FLEX-215A05/M15P100 Energy Storage System User manual

Project number	PR24040178
Product name	FLEX-215A05/M15P105
Document version	V1.0
Controlled file number	
Date	2024.06.06

Approve	**Check**	**Design**
Zhang Xin	Wang Le	Yang Yantao

Version records

Ver	**Updating**	**Date**	**Revision/Formulation**
V1.0	New Release	2024.06.06	Design

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1 About this manual

1.1 Applicable product

Thank you for purchasing the product from Poweroad.This manual applies only to Poweroad outdoor energy storage products.

Product model:FLEX-215A05/M15P100

Throughout this manual,unless otherwise noted,references to “energy storage system”are to that product.

1.2 Applicable personnel

This manual is for staff who perform installation and maintenance on this product.Only professional electrician or professionally qualified personnel should perform all operations on the product.The following requirements are required for readers:

- Have some specialized knowledge of electrical and mechanical installation and operation;
- Knowledge of electrical,mechanical schematics and electrical safety for energy storage;
- Fully familiar with the composition and working principle of the whole energy storage system;
- Operator should be fully familiar with the relevant standards of the country/region where the project is located;
- Familiarize with the installation,operation and other related contents described in this manual.

1.3 Manual usage

To ensure the personal safety of the user and to realize the excellent performance of this product,please read this manual in detail before using this product.Keep this manual together with other materials for easy reference.This manual will be updated as the product is developed,and the latest version of the manual can be obtained by consulting Poweroad.

1.4 Symbol usage

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

Danger	"Danger"indicates a situation of high potential risk which,if not avoided,would result in death or serious injury.
Warning	"Warning"indicates a moderately potentially hazardous situation which,if not avoided,will result in death or serious injury.
Be careful	"Be careful"indicates a low-level potentially hazardous situation which,if not avoided,will result in a moderate or minor injury.
Caution	"Caution"indicates a potentially hazardous situation which,if not avoided,will result in equipment failure or property damage.
Instruction	"Instruction"are additional information in the manual that highlights and supplements the content and may provide tips on how to optimize the use of the product,help you solve a problem or save your valuable time.

Always be aware of the hazard warning signs on the machine,signs include:

Sign	Sign interpretation
	This sigh indicates that the cabinet contains high voltage inside,which may cause an electric shock hazard.
	This sign indicates that the temperature here is higher than the acceptable range for human beings,so please do not touch it freely to avoid personal injury.
	This sign indicates that this is the protective earth (PE)terminal,which needs to be firmly grounded to ensure the safety of the operator.

1.5 Explanation of terminology

Abbreviation	Original text	Chinese meaning
ESS	Energy Storage System	能量存储系统
EMS	Energy Management System	能量管理系统
PCS	Power Conversion System	双向变流器
BMS	Battery Management System	电池管理系统
A-BMS	Array-BMS	电池堆管理系统

Abbreviation	Original text	Chinese meaning
C-BMS	Cluster-BMS	电池簇管理系统
M-BMS	Module-BMS	电池模组管理系统
HVM	High Voltage Monitor	高压监测器

2 Safety instruction

2.1 Safe use instruction

Energy storage cabinet has a protection level of IP55 ,with an altitude not exceeding 2000m. The design and testing of the energy storage cabinet strictly follow international electrical safety regulations, This section introduces the safety principles that need to be paid attention to when installing, operating, and maintaining the integrated control cabinet. Please read this safety notice carefully before installation. For specific safety instructions on usage and maintenance steps, please refer to the warning instructions in the corresponding chapter.

Danger	It is prohibited for non-professional technicians or unauthorized personnel to operate the battery cabinet system. It is prohibited for non-professional technicians to disassemble,repair,or modify the battery cabinet system by themselves. It is prohibited to carry out operations other than installation,operation,maintenance and so on as instructed in the user manual.

Danger	Lethal high voltage exists inside the product! Do not move or touch the inside of electrical equipment with electricity when the equipment is not powered off. Observe and follow the warning signs on the product. Following the safety precautions listed in this manual and other documents related to this equipment.

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

Danger	Energy storage battery modules with positive and negative battery clusters are strictly forbidden to be short-circuited! Even when the power is turned-off,lethal high voltage is still present in the battery module inside the device!

Warning	After maintenance,overhaul and other work is completed,the equipment should be powered up in strict accordance with the steps in this manual.

Caution	Ensure that the machine markings are legible at all times. Always replace damaged or obscured machine markings immediately.

2.2 Precaution for safe usage

Use of this product must be in strict compliance with the precautions for use and safety instructions provided by the Company.The Company assumes no responsibility for any injuries or damages resulting from violation of safety operation requirements.The operator should comply with local safety regulations,and the safety precautions in this manual are intended only as a supplement to local safety regulations.The “CAUTION” and “WARNING” items in this manual do not represent all the safety items that should be observed,but are only supplementary to all the safety precautions.

2.2.1 General safety precaution

This product should be used in the scenario (voltage,current,temperature and humidity,altitude,etc.) that meets the specifications,and any abnormal function or damage to the product caused by over-specification use is not covered by the product quality warranty.

Before contacting any conductor surface or terminal,it must be measured with a multimeter to confirm that there is no voltage at the point of contact,or that the voltage is within the predicted range,and special insulating tools must be used during the operation.

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

When installing or removing power cables,make sure that the corresponding circuits are disconnected to prevent arcing or sparking.

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

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

Installation or maintenance operations must conform to the sequence of steps in the documentation and should not be changed.

It is prohibited to block the air inlet and outlet of the cabinet to keep the air convection around the cabinet unimpeded.

Blockage of the cabinet air inlet and outlet will affect the cooling of the cabinet,which may lead to automatic system protection,equipment damage,or even personal injury.

It is prohibited to place any items insides the cabinet that are not related to the system.

2.2.2 Electrical safety

When installing the equipment,the protective ground wire must be installed first;when removing the

equipment,the protective ground wire must be removed last.

Before operating the equipment,make sure that the equipment has been reliable grounded (grounding resistance is less than 4Ω),poor grounding of the equipment may affect the performance of the equipment,and even jeopardize personal safety.

It is prohibited to install and disassemble the power cord with electricity,and poor contact with the disassembly with electricity may produce electric arc or electric sparks.

Warning	The supply voltage of this system is hazardous and direct contact poses a risk of electric shock. Unregulated 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 risk of accidental short circuiting that could result in arcing,explosion,or thermal runaway.

Caution	The safety precautions for the battery module in this manual are only a reminder of the key points,for more safety precautions,please refer to the instruction manual provided by the battery module manufacturer. When installing the battery module,the circuit should be disconnected.

The cable terminals should be tightened in accordance with the corresponding torque value.Poor contact may lead to excessive contact voltage drop,which may cause a large amount of heating at the connection during high-current charging and discharging,posing a risk of thermal runaway,and the higher temperature is transferred to the internal part of the battery,which also affects the battery's lifespan.。

Warning	Battery short-circuit will produce instantaneous high current and release a large amount of energy,may cause personal injury,operation should be careful to avoid this situation. Excessive battery temperature will lead to battery deformation and damage. Battery pack in the charging process,if there is a strange smell,abnormal sound,please stop charging immediately and contact the manufacture,do not disassemble privately. Battery packs that have been used for a long time and have serious bulging are not allowed to be reused.

2.2.4 Mechanical safety

Lifting and transportation:

1、When lifting heavy objects, do not walk under the suspension rod and the lifted object;

2、Personnel conducting lifting operations must hold a certificate to carry out lifting operations, and lifting equipment must be inspected;

3、Before hoisting, ensure that the hoisting equipment is firmly fixed on the load-bearing device or wall;

4、During the lifting process, ensure that the angle between the two cables does not exceed 90 ', as shown in the following figure;



5、During the lifting process, do not drag the steel wire rope and sling, and do not touch hard objects;

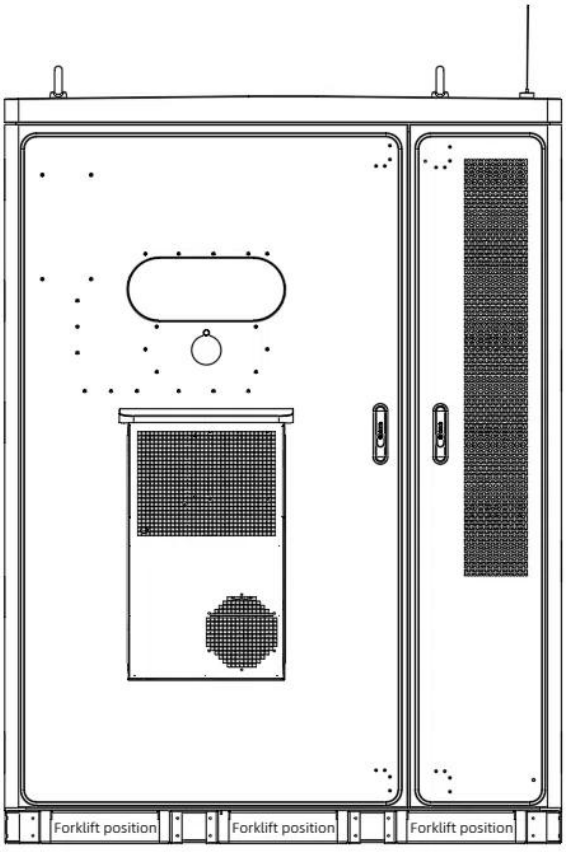
6、Be careful when installing or removing equipment from the cabinet to avoid crushing or injuring unstable or heavy equipment installed on the top of the cabinet.

Forklift transportation:

1、When using a forklift for handling, follow the packaging material requirements and the following diagram to enter the forklift to avoid overturning;

2、Before moving, fix the material on the forklift with a rope;

3、During transportation, it must be supervised by a specially designated person.



3 Product introduction

3.1 Product overview



Figure 3-1 Appearance of Energy Storage System

The energy storage system is a system that can accomplish storage and power supply. The main circuit of this system consists of 1 PCS, 1 cluster control box with 15 battery modules. The control loop contains modules of power distribution system, fire protection system, lighting system and thermal management system.

The energy storage system is characterized by simplified infrastructure construction cost, short construction period, high modularity, strong environmental adaptability, easy transportation and installation. It can be used for peak shaving and valley filling, power distribution expansion, demand response and other scenarios, and can be widely used in shopping malls, neighborhoods, schools, factories, farms and other applications.

3.2 System configuration

Form3-1 System configuration checklist

Category	No.	Name	Product description and quantity	Unit	Quantity	Note
Energy	1	PCS	Rated power 100kW	PCS	1	

storage system	2	Cluster control box	DC1000V	PCS	1	
	3	Battery module	14.336kWh	PCS	15	
	4	Spare parts	---	PCS	1	Please refer to the shipping list for details.

3.3 System parameter

3.3.1 Basic parameter of the AC side of the energy storage system

Form 3-2 Basic parameter of the AC side of the energy storage system

Performance index	Parameter specification
Rated power	105kW
Maximum power	110kW
Rated grid voltage	AC400V
Permissible grid voltage range	400V(-10%～+15%)
Rated grid frequency	50Hz/60Hz
Power factor	1(Leading)～1(Lagging)

3.3.2 Basic parameter of the DC side of the energy storage system

Form 3-3 Basic parameter of the DC side of the energy storage system

Performance index	Parameter specification
Nominal energy	215kWh
Rated voltage	768V
Maximum charging voltage	864V
Minimum discharging voltage	648V
Rated charging current	140A
Rated discharging current	140A
Maximum continuous charging power	107.5kW(0.5P)
Maximum continuous discharge power	107.5kW(0.5P)
Operating temperature	-30～50℃

Storage temperature	-30～60℃
Communication mode	Ethernet
Relative humidity	5%~95% no-condensing
Altitude(m)	<2000m
Cooling method	Air cooling
Protection level	IP55
Weight	≈2.2t
Product dimension	D:1600±3mm
	W:1132±3mm
	H:2150±3mm

