RENEPOLY

Distributed Energy Storage System

AI-ES100 Series

User manual

GUANGZHOU RENEPOLY ENERGY TECHNOLOGY CO., LTD.

<Please fully read and understand this Manual before use and installation. >

※ Before installing this system, please be sure to fully read and understand the Instructions and Safety Precautions, and install the system correctly.
※ All operators of the system shall comply with the user manual. Any damage to the device resulting from neglecting or misreading of the user's manual will invalidate the product warranty.
※ Equipment manufacturer shall not be liable for device damage or personal injury caused by failure to install, use, or configure the battery system in accordance with this document or the user manual.
※ Please be sure to connect the system to network. If there is no connection to the network, the customer consultation fee, the diagnosis fee and other related expenses shall be borne by the Agent (the Construction Party) in principle.

Content

1.Foreword

1.1 Preface

Dear customers, this article mainly introduces the integrated power energy storage system developed by GUANGZHOU RENEPOLY ENERGY TECHNOLOGY CO., LTD. We sincerely hope that this product can meet your needs, and expect you to have more ideas on the performance and function of the product. We will continue to improve and continuously improve the product quality.

1.2 Product model number

AI-ES100

1.3 Symbol model

	Danger	Lethal voltage! ● Battery strings will produce high voltage DC power and can cause a lethal voltage and an electric shock. ● Only person can wire the battery qualified strings.
	Warning	Risk of battery system damage or personal injury ● DO not pull out the connectors while the system is working! ● De-energize all multiple power sources and verify that there is no voltage.
	Caution	Risk of battery system failure or life cycle reduction.
	Symbol in label	Read the product and operation manual before operating the battery system!
	Symbol in label	Danger! Safety!
	Symbol in label	Warning electric shock!

	Symbol in label	Do not place near flammable material.

	Symbol in label	Do not connect the positive and negative reversely.
	Symbol in label	Do not be around open flame.
	Symbol in label	Do not place at where the children and pet could touch.
	Symbol in label	Recycle label.
	Symbol in label	Reliable grounding
	Symbol in label	Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU).
	Symbol in label	The certificate label for EMC.
	Symbol in label	The certificate label for EMC.
	Symbol in label	The certificate label for Safety by TÜV Rheinland.

2.Safety instruction

2.1 Scope of product use

This manual is applicable to the integrated power supply energy storage system products: AI-ES 100.

Mainly used in power grid peak load shifting and valley filling, power capacity increase, optical storage and filling system, backup power supply and other industrial and commercial application scenarios;

High-voltage energy storage system can only be operated by authorized personnel and professionals. Before doing any work, carefully read the user manual and strictly follow the contents of the operating system.

2.2 Safe use instructions

	Danger: Batteries deliver electric power, resulting in burns or a fire hazard when short circuit or incorrectly installment occurs.
	Danger: Lethal voltages are present in the battery terminals and cables Severe injuries or death may occur if the cables. and terminals are touched.
	Warning : Do not open or deform the battery module.
	Warning : Whenever operating the battery ,wear suitable personal protective equipment (PPE) such as rubber gloves , rubber boots and goggles .
	Warning: PowerCube-M1-C system working temperature range: 10°C~ 40°C; Optimum temperature :18°C~28°C The ambient temperature beyond the working temperature range may activate the battery system high/low temperature alarm or protection which further lead to the

2.3 Notes in operation

2.3.1 Manual storage

The manual contains important information for installation, operation and etc of this product. Read this manual carefully before the installation and operation of this product.

Please perform the product installation and operation in strict accordance with the description in this manual, otherwise, it may lead to equipment damage, casualties and property loss;

This manual shall be kept properly to installation and operators.

2.3.2 Personnel requirements

Qualified personnel must have the following skills:

- Training on the installation and debugging of the electrical system, with the ability of dangerous emergency treatment;
- Operators should be fully familiar with the composition and working principle of the entire energy storage system;
- Master of user manual and other relevant documents;
- Be familiar with the local laws and regulations.

2.3.3 Protection of equipment identification

- The warning signs outside the cabinet and inside the cabinet contain important information for safe operation of the product. No artificial tearing or damage is allowed.
- The product is installed with a nameplate, which contains the important parameter information related to the product. No artificial tearing or damage is allowed.

2.3.4 Setting of safety warning signs

In the implementation of the product installation, daily maintenance, overhaul and other operations, in order to prevent irrelevant personnel close and misoperation or accidents. Please follow the following items:

- erect obvious signs at the front and rear switches of the product to prevent accidents caused by accidental closing;
- erect warning signs or safety warning belts near the operating area;
- After maintenance or overhaul, pull out the door key and keep it properly.

2.3.5 Notes during maintenance or overhaul

Through the shutdown operation, the product is successfully out of operation. During the maintenance or overhaul operation, the following points should be noted:

- Ensure that the product will not be accidentally re-powered on;
- Use a multimeter to ensure that the product is completely dead;
- Implement the necessary grounding and short circuit;
- Cover the possible live parts near the operation part with insulating material;
- In the whole process of maintenance and overhaul, we need to ensure that the escape passage is completely unblocked.

	After the product is completely out of operation, you must wait at least 5 minutes to ensure that the internal capacitor is fully discharged before operating the product. If have the transformer, wait 10 minutes.

2.3.6 Electrical connection

- Electrical connections must be made in strict accordance as described in this manual and the electrical wiring schematic.

	The configuration, relevant current, voltage, power and other parameters of the battery pack must meet the technical parameter requirements of the distributed energy storage system.
	The distributed energy storage system can be connected to the grid only when approved by the local power supply company and installed by professional technicians.
	Please perform the wiring operation strictly according to the wiring identification within the equipment.

2.3.7 Electrostatic electricity protection

- Contact or improper operation of printed circuit boards or other electrostatic-sensitive components can lead to device damage;
- Avoid unnecessary circuit board contact;
- Observe the static electricity protection specifications, such as wearing an anti-static bracelet, etc.

2.3.8 Moisture protection

- When the air cabinet humidity is> 95%, do not open the cabinet door;
- Avoid installation and operation in rainy or wet weather conditions;
- The invasion of moisture is highly likely to damage the product;

3.Product specifications and parameters

Figure 1. Product appearance diagram

3.1 System introduction

Through energy storage converter PCS connecting grid and energy storage battery, transport AC/DC transformation principle control implementation battery energy storage system between dc pool and ac bidirectional energy transmission, through the control strategy of charge and discharge of battery system management, the network side load power tracking, the battery energy storage system charge and discharge power control, etc.

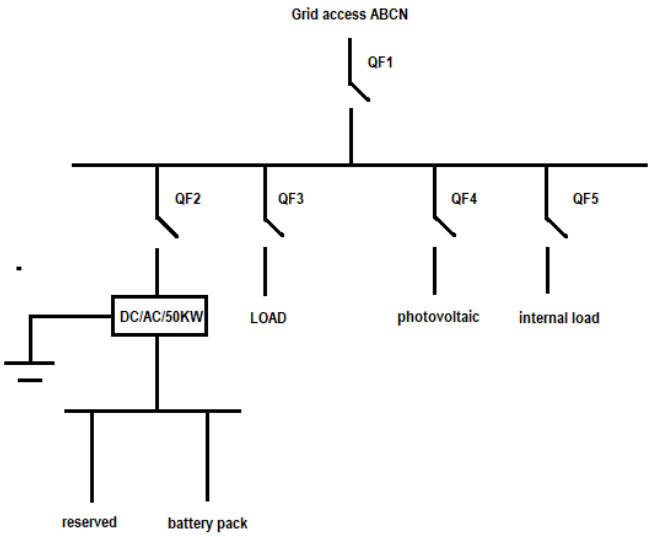


Figure 2. Primary topology diagram of the system

Main functions of the product:

➢Anti-countercurrent function: EMS adjusts between PCS and photovoltaic in real time by sampling the load power value, MPPT power and energy storage power

➢Power balance, so that the power of the grid meter, positive flow, that is, the power does not return to the grid;

➢EMS function: EMS performs the purchase, selling and demand functions according to the set five time periods. Data acquisition, analysis and decision support technology of equipment can monitor the operation status, energy consumption and environmental conditions of energy equipment in real time, so as to realize the efficient management and optimization of energy.

➢Power buying function: Charge the energy storage by taking power from the power grid through the set power value.

➢Power selling function: set the power value, not only ensure the normal operation of the power grid, but also transmit the set power value to the grid

➢Demand function: set the demand value to ensure that the power grid is kept at the demand value reduced by 5, and the remaining part is powered by energy storage.

3.2 System parameters

parameter type	parameter	remarks
Grid side parameters		
power rating	50kW	
rated voltage	AC/400V	
Maximum alternating, current current	87A	
mode of connection	3P+N +PE	
rated frequency	50/60Hz	
Total current harmonic distortion rate	≤3%	
Pressure stabilization accuracy and voltage ripple	≤2%	
power factor	1 in lag-1 in advance	
Rated output voltage (Vac)	400	
Off-grid voltage deviation	amplitude≤5%,phase <3°	
Rated Output frequency (Hz)	50/60	
Unbalanced carrying capacity	100%	
DC side parameters		
rated capacity	103.68kWh	
rated voltage	DC691.2V	
voltage range	DC604.8-777.6V	
Maximum straight, current current	88A	

General parameters are shown in the table below:

General parameters		
Size (W * H * D, mm)	1014*2270*1200	

weight (Kg)	1405	With the battery
Use the ambient temperature of (℃)	-30~55	
working temperature (℃)	10~45	
partition method	No isolation	
levels of protection	IP 54	
height (m)	4,500m (> 3,000 derations)	
relative humidity	0 – 95%, with no condensation	
Fire fighting mode	Perfluorhexone	
Refrigeration method	Temperature control and intelligent air cooling	
EMS communication	RS 485, TCP /IP	
Corrosion resistance grade of the cabinet body	C 3	

3.3 System composition

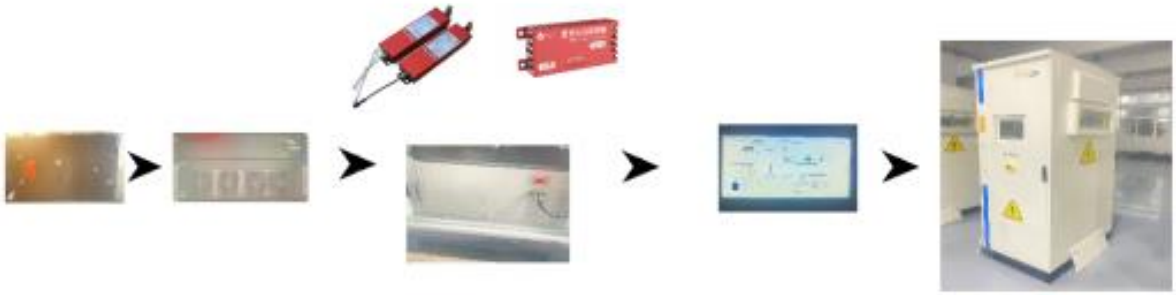


Figure 3. System composition

- Energy storage battery system: composed of modular electric system, 1 secondary BMS master control + 9 battery modules, forming a nominal 691V / 150Ah system, a cluster of 103kWh;
- Power supply system: using modular energy storage converter 50KW;
- Fire protection system: smoke sense, temperature sense, perfluorhexone for fire control;
- Temperature control system: using the temperature and humidity detector to detect the temperature and humidity in the cabinet, combined with the battery temperature, the temperature management through the embedded air conditioning;
- Security system: use the stroke switch to monitor the cabinet door, coupled with the padlock, increase anti-theft security;
- Local monitoring system: realize the monitoring and control of the outdoor integrated cabinet energy storage system, external communication;
- Cabinet: the cabinet is mainly installation carrier, protection grade IP54, internal main installation: battery system, PCS, local monitoring, air conditioning,Fire, distribution system and other equipment, to achieve the

advance prefabrication of products, the site can be quickly deployed system, reduce the site construction time.

3.4 Energy storage battery system

The energy storage battery system consists of BMS battery management system + battery system;

3.4.1 The BMS battery management system

BMS battery management system to achieve high precision, high reliability of the battery monomer voltage and temperature acquisition, at the same time the battery energy storage equipment charge state (SOC) for high precision estimation, storage related battery system running history data, realize the communication with local monitoring, and through the equilibrium control circuit battery monomer power equilibrium. In the case of abnormal battery data, the old alarm and protection, the operating state of the battery optimization control and comprehensive management.

Framework description of a single outdoor integrated cabinet battery management system:

- The whole management system is divided into two layers, namely BMS, BMU;
- Each battery module contains a BMU, which is responsible for measuring the voltage and temperature of the cell, and communicating with the BMS, while managing the balance function of the electric box.
- Each battery cluster contains 1 BMS, which is responsible for summarizing all the data of the battery module BMU, monitoring the charging and discharge current, charging and discharge logic, and protection circuit and protection parameters of the whole battery cluster.

