



BSL NEW ENERGY TECHNOLOGY CO., LTD

User Manual

ESS-GRID FlexiO Series

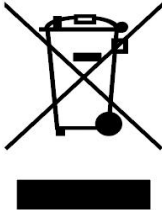
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Identification Instructions

	Please read the endorsed documentation carefully before using the product.
	When the user maintains and repairs, disconnect the power and wait five minutes before working to prevent a stored charge.
	Danger. Risk of electric shock!
RoHS COMPLIANT	Hazardous Substance Labeling
	CE certification
	Flammability risk
	Keep the battery away from open flame or ignition sources.
	Recycling
	The danger of high voltages. Danger to life due to high voltages in the energy storage system
	This marking indicates that this product should not be disposed with other household wastes

Version History

[illegible]

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01 Safety Instructions

1.1 Safety symbol description

When installing, operating, and maintaining equipment, please read this manual first and follow all safety precautions indicated on the equipment and in the manual. **To ensure that users can better use this product and protect personal and property safety, please read the symbol prompts used below carefully.**



Danger: Indicates a highly potential danger that, if not avoided, could result in death or serious injury.



Warning: Indicates moderate potential danger if not avoided, which may result in death or serious injury to personnel.



Note: Indicates a low potential danger, and failure to avoid it may result in moderate or mild injury to personnel.



Illustration: Emphasizing and supplementing content may also provide tips for optimizing product usage.

1.2 General Security



Illustration:

This equipment should be used in an environment that meets the design specifications. Otherwise, it may cause equipment failure. The resulting equipment malfunction or component damage, personal safety accidents, property losses, etc. are not within the scope of equipment quality assurance. Local laws, regulations and specifications should be followed when installing, operating and maintaining the equipment. The safety precautions in the manual are only used as a supplement to local laws, regulations and specifications. The company does not assume responsibility for any of the following situations.

1. The installation and use environment exceeds the requirements of relevant international, national and regional standards.
2. Operation not within the conditions of use described in this manual.
3. Unauthorized disassembly, modification of products or modification of software codes.
4. Failure to follow the operating instructions and safety warnings in the product and documentation.
5. Equipment damage caused by abnormal natural environment (Force majeure, such as earthquake, fire, storm, flood, mudslide, etc.).
6. Damage caused by the customer's failure to comply with transportation and installation requirements.
7. Damage caused by storage conditions not meeting the requirements of product documentation.
8. Damage to the hardware or data of the device due to customer negligence, improper operation or intentional damage .

9. System damage caused by a third party or customer , including relocation and installation of the system that does not comply with the requirements of this manual, and damage caused by adjustments, changes or removal of identification marks that do not comply with the requirements of this manual.

10. Defects, failures or damages caused by acts, events, omissions or accidents beyond the reasonable control of the Seller, including power outages or electrical failures, theft, war, riots, civil unrest, terrorism, intentional or malicious damage, etc.



Danger:

The equipment has high voltage. Improper operation may cause electric shock or fire, resulting in death, serious personal injury or serious property loss. Please follow the operation sequence and safety precautions given in this manual and other related documents and operate in accordance with the regulations:

1. Please check whether the pre-installed cables are connected and fastened. Check whether the device is damaged, such as holes, dents, or other signs of possible internal damage. Check that the internal components of the device are not displaced. It is forbidden to change the structure and installation sequence of the device without authorization.
2. It is forbidden to use water to clean the electrical parts inside the equipment. If liquid is found to have entered the equipment, please press the stop button immediately and notify the on-site management personnel.
3. It is forbidden to install, connect, maintain and replace with power on. Before touching any conductor surface or terminal, measure the voltage at the contact point and confirm that the protective ground wire of the equipment or the part to be repaired is reliably grounded to ensure that there is no risk of electric shock.
4. Except for the personnel who operate the equipment, other personnel are not allowed to approach the equipment. Do not power on the equipment before the equipment is installed or confirmed by professionals. When powering on for the first time or operating the main circuit with power on, at least two personnel must be present on site.



Illustration:

1. The user's operating behaviors and operating tools during transportation, handling, installation, wiring and maintenance must comply with the laws, regulations and relevant standards of the country and region where the user is located.
2. During installation, operation and maintenance, you must first clean up the accumulated water, ice, snow or other debris on the top of the cabinet before opening the cabinet door to prevent debris from falling into the cabinet.
3. It is prohibited to reverse engineer, decompile, disassemble, adapt, implant or other derivative operations on the device software. It is not allowed to study the internal implementation of the device, obtain the source code of the device software, steal intellectual property rights, etc. in any way, and it is not allowed to disclose the results of any device software performance test.

1.3 Electrical Safety

1.3.1 Wiring Requirements

1. Please select cables that comply with local laws and regulations. Cables of the same type should be bundled together, and cables of different types should be laid separately. They should not be entangled or crossed.
2. When the wiring is completed or you leave for a short time during the wiring process, you need to immediately seal the cable opening and close the cabinet door to prevent small animals from entering.
3. The cables used in the energy storage system must be firmly connected, well insulated, and meet the specifications. The cable conduit or wire hole must be protected to prevent the cables from being damaged by sharp edges, burrs, etc.
4. After the cable wiring is completed, it is necessary to use cable brackets and cable clamps to securely fix the cables. The cables in the backfill area must be ensured to fit tightly to the ground to prevent deformation or damage caused by the force applied when backfilling the soil.
5. Using cables in high temperature environments may cause aging and damage of the insulation layer. The distance between the cables and the heating device or the periphery of the heat source area should be at least 30mm.
6. To ensure construction safety, all cables should be laid and installed above 0°C. When moving cables, especially when working in low temperature environments, they should be handled with care.

1.3.2 Grounding Requirements

1. It is forbidden to damage the grounding conductor. The grounding body of the equipment should be permanently connected to the protective grounding grid. Before operating the equipment, the electrical connection of the equipment should be checked to ensure that the equipment is reliably grounded.
2. The grounding impedance of the equipment meets the national standard *GB - 50054* and local electrical standards.
3. It is forbidden to operate the equipment without installing the grounding conductor. When installing equipment that needs to be grounded, the protective ground wire must be installed first; when dismantling the equipment, the protective ground wire must be removed last.

1.3.3 Maintenance requirements

1. Before connecting or removing cables, the protection switch of the corresponding circuit must be turned off.
2. Use a multimeter of the corresponding voltage level to check whether it is energized and ensure that the equipment is completely powered off.
3. If there is a charged object nearby, please use an insulating board or insulating tape to cover or wrap it.
4. Use the grounding wire to reliably connect the circuit to be inspected to the grounding circuit before performing operation and maintenance.



Illustration:

1. Before connecting cables, make sure the cable labels are correct.
2. If the device has multiple inputs, all inputs of the device should be disconnected and the device can be operated only after it is completely powered off.

3. After the inspection is completed, remove the grounding wire between the inspection circuit and the grounding circuit.

1.4 Mechanical Safety



Note:

1. When transporting without wooden boxes, the bottom panel must be removed. Handle with care during take-off and landing to avoid impact or vibration.
2. During transportation, the center of gravity of the box should fall between the two forks on the forklift. Long-distance transportation or inversion or tilting is prohibited.
3. When transporting equipment, the large size of the equipment may block the operator's view, so auxiliary personnel need to be arranged to assist.
4. To ensure the safety of drilling outside the equipment, a suitable location should be selected before drilling to ensure that there will be no short circuit or other effects. The equipment should be shielded during the drilling process to prevent debris from falling into the equipment, and the debris should be cleaned up in time after drilling.
5. When moving equipment by hand, you should be prepared to bear the weight and wear protective gloves, anti-smash shoes and other safety protection equipment.
6. Move the equipment carefully during transportation to avoid collision or drop. Avoid scratching the surface of the equipment and damaging parts or cables.

1.5 Battery Safety



Illustration:

The company is not responsible for damage to the batteries provided by the company caused by the following reasons:

1. The customer fails to charge or inspect the battery in time, resulting in overdue storage, capacity loss or irreversible damage.
2. Mechanical damage, leakage, rupture, etc. caused by falling due to improper operation or failure to connect the battery as required.
3. The customer or third party changes the battery usage scenario without informing the company, including but not limited to: connecting additional loads to the battery, mixing with other brands of batteries, mixing with batteries of different rated capacities, etc.
4. Direct damage to the battery caused by the on-site equipment operating environment or external power parameters not meeting the environmental requirements for normal operation, including the actual operating temperature of the battery being too high or too low, the grid being in bad condition and frequent power outages, etc.
5. The customer fails to correctly set the battery operation management parameters or improperly maintains the battery, resulting in frequent over-discharge of the battery, on-site capacity expansion by the customer, or the battery cannot be fully charged for a long time.
6. The customer did not perform proper maintenance on the battery according to the operating manual of the supporting equipment, including but not limited to: failing to regularly check whether the battery terminal screws are tightened.
7. The battery is stolen or lost.
8. Batteries that have exceeded the warranty period.

**Danger:**

1. Do not expose the battery to high temperature environments or around heating devices, such as sunlight, fire sources, transformers, heaters, etc. Overheating of the battery may cause fire or explosion.
2. Do not disassemble, modify or damage the battery (such as inserting foreign objects, immersing it in water or other liquids, etc.) to avoid battery leakage, overheating, fire or explosion.
3. Battery thermal runaway will produce flammable gases, as well as harmful gases such as CO and HF. The accumulation of flammable gases produced after battery thermal runaway poses a risk of deflagration and explosion, which may cause personal injury and property loss.
4. When installing and maintaining the battery, you need to wrap the exposed cable terminals on the battery with insulating tape. At the same time, prevent foreign objects (such as conductive objects, screws, liquids, etc.) from entering the battery and causing a short circuit.

**Warning:**

1. Batteries must be stored in a separate warehouse and in outer packaging. Avoid mixing with other materials, avoid open-air storage, and avoid stacking batteries too high. Firefighting facilities that meet the requirements must be available on site, such as fire sand, fire extinguishers, etc.
2. Avoid impact on the battery. When transporting the battery, it should be carried in the direction required by the battery. It is forbidden to invert or tilt it.
3. Please use the battery within the temperature range specified in this manual. When the battery ambient temperature is lower than the lower limit of the operating temperature, charging is prohibited to avoid crystallization due to low temperature charging and causing internal short circuit of the battery.
4. Please dispose of used batteries in accordance with local laws and regulations. Do not treat batteries as household waste.
5. If the battery is not recharged for more than 8 months, it is necessary to recharge the battery. Failure to do so may affect the performance and service life of the battery.

Battery abnormality handling measures**Danger:**

1. When electrolyte leakage or abnormal odor occurs, avoid contact with leaking liquid or gas. Non-professionals should not approach, please contact professionals immediately.
2. The electrolyte is corrosive and contact may cause skin irritation and chemical burns. If you come into contact with battery electrolyte, you need to immediately wash the contact area with plenty of water and soap and seek medical help immediately.
3. After the battery has fallen (regardless of whether it is packed with materials or not), it is prohibited to continue to use it. If there is no obvious deformation or damage on the appearance and no obvious odor, smoke or fire, transport the battery to an open and safe place and let it stand for 1 hour before processing, and contact our service engineer.

4. If the battery drops and there is an obvious odor, damage, smoke, or fire, people should be evacuated immediately and the police should be called in time. Professionals should use fire-fighting facilities to extinguish the fire while ensuring safety.

1.6 Maintenance and Replacement



Warning:

1. Contact your dealer immediately if the device fails.
2. Do not power on the device before troubleshooting.
3. Keep unauthorized personnel away during maintenance. Erect temporary warning signs or fencing to secure the area.
4. Unauthorized personnel must not open the cabinet door. Risk of electric shock. Faults caused by unauthorized access will void the warranty.
5. It is forbidden to open the cabinet door in rain, snow, thunder and lightning, dust, fog and other weather conditions.
6. Before removing the components from the cabinet, please make sure that other components on the cabinet are not loose.
7. All operators, maintenance staff and qualified technicians must be properly trained in safe usage and equipment maintenance. Operations should only be conducted with sufficient safety precautions and while wearing appropriate PPE.
8. During equipment maintenance, nearby live parts should be covered with insulating materials.
9. Before the fan is powered off and stops rotating, do not allow any objects to touch the running fan(such as fingers, parts, bolts, etc.).
10. The equipment must not be re-energized until all faults have been completely resolved. Premature power restoration may lead to fault escalation or equipment damage.
11. When inspecting the system with power on, pay attention to the danger signs on the equipment and avoid standing at the cabinet door.
12. After the power components of the energy storage system are replaced or the wiring is changed, manual wiring detection is required to avoid abnormal system operation.
13. When replacing batteries, you must install the exact same type of battery module. Mixing different module types is prohibited.
14. Upon completion of maintenance operations, immediate inspection shall be conducted to verify no tools or components remain inside the equipment.
15. After completing maintenance and replacement operations, the cabinet door should be locked in time and the key should be properly kept.

02 Product Introduction

2.1 System Overview

The Flexio Series customized energy storage system adopts a modular integrated design, comprising Hybrid power conversion cabinet and multiple ESS-BATT-241C DC battery cabinets, delivering a modular MW-scale energy storage solution.

The power conversion cabinet integrates key components such as HMI and AC-DC conversion modules, while the DC battery cabinets incorporate safety and thermal control modules including BMS, battery racks, high-voltage distribution units, fire protection systems, and air conditioning. This system features multi-timescale application capabilities, meeting both long-duration requirements like peak shaving and load balancing as well as short-term applications such as frequency regulation and renewable energy stabilization, while also providing reliable backup power functionality. Through its modular architecture design, the system supports flexible capacity expansion and incorporates multiple safety protections, making it widely applicable in scenarios including grid frequency regulation and peak shaving, commercial and industrial energy storage, microgrid systems, and emergency power supply.

2.2 System Description

Product Series	ESS-GRID FlexiO-250/482
System Components	ESS-GRID P250E (100DC) ESS-GRID 241C



Illustration:

The ESS-GRID FlexiO Series energy storage system features highly flexible configuration, with adjustable rated output power and battery capacity to meet specific project requirements. The system achieves customized performance specifications through modular expansion or reduction of components including power conversion cabinets and DC battery cabinets.

2.3 Electrical Schematic Diagram

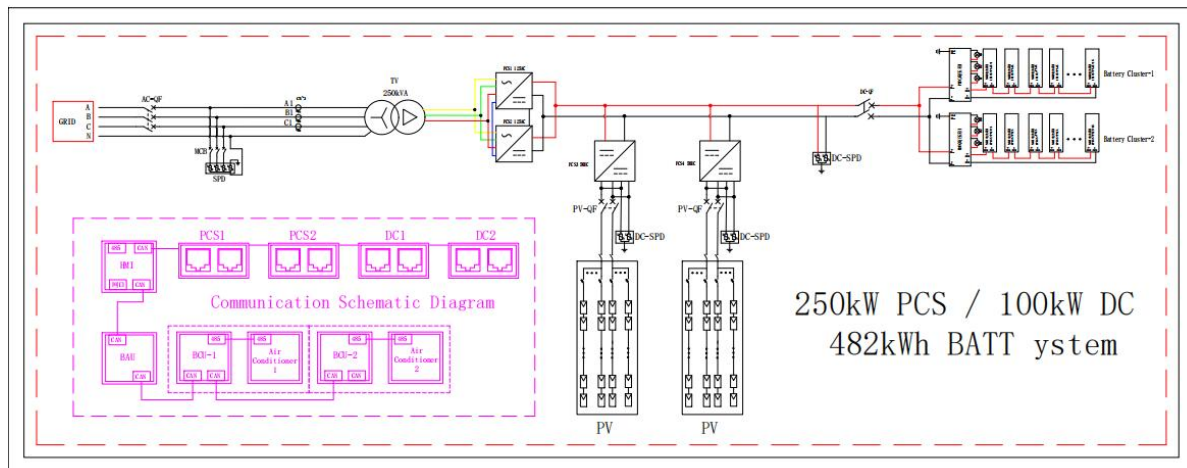


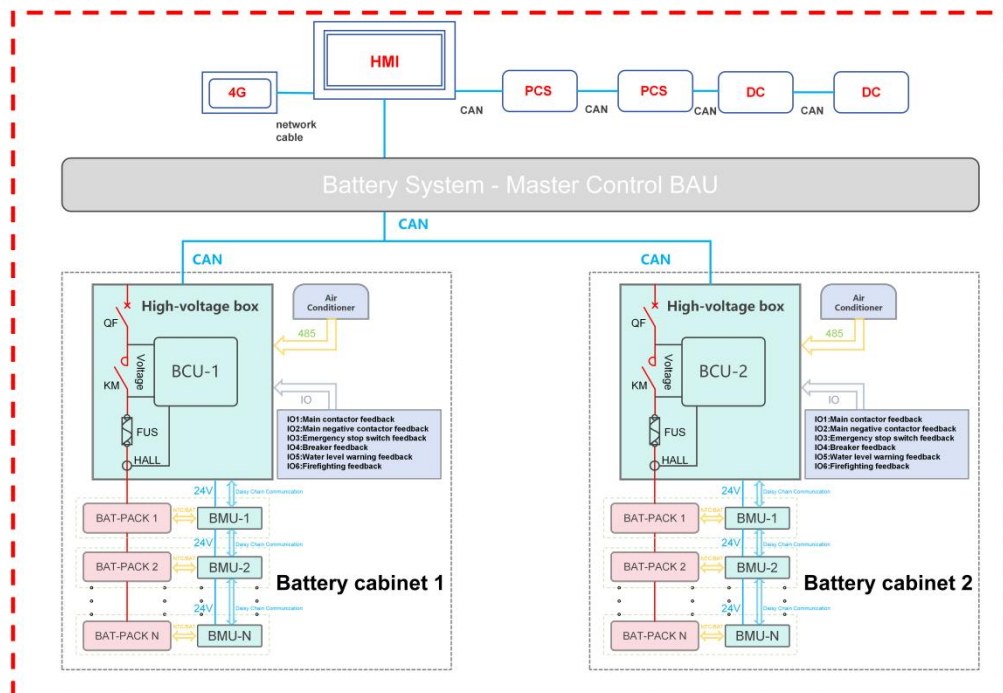
Figure2.3-Primary Electrical Diagram



Illustration:

Different projects have different configurations and slightly different lines. The actual configuration is subject to shipment.

2.4 Communication Topology Diagram



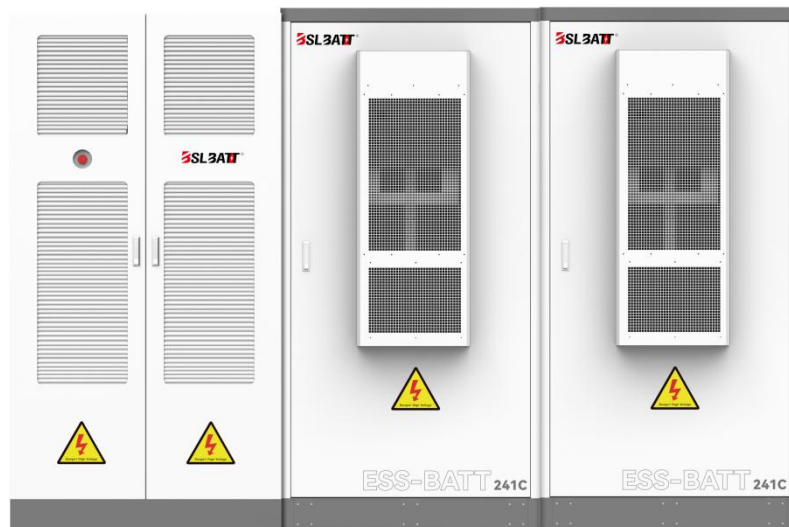
Communication Topology Diagram



Illustration:

Different projects have different configurations and slightly different lines. The actual configuration is subject to shipment.

2.5 System Appearance



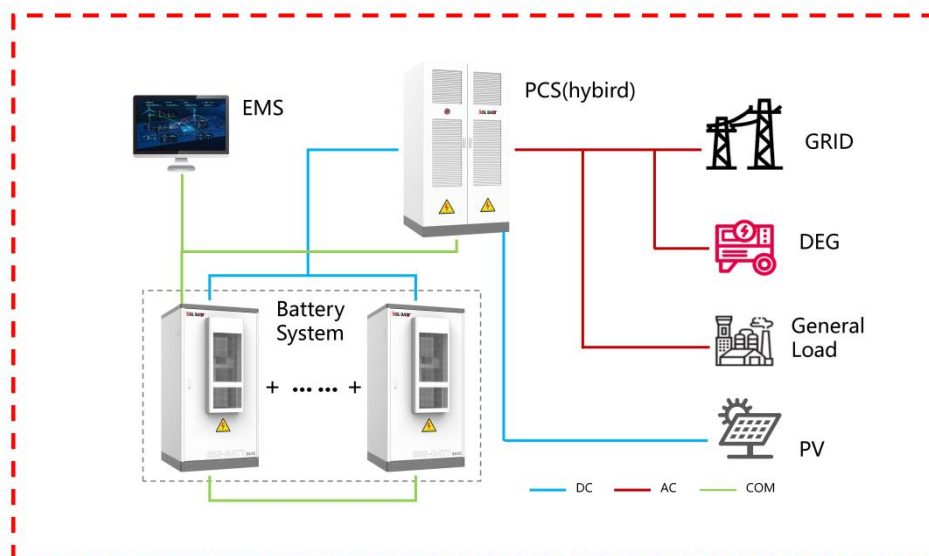
Appearance Diagram



Illustration: The actual configuration is subject to shipment.

2.6 System Applications

PCS Cabinet + DC Battery Cabinet:



System Applications Diagram



Illustration:

Different projects have different configurations and slightly different communications. The actual configuration is subject to shipment.

2.7 System Parameter

2.7.1 PCS Cabinet

Energy Storage Converter Cabinet Technical Parameters:

MODEL	ESS-GRID-P250E(100DC)
AC (GRID-CONNECTED)	
Rated Grid Voltage	400VAC, 3W+PE/3W+N+PE
Grid Voltage Frequency	50/60(±5Hz)
Rated AC Current	180A*2
Rated Power	250kW
Power Factor	-1 ahead ~ +1 behind
(THDI)Total Current Harmonic Distortion	< 3%(Rated Power)
DC SIDE (BATTERY SIDE)	
Input Voltage	625~950V
Max. DC Current	200A*2
Rated Power	250kW
PV SIDE	
Staing Voltage	200V
Operating Voltage Range(Input)	250V ~ 620V
Max. DC Current(Input)	160A*2
Operating Voltage Range(Output)	550V~950V
Max. DC Current(Output)	110A*2
Rated Power	100kW
Number of MPPTs	2
SYSTEM PARAMETERS	
Working Temperature	-25°C~+60°C (>45°C derating)
Storage Temperature	-20°C ~ +45°C
Protection Class	IP55
Altitude	3000m (> 3000m derate)
Cooling Method	Forced air cooling
Communication Interface	CAN/RS485/Ethernet
Electrical Isolation	With isolation transformer
Dimension(W*D*H,mm)	1450*1150*2300(±5)
Weight(Indicative)	1650kg±3%

Table 2.7.1



Note:

The ESS-GRID Power Conversion Cabinet (PCS) operates optimally within 10°C to 50°C;



Illustration:

The above parameters represent the standard configuration specifications of the ESS-GRID P250E Power Conversion Cabinet (PCS), applicable to transformer-coupled models. Please note that the actual delivered system will strictly comply with the technical agreement and project-specific requirements.



Note:

The actual parameters are set according to customer requirements before leaving the factory.

2.7.2 DC Battery Cabinet

DC battery cabinet technical parameter table:

Model	ESS-GRID 241C
Series-parallel connection	1P*16S*15S
Cooling Method	Intelligent Air Cooling
Rated Capacity	314Ah(LFP)
Rated Capacity	241kWh
Rated Voltage	768V
Operating Voltage Range	672V~852V
Standard Charge & Discharge Current	157A
Max. Charge/Discharge Current	200A(25°C)
Protection Level	IP55
Fire protection Configuration	Hot-air aerosol
Cycle Life	> 6000 Cycles (80% DOD @25°C 0.5C)
Relative Humidity	10~90%(no condensation)
Noise Level	70dB
Operating Temperature	-20°C~55°C
Communication Protocol	CAN/RS485 ModBus/RTU
Dimension(mm)	1150*1282*2300mm(±5mm)
Weight	2360kg ±3%

Table 2.7.3

**Note:**

The actual parameters are set according to customer requirements before leaving the factory.

2.8 Configuration List

The following are the standard configurations of the ESS-GRID FlexiO series energy storage system:

Name	Model	Unit	Quantity
Energy storage hybrid cabinet	125kW-PCS module	Set	2
	50kW-DC module	Set	2
	250kVA-Isolation transformer	Set	1
DC battery cabinet	241C	Tower	2
Three-level BMS	BAU	Set	1
Supplementary materials	Cables, etc.	Set	1

Table 2.8



Note:The actual configuration is subject to delivery.

03 Installation, Transportation and Storage

3.1 Packaging and Storage

3.1.1 Product Packaging

In order to keep the product in a better protective state during transportation, it is packed in a specific wooden box. The equipment packaging has the following basic parameters (including but not limited to), which need to be carefully checked according to project requirements:

Parameter	Illustration
Model	Product Model
Size	Product packaging size
Weight	Total weight of product after packaging
Logo	Face up, place with care, center of gravity, etc.

Table 3.1.1



Packaging diagram



Note: The actual configuration is subject to delivery.

3.1.2 Product Storage

If the product is not transported or installed for use immediately, it must be stored indoors in a place that meets the following conditions:

Parameter	Require
Storage temperature (without battery)	-25°C~+60°C
Battery	20°C ~ 30°C

Storage relative humidity	< 90%(no condensation)
Altitude	< 3000m

Table 3.1.2

3.2 Transportation and Handling

3.2.1 Product Transportation

1. In order to keep the equipment in a better protective state, it is recommended to transport it with packaging;
2. Equipment transportation must be carried out according to the requirements marked on the packaging to prevent personal injury and equipment damage;
3. Railway and air transportation are not recommended for energy storage batteries. Speed limit requirements for land transportation: 80km/h on flat roads and 60km/h on rugged roads. If there is a conflict, please follow local traffic regulations.