3.4 System principle

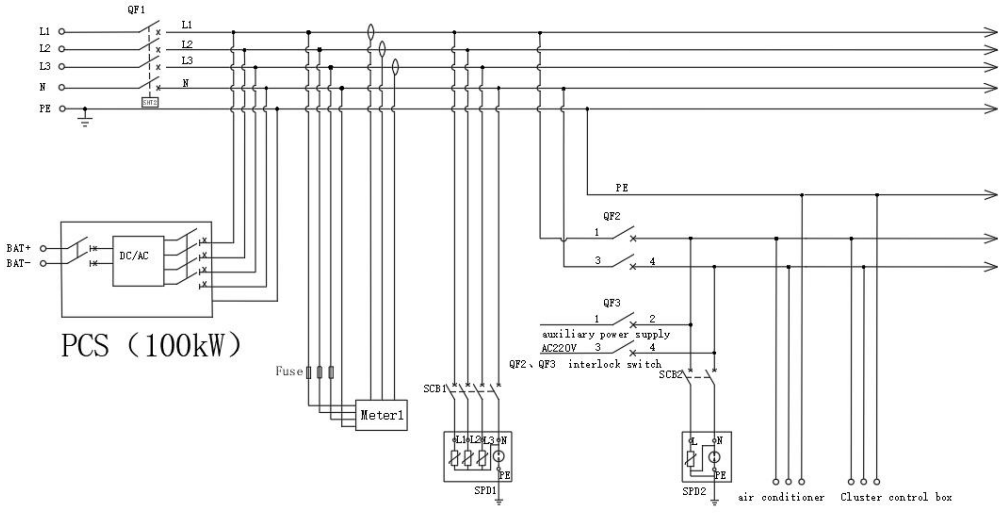


Figure 3-2 AC schematic diagram of energy storage system

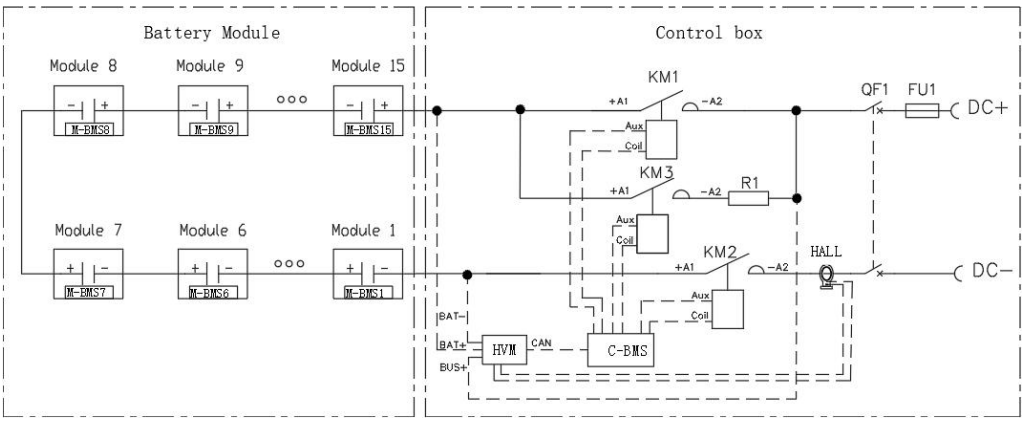
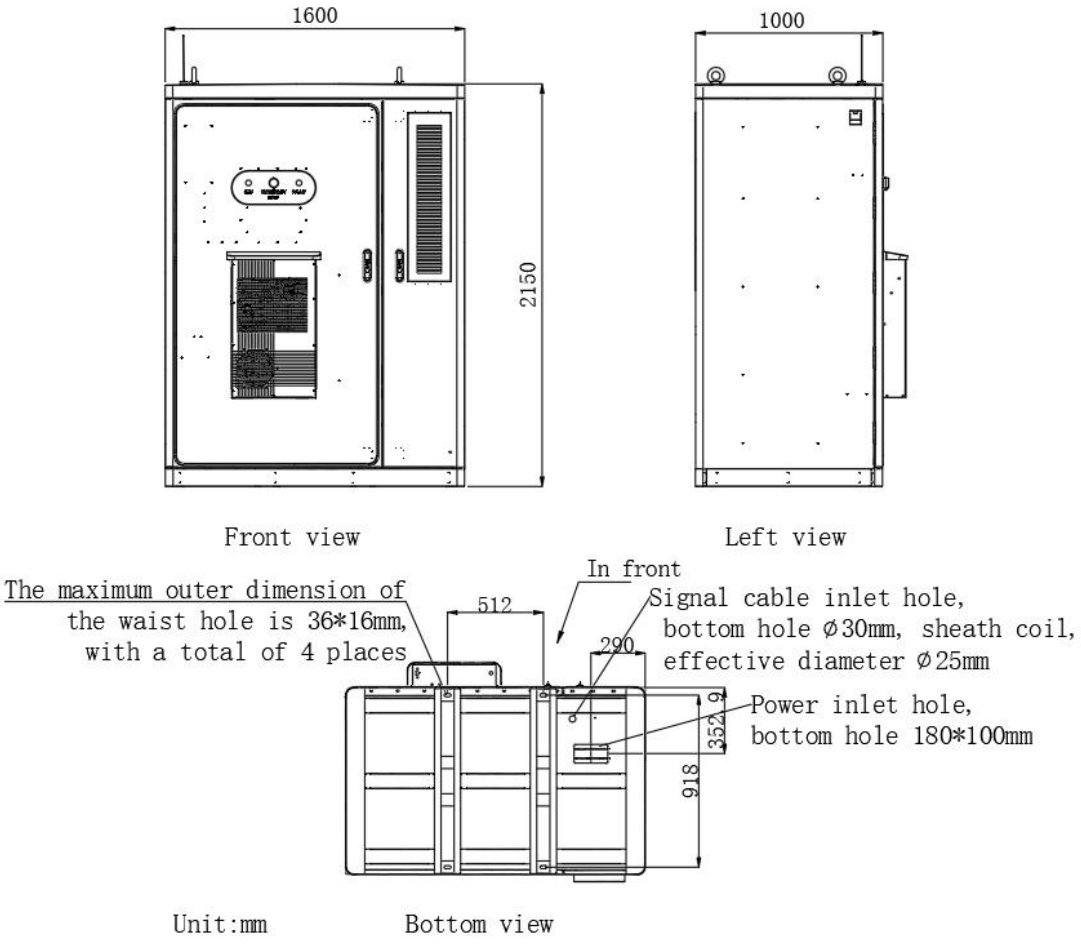


Figure 3-3 DC schematic diagram of energy storage system

The system distribution is connected from the mains power and converted into DC power through a bidirectional converter PCS. The DC system consists of 15 PACK 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 battery clusters.

3.5 Product installation dimension

3.5.1 Installation dimension of energy storage cabinet



4 Site requirement

4.1 Site requirement

1、Expansion bolts are recommended for fixing the energy storage cabinet to the foundation,M12*80mm;

2、Energy storage cabinet around the need to open,no shade,leaving a safe escape route;safe passage is not less than 1m;

3、The self weight of the energy storage 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 water accumulation and damage;

4、Energy storage cabinet installation pier foundation floor loading shall not be less than 2000kg/square meter;

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

6、The foundation should be kept horizontal and the energy storage cabinet should be kept perpendicular to the foundation.

4.2 Unpacking inspection

Open box inspection content:

- ✧ Inspect the outer packaging for visible damage;
- ✧ Unpacked and inspected internally for visible damage;
- ✧ Refer to the delivery note to check if the internal accessories are complete
- ✧ Check if internal documents are complete.

If any damage or missing parts are found on the product,please contact Poweroad or the supplier.It is recommended that you do not discard the original packaging,but store the product inside the original packaging.

Use a screwdriver and hammer to remove the packaging of the energy storage cabinet:

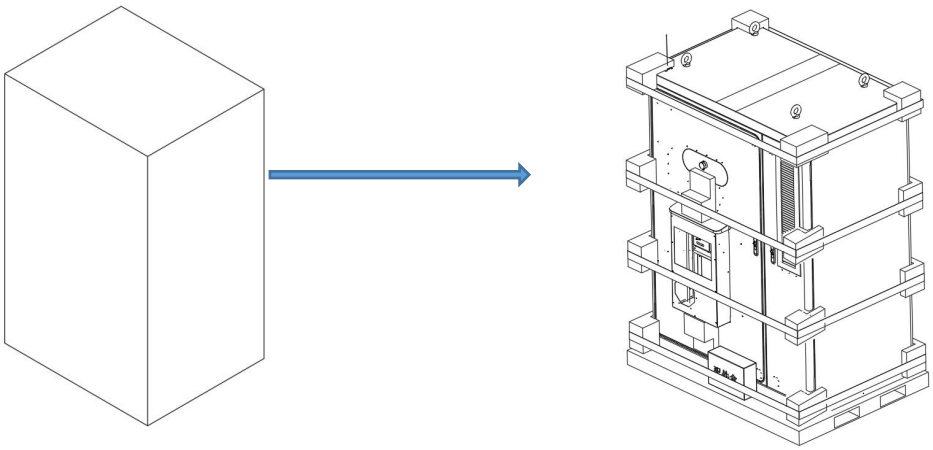


Figure 4-1 Dismantle the wooden box of the energy storage cabinet

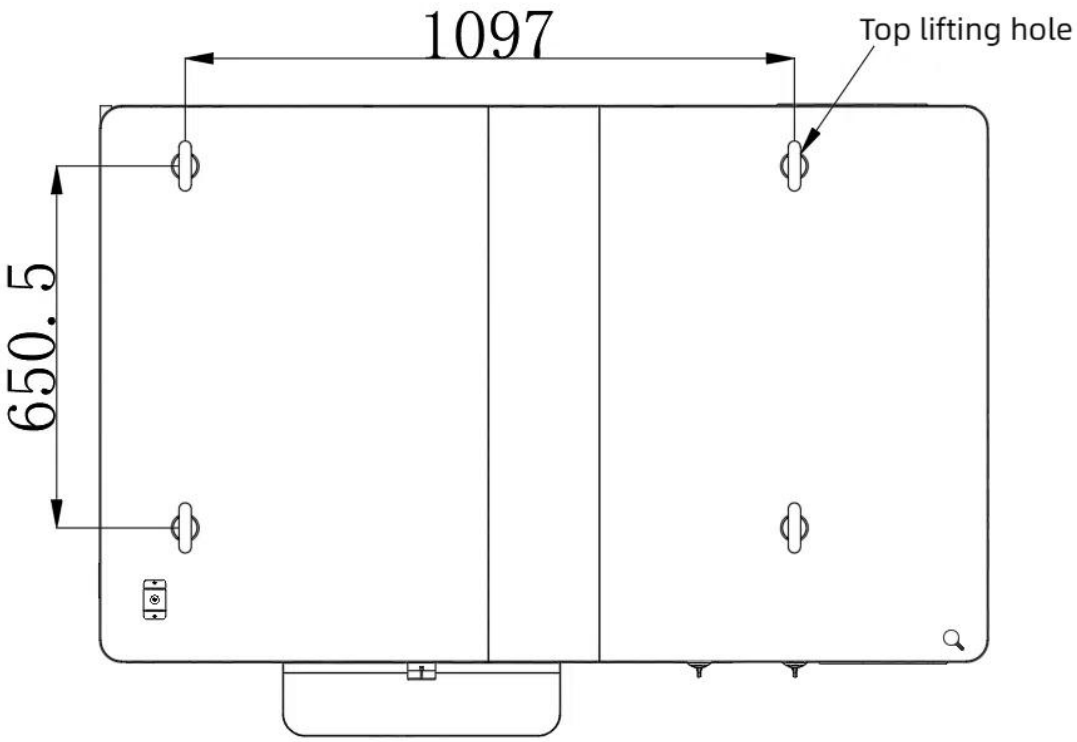
Remove the accessories and spare parts tied to the energy storage cabinet, and inspect the following:

Form4-1 Checklist

No.	Name	Product description	Unit	Quantity	Note
1	Energy storage cabinet	100kW/215kWh	PCS	1	
2	Accessories list	Desiccant	PCS	2	
		Flexible fire blocking clay	PCS	3	
		Hard copper row	PCS	4	
		Module plug	PCS	30	
3	Spare part list	Fan	PCS	2	
		CAN box	PCS	1	
		Toolbox	PCS	1	
		PCBA(M-BMS)	PCS	1	
		Adapter|Module cascade communication cable	PCS	2	
		Fuse	PCS	5	

4.3 Lifting requirement

The weight of the unpacked cabinet reaches 2.2 t, and priority should be given to using the bottom of the cabinet for forklift transportation. When the site does not meet the requirements for forklift transportation, lifting transportation can be used. Lifting method: Use two lifting straps to fasten the four lifting rings from the top of the cabinet, and then use lifting tools to fasten the lifting straps.


1097
Top lifting hole
650.5

5 Electrical connection

5.1 Grounding cable connection

1. Energy storage system cabinet connecting grounding device: Use 35mm² grounding cable to connect PE grounding row from the bottom inlet of the cabinet, the hole diameter of the grounding row is M6, and the fastening force is recommended to be: 55kgf.cm±10%;
2. Grounding resistance shall be measured at the end of the grounding connection, and the resistance value shall be less than 4Ω.

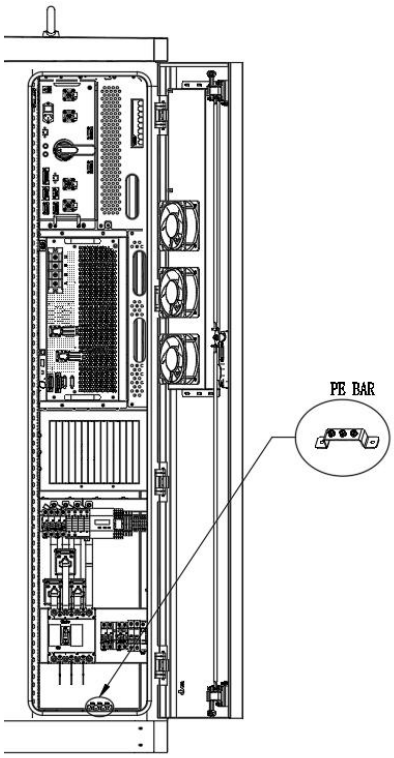


Figure 5-5 Energy storage system cabinet grounding row location

5.2 Module layout

5.2.1 The module layout is shown below

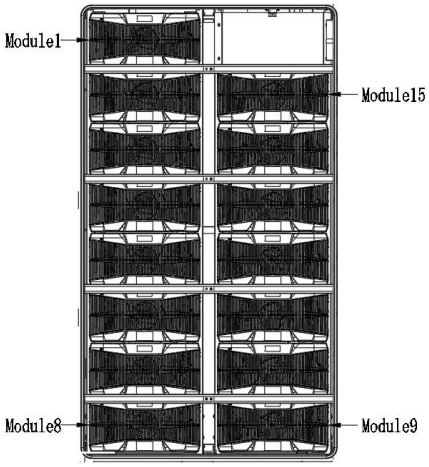


Figure 5-6 Module layout

5.3 Copper bar connection between energy storage cabinet modules

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

Note: Always wear insulated gloves for the following operations

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

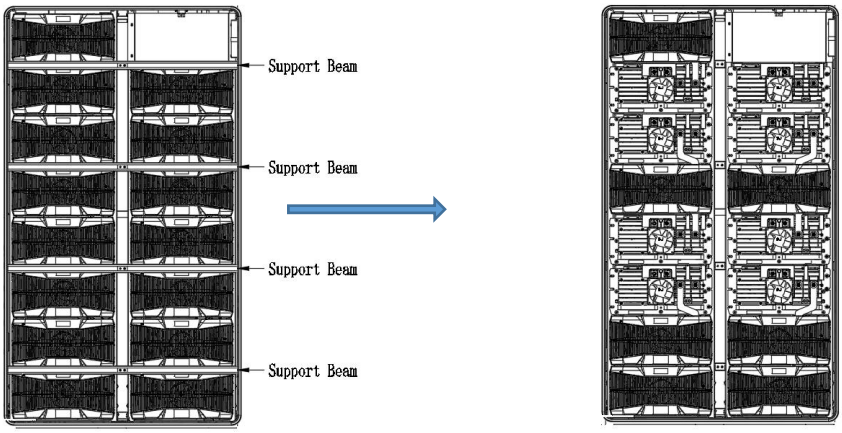


Figure 5-7 Schematic diagram of removal of the energy storage cabinet module support beams

Step 2: Take out 1 module serial copper row and 2 fixed copper row screws from the accessory kit and install them between module 2 and module 3, tightening force recommendation: 125kgf.cm±10%;

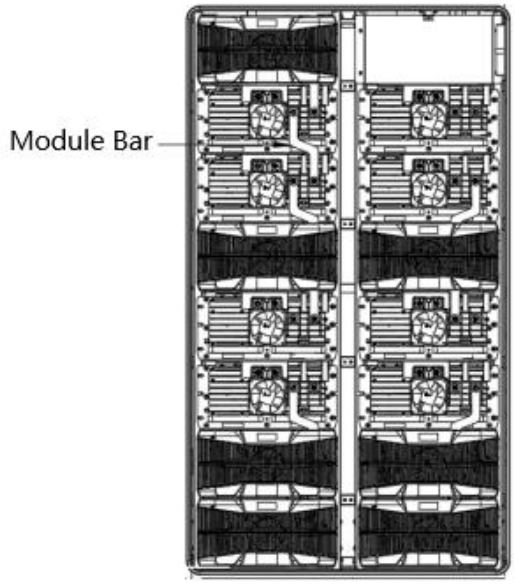


Figure 5-8 Schematic diagram of the series connection of copper rows between module 2 and module 3

Step 3: Attach the front cover of module 2 and module 3;

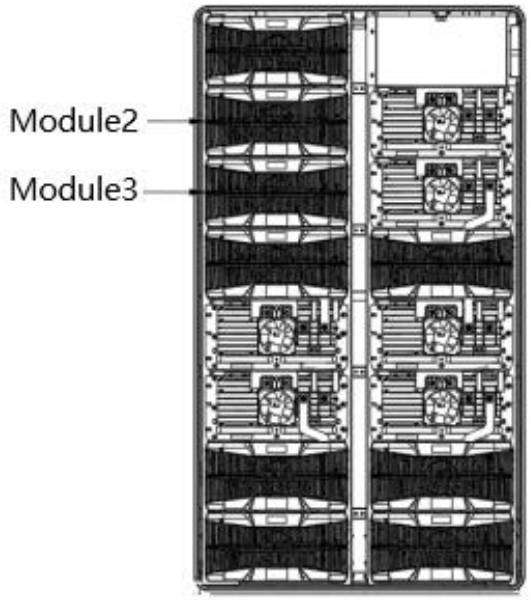


Figure 5-9 Schematic diagram of front cover mounting between module 2 and module 3

Step 4: Install the module serial numbers from Step 2 to Step 3 in the following order: Module 5, Module 6, Module 11, Module 12, Module 14, and Module 15. Connect the module copper bars and front cover between them. The mask screws are M4 * 20, and the recommended tightening force is 7kgf.cm ± 10%;

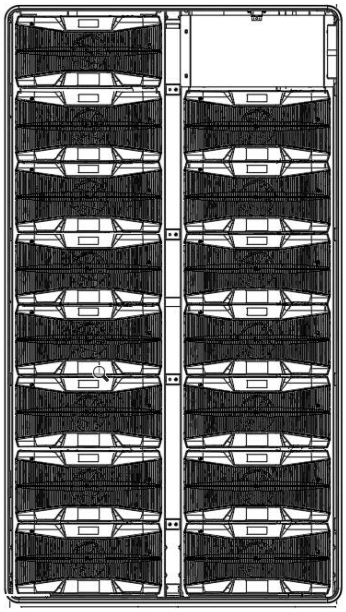


Figure 5-10 Installation diagram of front cover

Attention: Pay attention to the direction of the copper bars connecting module 11, module12, module14, and module 15.