3.4.2 Energy storage battery system

Battery System Parameter Table:

product model	AI-ES100
Battery type	Lithium iron phosphate (LFP)
Configure the number of battery modules	9
Battery System Energy (KWh)	103.68
Battery system rated voltage (Vdc)	691.2
Battery System Capacity (Ah)	150
Maximum charging voltage of the battery system (Vdc)	777.6
Battery system (conventional) charging current (A)	≤74 (0.5C)
Battery system discharge low voltage (Vdc)	604.8
Battery system (conventional) Discharge current (A)	≤74 (0.5C)
depth of discharge	90%
communication interface	RS 485 / CAN
Operating temperature range is (℃)	0~50
storage temperature (℃)	-20~60

3.5 Power supply system

Energy storage converter PCS parameter table:

AC Side parameters	
Rated AC power (kW)	50
mode of connection	Three-phase, four-wire + PE
AC Overload Capacity (kW)	1.1 x 1min@ ring temperature of 35℃
Grid-connected operation mode	
Allowed Grid Voltage (Vac)	400
Allowed Grid Frequency (Hz)	50
Total current harmonic distortion rate	≤3%
Voltage ripple coefficient	≤1%
power factor	-0.8~＋0.8
Off-grid transport, and is in the line mode	
Rated output voltage (Vac)	400
Output voltage distortion degree	1% (Linear load)
Rated Output frequency (Hz)	50
Unbalanced carrying capacity	100%
DC side parameters	
Maximum DC power (kW)	60
Battery Voltage Range (Vdc)	650~850
Rated voltage (Vdc)	750
Maximum DC current (A)	88
General parameters	
Maximum rotation, exchange efficiency	98.5%
Size (W*D*H mm)	440*650*220
weight(kg)	28
levels of protection	IP 20
Allowable ambient temperature	-30~60℃ (greater than 45℃ decrease)
cooling-down method	forced air cooling
Permitted relative humidity	0~95% (no condensation)
Allowed altitude of	3000m
Display and newsletter	
communication interface	R S 485，Ethernet，CAN
protocol	Modbus TCP /RTU
BMS insert	Support for the CAN RS485

3.6 Structural design of the outdoor cabinet

The external dimension diagram is shown below:

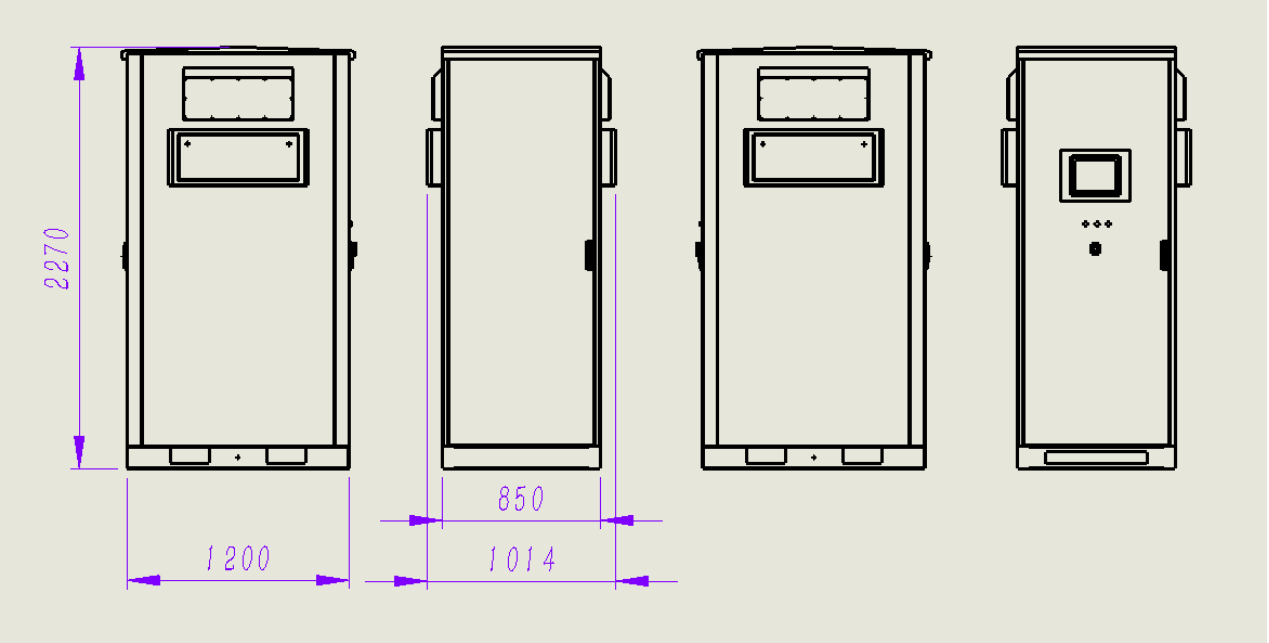


Figure 4. Product dimensions diagram

The internal layout is as follows:

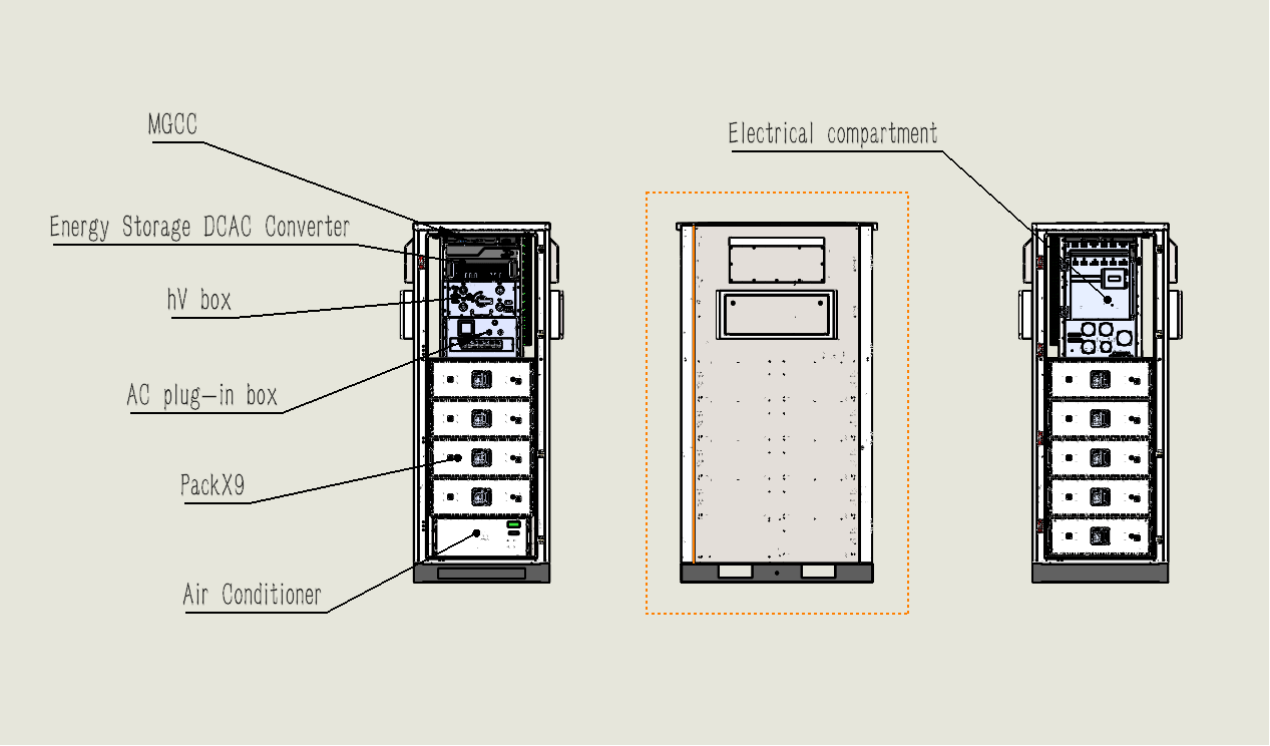


Figure 5 Layout drawing of product internal equipment

3.6.1 Air-conditioning system

In view of the different temperature requirements of battery system and PCS, the arrangement of containers is divided into equipment warehouse and battery warehouse. According to the temperature adaptability characteristics of the two warehouses, different ways are adopted to carry out thermal management, so as to achieve the purpose of optimizing management and energy saving.

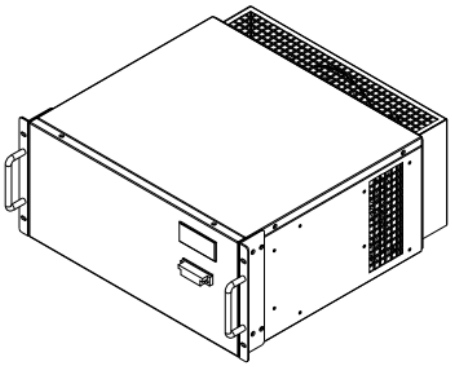


Figure. 6 Appearance diagram of product air conditioner

Air conditioning parameter table:

refrigerating output (w)	800
voltage (V)	220VAC
frequency (Hz)	50
power (w)	410
temperature (℃)	-5~55
IP grade	IP55

3.6.2 Fire fighting system

- The fire fighting system is composed of gas detection instrument, smoke detector, fire extinguishing device (including fire extinguishing agent storage bottle, pressure signal device), etc.;
- Two smoke detector colleagues hit and warning threshold, carbon monoxide> 190ppm, occurrence and warning information;
- Two detectors reach the secondary alarm threshold at the same time, and the smoke alarm, carbon monoxide concentration> 600ppm, the secondary alarm information occurs, the controller output the secondary alarm dry contact action;
- Two detectors reach the three-level alarm threshold at the same time, carbon monoxide concentration>1200ppm, smoke alarm (temperature 75 degrees or VOC concentration>1500ppm), three-level alarm, controller open the fire extinguishing device, three-level alarm dry contact action;
- Gas fire extinguishing device, fire probe tube to reach the rupture temperature, automatic release of gas, fire probe tube temperature can be selected;

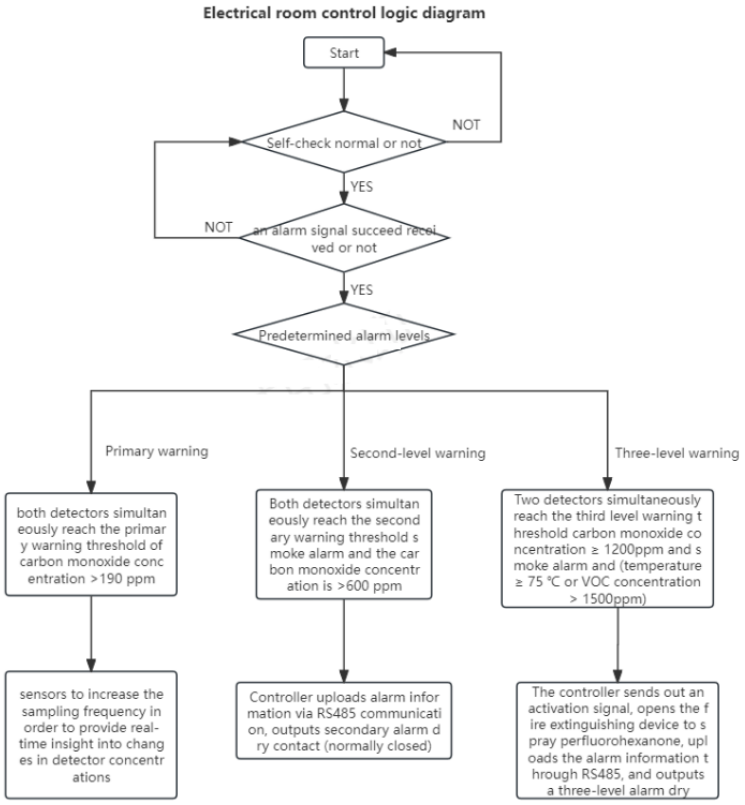


Figure 7 Fire control control logic diagram

3.7 Communication system

3.7.1 Local Monitoring EMS-B

Local monitoring EMS-B is designed and applied for an integrated power supply and energy storage system. The application scenarios can cover light, storage, wood and load systemsNow monitor and control the energy storage system light and load storage joint operation, peak load shifting and valley filling, demand control, coordinate and unify the safe and stable operation of each equipment.

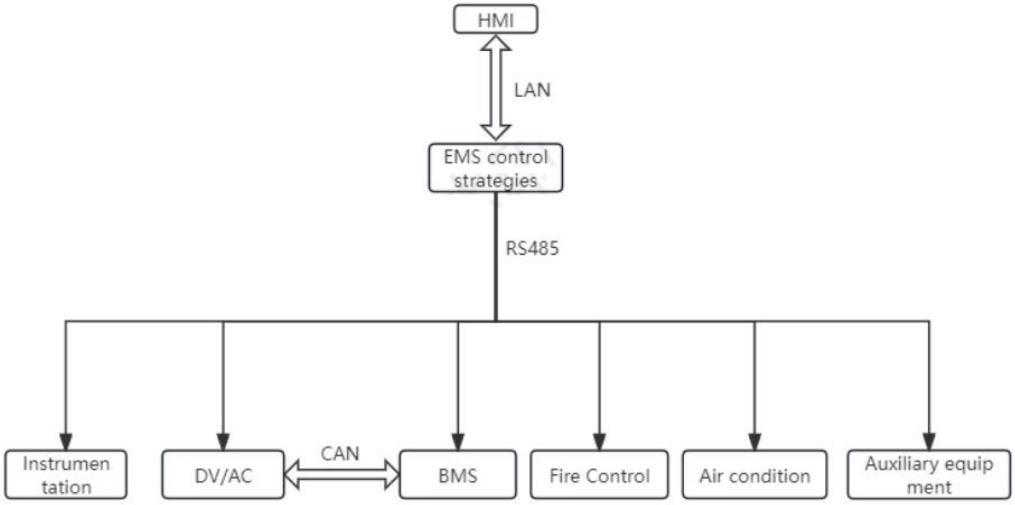


Figure 8. Secondary communication topology diagram of the system

- Configure an 8-port industrial switch Ethernet as the data bus, and preset the network segment and equipment IP;
- PCS adopts MODBUS _ TCP protocol, BMS, electricity meter, air conditioning, photovoltaic inverter and other serial port communication equipment to adopt MODBUS _ RTU protocol;
- Configuration of IO controller, independent access to the second network port of the local controller, with 8 DI, 8 DO;
- The IO controller can realize the equipment DI signal monitoring, and can also serve as an indicator light and external button control equipment, to realize the necessary control operation;
- The controller has the MODBUS _ TCP data forwarding function, which can forward the data to the background;

3.7.2 external communication interface

external communication joggle	One way to the Ethernet port, using MODBUS-TCP, IEC 103/104/ 61850 (Optional) protocol.	The outdoor integrated cabinet communicates with the external system platform for telemetry, remote communication, remote control and remote control information communication.
	One-way RS 485 interface, using the MODBUS-RTU protocol	

3.7.3 External communication protocol

The standard Ethernet port Modbus-RTU/TCP protocol is adopted for external communication. The communication protocol includes physical connection mode, transmission mode, frame format, address format, data format, information content, etc. The content of the agreement shall refer to the provisions of the Company.

3.8 System operating status

The system has three working states: standby, operation and fault.

3.8.1 Standby

After the device is normally powered on, the power indicator light will be on. When the device is not on command and fault, it is in standby state. In this state, the command operation and scheduling of the touch screen or the superior can be accepted.

When the operating conditions are met, the system can enter the policy or mode of operation. When the system receives the shutdown instruction, the operation mode is transferred to the shutdown mode.

When the system fails, the fault indicator light will light on and is in a fault state, it can be reset remotely. If the fault is in a non-reply fault, it needs to manually assign the fault in the startup operation.

3.8.2 Grid-connected operation

In the grid-connected operation state, the system can charge / discharge functions, using AC constant power mode, DC constant current mode and DC constant voltage mode.

3.8.3 Off-grid operation

The system charges / discharges the battery in the off-grid operation state. The whole system runs as an AC constant voltage source and discharges with the load power. When the system cannot support the load, the diesel generator will be started.

3.8.4 Failure

When the system fails, if the system is in grid-connected operation or off-grid operation, the system will immediately stop operation and report the fault information, and the system cannot be turned on. If the system is on standby, the fault will be reported and the system cannot turn on.

The system will continuously detect whether the fault is eliminated, if the fault is not eliminated, then the fault state is maintained; if the fault is confirmed and cleared, the system performs the following status according to the fault division:

- For the fault that can be cleared automatically, after the fault is eliminated, the system enters the standby machine by default;
- For faults that can be automatically cleared, the system enters the standby state by default;
- For faults that must be manually confirmed, the system enters standby state after manual manually.

3.9 Ground grounding design

Grgrounding according to local requirements and have grounding bolts on the equipment base.