3.2.2 Product Handling

1. When using a forklift to move the equipment, make sure the forklift has sufficient load capacity and make sure the center of gravity of the equipment falls between the forklift's feet to prevent personal injury and equipment damage;
2. For transportation with batteries, the forklift load-bearing capacity needs to be $\geq 3t$; for transportation without batteries, the forklift load-bearing capacity needs to be $\geq 1.5t$;
3. The recommended fork and knife length is $\geq 1.5m$, width is 80cm~160cm, and thickness is 25mm~70mm.

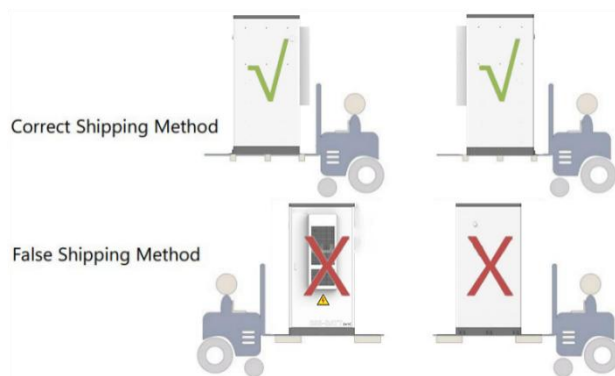


Figure 3.2.2-Schematic diagram of transportation

3.3 Installation Environment

The installation layout of the energy storage system must meet the fire protection distance or firewall requirements specified by local standards, including but not limited to *GB 51048-2014 Design Specifications for Electrochemical Energy Storage Stations* and "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems". The energy storage system is only suitable for outdoor scenarios and requires outdoor layout, not indoor layout. The general requirements for site selection are as follows:

1. The installation location should be above the highest historical water level in the area. The distance to the airport, landfill, river bank or dam should be $\geq 2\text{km}$.
2. Choose a well-ventilated place. When the equipment is running, do not block the vents and cooling system to prevent high temperature fire. There should be enough installation space to ensure that surrounding equipment will not be affected by the heat generated by the product; the installation location should ensure that there is enough space for external wiring. It should have convenient transportation conditions and reliable fire suppression system equipment.
3. The installation location should be far away from fire sources, and flammable and explosive items should not be placed around the equipment. If the equipment is installed in a place with lush vegetation, in addition to routine weeding, the ground under the equipment needs to be hardened to prevent weeds from growing.
4. Do not install the energy storage system outdoors in salt-damaged areas to prevent corrosion of the equipment and fire. Salt-damaged areas refer to areas within 2 km from the coast or affected by sea breeze.
5. The energy storage system must be equipped with protective measures such as fences and walls, and safety warning signs must be erected for isolation to prevent unauthorized personnel from entering during equipment operation, which may cause personal injury or property loss.
6. The equipment should be installed in an area away from liquids. It should not be installed below water pipes, air outlets, or other locations where condensation water is likely to form. It should not be installed below air conditioning outlets, vents, computer room outlet windows, or other locations that are prone to water leakage to prevent liquid from entering the interior and causing a short circuit in the equipment.



Illustration:

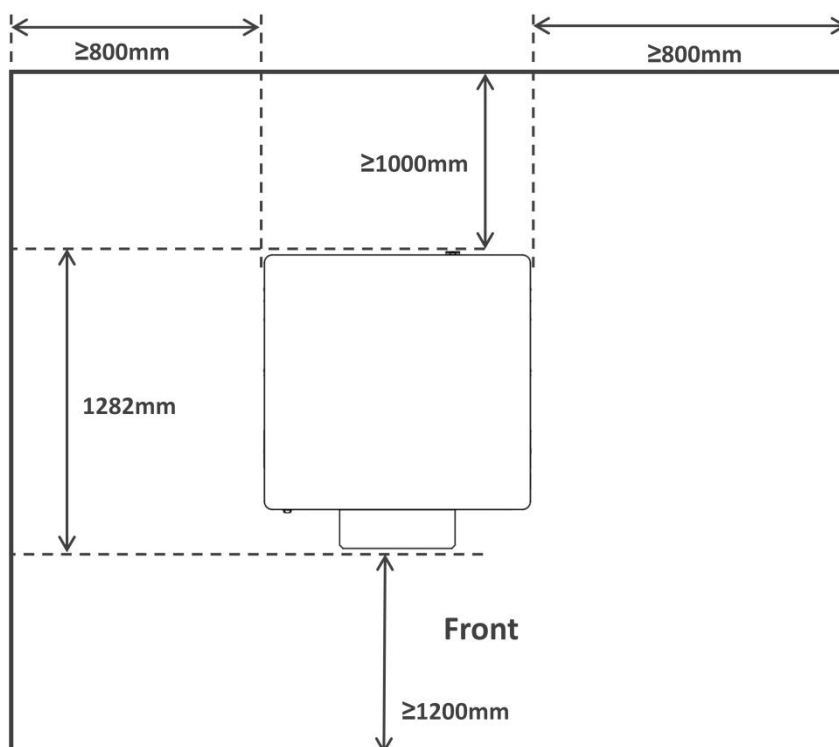
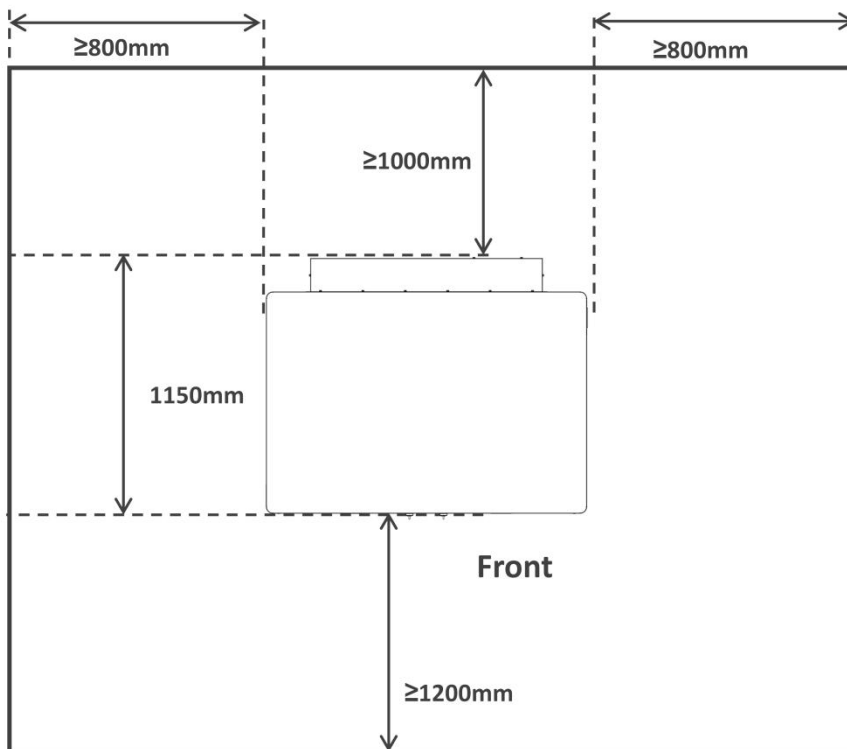
When the safety distance of the selected site cannot meet the requirements of relevant national standards, it is recommended to re-select the site. The site selection should avoid scenarios that are not recommended by industry standards and regulations, including but not limited to the following areas, regions and places:

1. Areas with strong vibration, strong noise sources and strong electromagnetic field interference.
2. Places that generate or have dust, oil smoke, harmful gases, corrosive gases, etc.
3. Places where corrosive, flammable, or explosive items are produced or stored. Areas subject to explosion hazard.
4. Places with existing underground facilities: crowded places, high-rise buildings, and underground buildings.
5. Unfavorable geological conditions such as rubber soil, soft soil layers, and ground that is prone to water accumulation and sinking.
6. Within the boundaries of mining subsidence (dislocation) areas. Areas that may be flooded after the dam or embankment breaks.
7. Earthquake faults and earthquake zones with a fortification intensity higher than 9 degrees. Areas with direct hazards such as debris flows, landslides, quicksand, and karst caves.
8. Important water supply source sanitary protection areas.

9. Historical relics and historic sites protection areas.

If there is no more suitable site, it is recommended to install a fire wall with a fire resistance of not less than 3h for safety protection, while considering the space requirements for equipment transportation, installation, maintenance, etc. It is recommended to refer to *T/CEC 373-2020*. The length and height of the fire wall should exceed the outer contour of the energy storage cabinet by 1m each.

3.4 Space Requirements



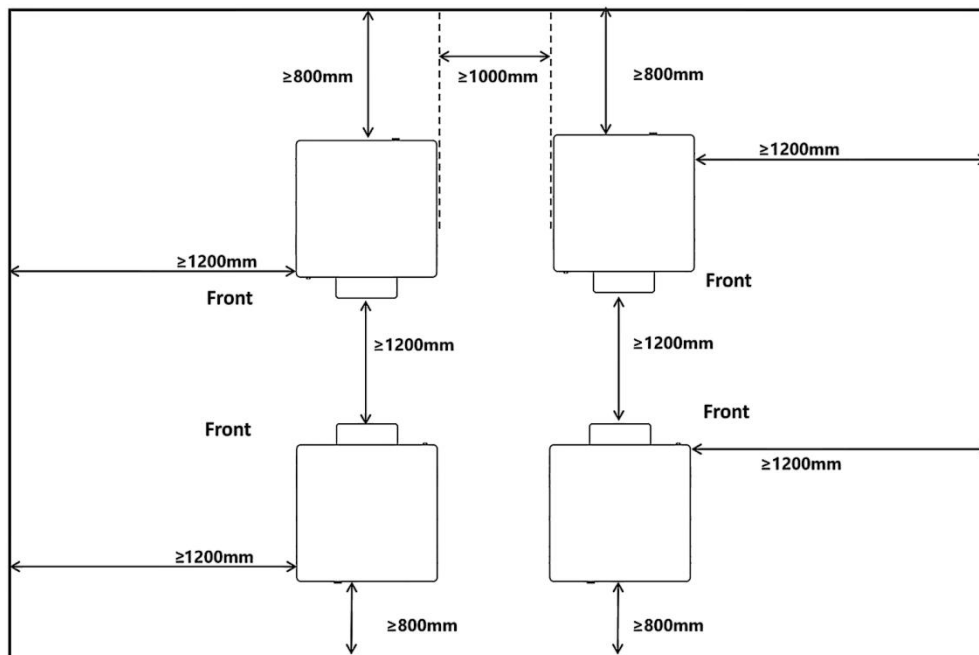


Figure 3.4

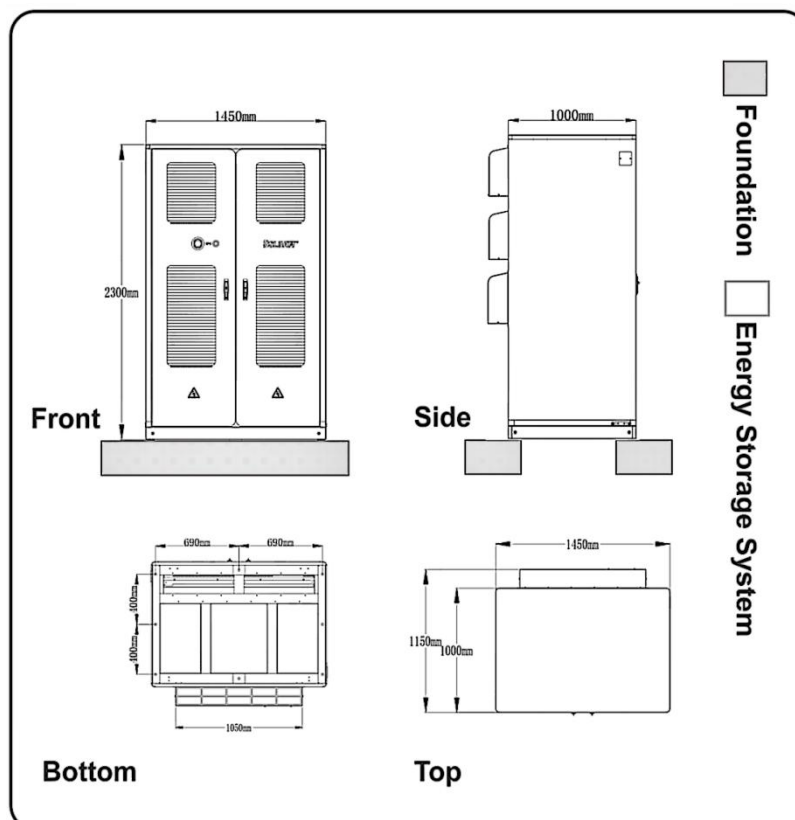


Illustration:

The layout design refers to the requirements of *GB 51048-2014 Code for Design of Electrochemical Energy Storage Power Station*. Safety clearance settings shall comply with local implementation standards.

3.5 Foundation Requirements

Foundation Reference Diagram:



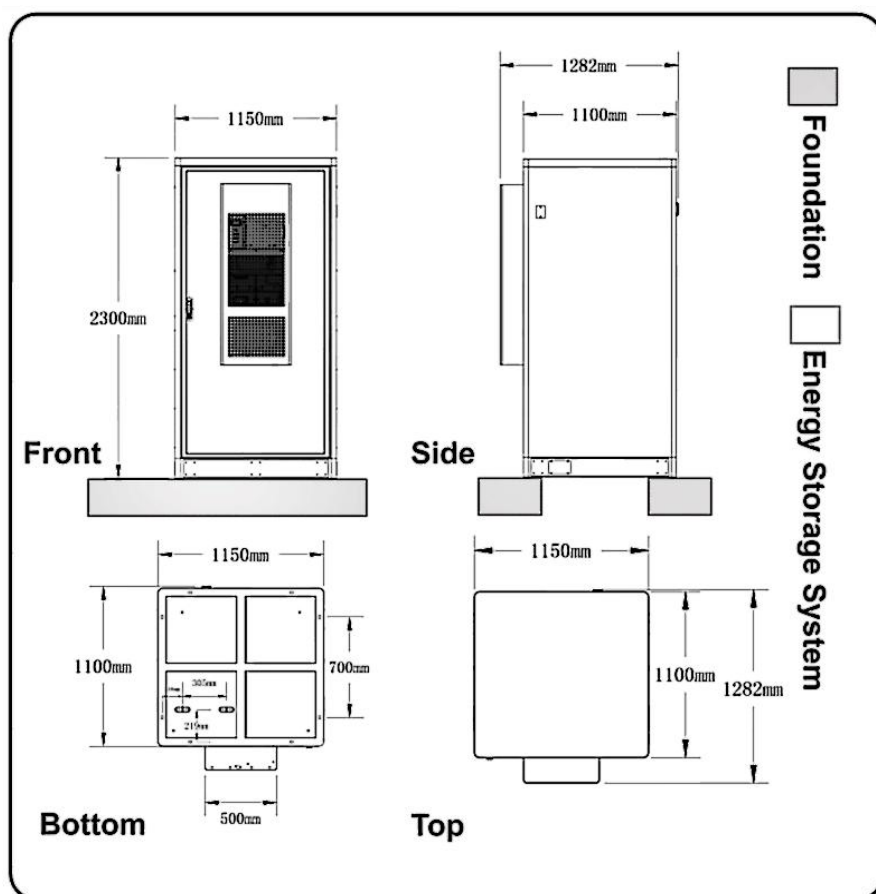


Figure 3.5



Illustration: For reference only , not for construction.

Foundation Design Requirements:

1. The foundation elevation must exceed the local historical highest water level by at least 300mm above ground level;
2. Drainage facilities shall be constructed according to local geological conditions and municipal drainage requirements to prevent water accumulation. The foundation must meet drainage capacity for local historical maximum rainfall, with discharged water treated in compliance with local regulations;
3. The energy storage system must be installed on concrete or other non-combustible surfaces. The installation plane shall be level, solid, flat, and with sufficient load-bearing capacity. Depressions or inclinations are strictly prohibited;
4. Foundation design must account for total equipment weight. If bearing capacity is insufficient, reinforcement is required. The foundation pit bottom must be compacted and leveled. Excavated foundations must not be water-soaked or disturbed; if occurring, continued excavation and backfilling replacement are mandatory;
5. Cable routing provisions (trenches or entry conduits) must be incorporated during foundation construction. All reserved openings and bottom cable entries shall be properly sealed;



Illustration:

All on-site foundation surveys, designs, and construction plans must be executed and verified by qualified design institutes or certified professionals in strict compliance with local regulations, industry standards, and actual engineering conditions.

3.6 Preparation Before Installation

1. Before installing the product, check whether the product is intact. If any damage is found, please keep the evidence and contact the equipment manufacturer.
2. If you are sure that there is no abnormality with the product, please check according to the delivery list to see whether the accessories are complete.
3. Users are required to prepare relevant installation tools before installation.

Pre-installation checklist:

Serial number	Inspection items	Treatment measures
1	Check whether the fasteners are tightened.	If it is loose, tighten the screws again.
2	Whether the space environment meets the installation size requirements.	If there is insufficient space, it is recommended to redesign and install.
3	Check whether the air duct is unobstructed and free of foreign matter.	If there is any foreign matter, please clean it up. If it is not smooth, eliminate the cause.

Table 3.6-1

Installation auxiliary tool list:

Serial number	Tool Name	legend
1	Insulating gloves	
2	Protective glasses	
3	Insulated shoes	
4	Work clothes	
5	helmet	
6	screwdriver	

7	Wire strippers	
8	Hydraulic pliers	
9	Heat Gun	
10	multimeter	
11	Torque wrench	
12	Marking pen	

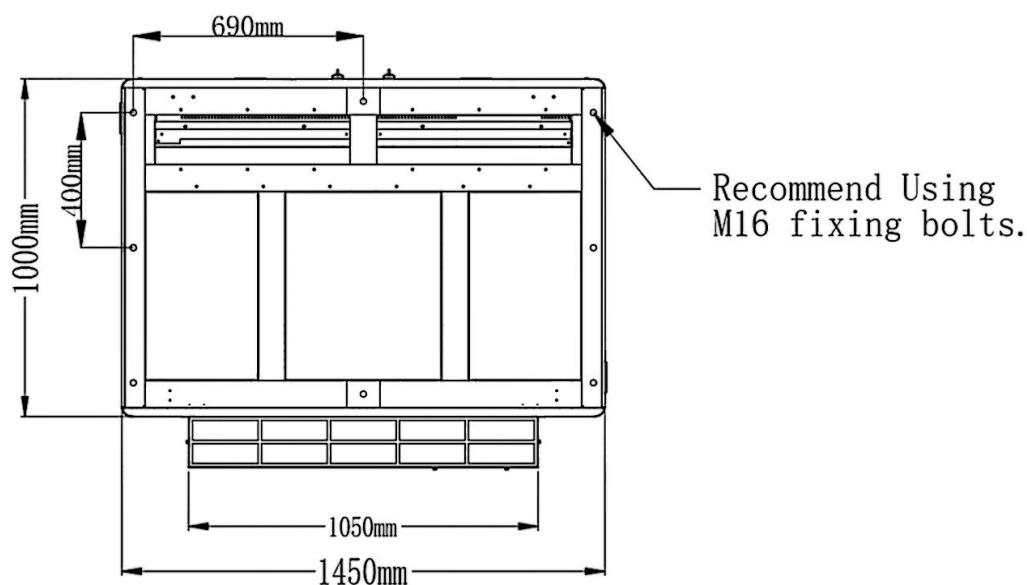
Table 3.6-2

3.7 Mechanical Installation

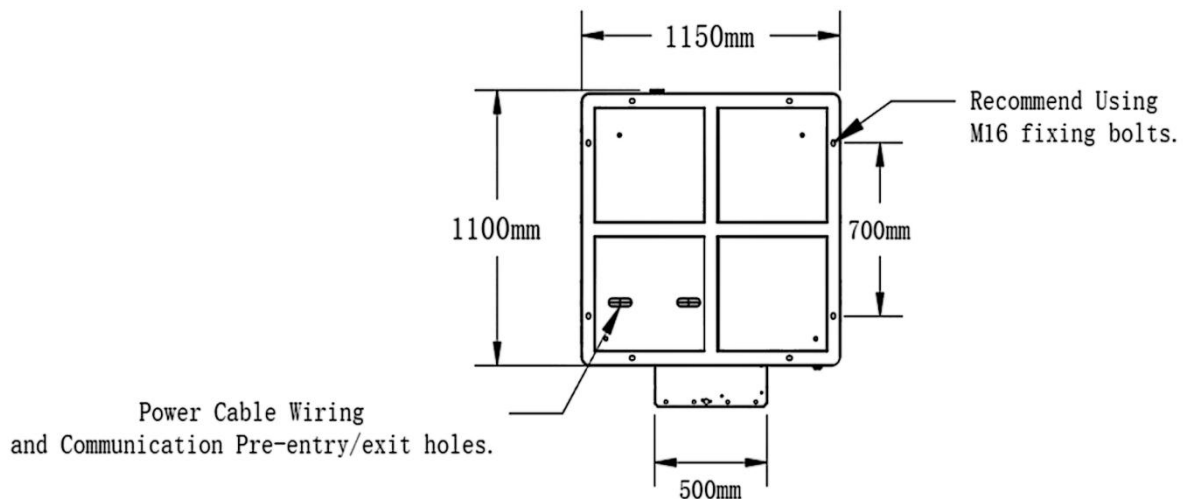
Step 1: make sure that the product is normal and all accessories are complete, and then refer to the following suggestions for mechanical installation:

1. Select the equipment installation location in advance according to the product size, and do a good job of positioning and fixing;
2. Refer to the product weight and select an installation location that has sufficient load-bearing strength;
3. The grounding point is reliable and the grounding resistance is guaranteed to be less than 4Ω .

P250E(100DC):



241C:



Step 2: remove the bottom panel of the equipment after removing the wooden box. Keep the removed panel and screws and reinstall them after the equipment is in place.

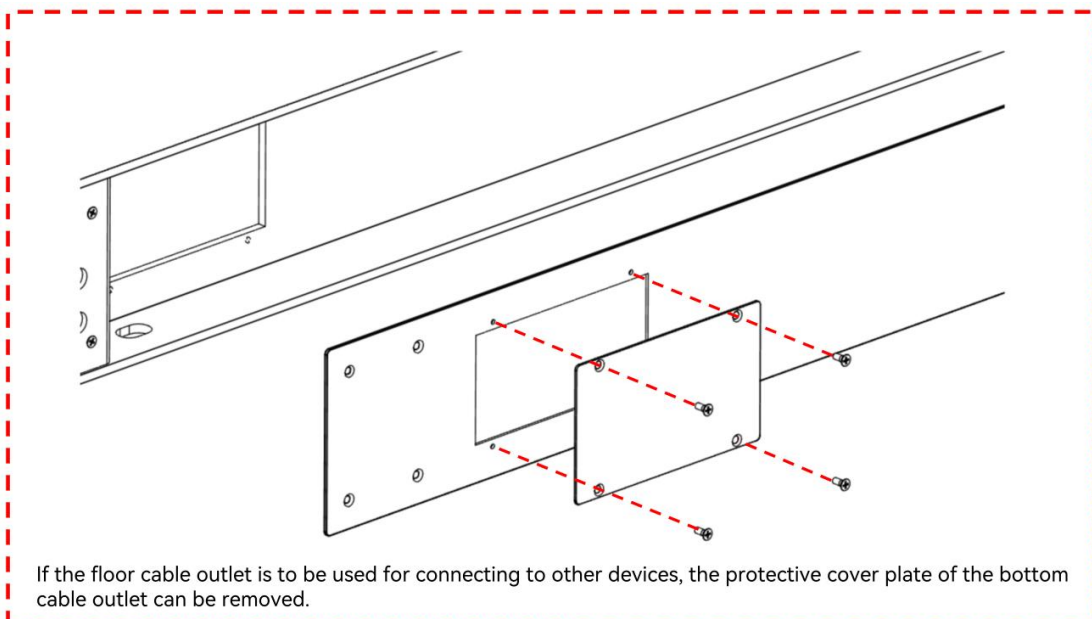
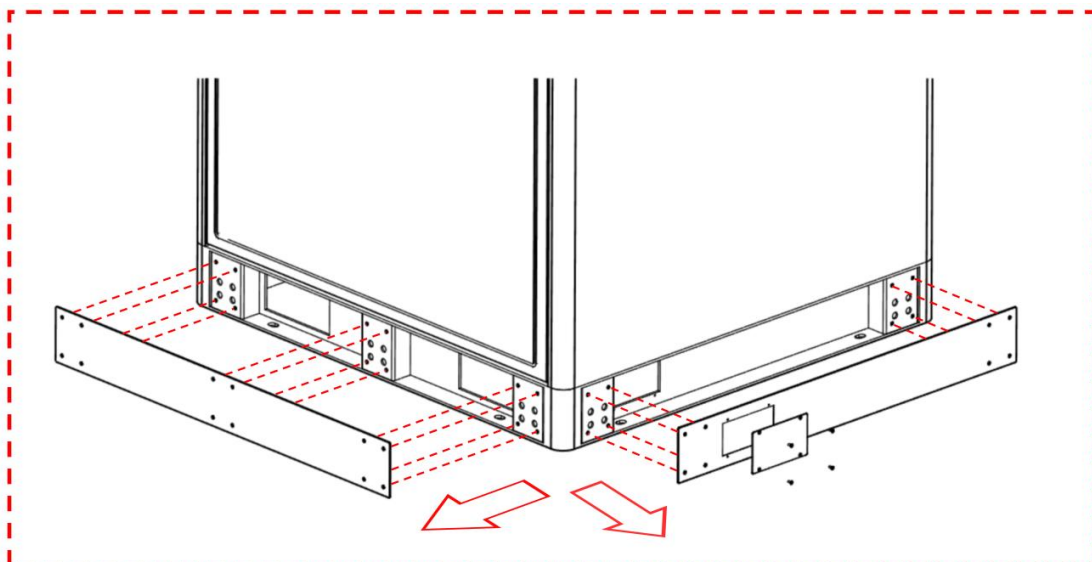


Figure 3.7-1

Step 3: use a forklift to place the equipment on the foundation, align the equipment fixing holes with the embedded nuts on the foundation, and tighten them with M16X40 bolts.

