BSL NEW ENERGY TECHNOLOGY CO., LTD

User Manual

B-LFP48 Series

Low-voltage rack-mounted battery system

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01 Safety Instructions

1.1 Safety Symbol Description

When installing, operating and maintaining the equipment, please read this manual first and follow all safety precautions marked 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 following symbols carefully.

 **Danger**: Indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

 **Warning:** Indicates a situation with a moderately hazardous situation which, if not avoided, could result in death or serious injury.

 **Caution:** Indicates a situation with a low risk of hazard which, if not avoided, may result in moderate or minor injury.

 **Illustration:** Emphasis and supplementation of content may also provide tips for optimal use of the product.

1.2 General Security

 **Illustration:**

This equipment should be used in an environment that meets the design specification requirements. Otherwise, it may cause equipment failure, and the resulting equipment malfunction or component damage, personal safety accidents, property losses, etc. are not within the scope of equipment quality guarantee. During installation, operation, and maintenance of the equipment, local laws, regulations, and norms should be followed. The safety precautions in the manual are only supplementary to local laws, regulations, and norms. In the event of any of the following situations, the company will not be held responsible.

1. The installation and usage environment exceeds the stipulations in relevant international, national and regional standards.
2. The equipment is not operated under the conditions described in this manual.
3. Unauthorized disassembly, modification of the product or alteration of the software code.
4. Failure to operate in accordance with the operation instructions and safety warnings provided in the product and documentation.
5. Equipment damage caused by abnormal natural environments (acts of nature such as earthquakes, fires, storms, floods, mudslides, etc.).
6. Damages caused by the customer's failure to follow the transportation and installation requirements.
7. Damages resulting from storage conditions not meeting the requirements specified in the product documentation.

8. Damage to the hardware or data of the equipment due to the customer's negligence, incorrect operation, or intentional damage.
9. System damage caused by reasons other than the customer, including relocation and installation of the system that does not comply with this manual, as well as adjustments, changes, or removal of identification marks that do not comply with this manual, etc.
10. Defects, failures, or damages caused by actions, events, negligence, 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 is powered on. Improper operation may cause electric shock or fire, resulting in death, serious personal injury or significant property damage. Please follow the operation procedures and safety precautions provided in this manual and other relevant documents, and operate in a standardized manner:
1. Please check that the pre-installed cables of the equipment are securely connected. Inspect the equipment for any damage, such as holes, dents or other signs of possible internal damage. Ensure that the internal components of the equipment are not displaced. It is strictly prohibited to arbitrarily modify the structure or installation sequence of the equipment.
2. Do not use water to clean the electrical components inside the equipment. If liquid enters the equipment , immediately press the emergency stop switch and notify the on-site managers.
3. Installation, wiring, maintenance and replacement operations must not be carried out while the equipment is powered on. Before touching any conductive surface or terminal, measure the voltage at the contact point and confirm that the protective ground wire of the equipment or the component to be repaired is reliably grounded. Ensure there is no risk of electric shock.
4. Except for the personnel operating the equipment, other people should not approach the equipment. Do not power on the equipment before its installation is completed or before it has been confirmed by professionals. When powering on for the first time or performing operations with the main circuit energized, at least two people must be present on site.

Illustration:

1. The operational behaviors and tools used by the users during transportation, handling, installation, wiring and maintenance must comply with the laws and regulations and relevant standards of the countries and regions where they are located.
2. It is prohibited to conduct reverse engineering, decompilation, disassembly, modification, implantation or any 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, or disclose any results of performance tests of the device software in any way.

1.3 Personal safety

 **Danger:**

1. During the operation of the equipment, appropriate personal protective equipment should be worn. If any faults that may cause personal injury or equipment damage are detected, the operation should be immediately terminated, and a report should be made to the person in charge, along with the implementation of effective protective measures.
2. Before using the tools, please master the correct usage methods to avoid injuring others and damaging the equipment.
3. During the operation of the equipment, some internal shells have high temperatures and pose a risk of burns. Do not touch them.
4. To ensure personal safety and normal use, reliable grounding should be performed before use.
5. When the battery module malfunctions, the temperature may exceed the burn threshold of the accessible surface. Avoid contact.
6. Do not open or damage the battery module. The released electrolyte is harmful to the skin and eyes. Avoid contact.
7. Do not place any irrelevant items on the top of the device or insert them into any position of the device.
8. Do not place flammable items around the device.
9.Batteries must not be exposed to fire to prevent explosion and endanger personal safety.
10. Do not place the battery module in water or any other liquid.
11.Do not short-circuit the terminals of the battery module. Short-circuiting the battery will cause combustion.
12.The battery may cause electric shock and dangerous large short-circuit current.
13.Do not clean the electrical components inside and outside the equipment with water or cleaning agents.
14. Do not stand or lean against, or sit on the equipment.
15. Do not damage the various modules of the equipment.
16. When installing the battery module, if the battery module drops or is subjected to a strong impact, it will cause damage to the equipment. Do not continue to use it; otherwise, there will be safety risks (such as possible leakage of battery cells, electric shock injuries, etc.).

 **Warning:**

1. Remove watches, rings or other metal objects.
2. Use tools with insulated handles.
3. Put on rubber gloves and boots.
4. Do not place small tools or metal parts on the top of the battery module.
5. Before connecting or disconnecting the battery terminals, disconnect the charging power supply.
6. Check if the battery is accidentally grounded. If it is, remove the power supply from the ground. Touching any part of the grounded battery can cause an electric shock. If these grounds are removed during installation and maintenance, it can reduce the possibility of such an electric shock.

1.4 Battery leakage handling measures

Warning:

In case of electrolyte leakage, depending on the severity of the situation, the following emergency measures can be taken.

1. Ensure adequate ventilation. Remove all ignition sources.
2. Quickly evacuate personnel to a safe area, away from the leakage area and in the upwind direction.
3. Use personal protective equipment. Avoid inhaling vapors, smoke, gases or dust.
4. Under the condition of ensuring safety, take measures to prevent further leakage or spillage.
5. For minor leaks, dry sand or inert adsorption materials can be used to absorb the leaked substances. For large-scale leaks, embankments should be constructed for control.
6. Attachments or collected substances should be stored in appropriate sealed containers and disposed of according to local relevant laws and regulations.
7. Eliminate all ignition sources and use fire-resistant tools and riot control equipment.

Danger:

In case of leakage, avoid contact with the leaked liquid or gas. The electrolyte is corrosive and contact may cause skin irritation and chemical burns. If the battery electrolyte is contacted, the following measures should be taken.

In case of inhalation: Evacuate the contaminated area, immediately move to an area with fresh air and keep breathing unobstructed; if breathing is difficult, provide oxygen inhalation; if the patient ingests or inhales this substance, do not perform mouth-to-mouth artificial respiration; if breathing stops, immediately perform cardiopulmonary resuscitation and seek medical help immediately.

2. Eye contact: Immediately rinse the eyes with plenty of water for at least 15 minutes. Do not rub your eyes and seek medical assistance immediately.
3. Skin contact: Immediately remove the contaminated clothing, wash the skin contact area with plenty of water and soap, and seek medical assistance immediately.
4. Ingestion: Do not induce vomiting. Do not feed anything to the unconscious person through the mouth. Seek medical assistance immediately.
5. Protective measures for emergency personnel: Ensure that medical staff are aware of the product's hazardous characteristics and take personal protective measures to protect themselves and prevent the spread of contamination.

1.5 Electrical safety

1.5.1 Regular requirements

Illustration:

1. All electrical connections must comply with the electrical standards of the respective country/region.

2. Installation, operation and maintenance must be carried out strictly in accordance with the steps outlined in the manual. It is strictly prohibited to modify the equipment or change the installation sequence without authorization.
3. Temporary barriers and "Do Not Enter" signs should be set up in the work area. Non-staff members are strictly prohibited from entering.
4. Before operation, registration and inspection of tool integrity should be conducted. After operation, the tools should be counted to prevent any remaining items inside the equipment.

 **Danger:** Before making electrical connections, please ensure that the equipment is undamaged. Otherwise, it may cause electric shock or fire. Before installing power cables, make sure the cable labels are correct and the terminal insulation protection is intact. Do not power on the equipment if it has not been fully installed or has not been confirmed by professionals.

1.5.2 Cabling requirements

1. Please select cables that comply with local laws and regulations. Similar cables should be bundled together, while different types of cables should be laid separately. It is prohibited to intertwine or cross them.
2. The sharp edges of the cable troughs/through-line holes need to be removed, and protective sleeves should be added at the pipe insertion positions to prevent damage to the surface.
3. The distance between the cables and the heat-generating components should be ≥ 30mm to prevent insulation aging caused by high temperatures.
4. When laying cables in an environment below 0℃:

- All cables must be laid in an environment with a temperature above 0℃.;
- If the storage temperature is below 0℃, it is necessary to move the product to a warm environment for storage for at least 24 hours before installation.

 **Danger:**It is strictly prohibited to install or dismantle power lines while they are energized. When the core of the power line comes into contact with the conductor, an arc or electric spark will be generated, which may cause a fire or result in personal injury.

1.5.3 Grounding requirements

1. The equipment must be permanently connected to the protective ground wire. Before operation, confirm that the grounding is reliable.
2. Do not operate the equipment without installing the grounding conductor. It is strictly prohibited to damage the grounding conductor.
3. The grounding impedance must meet the local electrical standards. Regularly test the grounding reliability.
4. For three-core socket equipment, ensure that the grounding terminal is connected to the protective ground; for large contact current equipment, ground first before connecting the power supply.

1.5.4 Maintenance requirements

1. Before connecting or disconnecting the cables, the protection switch of the corresponding circuit must be turned off first.
2. Use a multimeter of the corresponding voltage level to check if it is energized to ensure that the equipment has been completely powered off.
3. During maintenance, a "Do Not Close" sign should be hung on the up and down switches, and warning signs should be posted. The equipment can be re-powered only after the fault has been completely resolved.

Illustration:

1. Before connecting the cables, it is necessary to first confirm that the cable labels are correctly identified before proceeding with the connection.
2. If the equipment has multiple input channels, all the inputs of the equipment should be disconnected. Only after the equipment is completely powered off can the operation on the equipment be carried out.
3. After the maintenance is completed, the grounding wire between the maintenance circuit and the grounding circuit should be removed.

1.6 Mechanical safety

1.When handling equipment by hand, one should make preparations for the load-bearing capacity and wear protective gloves, safety shoes and other safety equipment.
2.During the equipment transportation process, handle the equipment carefully to avoid collisions or drops. Also, prevent scratching the equipment surface, damaging the components or cables.
3.During the transportation process, if the equipment is too large in size, it may block the operators' view, so additional assistants need to be arranged to assist in the operation.

1.7 Maintenance and replacement

Please maintain the equipment under the condition of having a good understanding of the content of this manual and having appropriate tools and testing devices.
1. Before conducting maintenance work, please first power off the equipment, then follow the instructions on the delayed discharge label and wait for the corresponding time to ensure that the equipment has been powered off before operating it.
2. During the maintenance process, try to avoid irrelevant personnel entering the maintenance site. Temporary warning signs or fences should be erected for isolation.
3. If the equipment malfunctions, please contact your dealer for handling promptly.
4. The equipment can be re-powered only after the fault has been resolved. Otherwise, it may lead to the expansion of the fault or damage to the equipment.
5. Unauthorized personnel are strictly prohibited from opening the cover plate. Otherwise, there will be a risk of electric shock, and the resulting fault will not be covered by the warranty.
6. Operators and professional technicians should receive adequate training on safe operation and equipment maintenance. They should operate under sufficient preventive measures and with personal protective equipment.

7. When it is necessary to move or rewire, the power input must be cut off. Wait for 5 minutes until the internal energy of the machine has been completely discharged. Then, use a multimeter to confirm that there is no dangerous voltage on the DC bus and the internal repairable parts of the machine. Only then can maintenance be carried out.
8. The maintenance of batteries should be performed or supervised by personnel who are familiar with batteries and the necessary preventive measures.
9. When replacing the battery, please use the same type of battery.
10.After the maintenance operation is completed, it is necessary to immediately check to ensure that no tools or other components are left inside the equipment.
11. If the device is not used for a long time, please follow this manual to store and recharge the battery.

 **Danger:**

During the operation of the equipment, there is **DANGEROUS VOLTAGE**, which may cause electric shock, resulting in death, serious personal injury or serious property loss. Therefore, before performing any maintenance work, the equipment must be powered off and the safety precautions listed in this manual and other related documents must be strictly followed.

02 Product Introduction

2.1 Product Overview

This product is a low-voltage rack-mounted energy storage battery, a household energy storage battery pack designed to meet the green electricity needs of households. This product uses a 5/10/15 kWh lithium iron phosphate battery pack. This product can be used in conjunction with electricity to adjust the way of electricity consumption. It also supports various application methods such as self-generation and self-consumption of photovoltaic power, achieving the goal of green electricity for households.

2.2 Model Description

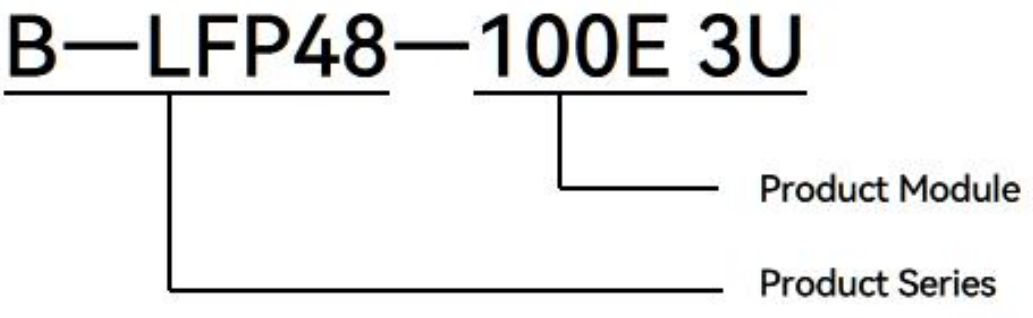


Figure 2.2

Illustration:

This product is an electrical battery device capable of charging and discharging. Users can choose the installation method that suits their specific environment: rack installation, cabinet installation, and floor installation.

Even though there are differences in appearance among different models of battery modules, the final installation effect remains consistent. The following figure illustrates this with an example of rack installation.

No.	Meaning	Illustration
1	Product Model	The height of 1U is 44.45 millimeters. This is based on the ***EIA-310*** standard and is defined as a Rack-Unit, which is used to measure the height of server cabinets or equipment installations.
2	Product Features	Battery type: LiFePO4 (Phosphate Iron Lithium)

Table 2.2

2.3 Product Appearance

B-LFP48-100E 3U

Standard version:

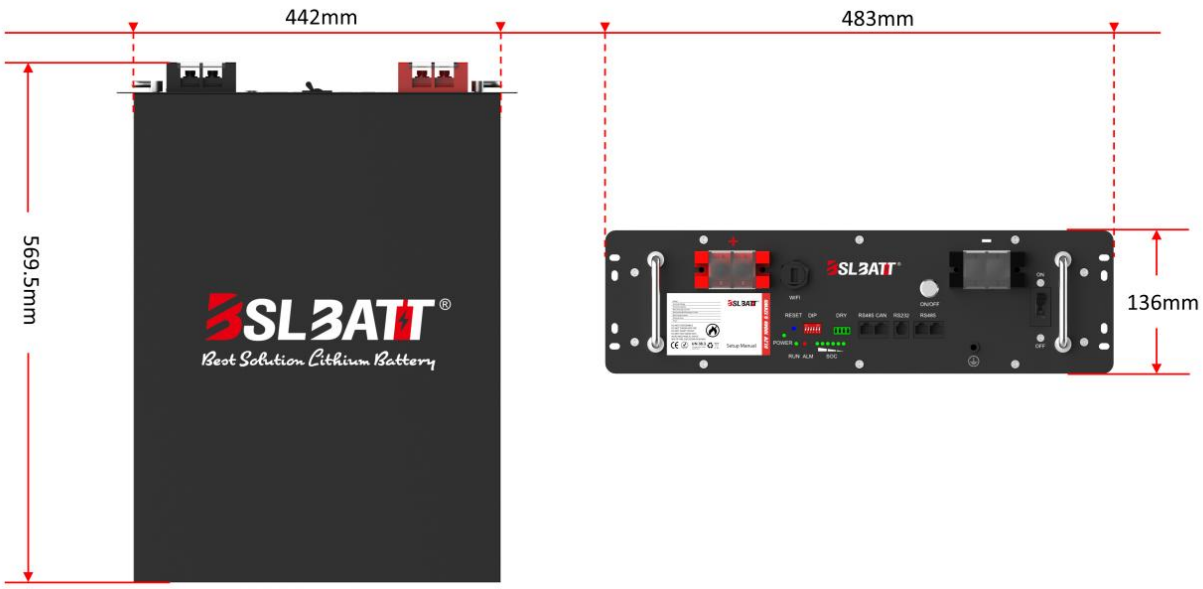


Figure 2.3-1

Quick plug port version:

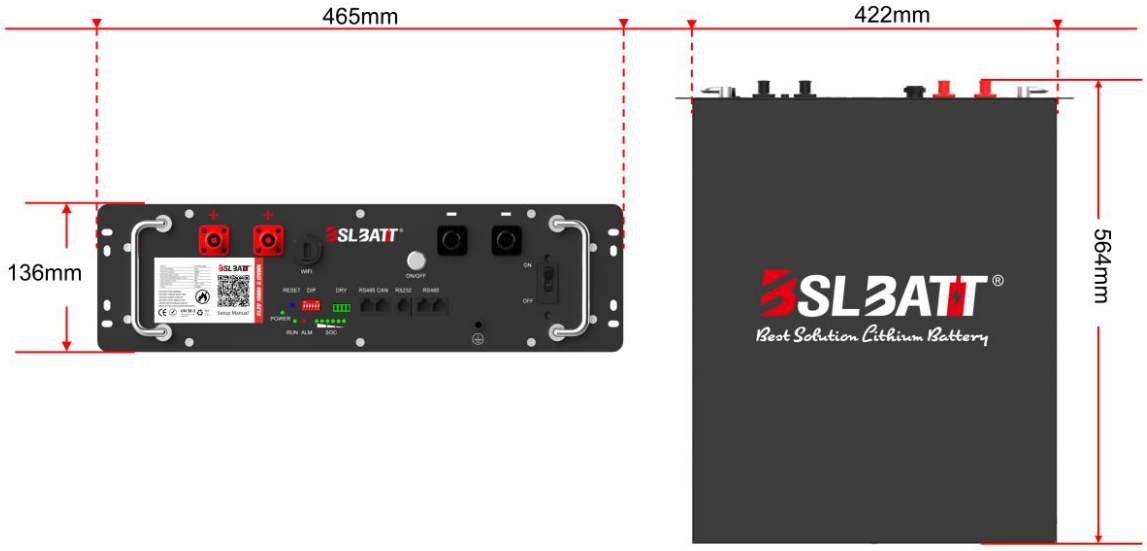


Figure 2.3-2

Illustration:

Different projects have different configurations. In practice, the actual delivery quantity shall prevail.

1.The actual height may vary slightly. Please refer to the actual installation height.

2.The series stacking can be freely combined according to the project configuration.

B-LFP48-100E:

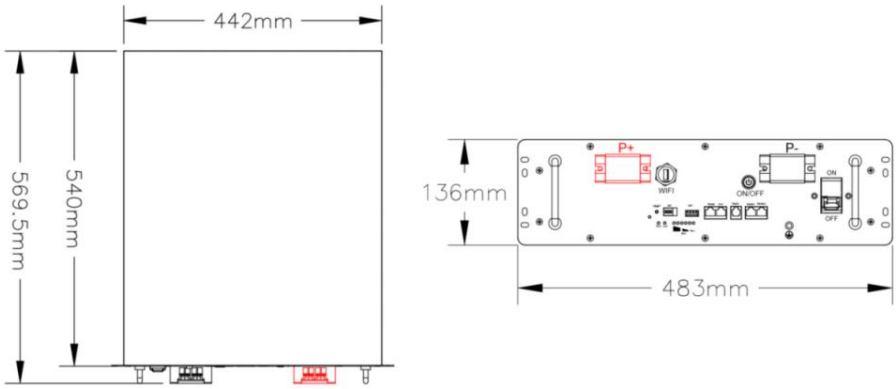


Figure 2.3-3

B-LFP48-200E:

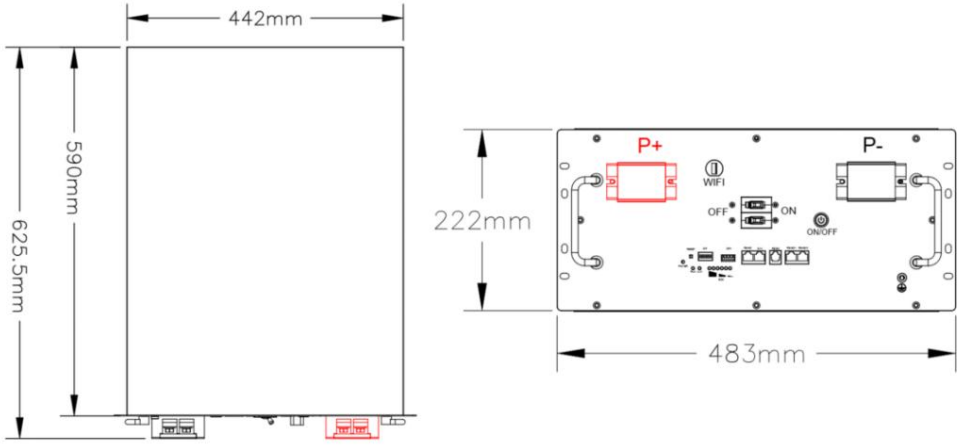


Figure 2.3-4

B-LFP48-300E:

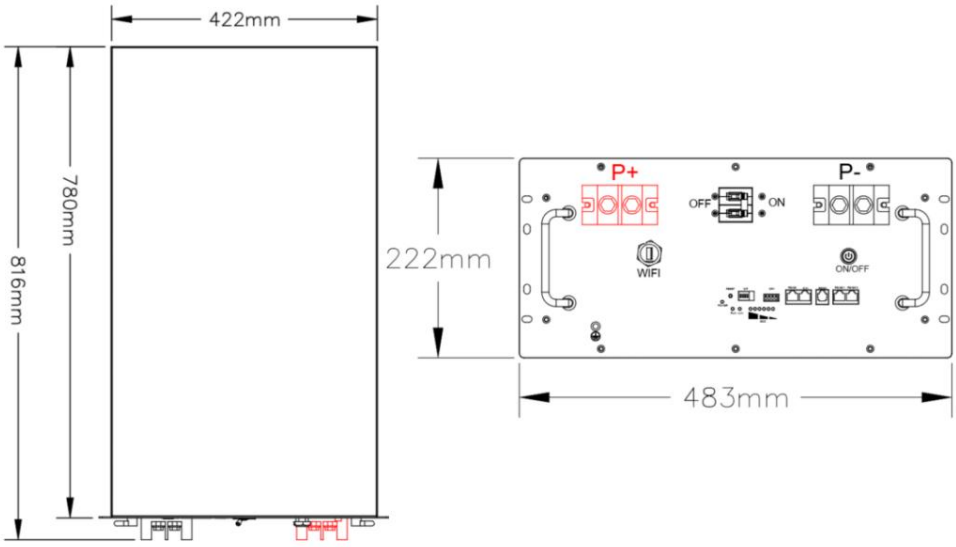


Figure 2.3-5

2.4 Product Parameters

Technical parameters of B-LFP48-Rack:

General Parameter	B-LFP48-100E 3U	B-LFP48-200E	B-LFP48-300E
Battery Type		LiFePO4	
Rated Voltage		51.2V	
Cell & Method	16S1P	16S1P	16S1P
Nominal Capacity(Wh)	5120	10240	15360
Usable Capacity(Wh)	4864	9728	14592
Cycle Life		＞6000 cycles (25℃,0.5C) 80%DOD	
Charging Voltage		55V	
Discharge Cut-off Voltage		47V	
Rate Charging Current	80A	160A	160A
Peak Charging Current	110A	210A	210A
Rate Discharge Current	100A	200A	200A
Max.Discharge Current	120A	220A	220A
Charge Working Temperature		0℃~ +55℃	
Discharge Working Temperature		-20℃ ~ +55℃	
General parameters			
Depth Of Discharge（DOD）		95%	
Expansion		Up to 63 units in parallel	
Communication		RS232, RS485, CAN, WIFI, Bluetooth	
Cooling Method		Natural	
Protection Level		IP20	
Self-discharge		≤ 3%/month	
Altitude		＜ 3000m	
Storage Temperature		0℃~ +35℃	
Storage Humidity		10～60% ROH(No Condensation)	
Dimension(W*D*H,mm)	540*483*136(±5)	590*483*222(±5)	780*483*222(±5)
Weight	43Kg±3%	79Kg±3%	111Kg±3%

Table 2.4

Illustration: Due to differences in production batches, the cycle life, dimensions, and weight may vary. The actual product shall prevail.