4.HMI

4.1 Introduction of the main interface

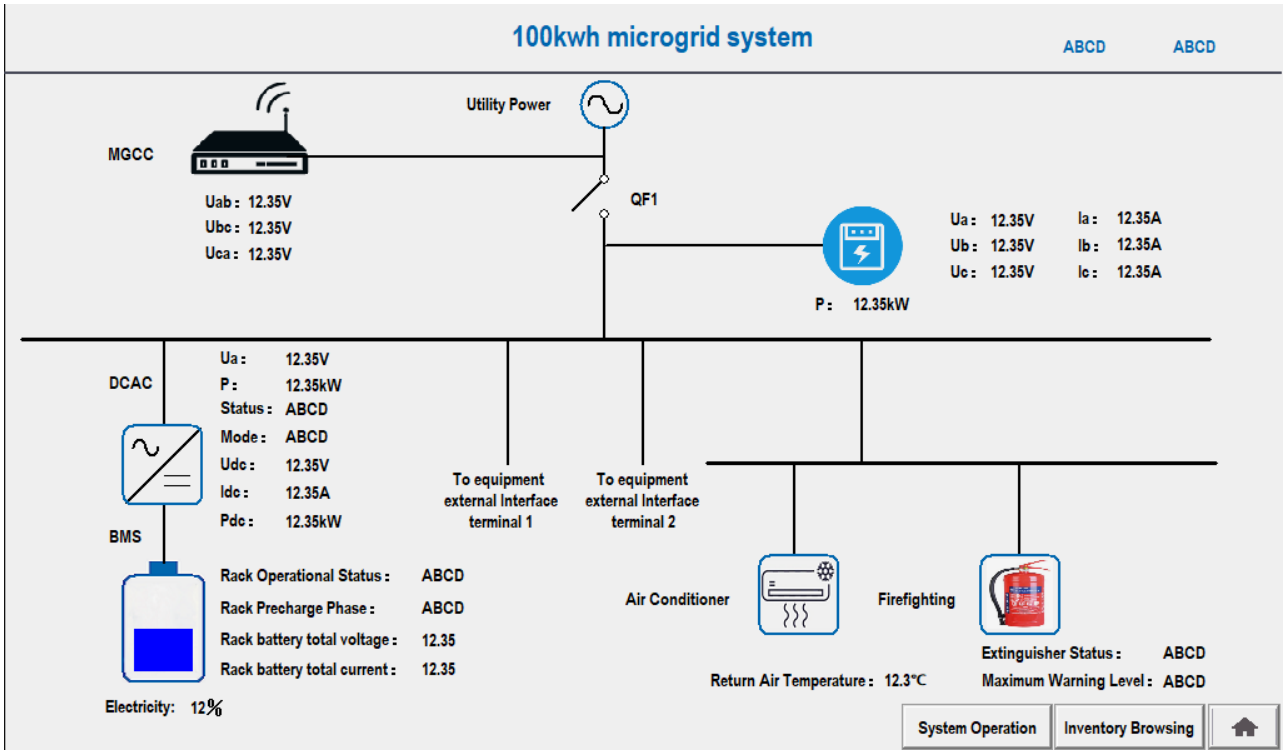
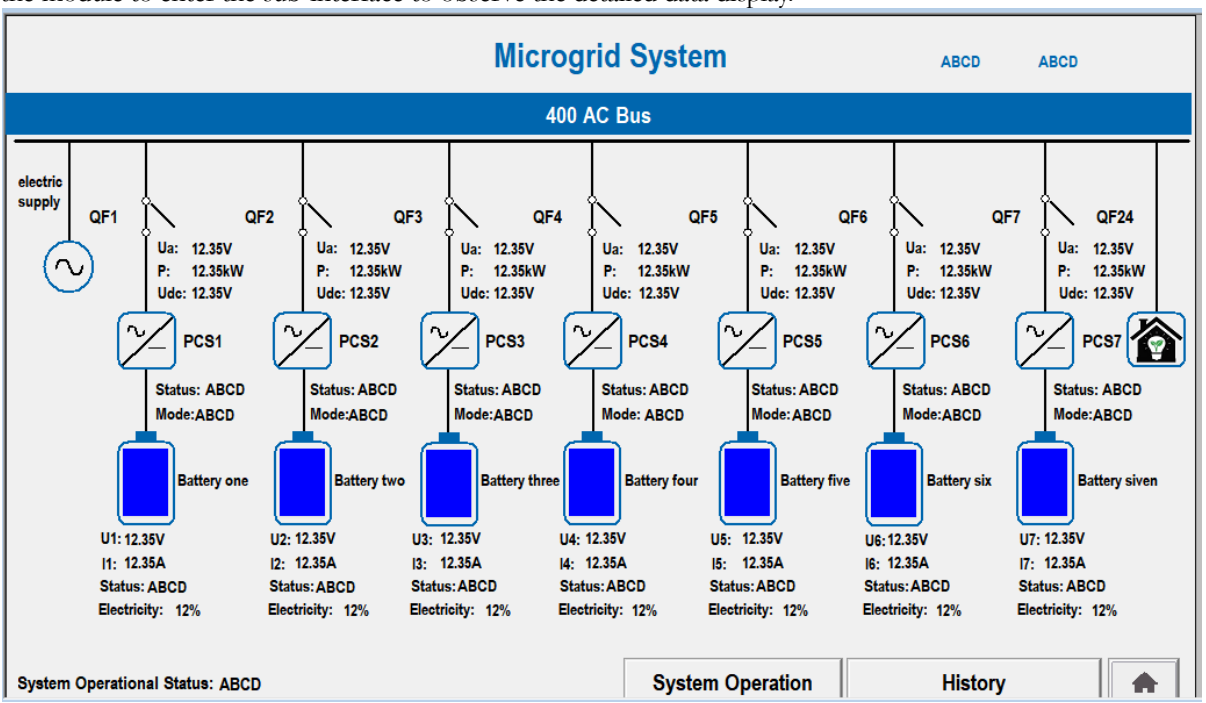


Figure 9. Main interface diagram of the system

The main interface includes MGCC, DC / AC, BMS, electricity meter, air conditioning, fire protection. The frame part is all touchable modules, and the main data display (communication state, voltage, current, power, etc.). Click the module to enter the sub-interface to observe the detailed data display.



The interface is the main control display interface, mainly including switch status, DC / AC parameters, battery parameters, EMS interface button (System Operation), history record, etc

4.2 Introduction of the MGCC subinterface

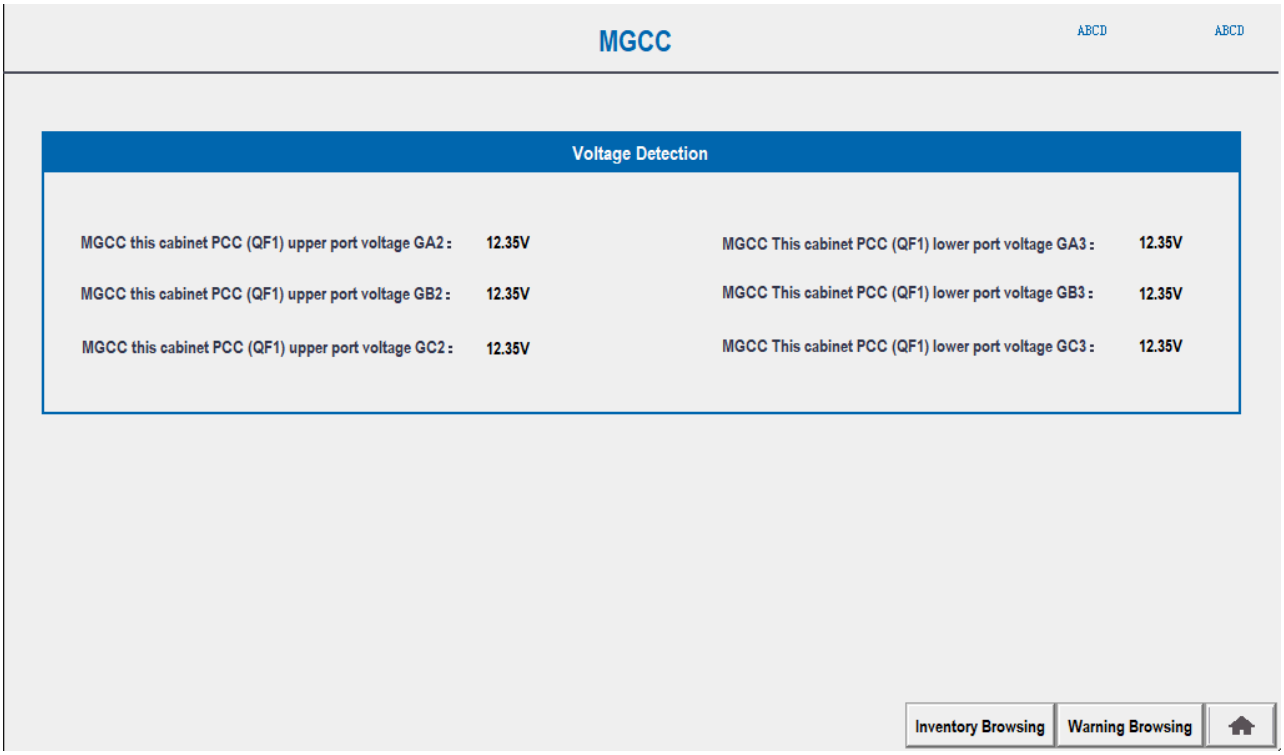


Figure 10 The MGCC data interface

Click the MGCC module of the main interface to enter the MGCC sub-interface, where the upper port voltage and lower port voltage (mains access voltage) are displayed.

4.3 Introduction of electricity meter interface

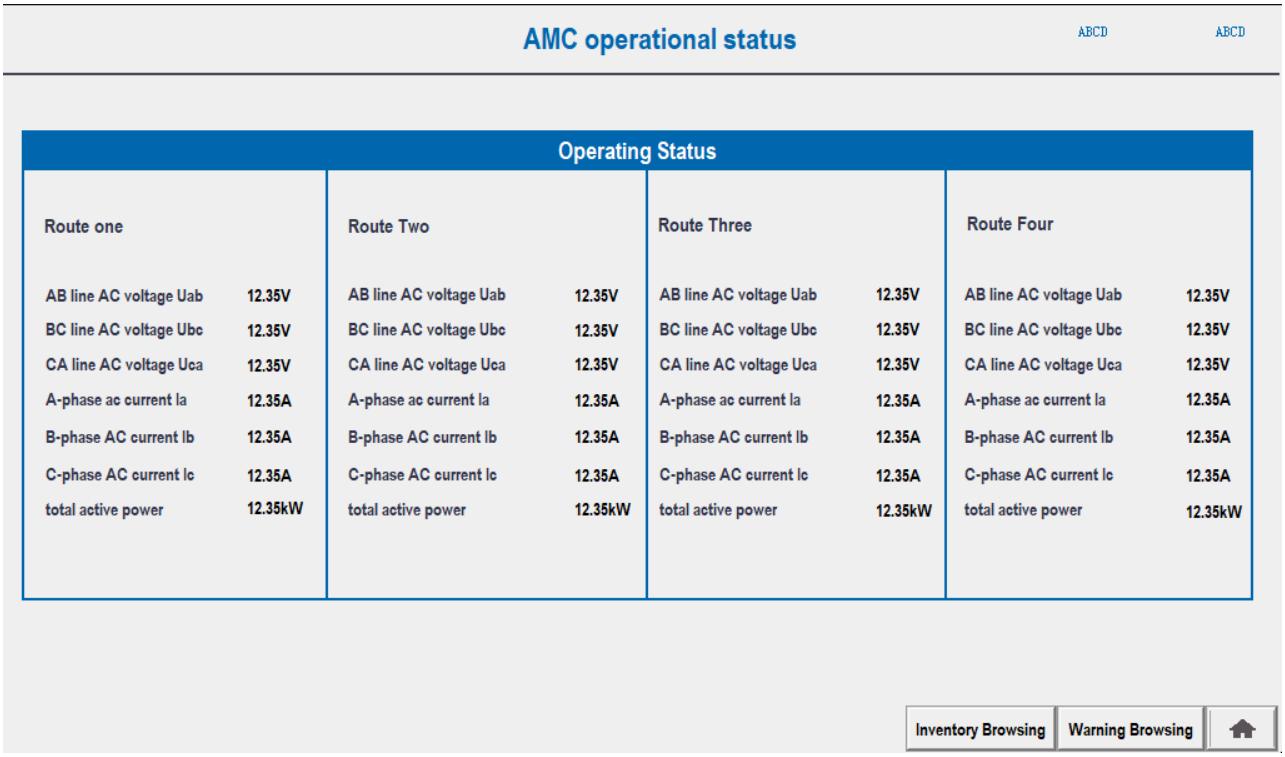


Figure 11 Data interface of each loop instrument

Click the main interface meter module to enter the meter sub-interface, which displays the current, voltage and total power through the high-voltagebox.