Step 5: Take out 30 module rubber plugs from the accessory package and seal the 2 screw holes on the front cover of 15 modules respectively;

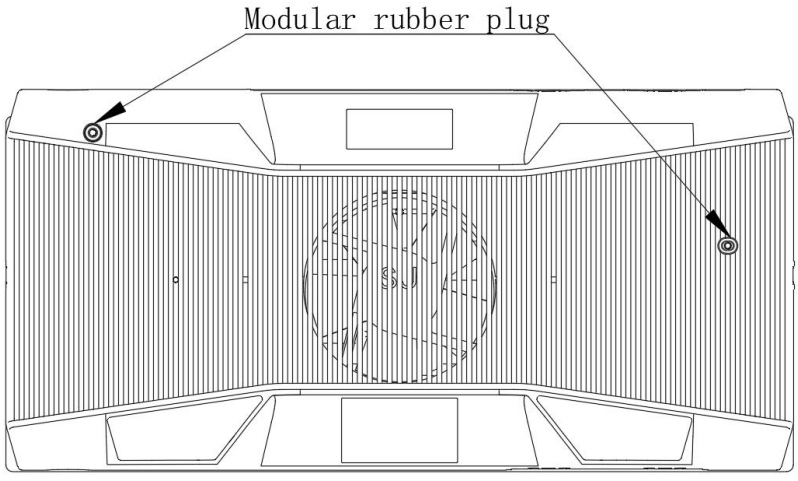


Figure 5-11 Schematic diagram of module rubber plug sealing screw hole

5.4 Insulation test of energy storage cabinet

1. After the module installation is completed, the insulation test method needs to be retested: adjust the voltage of the insulation meter to DC1000V, clamp the red meter head with the total positive BAT+copper bar, clamp the black meter head with the PE grounding terminal of the energy storage cabinet, and press the test button;
2. Judgment criteria: Insulation resistance ≥ 1M Ω;
3. Adjust the voltage of the insulation meter to DC1000V, clamp the red meter head with the total negative BAT copper bar, and clamp the black meter head with the PE grounding terminal of the energy storage cabinet. The

judgment standard is insulation resistance ≥ 1M Ω;

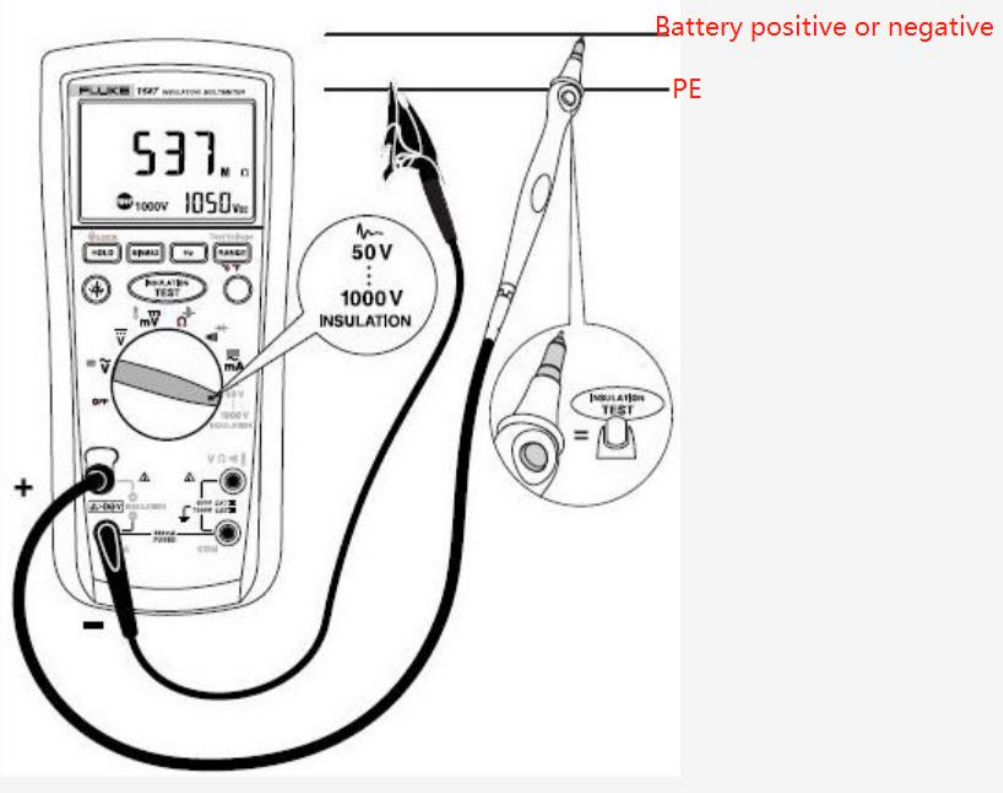


Figure 5-12 Schematic diagram of insulation test for energy storage cabinet

5.5 External cable connection

Form 5-1 External cable instruction

Cable name	Starting point	Ending point	Recommended cable	Note
AC-A input line	Energy storage cabinet QF1	Electric supply phase A	YJV22-0.6/1kv-3*70+2*35	
AC-B input line	Energy storage cabinet QF1	Electric supply phase B		
AC-C input line	Energy storage cabinet QF1	Electric supply phase C		
AC-N input line	Energy storage cabinet QF1	Electric supply phase N		
PE input line	Energy storage cabinet grounding strip	PE		
Ethernet communication	Switch network port	Client communication side	Shielded network cable	
L line	Energy storage cabinet QF3	AC220V auxiliary power supply L	YJV22-0.6/1kv-3*1.5	Optional
N line	Energy storage cabinet QF3	AC220V auxiliary power supply N		
PE line	Energy storage cabinet grounding strip	PE		

Note:

QF2 and QF3 are interlocked so that only one breaker can be closed;

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

QF3 is equipped with an optional auxiliary power circuit breaker, and loads such as air conditioning and cluster control boxes are powered by external auxiliary power sources. The power consumption of internal loads in the cabinet is not included in the energy storage cabinet's electricity meter.

5.6 Instruction for external connection of energy storage cabinet

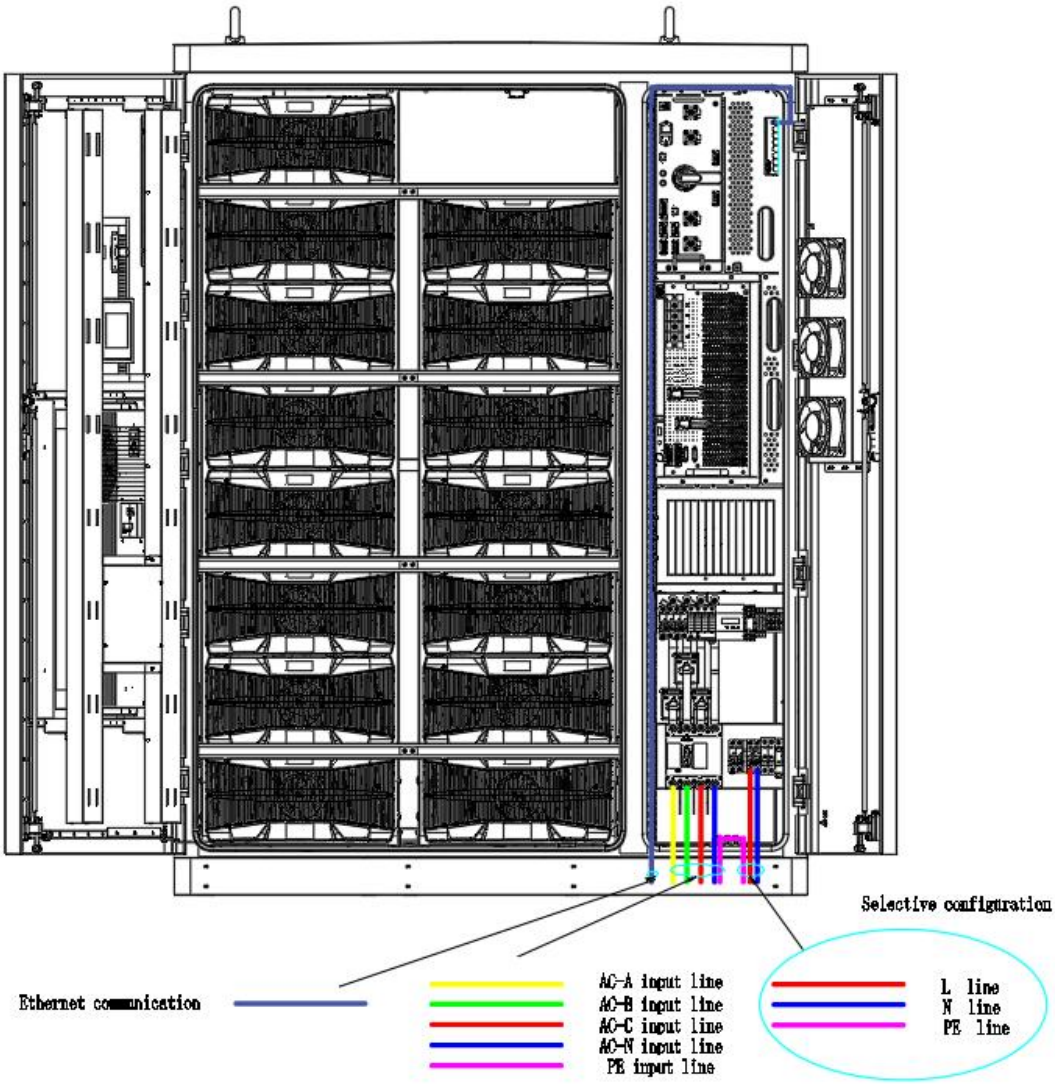


Figure 5-13 External wiring diagram of energy storage system

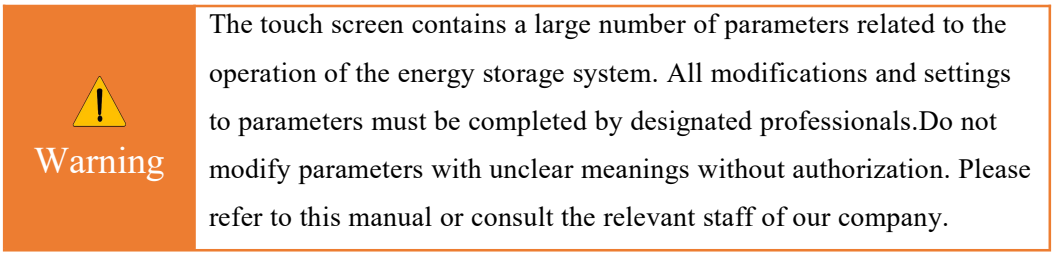
The main power cable is connected to the lower end of the main circuit breaker QF1 through the bottom inlet of the cabinet, with a diameter of M8 and a recommended tightening force of 117kgf.cm ± 10%;

6 HMI introduction

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

Note: For the convenience of users to operate the touch screen, this document has configured a large number of touch screen interface images. The parameter values and other specific details in the images are for illustrative purposes only. Users should refer to the actual touch screen display of the received product. Upon request, the system has set two permissions, namely normal user permission and administrator user permission. The normal user permission cannot modify the threshold, and all other permissions are the same as the administrator user permission. The user names and login passwords for the two permissions are as follows:

User name	User password
user	6666



6.1 Backlight function

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

If the not operated time reaches 5 minutes,HMI will enter the screensaver display;

If the not operated time reaches 10 minutes,HMI backlight will turn off;

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

6.2 Battery cabinet system interface

6.2.1 IP address setting

After 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 perform system settings and determine the energy storage device to be connected. Wait for the touch screen to successfully communicate with the energy storage system before proceeding to the next step.

