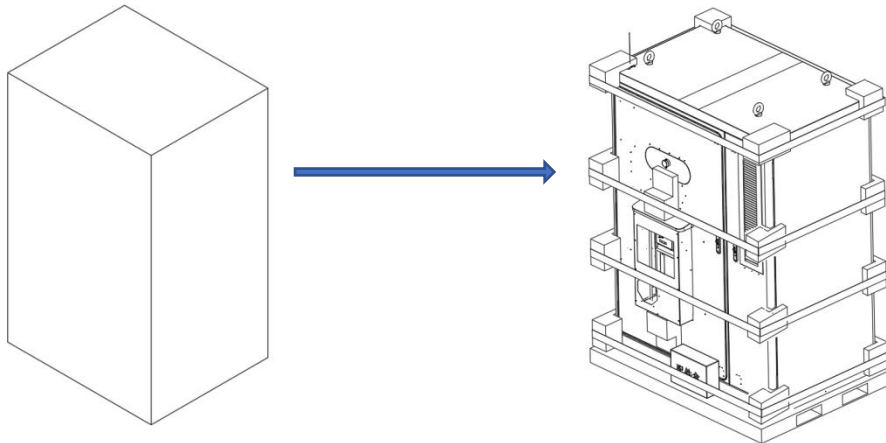


Figure 4-1 Remove the battery cabinet wooden box

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

Sheet 4-1 Checklist

serial number	name	Product Description	unit	quantity	Remark
1	Battery cabinet	100kW/215kWh	PCS	1	
2	Parts List	Flexible fireproof sealing mud	PCS	3	
		Hard copper bar	PCS	4	
		Modular rubber plug	PCS	30	
		Desiccant	PCS	2	
3	Spare parts list	Adapter cable Module series communication cable	PCS	2	
		Fuse	PCS	2	
		CAN analyzer	PCS	1	
		PCBA(M-BMS)	PCS	1	
		Waterproof glue	PCS	1	
		Toolbox	PCS	1	
		Fan	PCS	2	

# 5 Electrical connections

## 5.1 Ground cable connection

1. Connect the energy storage system cabinet to the grounding device: Use a 35mm<sup>2</sup> grounding cable to connect to the PE grounding bar from the cable inlet at the bottom of the cabinet;
2. After the grounding connection is completed, the grounding resistance must be measured. The resistance value should be less than 4Ω.

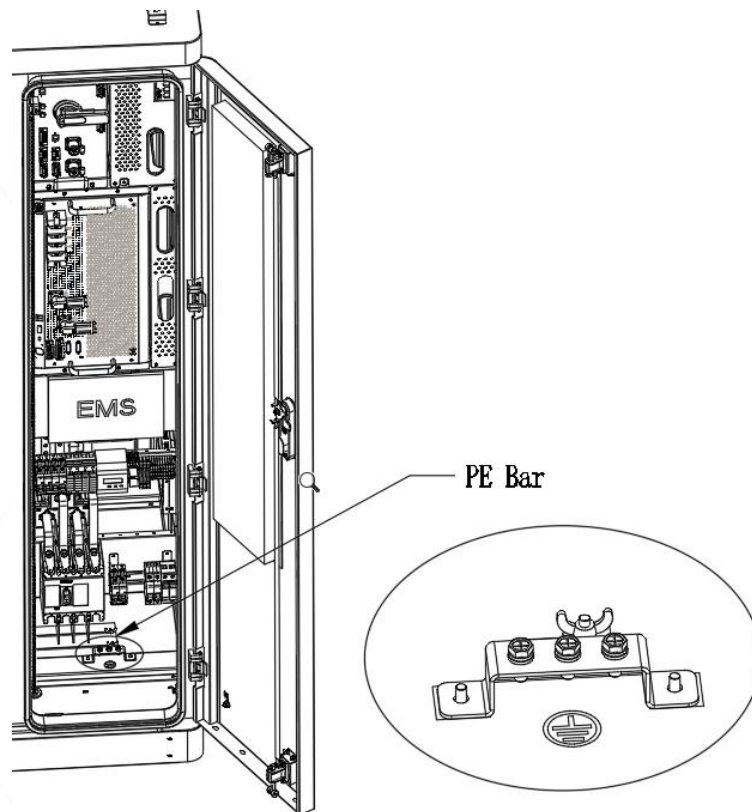


Figure 5-1 Position of the grounding bar of the energy storage system cabinet

## 5.2 Power cable connection between battery cabinet modules

Before the energy storage cabinet is shipped, some module copper bars in the cabinet will be removed for transportation to ensure safety;

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

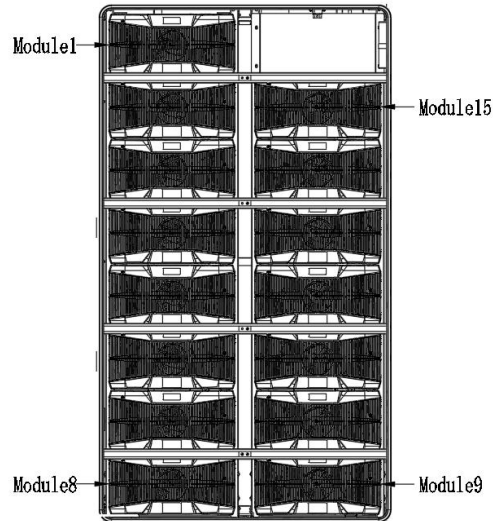


Figure 5-2 Module layout

Step 1: Remove the support beam of the energy storage cabinet module and the module serial numbers: module 2, module 3, module 5, module 6, module 11, module 12, module 14, module 15 front mask;

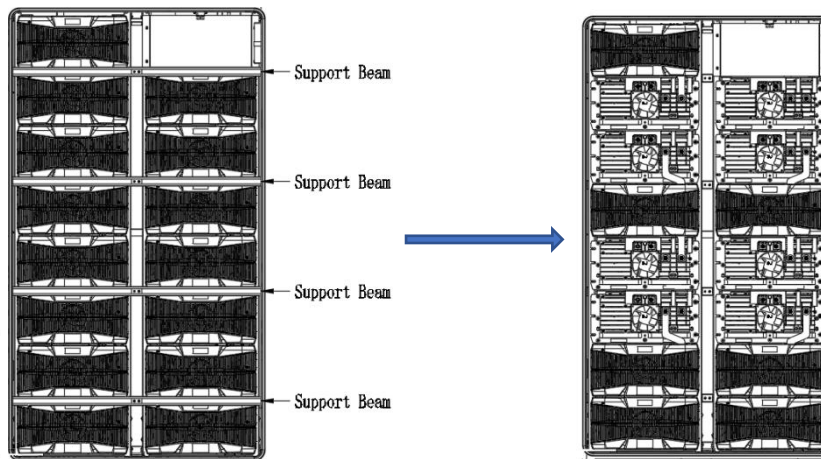


Figure 5-3 Dismantling the support beam of the energy storage cabinet module and its schematic diagram

Step 2: Take out 1 module series copper bar and 2 fixed copper bar screws from the accessory bag, and install them between module 2 and module 3. The recommended tightening force is:  $125\text{kgf.cm} \pm 10\%$ ;

