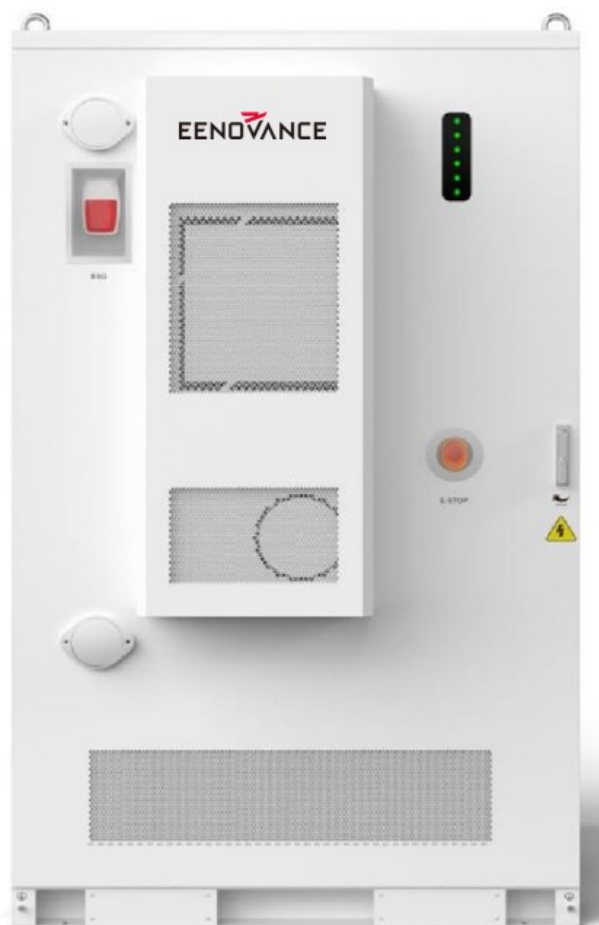




E-MATE 105-221-A

User Manual

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Preface

Main Contents

This manual describes the E-MATE 105-221-A introduction, transport, installation, operation, maintenance and troubleshooting. Before using this product, be sure to read the manual carefully and operate the energy storage system according to the methods described in this manual, or equipment or personal injury may result.

Target Reader

This document is primarily intended for users:

1. Technical support engineers: responsible for providing professional technical support and consulting to solve technical problems.
2. System Installation Engineer: responsible for on-site installation, wiring and hardware configuration of the energy storage system.
3. Testing engineers: responsible for system debugging and testing to ensure that the system operates normally in accordance with the design requirements.
4. Maintenance engineers: responsible for daily system maintenance and troubleshooting, to maintain long-term stable operation of the system.
5. Product end-users: end-users who utilize energy storage systems and need to understand basic operation and maintenance.

Manual Warning Sign Definition

To help users identify potential safety risks and take appropriate precautions to ensure safety when using the energy storage system. Users should read the manual carefully before using the energy storage system and strictly observe all safety warnings and operating instructions in the manual.

Notation	Descriptions
	Used to warn of an imminently hazardous situation which, if not avoided, will result in death or serious bodily injury.
	Used to convey an equipment or environmental safety warning message indicating a hazard with a medium level of risk that may result in death or severe typhoid fever if not avoided.
	Hazards with a low level of risk of causing minor or moderate harm if not avoided.

1 Safety Precautions

1.1 Safety Instructions

Please strictly observe the terms of the safety regulations in this product manual. In order to avoid possible injury or death and property damage during the use of this product, as well as to improve the service life and use efficiency of this product, please be sure to read the safety regulations carefully.

1. Do not immerse the battery in water;
2. Improper use and storage of the battery poses a risk of fire, explosion, and burns; do not disassemble, crush, incinerate, heat, or throw batteries into fire;
3. Do not expose the battery to fire or prolonged exposure to temperatures exceeding the temperature conditions specified in this manual, as this may result in fire;
4. When batteries reach the end of their useful life, used batteries should be disposed of in a timely manner in accordance with local recycling or waste regulations;
5. Do not disassemble, dismantle or recondition the battery in any way without authorization;
6. Do not mix different sizes and brands of lithium-ion batteries;
7. Do not use the battery if it emits a strange odor, heat, deformation, discoloration or any other abnormal phenomenon;
8. Do not short-circuit the positive and negative terminals of the battery, otherwise strong current and high temperature may cause personal injury or fire;
9. Connect the positive and negative terminals of the battery in strict accordance with the labeling and instructions, and prohibit reverse or series wire charging;
10. Prohibit over charging/over discharging of the battery, otherwise it may cause overheating and fire accidents;
11. Avoid skin and eye contact with the electrolyte when it is leaking. In case of contact, wash the contact area immediately with plenty of water and seek medical help;
12. It is prohibited for any person or animal to ingest any part of the battery or any substance contained in the battery;
13. Batteries are potentially hazardous and must be operated and maintained with appropriate protective measures. Failure to do so may result in serious personal injury and property damage;
14. Prohibit any behavior that may cause deformation of the battery, such as needling, hammering, etc., which may cause a short circuit or fire in the battery.
15. Customer setup for off-grid operation requires grid isolation to avoid grid incoming calls damaging the PCS.



WARNING

- This product should not be used off-grid, and does not promise off-grid operation performance and metrics, such as equipment and economic losses caused by customers' private use of off-grid customer's own responsibility..

On-grid connected to off-grid steps:

Step1: Stop ESS system

Step2: Isolated from the grid, PCS connects the N wire to the N copper row in the cabinet

and connects it to the N row of the load.

Step3: System startup, EMS setup PCS Off-grid mode

Off-grid to grid-connected steps:

Step1: Stop ESS system, remove N busbar

Step2: PCS connect to grid

Step3: System startup, EMS setup PCS On-grid mode

1.2 Personnel Requirements

1. When operating or maintaining the energy storage cabinet, it's necessary to wear a helmet, insulated gloves, insulated shoes, goggles, it is strictly prohibited to wear watches and other metal jewelry;
2. Only qualified electricians and trained personnel can operate and maintain this product, and complete professional electrical equipment is required;
3. Personnel responsible for the installation and maintenance of the equipment must be strictly trained in the correct operation methods, and be aware of the various safety precautions and the relevant standards of the country/region where they work;
4. Replacement of equipment or parts (including software) must be done by authorized professionals;
5. Keep persons other than those operating the equipment away from the equipment.

1.3 Electrostatic Protection

Accumulation of static electricity may cause electric shocks, fires, explosions, failure and damage of electronic devices, etc. There are circuit boards or other static-sensitive components in the energy storage cabinet. Board or other static-sensitive components, in order to prevent or reduce the harm of static electricity, it is necessary to do a good job of static protection, and thus inhibit the generation of static electricity, accelerate the leakage of static electricity, static electricity neutralization. The prevention methods include but are not limited to:

1. During the component replacement process, keep all the components that have not been installed in the ESD shielding bag, and the temporarily removed device is placed on a foam mat with anti-static function;
2. Do not touch solder joints, pins or exposed circuitry.

2 Product Introduction

2.1 Naming Rule

NO.	Meaning	Explanation of Parameter Values
1	Series Name	E-MATE
2	Energy Level	105-221: Rated Power 105kW Rated Energy 221kWh
3	Cooling Method	A: Air Cooling

2.2 Energy Storage Systems Overview

2.2.1 Systems Overview

This energy storage system adopts the form of one-piece outdoor cabinet, which integrates battery Pack, High Voltage (HV) box, Energy Management System (EMS), Power Conversion System (PCS), Battery Cluster, Heating Ventilating and Air Conditioning (HVAC), Fire Extinguishing device, Water sensor, Temperature and Humidity sensor, Smoke Sensor and Electric Distribution Unit.

2.2.2 Working Principle

The system consists of 1 Pcs 105 kW bidirectional energy storage inverter, 11 Pcs battery packs in series and 1 Pcs HV box. The main circuit of the HV box is mainly composed of isolation switch, fuse, charging contactor, discharge contactor, negative contactor, pre-charged contactor, pre-charged resistor and hall current sensor.



Fig. 2-1 E-MATE 105-221-A Air-cooled Energy Storage Cabinet Exterior View

2.4 Technical Parameters

No.	Items	Spec.	Remarks
System Parameters			
1	Rated Power	105 kW	
2	Rated Energy	221.056 kWh	
3	Rated DC Voltage	704 VDC	
4	Rated AC Voltage	400 VAC	
5	System Voltage	1000 VDC	
6	Charge/Discharge Current	157 A/157 A	
7	Operating Temperature Range	-30℃~+55℃	Derating below-15 ℃ or above 45 ℃
8	IP Level	IP55	
9	Corrosion Resistance	C4	
10	Dimension	1380*1540*2330 mm	
11	Weight	2500 kg	
Pack Parameters			
12	Configuration	1P20S	
13	Rated Capacity	314 Ah	
14	Rated Voltage	64 V	
15	Voltage Range	50 V-73 V	
16	Rated Energy	20.096 kWh	
17	Charge /Discharge Current	≤0.5 P	
18	Altitude	2000 m	
19	IP Level	IP20	
20	Dimension	420*910*228 mm	W*D*H
21	Weight	142.6±2 kg	
AC Parameters			
22	Rated Output Power	105 kW	
23	Rated Grid Voltage	400V±15%	

24	Rated Current	144 A	
25	Rated Frequency	50 Hz/60 Hz±2.5 Hz	
26	Output THDI	<3 %	
27	Power Factor	-1~1	
28	AC Output Type	3W+PE	
29	Charge/Discharge Time	Conversion	<100 ms
30	Maximum Efficiency	98.5%	
HV Box Parameters			
31	Rated Voltage	1000 V	
32	Rated Current	250 A	
33	IP Level	IP20	
34	Dimension	800*420*200 mm	W*D*H
35	Weight	35 kg	
Other Parameters			
36	Fire Fighting System	Aerosol	
37	Altitude	2000 m	
38	Noise	<75dB	
39	Environment Humidity	0~95℃,non-condensing	
40	Cooling Method	Air Cooling	
41	Environmental Requirement	ROHS	
42	Communication Protocol	CAN/RS485	
43	Design Service Life	8000 times cycle (25 ± 2 ℃ , 0.5P/0.5P,70% EOL,90%DOD /10 year, whichever comes first)	
44	Compliance	UN38.3, UN3480, IEC62619, IEC-LVD, IEC-EMC	

2.5 Main Components

2.5.1 Cabinet

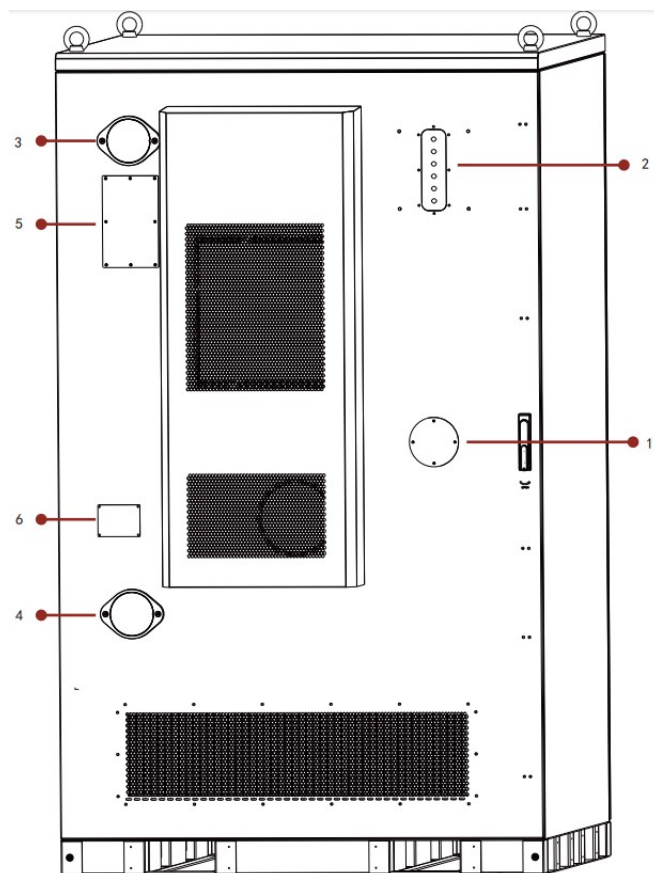


Fig. 2-2 Description of Cabinet Components (Closed State)

Table 2-1 Cabinet Front Door Components

No.	Components	Amounts	Remark
1	Emergency stop button	1	Press this button when the device is in emergency
2	Indicator display light	1	Display power and status indication: Display power and status indication: The top-down lights are numbered from 1# to 6#, 1# is the status light (the operation is yellow, the fault is red), 2# to 6# is the SOC power indicator (if only 6# is on, the SOC is 20%. if 5# and 6# are on simultaneously, the SOC is 40%. if 4#, 5# and 6# are on simultaneously, the SOC is 60%. The simultaneous brightness of 3#, 4#, 5# and 6# indicates that SOC is 80%, while the simultaneous brightness of 2#, 3#, 4#, 5# and 6# indicates that SOC is 100%)
3	Exhaust valve (air venting)	1	Vent the flammable gases from the battery cabinet to the outside.