1. The touch screen automatically enters the homepage when powered on.

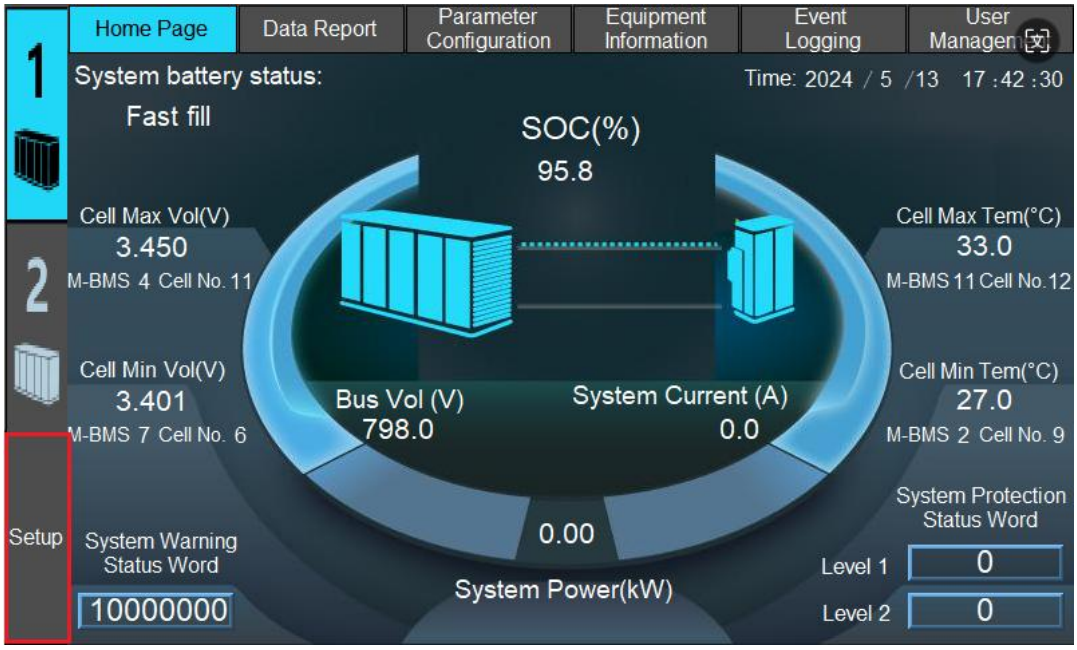


Figure 6-1 Energy storage homepage

2. Click the "Setup" button in the bottom left corner to bring up the interface shown in the following figure.

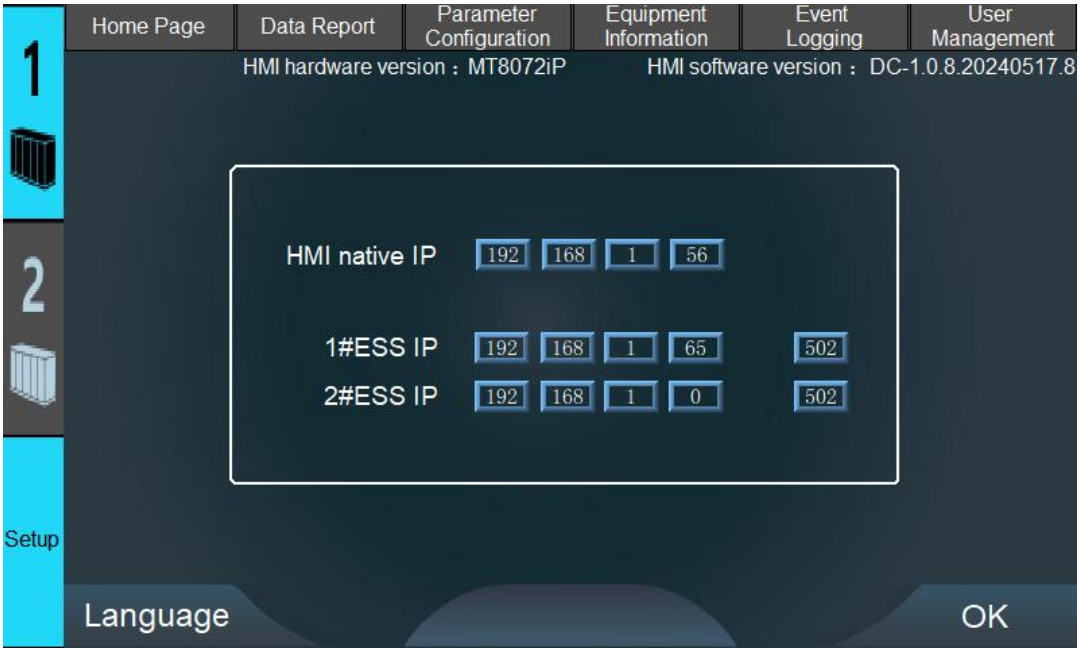


Figure 6-2 Click on the "Setup" button in the bottom left corner

3. This page is the setting page for connecting the touch screen to the energy storage system. Enter the corresponding IP to connect to the corresponding energy storage cabinet; '1 # ESS' is the first energy storage system,' 2 # ESS' is the second energy storage system, and so on.

4. As the screen of the battery cabinet is connected to the C-BMS, the default IP of the C-BMS is 192.168.1.60. While ensuring that the screen IP is on the same network segment as the default IP, select "1 # ESS", enter "192.168.1.60", and click "Finish" to automatically return to the homepage. If relevant data can be viewed on the homepage, the connection is successful (it should be noted that if the IP of the C-BMS has been modified, the modified IP can be connected). Here, the modified IP is 192.168.1.65, and the default port number is 502.

5. Click the "Language" button in the bottom left corner to switch languages. Currently, only "Chinese"

and "English" are supported.



Figure 6-3 Language setting

6.2.2 Energy storage homepage

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

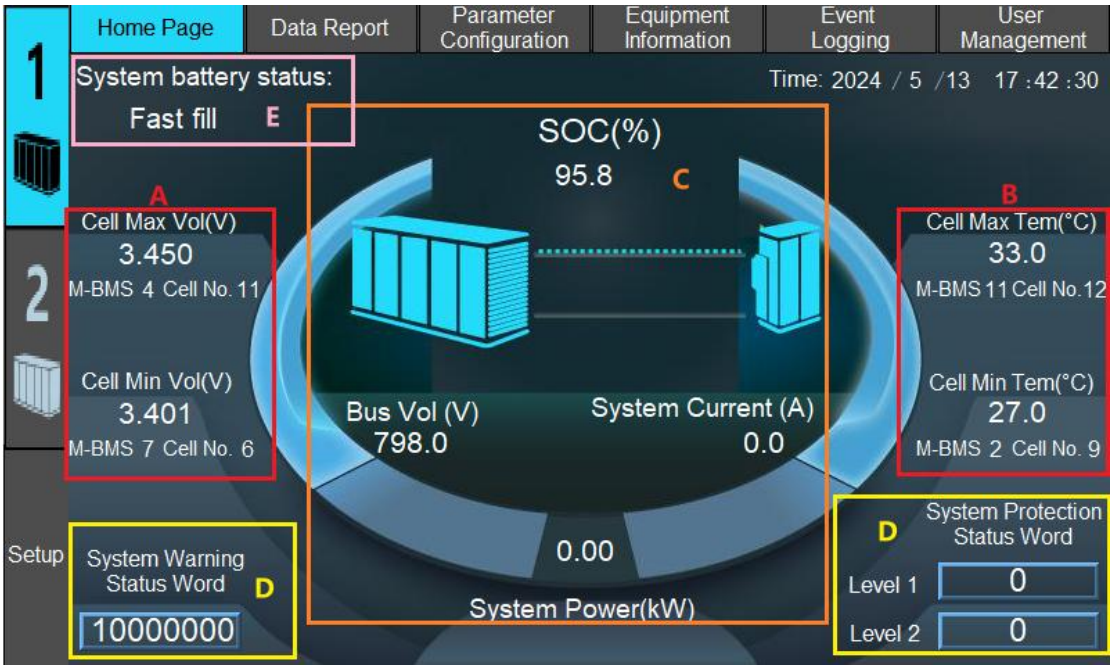


Figure 6-4 Energy storage homepage

2. This page displays important operational information in the energy storage system.

① Part A displays the "maximum voltage of the battery cell" and "minimum voltage of the battery cell" in the current energy storage system, as well as their corresponding positions.

② Part B displays the "maximum temperature of the battery cell" and "minimum temperature of the battery

cell" in the current energy storage system, as well as their corresponding positions.

③ Part C is the SOC, total voltage, total current, and total power of the current energy storage system.

④ Part D shows whether there is an alarm or protection in the current energy storage system. When there is no alarm or protection, the system's alarm status word and protection status word default to 0. When there is a corresponding alarm or protection, the value of the status word is not 0. Click on the relevant status word to view the corresponding status word analysis, as shown in the following figure.

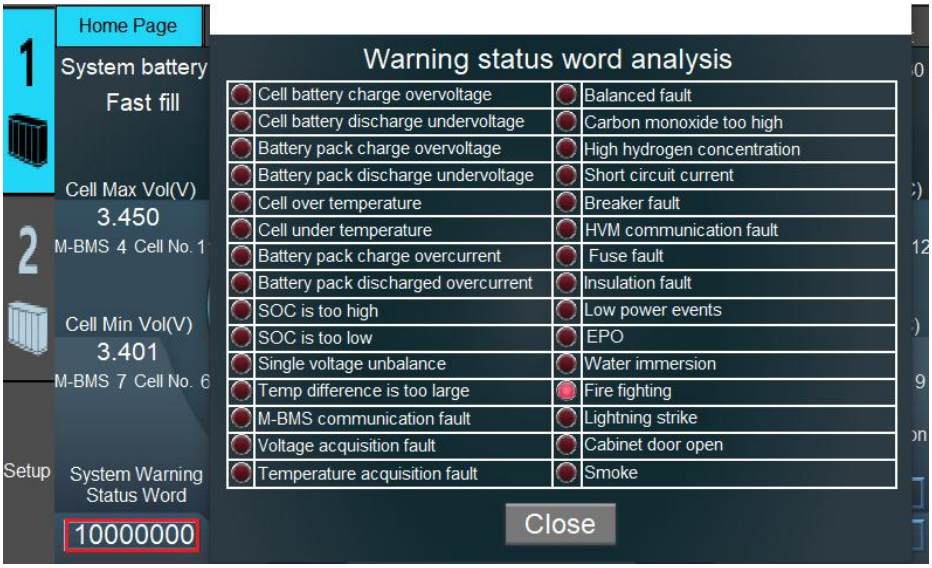


Figure 6-5 View status word parsing

⑤ Part E is the battery status of the system, which has five states: normal, almost fully discharged emptying, emptying, almost fully charging, and full charging.

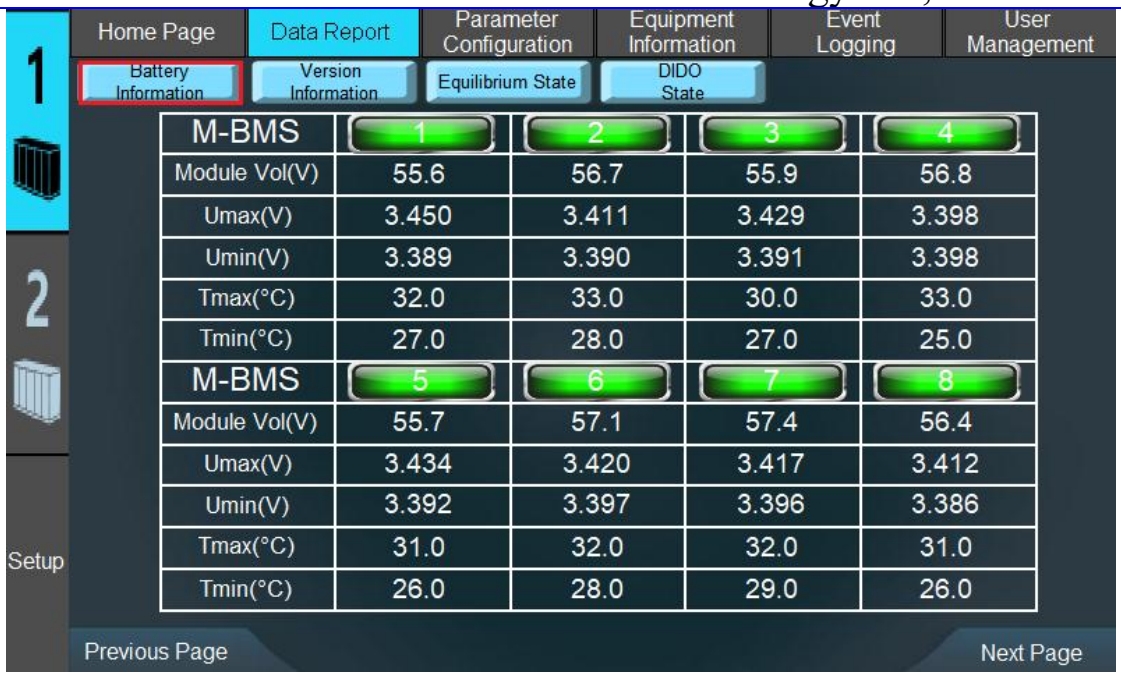
6.2.3 Data reporting

Click on data reporting to switch to the data reporting interface, where you can see subdirectories under that directory, including battery information, version information, state of equilibrium, DIDO status, etc.

6.2.3.1 View battery pack information within the current battery cluster

1. Enter the "Energy Storage System Page".

2. Click the "Battery Information" button above to enter the battery information interface, as shown in the following figure.



M-BMS	1	2	3	4
Module Vol(V)	55.6	56.7	55.9	56.8
Umax(V)	3.450	3.411	3.429	3.398
Umin(V)	3.389	3.390	3.391	3.398
Tmax(°C)	32.0	33.0	30.0	33.0
Tmin(°C)	27.0	28.0	27.0	25.0
M-BMS	5	6	7	8
Module Vol(V)	55.7	57.1	57.4	56.4
Umax(V)	3.434	3.420	3.417	3.412
Umin(V)	3.392	3.397	3.396	3.386
Tmax(°C)	31.0	32.0	32.0	31.0
Tmin(°C)	26.0	28.0	29.0	26.0

Figure 6-6 Battery pack information

① This page displays relevant information about battery packs within the battery cluster. The data below  is for battery pack 1, the data below  is for battery pack 2, and so on,  indicates that the M-BMS is online, and  indicates that it is offline.

② The displayed data includes "Battery pack voltage", "Maximum and minimum cell voltage inside the battery pack", and "Maximum and minimum cell temperature inside the battery pack".

6.2.3.2 View individual cell information inside the battery pack

1. Click any "" button to pop up the interface shown in the following figure.

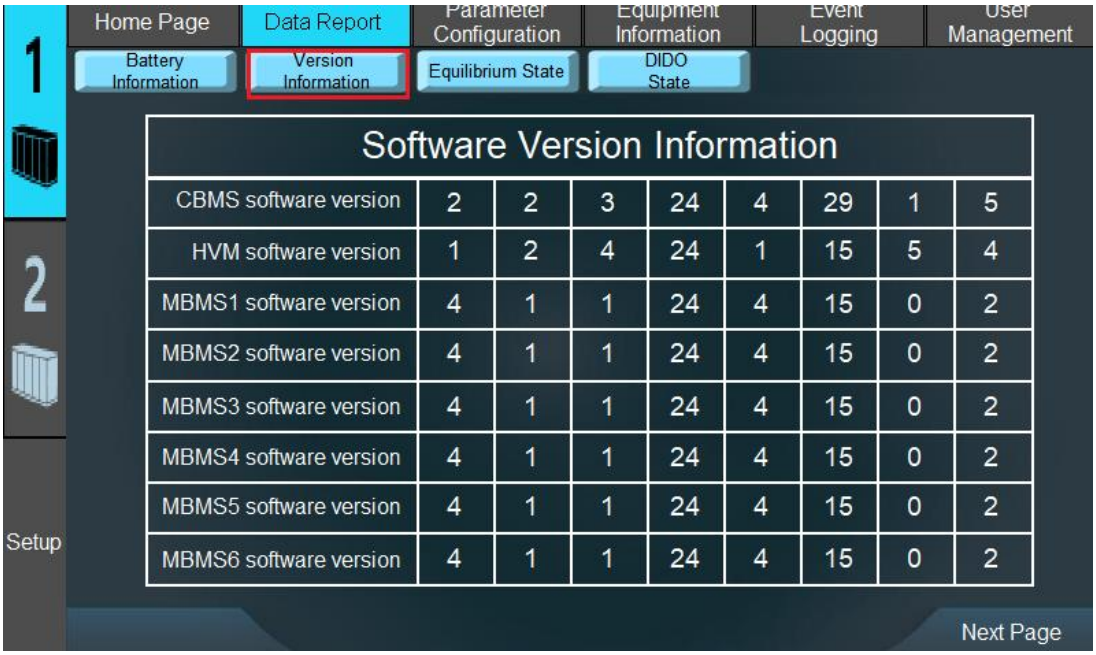


M-BMS 1					
Cell NO	Voltage(V)	Cell Tem(°C)	Cell NO	Voltage(V)	Cell Tem(°C)
1	3.200	33.0	10	3.200	32.0
2	3.200	33.0	11	3.211	32.0
3	3.200	33.0	12	3.211	32.0
4	3.200	33.0	13	3.211	32.0
5	3.200	32.0	14	3.211	32.0
6	3.200	32.0	15	3.211	32.0
7	3.200	32.0	16	3.211	32.0
8	3.200	32.0	17	0.000	32.0
9	3.200	32.0	18	0.000	0.0

Figure 6-7 Individual cell information of battery pack

6.2.3.3 View version information

1. In the data reporting interface, click on version information to enter the software version information query interface. On this interface, you can view the software version numbers of C-BMS,M-BMS, and HVM, as shown in the following figure.