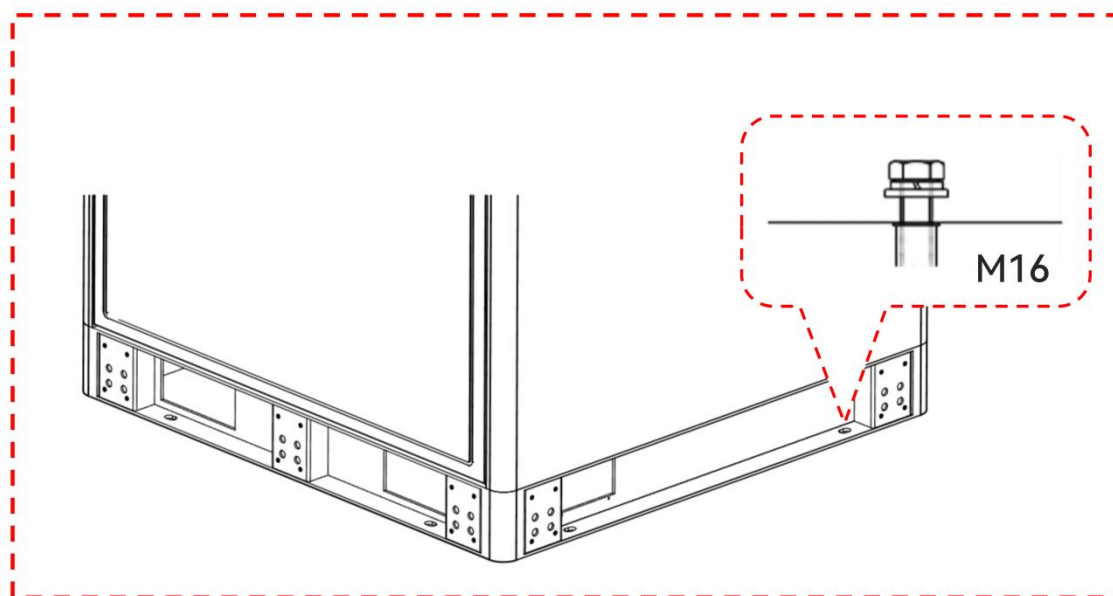


Figure 3.7-2

3.8 Electrical Connection

3.8.1 Electrical installation requirements

The energy storage converter cabinet and battery cabinet all adopt an integrated structure. The wiring between the internal modules has been completed. Only the electrical cables for the external DC side, AC side, and external communication need to be installed on site. According to the product power and cable specifications, a wiring reference is provided as shown in Table 3.8.1-1. The selection of cable diameters should comply with local cable standards. Factors affecting cable selection include: rated current, cable type, laying method, ambient temperature, and maximum acceptable line loss.

Cable diameter comparison table

Model capacity	AC cable	Neutral	Ground	DC cables
100kW	$\geq 3 \times 50\text{mm}^2$	$\geq 50\text{mm}^2$	$\geq 25\text{mm}^2$	$\geq 2 \times 50\text{mm}^2$
125kW	$\geq 3 \times 70\text{mm}^2$	$\geq 70\text{mm}^2$	$\geq 50\text{mm}^2$	$\geq 2 \times 50\text{mm}^2$
125kW*2	$\geq 3 \times (2 \times 70\text{mm}^2)$	$\geq 2 \times 70\text{mm}^2$	$\geq 70\text{mm}^2$	$\geq 2 \times 50\text{mm}^2$

Table 3.8.1-1



Danger:

When performing electrical installation, you can refer to the following suggestions:

1. Before wiring, check that all switches in the equipment are in the off state and ensure that the equipment is not powered;

2. Disconnect the power grid switch before wiring to ensure that the cables are not energized;
3. Make sure the phase sequence of the cables is correct. You can add yellow, green, red, and black insulation sheaths or logos to distinguish them to prevent incorrect phase sequence.
4. The connection between the cable terminal and the copper busbar needs to be tightened, and the screw length should be moderate to avoid affecting insulation and tightening;
5. Lay communication cables and power cables separately as much as possible, and ensure that the insulation layer of the cables is not damaged during the laying process;
6. The grounding cable must be reliably connected to the grounding copper busbar, and the cable cross-sectional area must meet the design requirements;
7. All AC cables must enter the device through the inlet and outlet holes at the bottom of the device and then be connected to the corresponding phase sequence;
8. After wiring is completed, use fireproof mud to seal the wiring gaps to prevent external insects and rodents from entering and damaging equipment or cables.

In order to prevent the terminal from loosening due to force, causing poor contact, increased contact resistance, and heat generation, etc., it is necessary to ensure that the bolts tightening the terminal meet the torque requirements listed in Table 3.8.1-2:

Wiring torque requirement table

Screw size	M4	M5	M6	M8	M10	M12	M14	M16
Torque (N*m)	1.8~2.4	4~4.8	7~8	22~29	44~58	76~102	121~162	189~252

Table 3.8.1-2

3.8.2 Internal wiring of battery cabinet

Step 1: To ensure the safety of subsequent operations, please unplug the maintenance switch inside the battery system;

Step 2: Employ the grounding protection the battery system;

Step 3: Connect the power lines between the battery packs to complete the assembly of the battery cluster (already completed at the factory);

Step 4: Connect the communication power cable between the battery packs (already completed at the factory);

Step 5: Connect the communication power cable between the battery PACK and the high-voltage box (already completed at the factory);

Step 6: Connect the power cable between the battery pack and the high-voltage box (already completed at the factory);

Step 7: Close the maintenance switch inside the battery system.

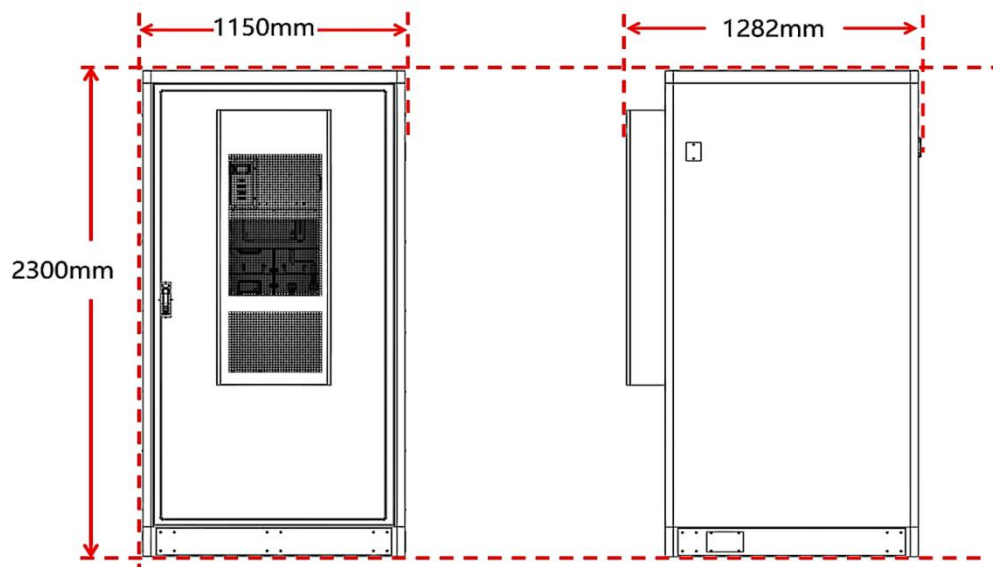


Figure 3.8.2-1

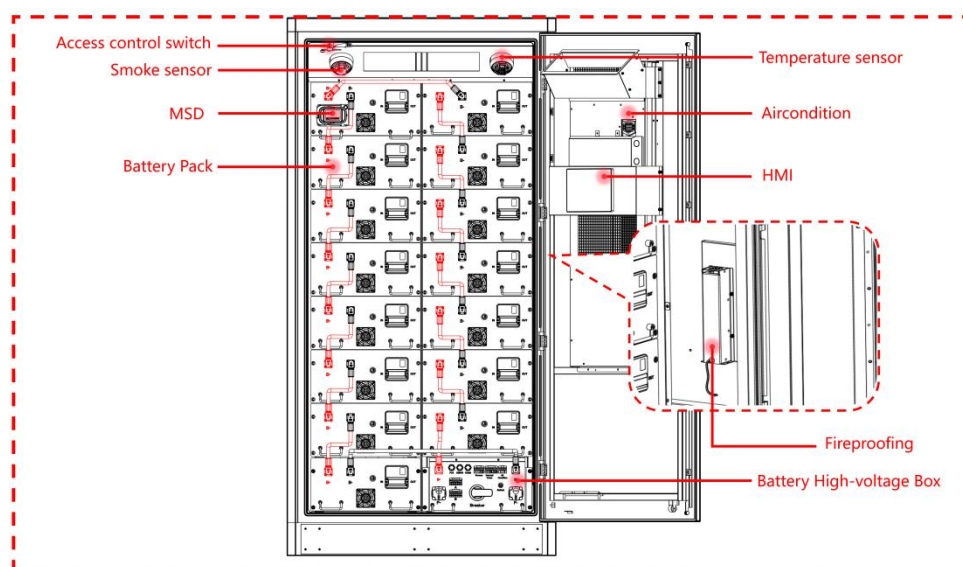
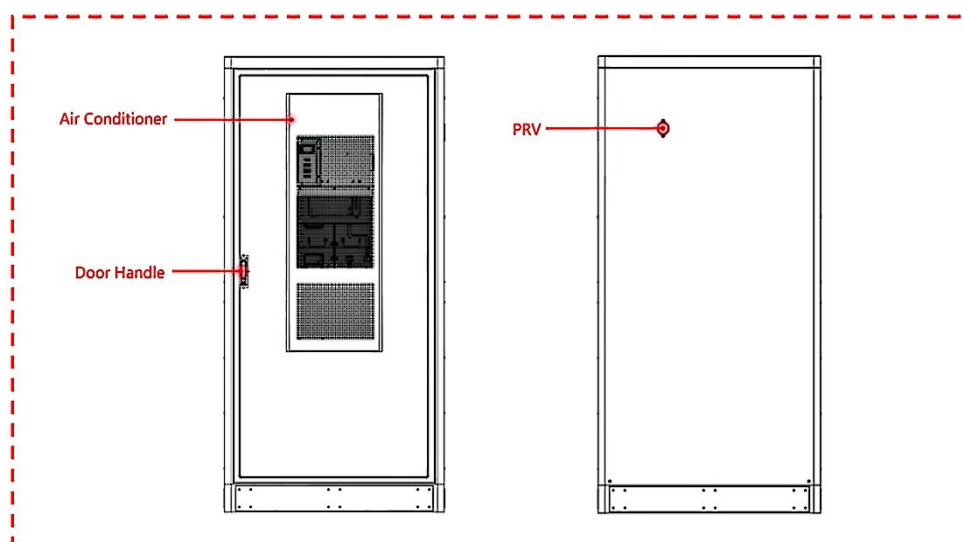
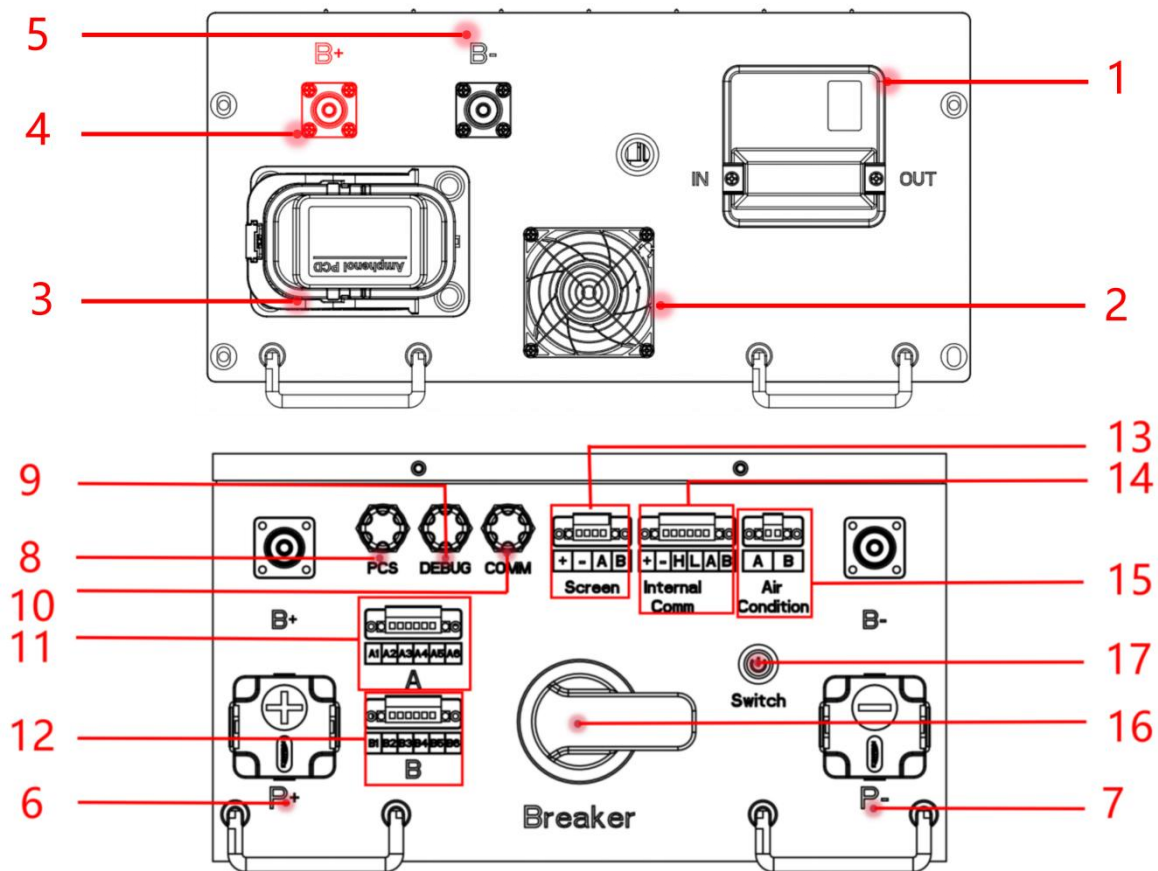


Figure 3.8.2-2



Illustration:

In the ESS-GRID Flexio System, the BMS follows a three-tier architecture. Specifically, the BAU, which serves as the central controller, is installed within the PCS cabinet.



Internal diagram-3

NO.	Name	Definition
1	BMU	Battery Management System from control center
2	Fan	Cooling fan
3	MSD	Maintenance Switch
4	B+	Positive output
5	B-	Negative output
6	P+	System positive output port
7	P-	System negative output port
8	PCS	PCS communication port
9	Debug	Debugging communication port
10	COMM	Upper system communication port
11	A	Fire protection, smoke temperature sensing and other dry contact

12	B	feedback ports
13	Screen	24V power output
14	Internal comm	BMU connection port
15	Air Condition	Air conditioning communication port
16	Breaker	Isolating circuit breaker
17	Switch	Circular metal switch

Table 3.8.2

3.8.3 PCS Cabinet

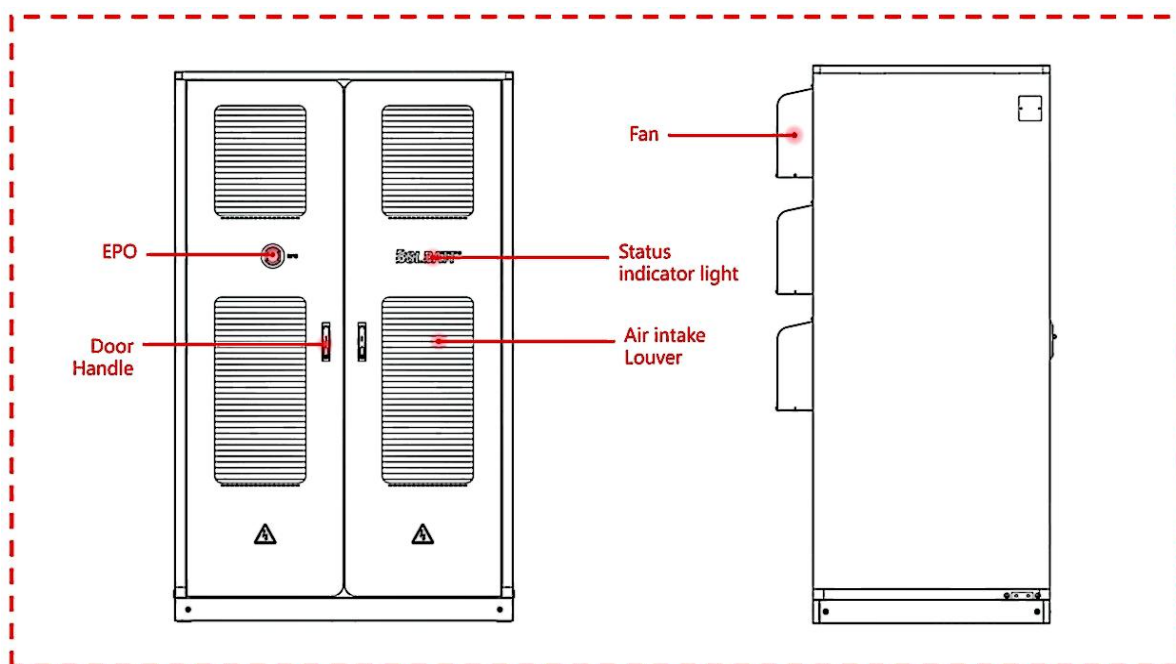


Figure3.8.3-1



Illustration:

The P250E(100DC) energy storage converter cabinet adopts an active air-cooling thermal management system with the following specific design: The equipment utilizes a louver structure on the front panel for natural air intake, while internally equipped with 220V AC-powered cooling fan units that employ forced convection to cool power components. After heat exchange, the system directs the heated airflow outward through centrally arranged axial exhaust devices at the rear of the cabinet. This front-intake/rear-exhaust circulation cooling architecture effectively creates a directional airflow path, ensuring reliable temperature control for the energy storage converter during continuous operation.

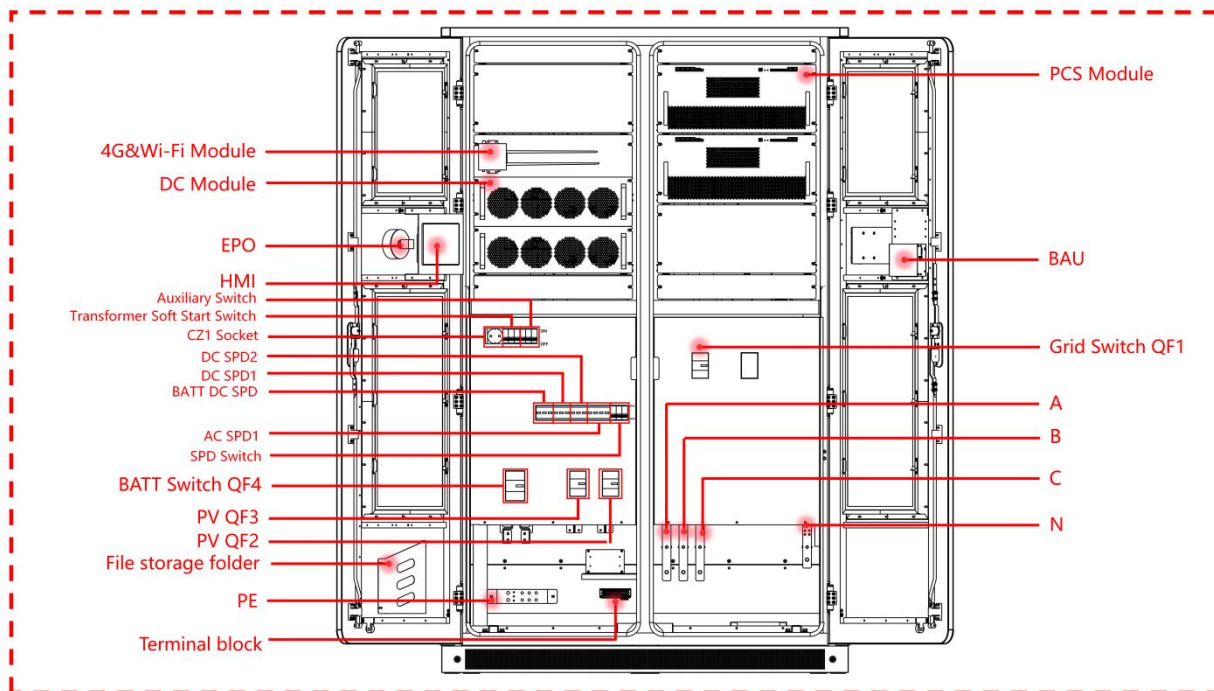


Figure3.8.3-2

PCS Module (already completed at the factory)

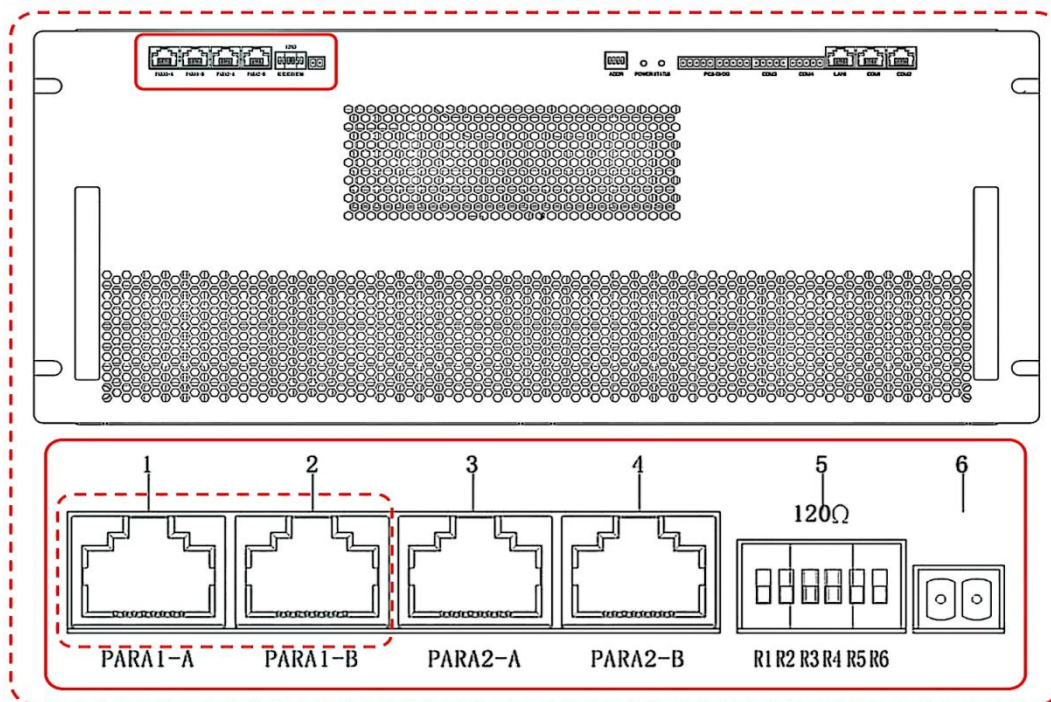


Figure3.8.3-3



Illustration:

In the parallel connection ports, the "A" and "B" interfaces of PARA1 (module parallel interface) are connected in parallel with no priority difference between them. All internal PCS modules must ensure proper connection of the parallel interface; otherwise, system abnormalities may occur during operation.

Parallel Connection Port Table

Serial number	Name
1	PARA1-A
2	PARA1-B
3	PARA2-A
4	PARA2-B
5	R1, R2, R3, R4, R5, R6
6	Internal Debug

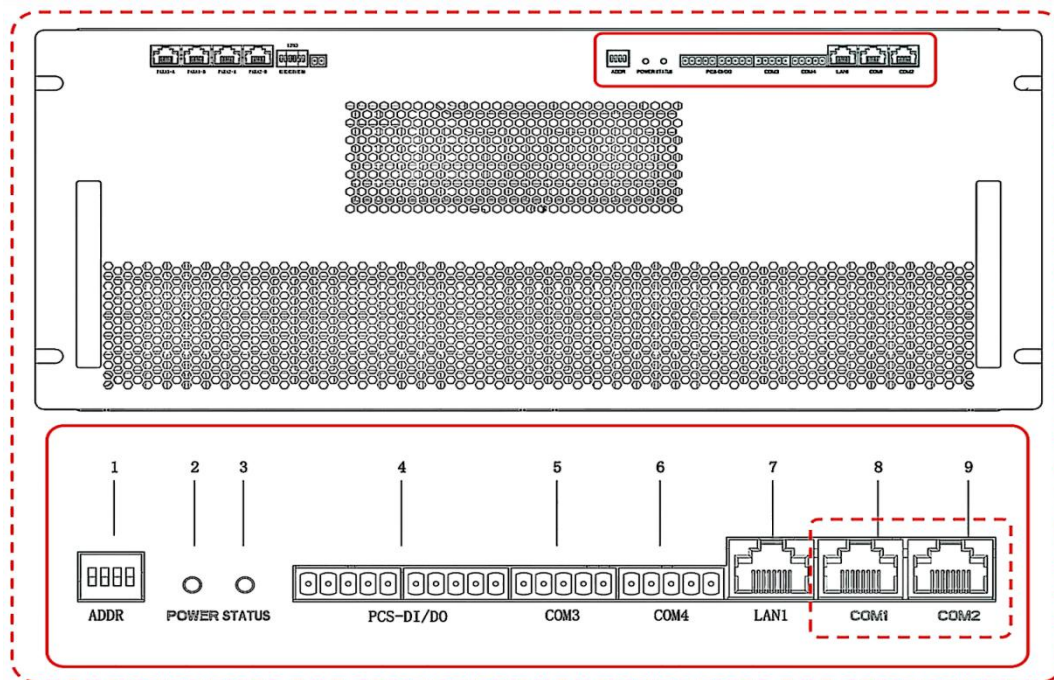


Figure3.8.3-4



Illustration:

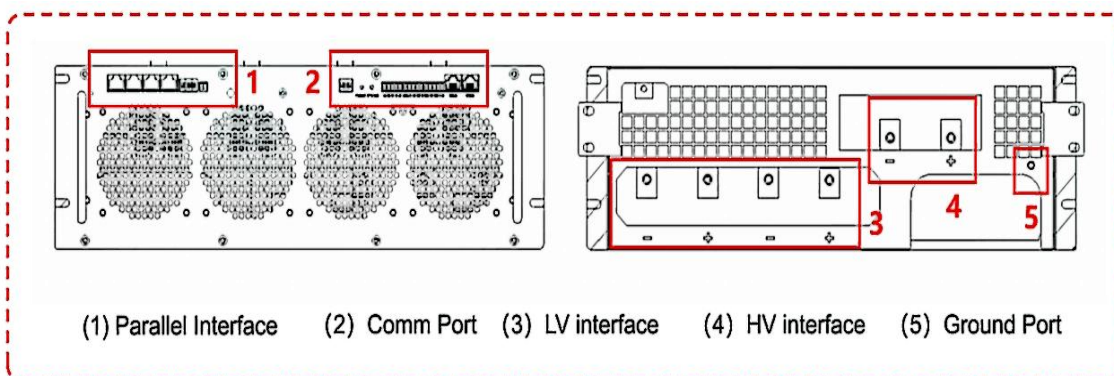
1. The COM1 and COM2 signal ports are parallel-connected and serve as the PCS module's external communication interfaces.
2. For parallel operation of multiple modules, each must be assigned a unique hardware address. If two modules share the same address, address conflicts will occur, preventing correct identification of parallel-connected units and compromising normal system operation.