4	Exhaust valve (air inlet)	1	Suck external air into the battery cabinet.
5	Audible and visual alarm	1	For internal equipment temperature, smoke and other abnormal alarm
6	Product nameplate	1	Product information

2.5.2 Battery Pack

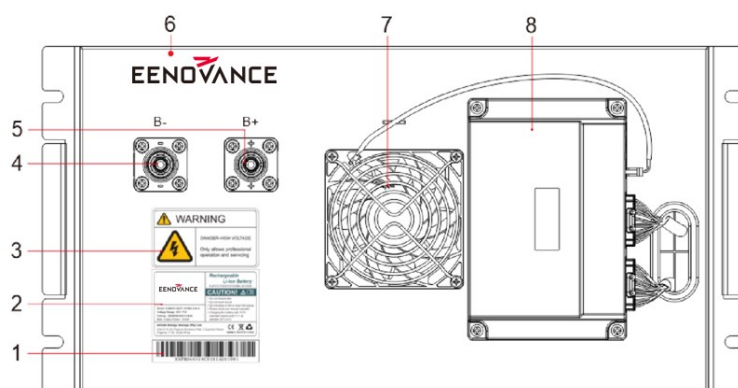


Fig. 2-3 Pack Panel Schematic diagram

Table 2-2 Device Description

No.	Description	Remark
1	Bar Code	Battery information
2	Nameplate	/
3	Warning Label	/
4	Negative Terminal	/
5	Positive Terminal	/
6	Logo	/
7	Fan	DC 24V fan
8	BMU Acquisition Module	Battery voltage and temperature collection

2.5.3 High-Voltage Box

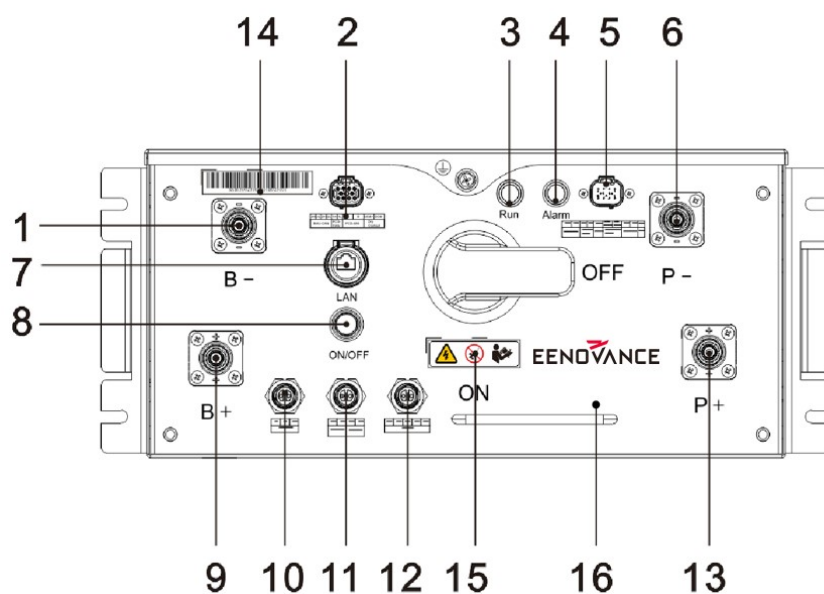


Fig. 2-4 HV Box Panel Schematic Diagram

Table 2-2 Device description

NO.	Description	In use	Remark
1	B-	✓	Battery cluster -
2	COM4	✓	Communication port (BMS-PCS/EMS)
3	Run	✓	Warning light, refer to the table (6)
4	Alarm	✓	Warning light, refer to the table (6)
5	COM2	✓	Communication port (BCU-BMU)
6	P-	✓	PCS -
7	LAN	Reserve	External network communication port
8	ON/OFF	✓	HV box power-on/off
9	B+	✓	Battery cluster +
10	COM1	✓	AC 220V input
11	COM3	✓	DC 24V output
12	COM5	✓	Debugging port
13	P+	✓	PCS +
14	Bar Code	✓	HV Box information
15	Warning Label	✓	/
16	Logo	✓	Supplier name

2.5.4 Communication Box

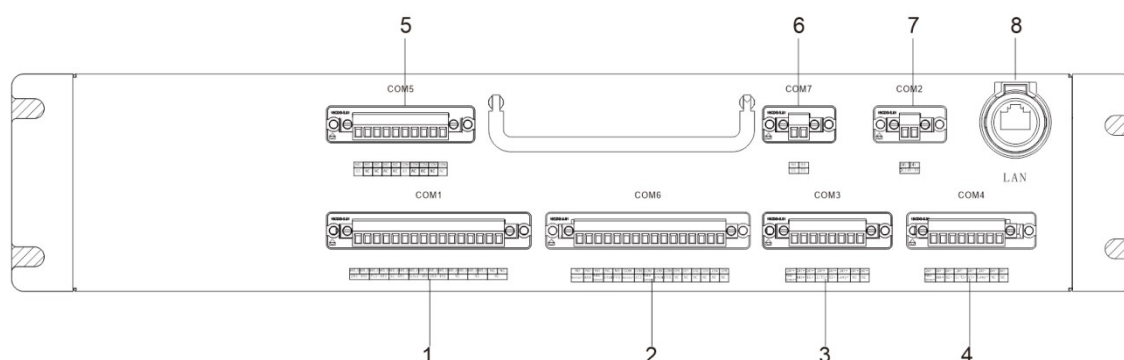


Fig. 2-5 Communication Box Panel Schematic Diagram

Table 2-3 Device Port Description

No.	Symbol/Name	In use	Remark
1	COM1	✓	External communication port (BMS, PCS, EMS etc.)
2	COM6	✓	Signal feedback (Aerosol, Access, Emergency Stop etc.)
3	COM3	✓	DC 24 V output +(HMI,4G, Water sensor etc.)
4	COM4	✓	DC 24 V output -(HMI,4G, Water sensor etc.)
5	COM5	✓	Signal feedback (Combustible Gas)
6	COM7	✓	Signal feedback (Smoke Sensors, Temperature Sensors)
7	COM2	✓	DC 24 V input (From HV box)
8	LAN	✓	EMS communication port

2.5.5 Power Distribution Box

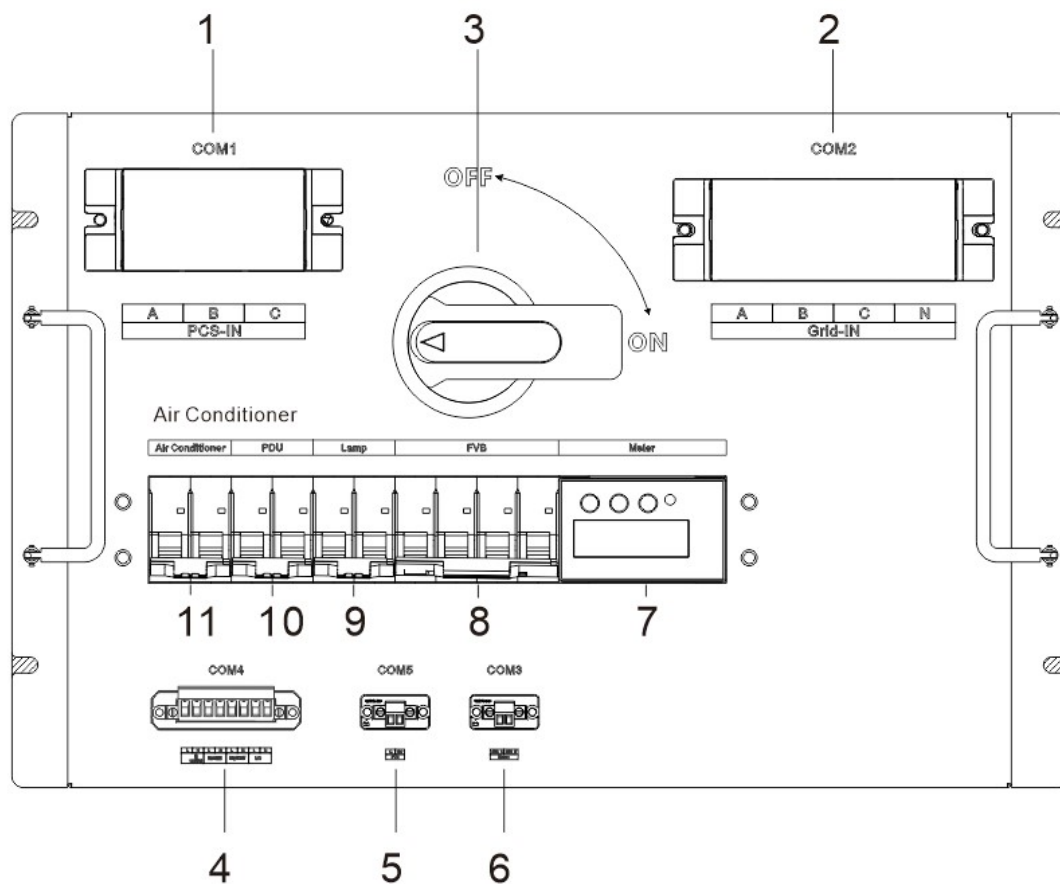


Fig. 2-6 Electrical Distribution Box Panel Schematic Diagram

Table 2-4 Device Description

NO.	Symbol/Name	In use	Remark
1	COM1	✓	PCS power terminal
2	COM2	✓	Grid power terminal
3	Circuit Breaker	✓	Breaker handle (ON/OFF Grid Breaker)
4	COM4	✓	AC 220V output (Air Conditioning Box and Lighting)
5	COM5	✓	Signal feedback (FVB)
6	COM3	✓	Communication port (EMS-Meter)
7	METER	✓	Electricity meter
8	FVB	✓	MCB of FVB
9	lamp	✓	MCB of lighting
10	PDU	✓	MCB of HV box
11	Air Conditioner	✓	MCB of Air conditioning

2.5.6 Air Conditioner

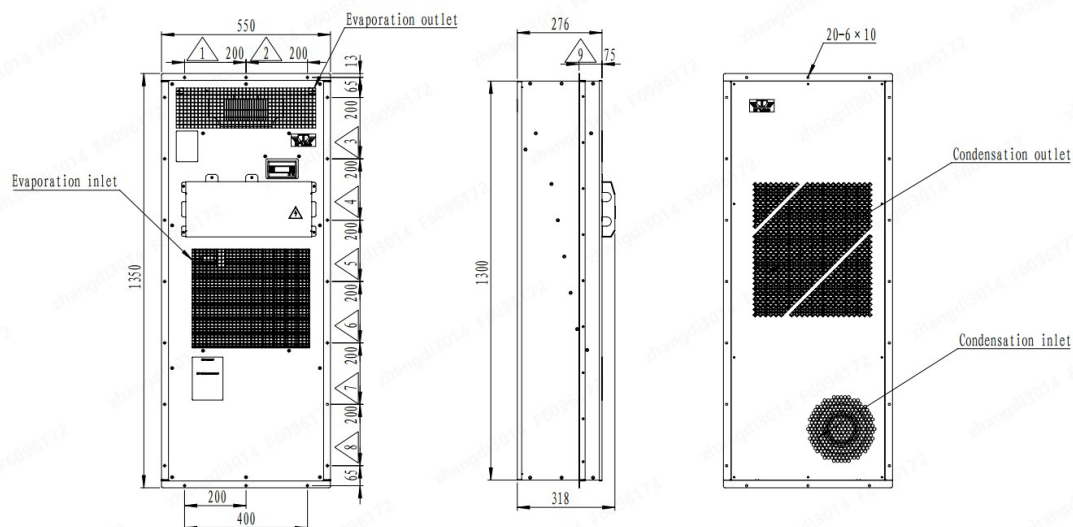


Fig. 2-7 Air Conditioner Diagrammatic Sketch

Table 2-5 Air Conditioning Technical Parameters

No	Item	Spec.
1	Operation Temperature	-45~50 °C
2	Rated AC input Power Supply	220VAC~50Hz/60Hz
3	Rated Cooling Capacity	3200 W
4	Rated Power (Cooling/Heating)	1600/1200 W
5	Rated Current (Cooling/Heating)	7.2/5.4 A
6	Heating Power	1000 W
7	Air Quantity	1300 m ³ /h
8	Weight	75 kg
9	IP Level	IP55
10	Refrigerating Fluid	R134a

2.5.6.1 Introduction of Air-conditioning Panel and Key Functions

The air conditioner enters standby loading after powering up, if there is no EMS communication strong control mode when set the parameters of the air conditioner through the panel.



Fig. 2-8 Display and Setting Board

Buttons	Function Descriptions
	To modify temperature parameter in setting mode.



To check cabinet-in temperature, cabinet-in humidity, condensing temperature, defrosting temperature and setting temperature in working mode.



Press and hold 3 sec. at the same time to enter the setting state, the digital tube blinks, 5 sec no operation automatically exit.



Long key press  for 3 sec can enter the parameter setting interface. setup mode is used to switch the parameter setting items.



Press  to turn on the power in standby mode, press  to turn off the power in power-on mode, and long press  for 3 sec to reset in faulty mode.

2.5.6.2 Display Instructions

The control board has three LED indicators for current chiller status and a four-digit, seven-segment LED digital tube display:

Name	Functional Description
Operation Indicator Light	Blinking: running
Cooling Indicator	Refrigeration compressor operating instructions
Alarm Indicator	Marking equipment is faulty and needs to be serviced
Display Window	Current ambient, defrosting and preset temperature are displayed, which can be switched by pressing "  " or "  ".

As shown in the following Fig., after switching on the cooling unit, the software version is displayed for 2 sec., (i.e., "r1.0" means software version is 1.0), followed by the setting state.



The controller has a 7-segment LED display, which can normally display the current ambient temperature after switching on the power supply, as shown below:



At this time, press the "" key, in the frost melting temperature and cabinet humidity, condensing temperature and preset temperature directly switch. The defrost temperature is shown below:



2.5.6.3 Modification Via Panel Parameters

After switching on the power supply, press "UP" and "DOWN" buttons simultaneously for 2 sec. to enter the password input interface, 【pd00】 is displayed. Then press the "DOWN" to modify the value of the password to 1, press the "UP" to enter factory parameter setting state, password error will automatically exit (Password:1). The setting state automatically exits without operations for 5 sec., and ambient temperature is displayed. automatically, and display the temperature inside the cabinet.