Software Version Information

CBMS software version	2	2	3	24	4	29	1	5
HVM software version	1	2	4	24	1	15	5	4
MBMS1 software version	4	1	1	24	4	15	0	2
MBMS2 software version	4	1	1	24	4	15	0	2
MBMS3 software version	4	1	1	24	4	15	0	2
MBMS4 software version	4	1	1	24	4	15	0	2
MBMS5 software version	4	1	1	24	4	15	0	2
MBMS6 software version	4	1	1	24	4	15	0	2

Figure 6-8 Version information

6.2.3.4 Equilibrium state

1. Click on the equilibrium state in the data reporting interface to switch to the equilibrium interface and view the equilibrium status of each module, as shown in the following figure. The number represents the unit in the module that has enabled equilibrium, the blue indicator light represents the enabled battery discharge equalization, and the yellow light represents the enabled battery charge equalization.

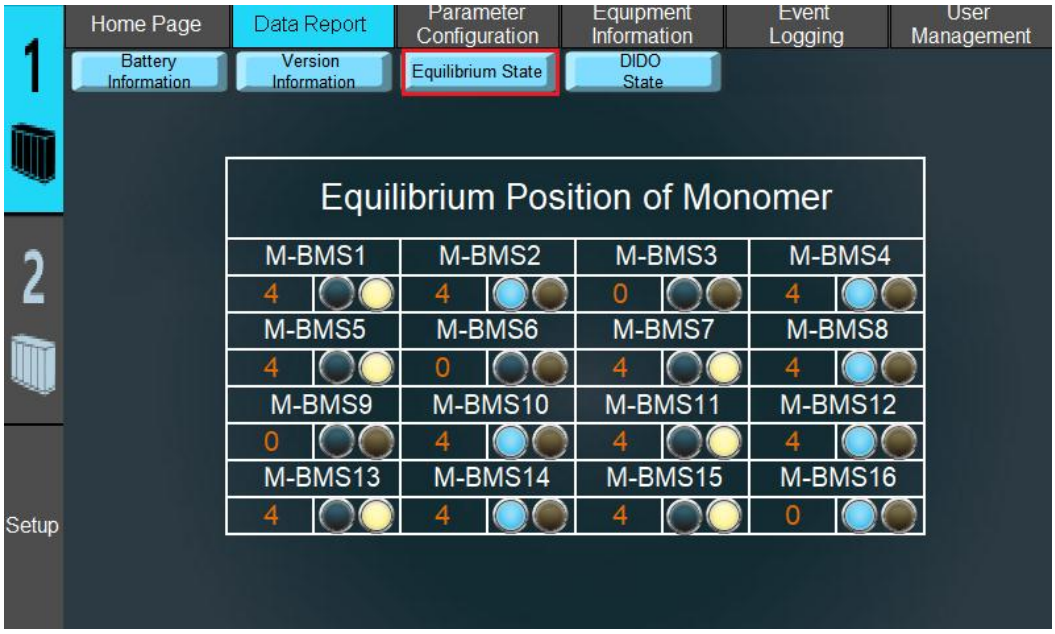


Figure 6-9 Module equilibrium interface

6.2.3.5 DIDO state

1. On the data reporting interface, click on the DIDO state to switch to the DIDO interface, where you can view the DIDO state of C-BMS and HVM, as shown in the following figure.



Figure 6-10 DIDO state

6.2.4 Parameter configuration

Click on parameter configuration to switch to the parameter configuration interface, where you can see the subdirectories under this directory, including threshold parameter, upper cloud parameter, SOC calibration, and system parameter.

6.2.4.1 Threshold parameter

1. In the parameter configuration interface, click on the threshold parameter to switch to the threshold parameter interface and view the threshold parameter information set by the system, as shown in the following figure.

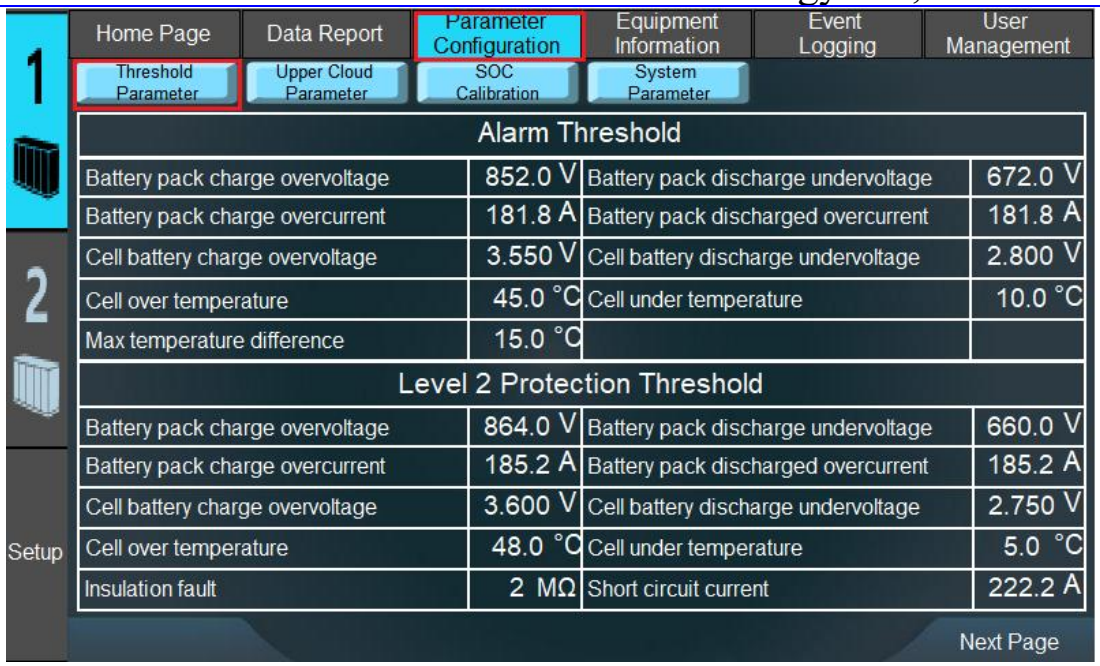


Figure 6-11Viewing threshold parameter

6.2.4.2 Upper cloud parameter

1. In the parameter configuration interface, click on the upper cloud parameter to switch to the upper cloud parameter configuration interface. In the modification interface, you can configure the different servers that the second and third level systems need to connect to. Generally, the IP and port number of the server need to be configured for the third level system, and the cloud platform device name needs to be set for the second level system, as shown in the following figure.

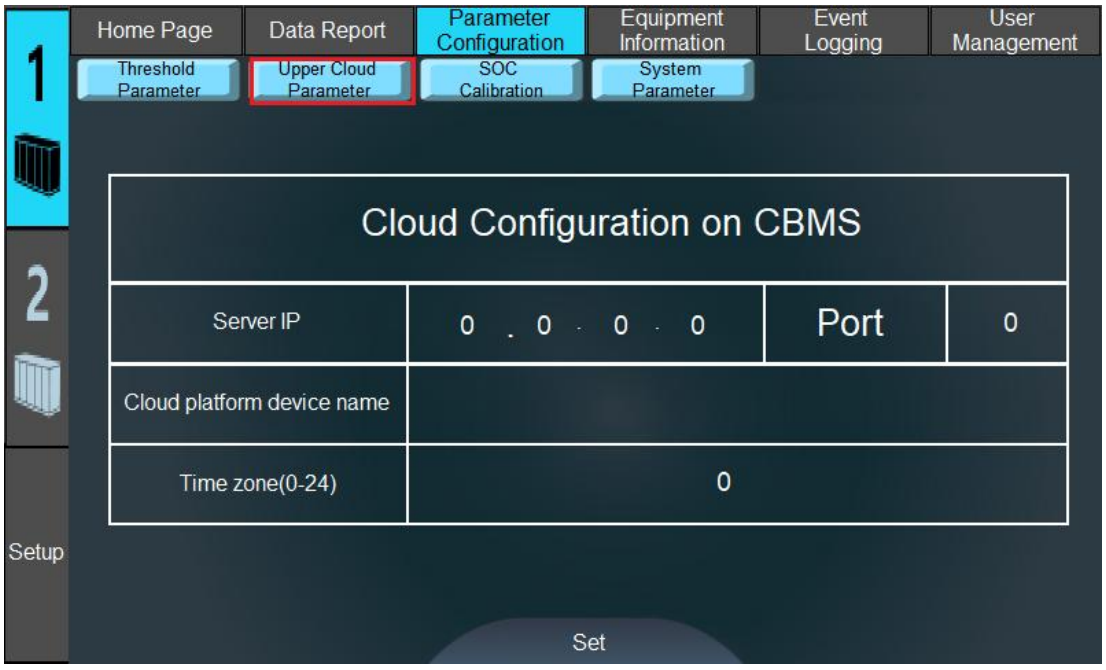


Figure 6-12 Upper cloud parameter viewing

2. After logging in with user privileges in the user management interface, the setting function can be used to configure the parameters for upper cloud deployment, as shown in the following figure.

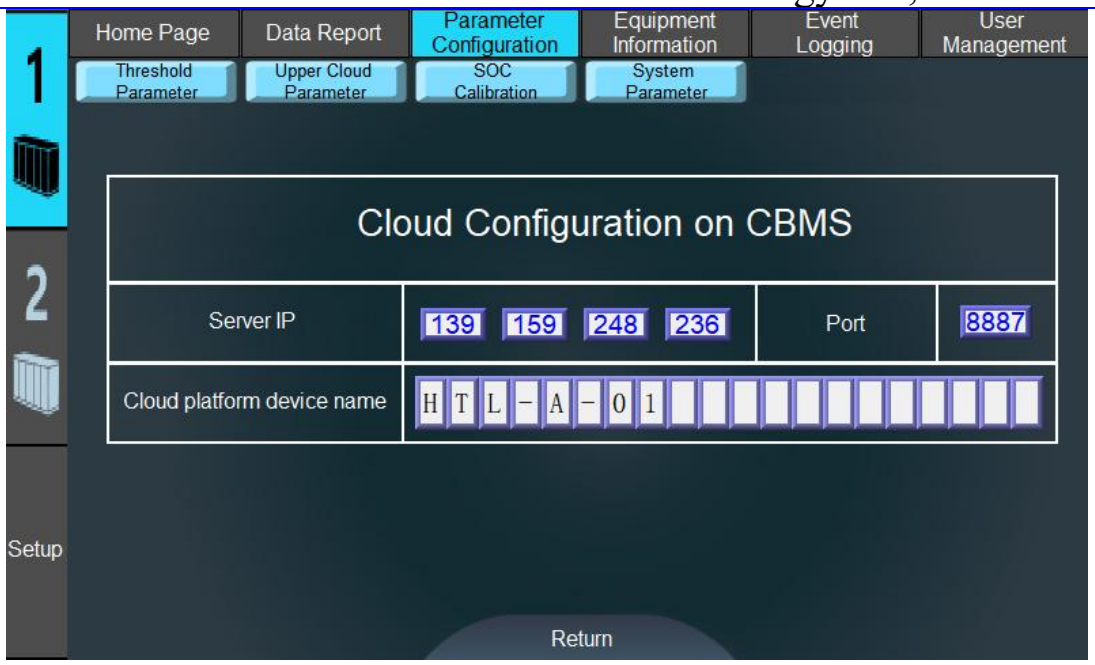


Figure 6-13 Upper cloud parameter setting

6.2.4.3 SOC calibration

1. Click on SOC calibration in the parameter configuration interface to switch to the SOC calibration parameter interface and view the calibration parameters related to SOC, as shown in the following figure.

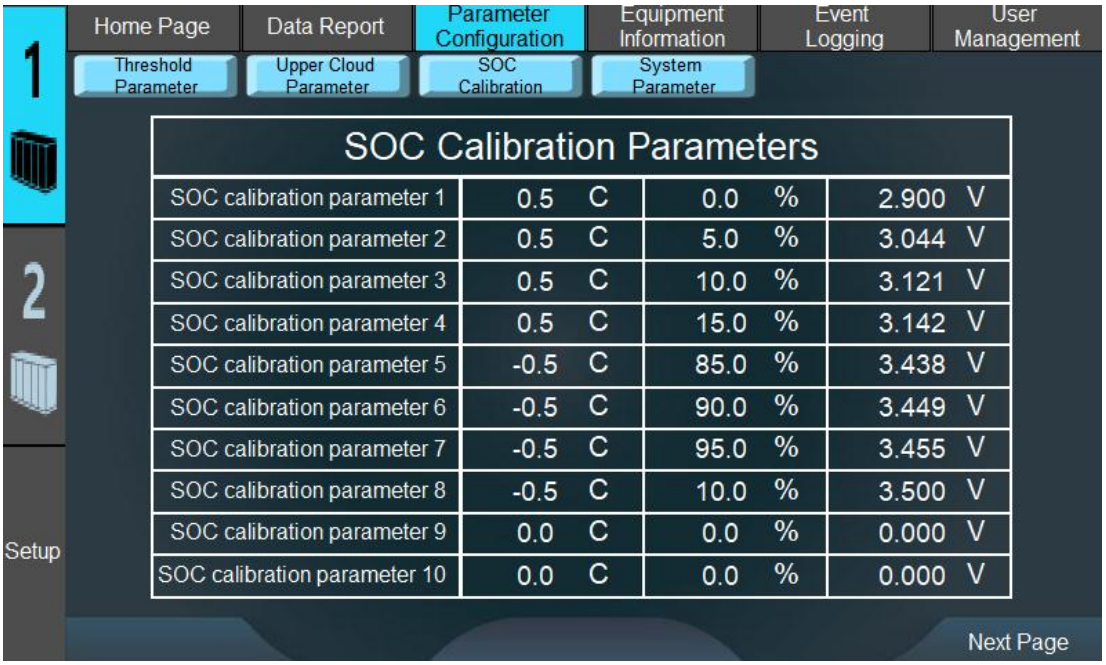


Figure 6-14 SOC calibration parameter viewing

6.2.4.4 System parameter

1. In the parameter configuration interface, click on the system parameters to switch to the system parameters interface and view the system related parameter configuration items, as shown in the following figure.