4.4 Introduction of air-conditioning and fire protection interface

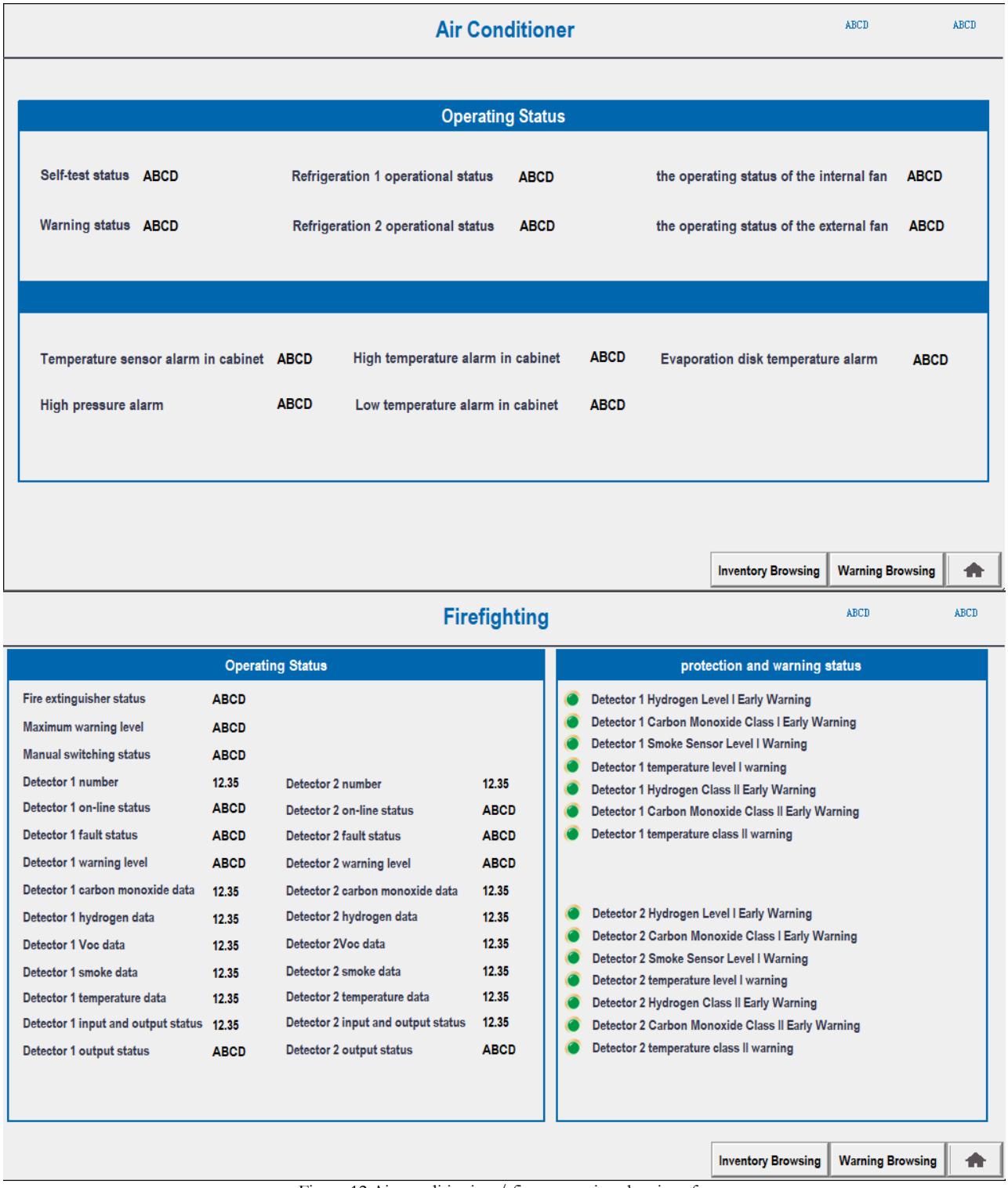


Figure 12 Air-conditioning / fire-protection data interface

Click the main interface air conditioning and fire protection module to enter its sub-interface, which displays the detailed data of air conditioning and fire protection.

4.5 Introduction to the BMS interface

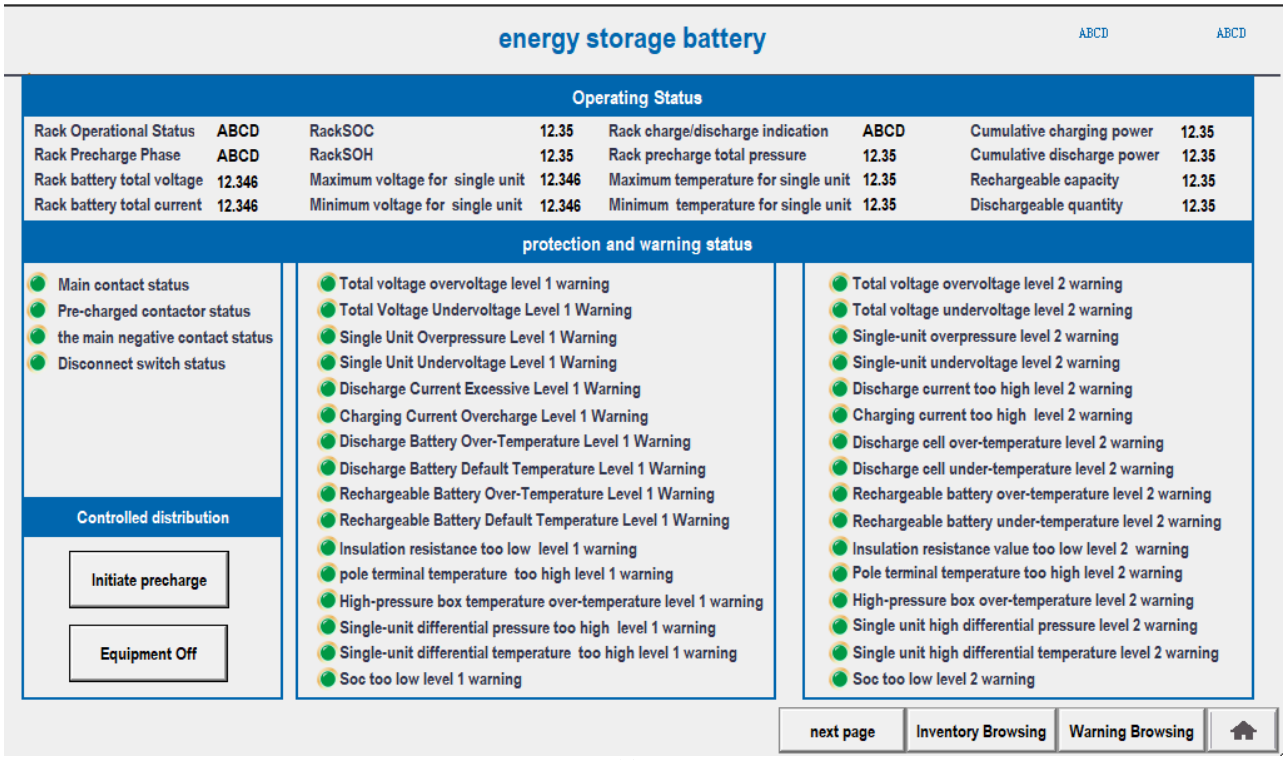


Figure Figure 13 The BMS data interface

Click the main interface BMS module to enter its sub-interface, here display the detailed data of BMS, click the next page at the bottom of the screen to enter the second interface, and can control the boot and shutdown of the high voltage box (click the device boot high voltage box boot, otherwise shutdown).

4.6 Introduction of the DC / AC interface

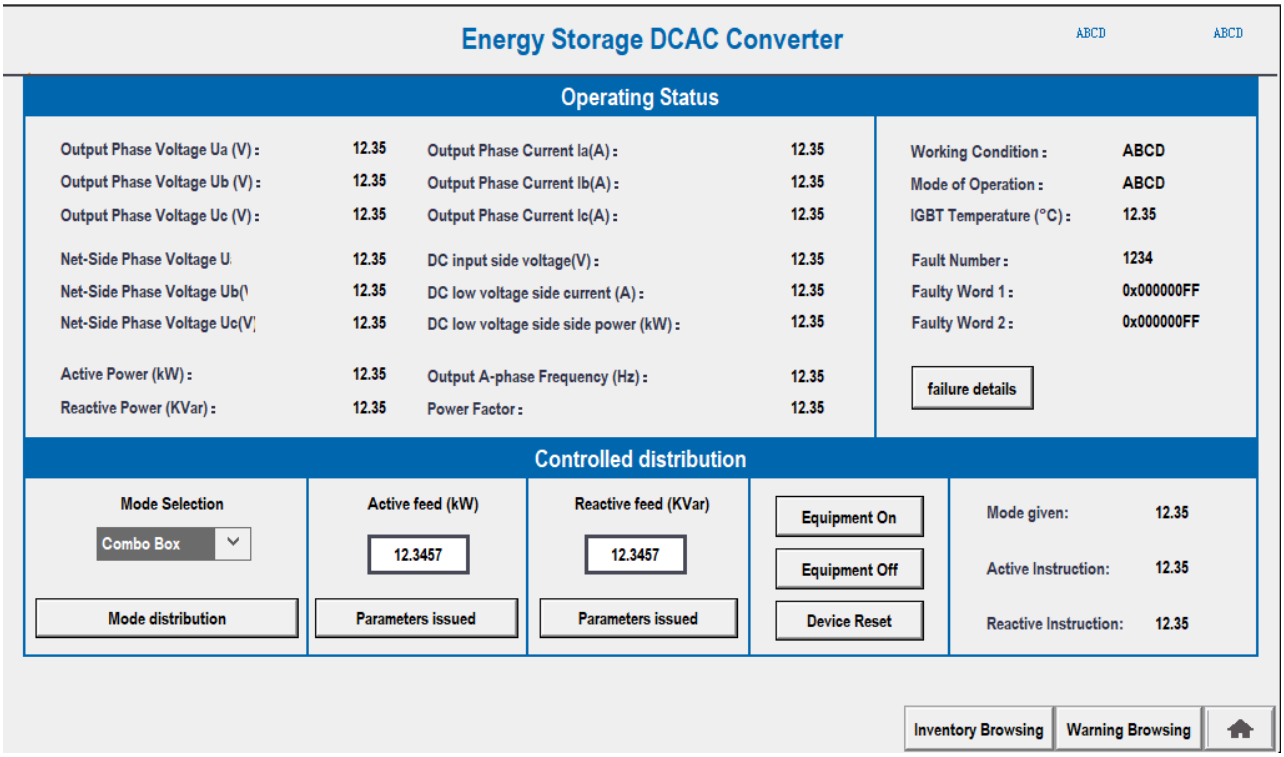
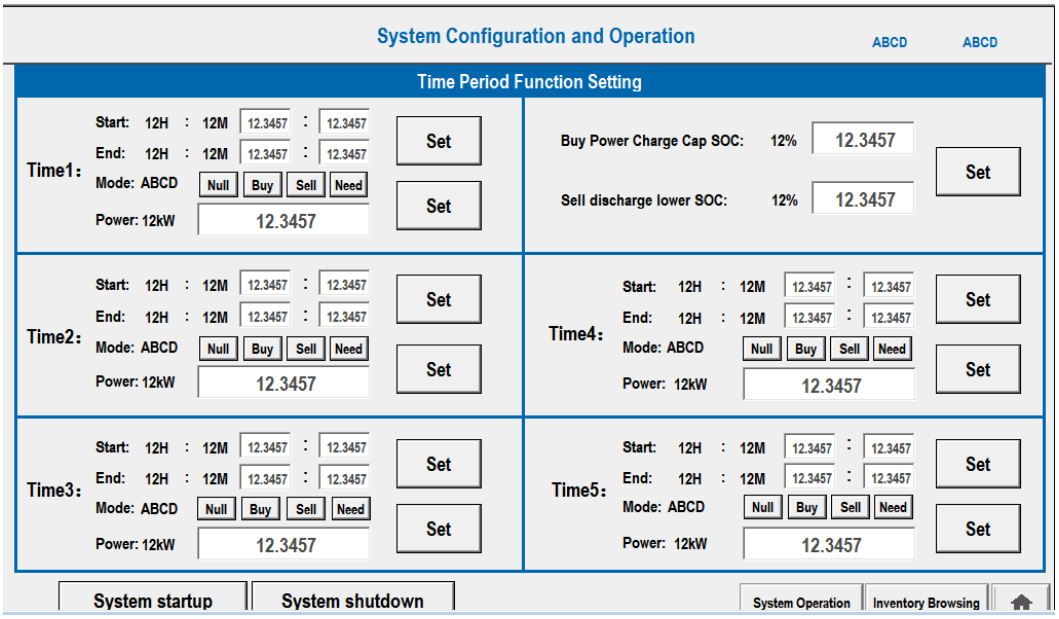


Figure 14 The DC / AC data interface

Click the main interface DC / AC module can enter the sub-interface, here shows the dc side and ac voltage,

two modes choose off-grid mode and grid mode, click the mode, click the device reset, observe the mode below given (grid display 1, off-grid display 2), active command, reactive power command is normal, if the value is too large to issue 0, or reset. After starting, the power can be distributed for charging and discharging (example: 40KW charging, the active power given set-40, click the parameter to send), and the power should be reduced to 0 before stopping.

4.7 Introduction to the EMS interface



The main interface includes the 5 time periods, SOC upper and lower limits, equipment startup and equipment shutdown function, Five time periods Time 1, Time2, Time3, Time 4, Time5, There are three main functions, Buy electricity, sell electricity, demand value setting function, For example: Time1 Start-8:00 End-10:00 Mode-Buy Power-30kw, At 8 o'clock, By 10, Output of 30 kW power; The upper limit of SOC and the lower limit of SOC can be set; System startup Is the device boot up System shutdown is the device shutdown, The device enters the boot state, If the 5min is not performed, it will shut down automatically.

5.Equipment installation and electrical connection

5.1 Check before the installation

- Packaging inspection

Before opening the outer packaging of the energy storage system, check whether the outer package has visible damage, such as whether there are obvious cracks, crushing, deformation, etc.

If there is any outer packing, please do not remove the outer packing and contact us as soon as possible.

- Check delivery

After opening the outer packaging of the energy storage system, we should check the completeness of the deliverables against the packing list. If there is any missing or damage in the deliverables, please contact us as soon as possible.

5.2 Tool Preparation

PPE and using tools are required to install the wiring:

 wire nipper	 Grid wire press clamp	 ribbon
 bolt driver	 electric screw driver	 Press wire clamp
 spanner	 1500VDC insulated sleeve	 The 2000VDC multimeter

 insulating gloves	 eye protector	 The cargo boots

	Use properly insulated tools to prevent accidental electric shocks or short circuits. If an insulation tool is not available, cover the entire bare metal surface of the available tool (except for tips) with electrical tape.

5.3 Installation requirements

The installation environment must meet the following requirements:

- The protection level of outdoor integrated cabinet is I P 54, which meets the normal outdoor environment. The anti-corrosion grade of standard products is C 3, so it is necessary to pay attention to stay away from high salt fog and high corrosion environment, away from heat source and flammable and explosive materials;
- The full weight of the energy storage system is 1500 Kg, so the installation ground must have a certain bearing capacity to support the amount of the cabinet;
- The foundation must ensure that the installation position of the outdoor integrated cabinet is stable and firm;
- The installation environment should be far away from the living area as far as possible. If the installation area is more crowded, it is recommended to install the fence;
- Ensure that the ambient temperature is between-20-50℃ to ensure the normal operation of the outdoor integrated cabinet.

5.3.1 Installation spacing

- The external size of the energy storage system is 1014 * 2270 * 1200mm (width and depth), and the installation site must have enough space to visit the equipment;
- The installation space of the energy storage system is shown in the following figure. If the site situation allows, it is recommended to leave more space between the surrounding equipment or walls for use and maintenance;

Schematic diagram of the installation space:

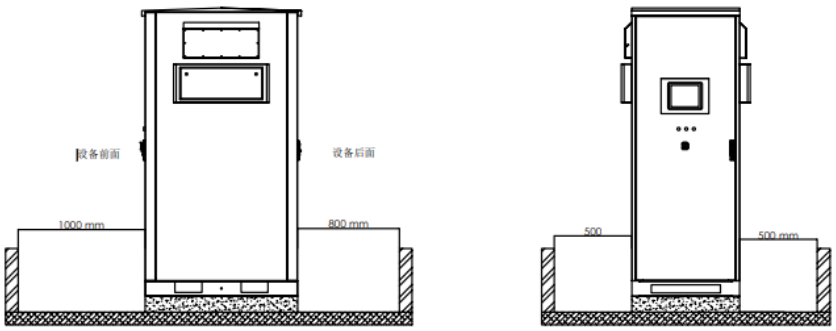


Figure 15 Schematic diagram of the equipment installation

5.3.2 Foundation requirements

The weight of the whole outdoor integrated cabinet (containing battery) weighs about 1500 Kg, its installation ground should be able to bear the weight of the outdoor integrated cabinet, should be concrete foundation or trough steel bracket structure, must ensure the installation foundation is smooth, firm, safe and reliable. Strict surface surface and depression.