Signal Port Interface Table

Serial Number	Name	Description
1	ADDR	DIP switch address
2	POWER	Power indicator (Red)
3	STATUS	Status indicator (Green)

4	PCS-DI/DO	PCS digital input/output dry contact port
5	COM3	PCS CAN & RS485 communication port
6	COM4	PCS CAN & RS485 communication port
7	LAN1	PCS Ethernet port
8	COM1	PCS CAN & RS485 communication port
9	COM2	PCS CAN & RS485 communication port

DC Module (already completed at the factory)



For islands, mountainous areas, border outposts, and other remote regions or areas with unstable power supply, or for the construction of zero carbon technology parks with photovoltaic storage systems. Users can configure the DC converter power module according to project requirements, and charge the battery through DC coupling to achieve an integrated power supply system of photovoltaic and energy storage.

NO.	Name	NO.	Name
1	PARA1-A	1	Dial address
2	PARA1-B	2	Power Indicator (Red)
3	PARA2-A	3	Status Indicator (Green)
4	PARA2-B	4	485 communication interface 1
5	R1、R2、R3、R4、R5、R6	5	485 communication interface 2
6	Internal Debug	6	I/O interface
		7	RJ45 Port 1 (CAN Communication port)
		8	RJ45 Port 2 (CAN Communication port)

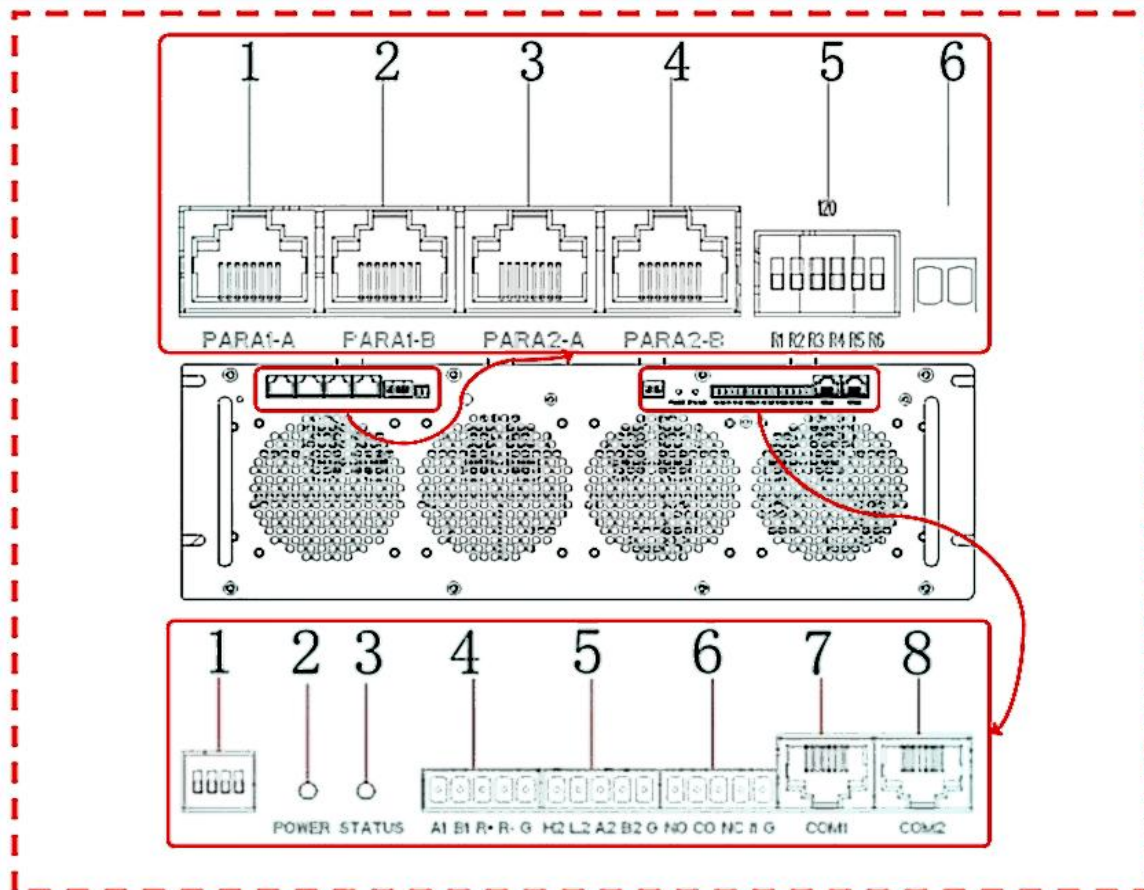
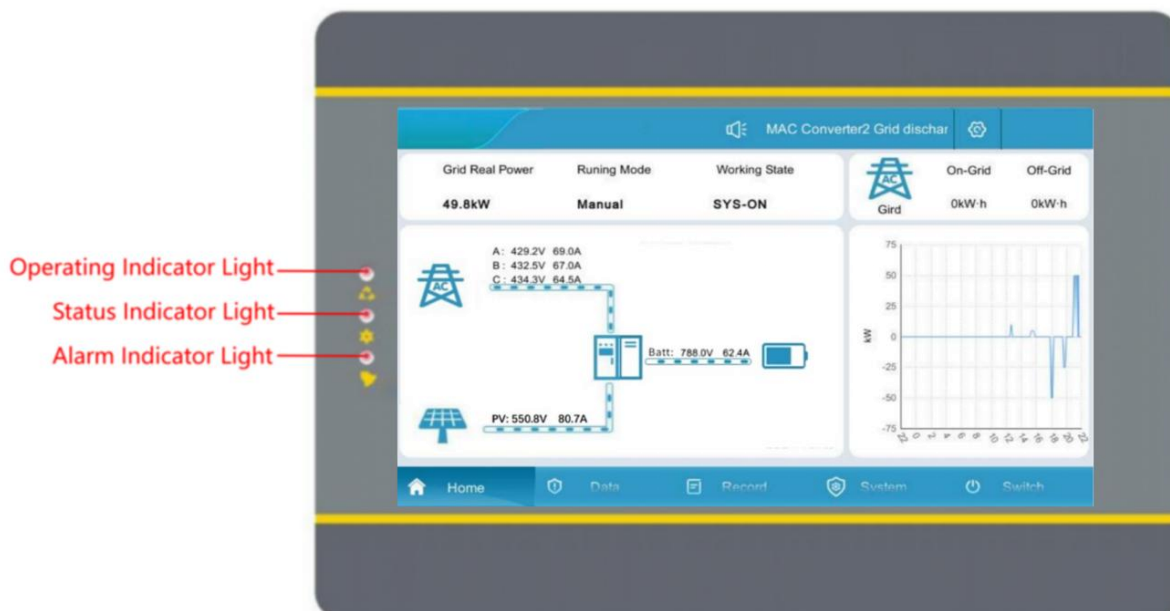


Figure3.8.3-5

HMI communication (already completed at the factory)



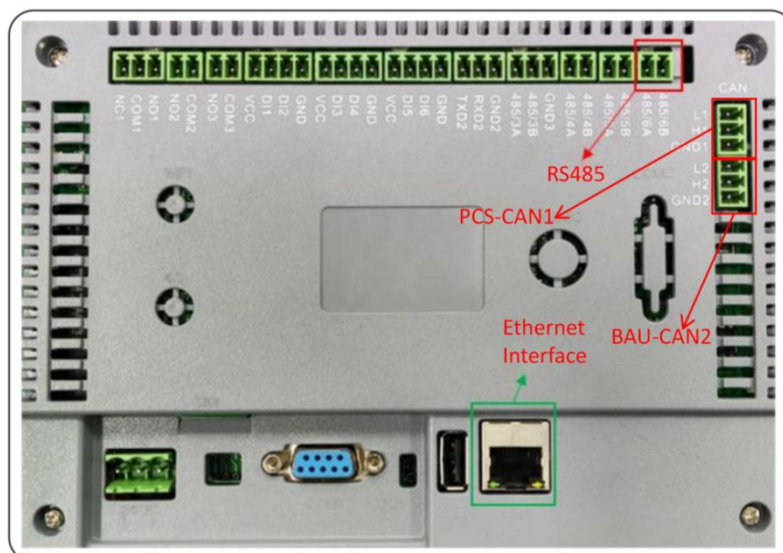


Figure3.8.3-6



Note:

The HMI backend communication supports both RS485 (Modbus RTU) and Ethernet (Modbus TCP) protocols, utilizing shielded twisted-pair cables or standard network cables for connectivity.

When installing external communication cables, it is important to separate them from power cables. When laying communication cables and power cables in parallel, the recommended distance should be no less than 300mm. When the communication cable must pass through the power cable, it is recommended to ensure that the angle between the two cables is 90 ° to reduce electromagnetic interference from the power cable to the communication cable. Communication cables should be routed as close to the surface support as possible, such as wire ducts, metal rails, etc. If there is no support, they can be basically fixed with ties.

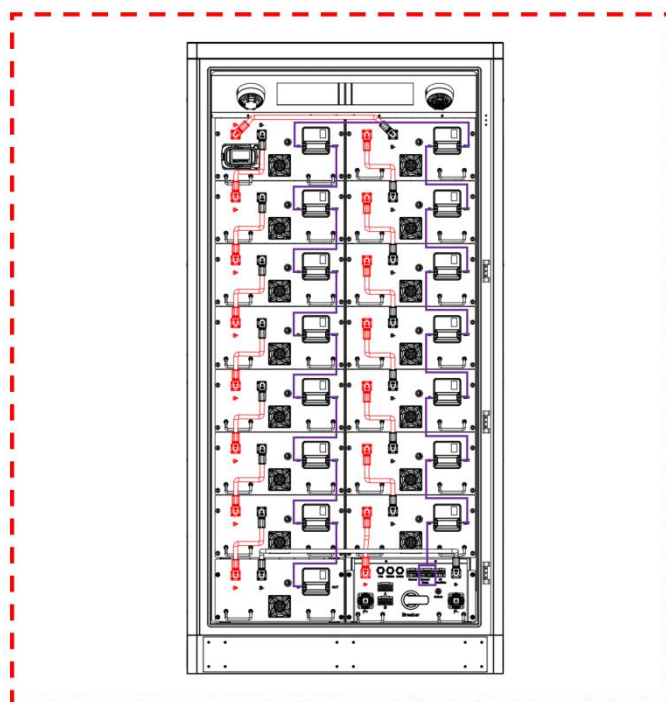


Figure3.8.3-7

3.8.4 System Connection

Step 1:

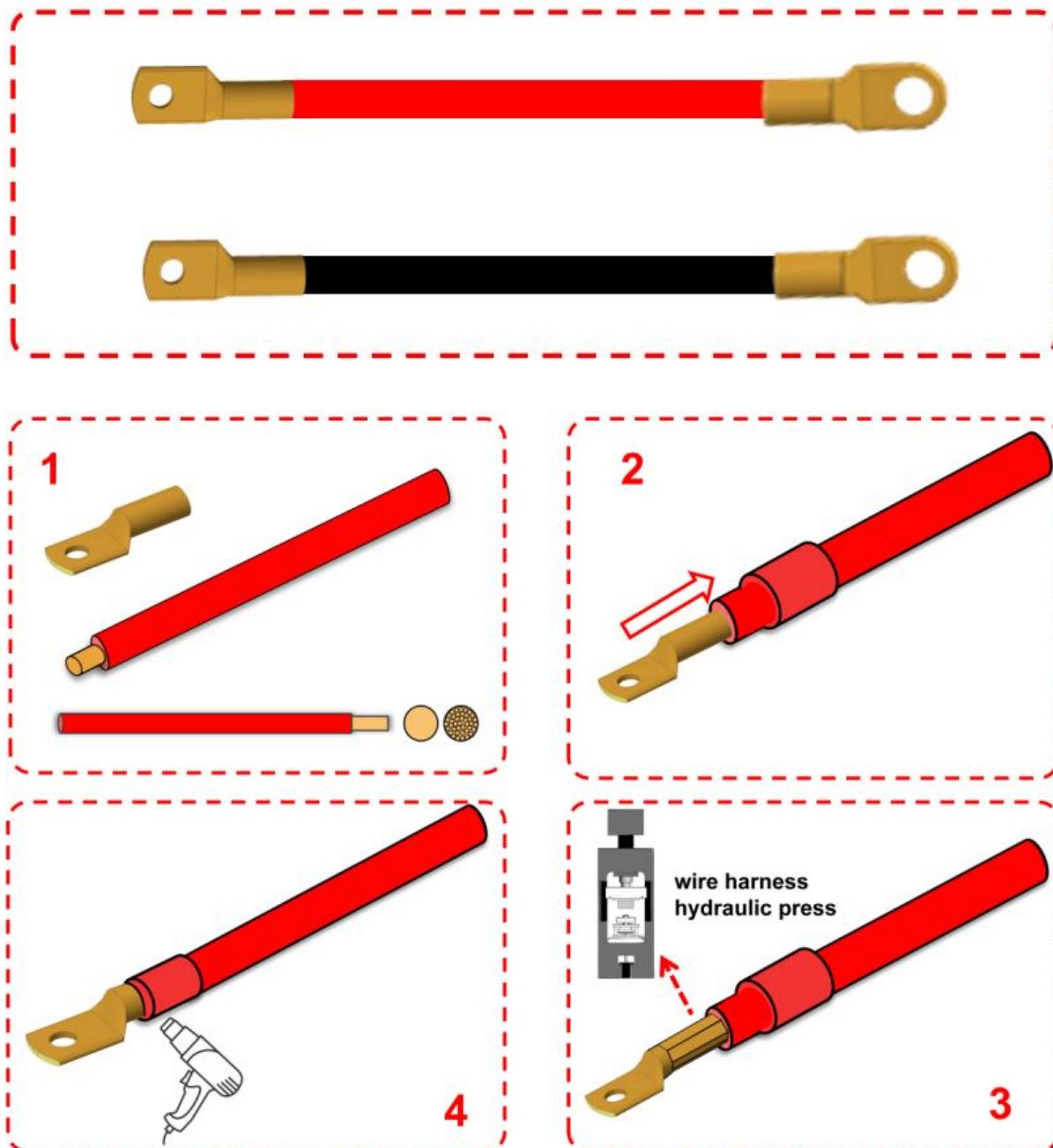


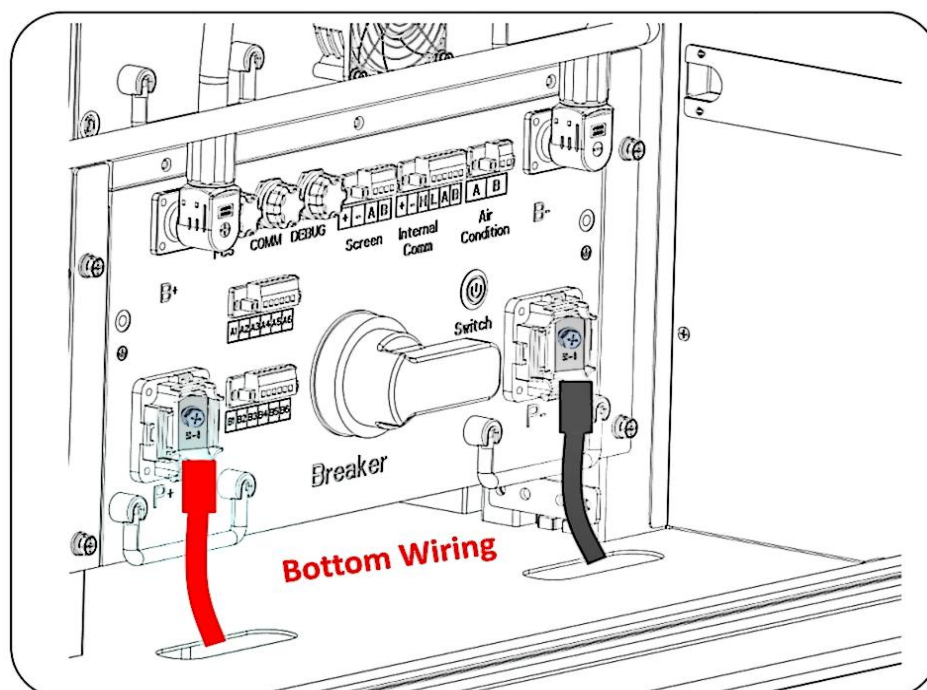
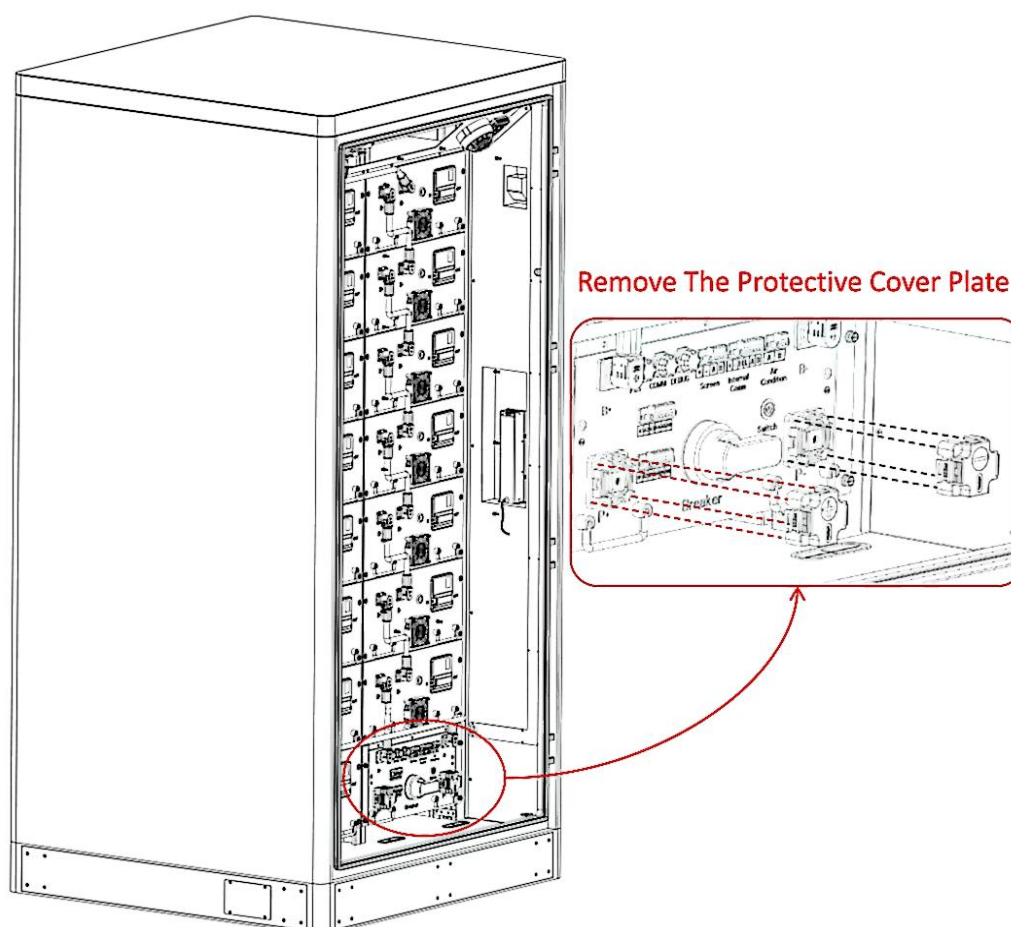
Figure3.8.4-1



Note:

1. Avoid scoring/conductor damage during insulation removal;
2. The crimped terminal must fully enclose the conductor strands and form a tight, secure connection without any looseness.

Step 2:



EFigure3.8.4-2

Step 3:

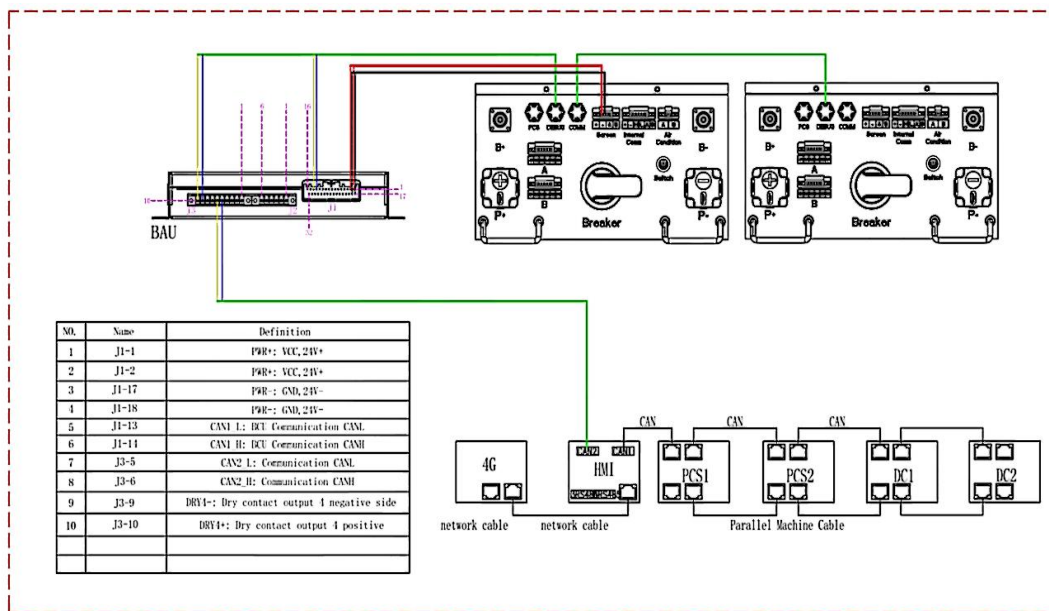


Figure3.8.4-3

**Illustration:**

1. The ESS-GRID series P250E/225C energy storage system adopts a centralized control architecture, realizing unified management and coordination of multiple DC battery cabinets through the Bus Control Unit (BAU).
2. Two CAN communication ports, "DEBUG" and "COMM", are configured on the panel of the high-voltage box in the battery cabinet. Their functions are parallel and independent, with no dependency in the operational sequence. Specifically, both ports support the CAN bus communication protocol, and are respectively used for system debugging (DEBUG) and conventional communication (COMM). They do not affect each other in physical connection and data transmission, and can perform data exchange simultaneously or separately.

Step 4: PCS Cabinet + DC Battery Cabinet**Illustration:**

1. The figure below shows the battery cabinet connected to the DC side of the energy storage converter cabinet, with the incoming and outgoing lines routed from the bottom, and the protective ground wire connected to the PE copper busbar.
2. During external circuit installation, ensure that communication cables and power cables are routed separately.
3. When communication cables and power cables are installed in parallel, maintain a minimum spacing of 300 mm between them.

**Note:**

1. The air-cooled air conditioning system equipped in the DC battery cabinet needs to be connected to the phase line (L line) and neutral line (N line) of the power supply; it can be

directly connected from the utility power grid or obtain electric energy from the power interface of the energy storage converter cabinet.

2. The "AC-DC power conversion system" is integrated inside the energy storage converter cabinet. This system realizes the conversion of electric energy from 220VAC to 12V-36VDC by connecting to the "L" and "N" of the AC power supply; and can provide the required DC working power for electronic components such as the touch screen and cooling fan in the cabinet.