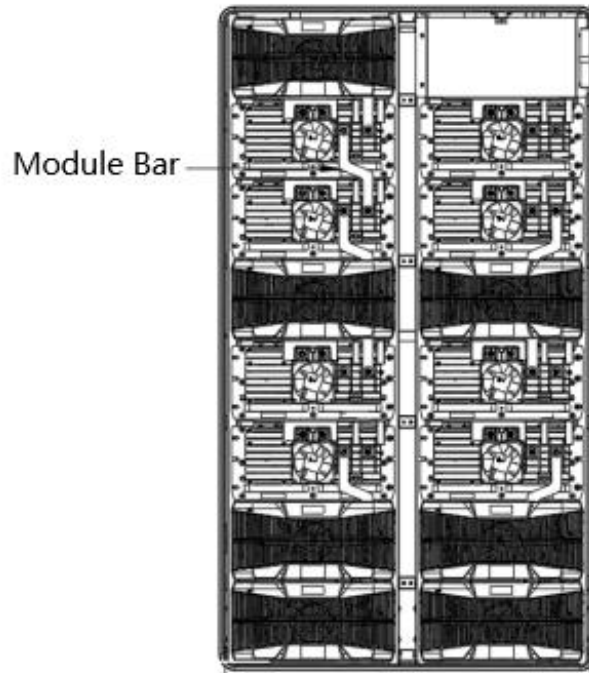


Figure 5-4 Schematic diagram of series copper bars between module 2 and module 3

Step 3: Install the front masks of module 2 and module 3;

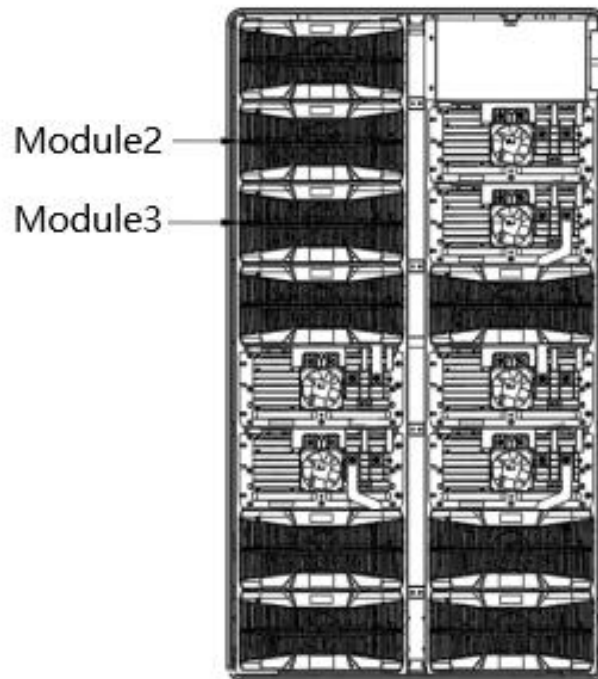


Figure 5-5 Schematic diagram of front mask installation between module 2 and module 3

Step 4: Install the module serial numbers in the order of steps 2 to 3: module 5, module 6, module 11, module 12, module 14, and module 15. Connect the module copper bars and

front face mask;

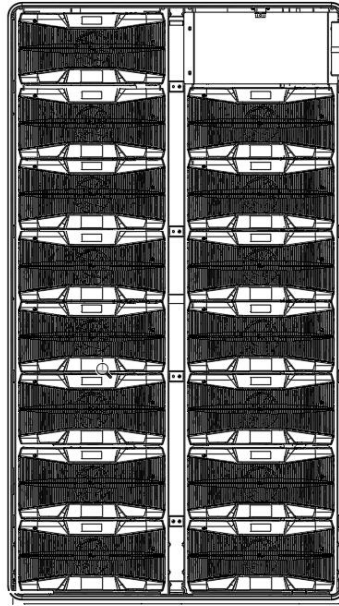


Figure 5-6 Front mask installation diagram

Note: Pay attention to the direction of the copper busbars connecting modules 11, 12, 14, and 15.

Step 5: Take out 30 module rubber plugs from the accessory package, and seal the 2 screw holes of the front masks of 15 modules respectively.

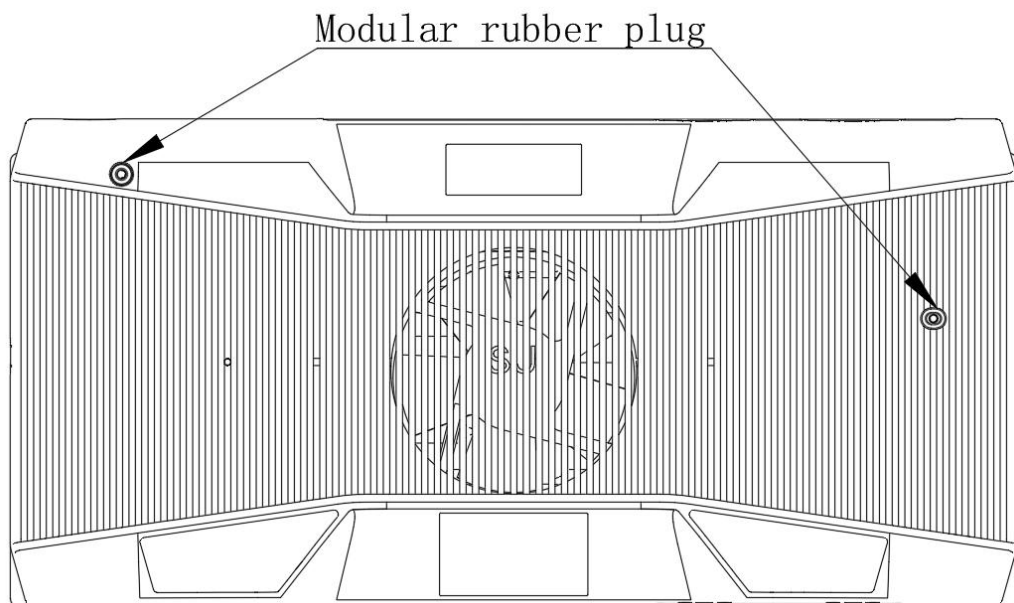


Figure 5-7 Schematic diagram of module rubber plug sealing screw holes

### 5.3 Battery cabinet insulation test

1. After the module is installed, the insulation needs to be retested. Insulation test method: 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 energy storage cabinet, and press the test button;
2. Judgment criteria: insulation resistance  $\geq 1M\Omega$ ;
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 energy storage cabinet. Judgment standard: insulation resistance  $\geq 1M\Omega$ ;