The cabinet is fixed at the bottom, and the foundation should be opened in accordance with the fixed hole position at the bottom of the energy storage system, and the hole size must be consistent with the fixed hole position of the system cabinet.

Schematic diagram of positioning hole and foundation dimension at the bottom of the frame (unit: mm)

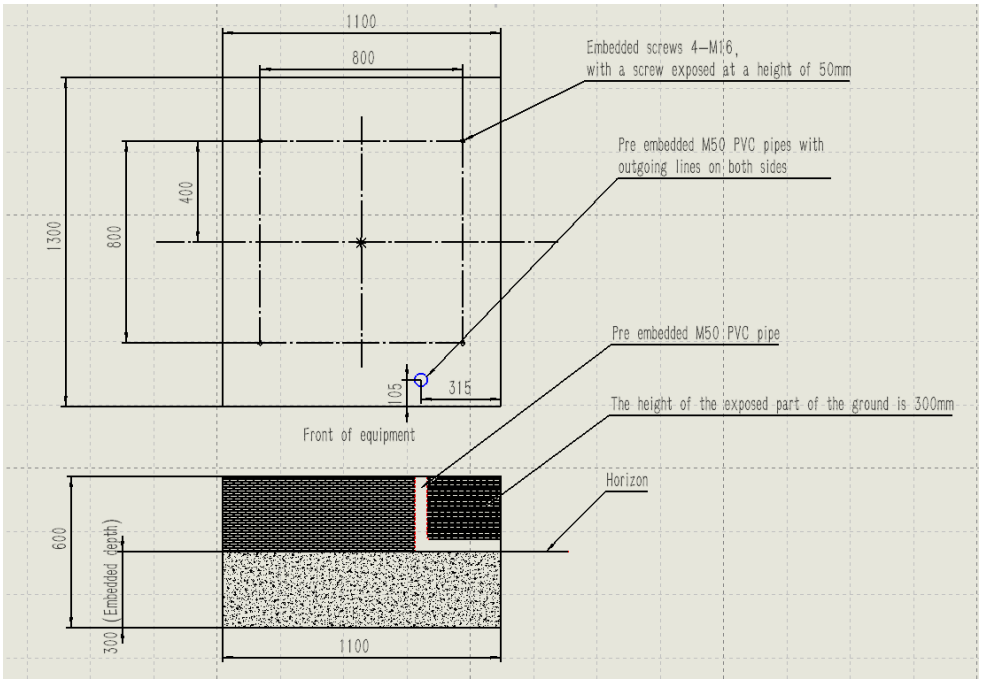


Figure 16 Equipment foundation positioning diagram

The location of the hole is shown below:

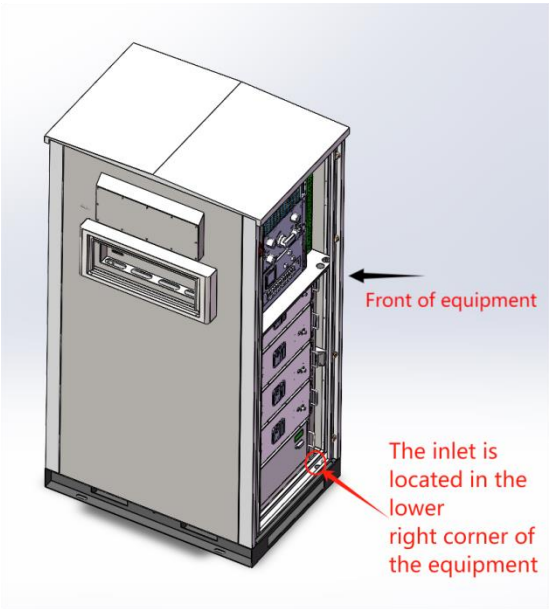


Figure 17 External routing diagram of the equipment

5.4 Handling mode

- Outdoor integrated cabinet needs to be carried by forklift truck. There is no lifting beam on the top and it does not support lifting and handling. When handling, move carefully to avoid impact or fall.
- When raising the machine, keep the center of gravity on the left battery side to keep the handling process slow and smooth.
- When the forklift is lifting the equipment, ensure that the fork is stable and balanced.
- During the movement, the tilt angle of the device shall not exceed 15°, and shall not be suddenly lowered or lifted.

The forklift hole is shown below:

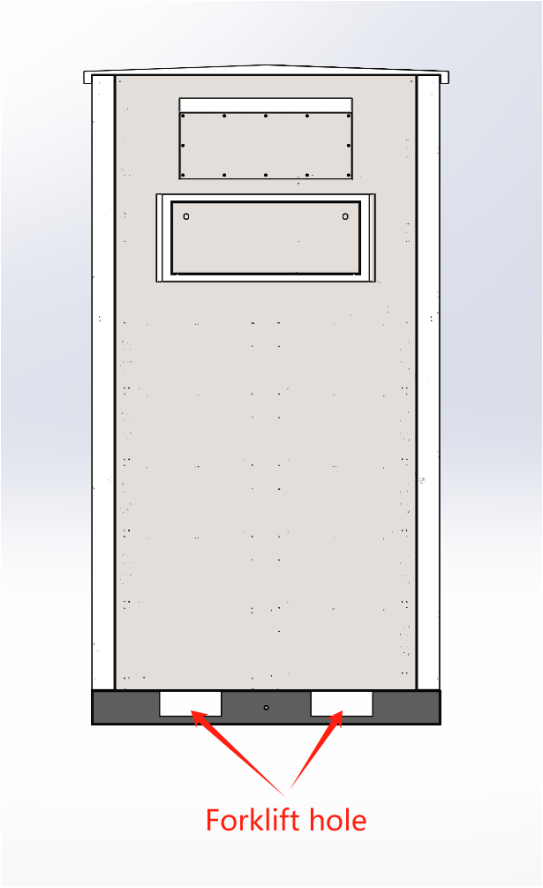


Figure 18 Schematic diagram of the equipment forklift truck hole

5.5 Installation steps

- Before installation, confirm that the installation size of the foundation is consistent with the bottom installation size of the energy storage system;
- Use a forklift to place the cabinet on the installation foundation, and align the 4 installation holes
- Use 4 expansion bolts to fix the cabinet reliably;
- The installation bolts will be protected by anticorrosive paint for outdoor use to prevent rust;

5.6 Electrical wiring

	The grid connection side shall be approved by the local power grid company;
	Need professional electricians for construction and installation, construction to ensure that the AC and DC side is not charged;
	The equipment must be connected first, the way to the external contact point of the cabinet, the way to the grounding copper row in the cabinet;

Throughout the electrical connection of the energy storage system, ensure the following:

- Ensure that the product will not be accidentally re-powered on;
- Use a multimeter to ensure that there is no short circuit and circuit break in the product;
- Cover the possible live parts near the operation part with the cloth of insulating material;
- In the whole process of maintenance and overhaul, we need to ensure that the escape passage is completely unblocked.

5.6.1 Cable requirements

The diameter of the cable used in the outdoor integrated cabinet must be selected according to the maximum current on the AC side and DC side of the converter, and there must be left. Please use the same specification cable.

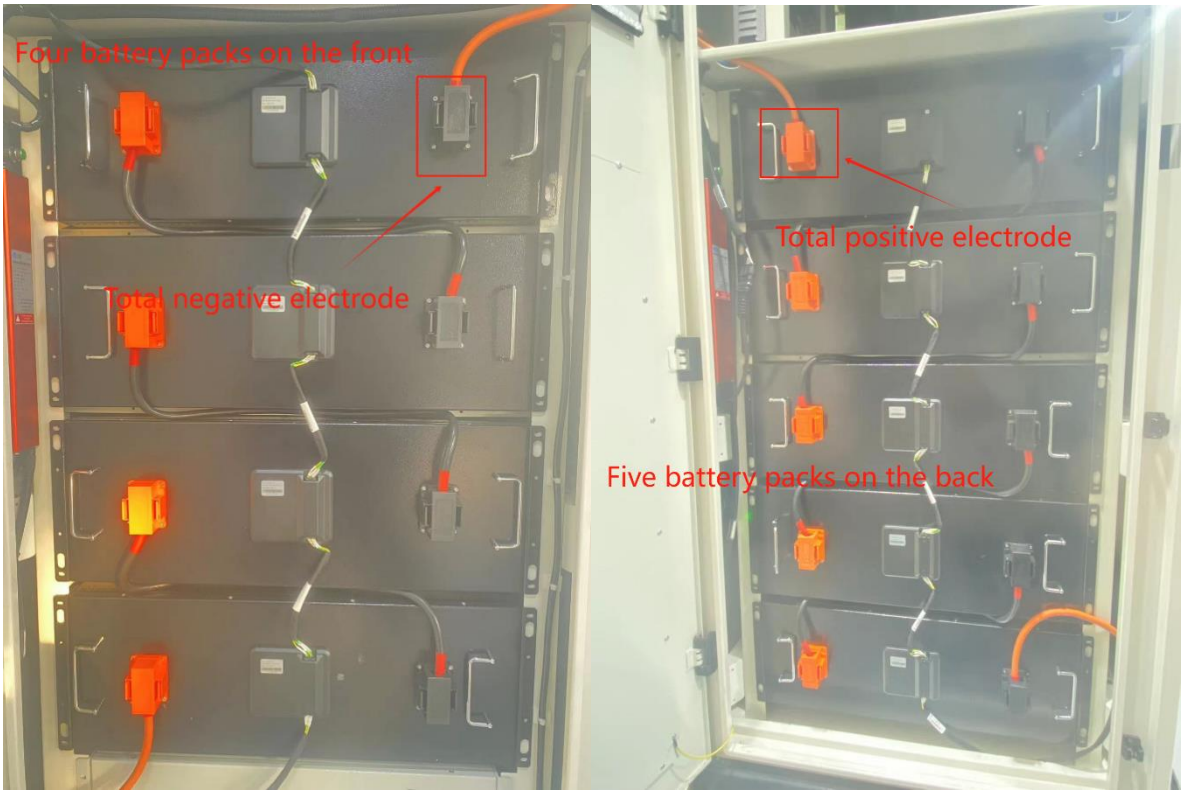
Match the 60K W wiring harness model number:

cable	Line diameter requirements	Terminal model
The AC-side of phase A	1*16mm²	SC 25-8
The AC-side is phase B	1*16mm²	SC 25-8
The AC-side is of phase C	1*16mm²	SC 25-8
The AC-side N phase	1*16mm²	SC 25-8
Ground wire PE-cable	1*16mm²	SC 16-8
External Ethernet communication line	Super five class with shielding line	RJ 45
External RS485-line	Pair-pair shielding wire 1,5mm2	E1510

6.Primary wiring and secondary wiring mode

6.1 Primary wiring mode

➢ Connect the positive and negative power copper row inside the battery in series (see the total positive and negative connection method in the 6 system startup, the description of the high voltage box), and connect the internal communication line of the battery cluster with a total of 9 BMS modules in the middle of the battery pack);.2



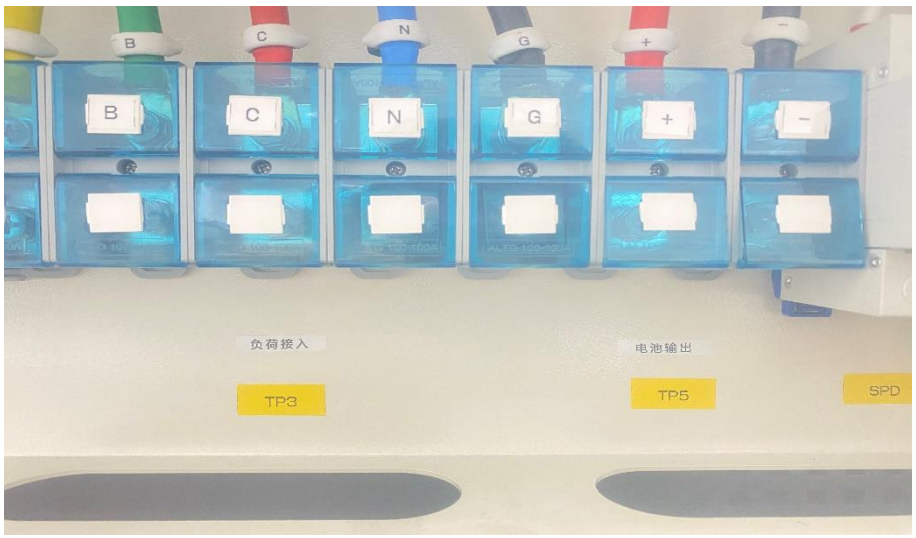
	When the internal power wiring harness of the battery is connected, pay attention to prevent short or reverse connection to avoid accidental injury.