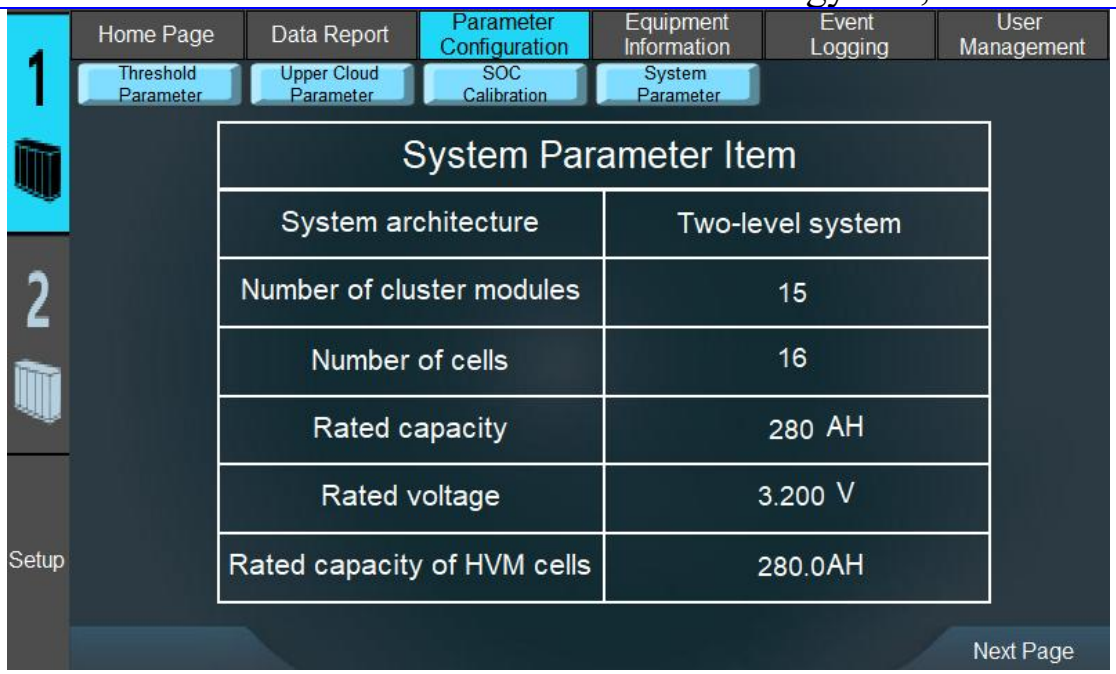


Figure 6-15 System parameter item

2. In the system parameter interface, click on the next page to view the status of circuit breakers and contactors, as shown in the following figure.

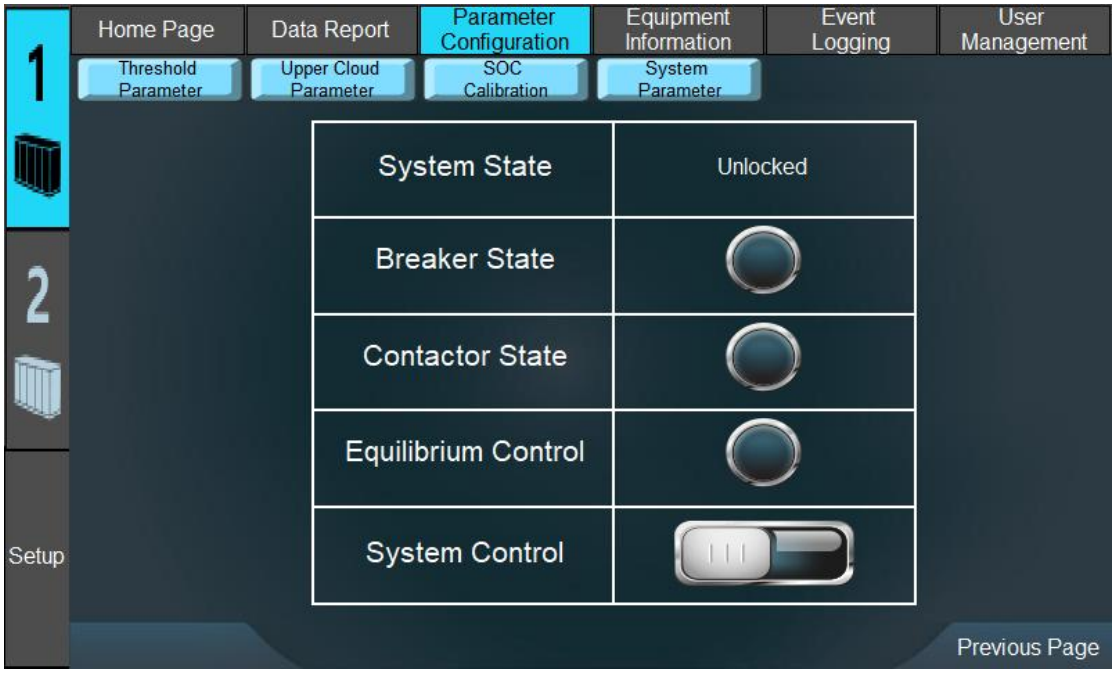


Figure 6-16 System control

3. Currently, the system is a secondary system. On this interface, after logging in as a user with user privileges, clicking the  button can issue address allocation instructions, balance control instructions, and contactor opening and closing instructions to the address M-BMS, as shown in the following figure.



Figure 6-17 Command operation interface

4. Click the corresponding  button on this interface, and when the indicator light lights up , select the command to issue to complete the relevant sub address operation or issue the balanced activation operation, as shown in the following figure.



Figure 6-18 Issue instruction

6.2.5 Equipment information

Click on equipment information to switch to the equipment information interface, where you can see subdirectories under that directory, including equipment data, equipment enablement, device type, etc.

6.2.5.1 Equipment data

1. On the main interface of the equipment information, click on the equipment data to view the data related to the air conditioner, as shown in the following figure.

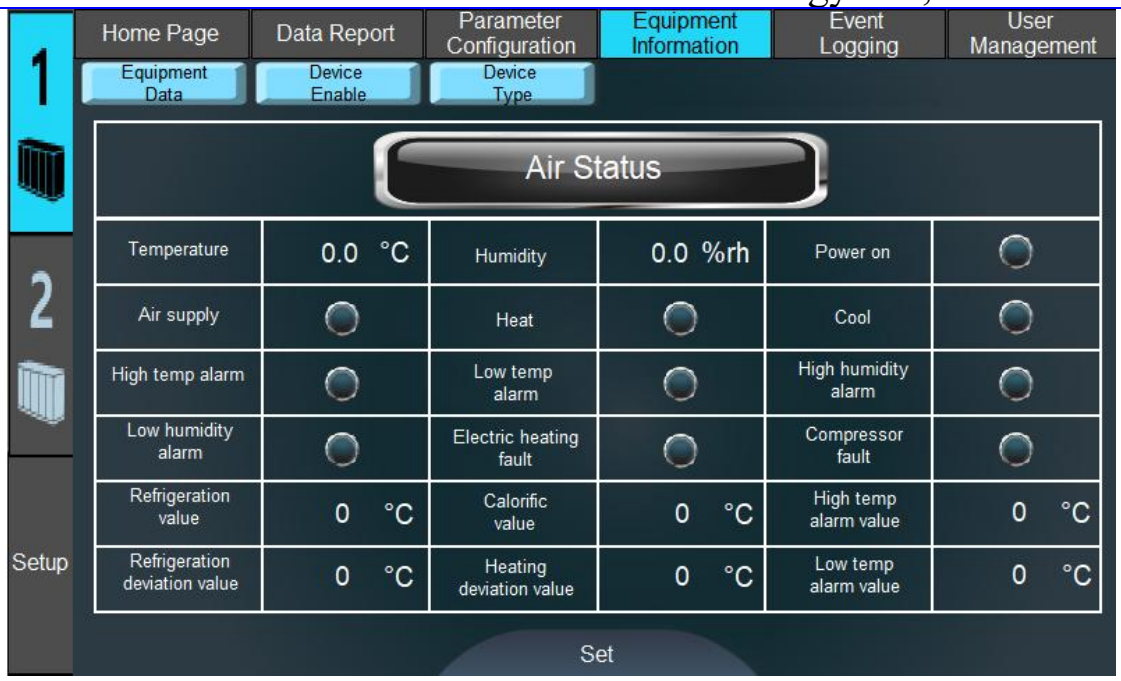


Figure 6-19 Air conditioning data

6.2.5.2 Equipment enablement

1. Click on the device enable button on the equipment information interface to view the device enable/disable status, as shown in the following figure.

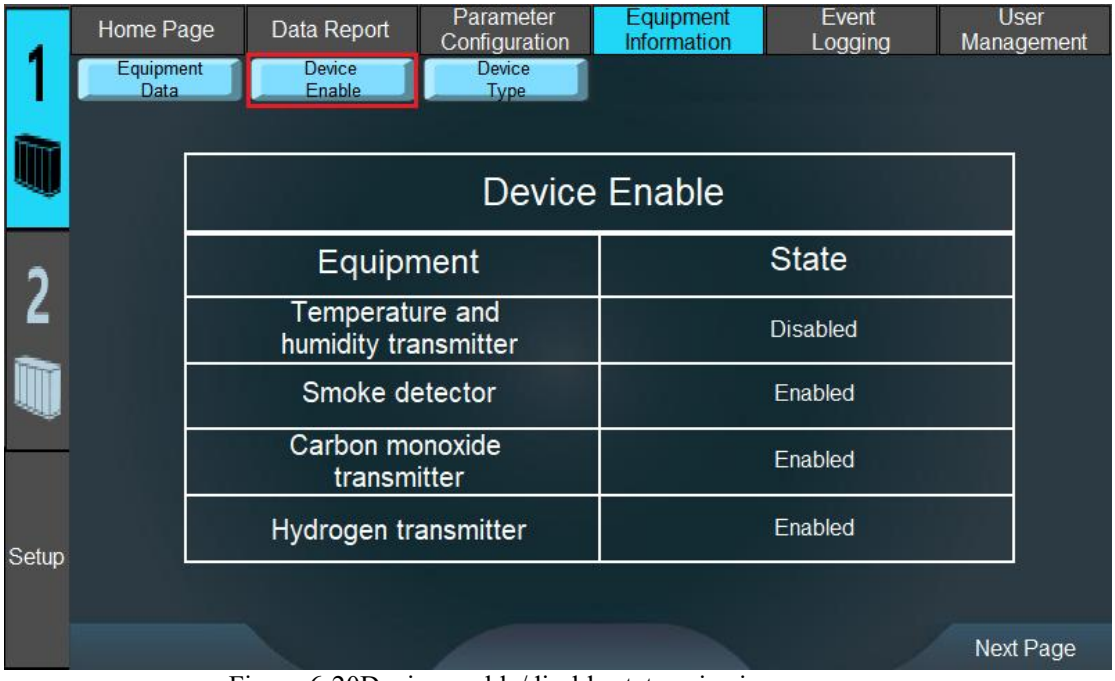


Figure 6-20Device enable/disable status viewing

6.2.5.3 Device type

1. In the equipment information interface, select the device type to switch to the device type configuration interface, where you can see the device type configuration , as shown in the following figure.

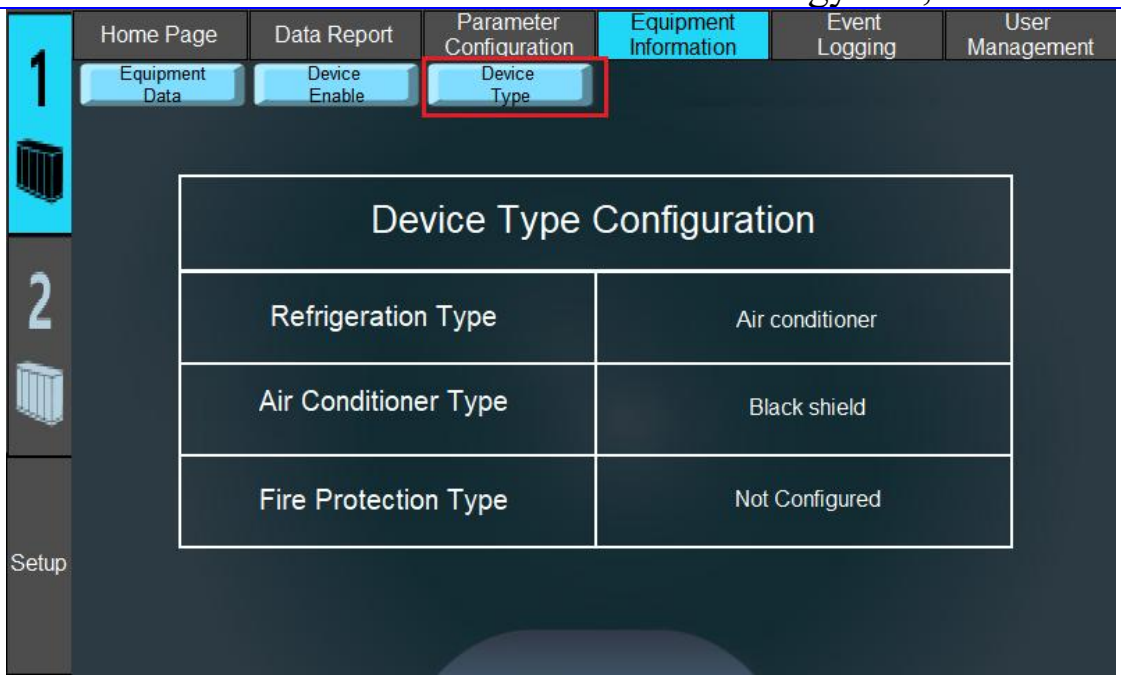


Figure 6-21 Device type viewing

6.2.6 Event recording

Click on the event record to switch to the main interface of the event record. On this interface, you can see the subdirectories under this directory, including alarm events, special events, Level 2 events, Level 1 events, and single event query.

6.2.6.1 Alarm event

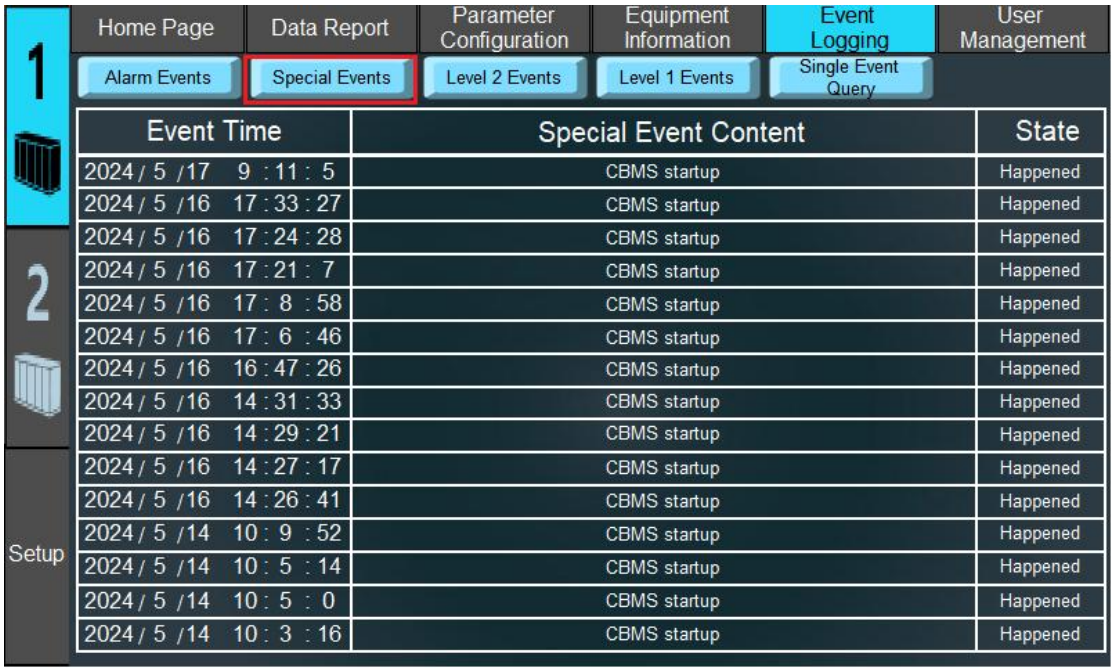
1. Click on the alarm event in the event recording interface to switch to the alarm event interface, which can view the last 15 alarm events that have occurred, including the events, content, and state of the events, as shown in the following figure.