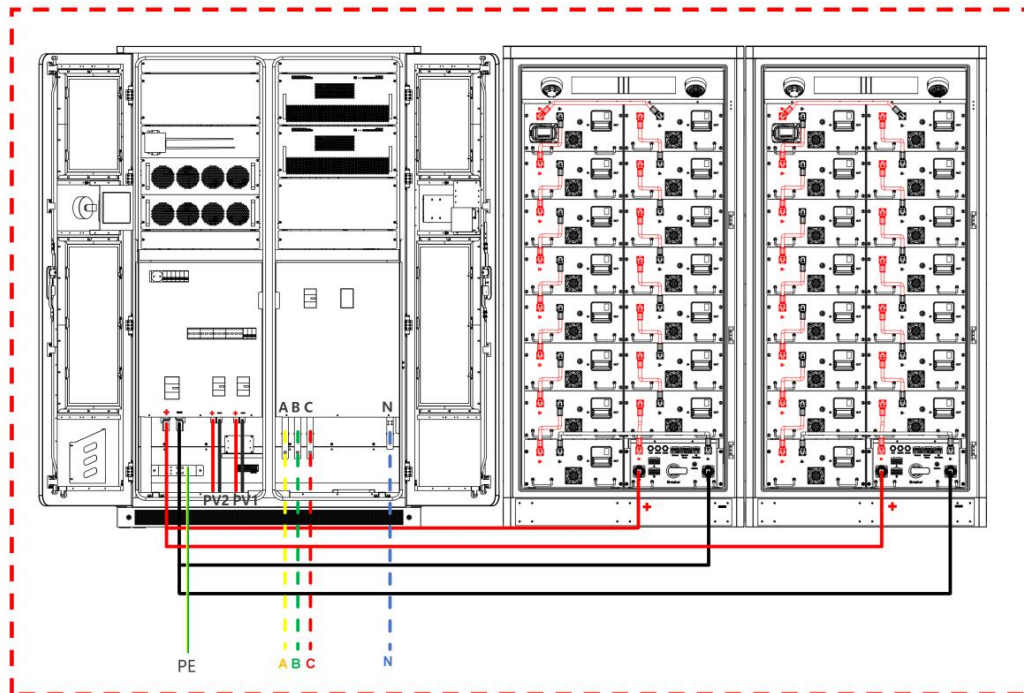


Figure3.8.4-4

The power supply lines for the battery cabinet air conditioner are connected to the PCS cabinet, as shown in the figure:

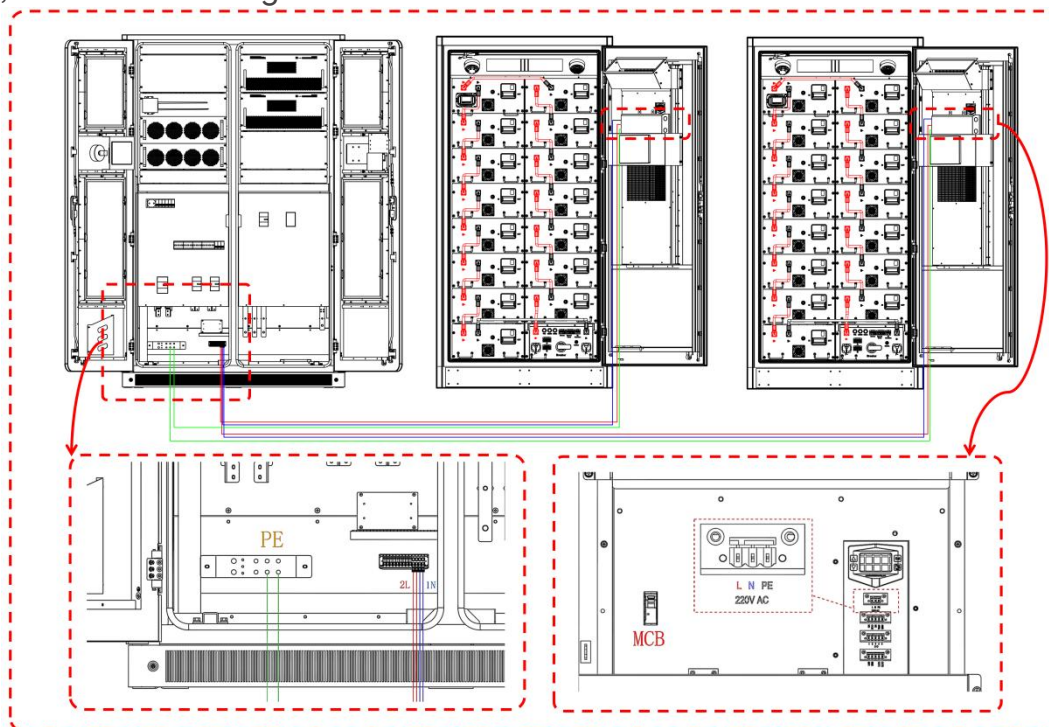


Figure3.8.4-5

3.9 Check after installation

After installation, to avoid equipment damage and property loss, the following items must be rechecked and measured.

Number	Inspection items
1	Before measuring, disconnect the battery and electrical switches to ensure that the energy storage device is not energized.
2	The positive and negative poles of the system are connected correctly and the AC phase sequence is correct and has been tightened. Measure the resistance between the three phases, which should be in the megohm level. If it is K level or less, check the circuit.
3	The external control cables, grounding cables, and communication cables are fastened.
4	The grounding wire resistance is less than 4Ω , and the cable is intact without damage or cracks.
5	Clean the installation area and make sure no tools or foreign objects are left in the installation area.
6	Use fireproof mud to seal the gaps between cables to prevent small animals from entering.

Table 3.9-1

04 Startup and debugging

4.1 Check before power on

1. Check whether the high-voltage box isolation switch in the DC battery cabinet is in the disconnected state;
2. Check whether the power cables in series between the battery packs and between the battery packs and the high-voltage box are connected reliably;
3. Check whether the connection terminals of all communication and power supply cables are connected reliably;
4. Check whether the communication, power supply harness and power cables on the high-voltage box panel are connected correctly;

4.2 Check before starting

Before operating the product, please ensure that the product has been installed in accordance with the specifications and conduct a comprehensive and detailed inspection of the machine to ensure that all indicators meet the requirements before starting the machine.

1) Appearance inspection:

- a. The appearance of the equipment is intact, without damage, rust or paint peeling. If there is paint peeling, please repaint it;
- b. Equipment labels must be clearly visible and damaged labels must be replaced in a timely manner.

2) Grounding check:

The box has a grounding point and is grounded securely; the grounding conductor inside the box is reliably connected to the grounding copper busbar of the box.

3) Cable inspection:

- a. The cable protective layer is intact and has no obvious damage;
- b. The terminal is manufactured in accordance with the specifications and the connection is firm and reliable;
- c. The labels on both ends of each cable should be clear and unambiguous. The wiring should comply with the principle of separation of strong and weak electricity. A margin should be left at the bends and the cables should not be tightened.
- d. The cable installation bolts have been tightened and the cables are not loose when pulled; the cable holes have been sealed.

4) Copper busbar inspection:

The copper busbar has no obvious cracks or deformation, the screws at the overlap are tightened, the markings are not misplaced, and there is no debris on the copper busbar.

5) Component inspection:

The circuit breakers are in the open position; the lightning arrester indicator is green.

**Note:**

For transportation safety, we disconnect one section of the battery module DC cable, and the entire battery cluster is in an open circuit state. The DC cable needs to be connected before powering on. Please note that you need to wear insulating gloves when operating. When you hear a "click" sound when inserting the connector, it means it is in place.

4.3 Boot Steps

The operation procedure for powering on the product is as follows:

Step 1: "Utility Power"

Use a multimeter to confirm that the grid voltage is within the range (400V $\pm$ 10%);

Step 2: "Energy Storage Converter Cabinet"

Refer to the figure 4.3 internal schematic diagram of the hybrid cabinet, turn on the Transformer Soft Start switch at first, then switch on the auxiliary power switch and MCB0 SPD switch, then switch on the Batt switch, Grid switch, PV switch.

Step 3: "Battery Cabinet"

Refer to the internal schematic diagram of the battery cabinet and sequentially press the battery "Switch" and the high-voltage box load switch (rotate to the ON position);

Step 4: "Energy Storage Converter Cabinet"

On the HMI touchscreen, click the switch to enable all modules, then click "System Start";

Step 5: "Energy Storage Converter Cabinet"

Wait for the touchscreen to start (approximately 30 seconds), then confirm normal display with no fault alarms;

Step 6: "Energy Storage Converter Cabinet"

Set converter parameters in the "System" → "Parameter Settings" interface. Select the required operating mode (Manual Mode, Peak Shaving & Valley Filling, Backup Mode, etc.) in the "System" → "Operating Mode" interface;

Step 7: "Energy Storage Converter Cabinet"

On the "Switch" page of the touchscreen, enable all modules, then click "Converter Start" to complete power-on.



Figure 4.3

**Note:**

When maintaining the equipment, be sure to confirm that the entire system is not energized.

4.4 Trial Run

After the electrical installation of the equipment is completed, to ensure stable system operation, professional electrical technicians must power on the system and set the operating mode and parameters for the first startup:

Step 1: set the equipment control mode to "Manual Mode" and set the active power to 5%;

Step 2: Turn on the air conditioner in "Data" -> "Environmental Monitoring". After enabling all modules in the "Switch" interface, click "System Start";

Step 3: During operation, monitor the parameters of the PCS, battery, and air conditioner on the screen. If any abnormalities are detected, stop the machine immediately for inspection;

Step 4: Run for 0.5 hour;

Step 5: Set the active power to -5%, at which point the battery will charge at 5% of the system's rated power;

Step 6: During operation, continue to monitor the parameters of the PCS, battery, and air conditioner on the screen. Stop the machine immediately for inspection in case of abnormalities;

Step 7: Run for another 0.5 hour;

Step 8: After completing 1 hour of trial operation without abnormalities, turn off the system in the "Switch" interface;

Step 9: Based on the project background and requirements, select the local manual power control mode, automatic peak shaving and valley filling mode, or backup mode for formal operation. Click "System Power On" in the system interface to proceed.

4.5 Normal Shutdown

When daily maintenance of the product is required, a shutdown operation is necessary. The normal shutdown procedure for the product is as follows:

Step 1: On the touchscreen switch interface, click "System Shutdown";

Step 2: Refer to the internal schematic diagram of the hybrid cabinet to disconnect the Auxiliary power switch, MCB0 SPD switch, then switch on the Batt switch, Grid switch, PV switch. Finally, turn off the transformer soft start switch.

Step 3: Refer to the internal schematic diagram of the battery cabinet to turn off the "Switch" auxiliary power switch and disconnect the DC load switch of the high-voltage control box;

Step 4: Wait for the busbar discharge to complete and the touchscreen to turn off, indicating that the equipment has completed shutdown.

Step 5: After powering off and waiting for 5 minutes, please use the external meter to test to ensure that the device is completely powered off.

4.6 Emergency Shutdown

When a fault or critical situation occurs and emergency shutdown of the product is required, the following emergency shutdown procedures can be implemented:

Step 1: Press the emergency shutdown button "EPO";

Step 2: Refer to the internal schematics of the PCS cabinet and battery cabinet to disconnect all auxiliary power switches, AC/DC plastic case switches, and battery DC load switches of the system;

Step 3: After confirming that the fault or danger has been resolved and operation is required, reset the EPO button.



Illustration:

After pressing the "EPO" for emergency shutdown, all AC plastic case switches, auxiliary power switches, and DC plastic case switches must be turned off. Wait for 10 minutes before powering on!

05 Run and Operation

5.1 Introduction to Human Machine Interface

After the system is powered on, the LCD touch screen enters the startup interface, and after 30s, the startup interface disappears and the system enters the "home" interface. As shown in Figure 5.1, the homepage interface displays the real-time power, voltage, current, power generation, operation mode, working status and other information of the system.

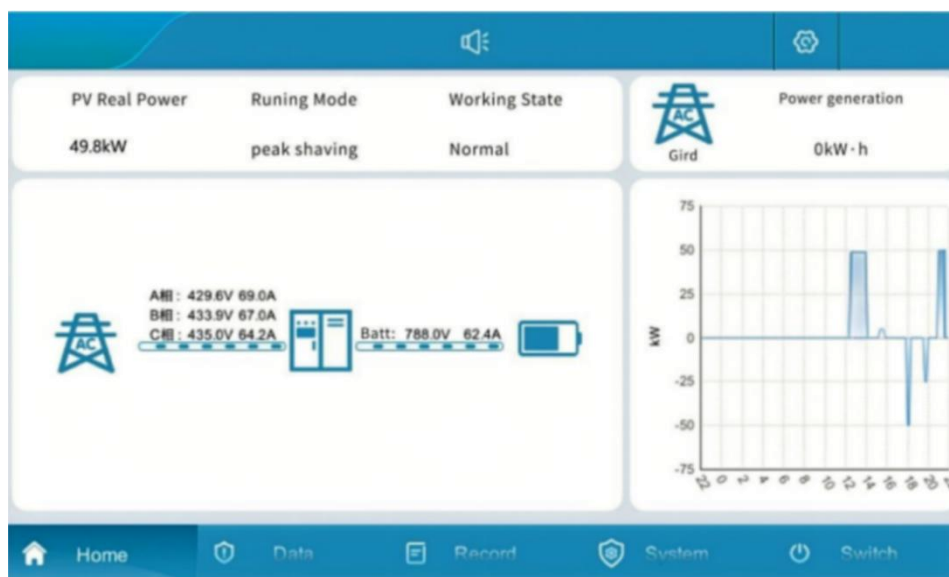


Figure 5.1 -1Main Page

If photovoltaic equipment is connected, when the startup device is activated, the HMI will display the following interface:



Figure 5.1 -2Main Page PV Connected.

Each menu expands items:

HMI display and control integrated screen menu table

Serial number	Menu Name	Menu Items	Parameter function
1	Home	None	Display the system's operating status and the current day's charge and discharge curve
		Real-time data	Display of all analog data of converter
2	Data	Real-time status	Converter operating status and switching status display
		Real-time alerts	Current system alarm information
		Historical alarms	Display historical alarm records
3	Record	Operation log	Display operation log
		Data Report	Export History records
		System Information	Display system information
		Run Mode	System operation mode settings
4	System	Parameter Set	Converter and battery parameter settings
		Manufacture	Equipment manufacturer settings
		System Up data	System software upgrade
		Communication Setting	Perform communication settings
5	Switch	Converter on/off	Converter power on and off

5.2 Switching Operation

1. System startup: Refer to the internal schematic diagram of the hybrid cabinet turn on the Transformer Soft Star switch to complete the soft start at first, to switch on the auxiliary power switch and MCB0 SPD switch, then turn on the QF4 BATT switch.
2. Set the converter parameters in 'System' -> 'Parameter Set' interface, and select the required operation mode in 'System' -> 'Run Mode' interface. In 'System' -> 'Run Mode' interface, select the required operation mode, select the grid connection and control mode manually or peak shaving and valley filling and user-defined mode, etc.

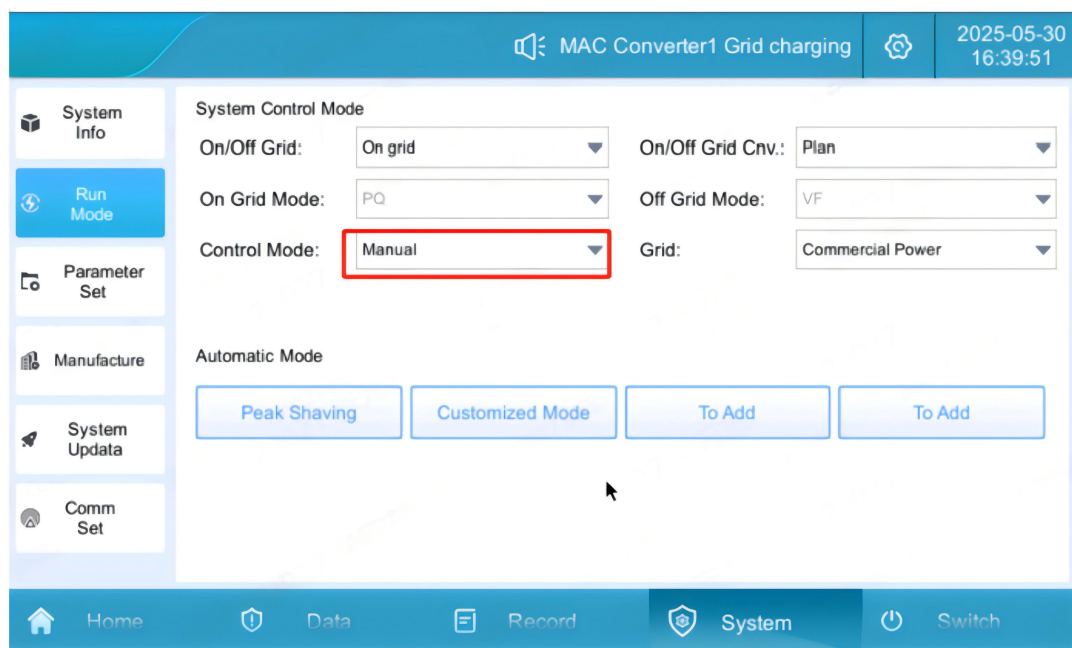


Figure 5.2-1 Run Mode Interface Diagram

3. In the touch screen “switch” page to enable all the modules (you can also turn on some of the modules according to the actual need), click on the “System ON” , the normal turn on time of about 30 seconds, as shown in Figure 5.2-2.

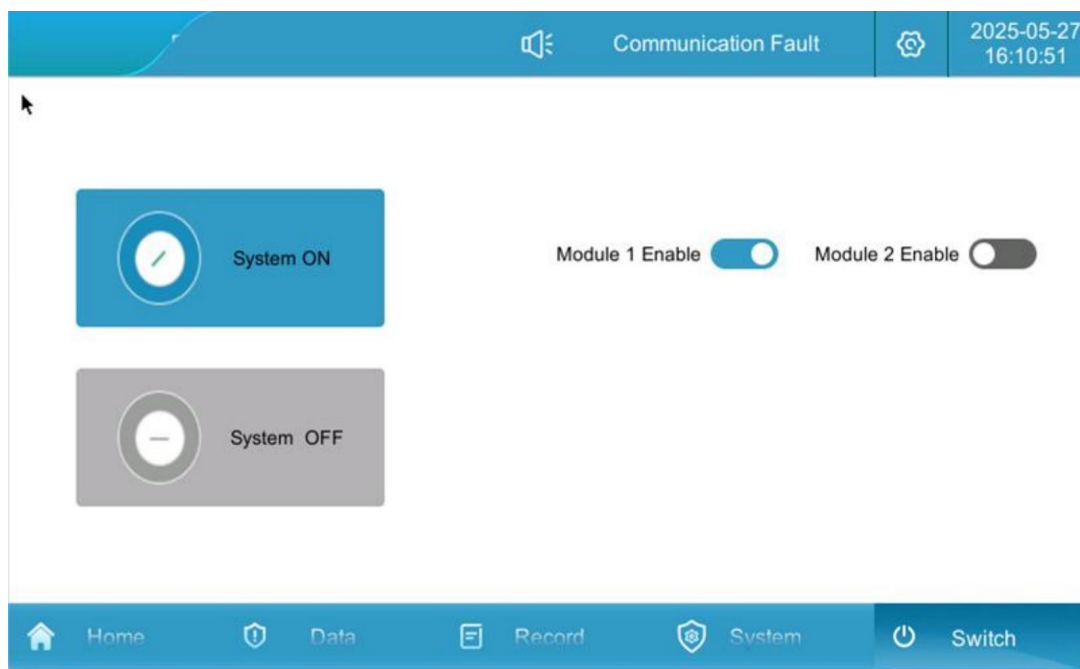


Figure 5.2-2 Switching Interface

4. Converter shutdown: When the converter is in operation, click "System OFF", as in Figure 5.2-2.
5. Closing auxiliary power switch
6. Trip QF1 Grid circuit breaker.
7. Trip QF4 Battery Circuit Breaker.

5.3 Communication Settings

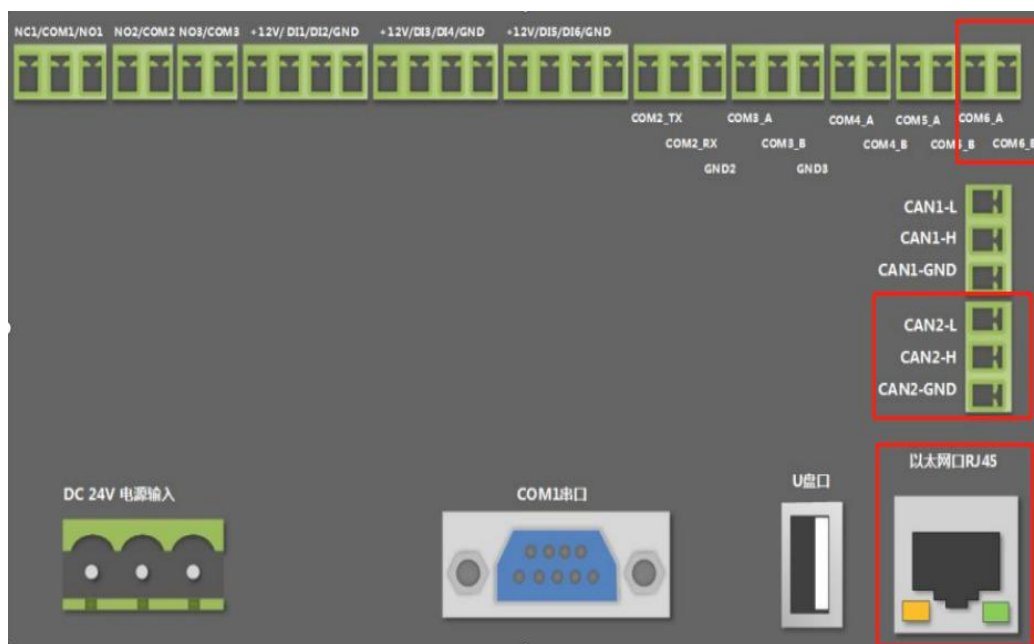


Figure 5.3-1 Communication inspection



Illustration:

Communication Setting refers to the communication protocol Settings between the HMI screen and the battery BMS, and between the LCD touch screen and the EMS background.

1. Check that the EMS communication cable is connected to terminal block JX1:5/JX1:6 or the router network port.
2. Click on "System" - > "Comm Set" on the LCD touch screen to enter the communication settings interface.

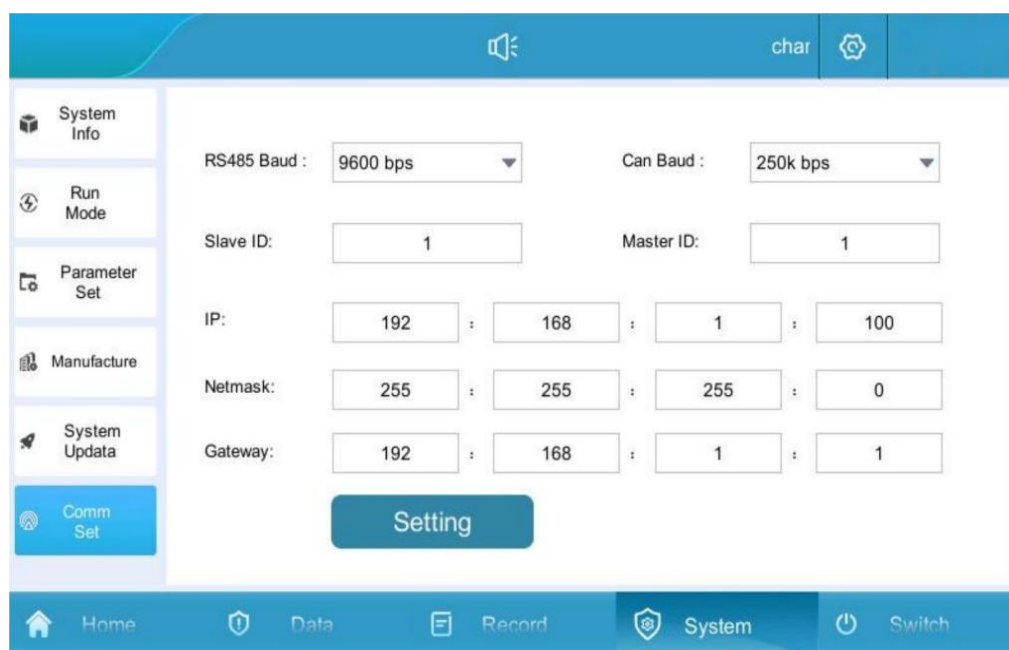


Figure 5.3-2 Communication Setting Screen

3. Background EMS communication setting 1:

If RS485 communication is used, set the local address corresponding to the communication panel to 1, if more than one energy storage converter is connected to the background from the address cannot be repeated.

4. Background EMS communication setting 2:

If Ethernet communication is used, the local machine of the energy storage converter is used as the server, the default address of the host is set to 192.168.1.100, and the corresponding local address of the communication panel is set to 1, and the server port is 502, if more than one energy storage converter is accessed to the background IP address can not be duplicated, and the IP address is modified by clicking on the Setup button to configure the IP address.

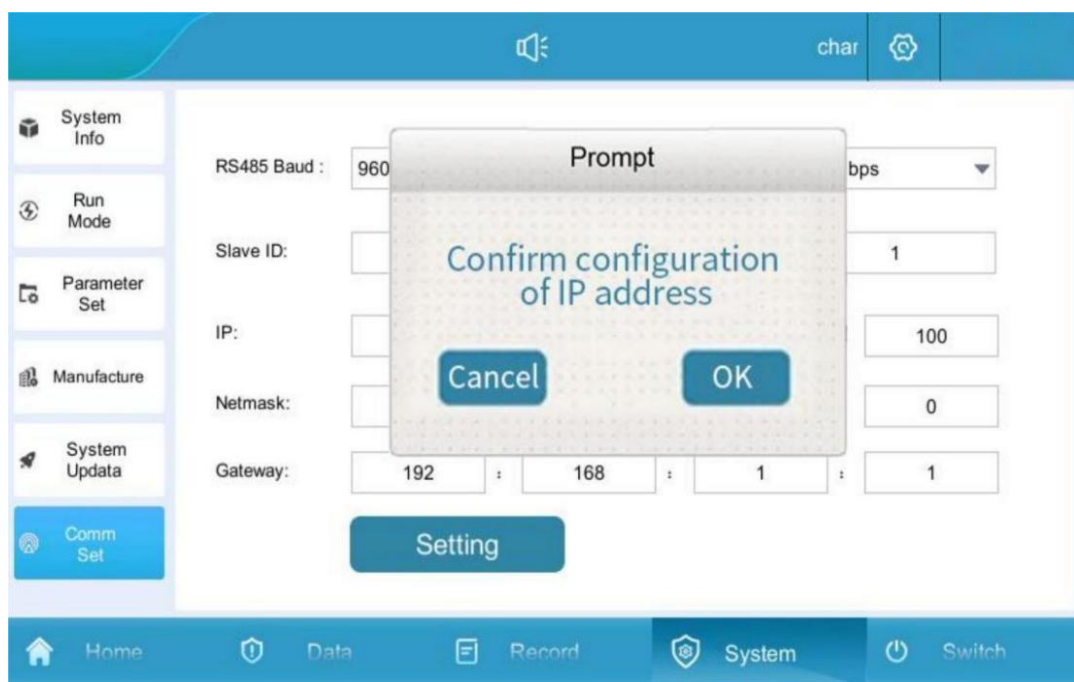


Figure 5.3-3 IP Address Configuration Screen

5.4 Operating Mode Settings

5.4.1 Operating Mode Introduction

The operation modes of the energy storage system are categorized into: On Grid Manual Mode, On Grid Automatic Mode

on-grid manual mode:

The energy storage system runs in on-grid mode, but the system startup or shutdown must be manually operated by the user on the LCD touch screen. The charging and discharging active power, reactive power and power factor of the energy storage system can be set in "Parameter Set".

On Grid Automatic Mode:

Suitable for peak shaving and valley filling scenarios, the system automatically connects to the grid and operates based on the preset charging and discharging power.