Table 2-6 Air Conditioning Settings Parameters

Codes	Parameter name	Suggested Setting Value	Default value	Setting range	Unit	Remark
P1	Refrigeration Set Point Temperature	20	30	20-50	°C	/
P2	Refrigeration Control Hysteresis	2	2	1~15	°C	/
P3	Heating Set Point Temperature	10	25	-40-35	°C	/
P4	Heating Control Hysteresis	2	2	1-15	°C	/
P5	Humidity Set Point	75	60	60-90	%RH	/
P6	Humidity Control Hysteresis	10	10	1-20	%RH	/
P7	Cabinet overheating point	50	60	30~70	°C	/
P8	Cabinet Temperature Lower Limit	10	0	0-30	°C	/
P9	Cabinet Humidity Overset Point	90	80	50-100	%RH	No humidity module and cabinet-in humidity overhigh point= "--", disable the alarm of cabinet-in humidity overhigh
PA	Communication Permissions	0	0	0~1	/	Communication permission = read-only, the host computer can only read data
PB	Communication Address	1	1	1~32	/	Setting the Device Address for RS485 Communication
PC	Baud Rate	0	0	0-2	/	0=9600/1=19200/2=115200
PE	Startup Method	1	1	0-1	/	Set D1=1 to automatically start the unit after a delay following power-up Set D1=0 for external signal control (start on closure).
PF	Fault Relay Output During Standby Mode	0	0	0-2	/	0 Manual: Press the button Strat/Stop to control the unit 1 Auto: In the case of standby, delay automatically start the unit. 2 Remote : When the remote control switch is closed, the delay automatically starts the unit.

2.5.7 PCS

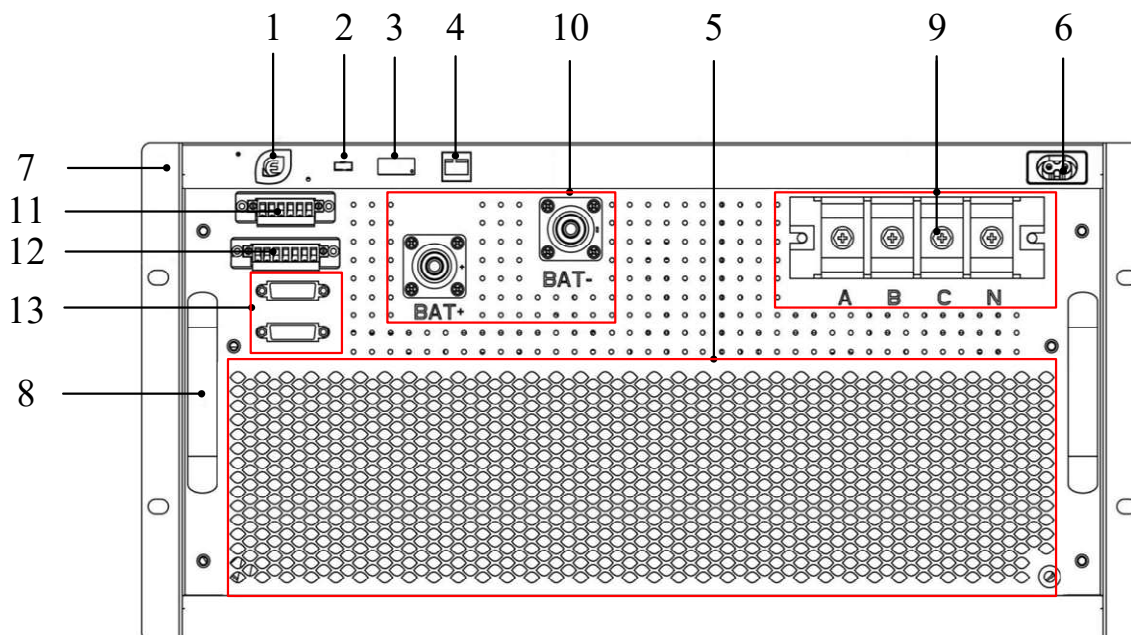


Fig. 2-9 PCS Panel Diagrammatic Sketch

Table 2-7 PCS Technical Parameters

NO.	Symbol/Name	Functional Description
1	Indicator light	● Operating output power is green for a long time. ● In standby (0kW operation), the green light blinks 0.5s quickly. ● When the system is not powered on and no fault occurs, the green light blinks slowly for 1s. ● If the device is faulty, the indicator blinks red.
2	ETH/LOCAL	Ethernet/local debug switch. Right dial LOCAL for local debugging. Dial ETH Ethernet (reserved) on the left
3	(I/O) 6-Position Dip Switch	Bits 1-2 are for CAN communication matching resistor access. Bits 3-6 are module address settings (binary) - bit 6 is the lowest bit (right to left).
4	TEST Debugging Network Port	Factory back-end debugging communication port (internal dedicated).
5	Ventilation Opening	Air duct vent hole for forward air and out air
6	220V Power Supply Interface	220Vac input (internal dedicated)
7	Mounting ears	Installed on both sides of the module to secure it to the rack.
8	Handle	Rack-mount module handle, not for load-bearing
9	AC Interface	AC Side Terminal
10	DC Aviation Connector	DC Side Terminal
11	Grid Current Sampling Interface	A/B/C three-phase current inlet and outlet interface (reserved)

12	Grid Voltage Sampling Interface	A/B/C/N Grid voltage sampling input interface (reserved)
13	External Communication Port	COM (26pin signal terminal) signal port

2.5.8 EMS/HMI

EMS is responsible for the equipment status monitoring and energy optimization scheduling of BMS battery system, PCS converter system, temperature control system and fire protection subsystem.



Fig. 2-10 EMS/HMI Schematic Diagram

Table 2-8 EMS / HMI Device Description

NO.	Symbol/Name	In use	Remark
1	Display Screen	✓	10.1 inches, 1280 × 800
2	LAN0	✓	It is used to connect serial server and communicate with BMS, PCS, air conditioner, electric meter, etc.
3	LAN1	✓	Used for connecting to 4G industrial gateways.
4	USB1、USB2、USB3、USB4	×	USB Interface, for exporting files, device upgrades, and more.
5	H0、L0	×	For connecting combustible gas detectors

6 POWER



9-28V, VCC connected to the positive electrode, GND connected to the negative electrode.

2.5.9 Fire Safety System

The energy storage cabinet fire protection system includes pack-level and cluster-level fire protection. Pack-level fire protection can provide early detection of fire sources at the root of the pack and rapid-fire extinguishing, while cluster-level fire protection can focus on the external fire sources of the system, preventing their spread and inhibiting their growth.

2.5.9.1 Cluster-level fire protection

Cluster-level fire protection system can be divided into fire extinguishing system and explosion-proof exhaust system. When the battery is out of thermal control and combustible gas leaks, the explosion-proof exhaust system responds in time for air intake and exhaust. When a fire occurs, the fire extinguishing system acts quickly to detect, alarm and extinguish the fire.

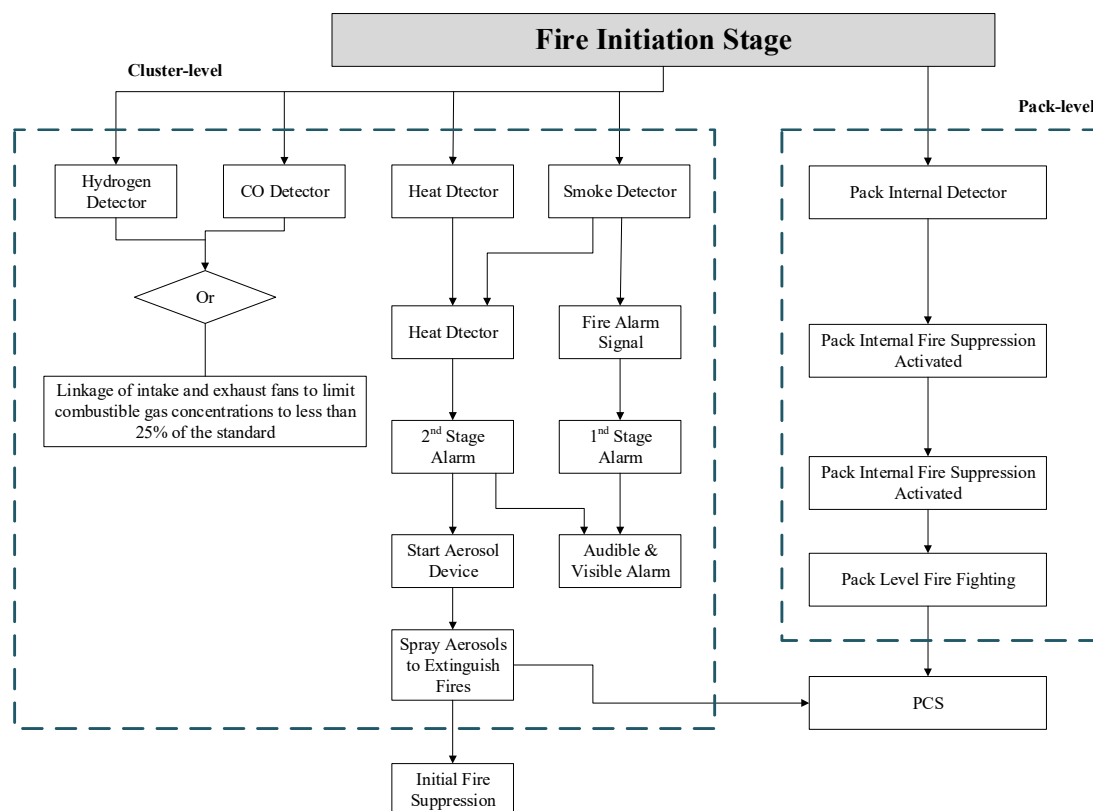


Fig. 2-11 Fire Control Logic Diagram

2.5.9.2 Fire Safety System Components

Table 2-9 Fire Safety System Components

Item	Name	Quantity
1	Temperature detector	1
2	Smoke detector	1
3	Audible and visual alarm	1
4	Aerosol extinguisher	1

5	Fire alarm	1
6	Inlet valve	1
7	exhaust valve	1

Firefighting Logic: When the smoke detector inside the cabinet detects a fire, the sound and light alarm outside the protected area will activate immediately to alert personnel to respond. When both the smoke and temperature detectors detect a fire simultaneously, they output an electrical signal, triggering the fire extinguishing device to initiate firefighting, and simultaneously sending a feedback signal to the EMS to notify personnel to handle the situation in a timely manner.

Valve Motion Logic: The explosion-proof ventilation system consists of a flammable gas detector, intake valves and fans, and exhaust valves and fans. When the flammable gas detector reaches the alarm threshold, it outputs an alarm signal, linking the intake/exhaust valves and fans to ventilate and exchange air, preventing the accumulation of flammable gases and the occurrence of deflagration phenomena.

3 Product Lifting, Transport, Storage



DANGER

- Prohibition of rough loading and unloading, as this may result in short-circuiting, damage, fire or explosion of the battery.

3.1 Hoisting Operation

3.1.1 Safety Precautions for Hoisting Operations

- Throughout the entire hoisting process, it is essential to strictly follow the safety operating procedures of the crane.
- Within a 10-meter radius of the operating area, no one is allowed to stand, especially under the crane arm and directly below any lifted or moving machinery, to prevent accidents and casualties.
- In case of adverse weather conditions, such as heavy rain, fog, or strong winds, hoisting operations should be halted.

3.1.2 Preparations Before Hoisting

- **Crane Preparation:** The total weight of the equipment (including packaging) is about 3 tons, please select the crane lifting tonnage according to the total weight of the equipment and the site conditions, recommended tonnage: 5 to 8 tons.
- **Tool Preparation:** Wire rope, buckles, brace, etc.

3.1.3 Hoisting Process

- The hoisting process must be carried out strictly in accordance with the hoisting diagram. For specific details, please refer to the attached Fig. 3-1 below.
- Lifting should be done vertically, and it is prohibited to drag on the ground or to push and

drag across any surface.

- After the cabinet is lifted 300mm off the ground, the movement should be paused to inspect the connection of the lifting gear. Only after confirming that the connection is secure, then continue with the lifting process.
- Throughout the entire hoisting process, it should be carried out slowly, with careful observation of the box's balance. The movement must not be too fast.