➢Pass the AC cable through the bottom crossing hole and connect it to the T P C terminal in the cabinet according to the label

Cable, do not allow three opposite order;

External interface-mains access:

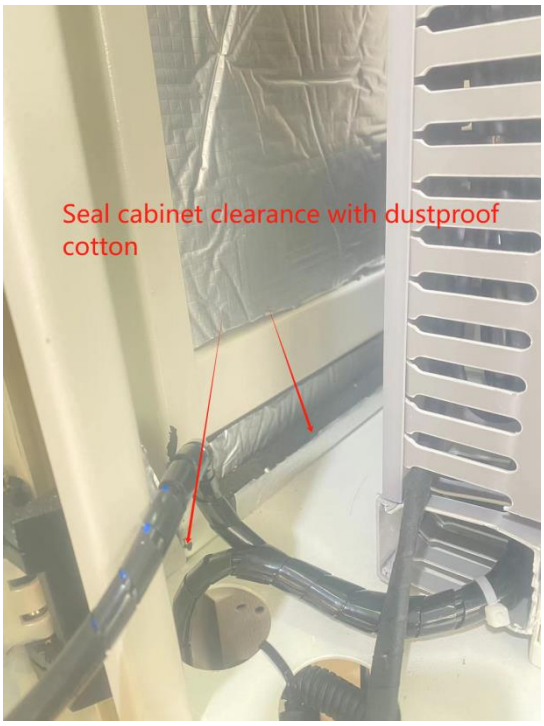
External interface TP 3-load access, TP 5 battery output:



External interface TP 4-PV access, QF 9 battery output switch:

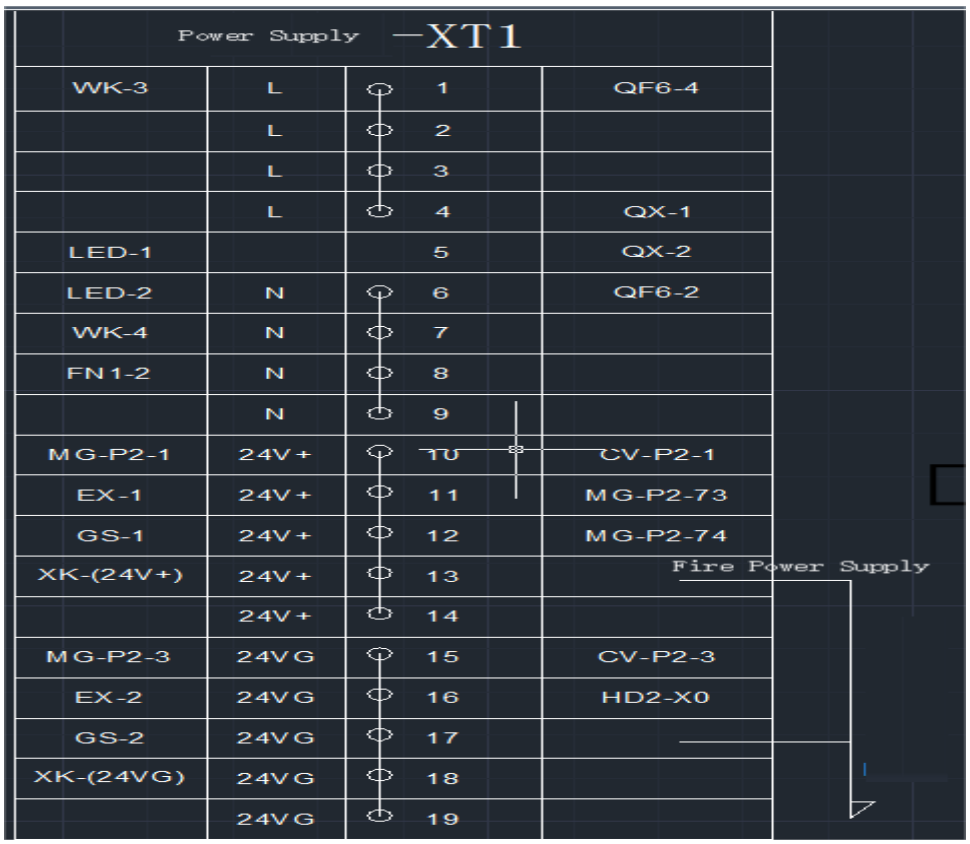
➢When the wiring is complete and confirm that all connections are correct, and finally seal the gap with a

dust cotton.



6.2 Secondary wiring mode

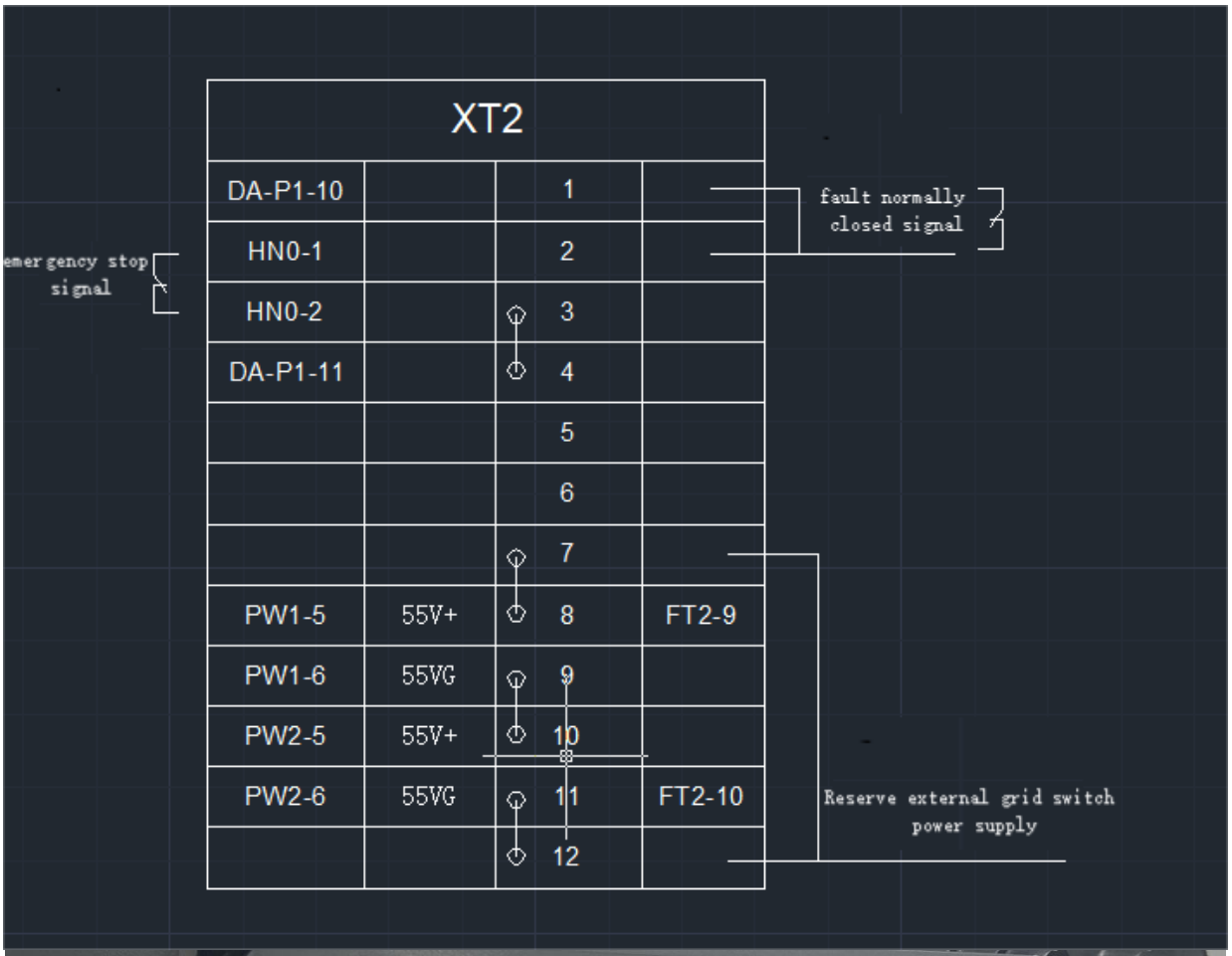
The XT 1-1-XT 1-9 terminal mainly provides L, N, and XT 1-10-XT 1-19 with 24V power supply



XT 2-8-XT 2-9 provides 48V-55V

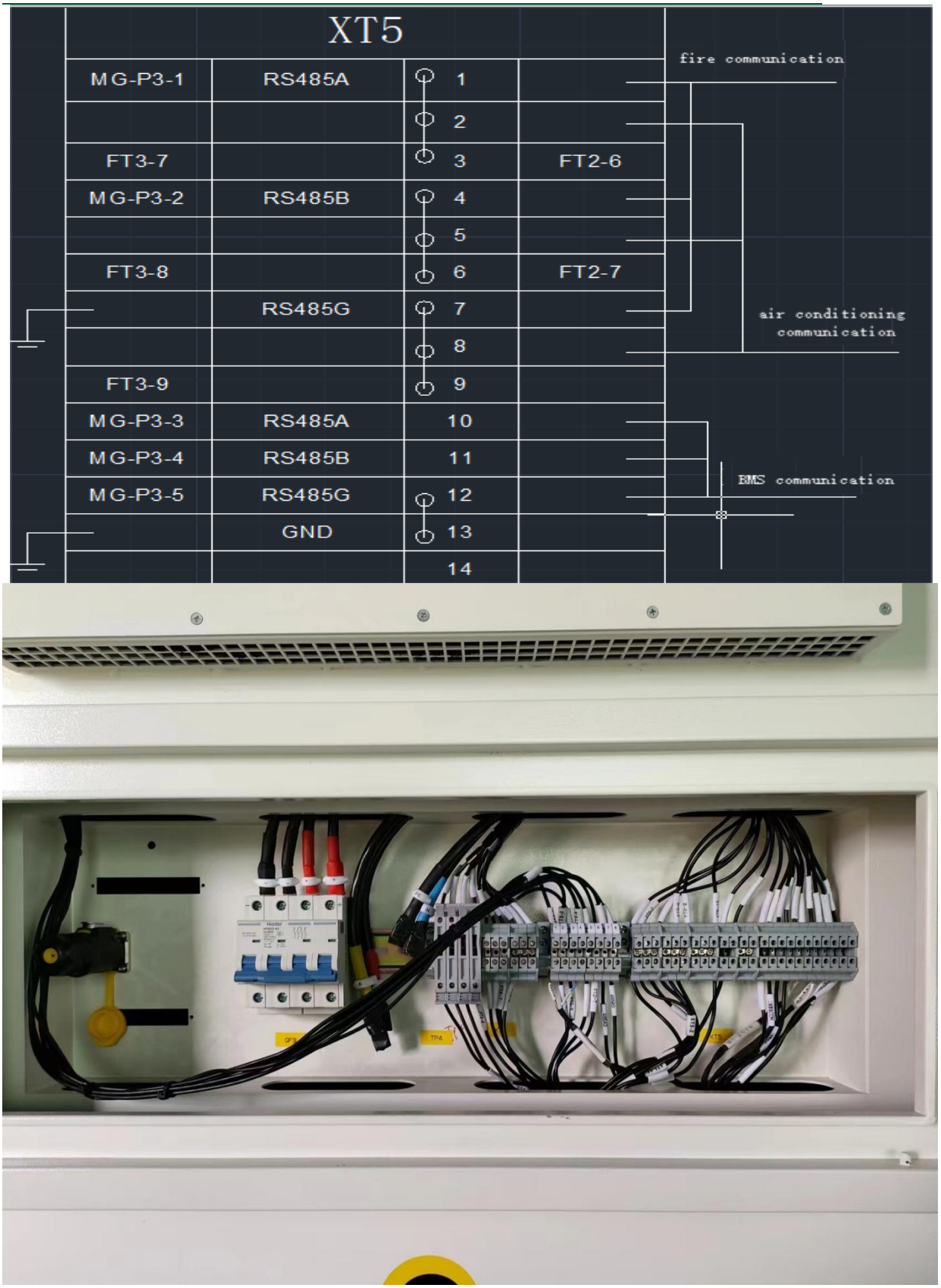
XT 2-10-XT 2-11 is provided with 48V-55V

XT 2-8-XT 2-11 offers 96v-110v



Communication interface serial port 1 is XT 5-1-3 is 485 A XT 5-4-6 is 485B

Communication interface serial port 2 is XT 5-10 is 485 A XT 5-11 is 485B



External communication line


A
B
C
N
G
1
2
3
4
5

7.Use steps

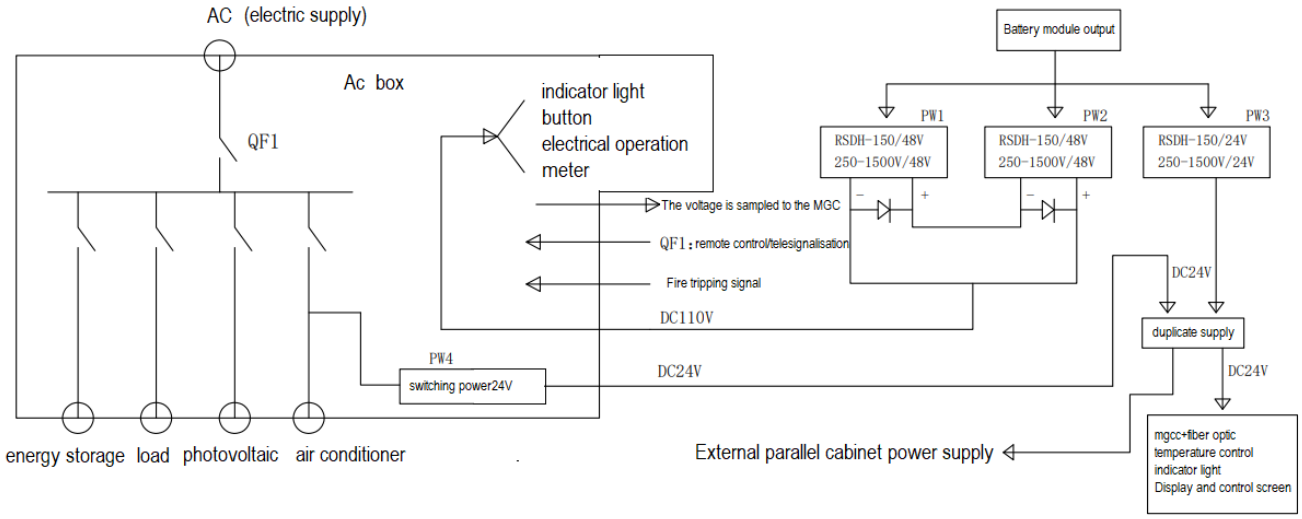
7.1 Check before the operation

To ensure safe operation of the equipment, after all installation and wiring:

- Check whether the installation environment of the equipment meets the requirements;
- Check whether the installation spacing is sufficient to ensure the normal maintenance of the equipment;
- Check whether the equipment and the installation ground are firmly fixed;
- Check whether the cable is correctly connected, whether the positive and negative aspects on the DC side are connected, and whether the phase sequence of U, V and W on the AC side is connected；
- Check whether the connection point of each cable is stable;
- Check whether each cable is bent and stressed;
- Check whether there is a risk of pressing or scraping between each cable and sheet metal;