2.5 Product Details

Standard version:

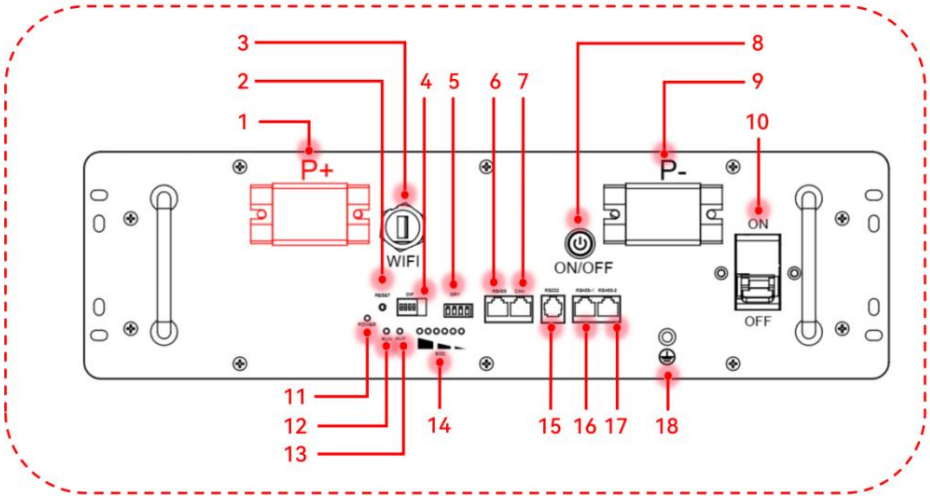


Figure 2.5-1

Battery Component Description Table

No.	Illustration	Silk-screen	Remark
1	Battery Positive Terminal post	P+	Positive Output
2	Reset Button	RESET	Reset Battery
3	WIFI Interface	WIFI	If the Wi-Fi function is selected, a Wi-Fi encryption stick can be inserted
4	Dial Switch	DIP	Address settings (range 2 to 15)
5	Dry Connection Point	DRY	Dry contact point 1: Normally open; closes when the SOC (State of Charge) is below 10%. Dry contact point 2: It remains open in normal conditions. It closes when the SOC reaches 100%.
6	RS485A Interface	RS485	Communication port for the monitoring equipment
7	CAN Bus Interface	CAN	The communication port connected to the inverter
8	Switch	ON/OFF	Button activation BMS
9	Battery Negative Terminal Post	P-	negative output
10	Breaker	ON/OFF	Battery string output enable switch
11	Power Light	POWER	The green light remains on after startup
12	Operation Indicator Light	RUN	The green light starts to flash after startup
13	Fault Indicator Light	ALM	Red light indicates a fault
14	Capacity Indicator Light	SOC	Refer to the instructions for indicator lights in Section 4.7
15	RS232 Port	RS232	RS232 Communication port
16	RS485-1 Port	RS485	RS485 And connect the communication ports
17	RS485-2 Port	RS485	RS485 And connect the communication ports
18	Ground Wire Interface	Grounding mark	Prevent leakage of electricity

Table 2.5-1

Quick plug port version:

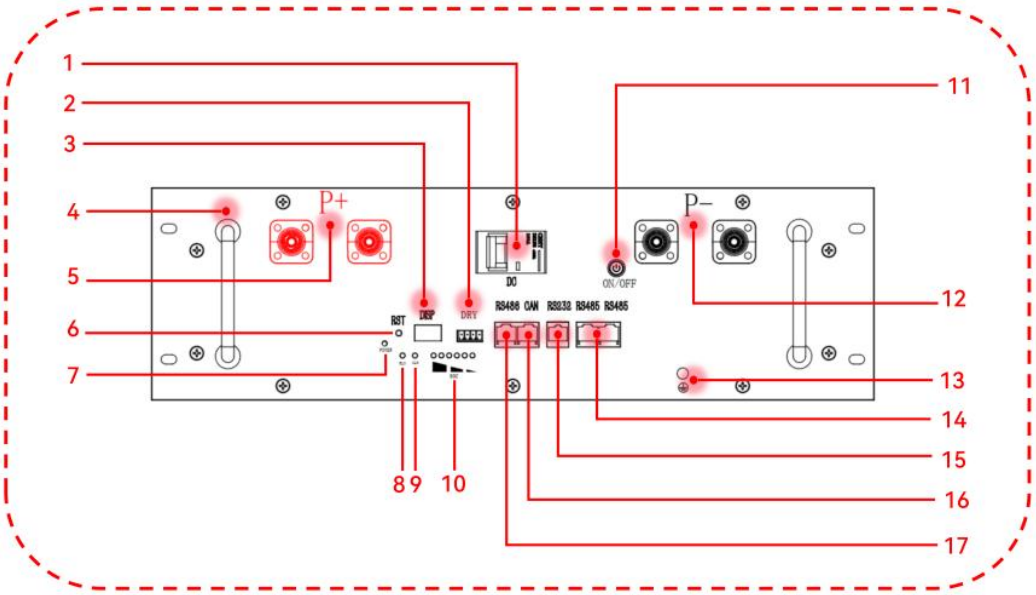


Figure 2.5-2

No.	Illustration	Silk-screen	Remark
1	Breaker	ON/OFF	Battery string output enable switch.
2	Dry Connection Point	DRY	Dry contact 1 - PIN1 to PIN2: Normally open, closes during fault protection; Dry contact 2 - PIN3 to PIN4: Normally open, closes when low battery warning occurs.
3	Dial Switch	DISP	Address settings. (range 2 to 15)
4	Battery handle	/	For the convenience of battery transportation.
5	Battery Positive Terminal post	P+	Positive Output.
6	Reset Button	RST	Reset Battery.
7	Power Light	POWER	The green light remains on after startup.
8	Operation Indicator Light	RUN	The green light starts to flash after startup.
9	Fault Indicator Light	ALM	Red light indicates a fault.
10	Capacity Indicator Light	SOC	Refer to the instructions for indicator lights in Section 4.7.
11	Switch	ON/OFF	Button activation BMS.
12	Battery Negative Terminal Post	P-	Negative Output.
13	Ground Wire Interface	Grounding mark	Prevent leakage of electricity
14	RS485A Interface	RS485	Communication port for the monitoring equipment
15	CAN Bus Interface	CAN	The communication port connected to the inverter
16	RS232 Port	RS232	RS232 Communication port
17	RS485-1/2 Port	RS485	RS485 And connect the communication ports

Table 2.5-2

2.6 Product Application

This product supports multiple application modes. The specific operation logic is as follows:

Solar power for self-generation and self-consumption with surplus power fed back to the grid

When the daylight conditions are good, the direct current electricity from the photovoltaic panels is converted into alternating current by the inverter to supply power to the household loads. If the household loads do not consume all the photovoltaic power generated, the remaining electricity will be stored in the batteries. If the batteries are full, the photovoltaic power will be sent to the power grid. During the night or on rainy days, when the photovoltaic power generation is not possible, the batteries supply power to the household loads through the inverter. If the state of charge (SOC) of the batteries is low, the household loads will draw power from the power grid.

Peak-valley arbitrage

In some countries and regions that implement time-based electricity pricing with peak and off-peak differentials, if the price difference between peak and off-peak periods is significant, the energy storage system can adopt the application mode of peak-off-peak arbitrage. During the periods of low electricity prices, the energy storage system charges; during the periods of high electricity prices, it supplies power to household loads. This can prevent users from consuming excessive grid electricity when the price is high, thereby saving energy costs.

Backup power supply

In cases of extreme weather (such as tornadoes, typhoons, and hailstorms), or when power supply is interrupted due to operational failures of the substation, if an energy storage system is installed, users can still enjoy adequate power supply under such circumstances.

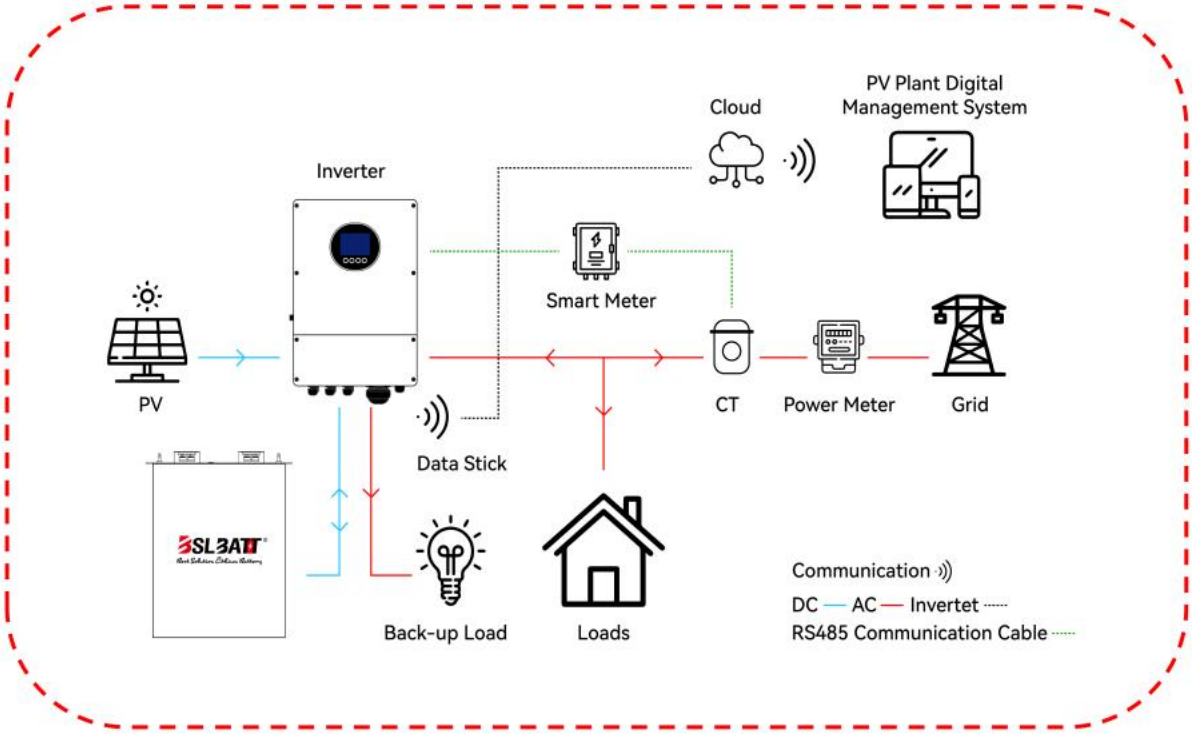


Figure 2.6 System connection diagram

03 Product Installation

3.1 Storage before installation

1. Preparations before storage: Ensure that the outer packaging box of the equipment is intact and undamaged; do not remove it. Ensure that the desiccant inside the box is not lost to maintain internal dryness.
2. Storage environment requirements: When storing the equipment, keep it away from flammable, explosive, and corrosive items; store the equipment in a cool place to avoid direct sunlight; ensure that the storage environment is clean, with appropriate temperature and humidity range, and without condensation.
3. Battery storage requirements: The state-of-charge (SOC) range of the stored batteries should be between 25% and 50% SOC; a charge-discharge cycle should be performed for the batteries every 6 months.
4. Storage temperature range: When the temperature is between -10℃ and 0℃, the storage time should not exceed 1 month; when the temperature is between 0℃ and 35℃, the storage time should not exceed 1 year; when the temperature is between 35℃ and 45℃, the storage time should not exceed 1 month.
5. Storage humidity range: The storage humidity range is no more than 60% ROH, without condensation. If there is any dampness or condensation at the battery interface, the battery system should not be installed and proper handling should be carried out.

3.2 Pre-installation inspection

1. Outer packaging inspection: Verify whether the outer packaging is intact, including checking for any deformations, holes, cracks or other signs that may cause damage to the internal equipment.
2. Equipment model and delivery item inspection: Confirm that the equipment model matches the order; verify that the type and quantity of the delivery items are correct, and check for any damage to the appearance.

3.3 Installation Environment

1.Installation environment requirements : The equipment must not be installed in environments that are flammable, explosive or corrosive; the installation location should be kept out of reach of children and should be chosen in a place that is unlikely to be accidentally touched; at the same time, be aware that the surface of the equipment may generate high temperatures during operation to prevent burns.

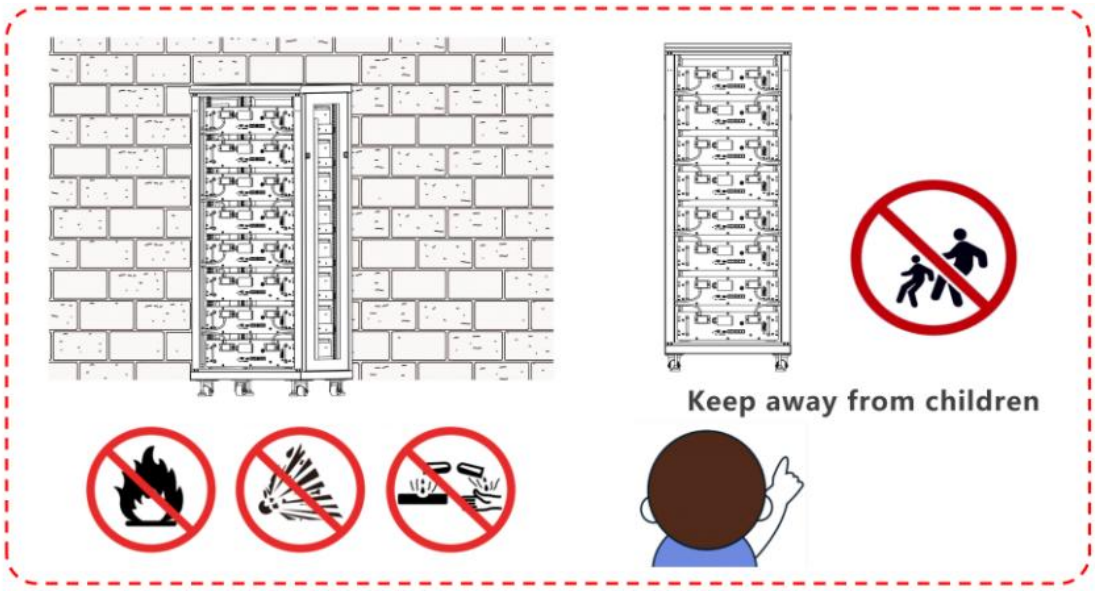


Figure 3.3-1

2.Installation Location Notes: Avoid installing in areas where there are water pipes, cables, etc. inside the wall to prevent damage to the battery; the installation environment should avoid direct sunlight, rain, and snowfall. It is recommended to install indoors in a well-ventilated area. In case of necessity, a fan-cooled air conditioner can be installed.

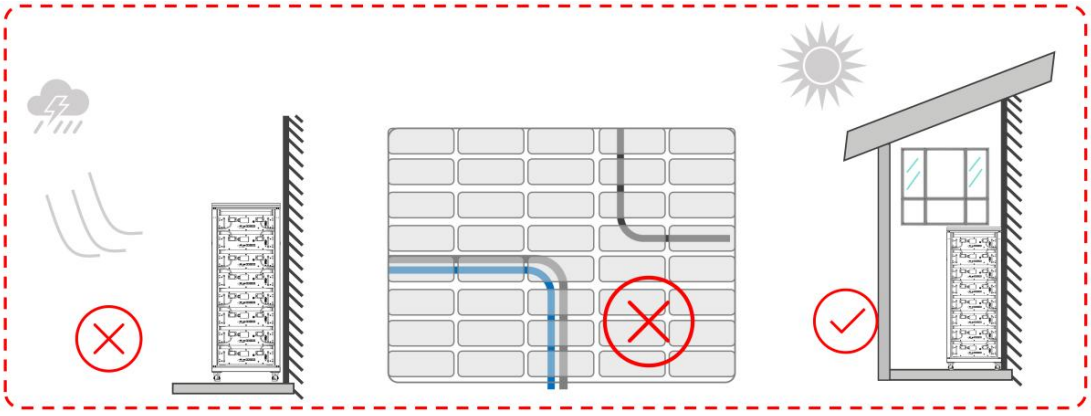


Figure 3.3-2

3.Installation space and environmental conditions: Ensure that the installation space meets the ventilation, heat dissipation and operation space requirements of the equipment; the protection level of the equipment should be suitable for indoor installation, and the temperature and humidity of the installation environment should be maintained within the appropriate range.

4.Equipment installation spacing : The installation height of the equipment should be convenient for operation and maintenance, ensuring that the indicator lights and labels are clearly visible, and the connection terminals are easy to operate. To ensure good heat dissipation and ease of disassembly, the minimum space around the rechargeable battery must meet the following standards:

- When installing the rack or cabinet, a distance of at least 300mm should be left on both sides of the equipment.
- The distance between the two sides of the equipment should be at least 300mm - 600mm wide.

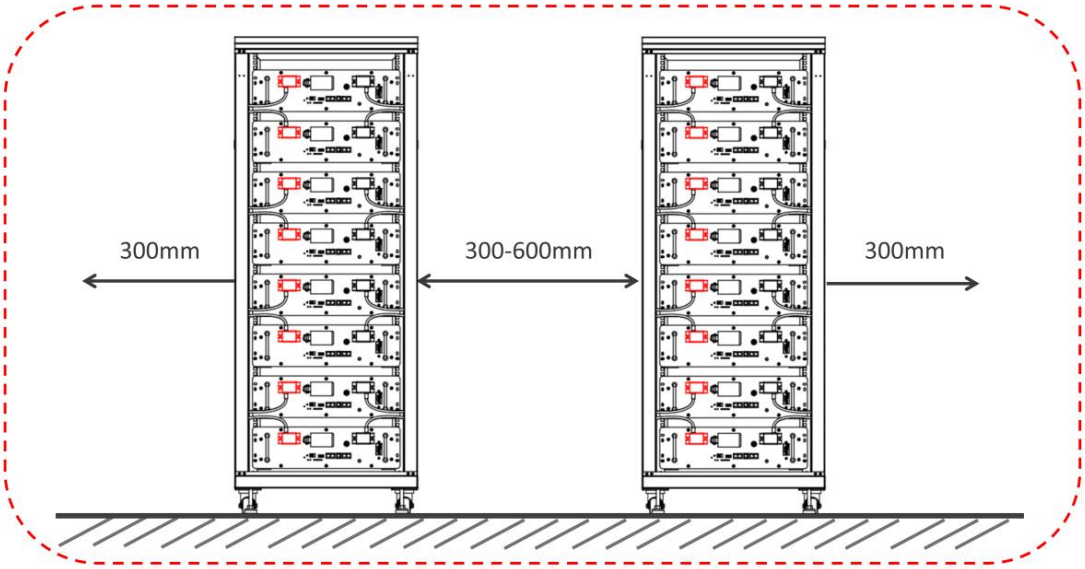


Figure 3.3-3

If you choose the product with model **100E 3U**, you can refer to the installation method of floor-standing and wall-mounted.

- The installation distance between the two machines should be reserved by 200mm.
- The distance between the equipment on both sides should be at least 300mm wide.

-When installing on the floor and attaching to the wall, the equipment should be no less than 300mm away from the ground.

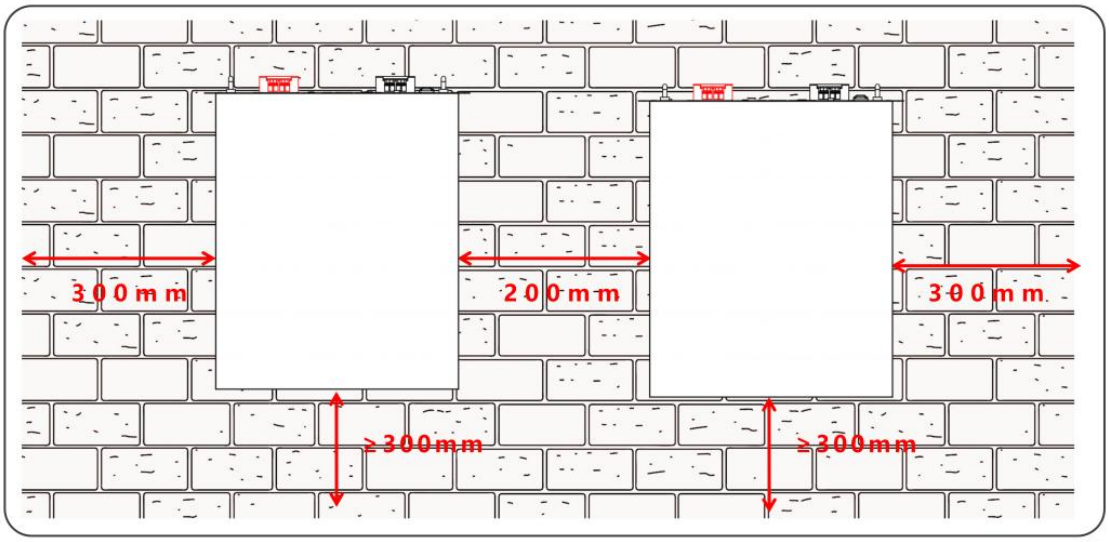
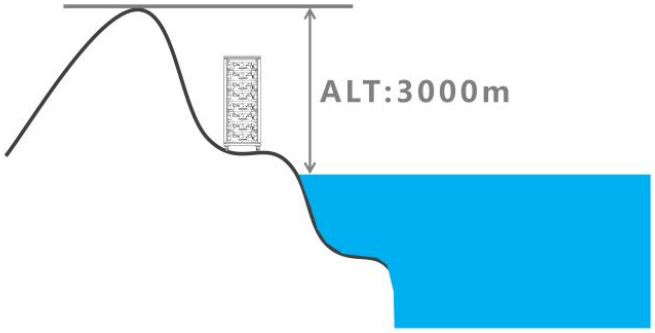


Figure 3.3-4

5.Equipment installation height and protection : The installation height of the equipment should be convenient for operation and maintenance, ensuring that the indicator lights and labels are clearly visible, and the connection terminals are easy to operate; the altitude at which the equipment is installed should not exceed 3000 meters.

6.Electromagnetic interference protection : The installation location should be far away from strong magnetic fields to avoid interference; if there are radio stations or wireless communication devices below 30 MHz near the installation site, the distance between the battery and these devices should be more than 30 meters.



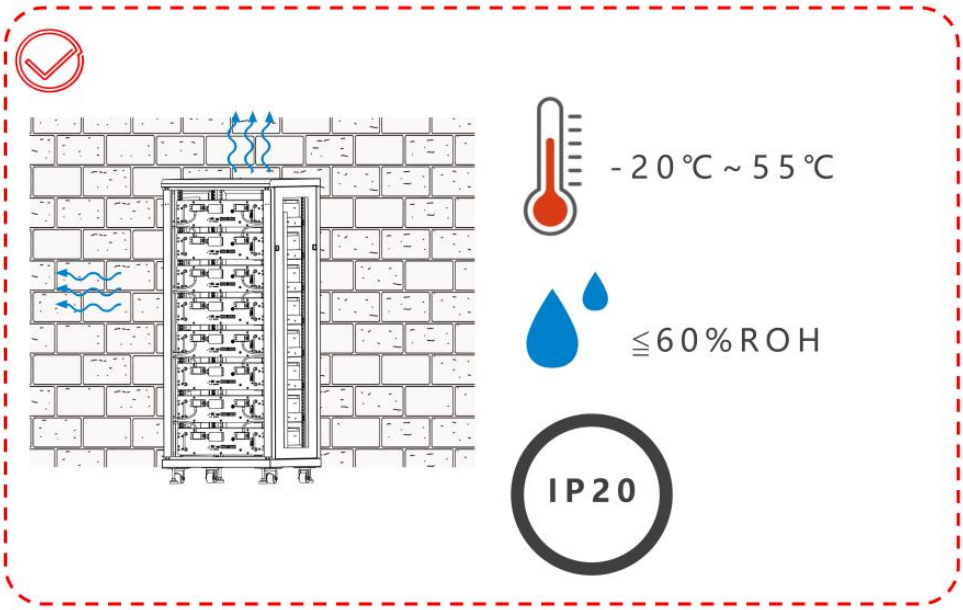


Figure 3.3-5

7.Installation carrier requirements: Use non-flammable materials (such as concrete, brick, stone or fire-resistant treated wood and metal);
The carrier should be sturdy and able to bear the weight of the equipment; the battery system should be installed against the wall and equipped with anti-toppling brackets.
8.Angle installation requirements: The equipment must be installed horizontally and must not be tilted or inverted.

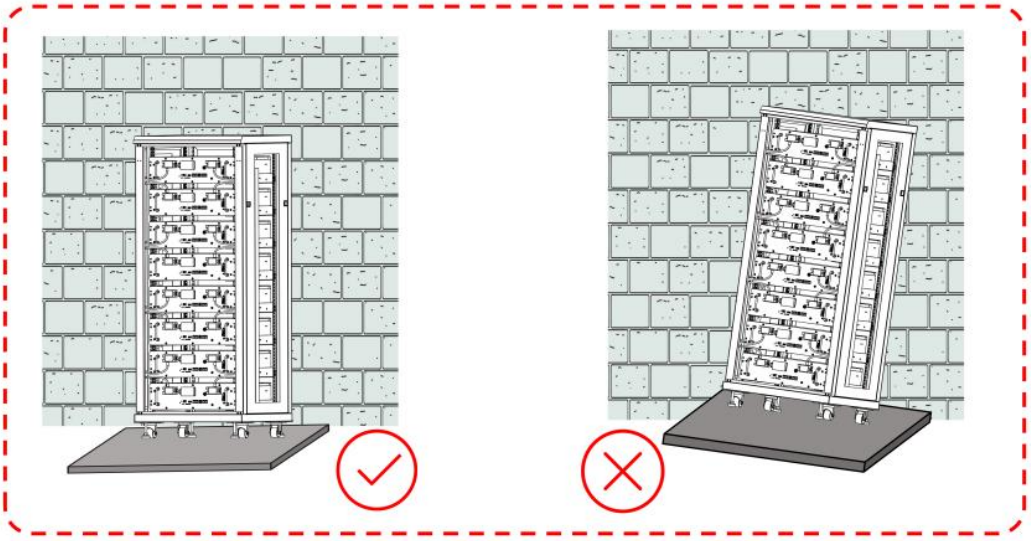


Figure 3.3-6

3.4 Prepare tools

Installation tool list

No.	Tool Name	Legend
1	Insulating gloves	
2	Protective goggles	
3	Insulating shoes	
4	Work uniform	
5	Safety helmet	
6	Screwdriver	
7	Pliers for stripping wires	
8	Hydraulic clamp	
9	Hot air gun	
10	Multimeter	
11	Torque wrench	
12	Marker pen	

Table 3.4

Illustration: This table is for reference only. The actual tools should be in accordance with the local installation standards.

3.5 Mechanical installation

To accommodate different requirements, we offer two tailored installation solutions:

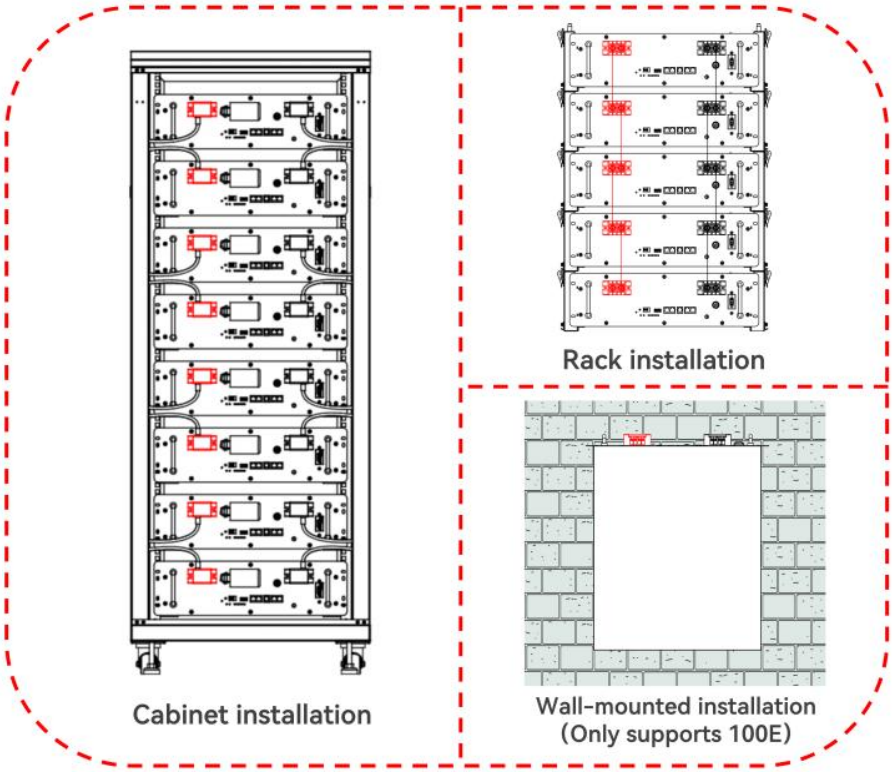


Figure 3.5-1

Illustration： If you choose the model 100E, the installation method also supports floor-standing and wall-mounted installation.