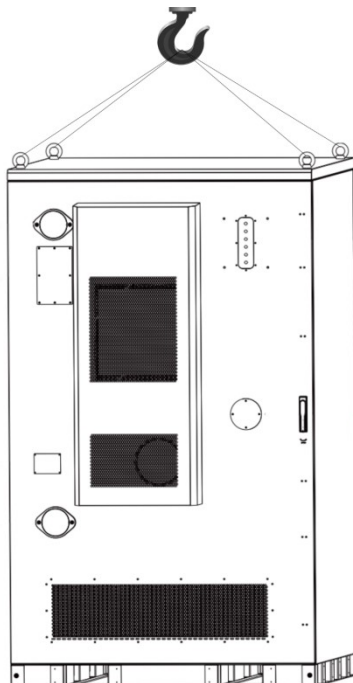


Fig. 3-1 Lifting Schematic

3.2 Forklift Operation

When conducting forklift operations with a forklift, the following conditions must be met:

1. The forklift used should have adequate load capacity (it is recommended to have at least 5 tons).
2. When using a forklift for lifting operations, the fork should be fully inserted into the entire depth of the energy storage cabinet, with the fork length being no less than 1500mm. As shown in Fig. 3-2 below:

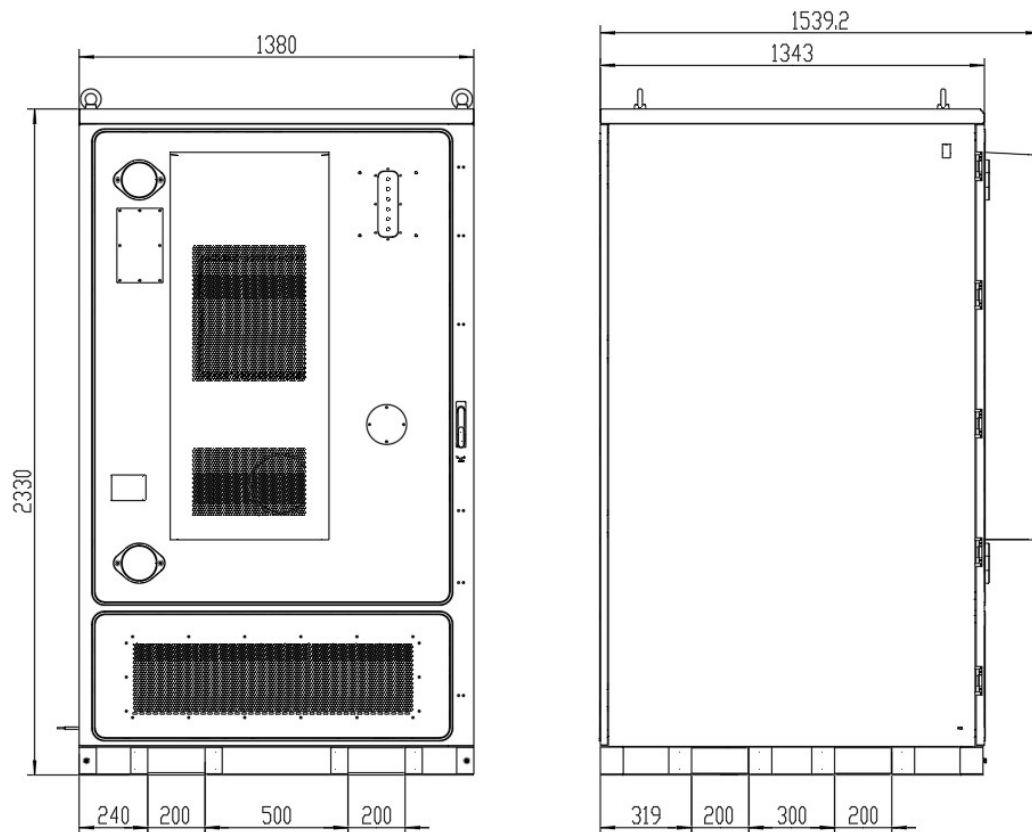


Fig. 3-2 Forklift Hole Diagram

3. During the movement, make sure that it is slow and smooth, and a test fork must be performed.
4. For safety considerations during forklift loading, it is recommended that a safety belt be tied around the energy storage cabinet and attached to the forklift crossbar. For specific forklift operations, refer to Fig. 3-3 below.

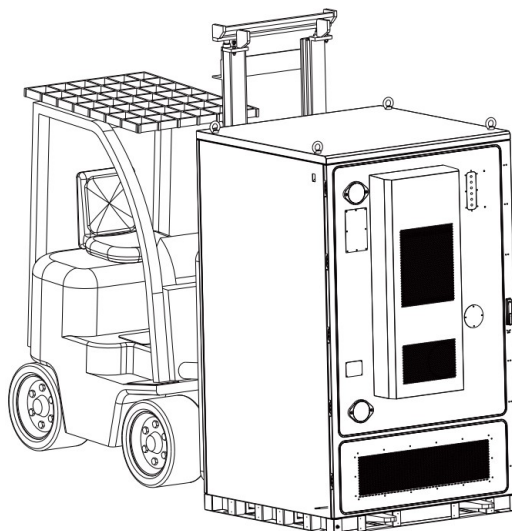


Fig. 3-3 Fork Diagram



- Always keep in mind the mechanical parameters of the energy storage system during transportation and handling
- Dimension (W*D*H): 1380*1540*2330mm
- Weight: about 2500kg

4 Equipment Installation

4.1 Installation Precautions

4.1.1 Installation Requirements

- Be careful not to touch the staff when the cabinet is lifted to the ground.
- Specialized installation isolation areas are required to perform installation operations.
- During the lifting process, pay more attention to the energy storage cabinets to be held lightly.
 - Installation should only be carried out by installers trained in high voltage electrical handling.
 - Do not install the energy storage cabinet if it is defective, cracked or damaged.
 - Do not attempt to open, disassemble or modify the energy storage cabinet during installation.
- Do not install in inclement weather such as rain, sand, etc..
- To protect the Energy Storage Cabinet and its components from damage during transportation, do not hit, drag or step on the Energy Storage Cabinet, and do not subject the Energy Storage Cabinet to any strong external force.
 - Do not insert foreign objects into any part of the energy storage cabinet.
 - Do not expose the energy storage cabinet or its components directly to flames.
 - Do not install energy storage cabinets near heating equipment.
 - Do not immerse the Energy Storage Cabinet or its components in water or other liquids.
 - Please place the energy storage cabinet on a level floor and make sure that it is placed smoothly without wobbling or tilting.
- The installation of energy storage cabinets should take into account the bearing and loading capacity of the ground on which they are installed.

4.2 Pre-installation

4.2.1 Installation Environmental Requirements

Considering the space requirements of the energy storage battery storage cabinet, the specific installation distance is based on the requirements of local design and installation specifications.



NOTICE

- The maintenance space of the front door of the cabinet is required to be not less than 1.5m (if a forklift is needed to replace the pack, it is recommended to reserve 2.5m).
- The maintenance space on the left and right sides is required to be not less than 0.05m.
- The maintenance space of the back door of the cabinet is required to be not less than 0.8m.

- Environment Humidity: 0~95 °C. non-condensing.
- Altitude: 4000m (>2000m derating).

Refer to Fig. 4-1 below for a diagram of the minimum dimensions for the installation and operation and maintenance of energy storage cabinets:

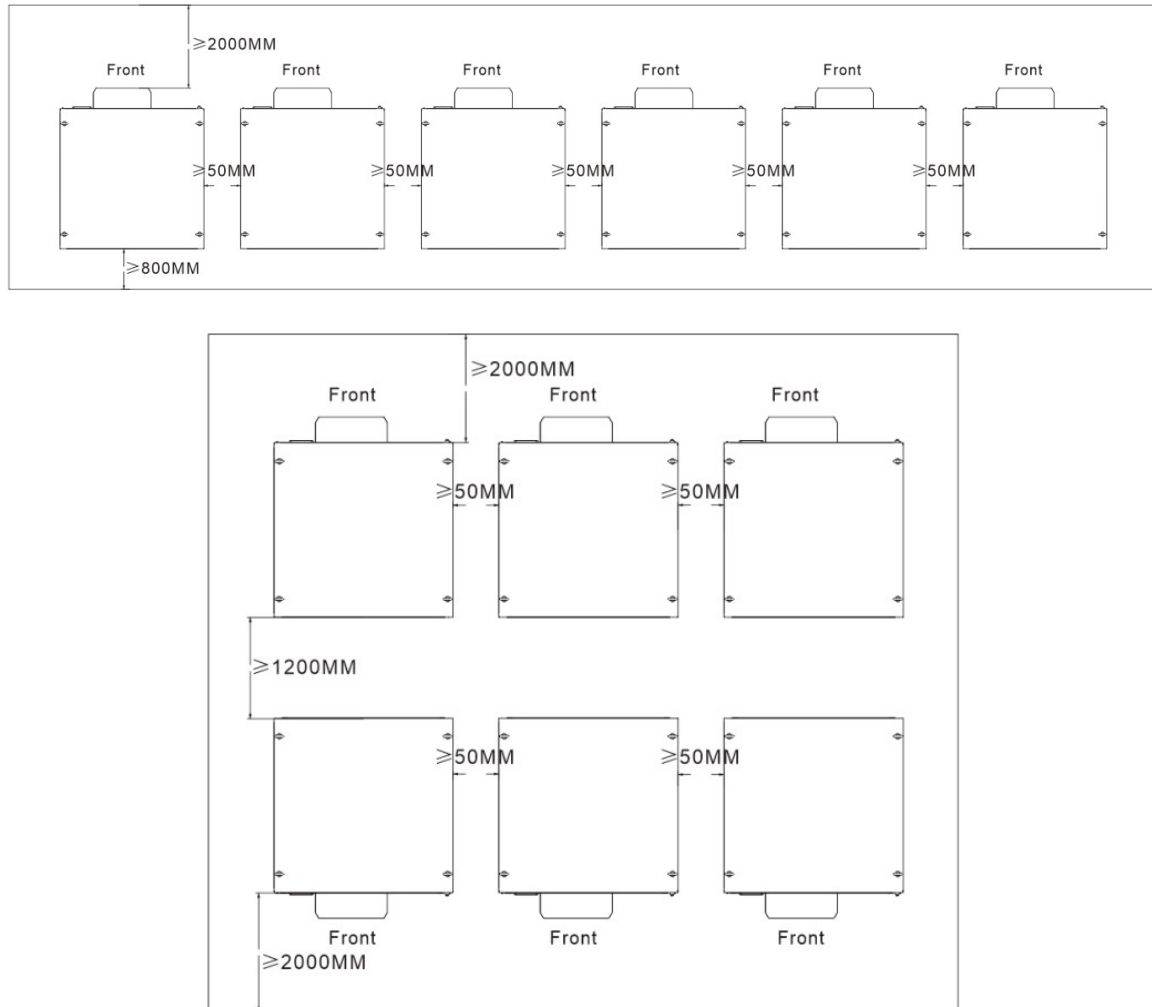


Fig. 4-1 Installation Site Requirements

4.2.2 Foundation requirements

1. The installation level should be higher than the highest water level in the history of the area and at least 200mm higher than the horizontal ground, and the installation position should not be in low-lying areas. The installation site should have a dry climate, good ventilation, and be located away from areas prone to fire or explosion hazards.

2. The energy storage cabinet must be mounted on concrete or other non-combustible surfaces, and the mounting plane must be level, firm, and flat, with sufficient bearing capacity to prohibit depressions or tilting.

3. The foundation soil needs to have a certain degree of compactness, and it is recommended that the relative density of the soil at the installation site is not less than 98%. If the soil is loose, corresponding measures must be taken to ensure the stability of the foundation. The equipment foundation is configured according to the total weight of the equipment, if the foundation capacity is not satisfied, it needs to be reviewed.

4. Equipment foundation excavation is strictly prohibited after soaking water disturbance, if soaking water disturbance should continue to excavate and replace the fill.
5. Equipment foundation and cabinet contact surface level error less 3m.
6. Construction of drainage facilities in conjunction with local geology and municipal supporting drainage requirements to ensure that water does not accumulate at the foundation of the equipment. foundation construction should meet the local historical maximum rainfall drainage requirements, and the discharged water needs to be treated in accordance with local laws and regulations.
7. When constructing the equipment foundation, it's important to consider the energy storage cabinet cable outlet and reserve a trench or inlet hole. The trench must incorporate necessary waterproof and moisture-proof designs to prevent cable aging and short circuits, which could affect the normal operation of the energy storage equipment. Due to the high power of the equipment and the correspondingly thick cables required, the design of the trench must take into account the cross-sectional area of the cables adequately.
8. The holes reserved for the foundation of the equipment and the holes for the inlet lines at the bottom of the equipment shall be blocked.
9. Customers can determine the number of cables supports based on their needs, and the cable supports must fully consider the weight and size of the equipment. When laying cables, communication lines, power lines, and power cables need to be laid separately. Direct current circuits and alternating current circuits should be laid separately, and the distance between different cables should be greater than 300mm.
10. Site Location Requirements. The area where the equipment is placed should be firm, level, well drained, and free of obstructions or protrusions.

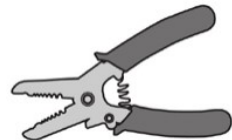
4.2.3 Equipment Ventilation Requirements

The operation of energy storage equipment generates a large amount of heat, and high equipment temperatures can cause deterioration of the electrical parameters of the energy storage equipment and may cause damage to the energy storage equipment. To ensure the heat dissipation of the energy storage device, the installation environment must meet the following requirements:

1. The equipment should be installed in a well-ventilated environment.
2. The air inlet must ensure that enough fresh air enters into enters.
3. The ventilation system for the equipment is recommended to be separate from the rest of the ventilation system in the control room.
4. If the equipment overheats, check whether the air vents are properly ventilated.

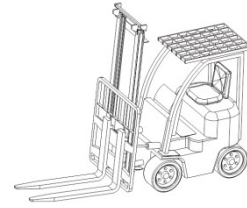
4.2.4 Installation Tool Preparation

Table 4-1 Tool Preparation

Tool	Quantity	Illustrative Diagram
Wire Stripper	1	

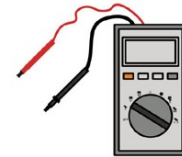
Electric Forklift Truck

1



Multimeter

1



Torque Wrench

1



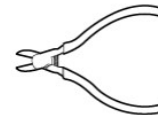
Insulated Socket Wrench

1



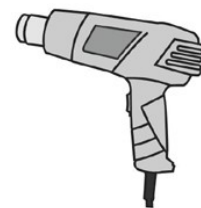
Tweezers

1



Heat Gun

1



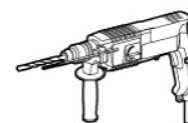
Hand Forklift

1



Pneumatic Drill

1



Art Knife

1



Safety Gloves

1



Protective Glasses

1



Insulating Shoes

1



Safety Helmet

1



4.2.5 Pre-installation Inspection

Table 4-2 Inspection items

No.	Inspection items
1	Check that the packing boxes are not missing, damaged, or damp
2	After unpacking, please check the shell of each module without deformation, paint loss, rupture and other abnormalities, and no water damage and other abnormalities in the shell.
3	Please check the contents of the box for accessories and count the items according to the list to ensure that they are complete (optional).