7.2 System power-up

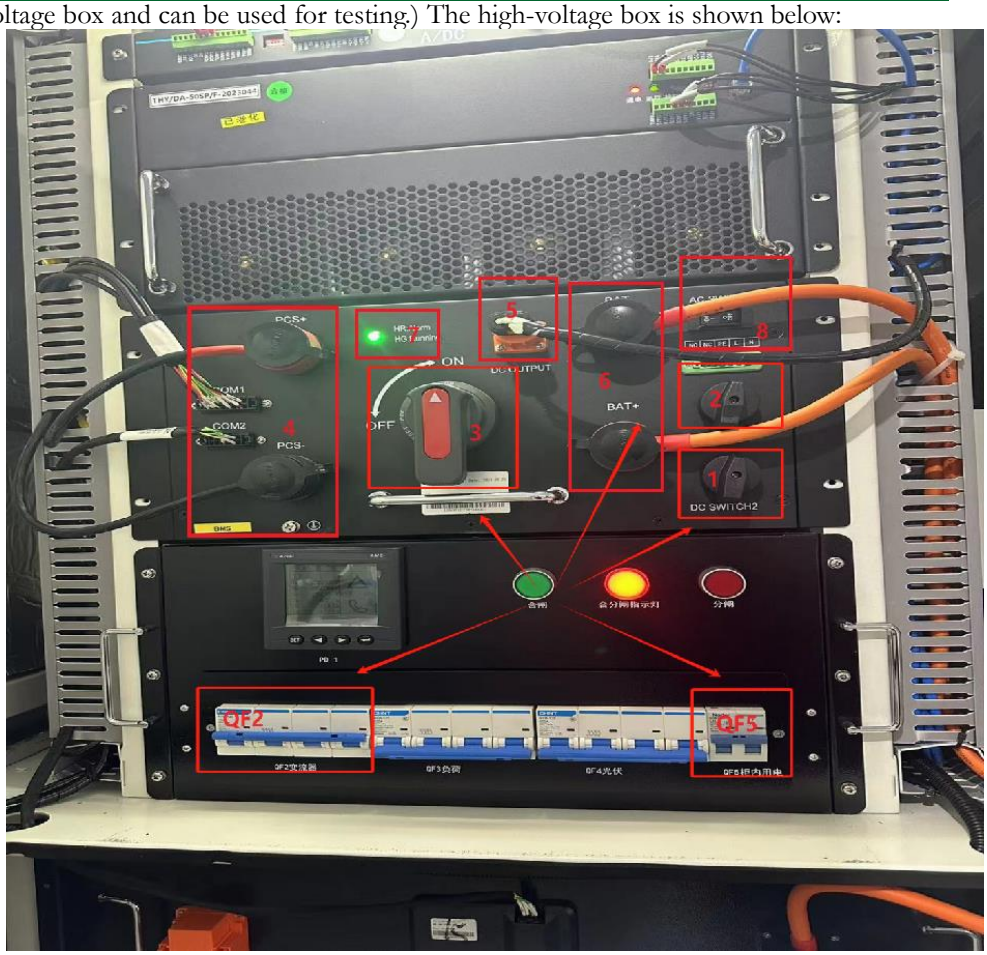
Diagram representation of power distribution section:



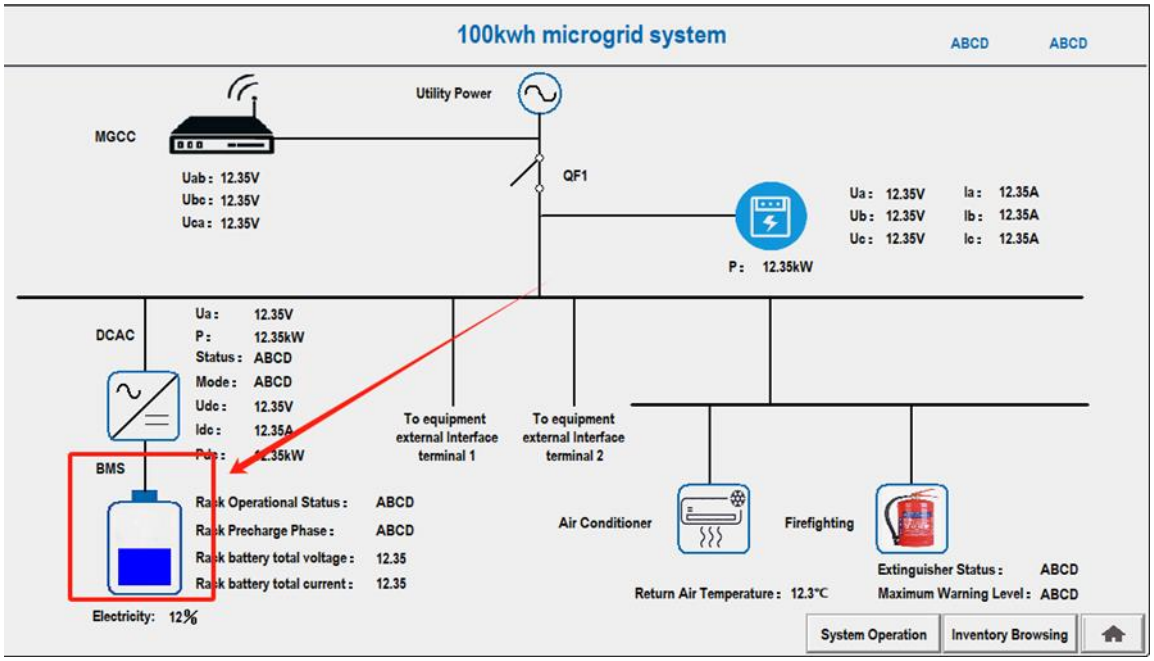
- Step 1: Turn on the switch of the high-voltage box.
- 1. Close the converter micro circuit breaker QF 2, PCS indicator light, note: off the grid can only discharge but not charge, but also connect to the AC side zero line of the converter; use the power micro circuit breaker QF 5 (front of the cabinet) in the closed cabinet;

- . 2. Turn on knobs 1.2.3 in sequence. Knob 1 supplies power to the cabinet. Knob 2 supplies power to the inside of the high-voltage box. Knob 3 is the DC output to the DC side switch of the PCS (for example, number 6 in the figure is the total positive and negative input line of the battery. Label 4 is the output line), enter the BMS interface on the display, click on the device to turn it on, and the indicator light labeled 7 shows green. At this time, it can be observed that there is voltage on the DC/AC DC side, proving that the startup is successful. (No. 8 is the external 220V terminal, which supplies power to the inside of the

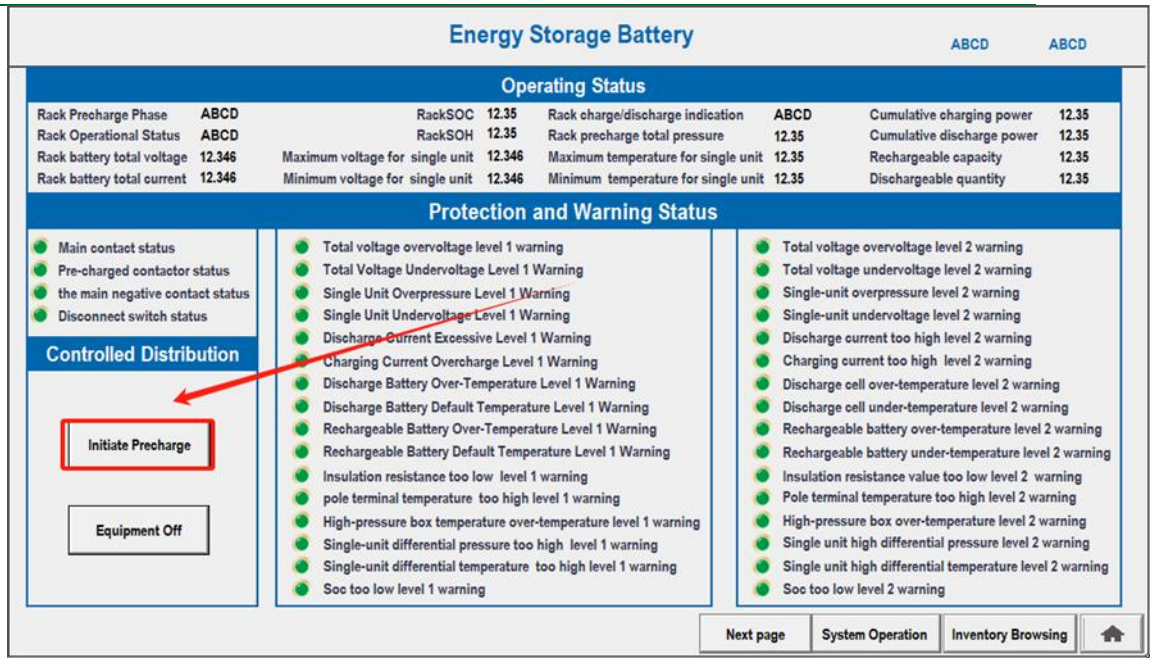
high-voltage box and can be used for testing.) The high-voltage box is shown below:



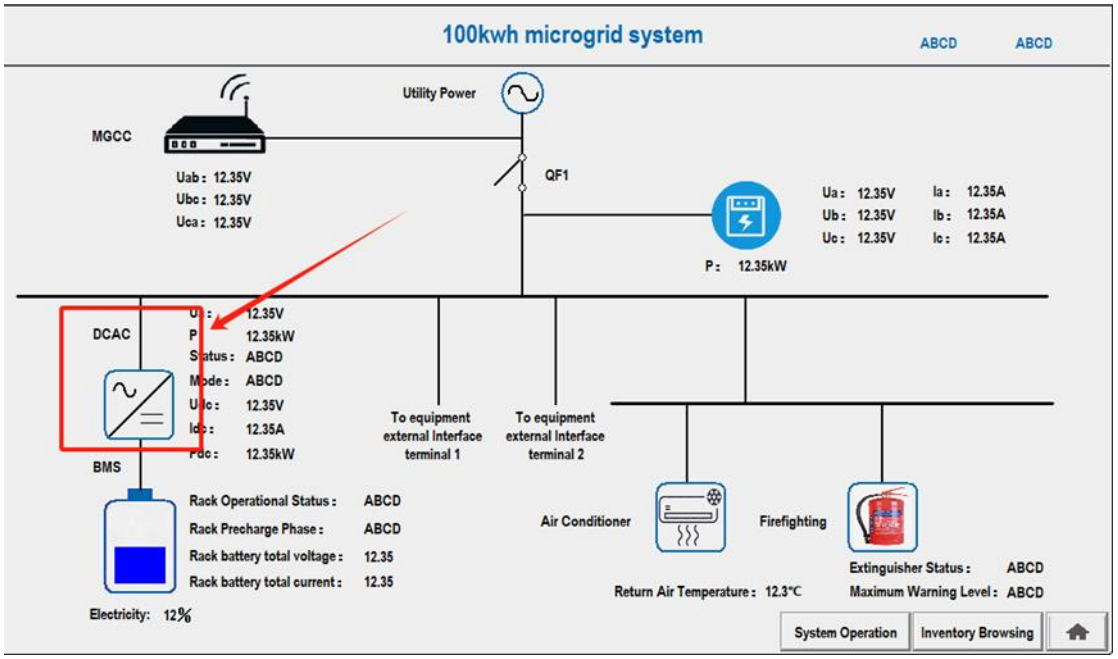
- Step 2: After the switch is turned on, wait for 10-20s to hear a "beep", indicating that the foreign machine has started. At this time, you can operate the screen, and you can observe the data and send parameters through the screen.
- Step 3: Click on the home screen BMS module.



- Step 4: The high voltage box starts the precharge to power the DC side.

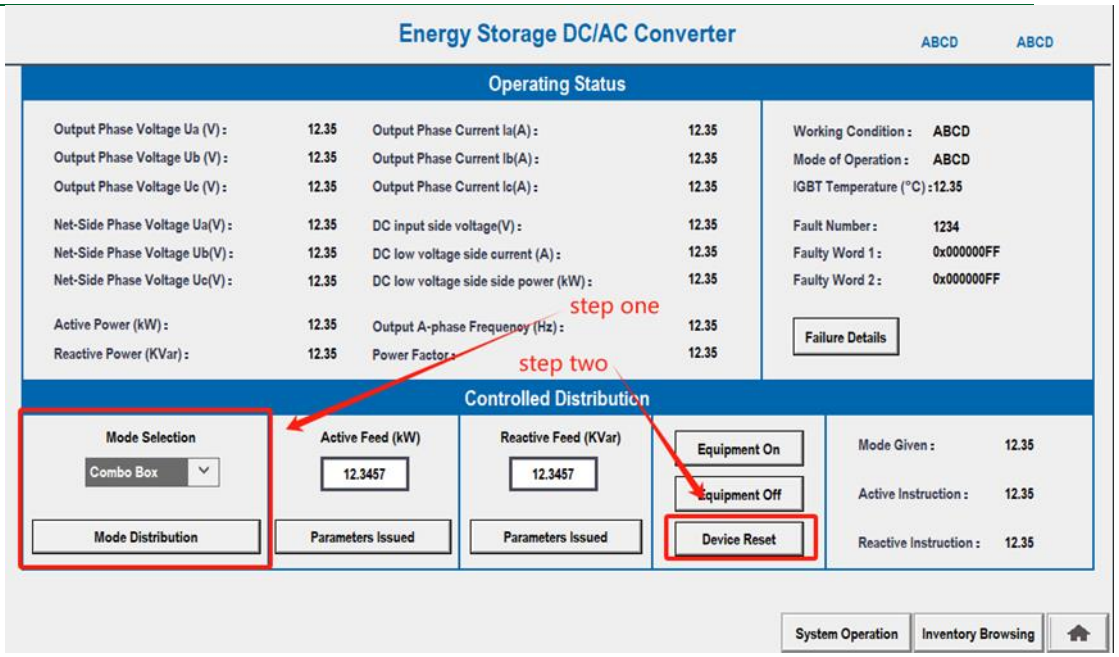


➢ Step 5: Click on the DCAC module on the home screen.