Danger:

Considering the weight of the battery, it requires at least two people to move the device. Please strictly follow the installation steps. The company shall not be held responsible for any injuries or damages caused by improper assembly or operation.

Step One: Remove the battery

Remove the battery product from its outer packaging, while ensuring that the wall is sturdy enough to bear the weight of the battery.

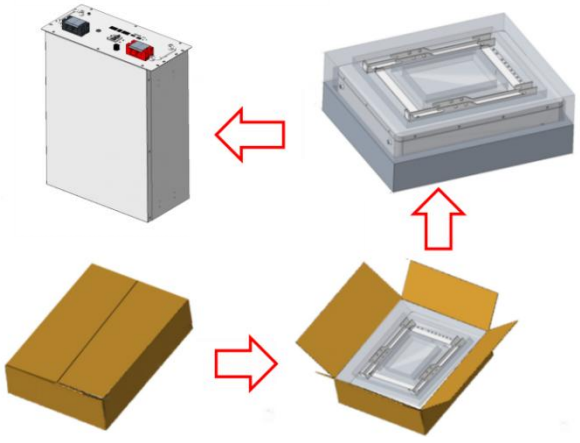


Figure 3.5-2

Due to the different installation methods, the configurations of the purchased products are different; the size and quantity of the packages received by users may vary, please refer to the actual situation.
When handling all packaging materials, be cautious as these materials may be reused in future storage and relocation of rechargeable batteries.
After opening the packaging, please check if the appearance of the rechargeable battery is damaged or if any accessories are missing. If any damage or missing parts are found, please contact the dealer immediately.
When choosing the storage method for the batteries, refer to the installation environment requirements in 3.3 for storage.

Step Two: Transporting batteries

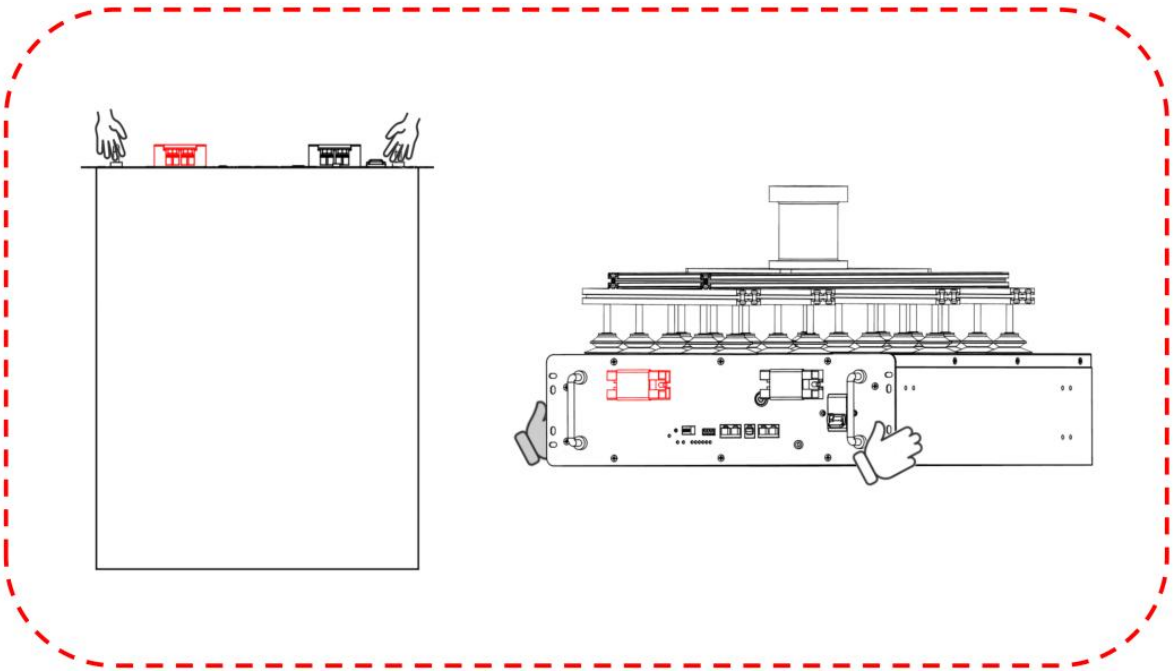


Figure 3.5-3

Caution: 1. During the transportation, handling and installation processes, local laws and regulations as well as industry standards must be followed.
2. Based on the weight of the battery, appropriately arrange the handling personnel. In case of necessity, use professional handling tools for the transportation. If you purchase products of the 200E model or above, please arrange at least four people for the handling to prevent injury caused by overweight transportation; at the same time, be sure to wear safety gloves to protect your hands.
3. Please ensure that the battery remains balanced during the handling process and avoid dropping.
4. Before installing the equipment, please connect the grounding cable first. For details, please refer to 3.6.1 Connecting the Grounding Wire.

Step Three: Installation of the support/enclosure

Illustration: If the installation is to be done on-site, please skip this step.

If the user chooses to install the bracket or the cabinet, they must first install the cabinet or the bracket, and then proceed with the battery installation.

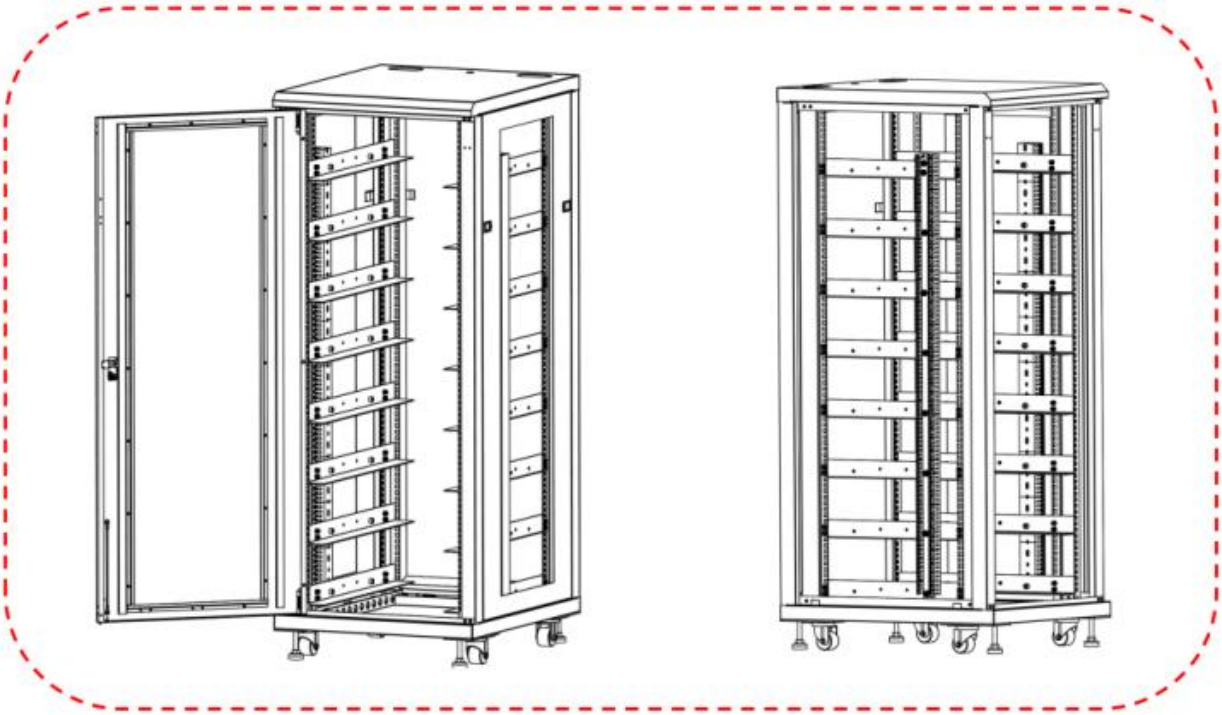


Figure 3.5-4

Installation of the cabinet:

1. If you choose the cabinet installation option, we will provide a cabinet with pre-installed battery pack slots and connection copper strips.
2. Hold the product with both hands and place it into the cabinet slot.

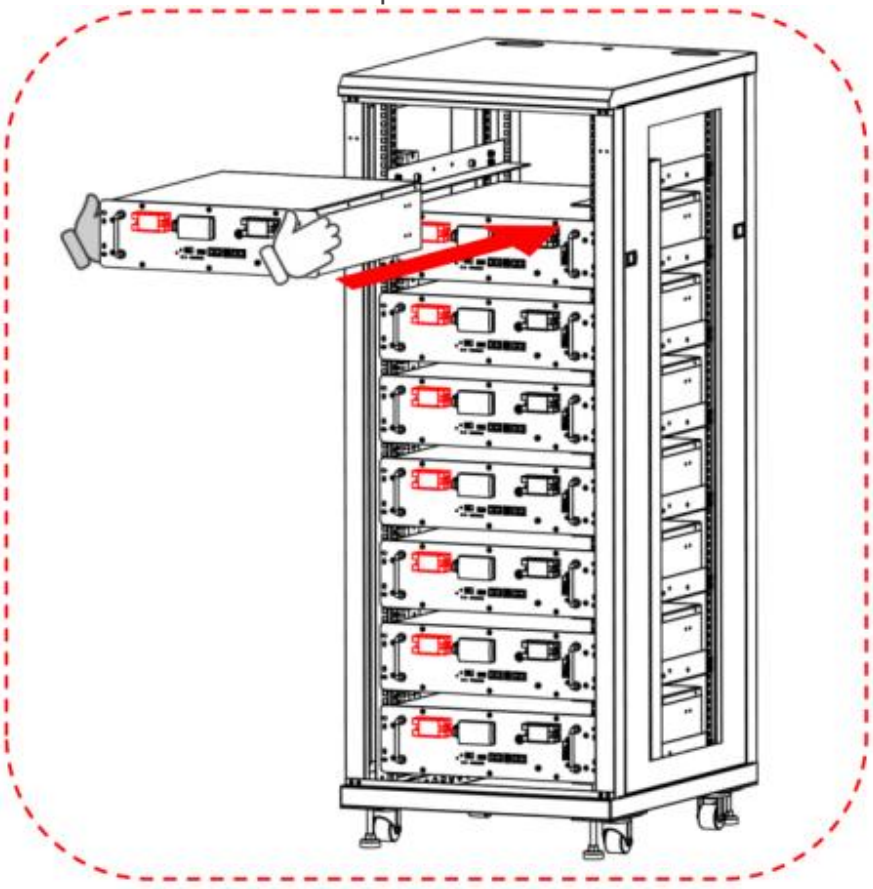


Figure 3.5-5

3. When fixing the card slot, use M6 screws to secure the holes on the battery pack control panel with the corresponding holes in the card slot.

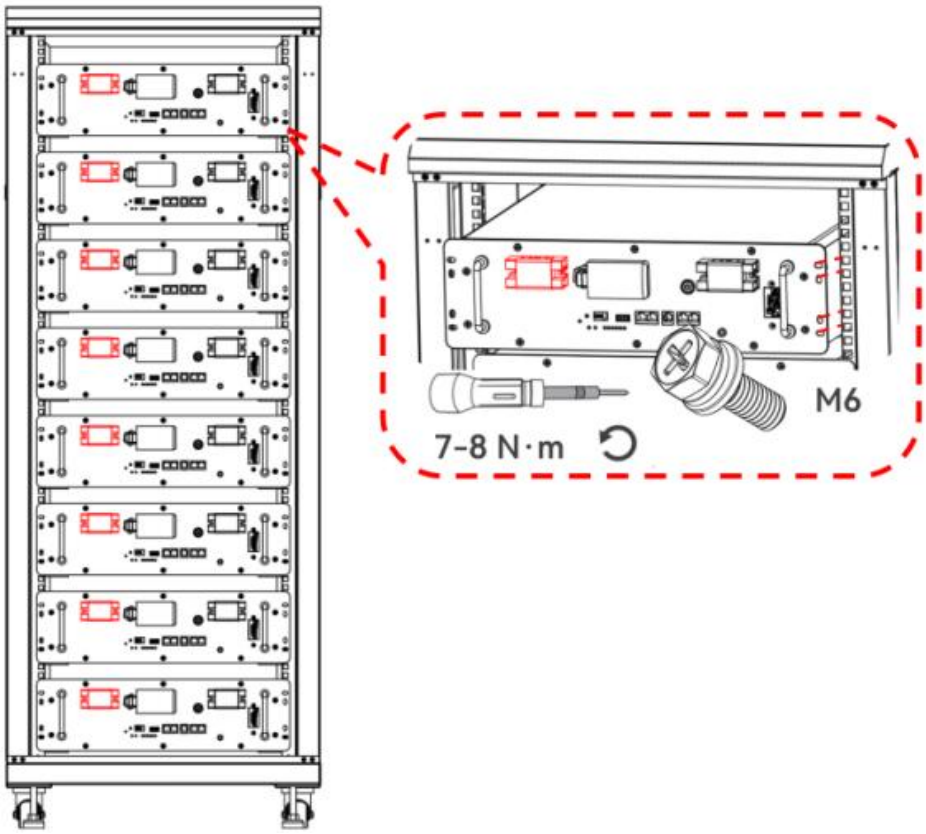


Figure 3.5-6

4.When installing the battery pack, if the packaging is too heavy, please use a special lifting device to lift the packaging so as to facilitate operation and ensure safety. Place the battery modules into the cabinet and tighten the fixing screws.

Rack installation:

Select an appropriate installation location and ensure that the battery pack is placed in a safe area. The first load-bearing plate should be no less than 15 cm from the ground. The distance between the load-bearing plates is approximately 205 mm. We recommend an installation distance of 205 mm. Use M5 screws to fix the bracket to the sides of the battery pack.

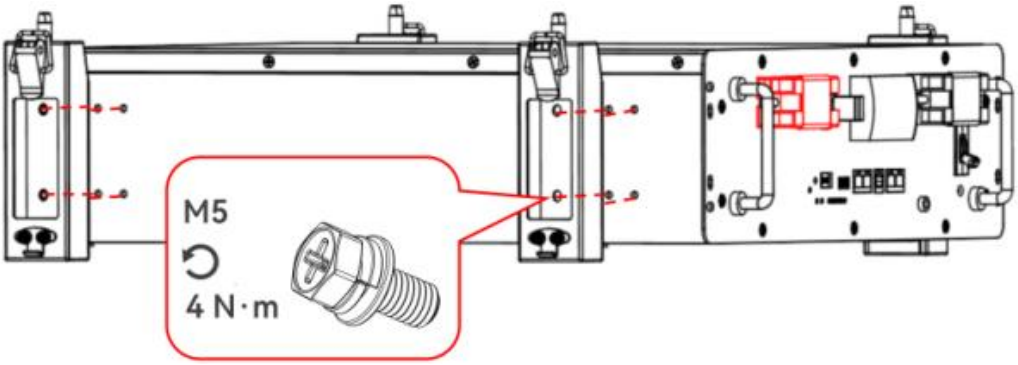


Figure 3.5-7

1.Combine the tops and bottoms of the two devices in corresponding pairs.

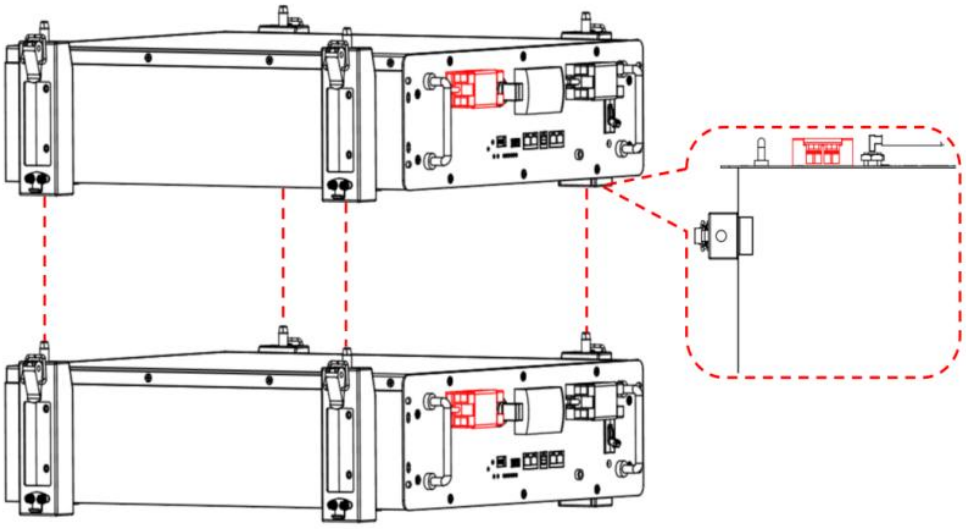


Figure 3.5-8

2.After combining the two devices, connect and fix the battery packs together using snap fasteners.

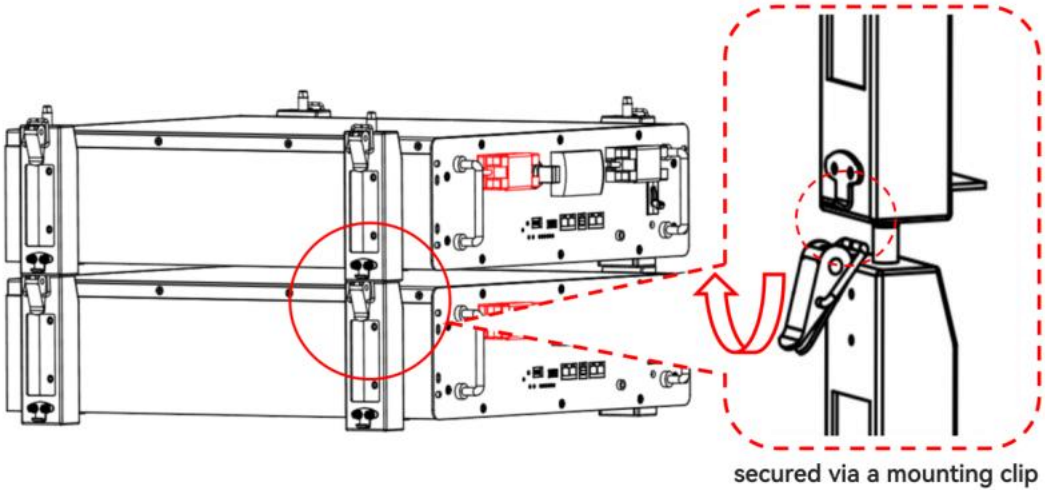


Figure 3.5-9

Step Four: Wall-mounted installation on the floor

If you choose to install it on the wall, please follow the steps below:

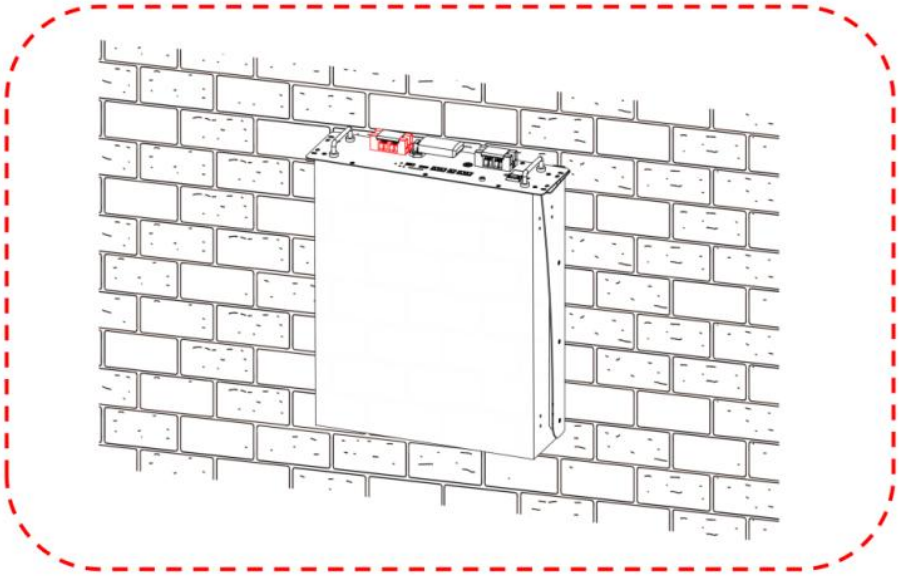


Figure 3.5-10

1.Re-cut holes in the wall to facilitate the installation of wall-mounted brackets.
2.Use M6 expansion screws to drive into the pre-drilled holes.

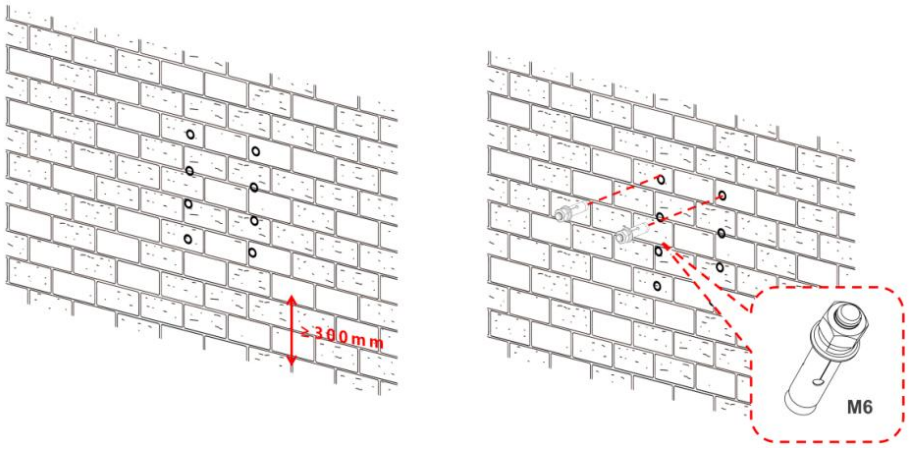


Figure 3.5-11

3.Hang the bracket onto the wall and secure it with a nut.

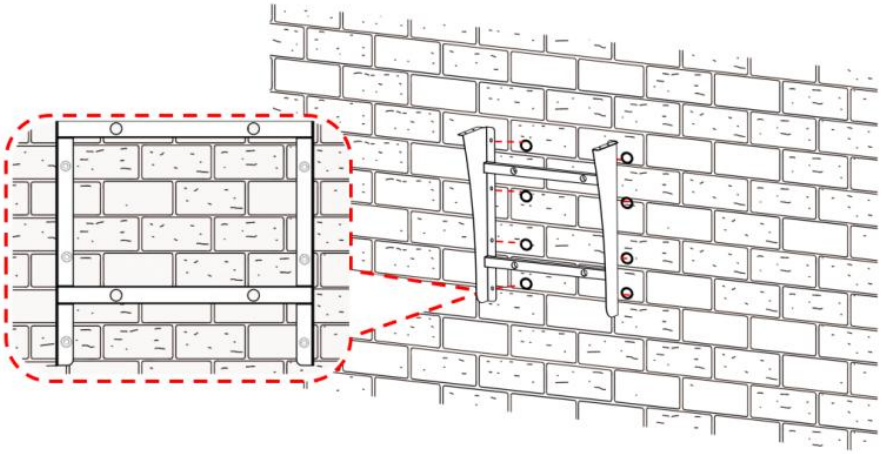


Figure 3.5-12

4.Align the top hole of the bracket with the hole on the battery control panel, and fix it using M6 screws.

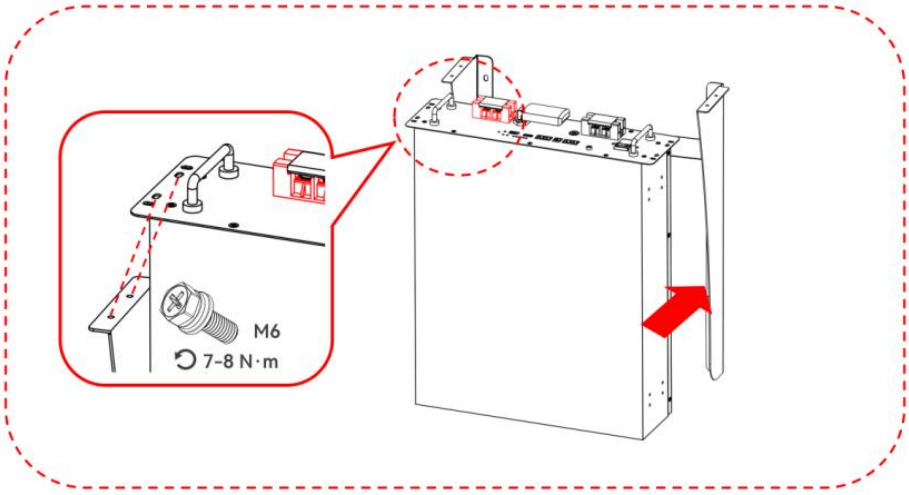


Figure 3.5-13

Step Five: Battery stack

According to the battery model listed on the delivery list, repeat this operation until the required number of battery PACK stacks have been completed.