4.3 Energy Storage System Structure Installation

4.3.1 Cabinet Package Removing & Installation

Step 1: Remove the outer box packaging

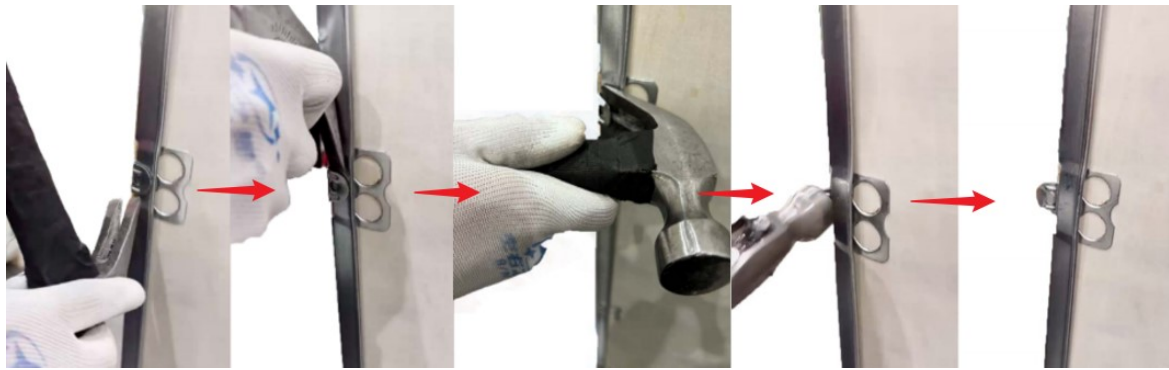


Fig. 4-2 Schematic Diagram of the Removal of the Wooden Box

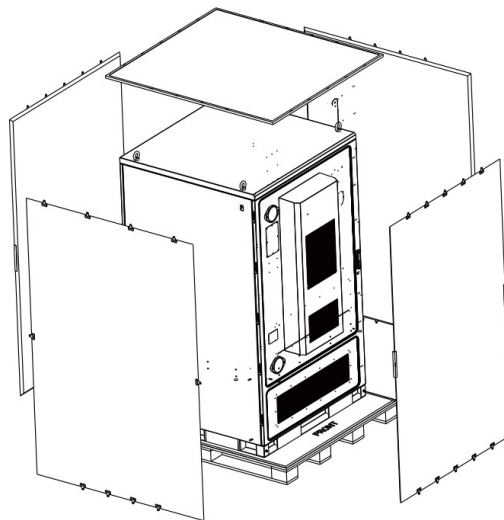


Fig. 4-3 Removing around Box Gragh

Step 2: Remove the pallet by removing the bolts connecting the energy storage system to the pallet with an adjustable wrench or socket wrench

Step 3: Remove the sealing plate of the cabinet base, use a Phillips screwdriver to remove the sealing plate of the base

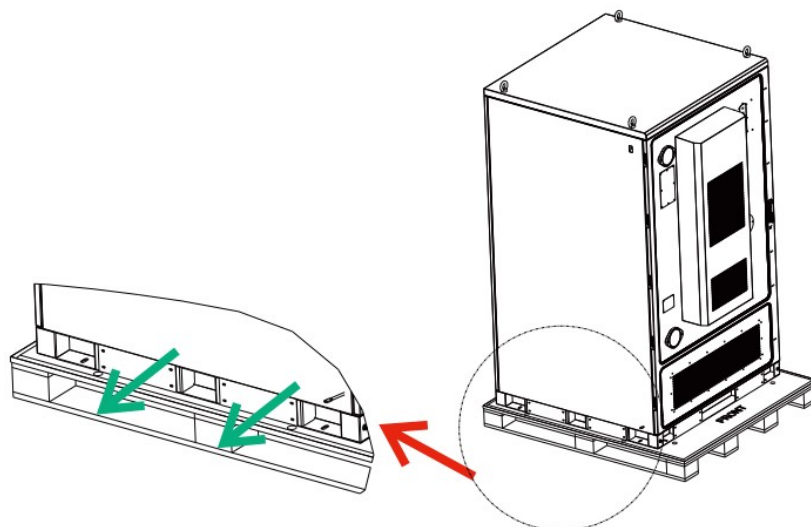


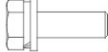
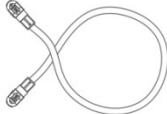
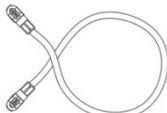
Fig. 4-5 Removing the Sealing Plate Schematic

Step 4: Open the cabinet door

Step 5: Pick up the information for the file box, such as packing list, etc..

Step 6: Take out the installation parts supplied with the box, after opening the door, please check the delivery parts and quantity supplied with the box according to the "packing list". As following table:

Table 4- 3 Inspection items

Name	Description	Quantity	Illustrative Diagram
Bolt	/	45	
Ring Screw	/	4	
Power Cable 1	PDU B- To 1#Pack B-	1	
Power Cable 2	1#Pack B+ To 2#Pack B-	1	
Power Cable 3	5#Pack B+ To 6#Pack B-	1	
Power Cable 4	11#Pack B+ To PDU B+	1	
FPC Adapter Cable 1	/	1	
4G Antenna	/	1	

Step 7: After closing the cabinet door, move the energy storage cabinet to the designated installation location. When using a forklift to move the equipment, please tie down and fix it according to the actual situation to ensure that there is no risk of tipping over. When using a hoist to move the equipment, use a nylon sling (strap) or wire rope

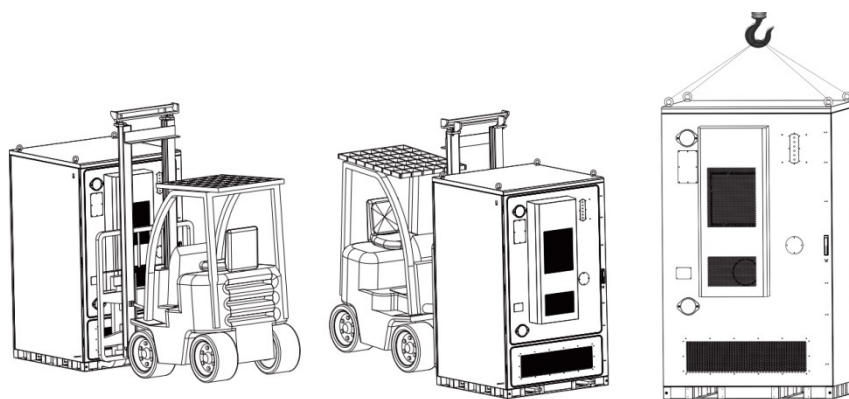


Fig. 4-6 Transportation Schematic

Step 8: Fixing the energy storage system

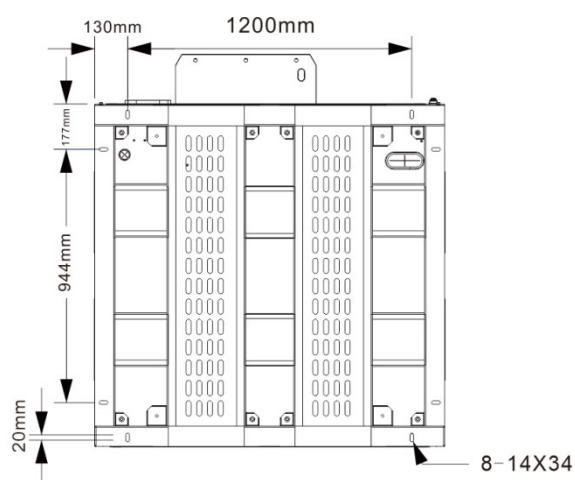


Fig. 4-7 Fixing Schematic

4.3.1 Pack Installation in Cabinet

1. Pre-installation Inspection



NOTICE

- Please make sure that the installed battery Pack is intact.
- Before installation, please consult the information on installing the battery Pack, and familiarize with and comply with its installation requirements and precautions.

2.Procedure

Step 1: Open the battery pack wooden box

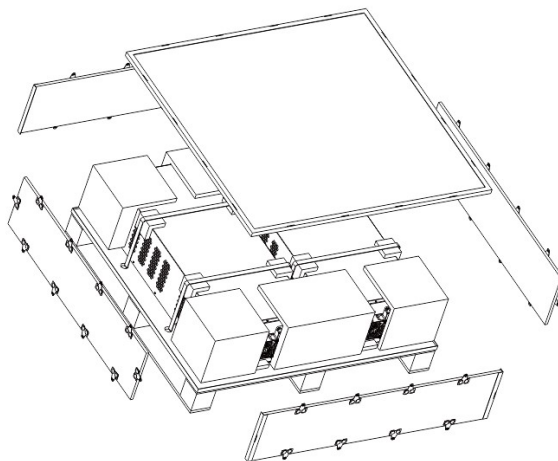


Fig. 4-8 Open wooden schematic

Step 2: Use a hobby knife to cut off the packing tape and remove the battery pack stack plate

Step 3: Remove the materials supplied with the box

Step 4: Installation of the battery pack into the energy storage cabinet using a forklift truck

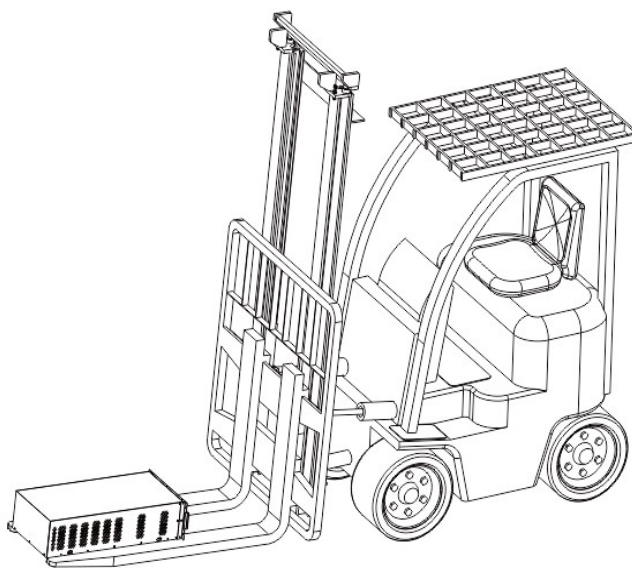


Fig. 4-9 forklift truck schematic

Step 5: The battery pack is installed in the energy storage cabinet, install the battery pack in the following sorting table position, take the M6 screws and use a socket wrench to lock them tightly, the installation torque is 5N.m. As following Fig. 4-10:

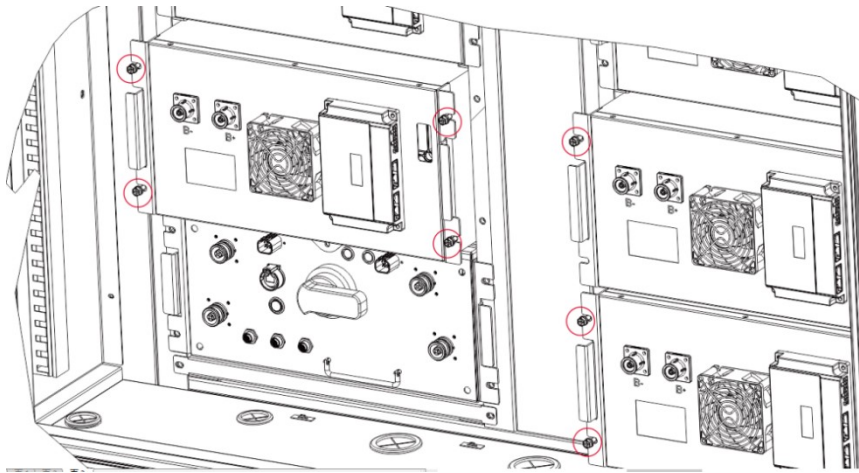


Fig. 4-10 Pack Installation Diagram

4.3.2 Structure Safety Check

Table 4-4 Safety Check

No.	Inspection Items	Treatment Measures
1	Fasteners are tightened or not	If loose, tighten the screws again
2	Whether the space environment meets the installation size requirements	If space is insufficient, it is recommended to redesign and reinstall
3	Are the air ducts clear and free of foreign objects	If there is a foreign body, please deal with it, if it does not flow smoothly to rule out the causes

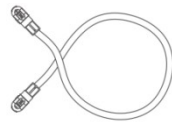
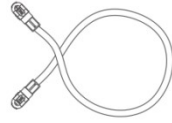
4.4 Energy Storage System Electrical Connection

The internal work of the energy storage cabinet has been completed before delivery except for the wiring between battery packs, the user only needs to connect the inter-cabinet cable and external wiring can be, the AC terminal is mainly located in the lower right side of the energy storage cabinet, the ground terminal is located in the bottom of the energy storage cabinet.

4.4.1 Energy Storage System Interface Description

It's necessary to connect cables between battery packs in the energy storage cabinet, as shown in the following figure

Name	Description	Quantity	Illustrative Diagram
Power Cable 1	PDU B- To 1#Pack B-	1	
Power Cable 2	1#Pack B+ To 2#Pack B-	1	

Power Cable 3	5#Pack B+ To 6#Pack B-	1	
Power Cable 4	11#Pack B+ To PDU B+	1	
FPC Adapter Cable 1	/	1	
4G Antenna	/	1	

Step1:

Take the four power harnesses and install them in a position as shown in the figure below, such as pressing the harness connections into place and hearing a “click” that is, the installation is in place

Step2:

Take the harness 5 and install it in the Fig. 2 position, plugging it in power cables connecting the energy storage cabinet to the power grid, this part of the cable to be provided by the customer.

Step3:

Take the 4G antenna and bring it inside the cabinet from the left side of the cabinet through the threading hole, then place it on the top of the cabinet.