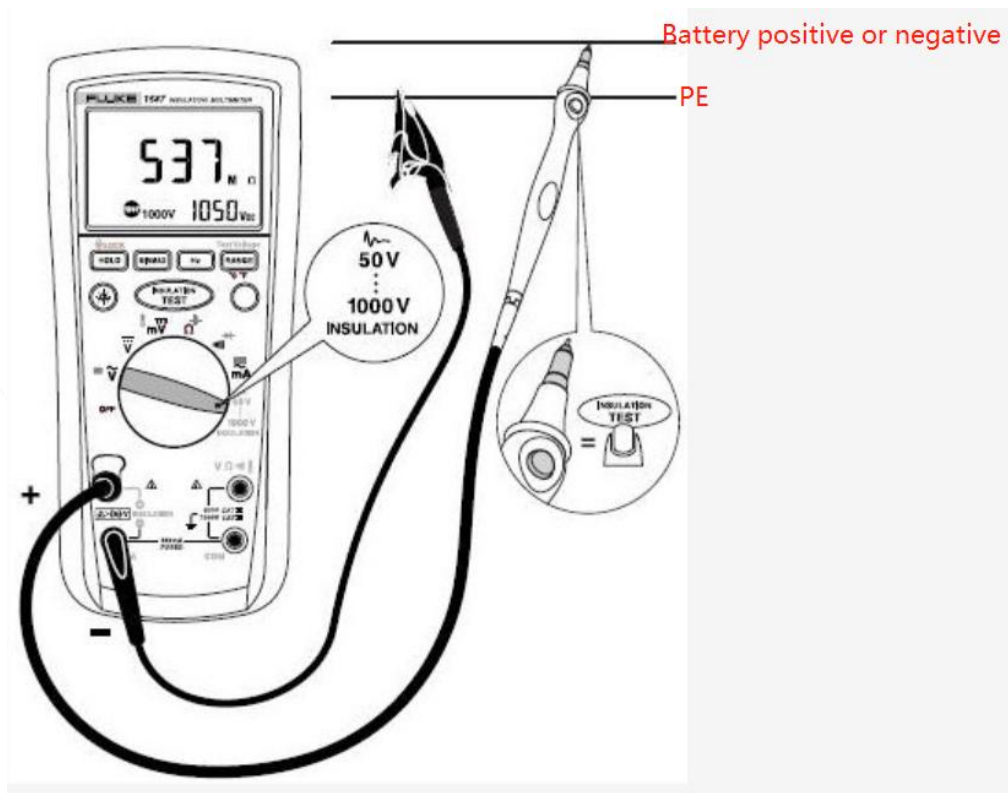


Figure 5-8 Schematic diagram of insulation test of energy storage cabinet

## 5.4 External interface description

### 5.4.1 Cable instructions

Sheet 5-1 External connection cable instructions

Cable name	Starting	Ending	Recommended cable	Remarks
AC-A input line	Cabinet QF1	Grid A phase	YJV22-0.6/ 1kv-3*70+2 *35	
AC-B input line	Cabinet QF1	Grid B phase		
AC-C input line	Cabinet QF1	Grid C phase		
AC-N input line	Cabinet QF1	Grid N phase		
PE input line	Cabinet ground bar	PE		
Communication line	Switch network port	Client communication terminal	Shielded network cable	
L line	Cabinet QF3	AC220V Auxiliary power L	YJV22-0.6/ 1kv-3*1.5	Optional
N line	Cabinet QF3	AC220V Auxiliary power N		
Pe line	Cabinet ground bar	PE		

Notice:

QF2 and QF3 are interlocked and can only close one circuit breaker;

QF2 is an internal power circuit breaker, and loads such as air conditioners and cluster control boxes are powered internally.

QF3 is an optional auxiliary power circuit breaker. Loads such as air conditioners and cluster control boxes are powered by external auxiliary power supplies. The power consumed by the loads inside the cabinet is not included in the energy storage cabinet watt-hour meter;



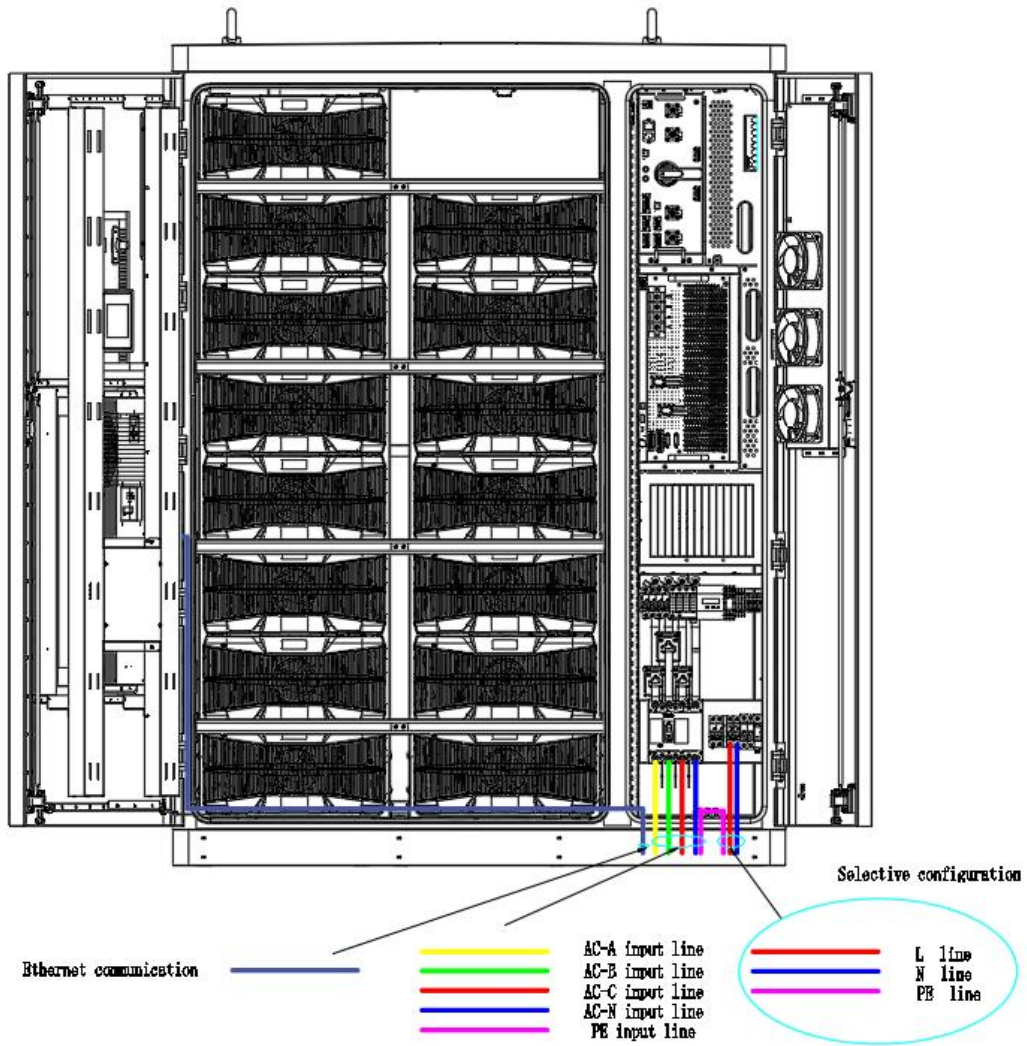


Figure 5-9 Schematic diagram of external wiring of energy storage system

# 6 Touch screen introduction

The LCD touch screen is located above the energy storage 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 Figures. The parameter values and other specific details in the Figures 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.

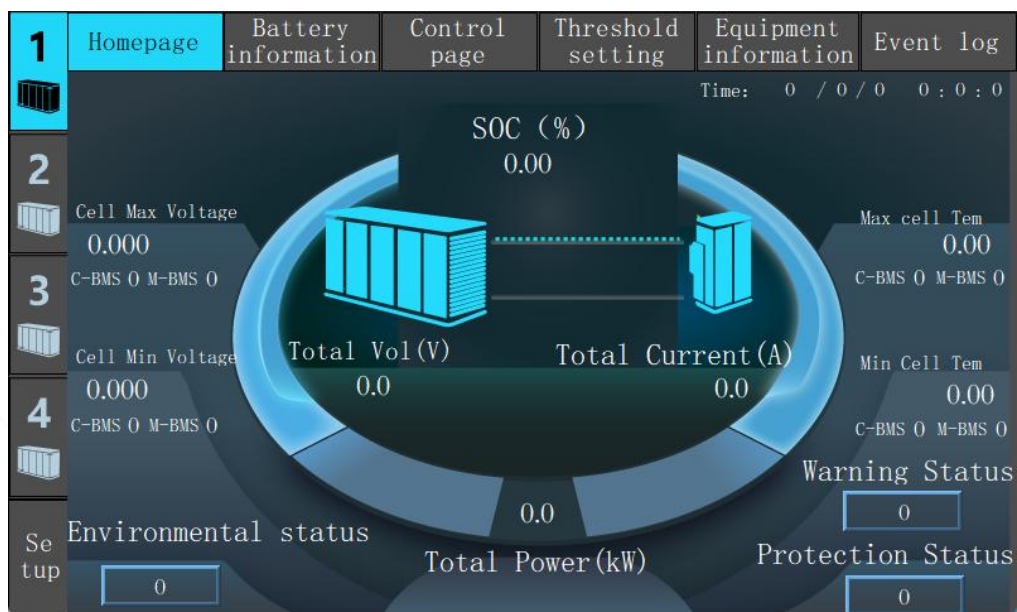


Figure 6-1 Energy storage homepage

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



Figure 6-2 Click the "System Settings (Setup)" button in the lower left corner

3. This page is a touch screen connection page for EMS and energy storage systems. Enter the corresponding IP to connect the corresponding components; "1#ESS" is the No. 1 energy storage system, and "2#ESS" is the No. 2 energy storage system. This goes down.
4. Select "1#ESS" and enter "192.168.1.100". After clicking "Complete", it will automatically return to the homepage and the connection is successful. .
5. Click the "Language" button in the lower left corner to switch languages. Currently, only "Chinese" and "English" are supported.