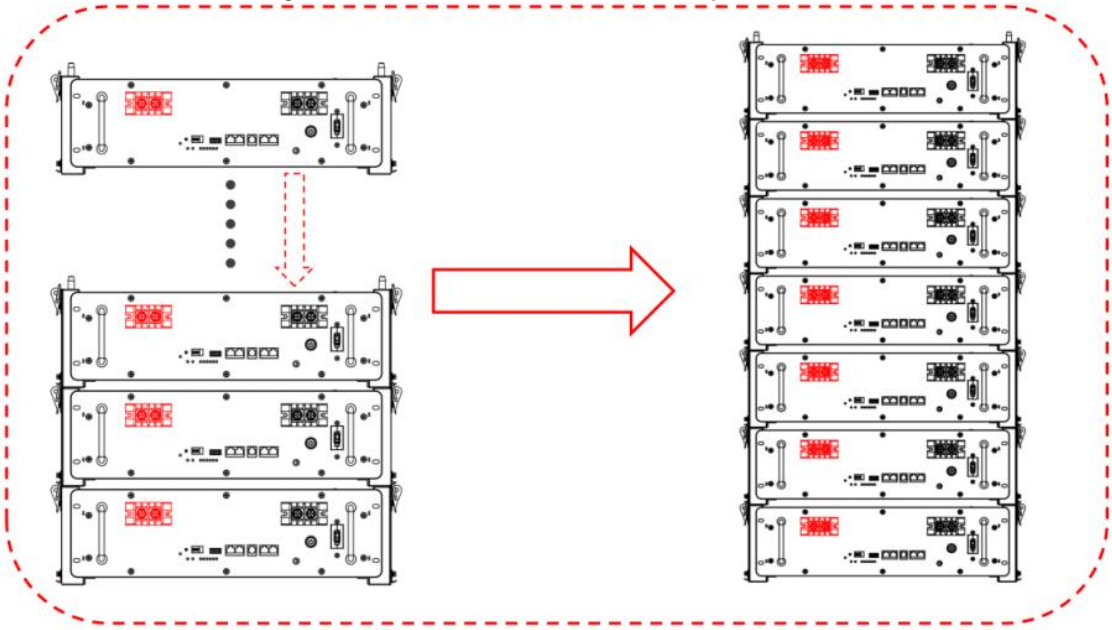


Figure 3.5-14

Danger:

When placing the battery base, it is necessary to ensure that the upper and lower holes are aligned before inserting the battery.

Illustration: If you are installing it for wall-mounted installation, please note that during the wall-mounted installation, the batteries must not be stacked. If you need to cluster them, you can install them side by side according to the distance of the installation space to achieve clustering.

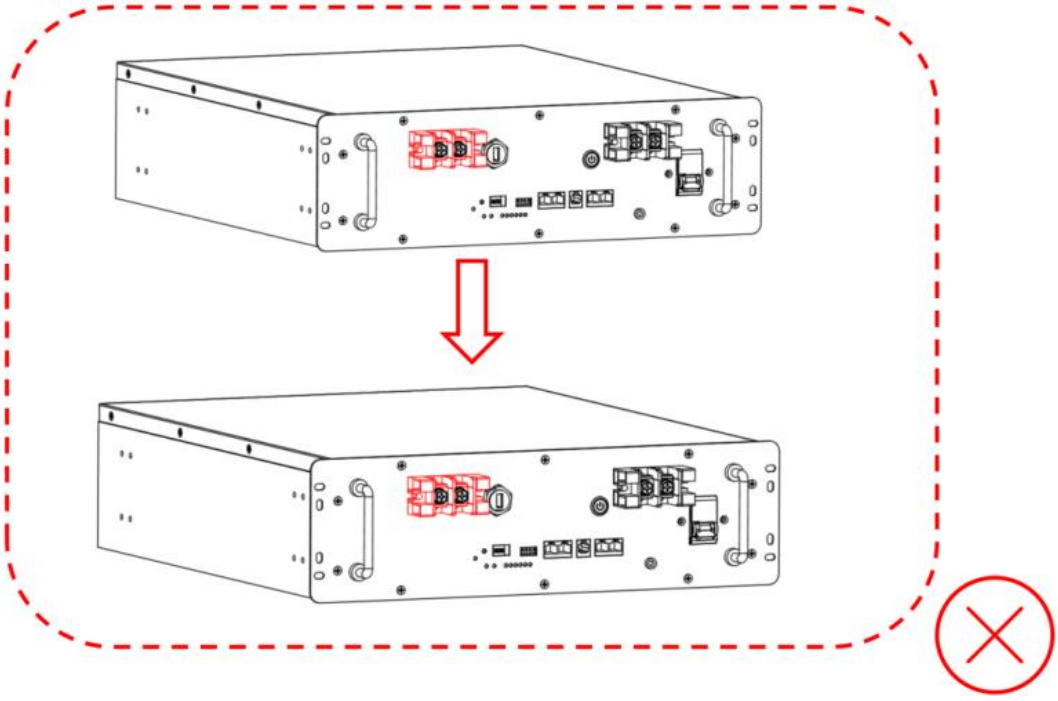


Figure 3.5-15

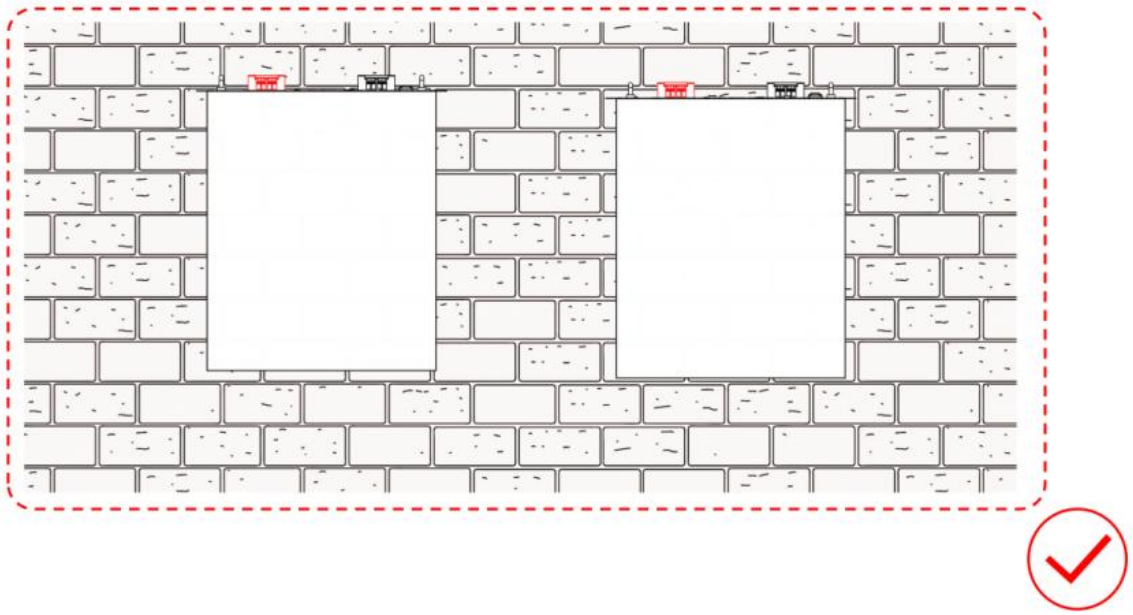


Figure 3.5-16

Step Six: Fixed base/frame of the cabinet / rack

After the battery system is installed in the cabinet, the installation brackets at the bottom of the cabinet chassis are fixed by "limiting columns" to ensure that the chassis does not loosen;

Similarly, in the installation of the battery system on the frame, the installation brackets around the control box need to be fixed by "limiting columns", "limiting holes" and "tower clamps", and ensure that the control box does not loosen.

Illustration : When more than 2 PCS are connected in parallel, we recommend that you install a combiner box. We suggest that you install the combiner box at 4 locations. The first two positions to choose are the top and the bottom. If the installation is to be done on-site, please skip this step.

3.6 Electrical connection

Danger:

1.Safe Power-off Procedure

Before performing any operation on the equipment in the battery system, make sure that the equipment is completely powered off to prevent electric shock accidents;

Strictly follow the safety precautions in this manual and the safety markings on the equipment;

2.Electrical connection specifications

During the process of electrical connection, it is necessary to use cables and component specifications that comply with local laws and regulations;

The same type of cables should be bundled together, and ensure that different types of cables are arranged separately to avoid cable entanglement or crossing with each other;

3.Attention points for crimping connection terminals

When crimping connection terminals, it is essential to ensure that the conductor part of the cable makes full contact with the terminal;

It is strictly prohibited to crimp the cable insulation layer together with the terminal. Doing so may cause the equipment to fail to operate normally, or during operation, due to an unreliable connection, it may heat up and thereby damage the inverter terminal block.

Danger:

1. Electrical connection operations are restricted to professionals only.
2. The cable colors shown in the diagrams are for reference only. In actual operations, the selection should be based on specific circumstances.
3. Ensure that the cable specifications used comply with the requirements of local laws and regulations.

3.6.1 Protection ground wire connection

Before the electrical installation of the battery, the protective ground wire should be connected first to ensure safety. And when removing the battery system, the protective ground wire should be removed as the last step.

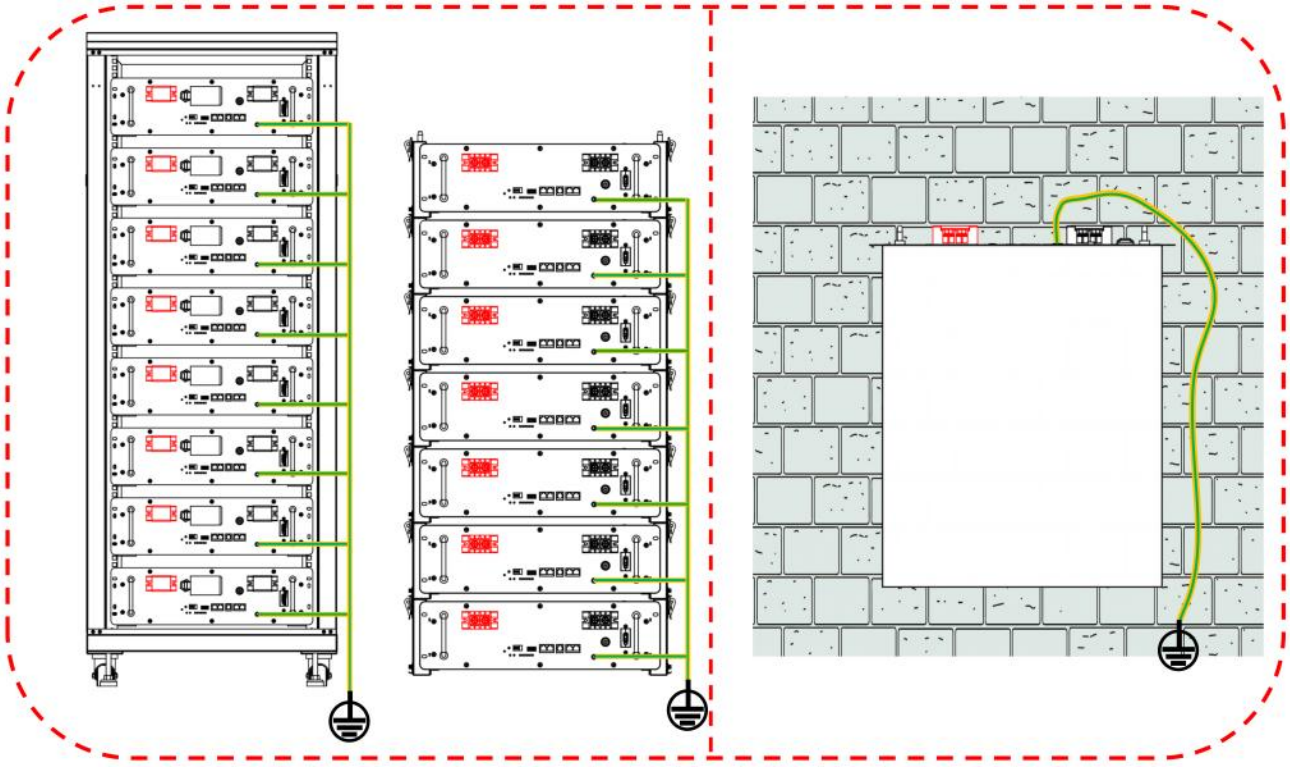


Figure 3.6.1

Note:

1. Protective ground wire, recommended specification: Type: Outdoor single-core copper wire, Conductor cross-sectional area: 10mm^2;
2. Please ensure that the cable is securely fixed after the crimping process and does not loosen.

3.6.2 Power line connection

If you choose to install the cabinet, before connecting the power lines, please open the side of the cabinet and remove the copper plate protective cover.

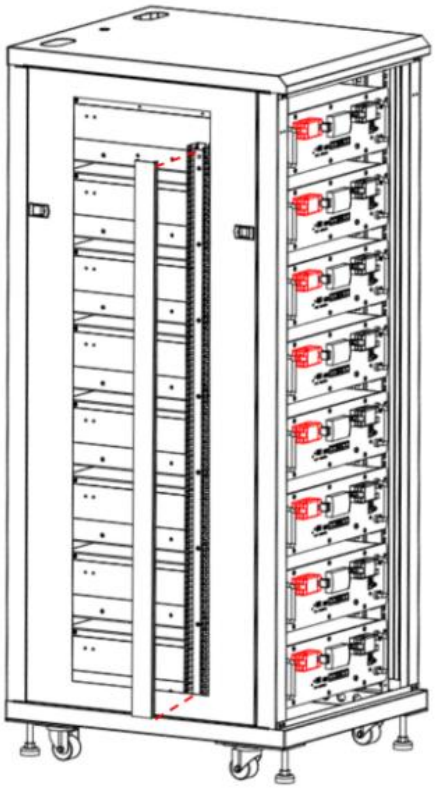


Figure 3.6.2-1

When connecting the power lines to the battery power terminals, one end of the power line is connected to the "P+/-" terminals of the battery pack, and the other end is connected to the fixed holes of the copper plate.

The same procedure applies when connecting to the next battery pack.

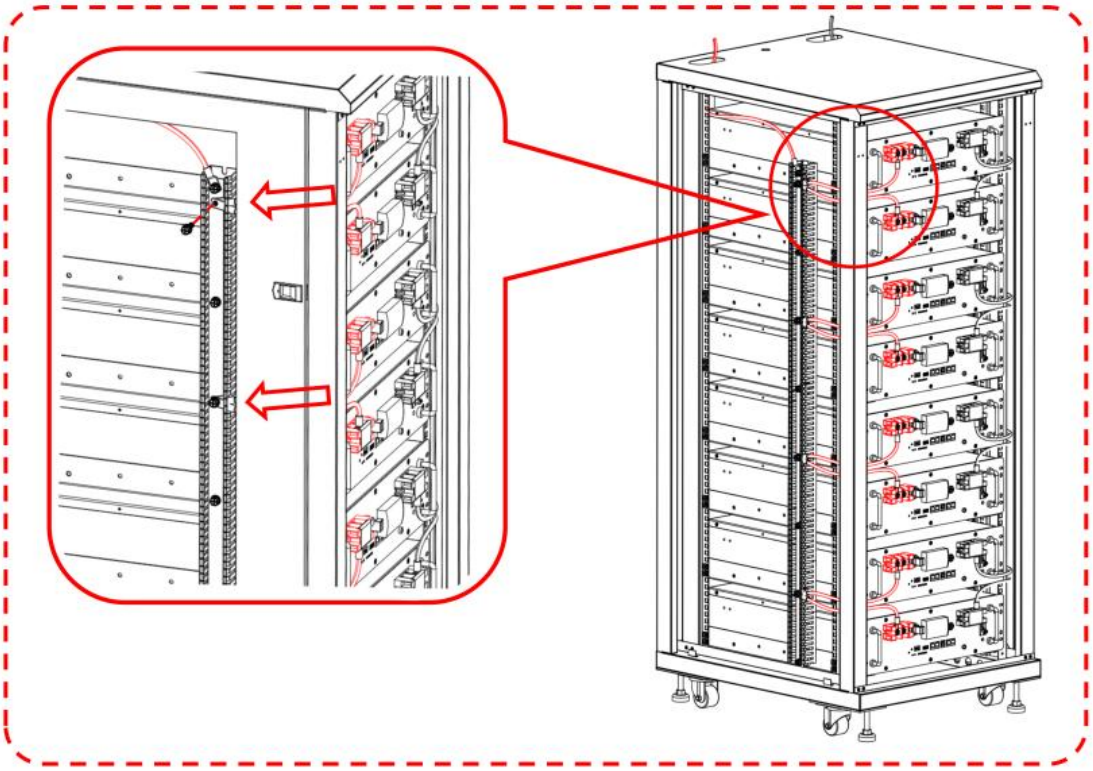


Figure 3.6.2-2

When **installing the rack**, the power line can be connected as shown in the figure:

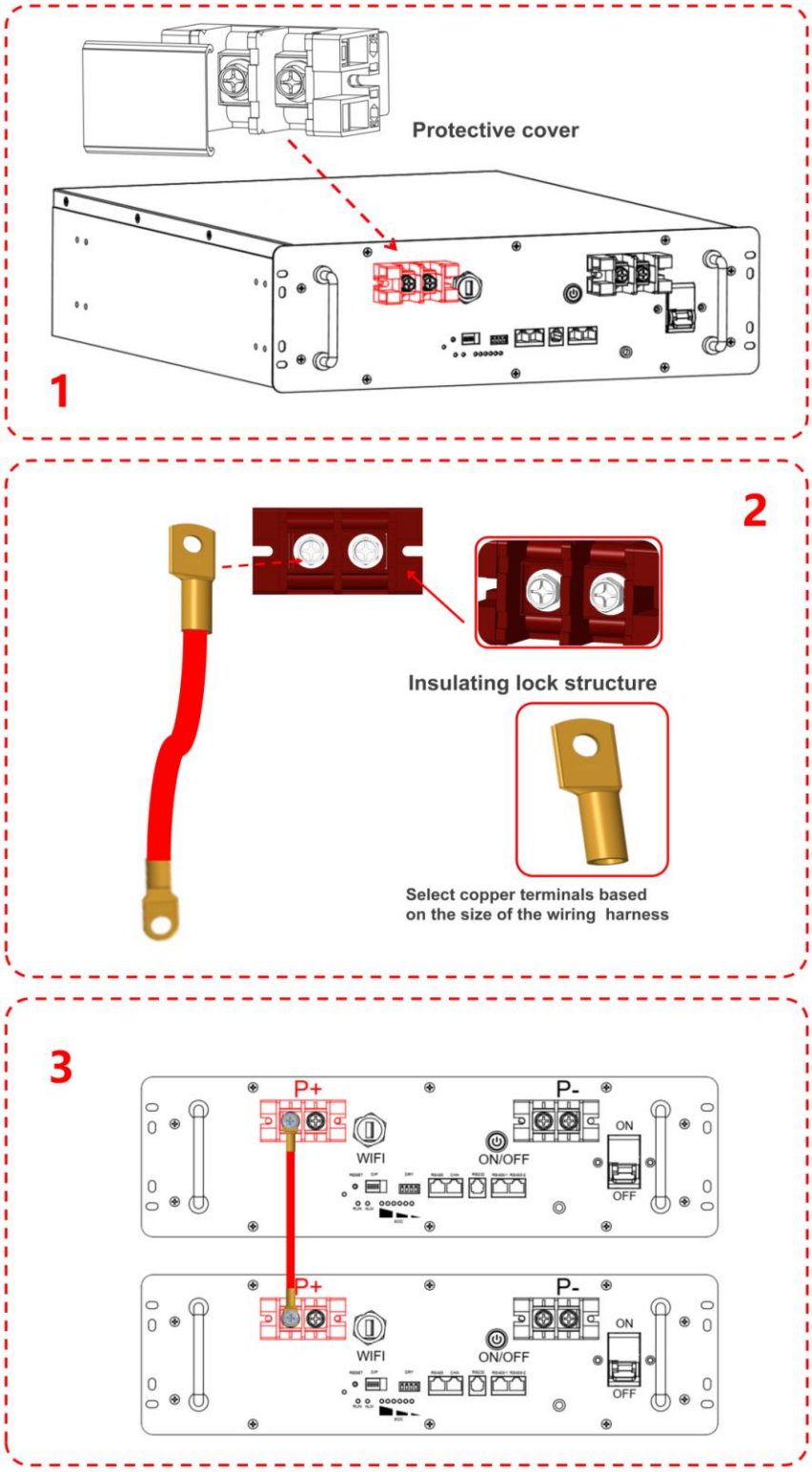


Figure 3.6.2-3

Illustration: When connecting power cables: Align positive/negative terminals with quick-connect ports until a "click" sound confirms full insertion.
The opposite end features cold-press terminals for user connection to inverters.

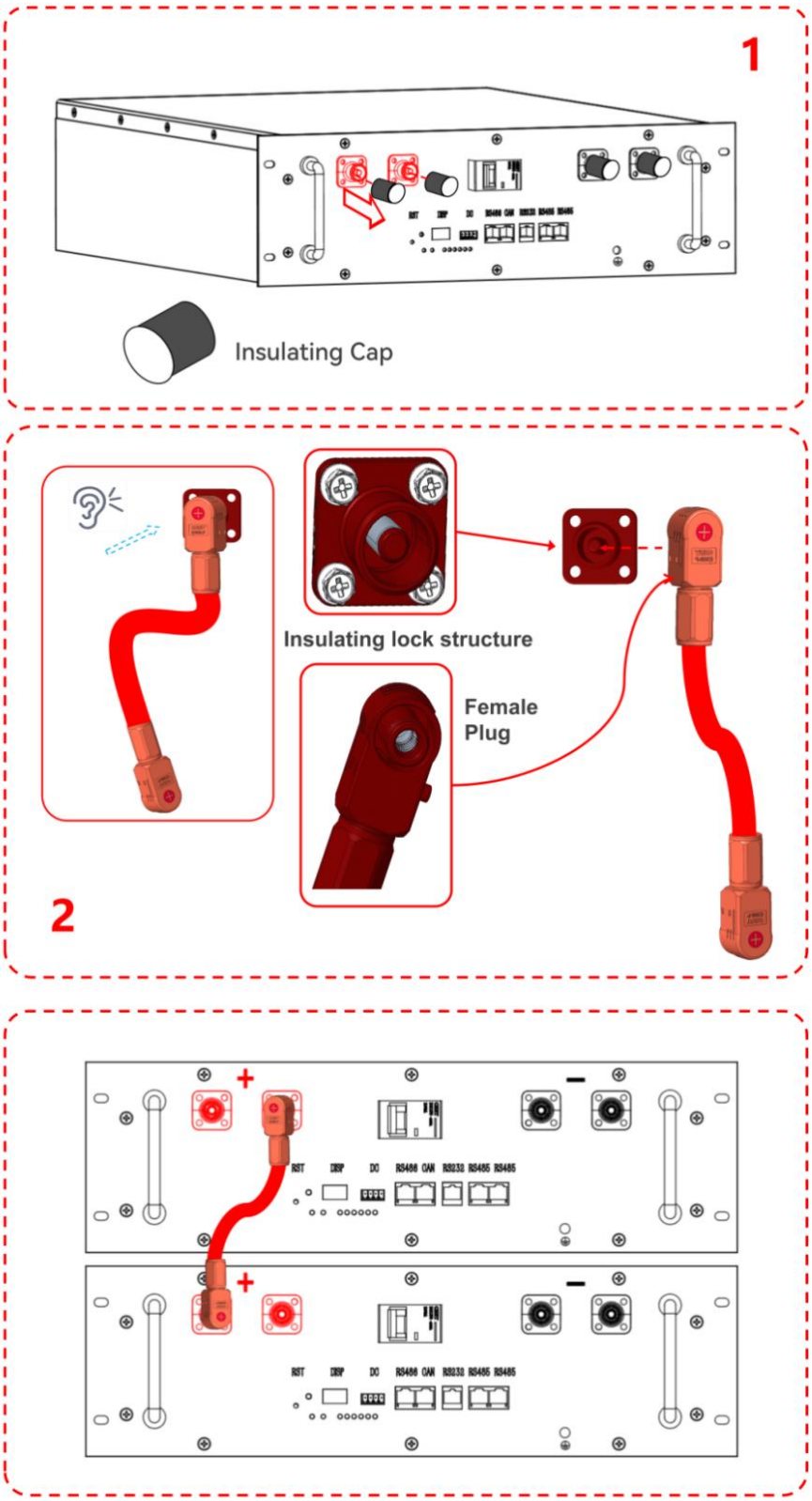


Figure 3.6.2-4

Illustration: When connecting power cables:

Align positive/negative terminals with quick-connect ports until a "click" sound confirms full insertion.

The opposite end features cold-press terminals for user connection to inverters.