Illustration:

In On Grid Mode, the anti-reverse current function can be set to disable or enable, set to enable: the power of the energy storage system will not be supplied back to the grid. Setting to disable: the power from the energy storage system can flow into the grid. In the system "System" -> "Parameter Set" -> "Advanced (Password 888888)" -> "MSTS Parameter" "Setting interface of "anti-reflux" is shown as below:



Figure 5.4.1-1 Password input interface

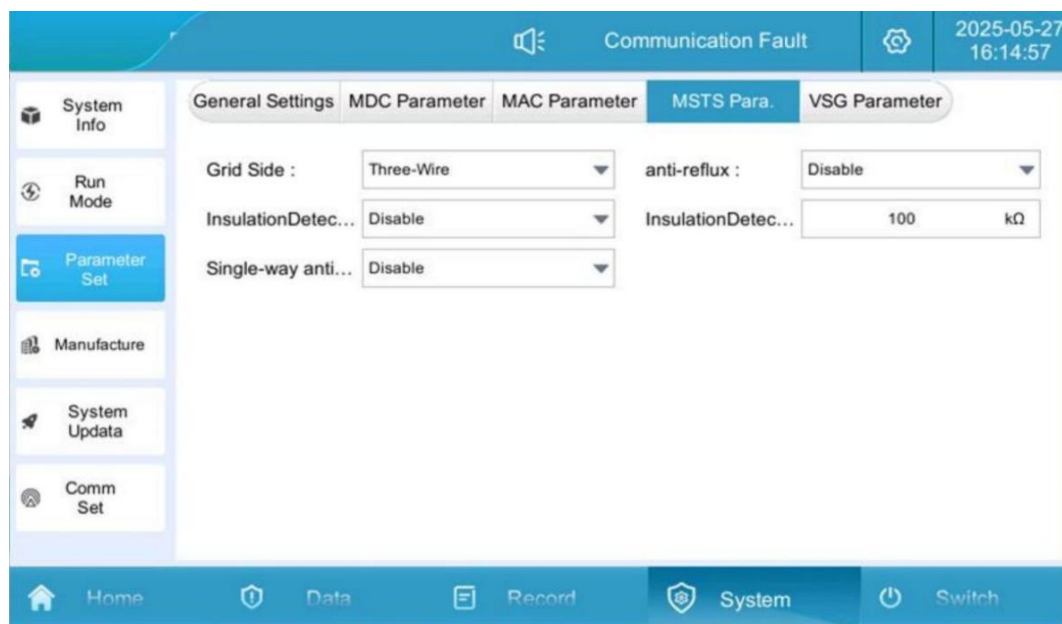


Figure 5.4.1-2 Anti-backflow setting interface

5.4.2 On-grid manual mode

1. Click “System” -> “Run Mode” mode to enter Figure 5.4.2-1.

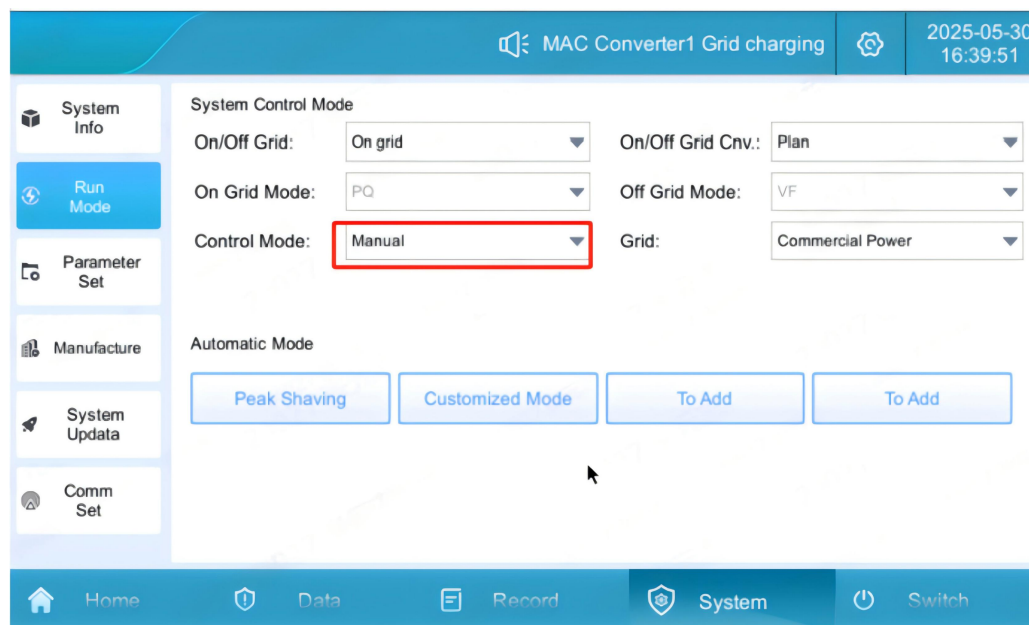


Figure 5.4.2-1 Grid-connected manual mode setting

- (1) Set the control mode to “Manual Mode”, set the corresponding active power, power factor, reactive power size in the “Parameter Set” page, and the machine will run according to the set value (positive value for discharging, negative value for charging). The power setting interface is shown in Figure 5.4.2-2.

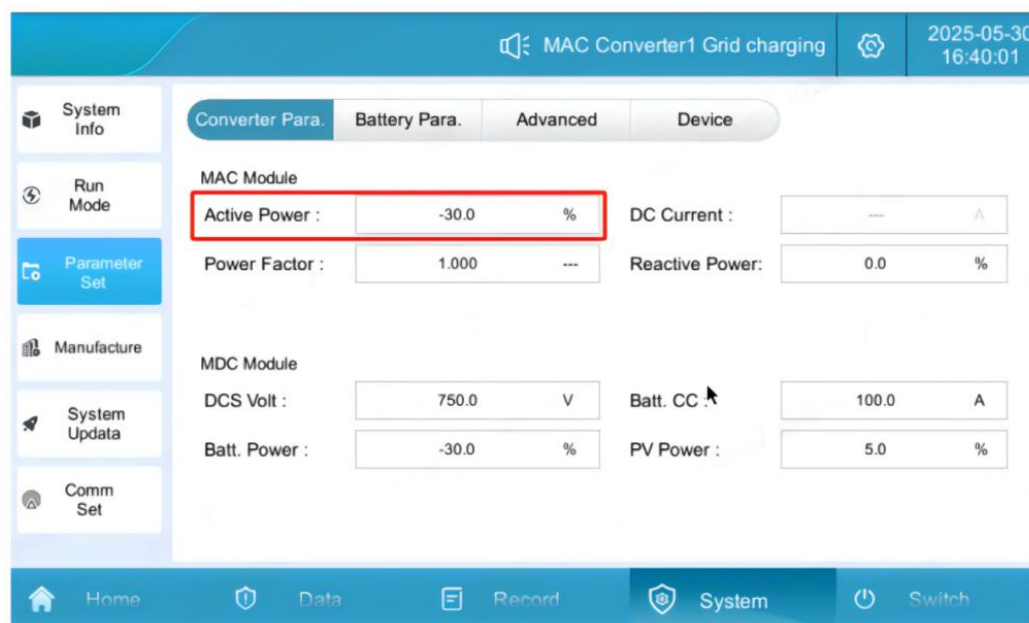


Figure 5.4.2-2 Power limit settings

5.4.3 On-grid automatic mode

Peak-shaving mode:

1. Click "System" -> "Run Mode" , and then click "Peak Shaving" button to enter the setting page;

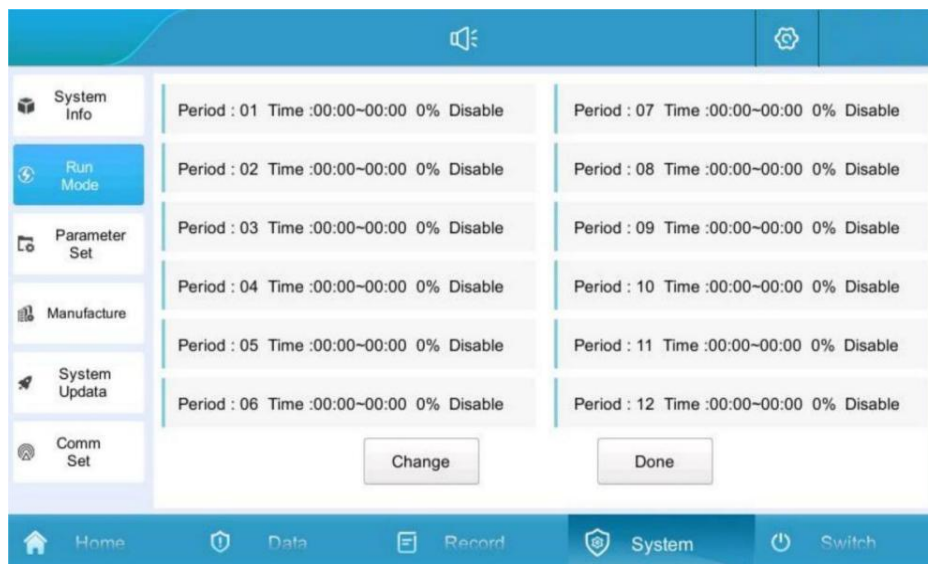


Figure 5.4.3-1 Peak Shaving Operation Setup Screen

2. Click "Change" to set the peak shaving and valley filling operation time and power: set the start and end time, charging and discharging power, and whether to enable or not in time period 1; click the next entry to enter the time period 2 settings, and save and exit after completing all the time period settings;

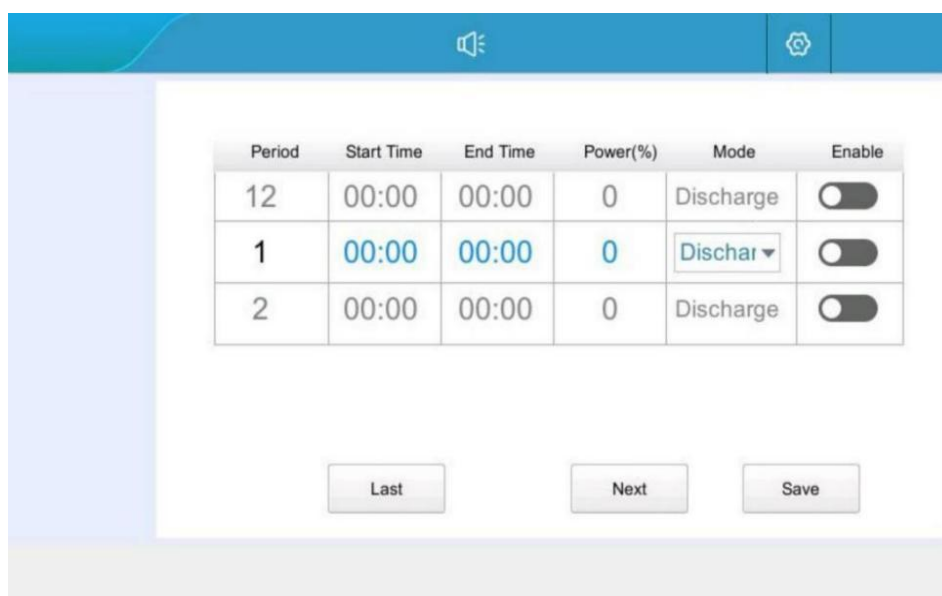


Figure 5.4.3-2 Charge and Discharge Time Setting Interface for Peak Shaving

3. Automatically jump to the following screen, click the Finish button;

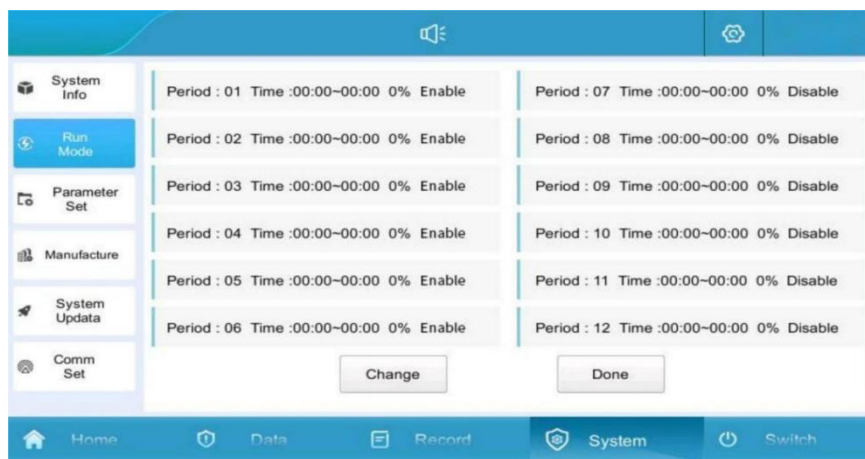


Figure 5.4.3-3 Charge and Discharge Time Setting Interface for Peak Shaving

4. "Control mode" changed to "Peak Shaving" ;

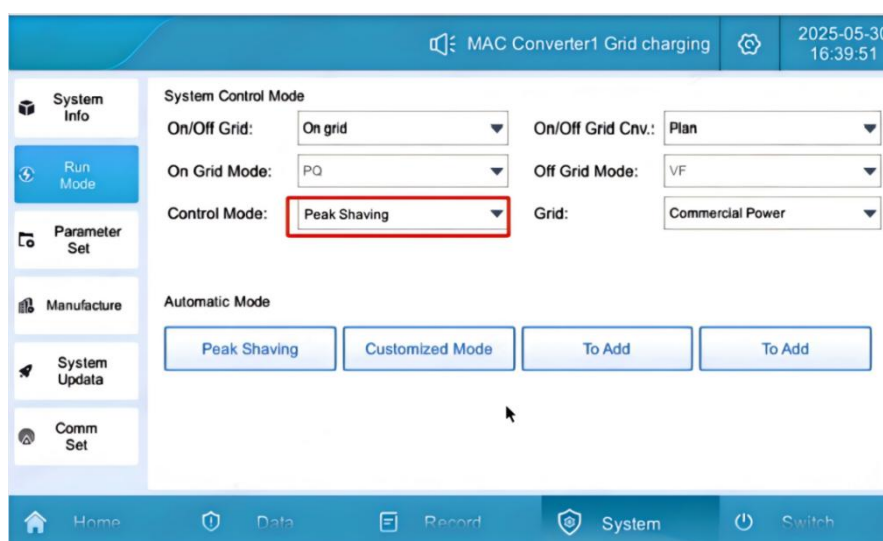


Figure 5.4.3-4 Peak Shaving control mode

5. This is the automatic mode: pause, click "switch"-">"system on" to complete the local automatic control mode setting.

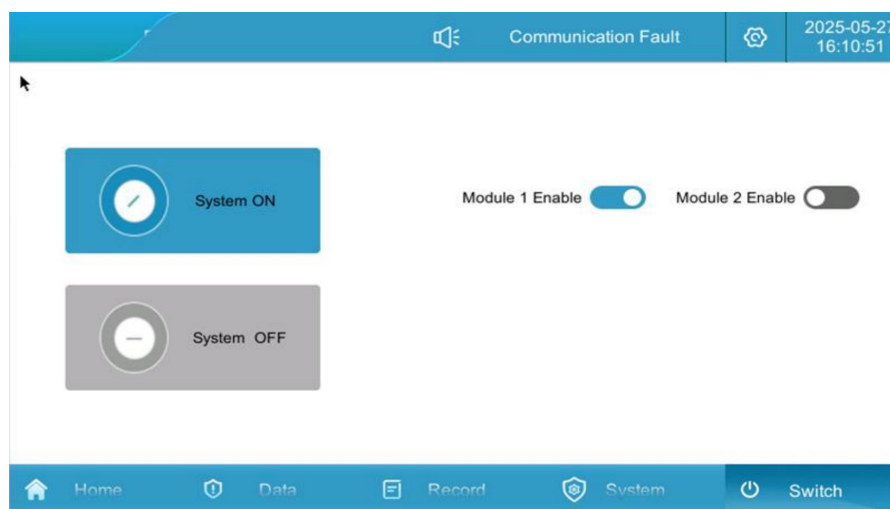


Figure 5.4.3-5 Local control operation mode on

5.4.4 Battery Parameter Settings

Click " System " -> " Parameter Set " to enter the current page; customers can set the Battery Float Volt., charge/discharge current limit, charge/discharge over-under-voltage and recovery value according to their own needs.

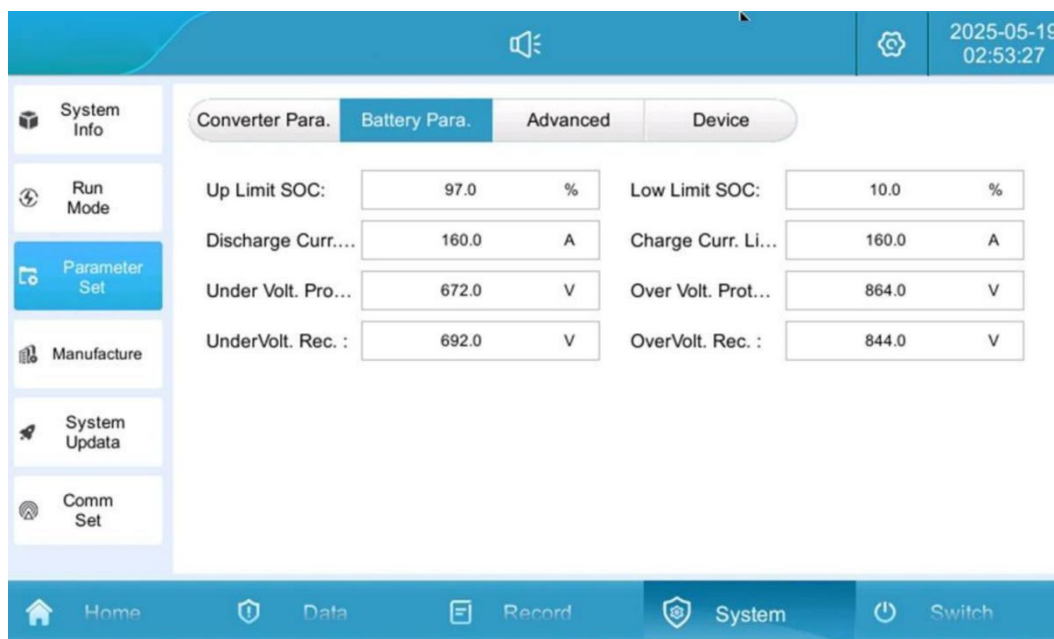


Figure 5.4.4 Battery parameter setting interface

5.4.5 Battery Parameter Settings

1. Click "Record" -> "Data Report" to enter the current page.
2. Check the charge and discharge volumes of the day, month, year and total.
3. Insert the USB flash drive, wait for it to connect, click on "Data Export", and wait for the export to complete.

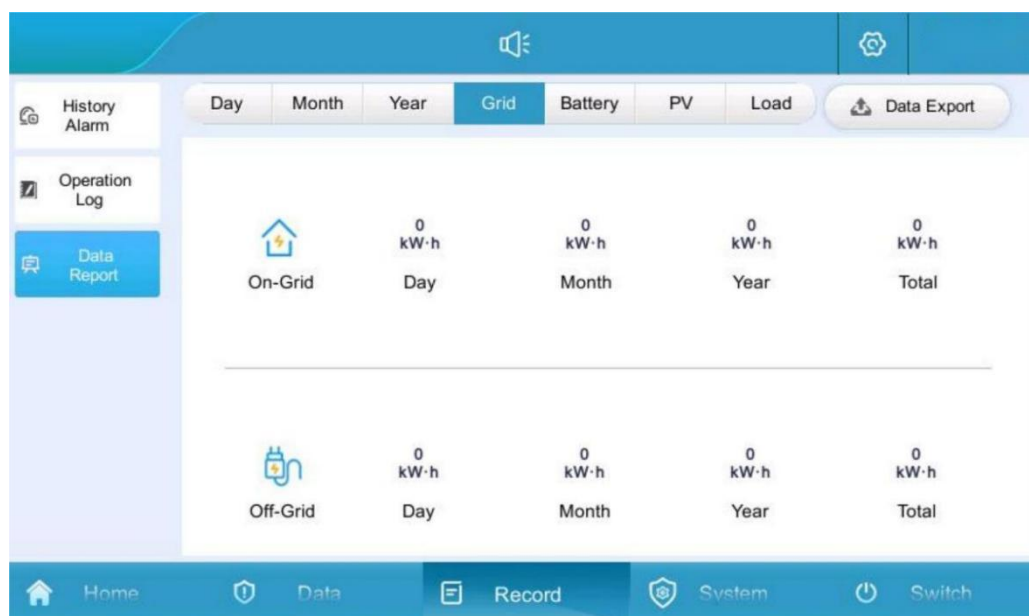


Figure 5.4.5-1 Data report interface

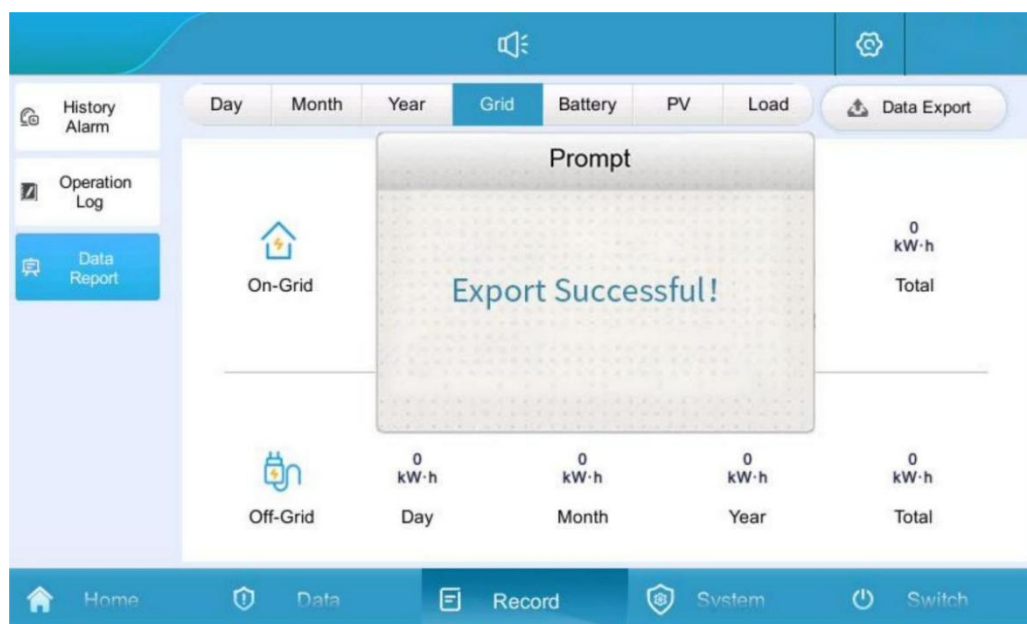


Figure 5.4.5-2 Data export interface

5.4.6 Software Upgrade

The software upgrade includes the upgrading of three types of software: the all-in-one screen software, the power module DSP software, and the power module ARM software. Before upgrading, turn off the system on the "Switch" page of the touch screen. That is, the software must be upgraded while the system is not running.

1. First, prepare a USB flash drive and a computer. Create a new folder on the USB flash drive which name it "UPDATE" to store the burning files;

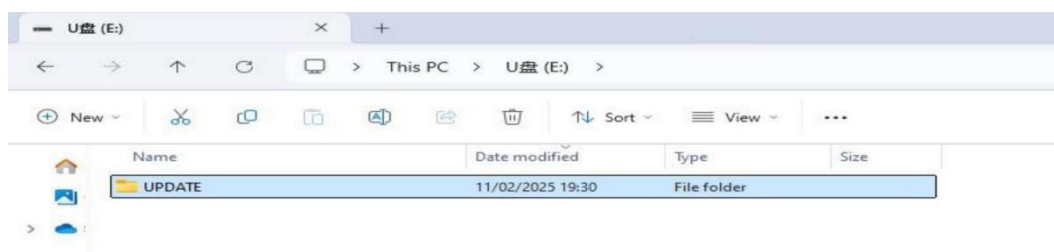


Figure 5.4.6-1 Create an upgrade software folder

2. Copy the DSP, LCD and ARM firmware required for the system upgrade into the UPDATE folder;

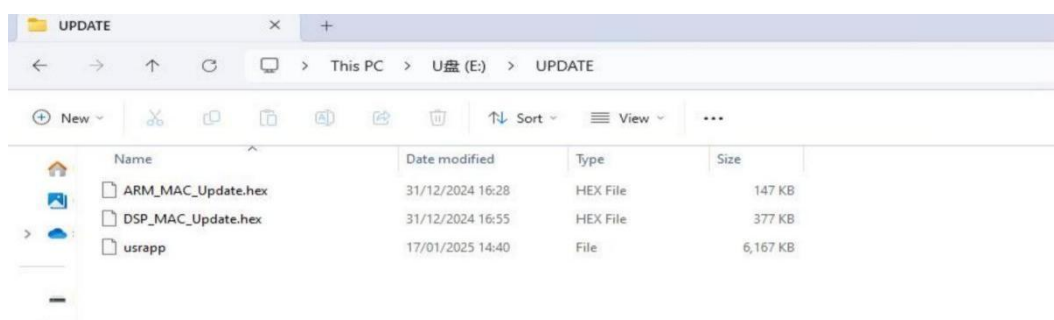


Figure 5.4.6-2 Store the upgraded software

3. Click "System" -> "System Upgrade", enter the password "888888", and enter the upgrade page;



Figure 5.4.6-3 Password verification

4. Insert a USB flash drive into the back of the LCD all-in-one screen. The interface shows that the USB flash drive is connected and detects the upgrade file;

5. To upgrade the all-in-one screen software, click on "LCD Upgrade", wait for about 15 seconds, and then a prompt will appear indicating that the upgrade was successful;

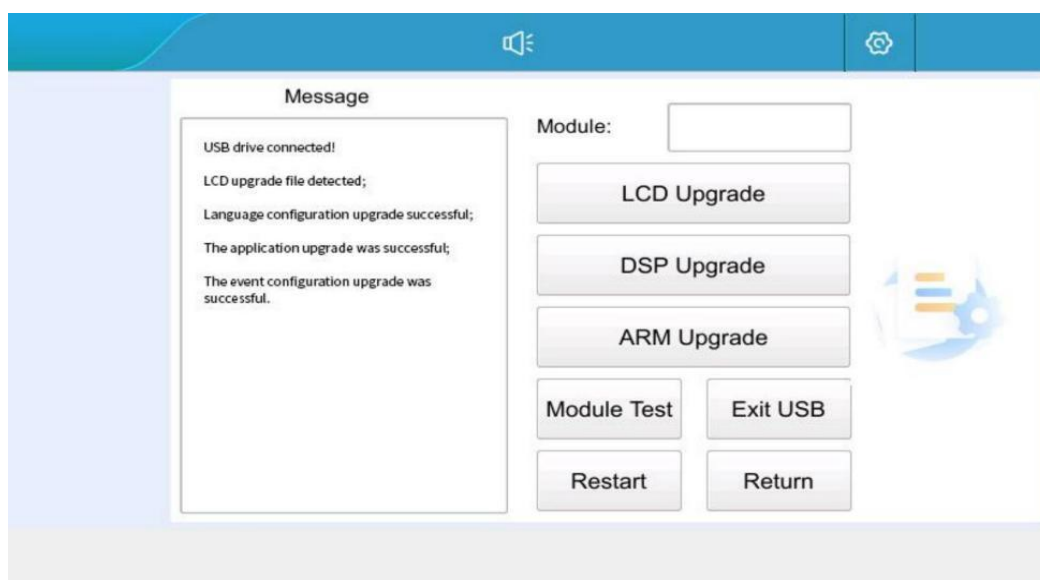


Figure 5.4.6-4 Upgrade the software and restart the interface

6. After the software upgrade of the LCD all-in-one screen is completed, click the "Restart" button and the version refresh will take effect. Customers can upgrade the DSP and ARM according to the actual situation and then click "Restart".