## 6.2.2 Home Page

1. The system will automatically return to the home page after successful connection.

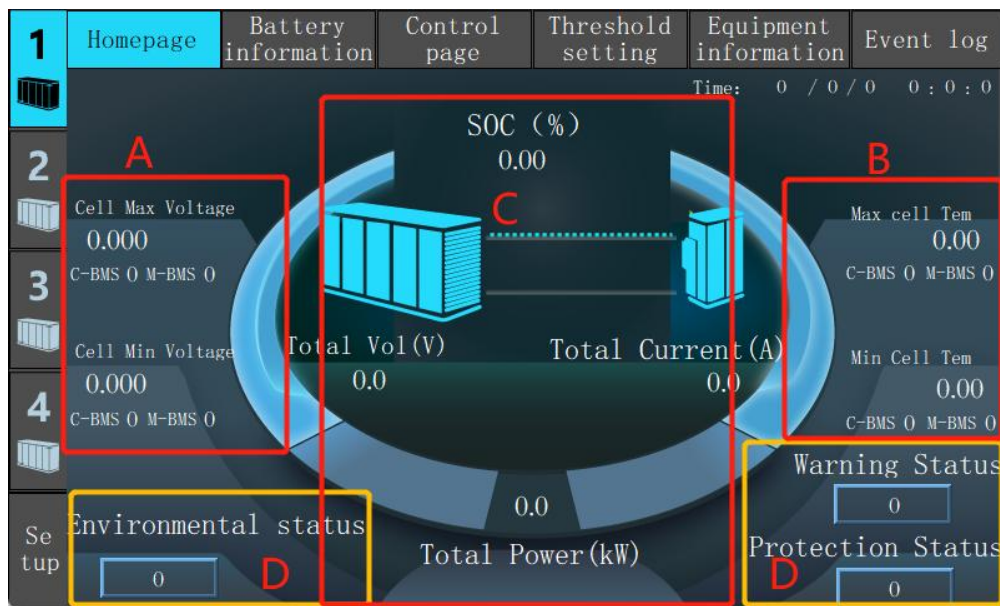


Figure 6-3 Home page

1. This page displays the more important operating information of the energy storage system.
2. Area A is the "maximum voltage of the cell", "minimum voltage of the cell" and "position" in the current energy storage system.
3. Area B is the "maximum temperature of the battery core", "minimum temperature of the battery core" and "position" in the current energy storage system.
4. Area C is the "SOC", "total voltage", "total current" and "total power" of the current energy storage system.
5. Area D is whether there is an alarm or protection in the current energy storage system. When no alarm or protection occurs, the alarm status word and protection status word of the system default to 0. When a corresponding alarm or protection occurs, the value of the status word Not 0.
6. Click the status to view details, as shown below.