When **installing the power line for wall-mounted installation**, please refer to the following diagram for the connection:

When **installing the power line for wall-mounted installation**, please refer to the following diagram for the connection:

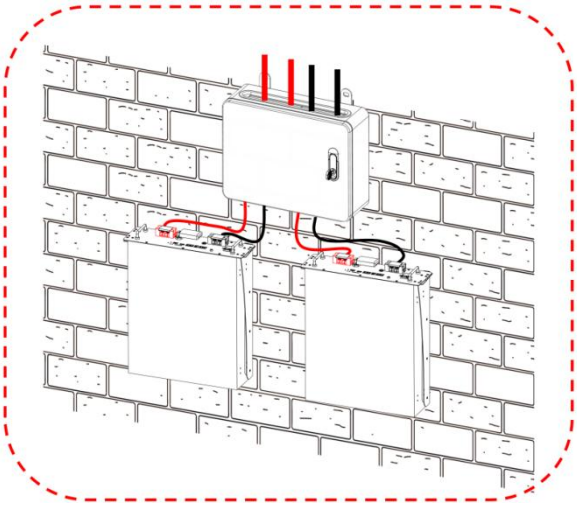


Figure 3.6.2-5

External Power Cables (Factory pre-installed)

Quick-insert version power cable:

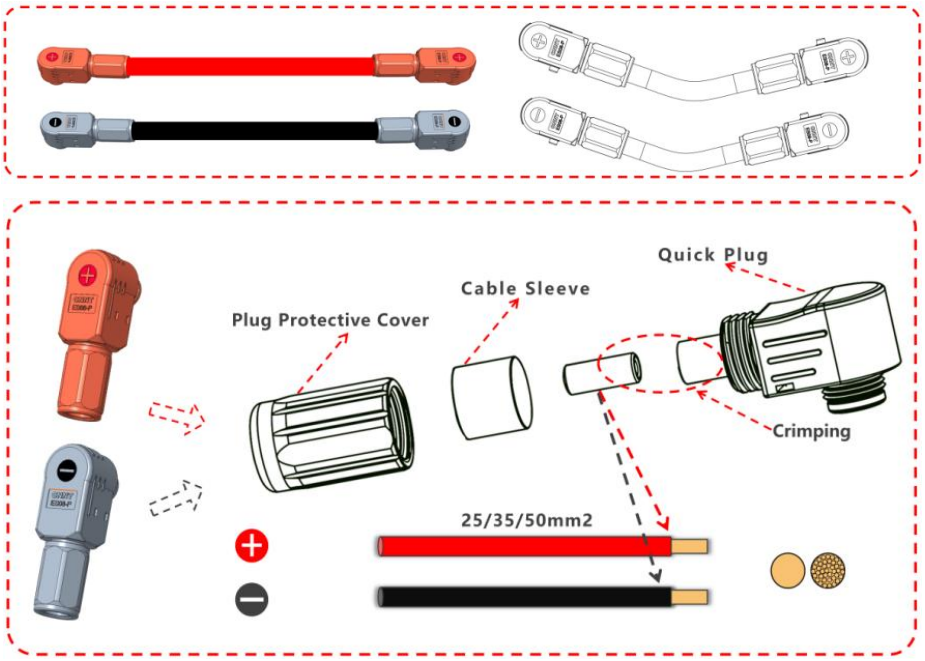


Figure 3.6.2-6

Slow insertion version power line:



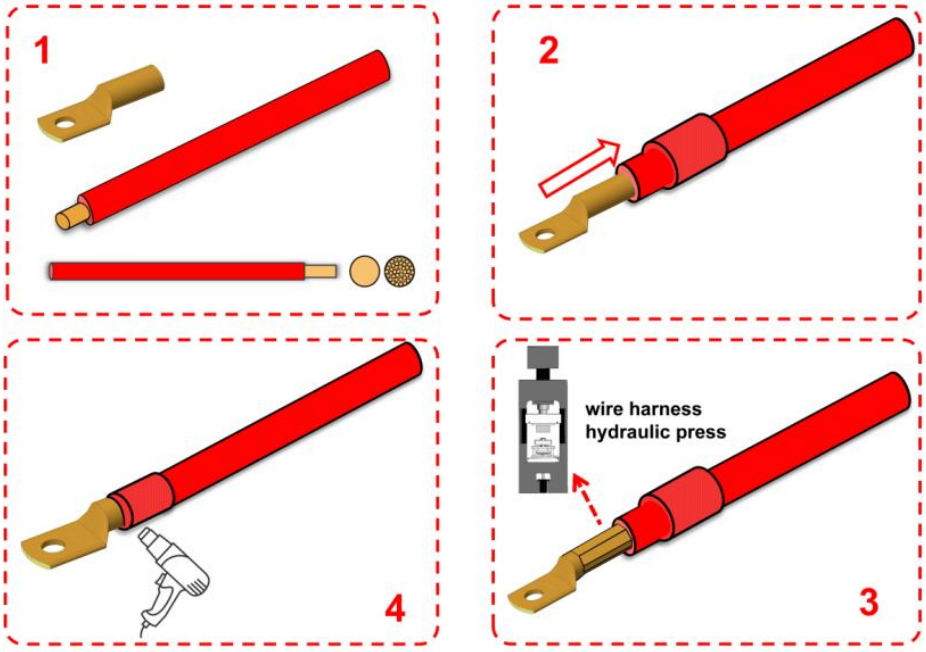


Figure 3.6.2-7

Cable selection:

Item	Specification	Figure
Power cable-positive	51.2V/100Ah	Red/25mm²/L300mm
Power cable-negative	51.2V/100Ah	Black/25mm²/L300mm
Power cable-positive	51.2V/200Ah	Red/35mm²/L300mm
Power cable-negative	51.2V/200Ah	Black/35mm²/L300mm
Power cable-positive	51.2V/300Ah	Red/50mm²/L300mm
Power cable-negative	51.2V/300Ah	Black/50mm²/L300mm

Table 3.6.2-1

3.6.3 Communication Line Connection

Caution:

1. Users should decide whether to use the communication cables provided with the inverter based on their installation requirements, and refer to the user manual to understand the specifications and connection methods of the cables.
2. If purchasing the communication cables by themselves or receiving them from the manufacturer, it is recommended to choose standard Ethernet cables paired with RJ45 crystal connectors as the connection solution.

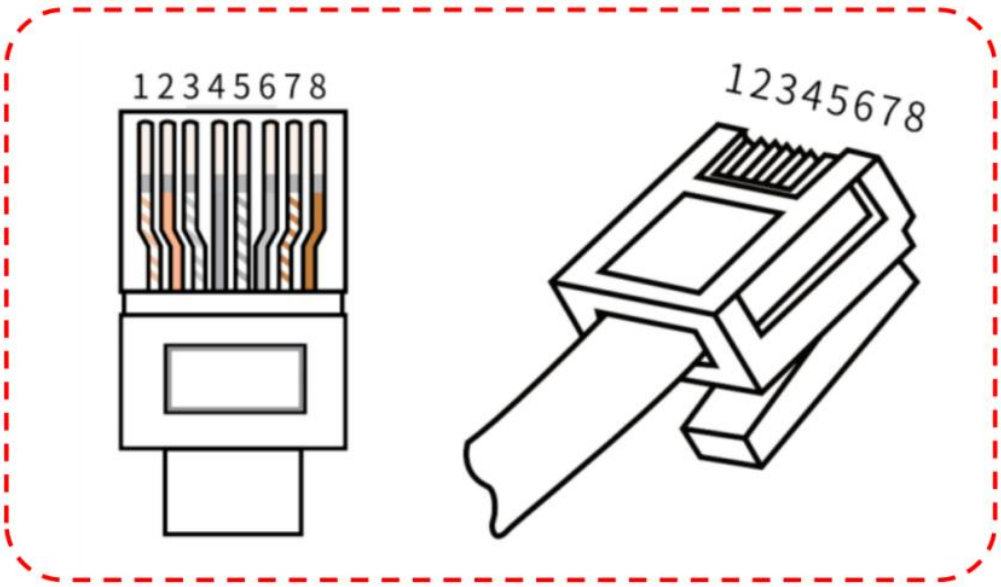


Figure 3.6.3-1

RS232 Communication: The BMS can communicate with the host computer via the RS232 interface, enabling monitoring of various battery information through the host computer, including battery voltage, current, temperature, status, and battery production information. The default baud rate is 9600bps.

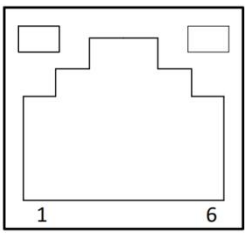
Picture	PIN	Description
	1	NC
	2	NC
	3	TX
	4	RX
	5	GND
	6	NC

Table 3.6.3-1

CAN Communication : The default baud rate is 500K. This interface is used for communication with the inverter. When this battery is the host, it can aggregate the data from the slave devices and communicate with the inverter.

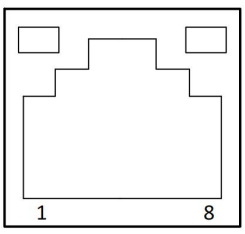
Picture	PIN	Description
	1	NC
	2	GND
	3	NC
	4	CAN-H
	5	CAN-L
	6	NC
	7	NC
	8	NC

Table 3.6.3-2

Independent RS485 Communication: The default baud rate is 9600bps. This interface is used for communication with the inverter. When this battery is the host, it can aggregate the data from the slave devices and communicate with the inverter.

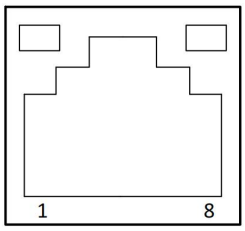
Picture	PIN	Description
	1	RS485-B1
	2	RS485-A1
	3	GND
	4	NC
	5	NC
	6	GND
	7	RS485-A1
	8	RS485-B1

Table 3.6.3-3

Parallel RS485 Communication: The default baud rate is 9600bps. When the battery PACK is used in a cluster, the host needs to perform parallel communication via RS485. Data is polled based on the code address to check the battery information.

When the PACK is used in parallel, the address can be set through the code switch on the BMS to distinguish different PACKs. It is necessary to avoid setting the same address. The definition of the code switch for the BMS can be referred to Table 3.6.3-3. In the parallel mode, the default code address of the host is 1.

RS485-1:

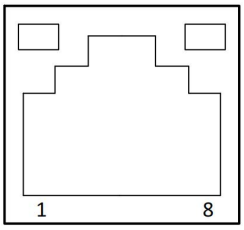
Picture	PIN	Description
	1	RS485-B
	2	RS485-A
	3	GND
	4	NC
	5	NC
	6	GND
	7	RS485-A
	8	RS485-B

Table 3.6.3-4

RS485-2:

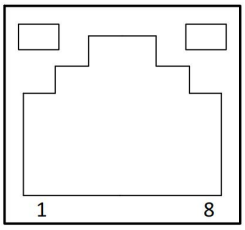
Picture	PIN	Description
	9	RS485-B
	10	RS485-A
	11	GND
	12	NC
	13	NC
	14	GND
	15	RS485-A
	16	RS485-B

Table 3.6.3-5

Table of Communication Cables

Item	Figure	Specification
Rack-mounted battery and network cable(Standard Configuration)	white/0.3m	with RJ-45 connector
Victrion inverter connection cable - for connecting inverter(optional)	blue/3m	Customized energy storage battery
Multiple universal connection cables for inverters - for connecting inverters(optional)	black/3m	two-ended crimped crystal connector
RS232 serial communicationcable (optional)	black/1.8m	With USB to RS232 conversion,Both ends have USB and RJ11 plugs

Table 3.6.3-3

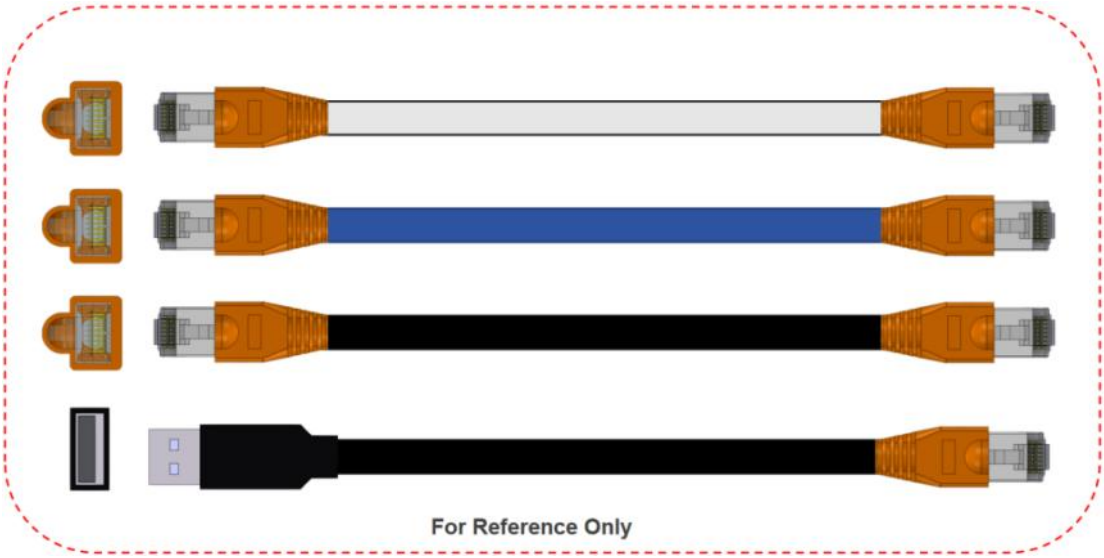


Figure 3.6.3-2

DIP Switch:

DIP switch A DIP switch is actually a set of small manual electronic switches designed to be packaged together with other circuits. This switch is currently installed on the battery module. The position and factory default settings of the DIP switch are as follows.

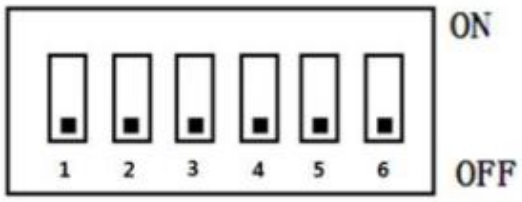


Figure 3.6.3-3

Dial switch settings: When using multiple PACKs in parallel, addresses can be set on the BMS dial switch to distinguish different PACKs and avoid setting the same address. The definition of the dial switch is referenced in the following table.

Set the address of pack Table

Address	Dial switch positi1						Remark
	#1	#2	#3	#4	#5	#6	
0	0	0	0	0	0	0	Stepless c1necti1，Single use
1	1	0	0	0	0	0	Set as main Pack1
2	0	1	0	0	0	0	Set as subordinate Pack2
3	1	1	0	0	0	0	Set as subordinate Pack3
4	0	0	1	0	0	0	Set as subordinate Pack4
5	1	0	1	0	0	0	Set as subordinate Pack5
6	0	1	1	0	0	0	Set as subordinate Pack6
7	1	1	1	0	0	0	Set as subordinate Pack7
8	0	0	0	1	0	0	Set as subordinate Pack8
9	1	0	0	1	0	0	Set as subordinate Pack9
10	0	1	0	1	0	0	Set as subordinate Pack10
11	1	1	0	1	0	0	Set as subordinate Pack11
12	0	0	1	1	0	0	Set as subordinate Pack12
13	1	0	1	1	0	0	Set as subordinate Pack13
14	0	1	1	1	0	0	Set as subordinate Pack14
15	1	1	1	1	0	0	Set as subordinate Pack15
16	0	0	0	0	1	0	Set as subordinate Pack16
17	1	0	0	0	1	0	Set as subordinate Pack17
18	0	1	0	0	1	0	Set as subordinate Pack18
19	1	1	0	0	1	0	Set as subordinate Pack19
20	0	0	1	0	1	0	Set as subordinate Pack20
21	1	0	1	0	1	0	Set as subordinate Pack21
22	0	1	1	0	1	0	Set as subordinate Pack22
23	1	1	1	0	1	0	Set as subordinate Pack23
24	0	0	0	1	1	0	Set as subordinate Pack24
25	1	0	0	1	1	0	Set as subordinate Pack25

26	0	1	0	1	1	0	Set as subordinate Pack26
27	1	1	0	1	1	0	Set as subordinate Pack27
28	0	0	1	1	1	0	Set as subordinate Pack28
29	1	0	1	1	1	0	Set as subordinate Pack29
30	0	1	1	1	1	0	Set as subordinate Pack30
31	1	1	1	1	1	0	Set as subordinate Pack31
32	0	0	0	0	0	1	Set as subordinate Pack32
33	1	0	0	0	0	1	Set as subordinate Pack33
34	0	1	0	0	0	1	Set as subordinate Pack34
35	1	1	0	0	0	1	Set as subordinate Pack35
36	0	0	1	0	0	1	Set as subordinate Pack36
37	1	0	1	0	0	1	Set as subordinate Pack37
38	0	1	1	0	0	1	Set as subordinate Pack38
39	1	1	1	0	0	1	Set as subordinate Pack39
40	0	0	0	1	0	1	Set as subordinate Pack40
41	1	0	0	1	0	1	Set as subordinate Pack41
42	0	1	0	1	0	1	Set as subordinate Pack42
43	1	1	0	1	0	1	Set as subordinate Pack43
44	0	0	1	1	0	1	Set as subordinate Pack44
45	1	0	1	1	0	1	Set as subordinate Pack45
46	0	1	1	1	0	1	Set as subordinate Pack46
47	1	1	1	1	0	1	Set as subordinate Pack47
48	0	0	0	0	1	1	Set as subordinate Pack48
49	1	0	0	0	1	1	Set as subordinate Pack49
50	0	1	0	0	1	1	Set as subordinate Pack50
51	1	1	0	0	1	1	Set as subordinate Pack51
52	0	0	1	0	1	1	Set as subordinate Pack52
53	1	0	1	0	1	1	Set as subordinate Pack53
54	0	1	1	0	1	1	Set as subordinate Pack54

55	1	1	1	0	1	1	Set as subordinate Pack55
56	0	0	0	1	1	1	Set as subordinate Pack56
57	1	0	0	1	1	1	Set as subordinate Pack57
58	0	1	0	1	1	1	Set as subordinate Pack58
59	1	1	0	1	1	1	Set as subordinate Pack59
60	0	0	1	1	1	1	Set as subordinate Pack60
61	1	0	1	1	1	1	Set as subordinate Pack61
62	0	1	1	1	1	1	Set as subordinate Pack62
63	1	1	1	1	1	1	Set as subordinate Pack63

Table 3.6.3-4

Dry Connection Point:

Dry contact port definition: Pin1 and Pin2 are normally open, closed during faults and protection; Pin3 and Pin4 are normally open, closed when low battery alarm occurs.

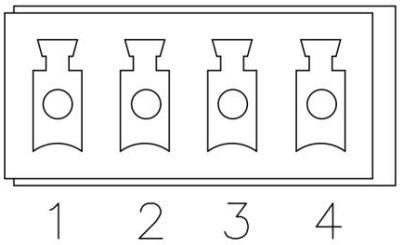


Figure 3.6.3-4

3.6.4 External connection cable

Illustration: If you choose a product with quick-connect ports, refer to this section for parallel connection.

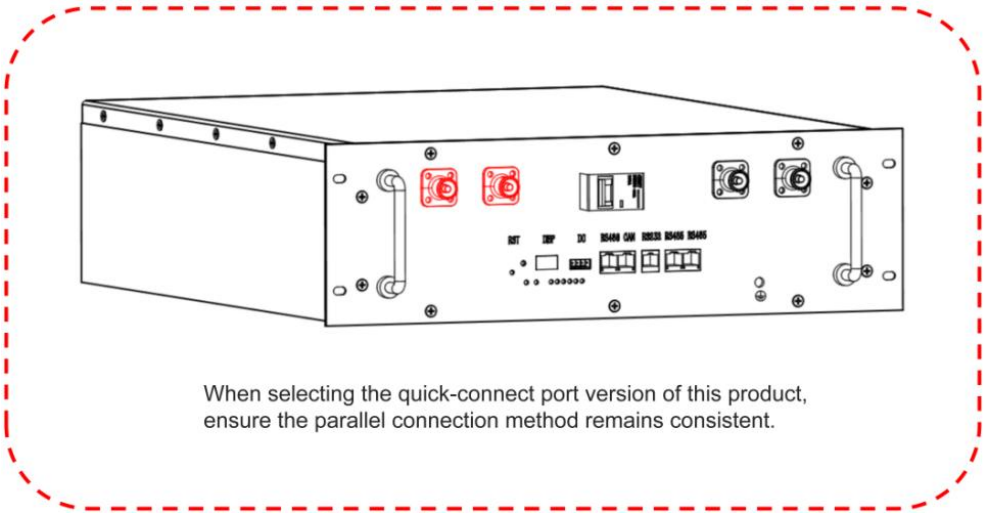


Figure3.6.4-1

When running as a standalone application, the inverter communicates with the battery as the main device.

Illustration： Double-pole circuit breaker is required on each battery model before connecting to the inverter.For the battery connection matching the AC side，an overcurrent protection and isolation device that isolates both positive and negative conductors is required between battery and inverter.Connect the positive electrodeof the main battery to the positive electrode of theinverter,Conneet the negative electrode of the main battery with the negativeelectrode of the inverter.The port of the main battery is connected to the CAN bus communication port of the inverter.

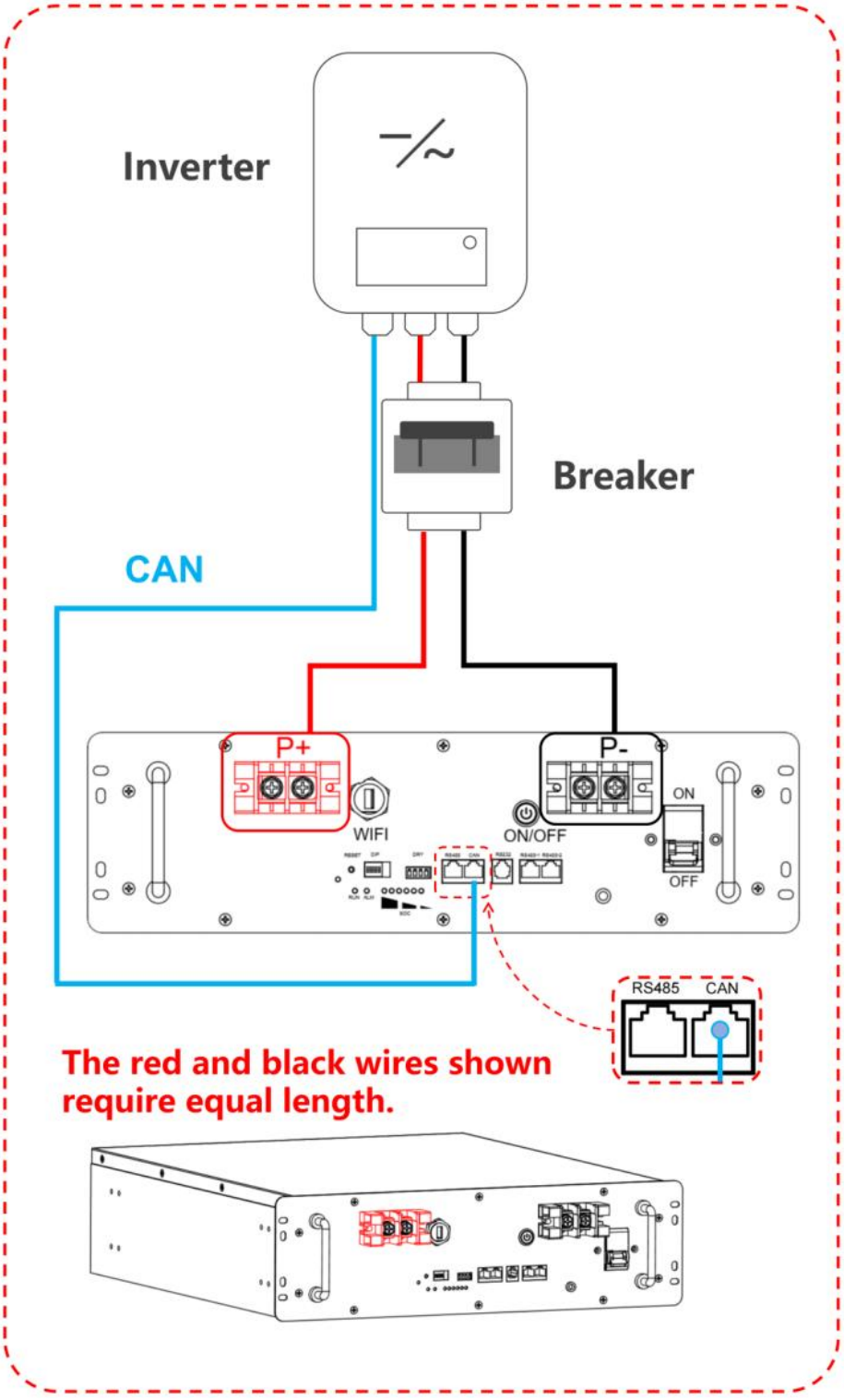


Figure3.6.4-2

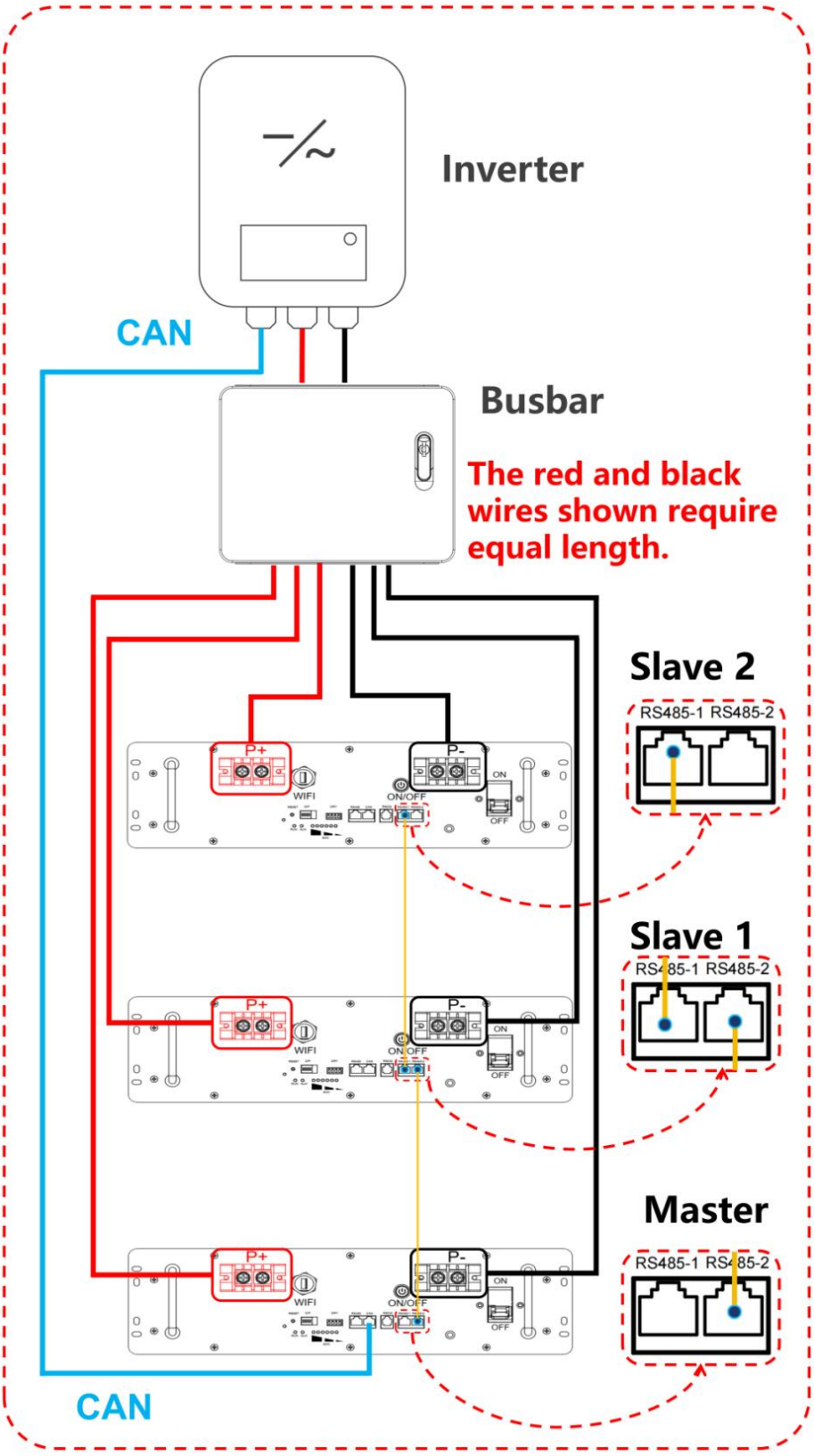


Figure 3.6.4-3

Illustration : When multiple batteries are connected in parallel, they are interconnected internally through the RS485-1/2 hardware interface and communicate with the inverter via the RS485/CAN bus. This product supports the operation of up to 40 devices in parallel.