7. To upgrade the power module DSP/ARM, select the module to be upgraded in the module box on the "System Upgrade" interface (when there are

multiple modules in the system, it is recommended to start with upgrading Module 1, then set and upgrade Module 2, and continue until all modules are upgraded).

8. Click on "DSP/ARM Upgrade", and wait for about 5 minutes before a prompt indicating successful upgrade. Complete the system upgrade.

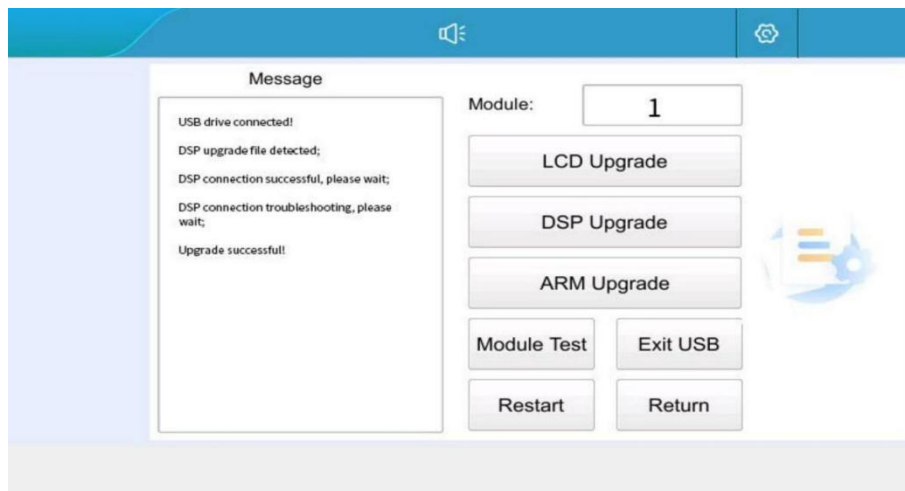


Figure 5.4.6-5 DSP/ARM Upgrade Interface

5.5 Router Connection Operation

5.5.1 SIM card Installation

The following operations are carried out in the power-off state:

① As shown in the figure below, press the yellow button shown and the card slot can be popped out.



Figure 5.5.1-1 Router Card Slot Location Diagram

② Remove the card slot.



Figure 5.5.1-2 Router card slot removal diagram

③ Insert the SIM card (provided by the customer) into the card slot, with the chip sense facing up (the SIM card must fit the size of the card slot).

④ Install the card slot into the router, the front of the card slot corresponds to the “SIM” silk screen in the right direction.

5.5.2 Network Connection

Connect the computer to the LAN port of the router through the network cable, connect the WiFi antenna and full-band antenna to the corresponding antenna interface in turn, insert the SIM card (provided by the customer) in the state of power failure (the front of the card slot corresponds to the direction of the silkscreen of “SIM”) (the SIM card needs to be taken out only after the power is cut off), and observe the indicator lights after the power is turned on: After powering on, observe the indicator lights: PWR is always on, LAN is flashing, 4G light (3G+2G light) is on, and all signal lights are on, which means the signal is good.

(1) Configure the network card of your computer and choose to obtain IP address automatically;

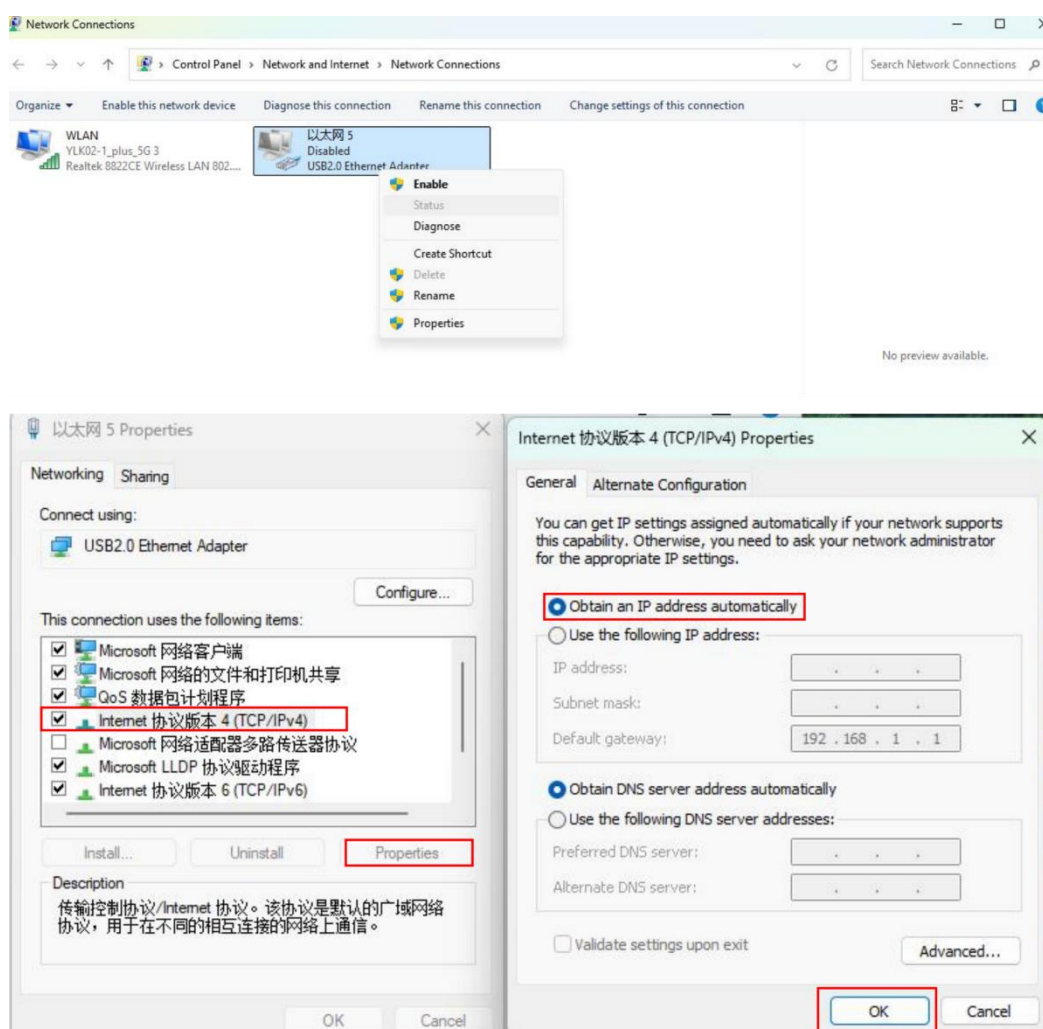


Figure 5.5.2-1 IP Acquisition Diagram

(2) Internet test: Power on the router, wait for about 2 minutes, the 2/3G indicator light will start to light up, indicating that the router's 4G networking is successful, and then you

can directly access the Internet. Let's check the network status through the default parameters of the router.

Router Initial Value

Parameter	Initial value
Username	root
Password	root
Self IP address	192.168.1.1

Table 5.5.2

(3) Enter: 192.168.1.1 in your computer's browser and hit enter. The following figure shows the router login screen. Enter root for both username and password.

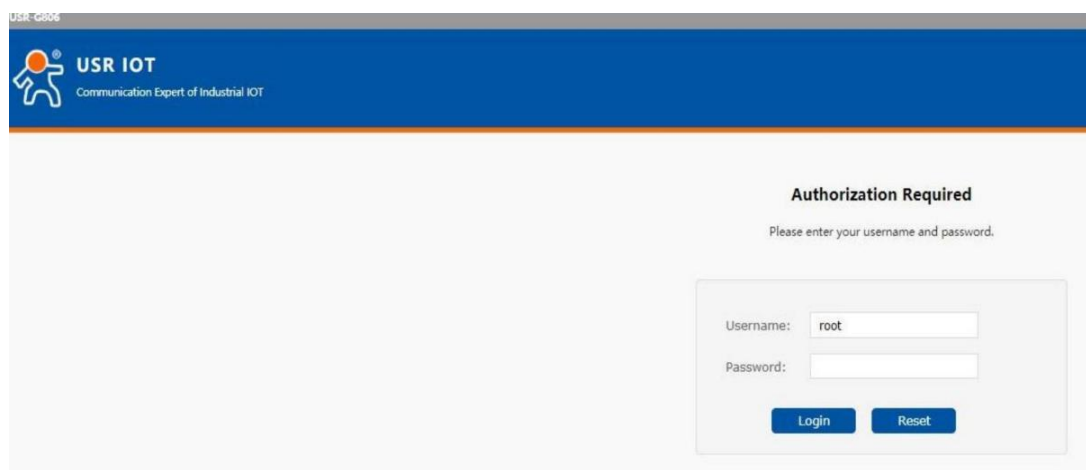


Figure 5.5.2-1 Landing on the home page

(4) Left menu bar, select Network => Network Diagnostics => Ping tool, can ping through the domain name (here to Baidu as an example), that is, the network is normal. You can also directly open the browser, directly enter the website URL you want to log in.

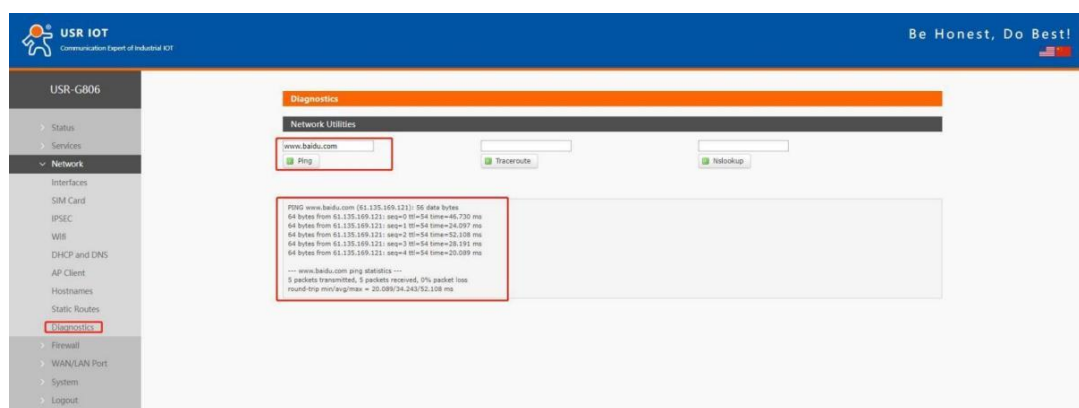


Figure 5.5.2-2 Network Diagnostics Page

5.6 Cloud Platform

5.6.1 Preparation

(1) Find and record the SN number of the HMI, and record the SN numbers of multiple masters and slaves if they are parallel cabinet devices;



Figure 5.6.1-1 Screen SN number

Activated SIM card or an Ethernet cable connected to an external network;

(3) Record the type of equipment, product model. (e.g. Optical Storage System/Monet-xxx);

(4) Provide the SIM card ICCID, which needs to be recorded into the cloud platform to manage this SIM card, if not, you can not provide it;



Figure 5.6.1-2 SIM Card ICCID

The above is the confirmation information prepared before the device is registered with the cloud platform.

5.6.2 Entering Equipment

Click "Asset Management > Equipment Inventory" page, click "New", a pop-up window will appear to add equipment, in the pop-up window, enter the name of the equipment, the serial number of the machine (SN code above the HMI), the model number of the equipment, the rated power, and select the type of equipment according to what you need. Make a choice, there are fifteen device types to choose from.

Device type:

- Energy storage system (purely on-grid)

- Energy storage converter (purely on-grid)
- Energy storage system (on-grid)
- Energy storage converter (on-grid and off-grid)
- Photovoltaic storage system (purely on-grid)
- Photovoltaic storage converter (purely on-grid)
- Photovoltaic storage system (on-grid and off-grid)
- Optical storage converter (on-grid and off-grid)
- Photo-storage charging system (pure on-grid)
- Photo-storage charging system (on-grid and off-grid)
- Battery system
- Photovoltaic control system
- Combined photovoltaic storage system
- Combined photovoltaic control system
- Combined energy storage system

Note: System with battery (converter without battery)

5.6.3 Entering Equipment

The screenshot displays the 'Equipment Storage' management interface. The top section shows a table with columns: #, Device Name, Machine Serial Number, Device Model, Device Type, Rated Power (kW), Photovoltaic Installed Capacity (kWp), Create Time (UTC+8:00), Creator, and Operate. The table lists 10 equipment entries. Below the table, there is a pagination bar showing 'Total 41' and '10 pages'.

The bottom section shows the 'Add Device' modal form. It contains the following fields:

- * Device Name: Please enter device name
- * Machine Serial Number: Please enter machine serial number (screen)
- * Device Model: Please enter device model
- * Device Type: Photovoltaic energy storage system(on&o
- * Photovoltaic Installed Capacity: Please enter photovoltaic kWp
- * Rated Power: Please enter rated power kW

At the bottom of the modal, there are 'Cancel' and 'Confirm' buttons.

Figure 5.6.3-1 Add Device Operation



Illustration: To select the corresponding device type.

5.6.4 Add Combination Device Operation

Combination device type:

- Combined photovoltaic storage system
- Combined photovoltaic control system
- Combined energy storage system

When adding the combination of equipment, the "machine serial number" can be directly combined with the SN of the two devices, for example: the master device SN number is 25101800000000000001, from the device SN number is 25101800000000000002, "machine serial number" can be filled in 251018000000000000012, if you want to add the combination of equipment, you need to add the "machine serial number" to the "machine serial number". Serial number can be filled in 251018000000000000012, if you do not want to name this combination of equipment can define their own serial number, as long as the only guarantee on the line!

The screenshot shows a web-based 'Add Device' form. It includes input fields for Device Name, Device Model, Machine Serial Number, and Device Type (a dropdown menu currently showing 'Combined Photovoltaic energy storage sy:'). There are also input fields with increment/decrement buttons for Photovoltaic Installed Capacity (kWp), Battery Capacity (kWh), and Rated Power (kW). At the bottom, there are two fields: '* Combination Type' and '* Combined Sequence Number', both with increment buttons. A red box highlights these two fields, and a red warning message is displayed next to them: 'Mainframe first, slave behind. The combination device type and combination must correspond one to one'. At the bottom right of the form are 'Cancel' and 'Confirm' buttons.

Figure 5.6.4-1 Combined serial number



Illustration:

The master type and master serial number must be in the first one. Then the slave type and slave serial number must be one-to-one.

Example:

The 'Modify Device' form contains the following fields and values:

- Device Name:** Please enter device name
- Machine Serial Number:** 241127000000000000022
- Device Model:** Please enter device model
- Device Type:** Combined Energy storage system
- Photovoltaic Installed Capacity:** 0 kWp
- Battery Capacity:** 696 kWh
- Rated Power:** 300 kW
- Combination Type:** Energy storage system(on grid) x Energy storage system(on grid) x +
- Combined Sequence Number:** 24112700000000000002 x 24110700000000000002 x +
- Host Type:** Host SN
- Slave type:** Slave SN

Buttons: Cancel, Save

Figure 5.6.4-2 Master-Slave Serial Number Entry

5.6.5 Add Project

Click “Add project” on the “Asset management > Project management” screen to bring up the Add project pop-up window. Enter the project name in the pop-up window, and click Map to fill in the project address, area, latitude, longitude, and so on, or you can enter it yourself, and it is recommended that you click Map to generate the project automatically. It is recommended that you click Map to generate automatically.

The 'Project Management' table contains the following data:

#	Project Name	Project Address	Country	State	Creator	Time Zone	货币	Create Time (UTC+08:00)	Operate
1	项目1	广东省深圳市南山区科技园...	中国	Enable	admin	UTC+08:00	CNY	2025-02-25 12:03:57	Edit Delete Allocate Project
2	1111	广东省深圳市南山区科技园...	中国	Enable	admin	UTC+02:00	ZAR	2024-08-23 16:31:01	Edit Delete Allocate Project
3	一维码识别设备	广东省深圳市南山区科技园...	中国	Enable	cezh004989	UTC+08:00	MYR	2024-07-15 14:26:15	Edit Delete Allocate Project
4	测试设备-140	广东省深圳市南山区科技园...	中国	Enable	admin	UTC+08:00	CNY	2024-07-08 10:08:54	Edit Delete Allocate Project
5	出厂设备	广东省深圳市南山区科技园...	中国	Enable	cezh00031	UTC+08:00	CNY	2024-06-04 17:39:55	Edit Delete Allocate Project
6	测试设备-140	江西省宜春市袁州区...	中国	Enable	yltest	UTC+08:00	CNY	2024-05-31 10:10:26	Edit Delete Allocate Project
7	F	江西省抚州市东乡区...	中国	Enable	yltest	UTC+08:00	CNY	2024-04-23 21:40:23	Edit Delete Allocate Project
8	11	广东省深圳市南山区科技园...	中国	Enable	yltest	UTC+08:00	CNY	2024-04-23 11:18:38	Edit Delete Allocate Project
9	test001	江西省宜春市袁州区...	中国	Enable	yltest	UTC+08:00	CNY	2024-04-20 10:21:21	Edit Delete Allocate Project
10	测试设备-140	R220V-PP 测试设备	美国	Enable	admin	UTC+08:00	CNY	2024-03-15 17:00:46	Edit Delete Allocate Project

Page Info: Total 12 | 10 page | 1 2 3 4 5 6 7 8 9 10 11 12 | Go to 1

Figure 5.6.5-1 Add Project

5.6.6 Adding Time Zone and Currency

You need to select the time zone and currency where the project is located (it will affect the power statistics), if you don't have the right time zone and currency, please contact us to add them.

Add Item

* Project Name: Please enter project name

Area: 中国 (Select)

* Project Address: Project Address

* Latitude And Longitude: Please enter the longitude or click on the map to get (Please enter the latitude or click on the map to get)

* Time Zone: Select

* Currency: Select

SN	Device Name	Machine Serial Number	Device Model	Device	Operate
No Data					

+ Add the device to bind to the project

Cancel Confirm

Figure 5.6.6-1 Adding Time Zone and Currency

Click “Add the device to bind to the project” The following picture will pop up, where you can see the previously added devices and then select the desired device to add to the project.

Select Device

☐	Device Name	Machine Serial Number	Device Model	Device Type	Rated Power (kW)	Photovoltaic
☐	研发测试2	882	...	Photovoltaic energy storage system(on&off grid)	2	
☐	湖北益生	...	...	Photovoltaic energy storage system(on&off grid)	100	
☐	Monet-500TS	24012000000000000002	...	Energy storage converter(on&off grid)	500	
☐	测试	1111	...	Photovoltaic energy storage system(on&off grid)	111	
☐	IESS-50TS(...)	...	...	Photovoltaic energy storage system(on&off grid)	50	
☐	Monet-100A...	...	...	Photovoltaic-storage hybrid inverter(on&off grid)	100	

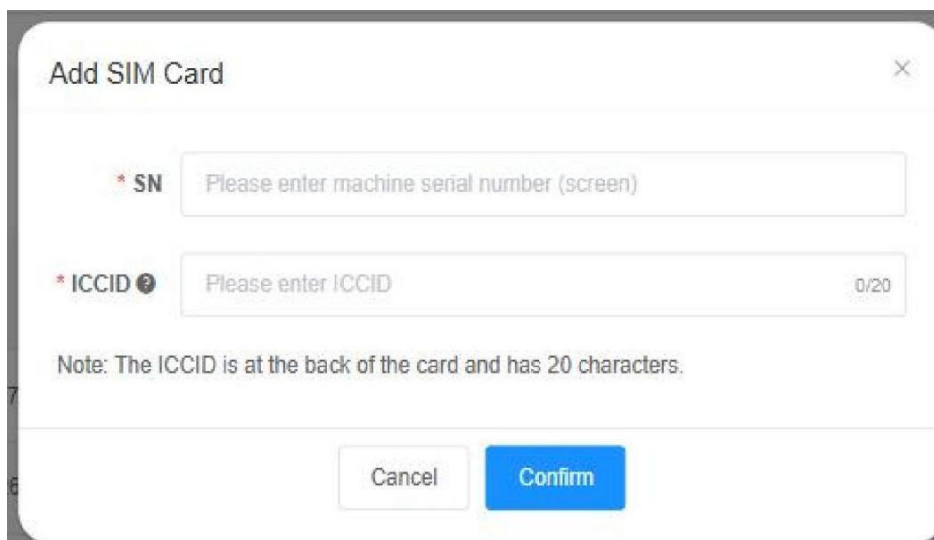
Total 6 10/page 1 Go to 1

Cancel Confirm

Figure 5.6.6-2 Added items

5.6.7 Add SIM card

In the “Asset management > SIM” screen, click “Add SIM card” to bring up the Add IoT card pop-up window. In the pop-up window, enter the device SN code and ICCID number (the ICCID number is a 20-digit character on the back of the card), and then click OK to see the information of the IoT card in the list. You can see the information of the IoT card in the list. If there is no problem with the ICCID number after adding, an IoT card number will be generated.



Add SIM Card

* SN

* ICCID ⓘ 0/20

Note: The ICCID is at the back of the card and has 20 characters.

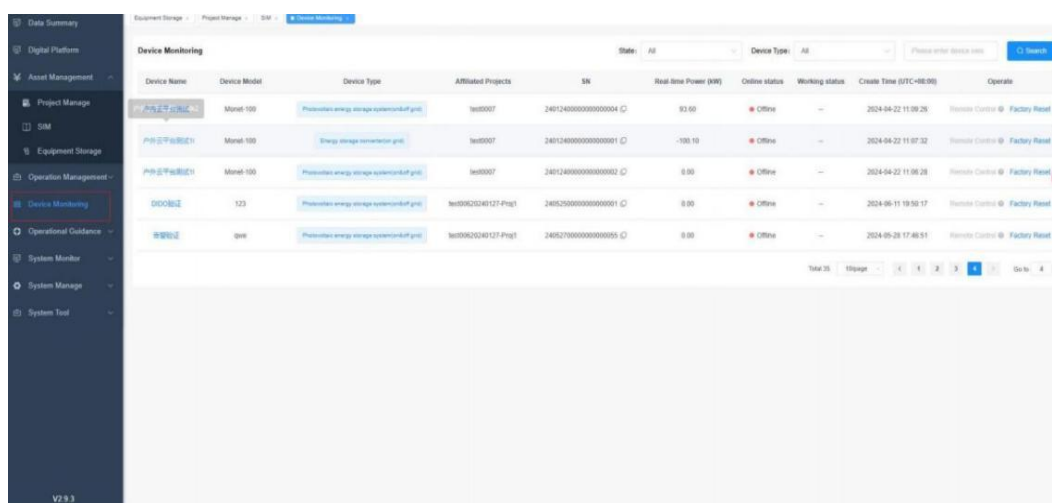
Figure 5.6.7-1 Add SIM card

**Illustration:**

Only SIM cards provided by our company need to be added, if not then no need to be added.

5.6.8 Viewing Devices

Click the “Device Monitor ” screen to see all the devices that have been operated as described above.



Device Name	Device Model	Device Type	Affiliated Projects	SN	Real-time Power (kW)	Online status	Working status	Create Time (UTC+08:00)	Operate
储能系统	Model 100	Protection energy storage system control unit	test0007	24012400000000000004	93.60	Offline	—	2024-04-22 11:09:25	Remote Control ⓘ Factory Reset
储能系统	Model 100	Energy storage conversion unit	test0007	24012400000000000001	-100.10	Offline	—	2024-04-22 11:07:32	Remote Control ⓘ Factory Reset
储能系统	Model 100	Protection energy storage system control unit	test0007	24012400000000000002	0.00	Offline	—	2024-04-22 11:08:28	Remote Control ⓘ Factory Reset
储能系统	123	Protection energy storage system control unit	test0002040127-Prj01	24052000000000000001	0.00	Offline	—	2024-05-11 10:50:17	Remote Control ⓘ Factory Reset
储能系统	000	Protection energy storage system control unit	test0002040127-Prj01	24052700000000000005	0.00	Offline	—	2024-05-28 17:48:51	Remote Control ⓘ Factory Reset

Total 25 Storage

Figure 5.6.8-1 Monitor page

5.6.9 Frequently Asked Questions

(1) What should I do if I forget my login password?

If the user forgets the login password, he/she can contact the administrator or distributor to change the login password again, or he/she can click “Retrieve Password” on the login page to change the login password again.

(2) How to bind mailbox?