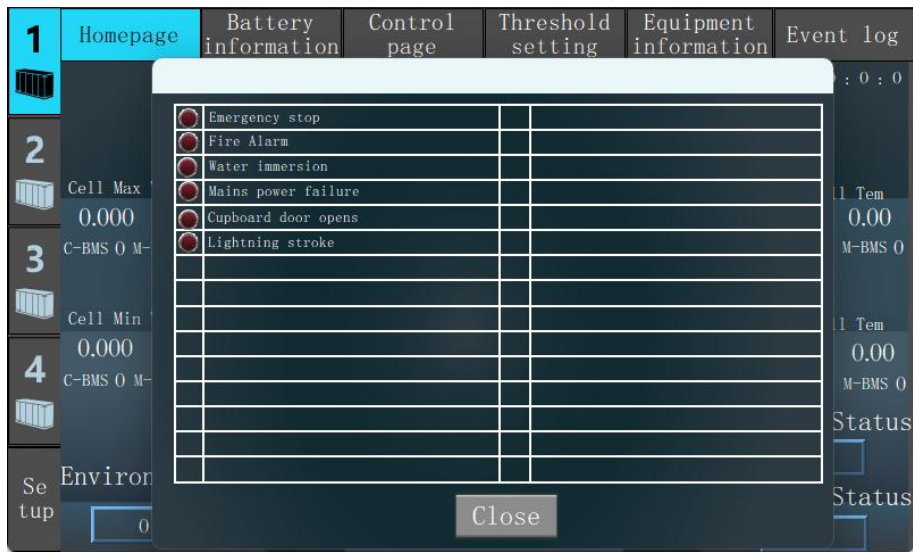


Figure 6-4 "Environmental status" analysis diagram

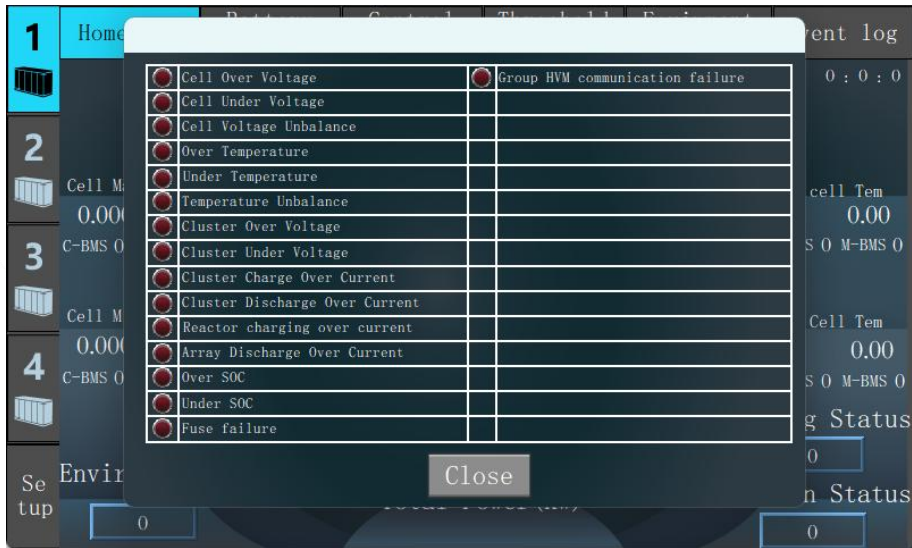


Figure 6-5 "Alarm status" analysis diagram

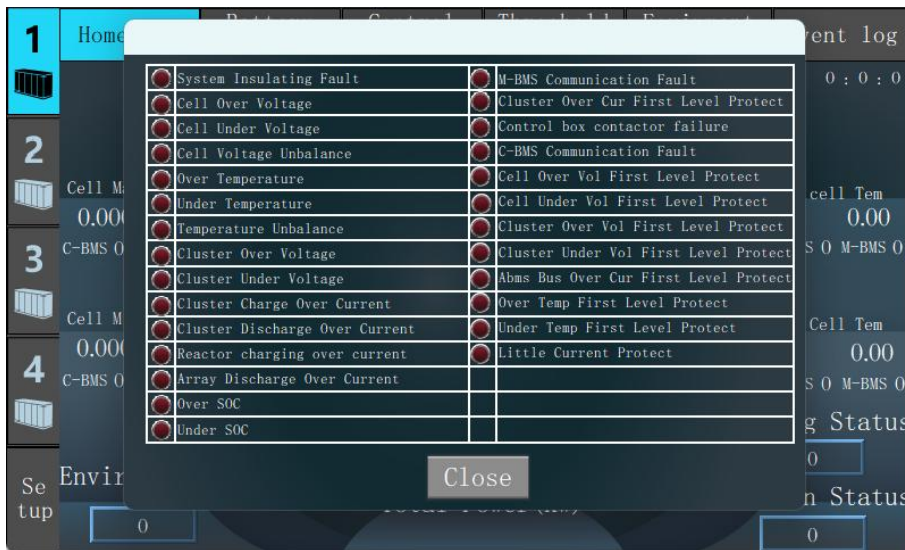


Figure 6-6 "Protection status" analysis diagram

### 6.2.3 View battery information in the current cluster

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



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.  means online and  means 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 View information of individual cells in a pack

1. Enter Battery information page



Figure 6 - 8 Single unit information under the package

2. Click any "1" button and the interface as shown below will pop up.



Figure 6 - 9 Pack Information

1. This page displays the battery pack information in the battery pack. The data below "1" is the data of battery pack 1, the data below "2" is the data of battery pack 2, and so on.



- The displayed data includes "maximum and minimum voltage in the battery pack" and "maximum and minimum temperature in the battery pack".

### 6.2.5 View information of individual cells in a pack

- Enter a pack page

1	Homepage	Battery information	Control page	Threshold setting	Equipment information	Event log			
1 #ESS 1 C-BMS									
2	M-BMS	1	2	3	4	5	6	7	8
	Umax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Umin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	Tmax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tmin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	M-BMS	9	10	11	12	13	14	15	16
	Umax	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Umin	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	Tmax	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Tmin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Setup									Return

Figure 6-10 Pack Information

- Click any "" button, and the interface as shown below will pop up.

1	Homepage	Battery information	Control page	Threshold setting	Equipment information	Event log
1 #ESS 1 C-BMS 1 M-BMS						
2	Cell No	voltage (V)	Cell Tem(°C)	Cell No	voltage (V)	Cell Tem(°C)
	1	0.000	0.00	9	0.000	0.00
	2	0.000	0.00	10	0.000	0.00
3	3	0.000	0.00	11	0.000	0.00
	4	0.000	0.00	12	0.000	0.00
	5	0.000	0.00	13	0.000	0.00
4	6	0.000	0.00	14	0.000	0.00
	7	0.000	0.00	15	0.000	0.00
	8	0.000	0.00	16	0.000	0.00
Setup						Return

Figure 6-11 Single cell information in a pack

- The data displayed on this page is the information of the individual cells in the battery pack.
- The displayed data includes "voltage of 1~16 single cells" and "temperature".

### 6.2.6 Manual opening and closing control of contactor

- Enter the "Energy Storage System Home Page".

2. Click the "Control Page" button above, and the interface as shown below will pop up.

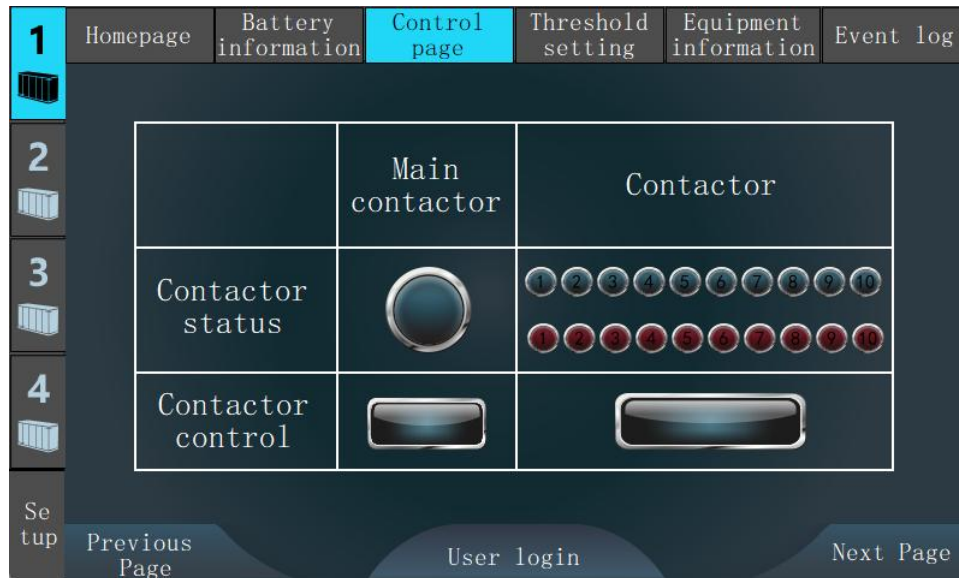





Figure 6-12 Control page

3. This page allows manual opening and closing control of the system's contactor.

4. Before closing, you must log in as a user. Click the button in the middle and lower position, select user, and enter the password: 6666 to log in. If the user has not logged in, the relevant operation prompts on the left will appear to remind the user to log in.



Figure 6-13 Contactor control

5. Click the "" button you want to control
6. Click the button to turn off the light  to disconnect the contact, Clicking the button lights up  to close the contactor.
7. After clicking "Complete", click the "Write" button below to complete the opening and closing control.
8. Click the next page to view the system balancing status. The page displays whether cluster battery balancing is enabled. Click Balance Control to control the balancing of each cluster.

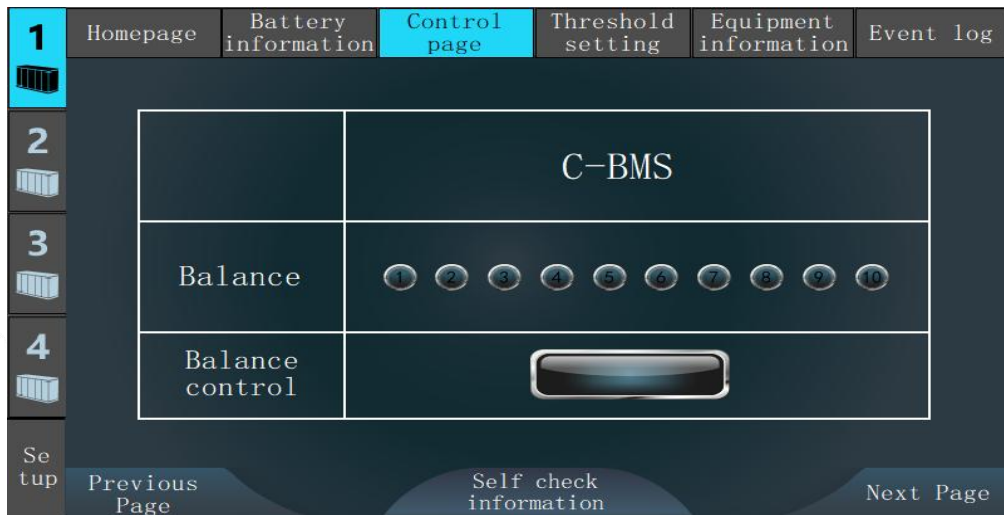


Figure 6-14 Click "Next Page"