For battery projects that have already been installed, if it is necessary to increase the battery capacity in the future, it is recommended to install new batteries before the battery usage exceeds one year. This is to prevent a significant difference in the State of Charge (SOC) between the new and old batteries, which could lead to an imbalance in the energy storage system.

Inverter Connection:

Before connecting the battery to the inverter, use a **multimeter** to verify that the bipolar circuit breaker is in the de-energized state.

Step 1: Connect the battery P+ and P- terminals to the bipolar circuit breaker using professional tools.

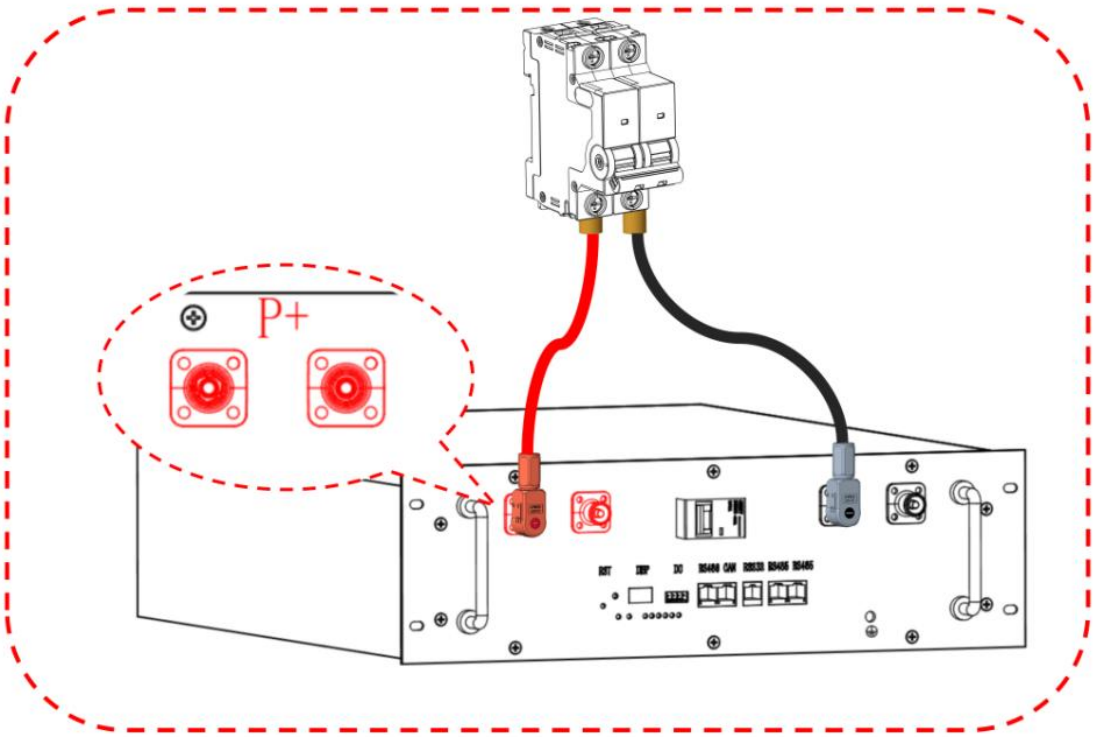


Figure 3.6.4-4

Step 2: Use the cable provided with your selected inverter to connect the bipolar circuit breaker to the inverter.

Step 3: Connect the battery to the inverter using the communication cable compatible with the inverter.

Caution:

All electrical connections between the bipolar circuit breaker and the inverter must be performed by qualified personnel using professional tools. Refer to **Section 3.6**,Installation tool list for the required tools.

The communication cable required for connecting this product to the inverter is provided. For details, refer to **Table 3.6.3-3**.

The power cable for connecting this product to the bipolar circuit breaker must be separately procured. Please contact relevant personnel for configuration.

04 Operation and Maintenance

Danger:

Please use special protective gear and specialized insulation tools to prevent electric shock injuries or short-circuit faults.

Caution:

1. During the power-on process, one should observe while powering on. If any abnormal phenomenon is detected, immediately power off the battery and identify the cause. After resolving the issue, continue the power-on process.
2. After the battery installation and adjustment is completed, or after the battery discharge is finished, please promptly recharge the battery. Otherwise, it may be damaged due to over-discharge.

4.1 Pre-power-on inspection

Inspection items and acceptance criteria

No.	Inspection Items	Inspection Standards
1	Properly Installed System	Correct and reliable installation
2	Reasonable Cable Layout	Meet the user's requirements
3	A Beautifully Tied Bandage	Uniformly tied string band, with no sharp corners at the cut ends
4	Reliable Grounding	Proper and reliable grounding connection
5	Turn Off the Switch	The "inverter" and all the switches connected to the battery are all in the "OFF" position.
6	Properly Cables Connection	Correct and reliable connections of DC wires, AC wires and communication wires
7	Seal unused terminals and interfaces	The unused terminals and interfaces are covered with waterproof caps.
8	The required installation environment	Reasonable installation space, clean and tidy environment

Table 4.1

4.2Power-on procedure

Step One: Use a multimeter to confirm that the grid voltage is within the specified range;

Step Two: Close the circuit breaker between the inverter and the battery;

Step Three: Close the circuit breaker on the control panel; (The sequence should be: from near to far, first close the main cluster - battery, then close the secondary cluster batteries);

Step Four: Press the "SWITCH" button for battery startup; If it is a parallel cluster system, before the first parallel connection, make sure that the voltage difference between each battery system does not exceed 5V. Then, press the "SWITCH" button for each battery system one by one, and it is necessary to wait for a 5-minute stabilization period;

Step Five: Please follow the user manual of the inverter to perform the power-on operation to start the inverter in the system.

Standard version:

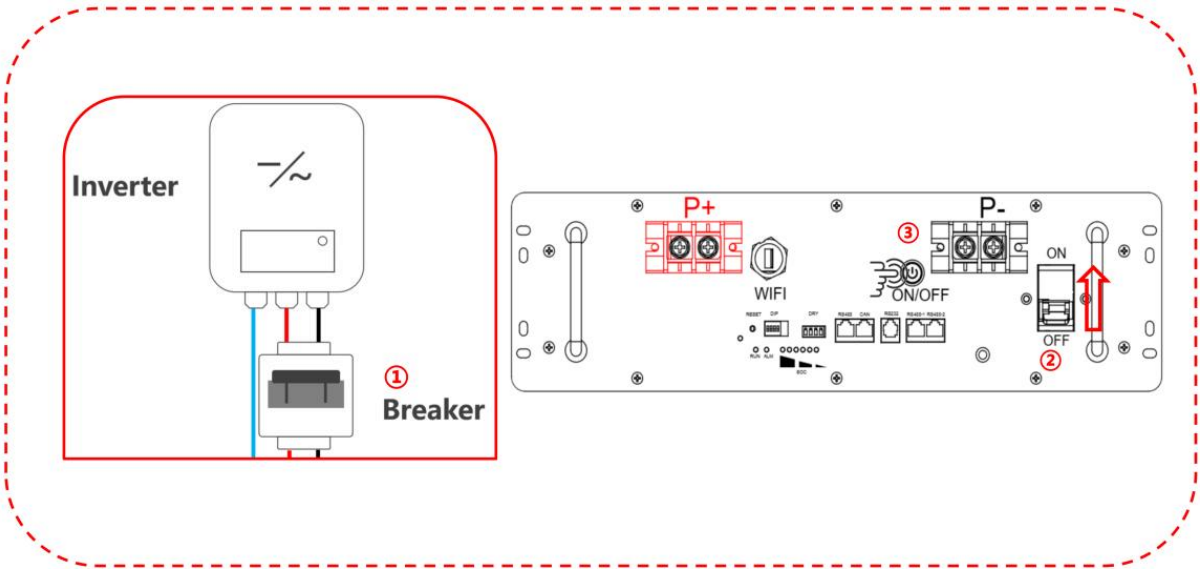


Figure 4.2-1

Quick plug port version:

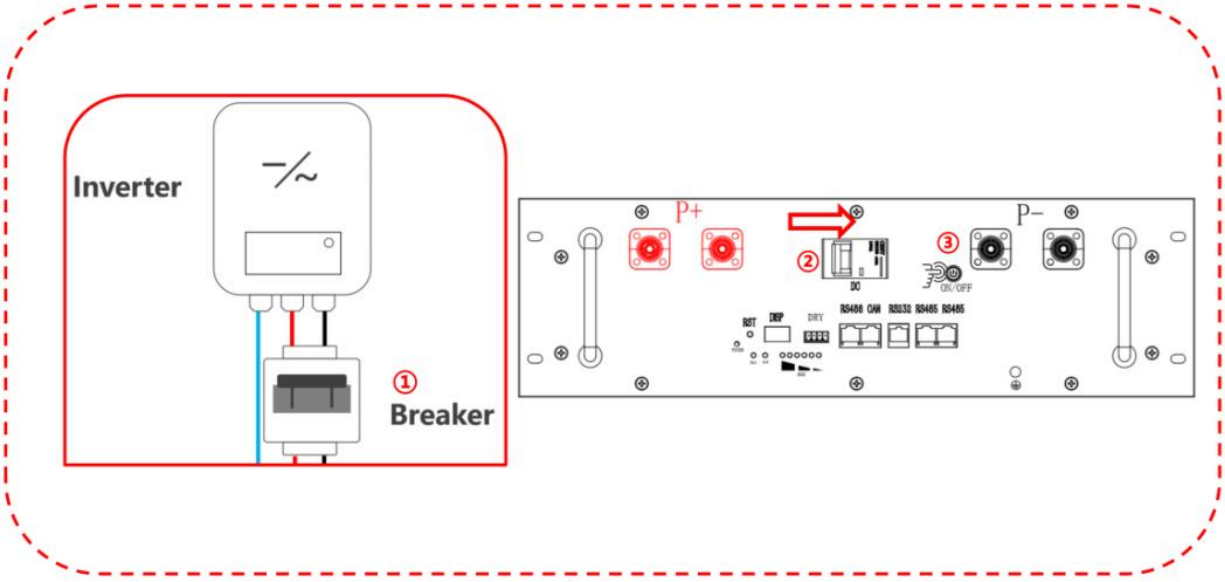


Figure 4.2-2

Caution: Prior to energizing or de-energizing the system, verify the isolation of all live components by testing the bipolar connector with a multimeter.

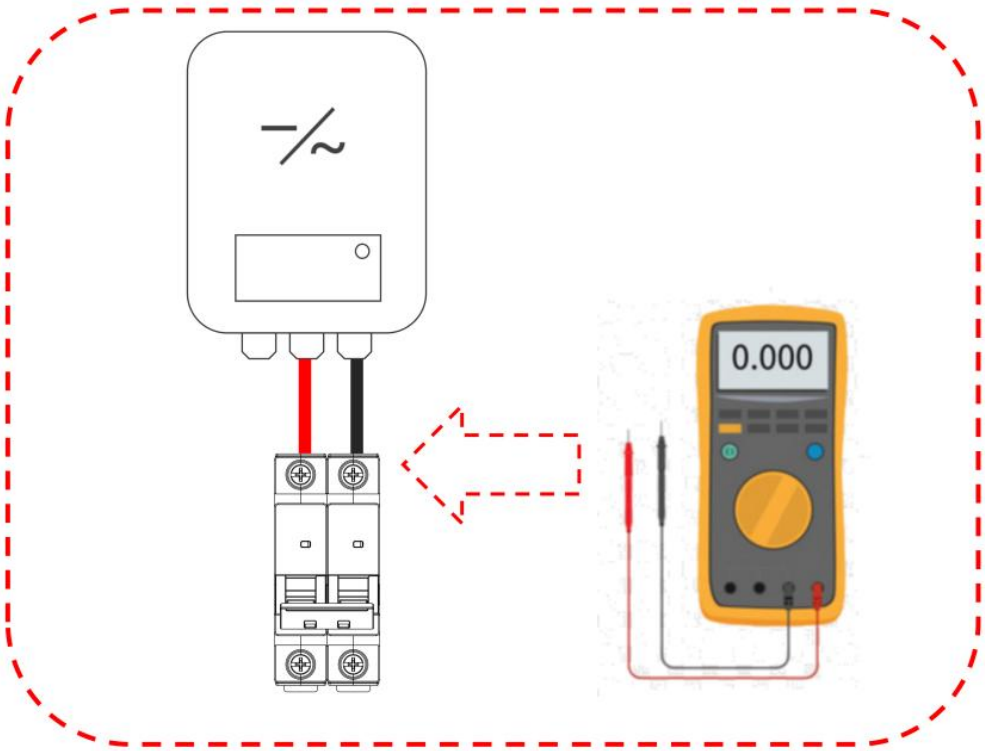


Figure 4.2-3

4.3 The steps for powering off the device

Danger:

When shutting down the battery system, please strictly follow the power-down requirements of the battery system to prevent damage to the battery system.

Step One: Please follow the user manual of the inverter to perform the power-down operation to shut down the inverter in the system;

Step Two: Disconnect the circuit breaker between the inverter and the battery.

Step Three: In the cluster system, please press the "SWITCH" button on the battery system one by one to ensure that the indicator lights of each "SWITCH" are off.

Step Four: Shut down the power supply of each battery pack.

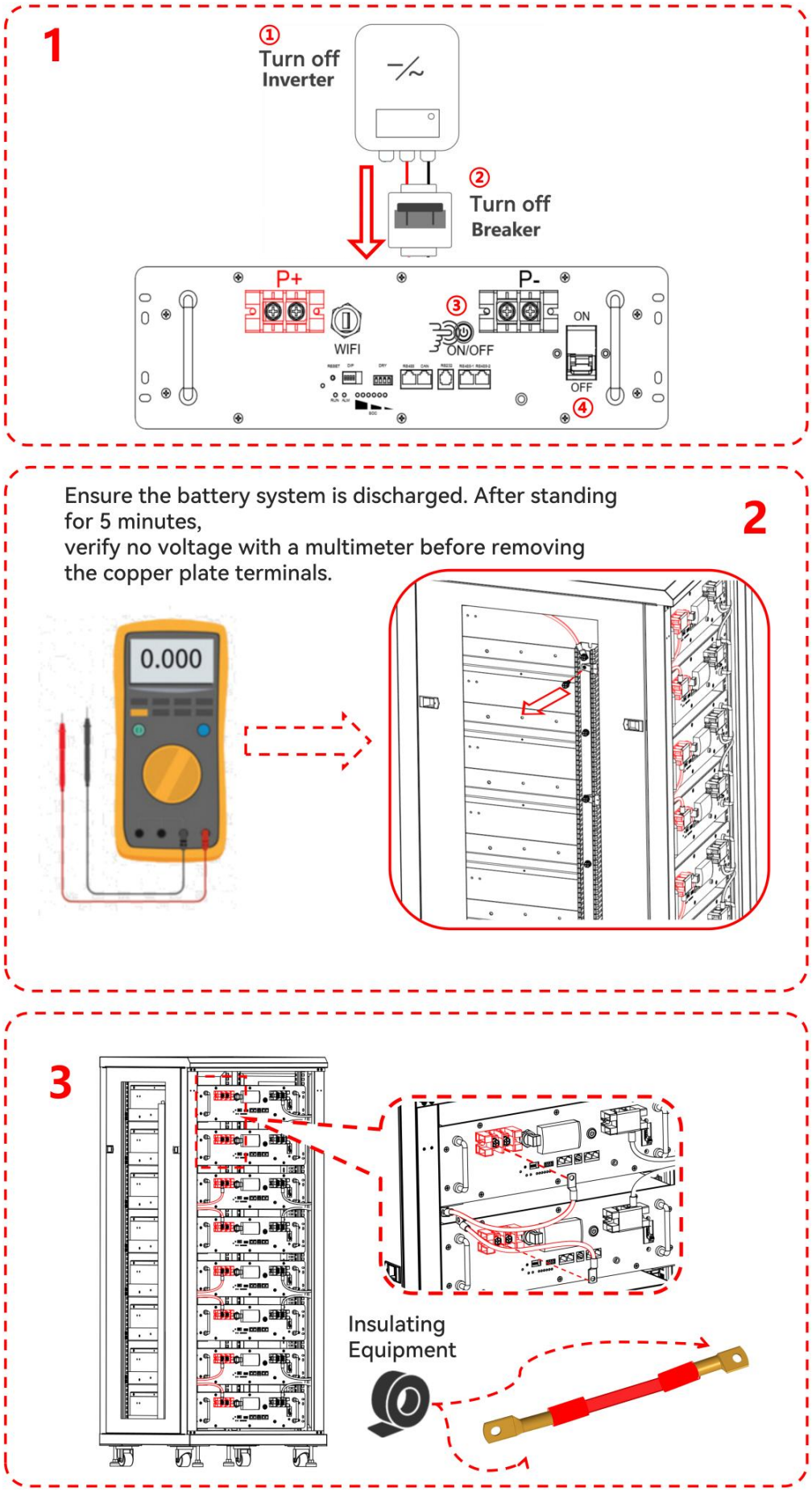

1
① Turn off Inverter
② Turn off Breaker
P+
P-
③
ON/OFF
WIFI
ON
OFF
④
Ensure the battery system is discharged. After standing for 5 minutes,
verify no voltage with a multimeter before removing the copper plate terminals.
2
0.000
3
Insulating Equipment

Figure 4.3

Illustration:

After the system is shut down, the instructions for safely removing the battery system are as follows:

First, keep the power off for more than 10 minutes to ensure that the energy storage system has fully discharged;

Then, use a multimeter to test and confirm that the inverter and the battery system are not powered on;

When removing the batteries, after unplugging the connection lines, immediately install the protective cover tightly onto the power line socket of the battery box. Through the sealing structure, a physical isolation barrier is established between the energized components and the operating environment, blocking the risk path for human contact with the energized terminals.

Danger:

1. When removing the quick-connect cable, it is strictly prohibited to only pull out one end of the plug while leaving the other end still inside the socket of the battery pack.
2. After the connection cable is removed, use insulating tape to tightly wrap the terminals at both ends of the cable.

4.4 Mobile application (App)

Illustration: If you choose the battery with WiFi function, after the battery system is powered on, you can view the specific information of the battery on your mobile device.

Step One: Scan the QR code to download the mobile app

IOS

Android

Figure 4.4-1

Step Two: Network Configuration of the WIFI Module

Turn on the Bluetooth, WLAN (Wireless Local Area Network) and location functions of your mobile phone;

Select "Local Connections";

Click "Search Bluetooth" and "Select the device number" (for example: wl1001_2188260000*);

Click the "Change WIFI password" box, select the currently available 2.4G WIFI account, enter the password and confirm.

The network configuration is complete. Click "View Data" to enter the Bluetooth data page.

Note: When configuring the network on the mobile phone, the phone needs to be connected to the same 2.4G WIFI network as the device.

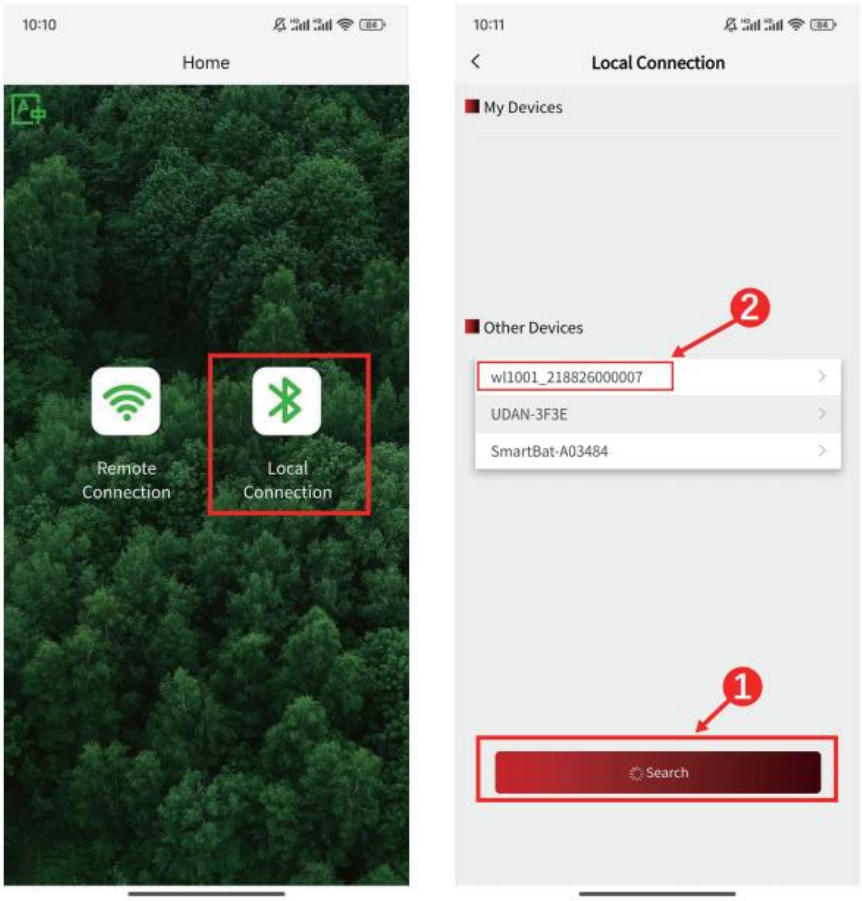


Figure 4.4-2

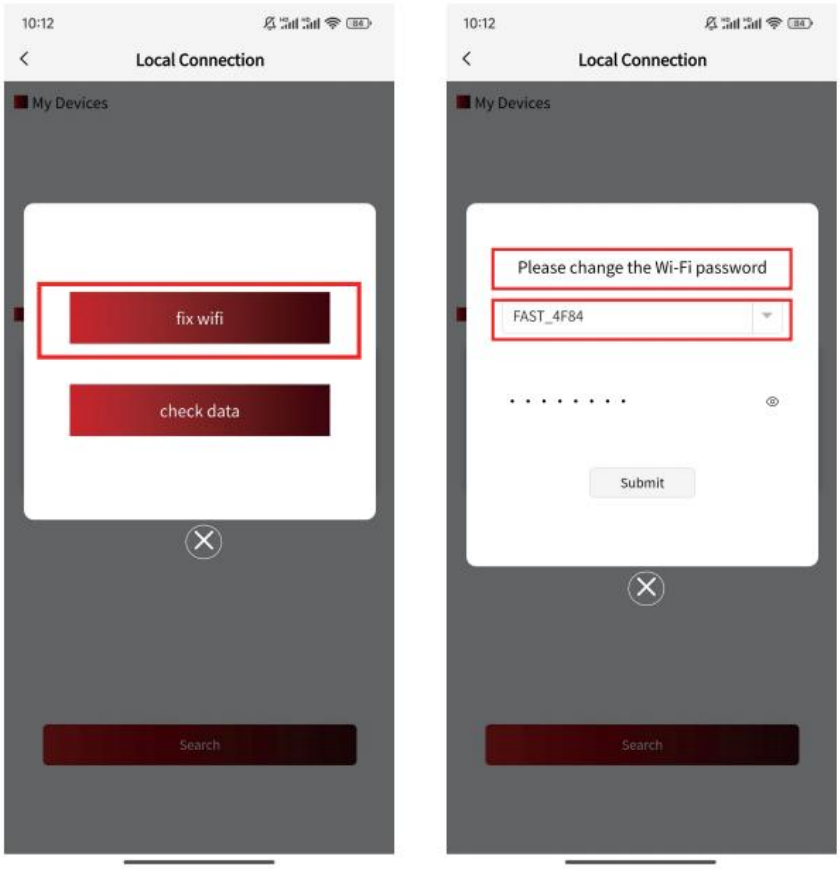


Figure 4.4-3

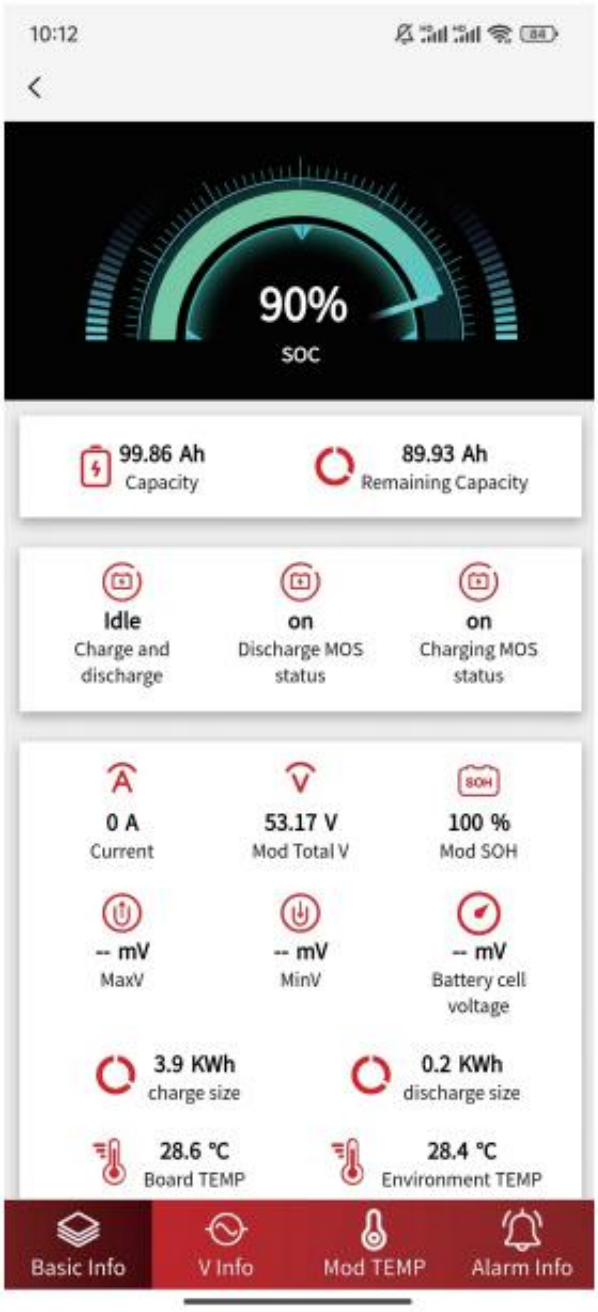


Figure 4.4-4

Step Three: Click on "Remote Connection", register a new account and log in;

Click on the scanning function at the top right corner, scan the QR code on the WIFI module to bind the device;

Click on the WIFI module number to view the remote monitoring data.