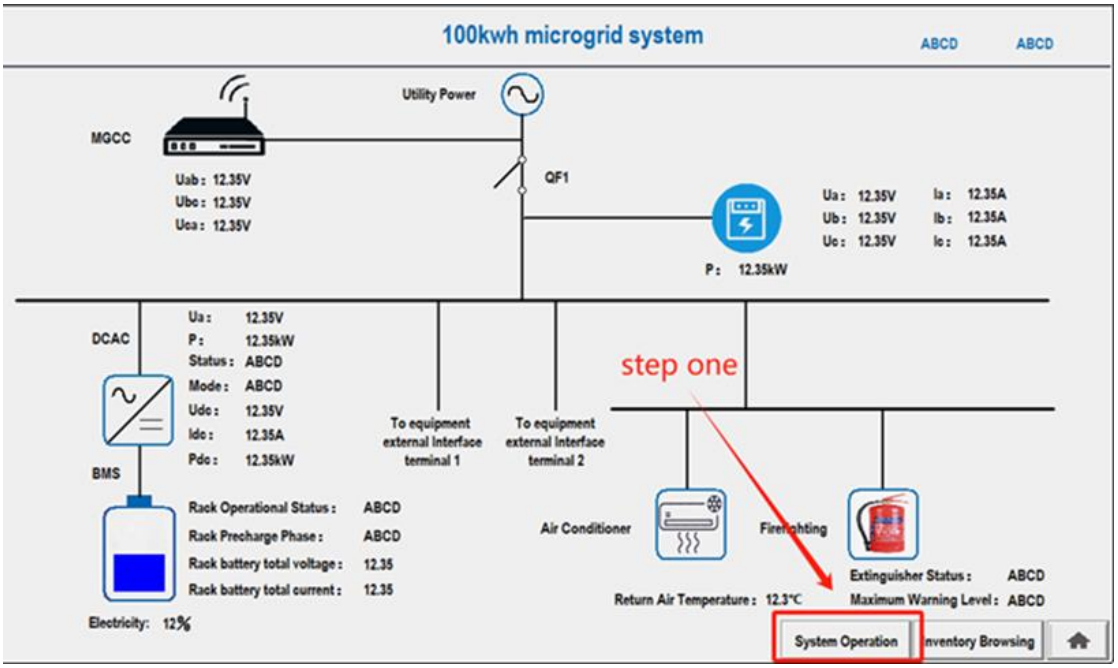


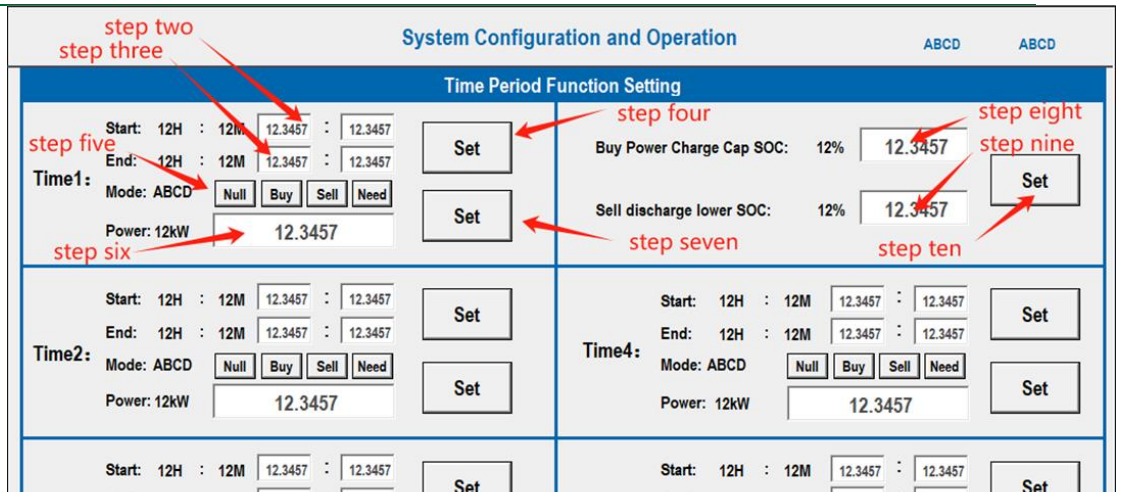
➢ Step 6:1. Select the grid-connected mode (the need for city power access);

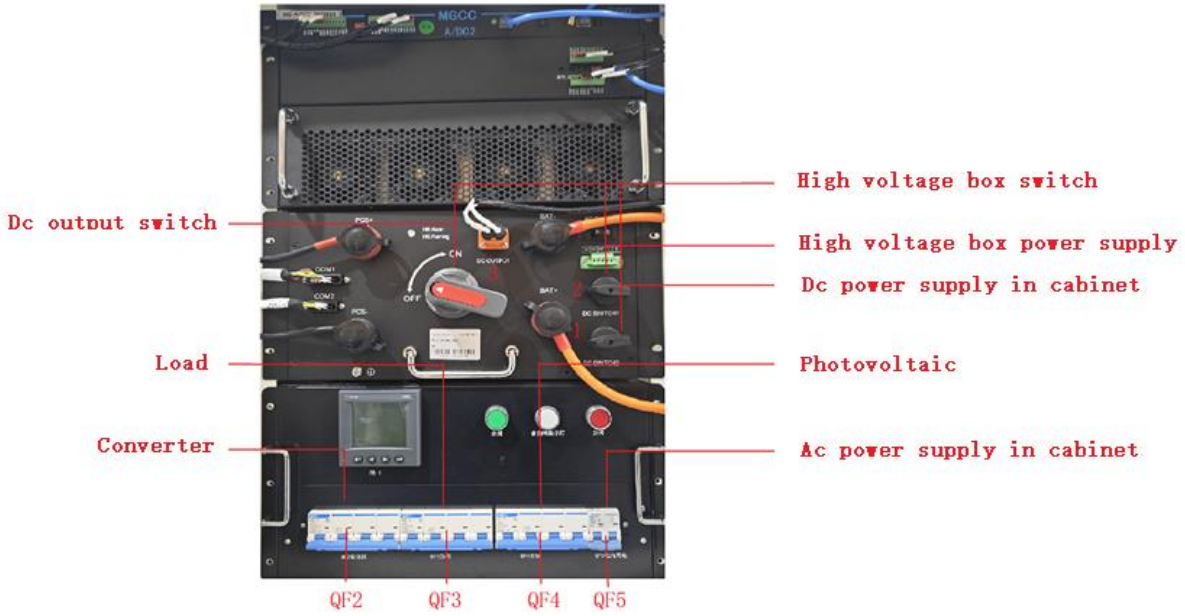
➢ 2. Device reset (wait a few seconds to see if there is any fault).



➢ Step 7: For example, 1. Click to enter the system operation interface; 2. Set the start time; 3. Set the end time; 4. Click SET issuing parameters; 5. Set the mode to buy power, sell power, demand or no; 6. Set the power during the time period; 7. Click SET issuing parameters; 8. Set the upper limit of buying SOC; 9. Set the lower limit of selling SOC; 10. Click SET issuing parameters.11. Click the system to boot up.(After the system is turned up, DCAC will automatically turn up according to the set start period, and check whether the power is consistent with the setting.）







	After shutdown, turn it on again and wait for at least 5 minutes to ensure that the internal capacitor is fully discharged before the product can be operated again.

7.4 Emergency power shutdown

- In case of failure, the system will automatically shut down;
- In a critical situation, you can press the emergency stop button (the red main screen is the emergency stop button), and the system will automatically shut down. After troubleshooting the fault, reset and directly pull out the emergency stop button can be used;
- In case of fire, the system will automatically extinguish the fire, and the EMS system will automatically break the main circuit breaker, turn off the air conditioning system,
- Automatic system shutdown;

	EPO emergency stop button is only used in critical situations. It is strictly prohibited to shut off in non-emergency situations.

8.Routine maintenance

Due to the influence of ambient temperature, humidity, dust and vibration, the devices inside the energy storage system will age and wear, leading to potential faults inside the energy storage system. Therefore, it is necessary to implement daily and regular maintenance of the energy storage system to ensure its normal operation and service life.

All the measures and methods to help the energy storage system to be in good working condition belong to the category of maintenance work.

8.1 Safety precautions

To ensure the safety of the operator, observe the following safety requirements:

- Maintenance must remove all external connections to the energy storage system and to the internal power supply of the equipment;
- Ensure that the energy storage system is not accidentally powered up or turned up during maintenance;
- Use the multimeter measurement to ensure that the internal ac / DC side of the energy storage system is completely uncharged;
- Implement the necessary grounding and short-circuit connection;
- The maintenance tools used must pay attention to the insulation protection;
- Do not remove the internal components privately, If you have any questions, please contact the staff in time;
- End the maintenance, count tools, do not miss tools in the cabinet;

	In order to safely and successfully perform the normal maintenance, we must comply with the relevant safety requirements, must use qualified tools and test equipment, need to have qualified maintenance personnel to participate, suggest two people or more;
	Pay attention to disconnect the AC and DC switch and close the UPS;
	After shutdown and maintenance, please need to wait at least 10 minutes before the corresponding maintenance operation;

8.2 Maintenance work and cycle

Routine maintenance work and cycle, related content recommendation table:

scope of examination	Check the method	Maintenance cycle

System operation status and environment	➢ Whether the equipment is deformed, whether there is abnormal sound in the energy storage system operation; ➢ When the system runs, check whether the parameters are correct; ➢ Check whether the main components are normal; ➢ Check whether the heating of the energy storage system shell is normal, and use the heating monitoring system; ➢ Check the humidity and dust around the energy storage system and all air inlet filters are functioning properly.	Once every six months

	➢ The ventilation of the inlet and outlet, and the blockage degree of the filter screen must be checked; ➢ Maintenance open the door to open gently to prevent the dust of filter cotton raised, resulting in smoke Detector alarm;	
System cleaning	➢ Check the cleaning of the components; ➢ If necessary, clean the system with a compressed air machine; note: ➢ The system must be cut off the power when cleaning the dust;	Every six months to 1 year (depending on the dust content of the used environment)
Power circuit connection check	➢ Check whether the power cable connection is loose and tighten it according to the torque specified above; ➢ Check the power cable and control cable have no damage, especially with the metal surface contact skin has traces of cutting; ➢ Check whether the insulation bandage of the power cable terminal falls off;	Official operation for half a year, and then every six months to a year once
Check terminal and line connection	➢ Check whether the control terminal screw is loose and tighten with a screwdriver; ➢ Check whether the wiring copper row or screws have any color change; ➢ Visually inspect the connection and distribution of equipment terminals; ➢ Check whether the main loop terminal has poor contact and the presence of overheating;	Official operation for half a year, Once every 1 year thereafter
Circuit breaker maintenance	➢ Routine inspection of the corrosion of all metal elements; ➢ Annual inspection of contactor (auxiliary switch and micro switch) to ensure its mechanical operation; ➢ Check the operating parameters (especially the voltage and insulation);	Official operation for half a year, Once every 1 year

		thereafter
Battery maintenance	➢ Conduct normal charging and discharging operation of the battery system to check whether there is any abnormal operation status of the battery, and check whether the status of the battery system indicator light is normal; ➢ It is recommended to carry out full charging and balance operation on the battery regularly;	Every six months to once a year
Fire protection and fire extinguisher gas cylinder inspection	➢ Check whether the pressure gauge of the fire extinguisher cylinder is in the green position. If the air pressure is less than the value, please contact the manufacturer;	Official operation for half a year, and then every six months to a year once
Air conditioning maintenance	➢ Check whether the temperature of the air outlet is close to the refrigeration setting value, ± 2℃; ➢ Dust degree of air inlet and outlet, air outlet using compressed air machine ➢ cleaning;	Once quarter, half year or 1 year; (depending on the dust content of the used environment)
Display maintenance	➢ Check whether there is any water intake in the display screen, and check whether the display screen displays normally without color difference change; ➢ Test whether the display screen responds to switching and selecting content;	Every six months to once a year
safety function	➢ Simate shutdown and check shutdown signal communication; ➢ Check body warning signs and other equipment identification, if found fuzzy or damage, please and When replacement, check the emergency stop button and LCD stop function.	Official operation for half a year, Once every 1 year thereafter

9.Fault treatment

The following fault list lists the possible faults and the handling methods. If the fault occurs, the fault still cannot be solved with the help of this manual, please contact the company.

Please combine the alarm information displayed on the touch screen.

fault type	Possible cause	Handling advice	remarks
Power grid high pressure	The grid voltage is higher than the allowed converter Upper net voltage range limit	Check grid voltage grid voltage recovery to allow The allowable range can be manually reconnected to the grid	Grid voltage is restored to the allowable level Range can be run again
Power grid low voltage	The grid voltage is lower than that allowed of the converter Lower limit of the net voltage range	Check grid voltage grid voltage recovery to allow The allowable range can be manually reconnected to the grid	Grid voltage is restored to the allowable level Range can be run again
High frequency of power grid	The power grid frequency is higher than that of the distributed energy storage system Alallowable grid frequency range	Check power grid frequency power grid frequency recovery to allow The allowable range can be manually reconnected to the grid	Grid frequency is restored to the allowable level Range can be run again
Low power grid frequency	The power grid frequency is lower than that of the distributed energy storage system Alallowable grid frequency range	Check power grid frequency power grid frequency recovery to allow The allowable range can be manually reconnected to the grid.	Grid frequency is restored to the allowable level Range can be run again
Communication flow	The AC current is greater than the AC overcurrent limit.	Check the cable connection of the AC side circuit of the distributed energy storage system and other sources on the AC side or Problem with the load.	If the fault occurs more than 5 times a day, please contact the company
Module failure	internal fault	AC / DC side power off, disconnect the control power after again power on	If the fault persists, please connect Is the company
DC side voltage Low voltage failure	The DC side voltage is below the DC side voltage Under pressure limit	Check the DC of other sources or loads on the DC side Voltage and operating power	If the fault persists, please connect Is the company
DC side voltage High voltage failure	The DC side voltage is higher than the DC side voltage Overpressure limit	Check the DC of other sources or loads on the DC side Voltage and operating power	If the fault persists, please connect Is the company
a-c circuit breaker hitch	Circuit breaker connected by the equipment to the power	After the AC / DC side of the equipment is completely cut off, the	If the fault persists, please connect

	grid Fault	maintenance is broken The router	Is the company
LCD screen failure	LCD screen frequently on and down the power	Disconnect the LCD screen power supply for more than 5 minutes and then start again power on	If the fault persists, please connect Is the company
The BMS communication reason block	Loose communication line, A / B connection, address Or inconsistent port rates	Re-check the connection, address and wave of the communication lines Special rate	If the fault occurs more than 5 times a day, please contact the company
Surge protector fault	Surge protector action	Observe whether the color mark of the surge protector module turns red, and replace the fault surge protector module	If the fault persists, please contact the company
Emergency stop / external jerk	Local or external trigger of the emergency stop system	Check the system for abnormal faults	If the fault persists, please contact the company

10.Transportation and storage

10.1 Transportation

- Integrated power energy storage system delivery is with battery transportation, in the process of handling, it can not be subjected to severe impact;
- In the transportation should be fixed firmly, can not shift in the carriage;
- In the transportation should be strictly placed and transportation, tilt Angle 15°, not horizontal or side lying transportation, so as not to vibrate the device;
- In the process of transportation, it is not allowed to be shipped with inflammable, explosive and corrosive articles;
- It shall not be stored in the open-air warehouse during the midway transfer;
- Equipment is not allowed to withstand shower and mechanical damage from rain, snow or liquid material.

10.2 Storage

- The direction of equipment storage should be placed in the upright direction;
- The cabinet is placed on the wooden plank for storage, 200mm from the ground;
- At least 500mm away from the wall, heat source, cold source, window or air inlet;
- Storage temperature: -20℃ ~65℃;
- The warehouse is not allowed to have all kinds of harmful gases, flammable, explosive articles and corrosive chemicals, and there should be no strong mechanical vibration, impact and strong magnetic field action;
- Since the energy storage system contains the battery system inside, it is recommended that the storage time should not exceed 6 months. If it exceeds 6 months, the battery system should be replenished in time.

11.Quality assurance

Failure of the products during the warranty period will be repaired or replaced with new products free of charge.

The Company has the right not to perform quality assurance due to the following circumstances:

- The whole machine and parts have exceeded the free warranty period;
- Problems caused by when users arbitrarily decompose the product or do not maintain it correctly;
- Operating beyond the very harsh environment described in this manual;
- Problems caused from correct installation and operation as described in the manual;
- Damage to the machine caused by non-standard or non-standard parts or software;
- Product damage caused by the abnormal natural environment;
- Damaging of the controller due to the damage to the external equipment;
- Damage caused during transportation due to unauthorized transfer of products;
- All accidental damage caused by the user's own modification or maintenance of the product;
- For the product failure caused by the above reasons, when the customer requests maintenance service, the service agency may decide and provide paid maintenance service. When needing to repair or transform this product, please contact our company in advance.