9. Click the button below "", The interface shown below will pop up.

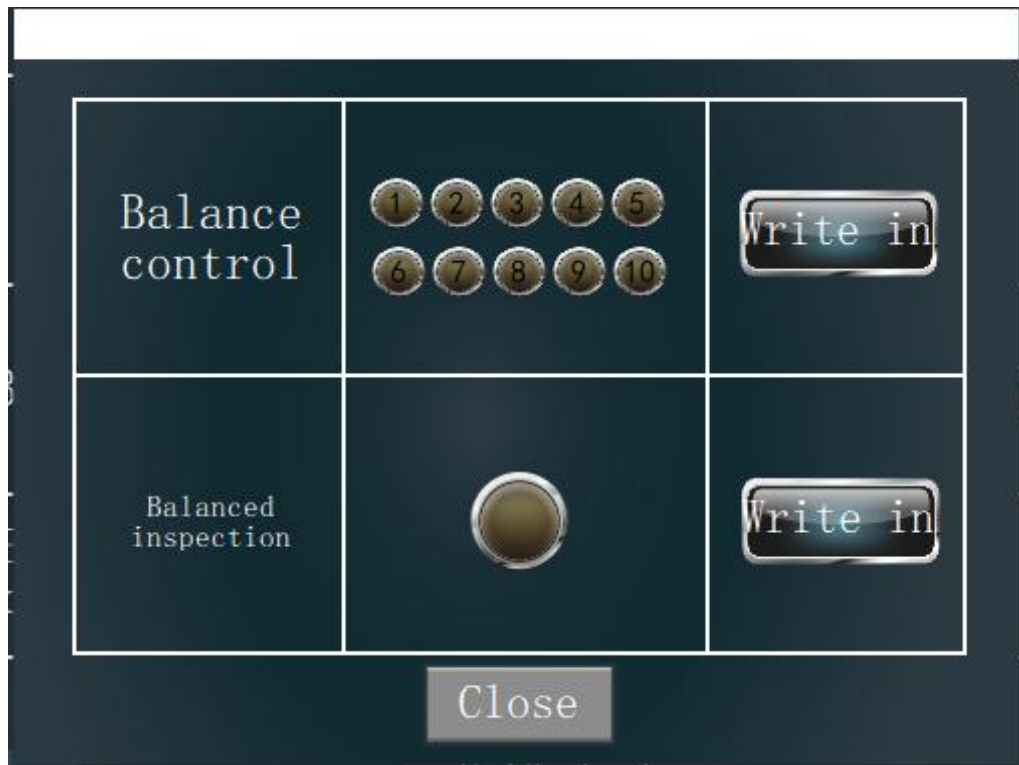


Figure 6-15 Equalization control page

10. The contactor control is similar, and each cluster of batteries can be balanced.
11. The balance inspection button at the bottom can perform self-test of the balancing function of all battery packs.



#### Warning

- The cluster contactor cannot be closed before the main circuit breaker is closed.
- The touch screen can only issue opening instructions to the main circuit breaker, but cannot issue closing instructions to the main circuit breaker.
- When the touch screen issues a disconnection command to the main circuit breaker, after the main circuit breaker is disconnected, it can only be closed manually.
- When the main circuit breaker is closed, do not issue a disconnection command to the main circuit breaker at will.
- In remote mode, the main circuit breaker cannot open and close, but the cluster contactor can open and close.

### 6.2.7 Modify system operation threshold

1. Enter the "Energy Storage System Page".
2. Click the "Threshold Setting" button above, and the interface shown in the figure below will pop up.

Alarm Threshold		Level 2 Protection Threshold	
Cluster Over Voltage	0.0 V	Cluster Over Voltage	0.0 V
Cluster Under Voltage	0.0 V	Cluster Under Voltage	0.0 V
Cluster Discharge Over Current	0.0 A	Cluster Discharge Over Current	0.0 A
Cluster Charge Over Current	0.0 A	Cluster Charge Over Current	0.0 A
Cell Over Voltage	0.000 V	Cell Over Voltage	0.000 V
Cell Under Voltage	0.000 V	Cell Under Voltage	0.000 V
Cell Over Temperature	0.00 °C	Cell Over Temperature	0.00 °C
Excessive Temperature Differentials	0.00 °C	Excessive Temperature Differentials	0.00 °C
Cell Under Temperature	0.00 °C	Cell Under Temperature	0.00 °C
DC-BUS Charge Over Current	0.0 A	DC-BUS Charge Over Current	0.0 A
DC-BUS Discharge Over Current	0.0 A	DC-BUS Discharge Over Current	0.0 A


Figure 6-16 Threshold setting page

3. The data displayed on this page is the operating threshold of the energy storage system.
4. If you need to modify the threshold, click the "User login" button below to log in as the admin user. After entering the password 3366, click the "Set up" button at the bottom left to pop up the interface as shown below.

Alarm Threshold		Level 2 Protection Threshold	
Cluster Over Voltage	0.0 V	Cluster Over Voltage	0.0 V
Cluster Under Voltage	0.0 V	Cluster Under Voltage	0.0 V
Cluster Discharge Over Current	0.0 A	Cluster Discharge Over Current	0.0 A
Cluster Charge Over Current	0.0 A	Cluster Charge Over Current	0.0 A
Cell Over Voltage	0.000 V	Cell Over Voltage	0.000 V
Cell Under Voltage	0.000 V	Cell Under Voltage	0.000 V
Cell Over Temperature	0.00 °C	Cell Over Temperature	0.00 °C
Excessive Temperature Differentials	0.00 °C	Excessive Temperature Differentials	0.00 °C
Cell Under Temperature	0.00 °C	Cell Under Temperature	0.00 °C
DC-BUS Charge Over Current	0.0 A	DC-BUS Charge Over Current	0.0 A
DC-BUS Discharge Over Current	0.0 A	DC-BUS Discharge Over Current	0.0 A

Figure 6-17 Equalization control page

5. Select the threshold option box that needs to be modified and enter the value.

6. After entering the values, click the "  " button in the lower left corner to complete the modification.



### Warning

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.

## 6.2.8 Device Information

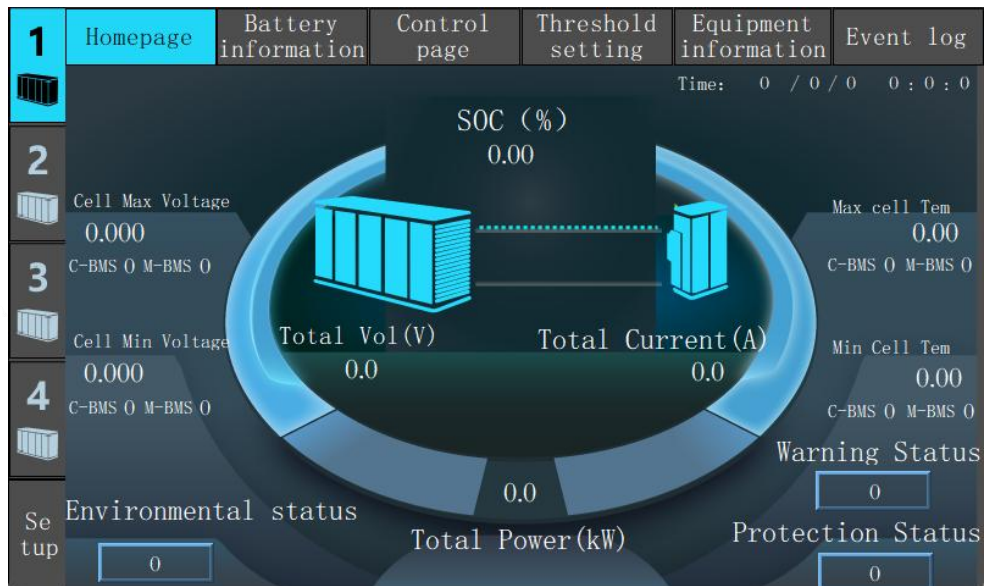


Figure 6-18 Homepage

1. Enter the "Energy Storage System Home Page".

2. Click the "Device Information" button above, and the interface as shown below will pop up.



Figure 6-19 Air conditioner status

This page displays the "status" of the air conditioner, "cooling temperature point", "heating temperature point" and "other air conditioning parameters"

### 6.2.9 System mode switching

1. Enter the "Home Page".  
 2. Click the "System Settings Button" button on the lower left, and the interface as shown below will pop up.