Caution: On the WIFI module list page, the green box in the upper left corner indicates that the WIFI module's network configuration is successful. If it shows gray, it means you need to reconfigure the WIFI module's network.

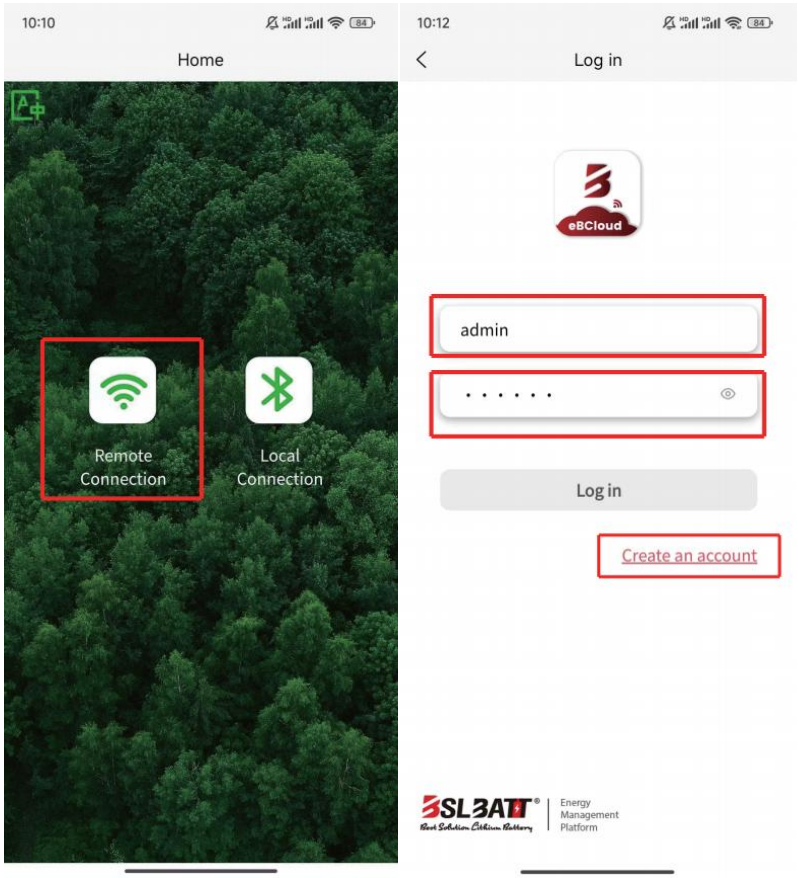


Figure 4.4-5

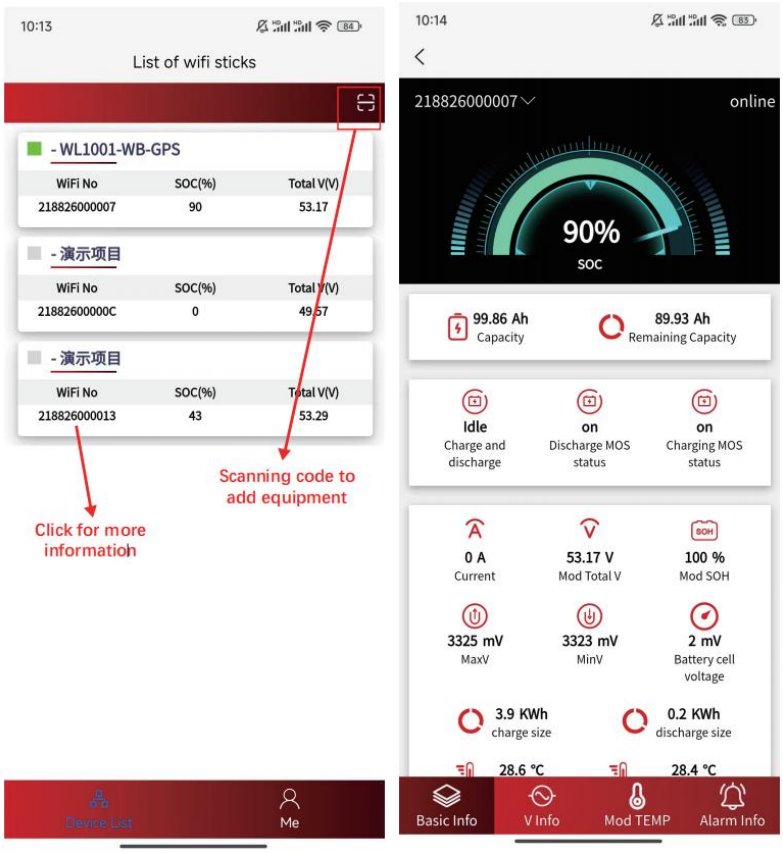


Figure 4.4-6

4.5 PC end cloud platform

4.5.1 Log in to the PC cloud platform



Figure 4.5.1-1

Click on http://3.230.167.72/#/login/1481625648143839234 , enter the account and password assigned to you on the login interface to log in.

After entering the home page, the page will display information such as "Offline WIFI Module Quantity", "Charging Distribution", "Alarm Distribution" and "Account Items".

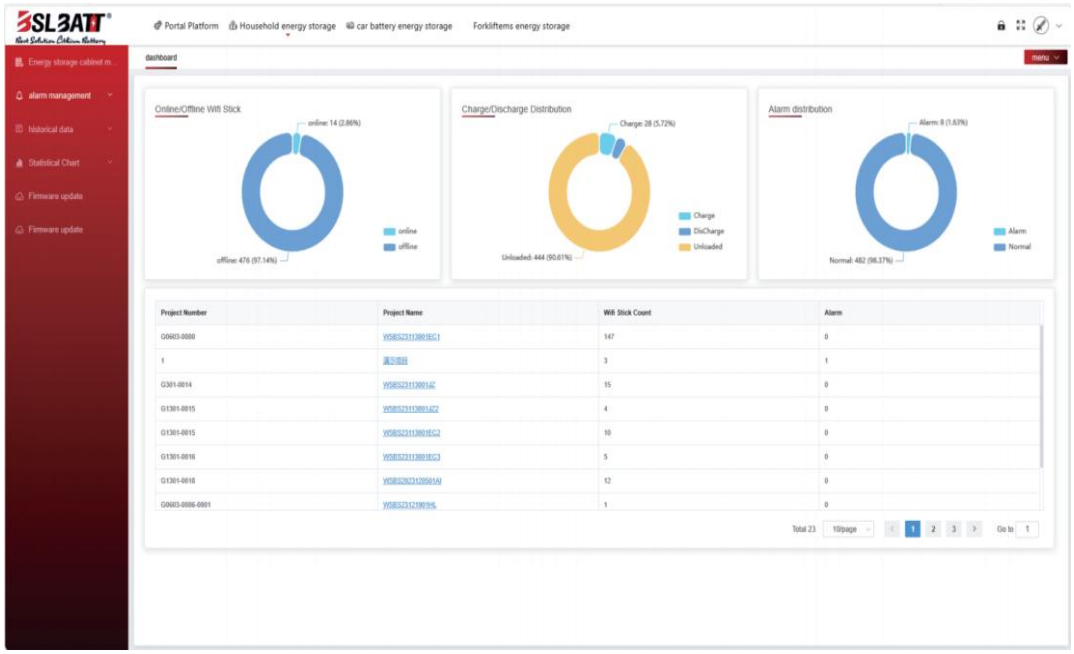


Figure 4.5.1-2

Click on "Project Name" and you will be able to access the WIFI management list of your project.

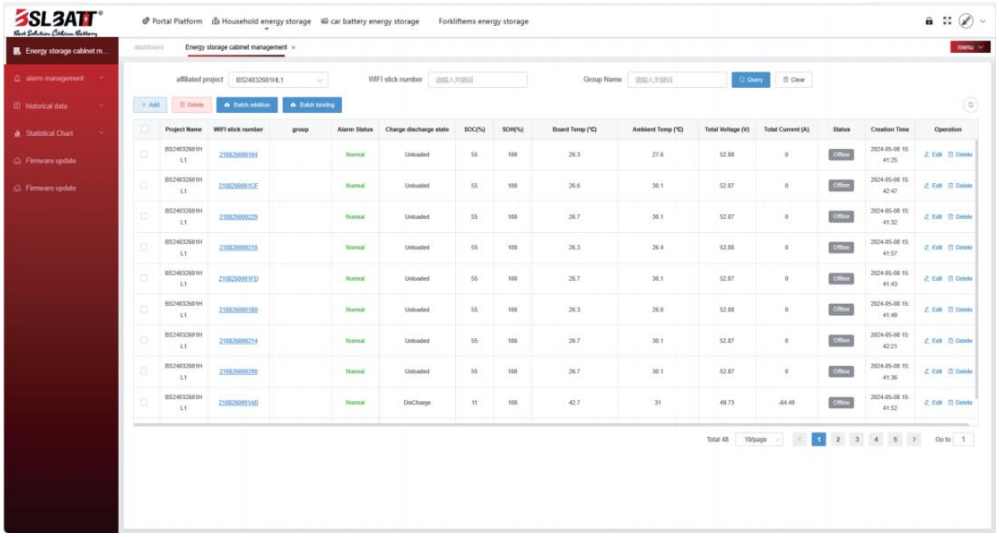


Figure 4.5.1-3

Click on any "WIFI module number (WIFI number)", and you can enter the data page of the monitored battery pack.

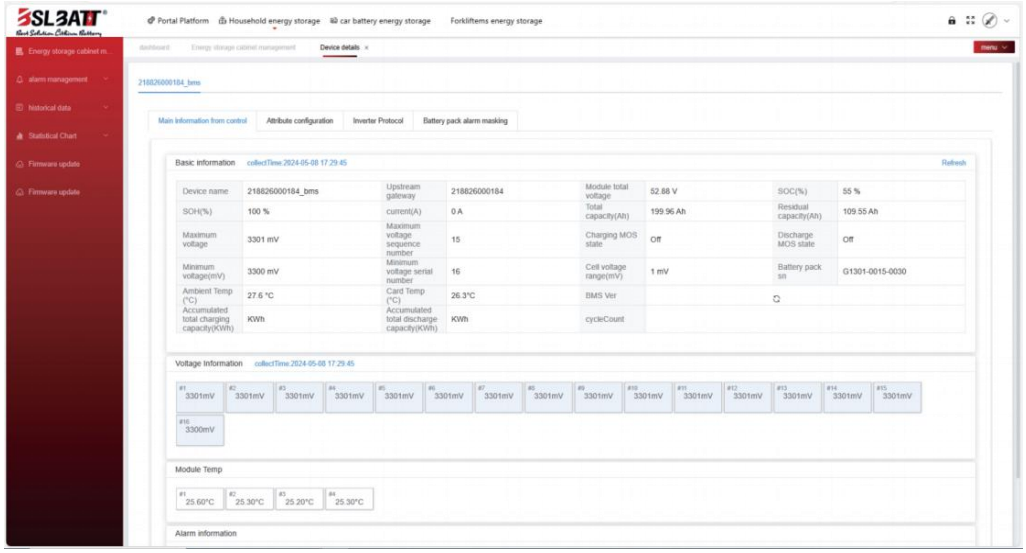


Figure 4.5.1-4

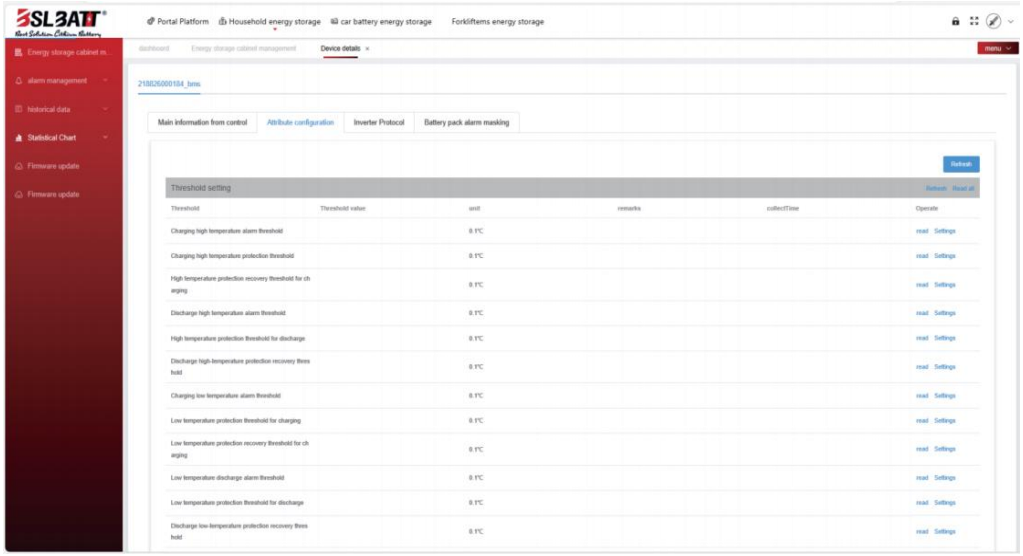


Figure 4.5.1-5

4.5.2 Operation Instructions

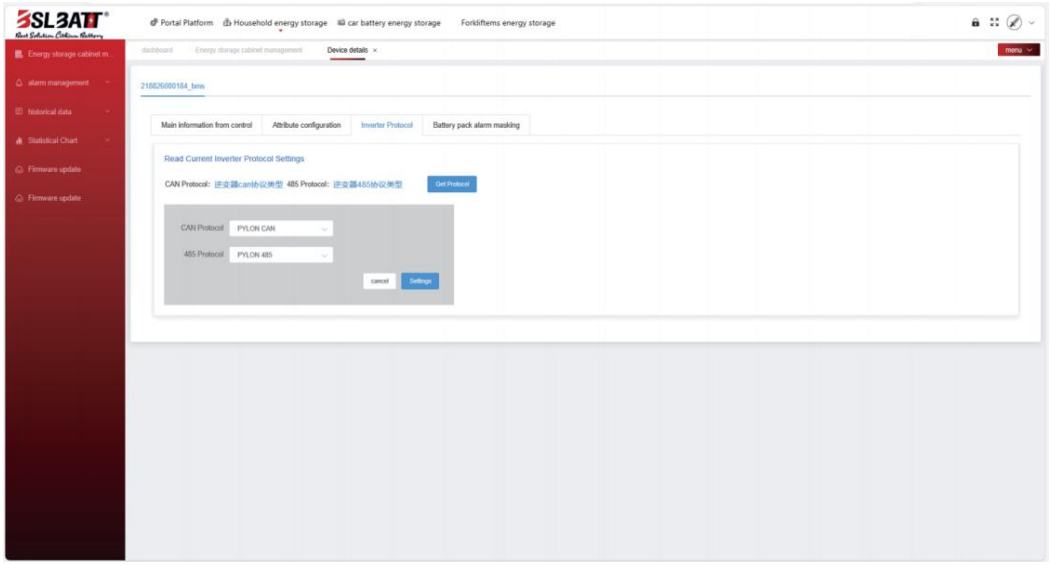


Figure 4.5.2-1

The battery pack data display page includes: "Single cell voltage", "Single cell temperature", "Total voltage", "Current", "Charging MOS tube status", "BMS software version", "Cycle count", "Real-time alarm information".

Clicking "Property Configuration (Properties Configuration)" allows you to display the battery protection parameters and enables modification;

Clicking "Inverter Protocol (Inverter Protocol)" displays the currently selected inverter protocol and enables modification.

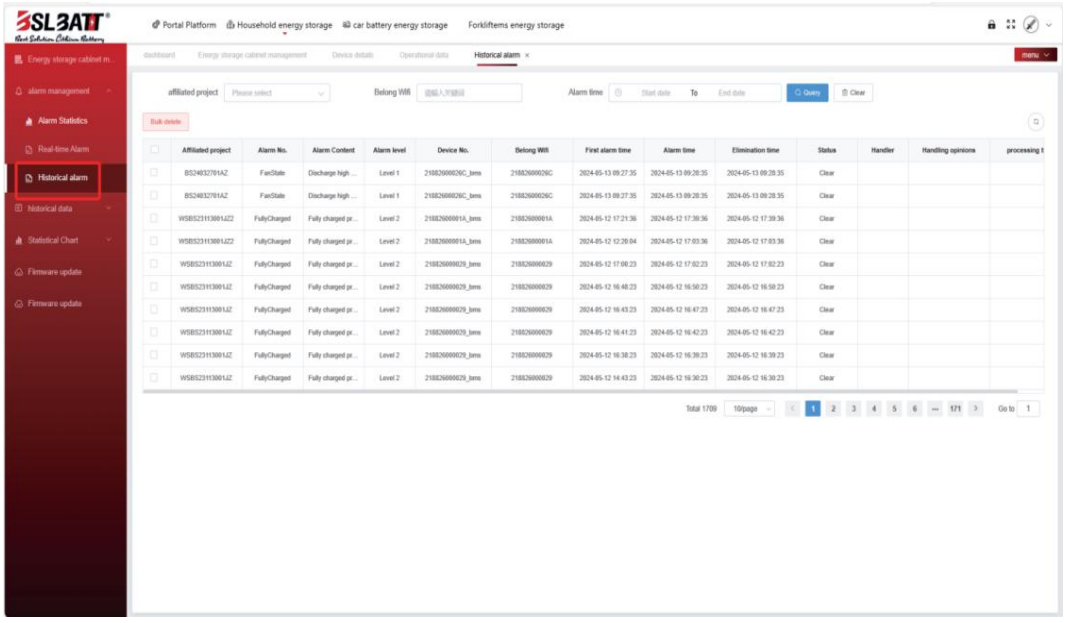


Figure 4.5.2-2

Click on "History Alarm" to view the historical alarm records of the battery pack.

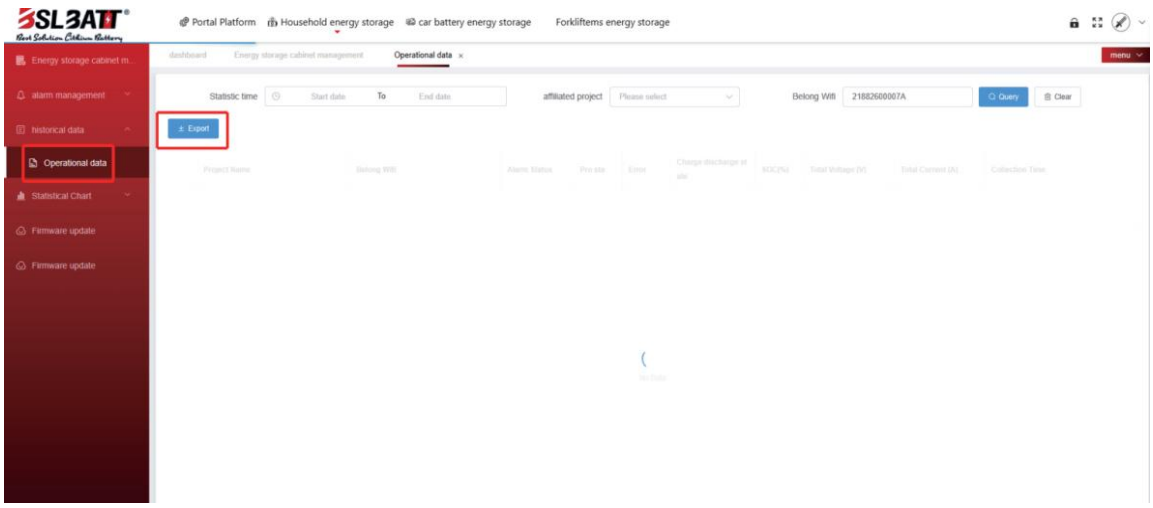


Figure 4.5.2-3

Click on "Operation Data" to view the historical operating data of the battery pack, including voltage and temperature during its operation;

You can also query the data of the battery pack within a specific time period and export it.

4.6 Supervisory computer monitoring

Caution:Before initiating the upgrade, ensure that the BMS (Battery Management System) and the battery are in standby mode, the load switch and charger switch are turned off, and the RS232-USB cable is correctly connected as follows.

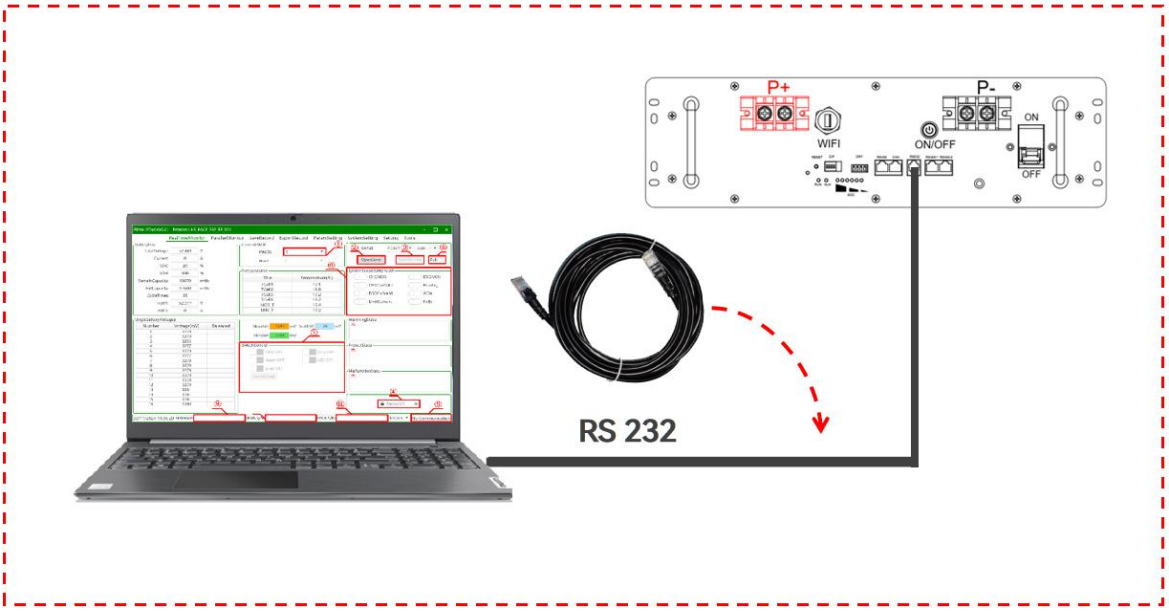


Figure 4.6

4.6.1 Product Upgrate Procedure

1. Enter the [Windows Device Manager], and in the [Windows Device Manager], click on [Ports (COM and LPT)] to find the matching COM port. If you can see the device as shown in the following picture, it indicates that the RS232 driver has been installed. If you cannot find it, it means that the driver software is not installed. Please install the driver package first.

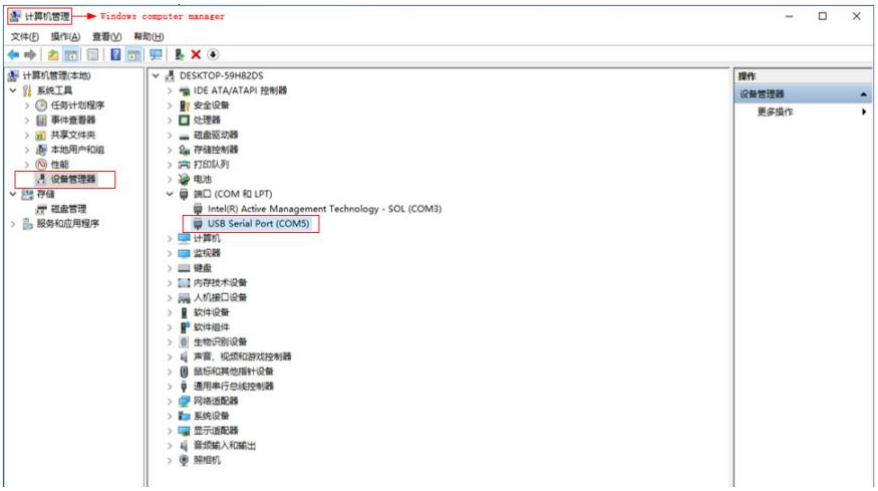


Figure 4.6.1-1

Caution: The above image is for reference only.

2. Click on the RS232 driver installation package.



3.Double-click the application icon "BMS Upgrade V1.0.8.exe" to open the upgrade tool. The specific interface is as follows:



Figure 4.6.1-2

4.Select the correct serial port and baud rate. The default baud rate is 9600. Click "Browse" to select the corresponding BIN file.

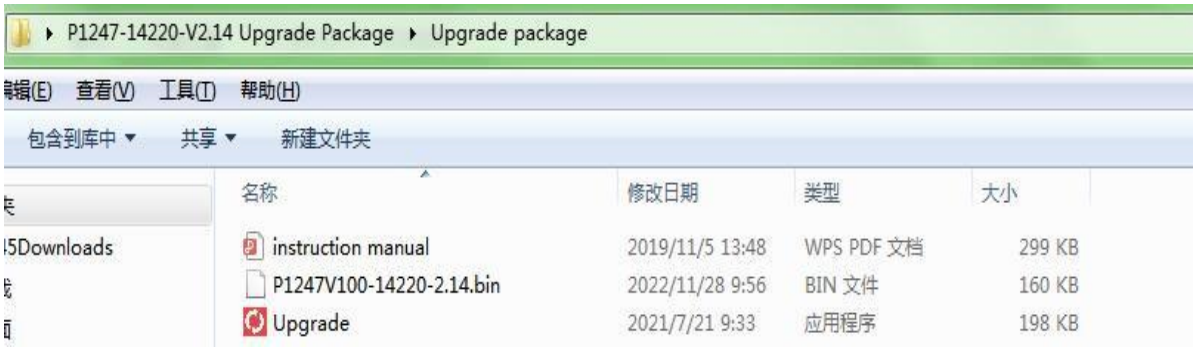


Figure 4.6.1-3

5.After importing the BIN file, select the correct address 0 or 1. Follow the picture below to select the BIN file.