Bound mailbox is in System Management->User Management, click Modify to enter the bound mailbox. (Binding mailbox is convenient for resetting password through mailbox in the future)

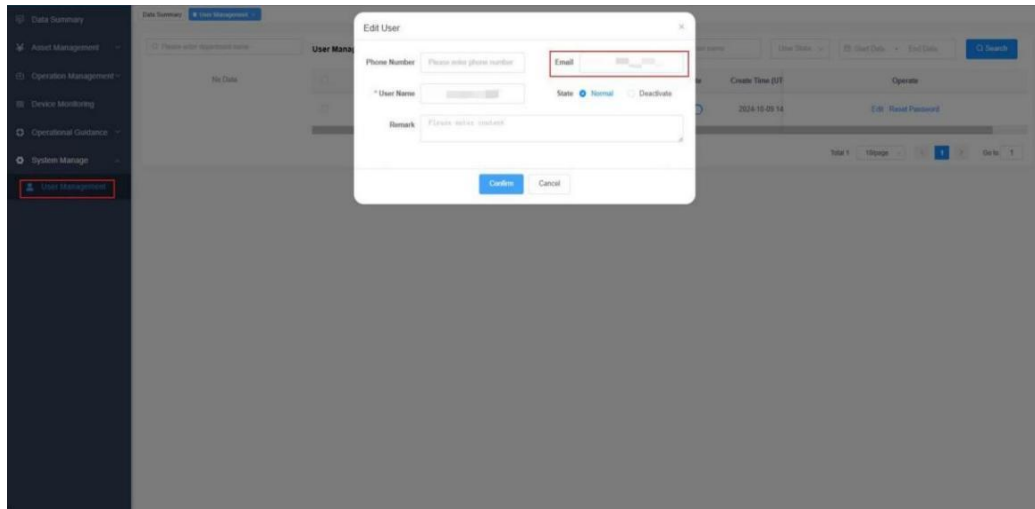


Figure 5.6.9-1 Modify mailbox header

(3) APP page data loading speed is too slow?

If other APP products on your phone are running without lagging and the network condition is good, please click Clear Cache on “My” page and try again.

(4) I can't see the device in “Device Monitor” after adding the device

After adding a device to “Device Inventory”, you need to go to “Project Management” to add a project and bind the device to the project before you can see the device on the “Device Monitor” page.

(5) After adding a device, the device is offline?

When you add a device for the first time, the device needs to wait for a while before it can be online after connecting to the server. If it still shows “Offline” after waiting for 10 minutes, please follow the steps below to check it.

1) Troubleshooting steps

General screen with network instructions:

- If other network cables connected from router/switch have network, you need to check whether the network segment of HMI is the same as the network segment of the network cable with network, if it is not the same, please modify it to the network segment of other devices with network.
- Check the DNS of HMI and change the DNS to 8.8.8.8 or 114.114.114.114.
- Check whether the IP of HMI is in conflict with the IP of other devices, if there is conflict, please modify the IP of HMI (HMI default IP:192.168.1.100).
- Check whether the network cable is damaged or loose.

- Using a wired connection, check whether the inserted network cable has a network (e.g., plug the cable into the computer to see if the web page can be opened).
- Using 4G screen or 4G router, please check the activation status of SIM card and whether it is in arrears (if our company provides SIM card, please take a picture of SIM card and give it to our after-sales service for checking). Attention: disconnect the power when unplugging and plugging in the SIM card.
- Please check whether the serial number is consistent with the platform. Inconsistent please keep the cloud platform serial number and HMI SN number consistent.
- Server address configuration error, such as foreign platform, configured with domestic address. (After-sales check).

When all the above are checked, please go to the PC end and click on the device monitoring page to open the device, then click on the upper-right corner of the refresh button, and then observe the details of the page "update time" (upper-right corner of the time) whether there is a change (the following chart), if in accordance with the above are checked or "offline" If the device is still "offline" after checking above, please contact our after-sales service to deal with the problem.

(6) Power analysis chart data time display is obviously incorrect?

It may be that the time zone is incorrect, check whether the time zone of the project where the device is located is correct, the time zone of China is usually +8.

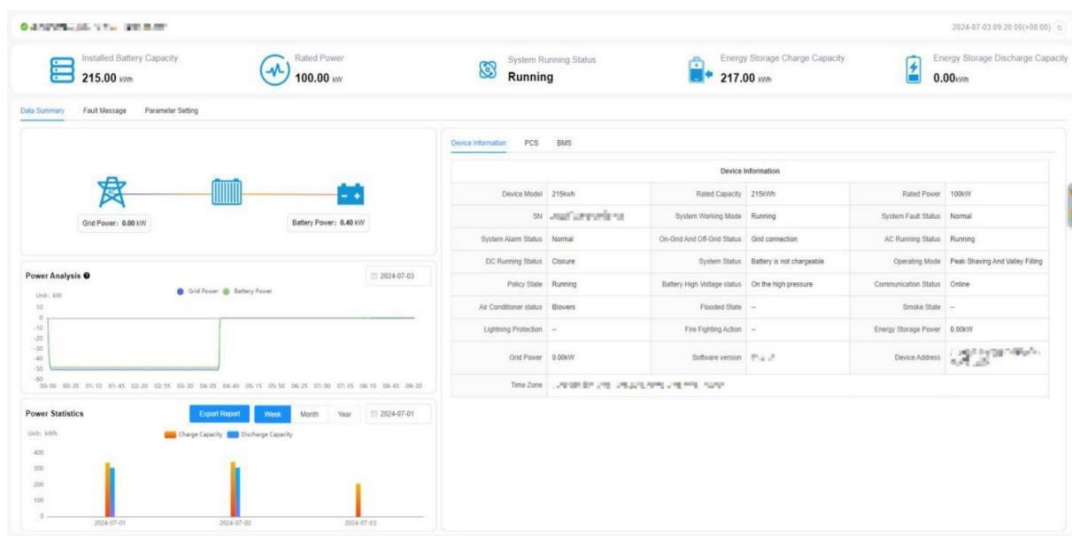


Figure 5.6.9-2 Time zone position

(7) When adding a device, it prompts "Serial number already exists" ?

First check whether the device has been added to the user, if not, the device may be added to other users. If not, the device may have been added to another user. In this case, you can contact the after-sales personnel to deal with it.

(8) Instructions for selecting server for APP?

In order to allow users around the world to have a better experience, the system is divided into different regions for users to visit, the region is divided into: China station, international station (other Asian countries / regions, Europe, Africa, Oceania, North America, South America, Antarctica, etc.).

The impact of choosing different servers

1: China station, international station corresponds to a different account system, if the user wants to access the Chinese mainland, international, the user needs to open the account and log in separately.

2: The data of China station and international station are isolated, i.e. you can't see the data of international station when you visit mainland China.

(9) How to choose a server?

If your business scope are in mainland China, you choose China site;

If your business scope are in international, you choose the international station;

If your business scope exists in both mainland China and international, then you need to open accounts in China station and international station respectively to manage the business in different geographical areas;



Illustration : the business scope refers to the scope of the location of your management station.

06 Alarm and Maintenance



Illustration:

Maintenance personnel for energy storage systems must hold a Special Operation Certificate for Electricians (China) or an equivalent electrician license compliant with local regulations. They must complete specialized operation and maintenance training for energy storage systems, demonstrate proficiency in operational procedures, and possess comprehensive electrical safety protection and emergency response capabilities.

Terminology explanation

Number	Term	Explain
1	Fault	The equipment fails and the system stops running
2	Alerts	The output power of the equipment decreases or some functions fail due to external factors, but it does not affect the charging and discharging functions of the system.
3	Normal operation	Refers to the system that works every day
4	Interval operation	Refers to a system that does not run on a fixed monthly basis and cannot be guaranteed to work every day
5	Long time no use	Battery system that has not been started for more than 3 months

6.1 Alarm Processing

Fault alarm processing method table

Alarm/Fault	part	question	Solution
Flooding Fault	Battery compartment	Energy storage cabinet flooded	1. Check whether there is water accumulation inside the cabinet; 2. Confirm whether the distributed energy storage cabinet is leaking and whether the equipment inside the cabinet is intact.
Door sensor Alerts	Battery compartment	Energy storage cabinet door open	1. Check whether the cabinet door is completely closed. 2. Check whether the cable on the

			door magnetic sensor is disconnected. 3. Check whether the door magnetic sensor is offset.
Fire Fighting Fault	Battery compartment	Battery overheating or fire	1. Immediately press the EPO button and quickly move away from the energy storage cabinet; 2. Continue to observe for 30 minutes at a safe distance. If there is smoke or fire, please call the fire alarm; if there is no abnormality, manually clear the active alarm and contact the manufacturer.
Lightning arrester alarm	Electrical Warehouse	Lightning arrester failure	1. Check whether the signal line of the lightning arrester is loose; 2. Check whether the indicator of the lightning arrester changes color; 3. Replace the AC lightning arrester.
Compressor alarm	air conditioner	1. Loose wiring 2. Compressor damage	1. Disconnect the power switch, open the air conditioner junction box, and check whether the wiring is loose; 2. Observe whether the compressor has obvious damage on the outside and whether there is a burning smell. If so, contact the manufacturer.
Outdoor fan alarm	air conditioner	1. Loose wiring 2. Fan damage	1. Disconnect the power switch, open the air conditioner junction box, and check whether the wiring is loose; 2. Observe whether the fan is obviously damaged or has a burning smell. If so, please contact the service hotline.
Grid overvoltage /undervoltage fault	Power grid/diesel engine	on-grid side voltage is abnormal	Check whether the voltage on the grid side is abnormal;
Grid overfrequency /underfrequency	Power grid/diesel	on-grid side frequency is	Check whether the frequency on the on-grid side is abnormal;

fault	engine	abnormal	
Island protection failure	Power grid/diesel engine	on-grid side voltage is abnormal	Check whether the voltage on the grid side is abnormal;
High/low voltage crossing alarm	Power grid/diesel engine	on-grid side voltage is abnormal	Check whether the voltage on the grid side is abnormal;
Grid voltage unbalance fault	Power grid/diesel engine	on-grid side voltage is abnormal	Check whether the voltage on the grid side is abnormal;
Grid phase error	Power grid/diesel generator	The phase sequence on the grid side is wrong	Swap any two cables among ABC
DC voltage high/low fault	Battery	Abnormal battery voltage	Check whether the DC input voltage is abnormal;
Busbar overvoltage fault	Energy Storage Converter	1. Load imbalance 2. Software abnormality	1. Check if the DC wiring is loose or abnormal; 2. Contact the manufacturer
Busbar half-voltage unbalance fault	Energy Storage Converter	1. Load imbalance 2. Software abnormality	1. Check if the load is abnormal; 2. Contact the manufacturer
Over temperature derating alarm	Energy Storage Converter	Internal temperature is too high	1. Check whether the air inlet and outlet of the electrical compartment are blocked; 2. Check whether the internal fan is operating normally; 3. Contact the manufacturer
Power tube Over temperature fault	Energy Storage Converter	Internal temperature is too high	1. Check whether the air inlet and outlet of the electrical compartment are blocked; 2. Check whether the internal fan is operating normally; 3. Contact the manufacturer
Balance bridge Over temperature fault	Energy Storage Converter	Internal temperature is too high	1. Check whether the air inlet and outlet of the electrical compartment are blocked; 2. Check whether the internal fan is

			operating normally; 3. Contact the manufacturer
DC overcurrent fault	Energy Storage Converter	DC current excess	1. Check whether there is a short circuit or line damage on the DC side; 2. Replace the energy storage converter module or contact the manufacturer.
Balance bridge Overcurrent fault	Energy Storage Converter	Internal current excess	1. Check whether the off-grid load is excessive; 2. Replace the energy storage converter module or contact the manufacturer.
Output overload /overcurrent fault	Energy Storage Converter	AC side power/current excess	1. Check whether the grid voltage is normal; 2. Check whether there is a short circuit or line damage on the DC side; 3. Check whether the off-grid load is excessive; 4. Replace the energy storage converter module or contact the manufacturer.
Wave-by-wave current limiting fault	Energy Storage Converter	AC side current exceeds rated value	1. Check whether the grid voltage is normal; 2. Check whether the off-grid load is excessive; 3. Replace the energy storage inverter module or contact the manufacturer.
Communication interruption failure	Energy storage converter local controller	Communication interruption	1. Check whether the communication network cable between modules is loose or abnormal; 2. Check whether the communication network cable of the local controller is loose or abnormal;
Parallel/synchronous fault	Energy Storage Converter	Parallel/synchronous signal interruption	1. Check if the parallel cables are loose or abnormal; 2. Check if the parallel settings

			are abnormal; 3. The hardware circuit is damaged.
Relay open circuit /short circuit fault	Energy Storage Converter	Internal relay abnormality Software abnormality	1. Replace the energy storage converter module 2. Contact the manufacturer to replace the internal panel
Fan 1/2/3 alarm	Energy Storage Converter	Internal fan abnormality	1. Replace the energy storage converter module 2. Contact the manufacturer to replace the internal fan
Leakage current fault	Energy Storage Converter	1. Excessive leakage current 2. Software abnormality	1. Check if the leakage current Hall connection is loose or abnormal; 2. Check if the ground wire is disconnected;
Insulation impedance abnormality fault	Energy storage inverter/battery	Insulation to ground is low, software abnormality	1. Check if the AC and DC cables are damaged or short-circuited to the ground. 2. Check if the battery circuit is damaged or short-circuited to the ground.
Module missing Alerts	Energy Storage Converter	Module to screen Communication interruption	Check whether the communication network cable between modules is loose or abnormal;
Low DC voltage Alerts	Energy Storage Converter	Battery not turned on	Check if the battery is turned on;

Table 6.1



Warning:

The above warnings and faults are common warnings or faults. If any fault other than that in Table 6.1 occurs, please contact the manufacturer directly.

6.2 System Maintenance



Danger:

Maintenance and repair personnel for energy storage equipment must hold an Electrician Special Operation Certificate (China) or an electrician license compliant with local regulations. They must complete specialized O&M training for energy storage systems,

demonstrate proficiency in operational protocols, and possess comprehensive capabilities in electrical safety protection and emergency response.



Warning:

1. Lethal high voltage exists inside the energy storage equipment. Accidental contact may cause fatal electric shock. To ensure safety, wait at least 10 minutes after equipment shutdown before opening cabinet doors. Verify that all internal components are completely de-energized prior to performing any maintenance work.
2. During maintenance, ensure no metallic objects (e.g., screws, washers) are left inside the energy storage equipment to prevent damage.
3. Ingress of sand/dust or moisture may damage electrical components or impair system performance.
4. Do not open equipment cabinet doors during sandstorm conditions or when ambient humidity exceeds 90%. Maintenance may only be performed under sand-free, sunny, and dry weather conditions.
5. To prevent electric shock hazards, disconnect all AC/DC disconnect switches and upstream/downstream circuit breakers of the energy storage system before performing maintenance, inspection, or related operations.

Maintenance Processing Table

Maintenance Object	Maintenance Method	Cycle
Equipment Status	Check for abnormal phenomena during operation, such as excessive noise or vibration.	Annual
Equipment Status	Check if temperature and humidity are within the normal range.	Annual
Equipment Status	Inspect for damage, component failure, or corrosion.	Annual
Equipment Exterior	Inspect the overall appearance: no obvious coating peeling, scratches, or corrosion.	Annual
Equipment Exterior	Check ventilation openings: no dust accumulation.	Annual
Equipment Exterior	Inspect door locks: no damage.	Annual
Equipment Exterior	Check stability: ensure the equipment is securely installed with no tilting or collapse risks.	Annual
Equipment Exterior	Inspect the surrounding environment for potential safety hazards.	Annual
Equipment Interior	Check for contamination, foreign objects, or dust, and clean if necessary.	Semi-annual

Wiring Harness	Verify the correctness of wiring connections and layout compliance.	Semi-annual
Wiring Harness	Inspect wiring harness sleeves for damage. Check for exposed copper wires, damage, corrosion, or loose connection screws.	Semi-annual
Wiring Harness	Ensure cable entry/exit holes are properly sealed.	Semi-annual
Grounding Wire	Inspect grounding wires for secure connections, damage, or corrosion.	Semi-annual
Grounding Wire	Measure grounding resistance to ensure compliance with standards.	Semi-annual
Lightning Protection	Check lightning protection devices for tightness and proper function.	Semi-annual
Air Conditioner	Inspect wiring for looseness.	Semi-annual
Air Conditioner	Check for clogged drainage outlets.	Semi-annual
Air Conditioner	Verify normal operation of fans and compressors, ensuring no abnormal noise or vibration.	Semi-annual
Air Conditioner	Clean air conditioner filters if excessively dusty.	Semi-annual
Fans	Check for noise and vibration: ensure smooth rotation without jamming or abnormal sounds.	Semi-annual
Fans	Inspect air outlet covers: clean and unobstructed.	Semi-annual
PCS/DC	Check for noise and vibration: ensure front panel fans rotate smoothly without jamming or abnormal sounds.	Semi-annual
PCS/DC	Inspect front panel ventilation openings: clean and unobstructed.	Semi-annual
PCS/DC	Check rear copper busbar contact surfaces: no corrosion, discoloration, or dust buildup.	Semi-annual
Internal Components	Perform routine inspections on all metal components.	Semi-annual
Equipment Parameters	Monitor and verify operational parameters.	Semi-annual

Table 6.2



Illustration:

The table provides recommended routine maintenance intervals only. Actual maintenance schedules should be reasonably determined according to the specific installation environment of the product. Factors such as the scale of the energy storage system, location, and on-site conditions may all affect equipment maintenance frequency. In dust-heavy environments with significant sand or dust accumulation, it is imperative to shorten maintenance intervals and increase servicing frequency.

6.3 Cleaning

6.3.1 Preparation before Cleaning



Notice:

Please prepare at least the following tools. If you do not have enough tools, you may not be able to complete the maintenance. The handles of the tools used, such as cross screwdrivers, need to be insulated, or insulated tools should be used.

Cleaning tools:

 Cross screwdriver	 Multimeter	 Rubber hammer	 Insulated ladder
 Vacuum cleaner	 High pressure water gun		

Protective tools:

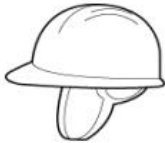
 Safety gloves	 Protective goggles	 Dust mask	 Safety shoes
 Reflective Vest	 Safety helmet	 Medical kit	

Figure 6.3.1

6.3.2 Cleaning and Maintenance

Cleaning maintenance table

Category	Action	Reference Standards	Confirm Power-off
Cabinet	Clean the vents	1. No dust accumulation in the vents	yes
Cabinet	Cleaning dustproof cotton	1. No insects, rats, snakes or other animals can enter	yes
Cabinet	Flush appearance	1. The dustproof cotton has no obvious discoloration and debris	yes
Air outlet cover	Cleaning fan	1. The surface of the air outlet cover is clean and unobstructed; 2. The fan rotates normally without any jamming or abnormal noise.	yes
power distribution area	Check if there are any foreign objects in the power distribution area	1. The area is clean and free of foreign matter	yes
Note: In dusty areas, it is recommended to clean the filter every time a sandstorm occurs; it is recommended to clean the filter before summer; in other areas, ensure that the filter or condenser is not blocked according to actual conditions; the dustproof cotton can be used for up to 2 years. Recommended tools: high-pressure water gun.			

Table 6.3.2

6.3.3 Operation Steps

Step 1: Power off the system

1. Click "System Shutdown" on the touch screen switch interface;
2. Disconnect the system transformer pre-charging switch, auxiliary power switch, open the utility power switch, open the load switch, open the battery-side switch, etc;
3. Wait for the discharge to end, the touch screen t`o turn off, and the device to shut down;
4. Turn off the upper-level distribution switch of the system and hang a "Do Not Close" maintenance sign.

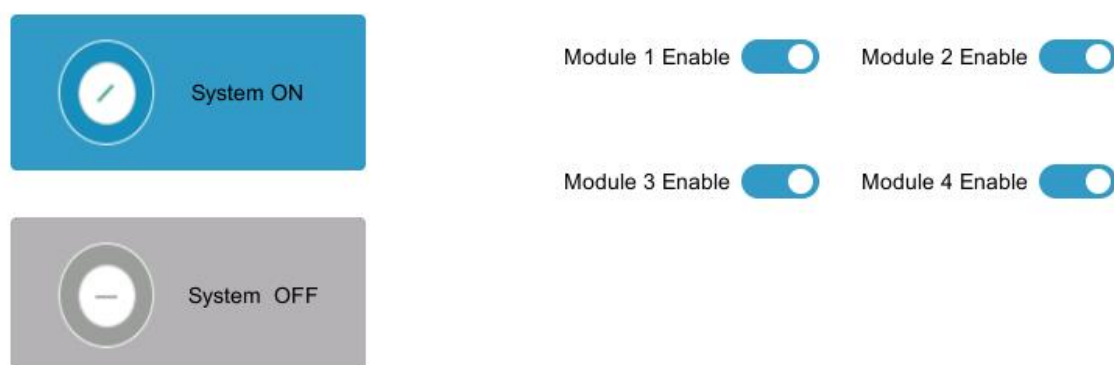


Figure 6.3.3-1

Step 2: Use special tools and keys to open the system cabinet door.

Step 3: Disconnect the mains circuit breaker from the upper distribution box and hang a "Do Not Close" inspection sign.

Use a multimeter to measure whether the device is still charged. Wait until the device is no longer charged before proceeding to the next step;



Figure 6.3.3-2

Step 4: Open the cabinet door, loosen the buckle of the dustproof cotton frame, remove the dustproof cotton, and place the aluminum alloy frame and dustproof cotton flat in a safe place

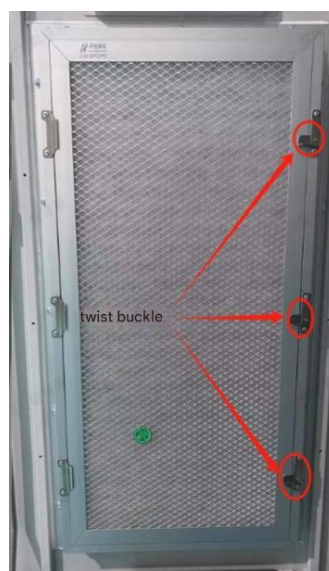


Figure 6.3.3-3

Step 5: Use a high-pressure water gun to rinse the dustproof cotton. If it is too dirty, use a detergent to clean it.

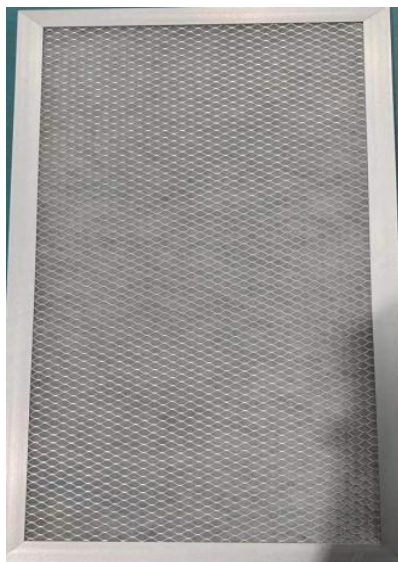


Figure 6.3.3-4

Step 6 :Put the cleaned dustproof cotton into the aluminum alloy dustproof cotton frame and dry it, then fix it with the buckle

Step 7: Reboot

6.4 Warranty Service

6.4.1 Warranty Period

In case of correct use of the product, the warranty period agreed in the commercial contract shall prevail.

6.4.2 Warranty Scope

During the warranty period, if the product is caused by quality problems, our company will repair or replace the product for free. Customers should reserve a reasonable response time for our company's repair, and the replaced product will be handled by our company. Customers need to show relevant proof of purchase of the product and ensure that the product trademark is clearly visible, otherwise our company has the right to not provide warranty guarantee.

6.4.3 Disclaimer

In the following situations, our company has the right not to provide quality assurance, but can still provide paid maintenance services.

1. The warranty period has expired;
2. Failure to provide relevant proof of product purchase;
3. Damage caused during transportation, loading and unloading;
4. Damage caused by improper installation, modification or dismantling by unauthorized personnel;
5. Damage caused by operation under abnormal conditions or environment;
6. Machine failure or damage caused by using non-Natong parts or software;
7. Failure caused by force majeure such as fire, earthquake, flood, etc.

Appendix

Emergency handling

When the battery is dropped or subjected to strong impact

If there are obvious odors, damage, smoking, fire, or other such situations:

Evacuate personnel immediately, call the police, and contact professional personnel.

Professional personnel should use fire-fighting equipment to extinguish the fire under safe conditions.

If there is no obvious deformation or damage in appearance, and no peculiar smell, smoke or fire occurs:

Warehouse scenario: Evacuate personnel. Professional staff shall use mechanical tools to transfer the battery to an open and safe place, contact the service engineer, let the battery stand for 1 hour while monitoring its temperature (within the range of room temperature $\pm 10^{\circ}\text{C}$) before handling it.

Energy storage system site: Evacuate personnel, close the door of the energy storage system. Professional staff shall transfer the battery to a safe place, contact the service engineer, and handle it after letting it stand for 1 hour.

When a flood occurs

If any part of the battery is submerged in water, do not touch the battery to avoid electric shock.

Do not use batteries that have been submerged in water; contact a recycling company for scrap disposal.

When a fire breaks out

**Warning:**

1. Power off the system under safe conditions.
2. Use carbon dioxide, FM-200, or ABC dry powder fire extinguishers to put out the fire.
3. Firefighters must avoid contact with high-voltage components to prevent the risk of electric shock.
4. High temperatures of the battery may cause deformation, electrolyte leakage, and release of toxic gases.
5. It is necessary to wear respiratory protection equipment, stay away from the scene, and avoid skin irritation and chemical burns.

When the audible and visual alarm is activated

Do not approach or open the door; move away immediately.

Remotely cut off the power supply under the condition of ensuring your own safety.

When the exhaust starts

On-site personnel protection: It is prohibited to operate directly facing the exhaust port.

Post-incident maintenance: Contact the service engineer for evaluation.

Emergency handling for air-conditioning refrigerant leakage**Warning:**

1. Immediately cut off the power, evacuate personnel, and prohibit open flames/spark operations (to prevent deflagration).
2. After troubleshooting, clean the inside of the system, re-power it on and check whether the system is functioning normally. If there is any abnormality, please contact the relevant engineers in a timely manner for handling.

Maintenance Key Points:

Use a leak detector to locate the leak (check the compressor shaft seal and condenser

joints);

For minor leaks: Recover the refrigerant and then tighten the seal;

For major leaks: Replace the air-conditioning components.

When fire extinguishing agent is discharged or a fire breaks out

Recommendations for operation and maintenance personnel:

Evacuate the site and call the police, providing information such as the type of battery pack, system capacity, and location distribution.

Do not re-enter the burning area or open the door of the energy storage system; isolate the site and keep watch.

Remotely power off the system (ensure personal safety).

Provide product information and user manuals to firefighters.

After the fire is extinguished, the site shall be handled by professionals; do not open the door without authorization.

Contact service engineers for maintenance evaluation.

Recommendations for firefighters:

Refer to the product information provided by operation and maintenance personnel.

Do not open the door of the energy storage system until safety is ensured.

Extinguish the fire through control measures to prevent the fire from spreading to surrounding energy storage cabinets.



User Manual

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