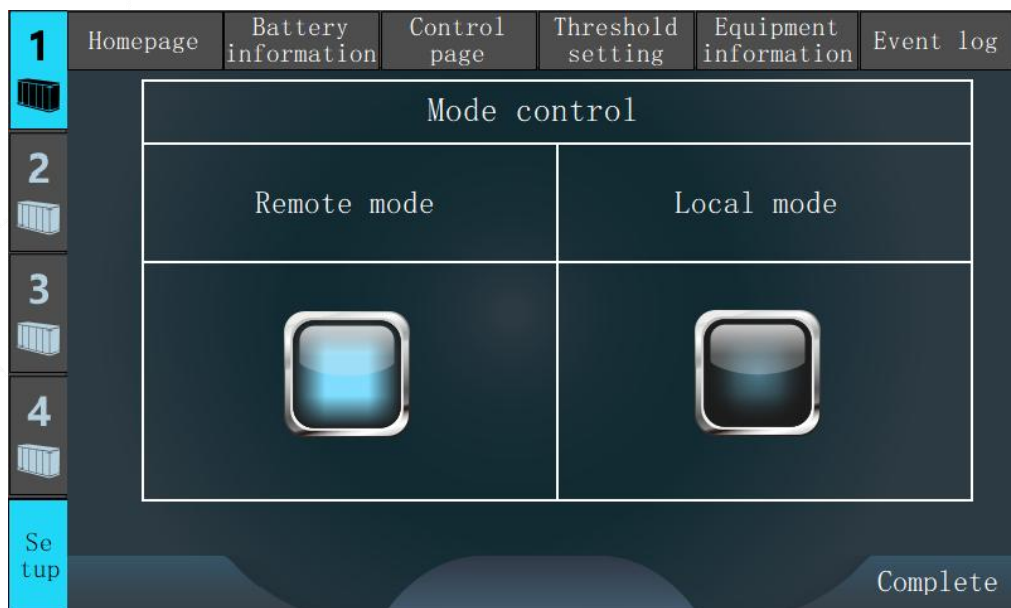


Figure 6-20 Click the "System Settings Button" button

1. This page can switch between "remote mode" and "local mode".



2. Click the control button " " to control the "remote" and "local" modes of the system.

**Local mode:** control the opening and closing of the contactor through the operation display screen;

**Remote mode:** The contactor opening and closing can be controlled through protocol;

### 6.2.10 Event view

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

1	Homepage	Battery information	Control page	Threshold setting	Equipment information	Event log
	Event time		Event content		Event status	
2	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
3	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
4	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	
Setup	0 / 0 / 0	0 : 0 : 0	Cluster Charge Over Voltage Warn		Disappear	

Figure 6-21 Air conditioner status

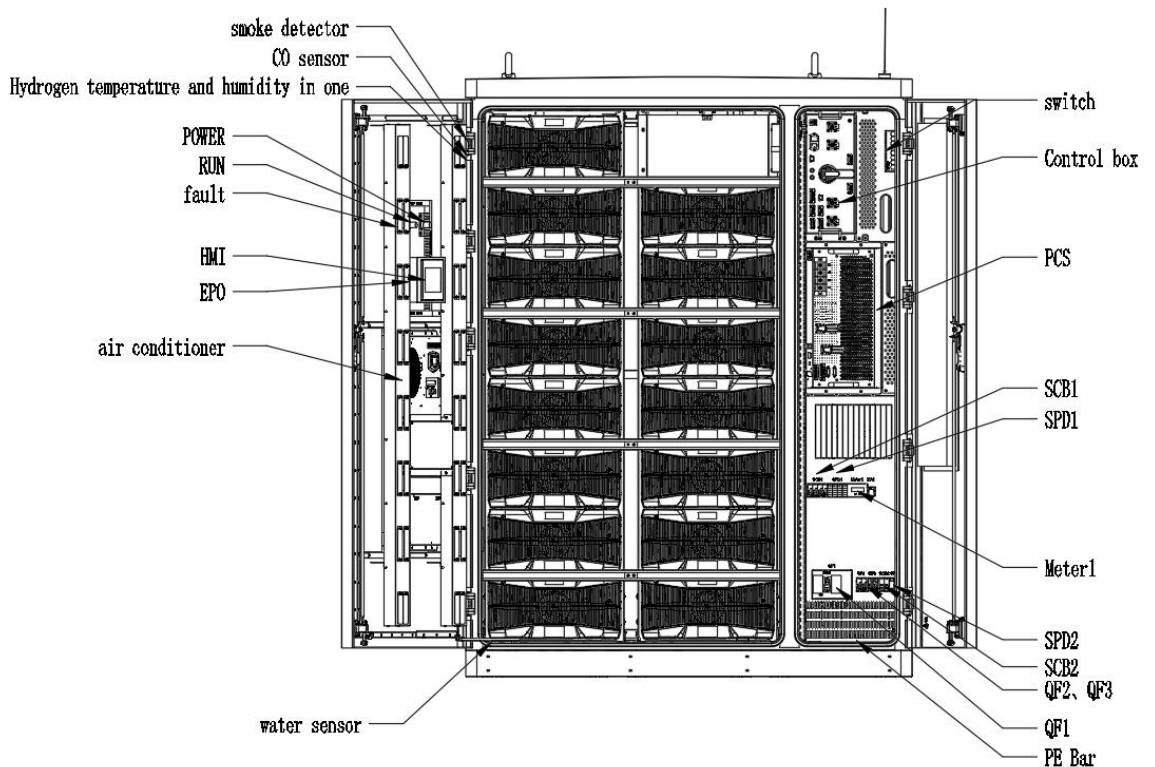
2. On this interface, you can view the total number of events that occurred. Only 100 events can be retained for all event records (the latest one will be saved). You can view the corresponding event through the time number on the right. After selecting, the time, content and status of the event will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



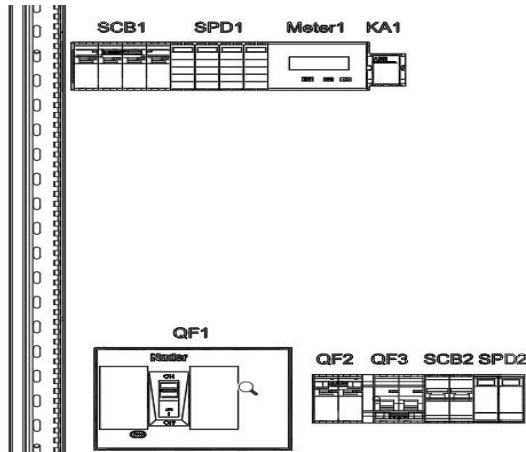
# 7 Product operating instructions

## 7.1 System starts with grid connection (internal power supply)

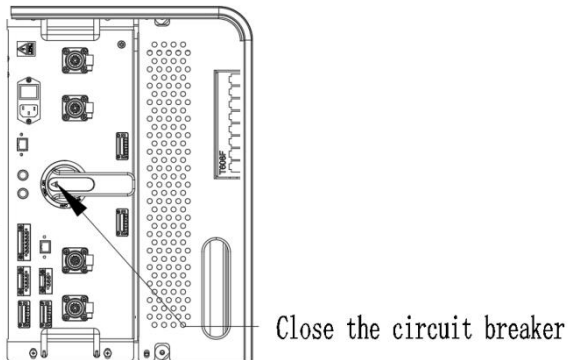
Step 1. Check before starting: Confirm that all connections are made according to the installation instructions: AC circuit breakers QF1, QF2, and QF3 are in the OFF state, and the emergency stop button is in the released state; the DC circuit breaker switch of the energy storage cabinet control box is in the OFF state. state;