Step4:

After crimping the external connection cable A/B/C phase to OT70-10 terminal) and N wire to OT70-6 terminal, lock it in the position as shown below(M10: 21N.m. M6: 5N.m)

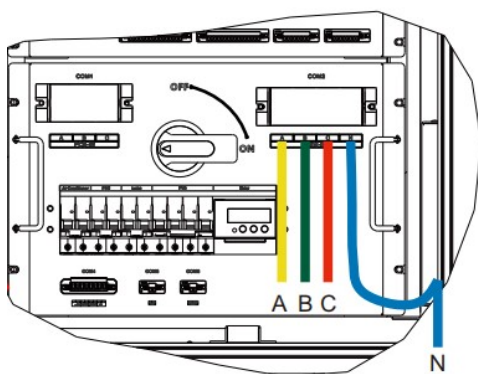


Fig. 4-11 Connect Cables to Grid

power cables connecting the energy storage cabinet to the power grid, this part of the cable to be provided by the customer, as shown in the following Fig.4-11

4.4.2 Wiring Description Sheet

Connect cables requirements between battery packs in the energy storage cabinet, as shown in the following Table 4-5

Table 4-5 Wiring Description Sheet

No	Name	Cable Specifications	Terminal Specifications	Clarification
1	A Phase	70 mm ²	M10(OT terminal)	Connecting cables between the cabinet and the external power grid
2	B Phase	70 mm ²	M10(OT terminal)	Connecting cables between the cabinet and the external power grid
3	C Phase	70 mm ²	M10(OT terminal)	Connecting cables between the cabinet and the external power grid
4	N Phase	35 mm ²	M6(OT terminal)	Connecting the energy storage cabinet to the grid's N line
5	PE	35 mm ²	M6(OT terminal)	Energy storage cabinet grounding connection

4.5 Electrical Wiring

4.5.1 External AC Cable Connection and Procedure

1. Before electrically connecting the energy storage cabinet, it is essential to ensure that the power grid and the cables are in a completely de-energized state, and the AC circuit breaker should not be closed before the electrical connection is completed.

2. Use a wire stripper to strip the corresponding specification ground wire to expose a bare copper core, and the length of the bare copper core should be 3mm longer than the OT terminal connection end.

3. Use a crimping tool to crimp the OT terminal onto the bare copper core.

4. Slide a heat-shrink tube of the appropriate size onto the wiring end of the OT terminal, and the length of the heat-shrink tube (with a voltage rating of at least 1000V) should be 1.5 to 2 times the length of the wiring end.

5. Use a heat gun to shrink the heat-shrink tube tightly, ensuring it grips the terminal and the cable securely, thus completing the cable assembly.

6. Secure the prepared cable at its interface with the corresponding screws (use M10 screws for phases A, B, and C, and M6 screws for phase N and PE).

7. Wiring complete.

4.5.2 Checking the Equipment After Wiring

After completing the wiring, it's necessarily to carefully check whether the phase sequence and the

silkscreen correspond to each other, and whether the wiring of the zero row and the ground row is correct.

The connection diagram is as follows:

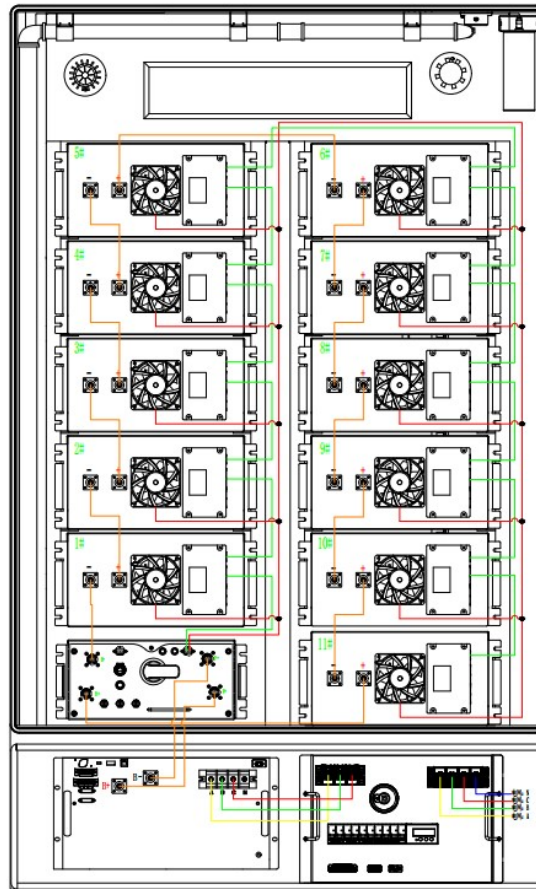


Fig. 4-12 Overview of All Connection Diagram

5 Product Operation

5.1 Energy Storage System Power-up Process

5.1.1 Pre-power-up Check

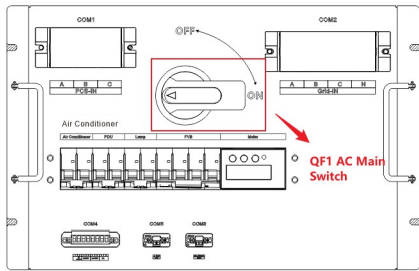
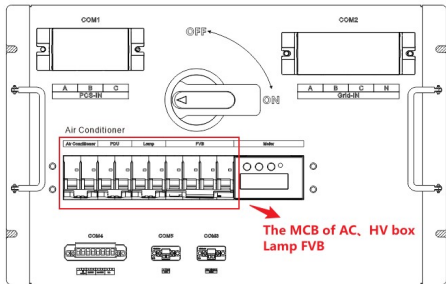
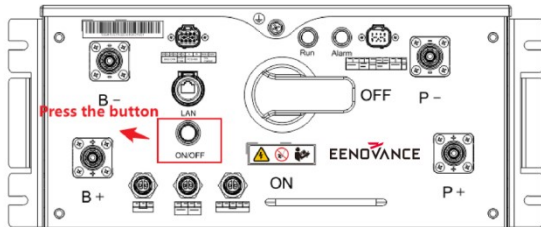
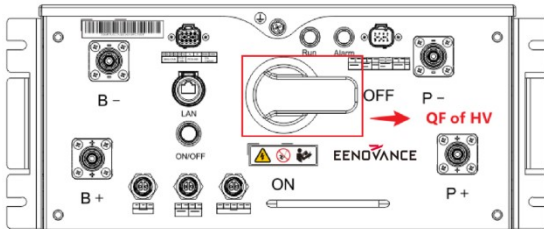
- Check that the circuit breaker in the electrical compartment inside the storage cabinet is in the disconnected position.
- Check whether the serial power cables between the battery packs and between the battery packs and the high voltage box are connected reliably.
- Check that all communication and power supply cable connection terminals are connected reliably and that the grounding cable is reliable.
- Check that the communication and power harnesses as well as the power cables are properly connected on the high voltage box panel.
- Check that the emergency stop button is released.
- Use a multimeter to check that the DC and AC voltages meet the startup conditions and

ensure that there is no overvoltage.

- Check and make sure that there are no unnecessary tools and devices inside the equipment.
- Check all air inlets and outlets for blockages.

5.1.2 Power-up Procedure

Table 5-1 Power-up Procedure Steps

Steps	Check Lists	Status
Step 1	Check that the air conditioner, HV box, Lamp, and FVB switches are in the disconnected state, close the main switch for the grid on the distribution box, then observe the meter display information which should be 400 ± 20 V.	
Step 2	Close the auxiliary power MCB air conditioner, HV box, Lamp, FVB on the power distribution as picture shows, box in the energy storage cabinet, then the lamp will be bright, air conditioner running, and PCS light on.	
Step 3	After closing the 220V power supply circuit breaker of the HV box, press the HV box start button. The fault indicator light of the HV box lights up. Close the circuit breaker of the HV box, and the fault light goes out while the operation light flashes. The main circuit relay of the HV box automatically closes, the fault light goes out, and the operation light remains on.	
Step 4	Close the main circuit breaker switch on the HV box and wait for the system to finish going to high voltage. Check the status of subsystems such as battery, PCS, battery, air conditioning, fire protection/IO, etc. through the local EMS display screen. The system is normal and the indicator light of the cabinet is yellow (no fault status).	
Step 5	Click the PCS power-on button on the EMS display screen and set the	/

charging and discharging time periods. For details, please refer to 5.2.2 and 5.2.4.



WARNING

- Please follow the steps strictly to power up
- If there is any abnormality, power down and check carefully step by step

5.2 EMS Interface Operation

5.2.1 EMS interface introduction

5.2.1.1 Overview

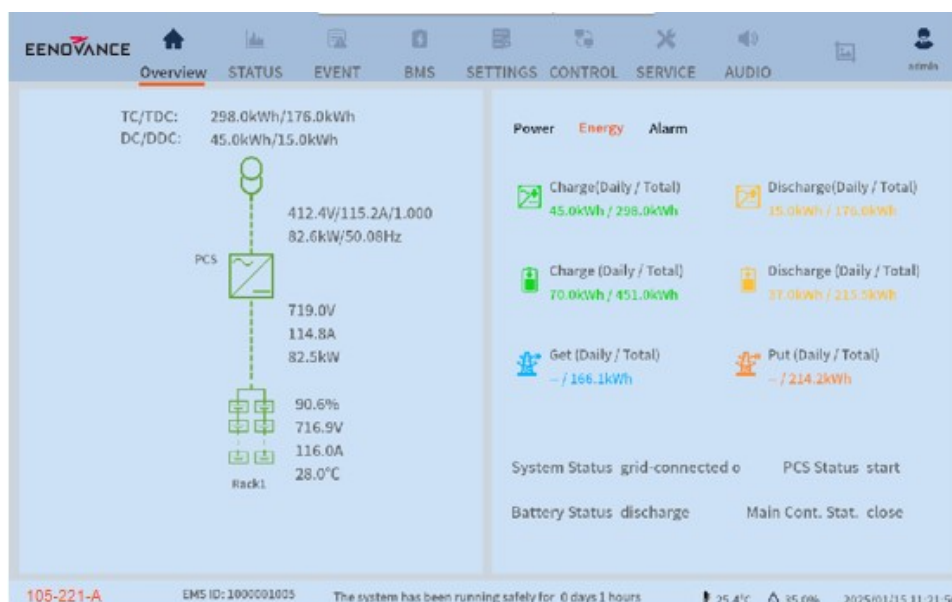


Fig. 5-1 EMS System Overview Screen

The system overview section can display real-time data such as total charging/discharging energy, daily charging/discharging energy, operational data of the PCS AC and DC sides, operational data of the battery pack, as well as the current charging/discharging power and the control strategy of the day. As shown in Fig. 5-1:

- In the energy storage system, the total charging energy (TC) is 298.0 kWh, and the total discharging energy (TDC) is 176.0 kWh.
- Daily charging energy (DC) is 45.0 kWh, and daily discharging energy (DDC) is 15.0kWh.
- Operational data of the PCS AC side: The AB line voltage is 412.4 V, current in phase A is 115.2 A, power factor is 1.000, output power is 82.6 kW, and frequency is 50.08 Hz.
- Operational data of the PCS DC side: DC voltage is 719.0 V, DC current is 114.8 A, and output power is 82.5 kW.
- Battery pack operational data: Battery SOC (State of Charge) is 90.6 %, voltage is 716.9 V, current is 116.0 A, and the average temperature of the battery cells is 28.0°C.
- The lower right corner of the picture shows the working state of the system: on grid, PCS working state: start, Battery state: discharge, main contactor state: close.

5.2.1.2 EMS Events

The event recording section records the alarm fault information of the equipment and system, and displays the current events, historical events, etc. As shown in Fig. 5-2.

No.	Level	Event ID	Device Name	Event Name	Start Time
1	✓	-3213	EMS	LUI command battery contactor close	2024/11/01 14:15:25.811
2	⚠	1000001	Air Conditioning	Equipment comm. status	2024/11/01 14:08:04.140
3	⚠	-2006	EMS	Air conditioning communication failed	2024/11/01 14:07:35.906
4	⚠	4	Fire System	Access	2024/11/01 14:06:29.912

Fig. 5-2 EMS Event Logging Screen

5.2.1.3 EMS Interface Settings

The parameter setting part provides the installed configuration and the operation configuration of the system parameters. As shown in Fig. 5-3:

Parameter	Value	Range/Unit	Parameter	Value	Range/Unit
Install. Cap.(Namepl./Nom)	221	(50~5000kWh)	Run Mode	On-grid	
Rated Capacity	221	(50~5000kWh)	System Grid Frequency	50Hz	
Nameplate Power	105	(25~2500kW)	Total Rated Batt. Volt.	704	(0~2500V)
System Batt. Type	Lithium-Iron		Batt. Amp-Hour	314	(100-900Ah)
Batt. Cell Count	220	(1~600)	Batt. Rack Count	1	(1~20)
Number of PCS	1	(1~4)	Number of BMS	1	(1~4)
Number of AIR Cond.	1	(1~4)	Number of Fire	1	(1~4)
Working Mode	Stand Alone Mode				

Fig. 5-3 EMS Parameter Setting Interface

5.2.1.4 Control

The control strategy partially controls the PCS on / off and the battery contactor open / close. At the same time, the control strategy of peak shaving and valley filling can also be set up. As shown in Fig. 5-4:

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Fig. 5-4 EMS Control Strategy Interface

5.2.2 EMS Basic Setting

The EMS interface allows for control and parameter settings of various components within the energy storage system, including BMS, batteries, air conditioning, as well as PCS and network parameters, all of which can be configured through the EMS panel. Here is an introduction to the basic parameter settings for the relevant equipment:

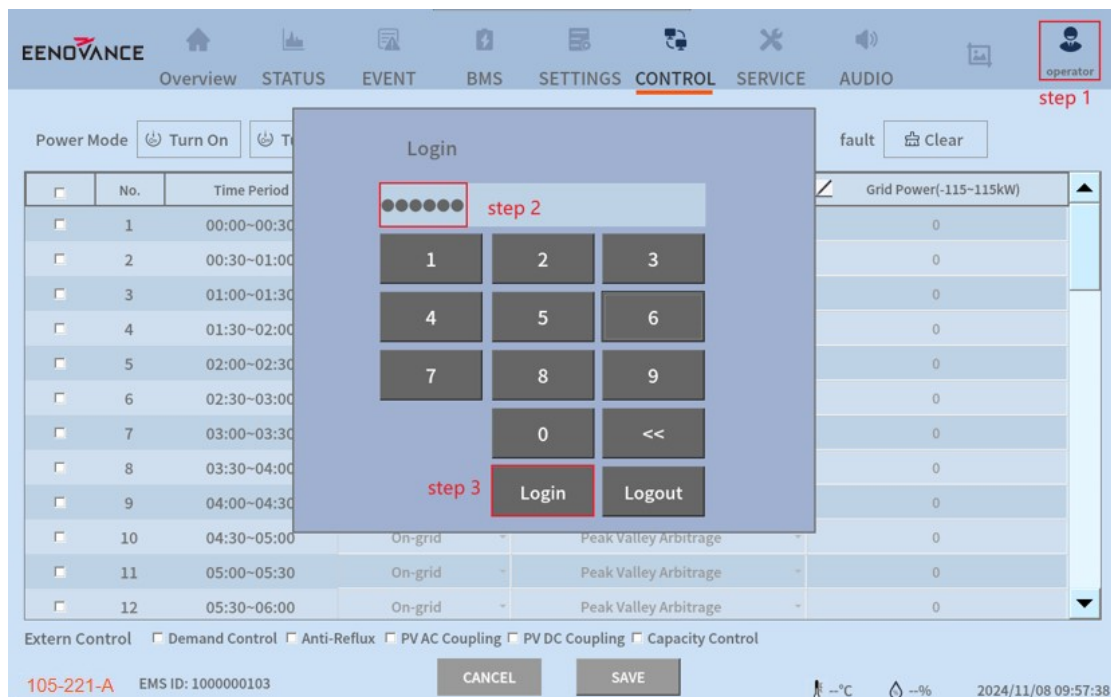


- The energy storage system has been configured and optimized for relevant parameters at the factory. It is not recommended to modify them under normal circumstances, otherwise, the consequences will be borne by the user.
- If there are any doubts regarding the parameter settings, contact the after-sales technical support.

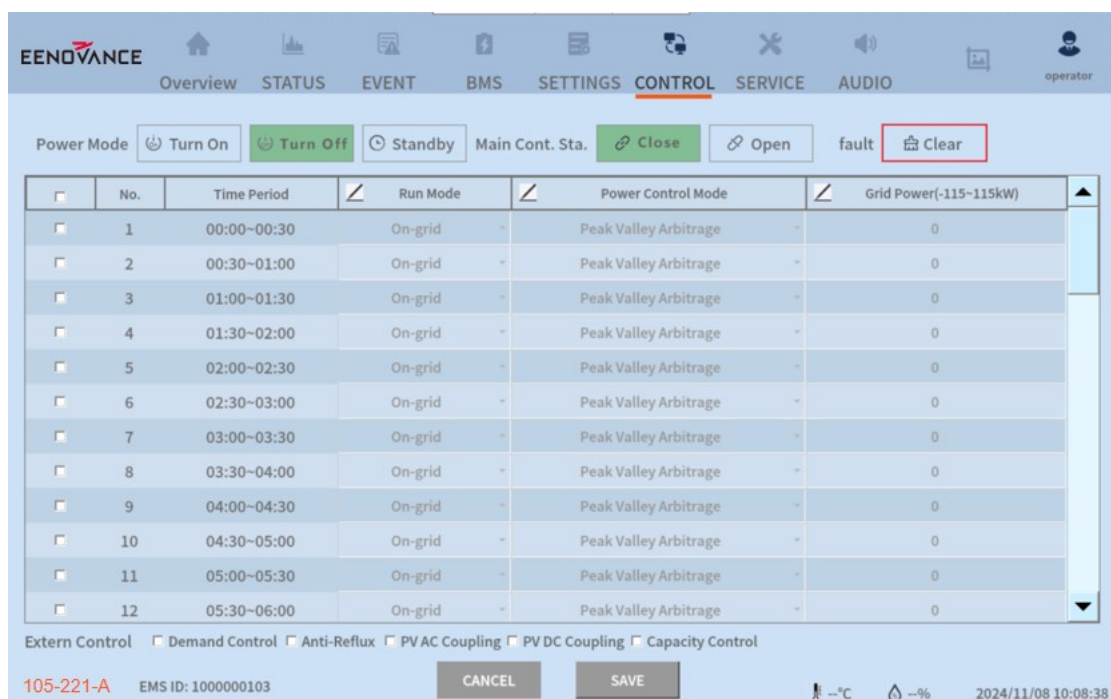
The parameter setting page provides the installation configuration and the operation configuration of the equipment parameters.

5.2.3 EMS Controlled Charge/Discharge Steps

Step 1: Log in to the EMS using the "Operator" account and password 123456.



Step 2: Ensure the system operates normally, no alarm fault. If there are faults on the Event page, first investigate the cause of the fault. If the system EPO fault, first reset the EPO button, click the "Clear" button twice on the "Control Strategy" page to reset the system.



Step 3: On the Control Strategy page, set the Operation Mode to on-grid, set the Power Control Mode to Peak-Valley Arbitrage, and set the peak, valley and flat values in the Grid Power column. There are two types of setting operations, namely, setting power for a certain time period and setting power for all time periods. See Section 5.2.3 for details of the control strategy.

The steps to set power for one time period are as follows:



The steps to set power for all time periods are as follows:

The screenshot shows the EENOVANCE CONTROL interface. At the top, there are navigation tabs: Overview, STATUS, EVENT, BMS, SETTINGS, CONTROL (selected), SERVICE, and AUDIO. Below the tabs, there are buttons for Power Mode (Turn On, Turn Off, Standby), Main Cont. Sta. (Close, Open), and fault (Clear). The main table has columns: No., Time Period, Run Mode, Power Control Mode, and Grid Power(-115~115kW). The table lists 12 time periods, all with 'On-grid' Run Mode and 'Peak Valley Arbitrage' Power Control Mode. The 'Grid Power' column shows '0' for all periods. A numeric keypad is overlaid on the right, with '0' entered and 'CONFIRM' highlighted. The bottom status bar shows '105-221-A', 'EMS ID: 1000000103', 'CANCEL', 'SAVE', and the date/time '2024/11/08 10:15:40'.

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Step 4: In the “Control Strategy” page, click the “Close” button to close the main contactor.

This screenshot shows the same EENOVANCE CONTROL interface as the previous one, but with the 'Close' button for 'Main Cont. Sta.' highlighted with a red box. The 'Grid Power' column still shows '0' for all periods. The bottom status bar shows '105-221-A', 'EMS ID: 1000000103', 'CANCEL', 'SAVE', and the date/time '2024/11/08 10:08:38'.

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Step 5: On the “Control Policy” page, click the “Turn On” button to power on PCS.

The screenshot shows the EENOVANCE CONTROL interface. The top navigation bar includes Overview, STATUS, EVENT, BMS, SETTINGS, **CONTROL**, SERVICE, and AUDIO. Below the navigation bar, the Power Mode section shows 'Turn On' highlighted in red, along with 'Turn Off', 'Standby', 'Main Cont. Sta.', 'Close', 'Open', 'fault', and 'Clear' buttons. A table displays 12 time periods, all with 'On-grid' Run Mode and 'Peak Valley Arbitrage' Power Control Mode, with Grid Power values of 0. Below the table, the Extern Control section includes checkboxes for Demand Control, Anti-Reflex, PV AC Coupling, PV DC Coupling, and Capacity Control. The bottom status bar shows '105-211-A', EMS ID: 1000000103, CANCEL and SAVE buttons, temperature and humidity icons, and the date/time 2024/11/08 10:08:38.

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

5.2.4 EMS Controlled Power off Steps

Step 1: On the "Control Strategy" page, click the "Turn off" button to shut down the PCS.

The screenshot shows the EENOVANCE CONTROL interface. The top navigation bar includes Overview, STATUS, EVENT, BMS, SETTINGS, **CONTROL**, SERVICE, and AUDIO. Below the navigation bar, the Power Mode section shows 'Turn Off' highlighted in red, along with 'Turn On', 'Standby', 'Main Cont. Sta.', 'Close', 'Open', 'fault', and 'Clear' buttons. A table displays 12 time periods, all with 'On-grid' Run Mode and 'Peak Valley Arbitrage' Power Control Mode, with Grid Power values of 0. Below the table, the Extern Control section includes checkboxes for Demand Control, Anti-Reflex, PV AC Coupling, PV DC Coupling, and Capacity Control. The bottom status bar shows '105-221-A', EMS ID: 1000000103, CANCEL and SAVE buttons, temperature and humidity icons, and the date/time 2024/11/08 10:08:38.

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Step 2: If you need to power off completely, on the "Control Strategy" page, click the "Open" button to disconnect the battery contactor.

EENOVANCE Overview STATUS EVENT BMS SETTINGS **CONTROL** SERVICE AUDIO operator

Power Mode: Turn On Turn Off Standby Main Cont. Sta. Close Open fault Clear

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Extern Control Demand Control Anti-Reflex PV AC Coupling PV DC Coupling Capacity Control

105-221-A EMS ID: 1000000103 CANCEL SAVE 2024/11/08 10:08:38

5.2.5 EMS Control and Off-Grid Switching

Step 1: Remove cables from the power grid and bar N

Step 2: Connect N cables of the PCS to N rows of cables

Step 3: On the "Control Policy" page, click the "Close" button to close the battery contactor

EENOVANCE Overview STATUS EVENT BMS SETTINGS **CONTROL** SERVICE AUDIO admin

TC/TDC: 0.0kWh/0.0kWh
DC/DDC: 0.0kWh/0.0kWh

PCS: 402.0V/0.0A/1.000
0.0kW/50.08Hz

0.9V
0.0A
0.0kW

Rack1: 39.9%
1.3V
0.0A
28.0°C

Power(kW) graph: 14:07:00 to 14:11:00

System Status: stopping PCS Status: stop
Battery Status: standby Main Cont. Stat.: open

105-221-A EMS ID: 10000001003 The system has been running safely for 0 days 5 hours 2024/11/01 14:11:49

Step 4: In the "Parameter Settings" overview page, switch the running mode to "Off-network"

**WARNING**

- This product is not intended to be used off-grid, and the product makes no commitment to off-grid operation performance and indicators.
- The customer shall be responsible for any equipment and economic losses and all liabilities caused by off-grid application.

**WARNING**

- This product should not be used off-grid, and does not promise off-grid operation performance and metrics, such as equipment and economic losses caused by customers' private use of off-grid customer's own responsibility..

On-grid connected to off-grid steps:

Step1: Stop EMS system

Step2: Isolated from the grid, PCS connects the N wire to the N copper row in the cabinet and connects it to the N row of the load.

Step3: System startup, EMS setup PCS Off-grid mode

Off-grid to grid-connected steps:

Step1: Stop EMS system, remove N busbar

Step2: PCS connect to grid

Step3: System startup, EMS setup PCS On-grid mode

Step 5: Click "Save"

EENOVANCE Overview STATUS EVENT BMS SETTINGS CONTROL SERVICE AUDIO admin

Summary System PCS Battery Air Cond. Display NetWork

Install. Cap.(Namepl./Nom) 221 (50~5000kWh) Run Mode Off-grid

Rated Capacity 221 (50~5000kWh) System Grid Frequency 50Hz

Nameplate Power 105 (25~2500kW) Total Rated Batt. Volt. 704 (0~2500V)

System Batt. Type Lithium-Iron Batt. Amp-Hour 314 (100~900Ah)

Batt. Cell Count 220 (1~600) Batt. Rack Count 1 (1~20)

Number of PCS 1 (1~4) Number of BMS 1 (1~4)

Number of AIR Cond. 1 (1~4) Number of Fire 1 (1~4)

Working Mode Stand Alone Mode

105-221-A EMS ID: 1000001003 CANCEL **SAVE** 2024/11/01 14:12:36

Step 6: On the "Control Policy" page, click "Turn on" to turn on PCS

EENOVANCE Overview STATUS EVENT BMS SETTINGS CONTROL SERVICE AUDIO admin

Power Mode **Turn On** Turn Off Standby Main Cont. Sta. Close Open fault Clear

No.	Time Period	Run Mode	Power Control Mode	Grid Power(-115~115kW)
1	00:00~00:30	On-grid	Peak Valley Arbitrage	0
2	00:30~01:00	On-grid	Peak Valley Arbitrage	0
3	01:00~01:30	On-grid	Peak Valley Arbitrage	0
4	01:30~02:00	On-grid	Peak Valley Arbitrage	0
5	02:00~02:30	On-grid	Peak Valley Arbitrage	0
6	02:30~03:00	On-grid	Peak Valley Arbitrage	0
7	03:00~03:30	On-grid	Peak Valley Arbitrage	0
8	03:30~04:00	On-grid	Peak Valley Arbitrage	0
9	04:00~04:30	On-grid	Peak Valley Arbitrage	0
10	04:30~05:00	On-grid	Peak Valley Arbitrage	0
11	05:00~05:30	On-grid	Peak Valley Arbitrage	0
12	05:30~06:00	On-grid	Peak Valley Arbitrage	0

Extern Control Demand Control Anti-Reflux PV AC Coupling PV DC Coupling Capacity Control

105-221-A EMS ID: 1000001003 CANCEL **SAVE** 2024/11/01 14:12:56

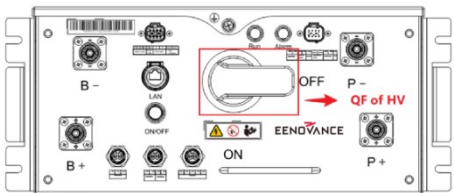
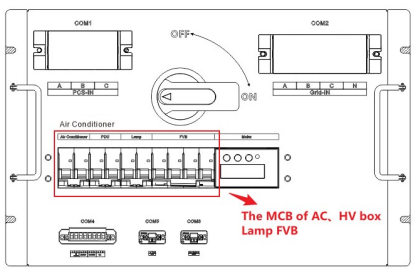
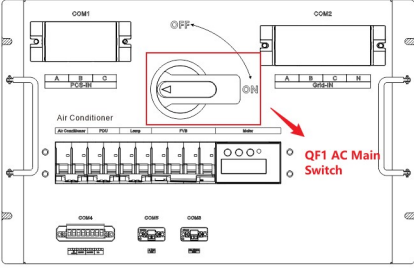
5.3 Normal Shutdown Procedure



WARNING

- The system needs to be powered off on both AC and DC sides to ensure personal safety when it is not operating for a long time or during installation and maintenance.