Figure 6-22 Alarm event

6.2.6.2 Special event

1. Click on the special event in the event recording interface to switch to the special event interface, which can view the last 15 special events that have occurred, including the events, content, and state of the events, as shown in the following figure.

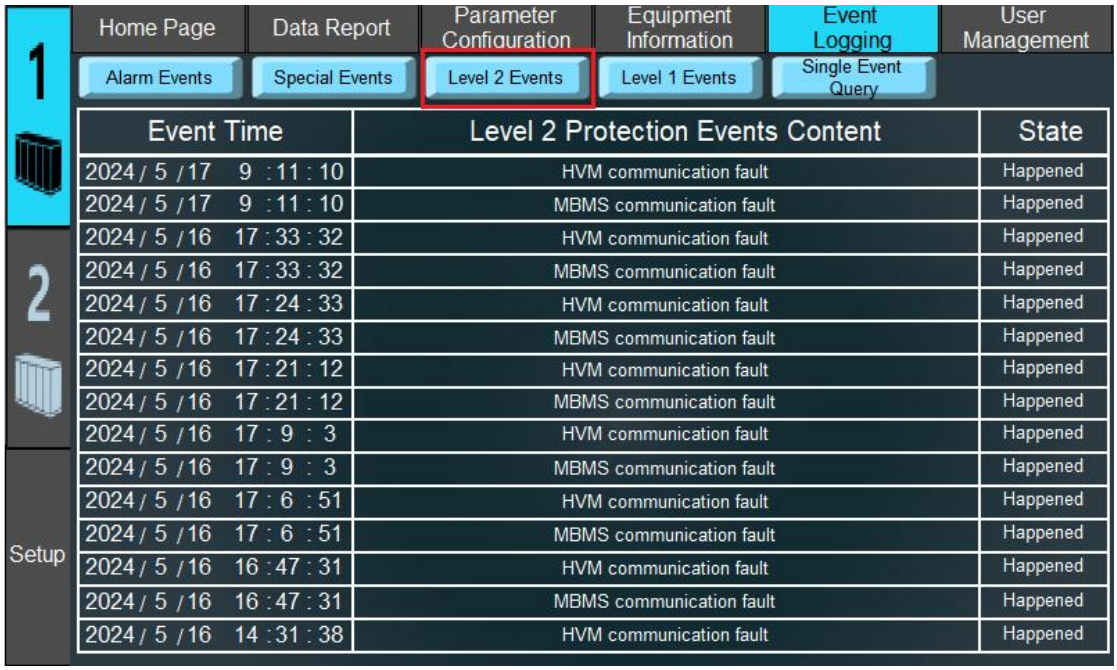


Event Time	Special Event Content	State
2024 / 5 /17 9 :11 : 5	CBMS startup	Happened
2024 / 5 /16 17 :33 : 27	CBMS startup	Happened
2024 / 5 /16 17 :24 : 28	CBMS startup	Happened
2024 / 5 /16 17 :21 : 7	CBMS startup	Happened
2024 / 5 /16 17 : 8 : 58	CBMS startup	Happened
2024 / 5 /16 17 : 6 : 46	CBMS startup	Happened
2024 / 5 /16 16 :47 : 26	CBMS startup	Happened
2024 / 5 /16 14 :31 : 33	CBMS startup	Happened
2024 / 5 /16 14 :29 : 21	CBMS startup	Happened
2024 / 5 /16 14 :27 : 17	CBMS startup	Happened
2024 / 5 /16 14 :26 : 41	CBMS startup	Happened
2024 / 5 /14 10 : 9 : 52	CBMS startup	Happened
2024 / 5 /14 10 : 5 : 14	CBMS startup	Happened
2024 / 5 /14 10 : 5 : 0	CBMS startup	Happened
2024 / 5 /14 10 : 3 : 16	CBMS startup	Happened

Figure 6-23 Special event

6.2.6.3 Level 2 event

1. Click on the level 2 event in the event recording interface to switch to the level 2 event interface. This interface can view the latest 15 level 2 event, including the events that occurred, their content, and state, as shown in the following figure.



Event Time	Level 2 Protection Events Content	State
2024 / 5 /17 9 :11 : 10	HVM communication fault	Happened
2024 / 5 /17 9 :11 : 10	MBMS communication fault	Happened
2024 / 5 /16 17 :33 : 32	HVM communication fault	Happened
2024 / 5 /16 17 :33 : 32	MBMS communication fault	Happened
2024 / 5 /16 17 :24 : 33	HVM communication fault	Happened
2024 / 5 /16 17 :24 : 33	MBMS communication fault	Happened
2024 / 5 /16 17 :21 : 12	HVM communication fault	Happened
2024 / 5 /16 17 :21 : 12	MBMS communication fault	Happened
2024 / 5 /16 17 : 9 : 3	HVM communication fault	Happened
2024 / 5 /16 17 : 9 : 3	MBMS communication fault	Happened
2024 / 5 /16 17 : 6 : 51	HVM communication fault	Happened
2024 / 5 /16 17 : 6 : 51	MBMS communication fault	Happened
2024 / 5 /16 16 :47 : 31	HVM communication fault	Happened
2024 / 5 /16 16 :47 : 31	MBMS communication fault	Happened
2024 / 5 /16 14 :31 : 38	HVM communication fault	Happened

6.2.6.4 Level 1 event

1. Click on the level 1 event in the event recording interface to switch to the level 1 event interface. This interface can view the latest 15 level 1 event, including the events that occurred, their content, and state, as shown in the following figure.

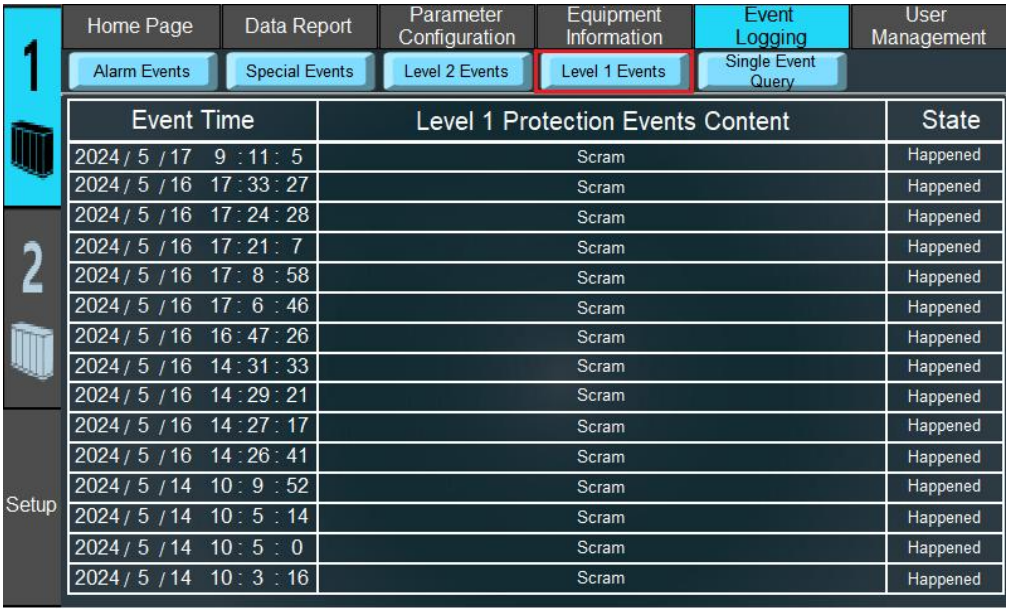


Figure 6-25 Level 1 event

6.2.6.5 Single event query

（1）Click on the single event query in the event record interface to switch to the single event query interface. This interface allows you to view the alarm, special, level 1, and level 2 event that have occurred in the system by the event number you want to view, as shown in the following figure.

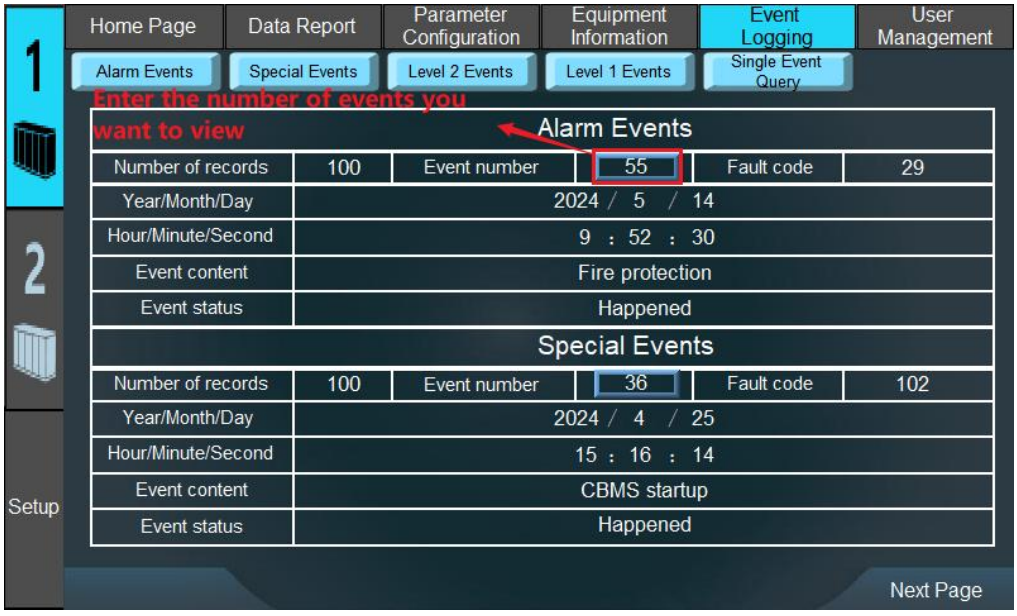


Figure 6-26 Single event query

6.2.7 User management

Click on User Management to switch to the User Management interface, where you can log in as a user with

either user or admin privilege, as shown in the following figure. Click on Login, and if the password is entered correctly, you will be redirected directly to the homepage interface after logging in.

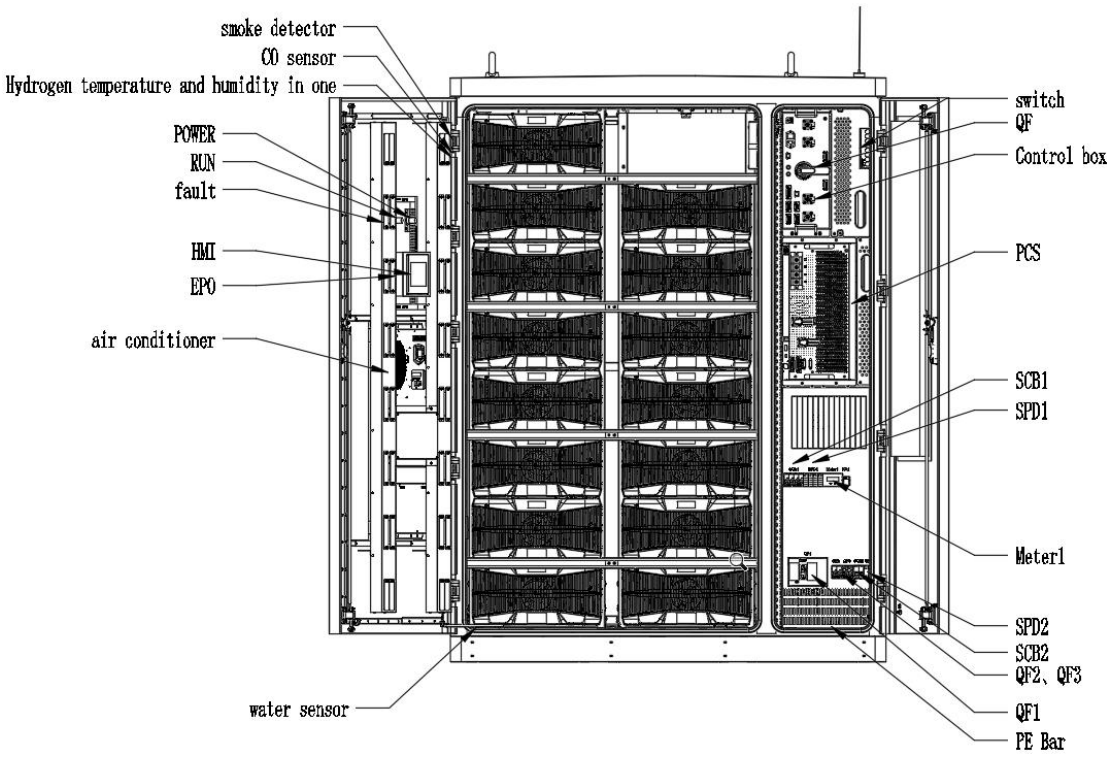


Figure 6-27 User management interface

7 Product operation instruction

7.1 System grid connection startup (internal power supply)

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



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

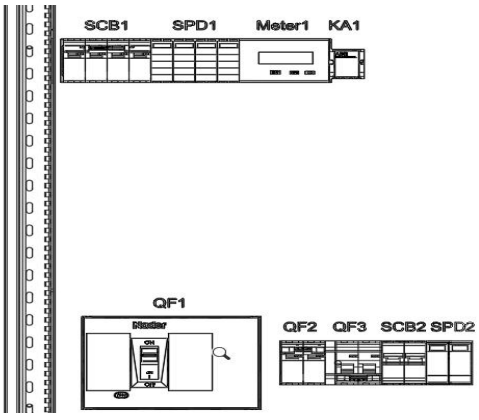


Figure 7-1 Schematic diagram of closed AC control system switch

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

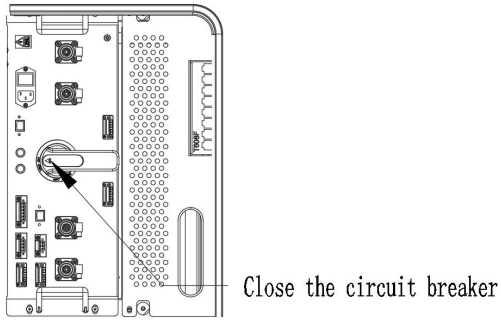


Figure 7-2 Schematic diagram of QF circuit breaker for closed control box

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

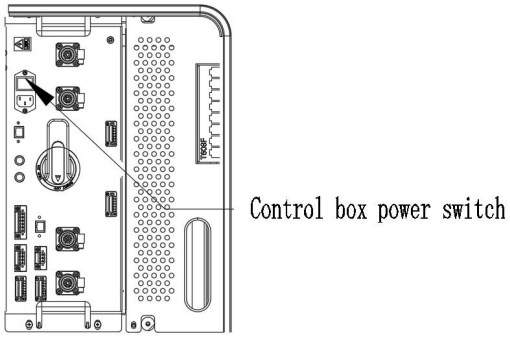


Figure 7-3 Schematic diagram of ship type switch for closed control box

Step 5: Confirm the IP address of the display screen homepage system settings on the storage cabinet door panel; Confirm whether there is protection information on the main page. If it displays "0", it indicates that the system auxiliary wiring is normal;