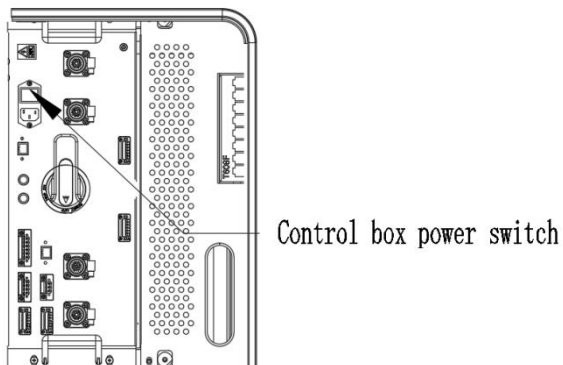
Step 2. Close AC circuit breakers QF1 and QF2, and close surge protection switches SCB1 and SCB2;



Step 3. Check whether the voltage of the battery pack on the display is normal. If there is no fault, close the control box circuit breaker of the energy storage cabinet;

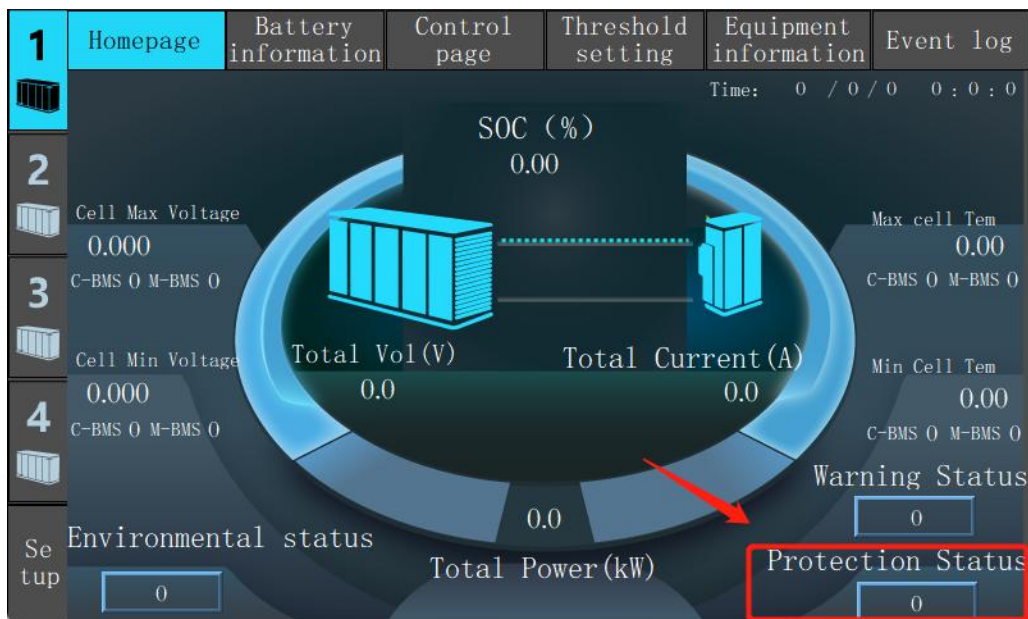


Step 4. Close the ship-shaped switch on the front panel of the cluster control box and power on the energy storage cabinet system;



Step 5. Confirm the system settings on the home page of the display screen on the 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 6. Select the current device on the energy storage cabinet touch screen and close it; Please see section 6.2.6 for details of closing operation instructions;



Step 7: Check the data reported on the home page. If there is no fault, the client EMS can charge, discharge and power schedule the system;

Note: If you use the auxiliary power supply connection method, please connect the AC220V auxiliary power supply to the lower incoming line of QF3. At the same time, step 2 is changed to close the AC circuit breakers QF1 and QF3, and close the surge protection switches SCB1 and SCB2. The other steps are the same.

## 7.2 System emergency stop

The system emergency stop button is located on the door of the energy storage cabinet. When an emergency occurs, take a photo of the emergency stop button of the energy storage cabinet. The system will disconnect the DC circuit breaker inside the control box of the energy storage cabinet, and then the software will control the disconnection of the DC contact inside the control box. to completely cut 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);

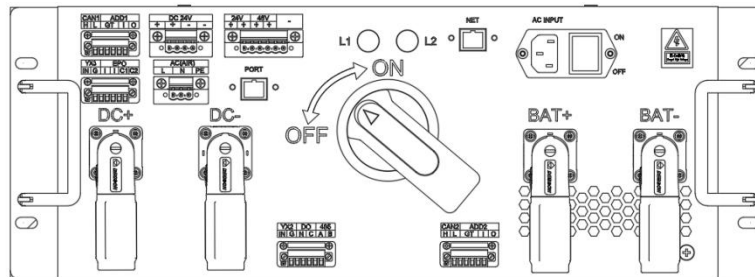


## 7.3 Cluster control box DC circuit breaker tripping recovery and closing

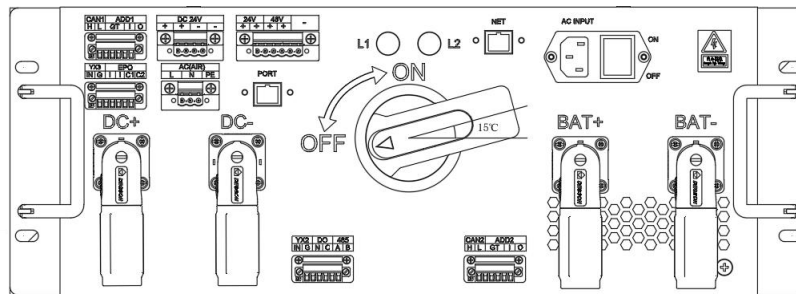
When a serious fault occurs in the system or the emergency stop button is pressed, the system will disconnect the circuit breaker for protection. After the fault is eliminated, the circuit breaker needs to be manually restored and closed, and then the energy storage system can be restarted.

Pay attention to the recovery and closing process of the cluster control box DC circuit breaker:

The cluster control box resumes closing:



Move from the tripping position to OFF and level 15°C and hear the sound of recovery.



Check whether the voltage of the battery pack on the display is normal. If there is no fault, re-close the QF1 switch, and then close the control box circuit breaker QF of the energy storage cabinet;

# 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 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

Serial number	Fault alarm content	Response action
		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	Contactors 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.
13	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 line	1.Check the cooling function of the liquid cooler 2.Check the wiring harness

Serial number	Fault alarm status	Cause Analysis	Troubleshooting
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
17	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!

**Name:** POWEROAD ( Xiamen ) Renewable Energy Technology Co., Ltd.

**Address:**18th Floor, F5 Building, Xiamen Software Park III, Jimei District, Xiamen, Fujian, China 361023

**Tel:** +86-0592-5558101(Xiamen)      +86-0755-86955325(Shenzhen)

**Website:** [www.poweroad-ess.com](http://www.poweroad-ess.com)