5.4 Emergency Shutdown Procedure

Steps	Check lists	Status
Step 1	Ensure that the system is not in a charged or discharged state, turn off the PCS and cut off the HV box relay through EMS. see section 5.2.3 for details. Then disconnecting the hand operated circuit breaker switch on the high voltage box and pressing the HV box power switch QF.	
Step 2	Disconnect the auxiliary power miniature circuit breakers (MCB) QF2, QF3, QF4, and QF5 on the power distribution box inside the storage battery storage cabinet	
Step 3	Close the grid molded case switch QF1	



DANGER

- In case of emergency, tap the emergency stop button on the cabinet door and the system will stop running.
- Fire Incident: Contact local professional firefighters.
- System Failure: Contact local aftermarket operator.

6 Battery System Maintenance Instructions

6.1 System Usage Requirements

6.1.1 Precautions Before Maintenance



WARNING

- The customer shall be responsible for any equipment and economic losses and all liabilities caused by off-grid application.
- Violent disassembly and maintenance are prohibited and EENOVANCE will not be held liable for any violation of maintenance regulations.



WARNING

- To avoid electric shock, do not perform any other maintenance operations beyond this manual..
- If necessary, contact EENOVANCE customer service for maintenance.



- Maintenance requires licensed professional maintenance personnel, non-professional maintenance personnel are prohibited to operate.
- If necessary, maintenance intervals can be shortened depending on site conditions

6.1.2 Maintenance (Every two years)

Item			Check method
System cleanliness	status	and	• Check equipment inside the outdoor cabinet for any damage or deformation.
			• Check for any abnormal noises during the operation of the internal equipment.
			• Check whether the temperatures inside the outdoor cabinet and on its exterior are excessively high.
			• Check whether the humidity inside the outdoor cabinet is within the normal range.
			• Check for any signs of oxidation or rust inside the outdoor cabinet.

6.1.3 Long Without System Usage Requirements

Check the remaining charge and health of the battery.

Ensure that the battery is stored under suitable temperature and humidity conditions to

prevent degradation or damage to the battery.

Check whether the battery management system (BMS) is working properly and ensure that the safety protection functions of the battery system are effective, including overcharging, over-discharging, short-circuit and thermal runaway protection.

Before being put back into service, the energy storage system should be subjected to a comprehensive system test, including battery performance, electrical connections and protective features.

Perform cleaning and maintenance of the system, e.g., cleaning battery contacts, checking the cooling system, etc.

6.1.4 Maintenance (Once a year)

Item	Check method
System status and cleanliness	• Check the interior of the outdoor cabinet for foreign objects, dust and grime. Remove interior dust if necessary. • Check the air inlet and outlet of the outdoor cabinet for blockages. • Check for any screw detachment inside the outdoor cabinet. • Check for any water ingress within the outdoor cabinet.
Appearance	• Check the enclosure of the outdoor cabinet for damage, paint loss, oxidation, etc. • Check the cabinet door locks, etc. for smooth operation. If necessary, apply appropriate lubricants to door locks, hinges, etc. • Check whether sealing strips, etc. are securely attached. • Properly maintained sealing strips are essential for preventing water ingress into the product. Inspect them carefully, and replace immediately if any sealing strips are found damaged. • Check machine warning signs and other device signs. If any signs are blurred or damaged, replace them promptly.
Cable connections	• Check whether all incoming and outgoing cable holes of the outdoor cabinet are well sealed. • Check cable connections for looseness. Retighten any loose cables according to the specified torque. • Check cables for any damage, particularly for cuts on the surface in contact with metal. • Check the insulating cable ties of cable connection terminals for detachment.
Grounding and equipotential connections	• Check whether grounding connections are correct. The grounding resistance should not be greater than $4\ \Omega$. • Check whether equipotential connections inside the energy storage system are correct. • Check whether the cable shielding layers are in good contact with insulation sleeves, and whether the grounding copper bars are reliably secured.
Fire protection system	• Check smoke conditions inside the battery container. • Check the external condition of the equipment for any damages or compressions from nearby equipment. • Check whether the equipment status indicator lights are normal. • Visually inspect the input/output modules. Check the external

condition of the equipment for any damages or compressions from nearby equipment. Check whether the equipment status indicator lights are normal.

6.2 Battery Maintenance

6.2.1 Maintenance Overview



WARNING

Do not leave the product in a low voltage or low SOC condition for a long period of time. Loss of capacity due to the following conditions is not covered by the warranty.

- Battery discharge cell voltage is below 2.7V for 120 consecutive hours.
- Any cell cluster SOC is 0% for 80 consecutive hours.
- Single battery discharge cell voltage $\leq 2.2V$.

- Read the user manual or instruction manual before maintenance.
- Ensure that the battery system is shut down during maintenance.
- Please check and confirm the positive (+) and negative (-) poles before assembly.
- Check insulation before assembly to prevent short circuits.
- It must be stored according to the battery storage environment requirements.
- Maintain the removed batteries and prohibit sunlight and rain.
- Charging and discharging should be carried out in strict accordance with the requirements of this manual.
- When the battery reaches the specified end-of-life conditions, it should be discontinued in time.

6.2.2 Battery Storage



NOTICE

- If the system is stored for a long period of time (six months or more) without operation, the system needs to do at least 1 full charge in order to activate the battery before the system is used for the first time.
- Battery storage requires proper storage at the appropriate temperature and humidity, otherwise it will reduce the battery's service life.
- It is recommended to adjust the power of product storage to 30% ~ 50%.

Product storage must be kept away from fire and heat sources. When continuous static storage is required for more than 2 months, maintenance should be performed every two months.

6.3 Alarm and Troubleshooting

Table 6-2 EMS Alarm Troubleshooting

Alarm ID	Alarm message	Alarm level	Troubleshooting
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Alarm ID	Alarm message	Alarm level	Troubleshooting
-1001	PCS fault	High	Troubleshooting PCS.
-1002	PCS communication fault	High	Check whether the communication line between EMS and PCS is abnormal.
-1003	BMS fault	High	Troubleshooting BMS.
-1004	BMS communication fault	High	Check whether the communication line between EMS and BMS is abnormal.
-1005	Fire fault	High	Troubleshoot fire-related faults.
-1006	Fire communication fault	High	Check whether the communication line between EMS and Fire is abnormal.
-1007	EPO	High	Confirm that the EPO has been reset and click Clear Fault.
-1008	Battery low	High	No need to deal with it.
-2001	PCS alarm	Medium	Troubleshooting PCS.
-2002	PCS communication failed	Medium	Check whether the communication line between EMS and PCS is abnormal.
-2003	BMS alarm	Medium	Troubleshooting BMS.
-2004	BMS communication failed	Medium	Check whether the communication line between EMS and BMS is abnormal.
-2005	Fire alarm	Medium	Troubleshoot fire-related alarm.
-2006	Troubleshoot fire-related alarm.	Medium	Check whether the air conditioner is turned on and confirm whether the communication line between the EMS and the air conditioner is abnormal.
-2008	Battery low	Medium	No need to deal with it.
-2009	Site communication failed	Medium	Check whether the 4G card and 4G suction cup antenna are properly plugged in. Then restart the system.

6.3.3 BMS Alarm Troubleshooting

Table 6-3 PCS alarm troubleshooting

Alarm ID	Alarm message	Alarm level	Troubleshooting
1	Cell over-voltage Level-2 Alarm	Medium	No need to deal with it.
2	Cell under-voltage Level-2 Alarm	Medium	No need to deal with it.
3	Pack over-voltage Level-2 Alarm	Medium	No need to deal with it.
4	Pack under-voltage Level-2 Alarm	Medium	No need to deal with it.
5	Cell charge over-temperature Level-2 Alarm	Medium	No need to deal with it.
6	Cell charge under-temperature Level-2 Alarm	Medium	No need to deal with it.
7	Cell discharge over-temperature Level-2 Alarm	Medium	No need to deal with it.
8	Cell discharge under-temperature Level-2 Alarm	Medium	No need to deal with it.
9	Charge over-current Level-2 Alarm	Medium	No need to deal with it.
10	Discharge over-current Level-2 Alarm	Medium	No need to deal with it.
11	Battery Box Busbar High-Temperature Level-1 Alarm	Medium	No need to deal with it.
12	High-Voltage Box Busbar High-Temperature Level-1 Alarm	Medium	No need to deal with it.

13	Battery Cabinet Environmental High-Temperature Level-1 Alarm	Medium	No need to deal with it.
14	Cell high voltage-difference Level-1 Alarm	Medium	No need to deal with it.
15	Cell high temperature-difference Level-1 Alarm	Medium	No need to deal with it.
16	Low SOC Level-1 Alarm	Medium	No need to deal with it.
17	Cell over-voltage Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
	Cell under-voltage Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
18	Pack over-voltage Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
	Pack under-voltage Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
19	Pack over-voltage Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
20	Pack under-voltage Level-3 Alarm	High	No need to deal with it.
21	Cell charge over-temperature Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
	Cell charge under-temperature Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
22	Cell charge under-temperature Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

23	Cell discharge over-temperature Leve-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
24	Cell discharge under-temperature Leve-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
25	charge over-current Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
26	discharge over-current Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
27	Battery Box Busbar High-Temperature Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
28	High-Voltage Box Busbar High-Temperature Level-3 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
29	Battery Cabinet Environmental High-Temperature Level-2 Alarm	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

30	Cell high voltage-difference Alarm	Level-2	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
31	Cell high temperature-difference Alarm	Level-2	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
32	Low SOC Level-2 Alarm		High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
33	High SOC Level-2 Alarm		High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
34	Pack large pressure difference between the inside and outside		High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
35	Cell voltage drops too fast		Medium	No need to deal with it.
36	Cell temperature rises too fast		Medium	No need to deal with it.
37	Cell over-voltage Level-1 Alarm		Medium	No need to deal with it.
38	Cell under-voltage Level-1 Alarm		Medium	No need to deal with it.
39	Cell over-temperature Level-1 Alarm		Medium	No need to deal with it.
40	Cell under-temperature Level-1 Alarm		Medium	No need to deal with it.
41	Charge over-current Alarm(current over limit)	Level-1	Medium	No need to deal with it.
42	Discharge over-current Alarm(current over limit)	Level-1	Medium	No need to deal with it.
45	High SOC Level-1 Alarm		Medium	No need to deal with it.
47	Slave Cascade Addressing Anomaly		Medium	No need to deal with it.
48	Master Parallel Addressing Anomaly		Medium	No need to deal with it.

49	Current module communication interrupted	Medium	No need to deal with it.
54	Cell voltage sampling circuit anomaly	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
55	Cell temperature sampling circuit anomaly	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
56	Cell voltage sampling disconnected	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
57	Cell temperature sampling disconnected	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
58	Slave controll external temperature sampling disconnection	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
59	Slave controll cell balancing failure	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

60	Slave controll device address conflict	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
61	Slave controll cell information missing	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
62	Slave controll fan operation abnormal	High	No need to deal with it.
65	Slave controll communication interruption	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
66	Master control communication interruption	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
67	Master control device address conflict	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
75	Abnormality of main control shunt sampling circuit	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

76	Abnormality of main control total voltage sampling circuit	High				1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
77	Abnormality of main control high voltage sampling circuit	High				1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
78	Abnormality of main control high voltage external temperature sampling circuit	High				1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
79	Abnormality of main control high voltage insulation detection circuit	High				1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
80	Battery pack fuse blown	High				1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
86	Battery Pack Isolation Switch Closing	Not	Medium			No need to deal with it.
89	Battery Insulation Alarm		Medium			No need to deal with it.
90	Battery Insulation Fault		High			1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

93	Battery pack precharge failure	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
94	Battery pack start-up fault	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
95	Battery pack shutdown fault	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
96	Battery pack negative contactor adhesion	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
97	Battery pack charging contactor adhesion	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
98	Battery pack discharging contactor adhesion	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
99	Battery pack negative contactor open circuit	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

100	Battery pack charging contactor open circuit	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
101	Battery pack discharging contactor open circuit	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
102	Battery pack precharge circuit open circuit	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
103	Abnormality of main control negative contactor recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
104	Abnormality of main control charging contactor recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
105	Abnormality of main control discharging contactor recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
106	Abnormality of main control negative contactor board level recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.

107	Abnormality of main control precharge contactor board level recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
108	Abnormality of main control charging contactor board level recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
109	Abnormality of main control discharging contactor board level recheck	High	1.On-site confirmation of the fault, re-closing the high-voltage box circuit breaker . 2.Remove the fault, the system power on again 3.If it fails to solve, please contact the supplier.
1000001	Equipment comm. status	High	Check whether the communication line between EMS and BMS is abnormal.