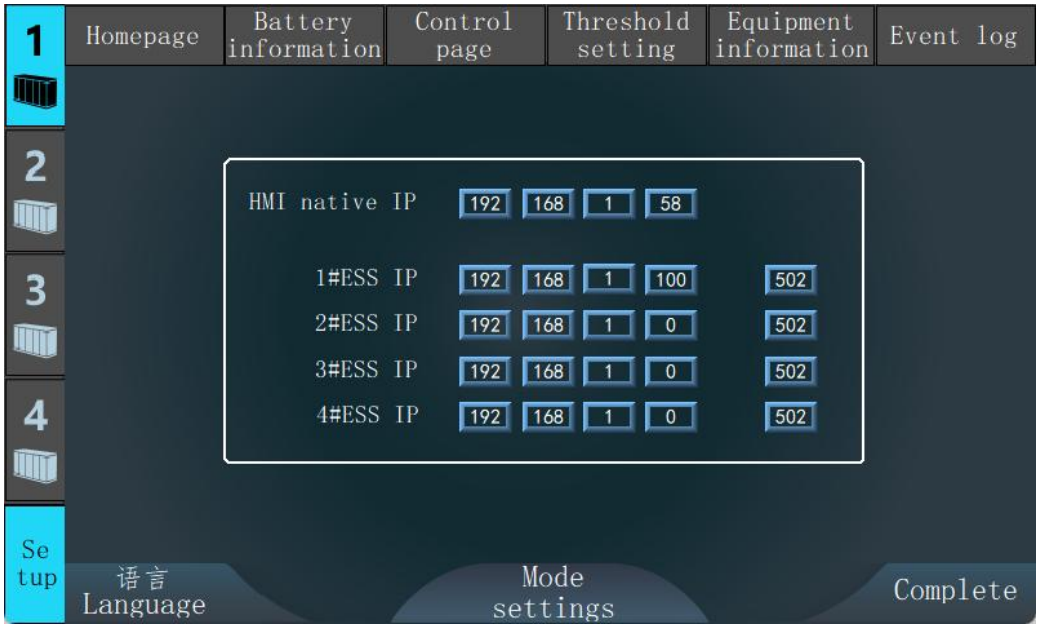


Figure 7-4 Confirm the system's IP address setting

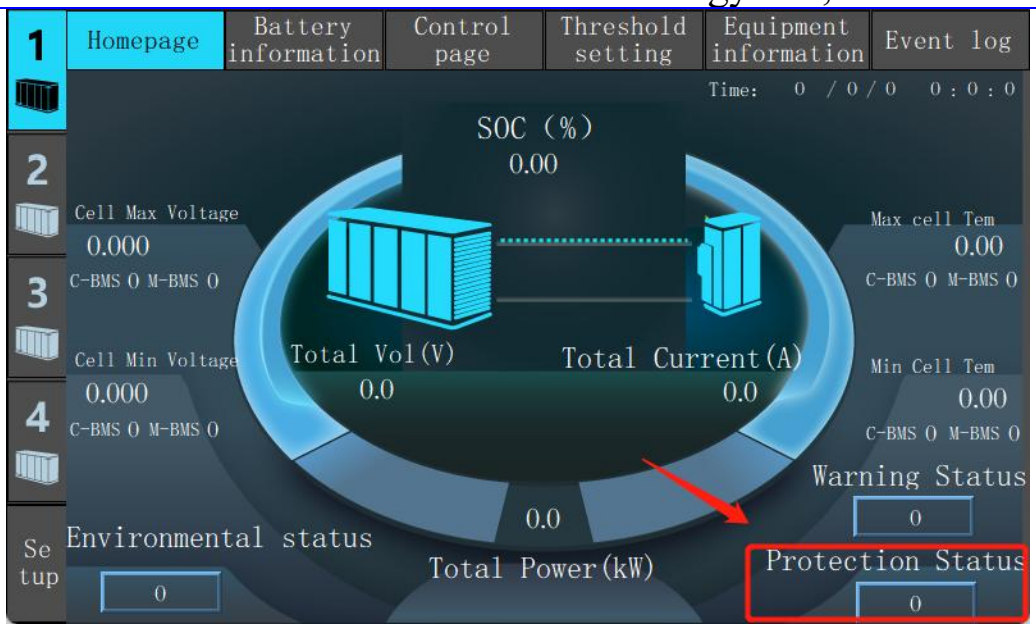


Figure 7-5 Confirm whether there is protected information on the main page

Step 6: Select the current device on the touch screen of the energy storage cabinet and turn it on;

Please refer to section 6.2.4.4 for details of the closing operation instructions;



Step 7: Check the reported data on the main page. If there are no faults, the client EMS can perform charging, discharging, and power scheduling on the system;

Attention: If using the auxiliary power supply connection method, please connect the AC220V auxiliary power supply to the lower incoming line of QF3. At the same time, change step 2 to close the AC circuit breakers QF1 and QF3, and close the surge protection switches SCB1 and SCB2. The operation method for other steps is the same.

7.2 System emergency stop

The emergency stop button of the system is located on the door of the energy storage cabinet. In case of an emergency, press the emergency stop button of the energy storage cabinet to disconnect the DC circuit breaker inside the control box of the energy storage cabinet. Then, the software controls the disconnection of the DC contactor inside the control box, completely cutting off the external connection of the battery. After troubleshooting, if you want to restart the energy storage system, you must rotate the emergency stop button clockwise to release the locking state (see the figure below);



Figure 7-6 Clockwise rotation button

7.3 DC circuit breaker of cluster control box tripped, restored and closed

When a serious malfunction occurs or the emergency stop button is pressed, the system will protect and disconnect the circuit breaker. After troubleshooting, the circuit breaker needs to be manually restored and closed before restarting the energy storage system.

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

Cluster control box restoration closing:

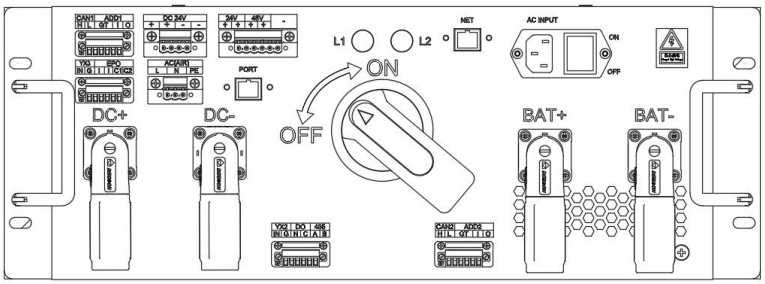


Figure 7-7 Schematic diagram of circuit breaker tripping state

Turn from the release position to OFF and level at 15 ℃, and hear the sound of recovery

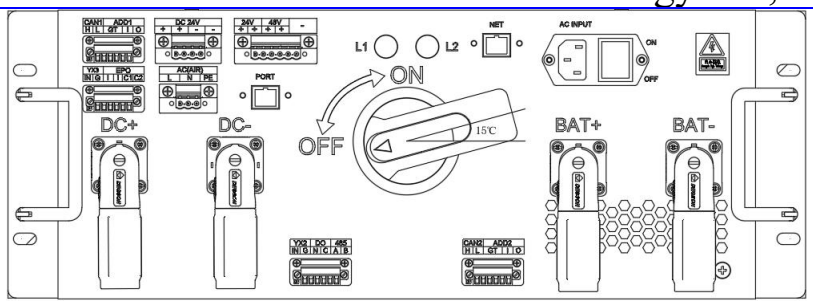


Figure 7-8 Schematic diagram of circuit breaker recovery trip

Check if the battery pack voltage on the display screen is normal. If there is no fault, close the AC side QF1 switch again, and then close the control box circuit breaker QF of the energy storage cabinet;

8 Failure analysis and handling

8.1 Failure alarm content and response action

No.	Fault alarm content	Response action
1	Insulation fault	Disconnect the contactor, and the contactor（in the control box) cannot be closed
2	Cell over voltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker
3	Cell under voltage	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker
4	Over temperature	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker
5	Under temperature	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection:Disconnect cluster contactor Class I protection:Disconnect cluster breaker
6	Cluster total Voltage over-voltage	Alarm: Suggest The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker
7	Cluster total Voltage under-voltage	Alarm:The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker

No.	Fault alarm content	Response action
8	Cluster current charging Over-current	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection: Disconnect cluster contactor Class I protection:Disconnect cluster breaker
9	Cluster current discharging Over-current	Alarm: The system will feedback the alarm signal to the superior, and it is recommended to stop the (PCS) power Class II protection:Disconnect cluster contactor Class I protection:Disconnect cluster breaker
10	Communication failure	1. System power outage 2. Cut off the cluster contactor
11	Contactor fault	Suggest PCS to stop power
12	Short circuit fault	1.System stop power 2.Disconnect the control box contactor after disconnecting the DC side circuit breaker
13	Emergency stop fault	1.Disconnect all cluster contactors 2. Disconnect the DC side circuit breaker
14	SPD fault	1.Disconnect all cluster contactors 2. Disconnect the DC side circuit breaker*
15	Water immersion	The system will feedback the alarm signal to the superior
16	Smoke	The system will feedback the alarm signal to the superior

8.2 Common failure analysis and handling

No.	Fault alarm status	Reason analysis	Troubleshooting
1	Insulation fault	1. The insulation strength is reduced due to the damage or aging of the cable insulation skin 2. Foreign matters contact the power circuit with the conductive part of the cabinet	1. Check whether the insulating skin of power cable is normal 2. Check the power circuit for foreign matters 3. Replace the power cable
2	Cell over voltage	1. Overcharging 2. Abnormal sampling	1. Stop charging 2. Check the wire harness
3	Cell under voltage	1. Excessive discharge 2. The system is idle for a long time, and the battery is in power shortage due to self consumption 3. Abnormal sampling	1. Stop discharging 2. Trickle charging 3. Check the wire harness
4	Over temperature	1. Air conditioner fault 2. Fan fault 3. The air inlet or outlet of the cabinet is blocked 4. Abnormal sampling line	1. Check the refrigeration function of the air conditioner 2. Check whether the fan rotates normally 3. Clean the air inlet and outlet of the cabinet 4. Check the wire harness 5. After the system has stood for 24 hours, wait for the temperature to return to normal and restart
5	Under temperature	1. Air conditioner fault 2. Abnormal sampling line	1. Check the heating function of the air conditioner 2. Check the wire harness
6	Cluster total Voltage over-voltage	1. Overcharging	1.Stop charging
7	Cluster total Voltage under-voltage	1.Excessive discharge 2.Abnormal sampling line	1.Stop discharging 2.Check the wiring harness
8	Cluster current charging Over-current	1. The system charging power is set high	1.Reset the system power

No.	Fault alarm status	Reason analysis	Troubleshooting
9	Cluster current discharging Over-current	1.The system discharging power is set high	1.Reset the system power
10	Communication failure	1 Loose communication or power supply cable 2. BMS fault	1. Check communication and power supply cables 2. Replace the BMS
11	Short circuit fault	1. Short circuit occurs outside	1. Check whether there is a short circuit outside and eliminate the short circuit point
12	Circuit breaker fault	1. Breaker failure 2. Circuit breaker control and wire looseness	1. Check the circuit breaker cable 2. Replace the circuit breaker
13	Emergency stop fault	1. Press the emergency stop switch 2. Emergency stop switch failure	1. Check whether the emergency stop switch is pressed 2. Check whether the wiring of the emergency stop switch is loose 3. Replace the emergency stop switch

9 System maintenance

9.1 Routine inspection

System routine inspection items and cycles:

Inspection content	Cycle	Measures to address the problem
Complete cabinet and environmental inspection	Every 3 months	Clean and replace problematic parts
Air conditioning maintenance check	Every 3 months	Cleaning and overhaul
Fire system inspection	Every 3 months	Replacement or overhaul
Power circuit and circuit main switch check	Every 6 months	Fasteners
Fan inspection	Every 3 months	Replacement of problematic parts
System cleaning	Every 3 months	Cleaning

- Complete cabinet and environmental inspection

  The complete cabinet and environmental inspection is performed as follows:

  1、Cabinet door tightness.

  2、Does the fan impeller sound strange.

  3、Dust and dirt inside the fan.

  4、Dust and dirt on the dust screen.

  5、Is the cabinet inlet well sealed.

  6、Check structural components for damage, deformation;

- Air conditioning maintenance check

  Air conditioning maintenance checks are conducted as follows:

  1、Check the heating and cooling functions of your air conditioner.

  2、Check the radiator fins of your air conditioner for dust and dirt.

- Fire system inspection

  Fire system inspections are conducted as follows:

  1、Check the feedback signal from the fire hose.

- Power circuit and circuit main switch checking

  Power circuit and circuit main switch are checked as follows:

1、Tighten the bolts of the grid and battery connection cables.

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

3、Check all types of switches on the main circuit, including the main circuit breaker and main contactor.

4、Check the insulation (with a meter).

- Control circuit check

  The control circuit and software are checked as follows:

  1、 Check control circuit board pieces and components for looseness and clean if necessary.

  2、Check that the control software is working properly.

- Fan inspection

  Parts are inspected as follows:

  1、 Check the fan for proper operation.

  2、 Is the fan loose, shaking, or vibrating violently.

- Signal circuit check

  The signal circuit is checked as follows:

  1、Terminals, splice connections and the installation of cables inside the unit 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 air conditioner, resulting in thermal resistance affecting the air convection of the cabinet and the cooling efficiency of the air conditioner. In serious cases, it will lead to system shutdown. It is recommended to clean and maintain the air inlet of the cabinet and the heat exchanger of the air conditioner every 3~6 months, and the maintenance interval depends on the degree of air pollution in different areas and the operation time to be determined, and please do not use hot water or gasoline and other organic solvents to clean the system.

It is recommended to perform maintenance, installation, and other work when the system power is at 40% SOC. Avoid deep discharge (0% -100%). When not in use for a long time, it is recommended to store at 40% SOC. Check the battery level every 3-6 months. If it is below 20%, charge it to 40% before storing.

10 Disclaimer

The use of this product must strictly comply with the precautions and safety instructions provided by the company. The company shall not be liable for any injury or loss caused by violation of safety operation requirements. Operators shall comply with local safety regulations, and the manufacturer of energy storage system shall not be responsible for any loss that may be caused by equipment failure.

See the following disclaimers:

- Transport damage
- Incorrect installation, transformation, use, transformation and other operations
- Operation beyond the environment specified in this manual
- Ignore safety warnings and warnings for use
- Experiencing force majeure (e.g., lightning, heavy rain, floods, fires, earthquakes, etc.)

11 About Xiamen Poweroad

If you have any questions about this product, please contact us. Thank you for your use!

Name: Poweroad (Xiamen) Renewable Energy Co., Ltd.

Address: Building 7-1, No. 1068, Jimei North Avenue, Jimei District, Xiamen City, Fujian Province, China

Tel: +86-0592-5558101(Xiamen)

Website: www.poweroad.com