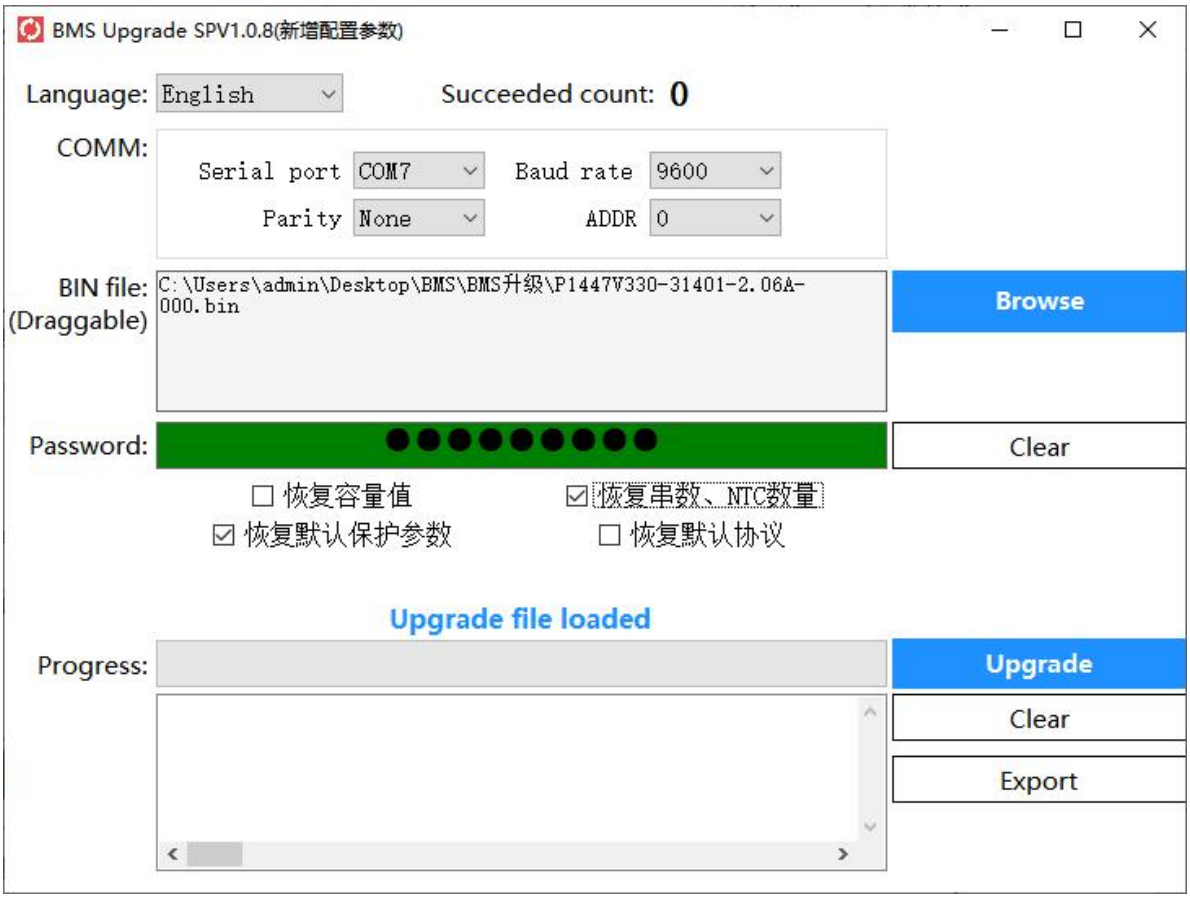


Figure 4.6.1-4

6.Enter the correct password (Password: paceadmin). Click the "Upgrade" button to proceed with the upgrade. The first upgrade will prompt "Upgrade is ready. Are you sure you want to upgrade? ", click "OK" to continue the upgrade (no further prompts will be shown later); click "Cancel" to exit the upgrade. Click "OK" to enter the normal upgrade process. Please ensure the upgrade is completed successfully. Do not disconnect the communication during the process.

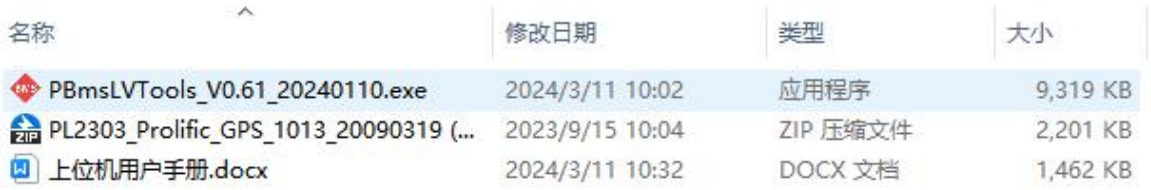
Error handling:

(1) If there is an error message about the bin file, please confirm whether the selected bin file is correct, or contact the supplier to obtain the correct bin file.

(2)If there is a response timeout error, please check whether the communication line is properly connected and in good contact.
(3) If the upgrade process fails, you must repeat the upgrade until it succeeds. If the upgrade is always unsuccessful, please contact our technical department.

4.6.2 Installation and Selection of the Host Computer

1.The host computer can directly decompress the entire folder, or install it through the installation program. After the installation is completed, open the decompressed folder, double-click the "PBmsLVTools" software to open it, and change the language from Chinese to English. As shown in the following picture.



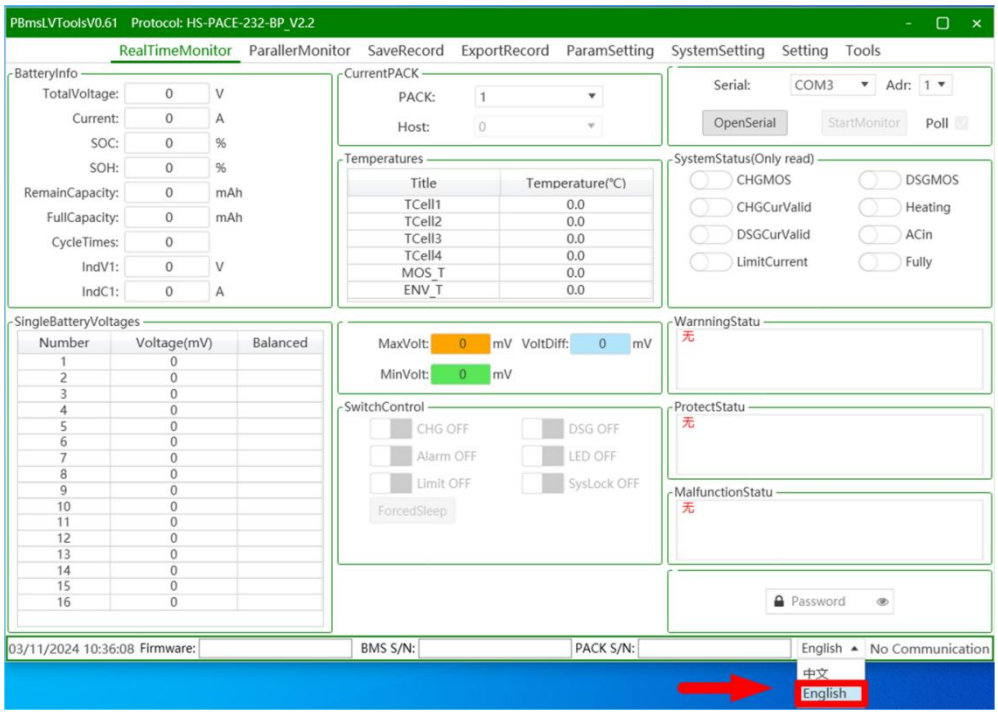


Figure 4.6.2-1

2. Select the serial port and baud rate for communication, then open the serial port and attempt to connect.
Complete the communication settings by selecting COMMSetting:

(1). Link: Dropdown option, select the communication link (serial port).

(2). Baud Rate: Dropdown option, select the communication baud rate (9600).

(3). Interval: Dropdown option, set the interval for reading BMS board data (1).

(4). PACKNUM: Dropdown option, select the number of battery packs.

(5). StartAddr: Dropdown option, select the starting address for polling the battery packs.

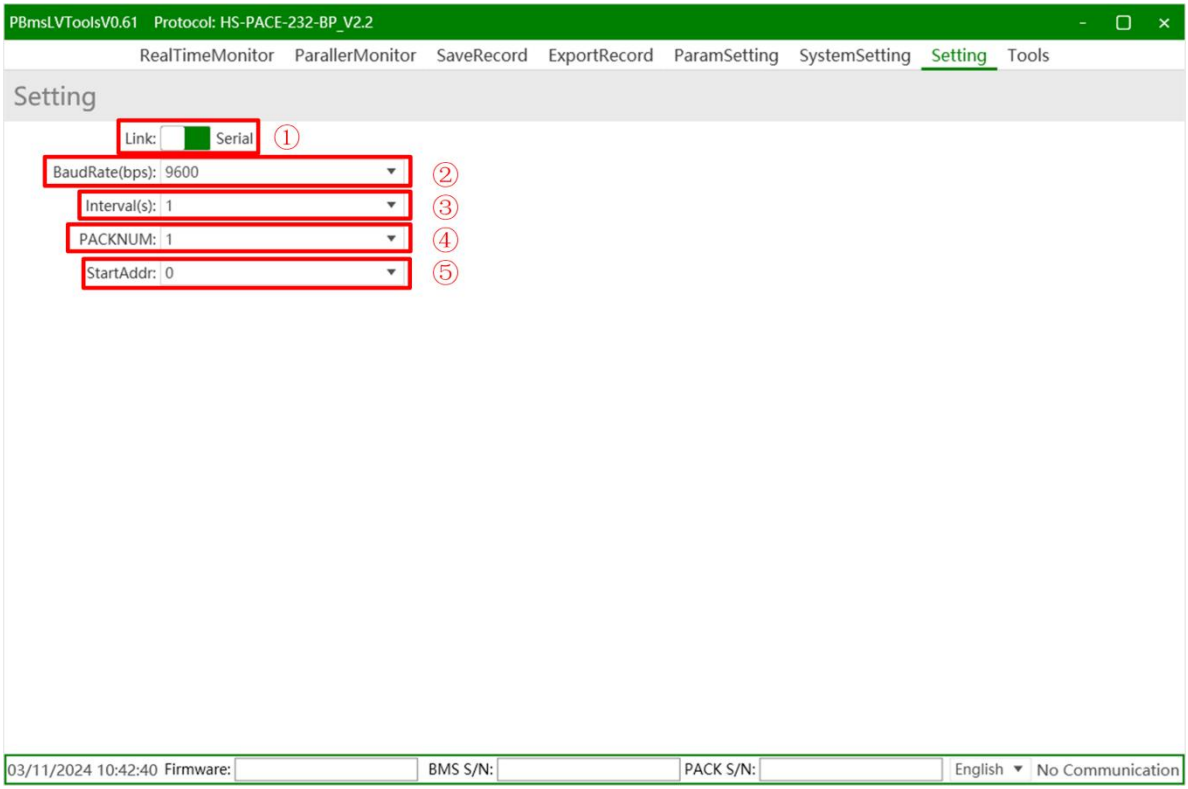


Figure 4.6.2-2

3.Monitoring page operation

After the battery pack is correctly connected to the computer, click button 5 to open the serial port, and then click button 4 to start the monitoring.

Note: When communication is normal, area 9 will display the green "green normal communication characters"; when it shows the red "red abnormal communication characters", please check if the RS232 wiring and COM port selection are correct.

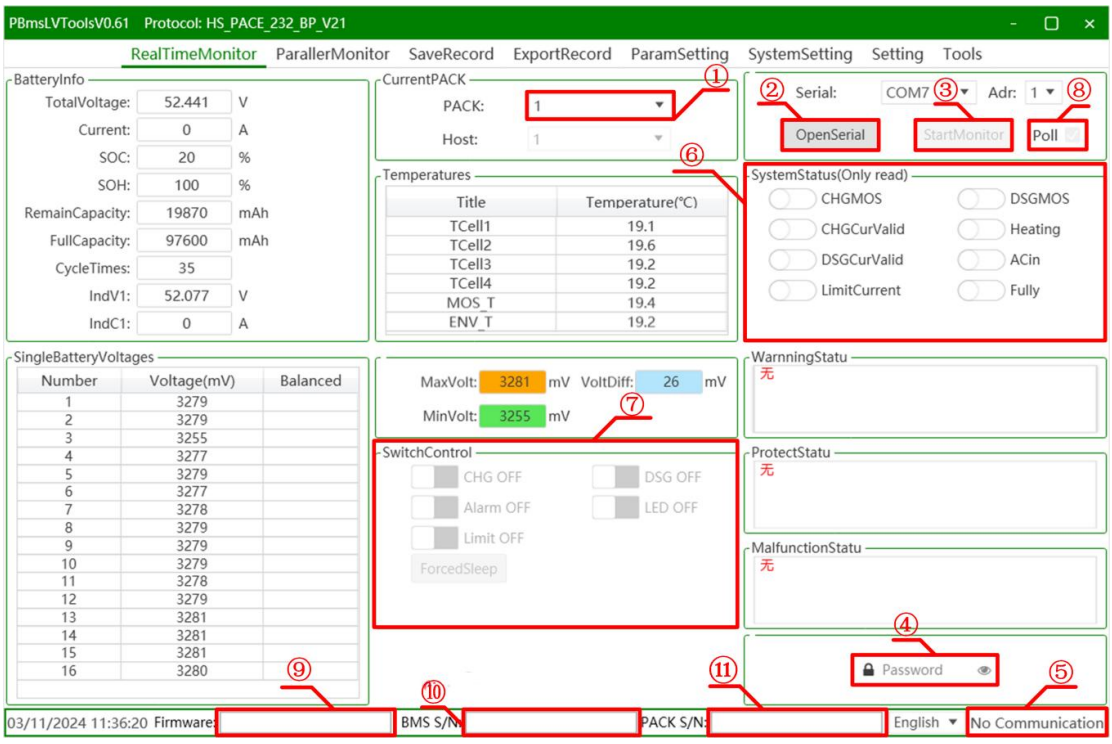


Figure 4.6.2-3

4.Main Function Description:
(1). Current Battery Pack: Represents the currently selected battery pack. The default is Battery Pack 1. You can select the battery pack you want to view by choosing from the drop-down options.
(2). Open serial:Opens the serial port to enable battery pack monitoring and parameter modification functions.
(3) Start Monitor: Reads various information on the BMS, such as voltage, current, temperature, etc.
(4). User privilege:Enter the password 123456 to obtain management privileges. After that, you can modify the parameters.
(5).Communication status: Displays whether the current communication is successful. If successful, it will prompt the operation.
(6).System status (Only Read): View the status of the charging and discharging MOS tubes in the system, or the limitations and functions of the switches.
(7).Control switching: Switch the functions within the switch box, such as the charging/discharging switch, alarm, LED, etc. Red indicates off, green indicates on.
(8).Poll :Enable the automatic polling function for multiple parallel-connected packages.
(9). Firmware Version: The software version number of the BMS.
(10). BMS Serial Number: The barcode of the BMS board.
(11). Battery Serial Number: The barcode of the battery pack.
5.After the communication is successful, if there is a fault alarm in the battery pack, you can check it at the indicated position. If there is any abnormality, please contact the supplier and provide the specific problem details.

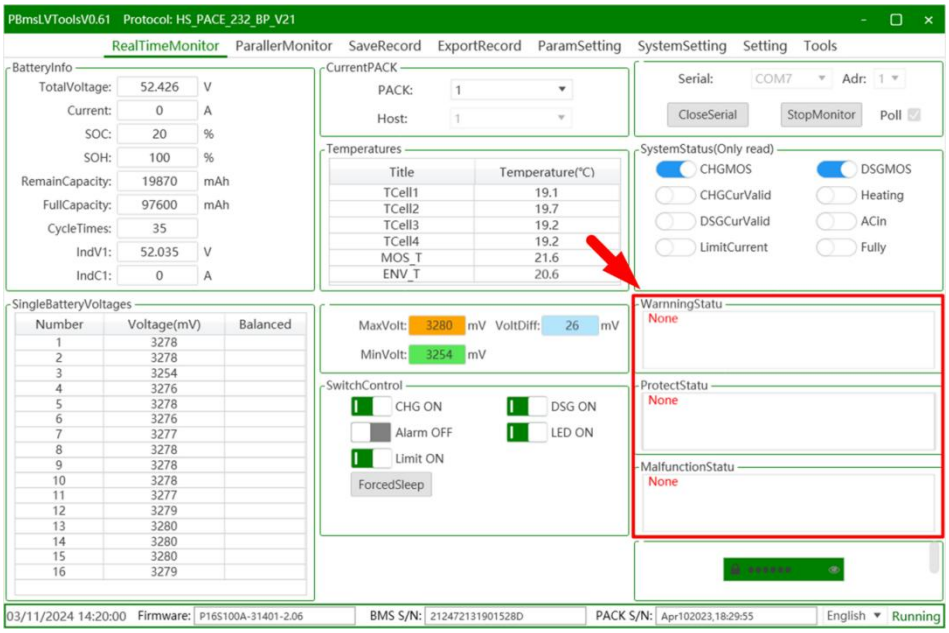


Figure 4.6.2-4
6.If no faults or alerts occur, please enter the administrator password: 123456. (After entering the correct password, the input box will turn green, indicating that you have obtained the administrator privileges.)

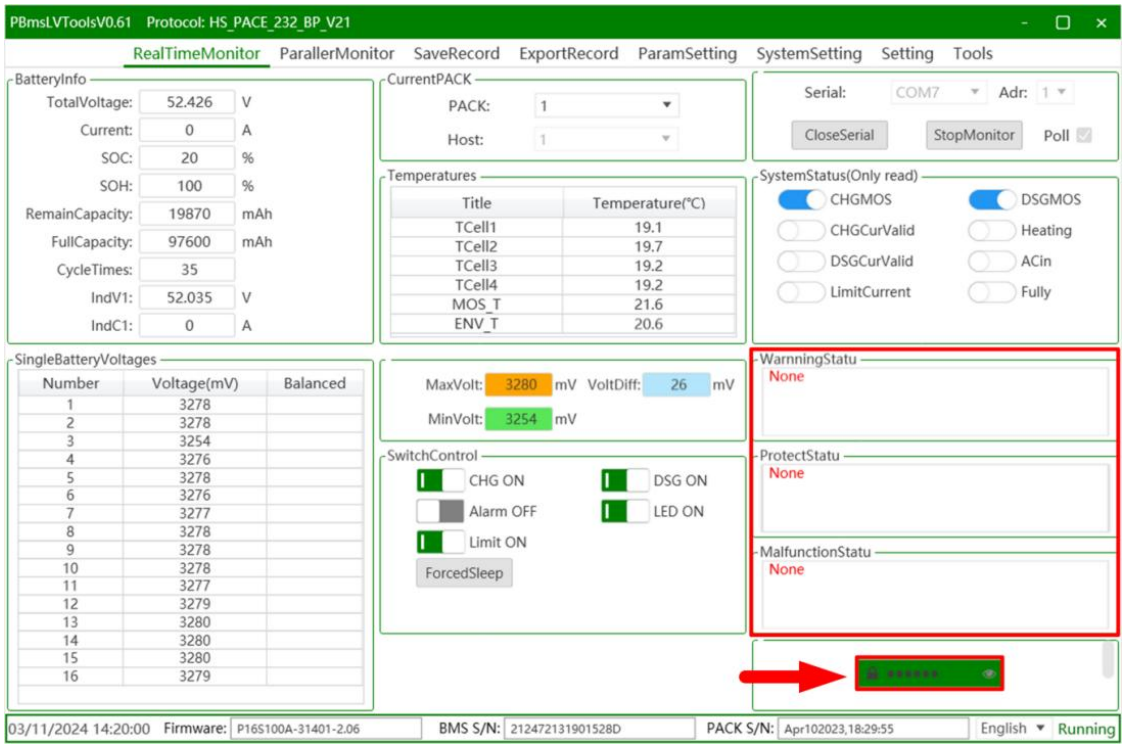


Figure 4.6.2-5

7.Click to enter "System Configuration", and then enter the settings sub-interface. Read the current protocol of the inverter.

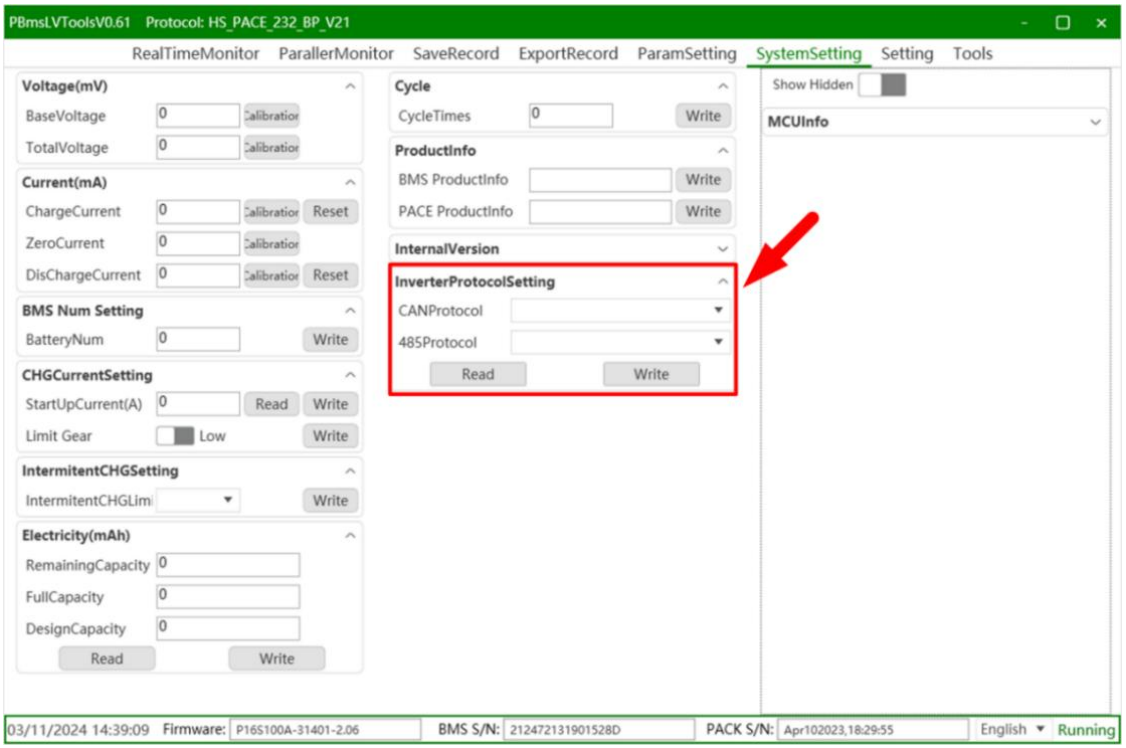


Figure 4.6.2-6

8.Select the inverter protocol to be used, and click "Write". After successful writing, please read it again to ensure that the required protocol has been correctly written.

4.7 Battery Display Screen

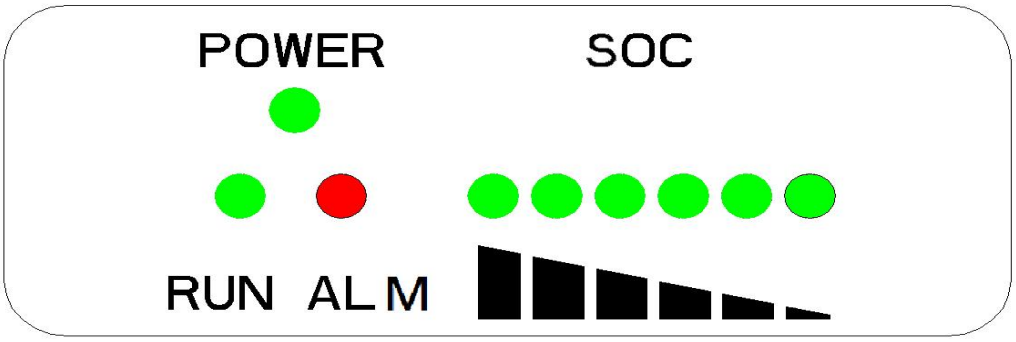


Figure 4.7

No.	Indicator Light Name	Status	Illustration
1	POWER Light	System no abnormal, always bright	
2	RUN Light	See Table 2, Table 4	
3	ALM Light	See Table 2, Table 4	
4	SOC Light	See Table 3, Table 4	

Table 4.7-1

LED Work Status Indicator Light

Status	Normal/ Alarm/ Protection	RUN ●	ALM ●	Electricity indicator LED ● ● ● ● ● ● ● ●	Remark
Power off	Sleep mode	off	off	off off off off off off off off	All off
Standby	Normal	Flash1	off	According to the status of the battery indicator light	Standby state
	Alarm	Flash1	Flash 3		Module low voltage
Charge	Normal	Bright	off	According to the status of the battery indicator light (the highest battery level indicator light flashes twice)	The maximum power indicator light flashes twice.
	Alarm	Bright	Flash 3		When the overcharge alarm occurs: The ALM light does not flash.
	Overcharge protection	Bright	off	Bright Bright Bright Bright Bright Bright Bright Bright	When there is no current, the indicator light enters the standby mode.

	Temperature, overcurrent, fault protection	off	Bright	off	off	off	off	off	off	Stop charging
Discharge	Normal	Flash 3	off	According to the electricity indicator						
	Alarm	Flash 3	Flash 3							
	Under-voltage protection	off	off	off	off	off	off	off	off	Stop discharging
	Temperature, overcurrent, short circuit, reverse connection	off	off	off	off	off	off	off	off	Reach the upper limit of discharge
	Fault protection									
Invalid state	Normal	off	off	off	off	off	off	off	off	Stop charging and discharging

Table 4.7-2

Capacity Indication Description

Status		Charge						Discharge					
Capacity indicator		L6●	L5●	L4●	L3●	L2●	L1●	L6●	L5●	L4●	L3●	L2●	L1●
SOC	0 ~ 16.6%	off	off	off	off	off	Flash 2	off	off	off	off	off	Bright
	16.6 ~ 33.2%	off	off	off	off	Flash 2	Bright	off	off	off	off	Bright	Bright
	33.2 ~ 49.8%	off	off	off	Flash 2	Bright	Bright	off	off	off	Bright	Bright	Bright
	49.8 ~ 66.4%	off	off	Flash 2	Bright	Bright	Bright	off	off	Bright	Bright	Bright	Bright
	66.4 ~ 83%	off	Flash 2	Bright	Bright	Bright	Bright	off	Bright	Bright	Bright	Bright	Bright
	83 ~ 100%	Flash 2	Bright	Bright	Bright	Bright	Bright	Bright	Bright	Bright	Bright	Bright	Bright
Operating indicator		Bright						Flash (flash 3)					

Table 4.7-3

LED Flash Recording

Flash mode	Bright	OFF
Flash 1	0.25S	3.75S
Flash 2	0.5S	0.5S
Flash 3	0.5S	1.5S

Table 4.7-4

4.8 Battery failure handling

When the battery system malfunctions, it may cause the system to automatically shut down or some functions to malfunction. Please follow the following methods to troubleshoot the problem. If these troubleshooting steps fail to solve the issue, please contact the after-sales service center immediately.

Caution: When contacting the after-sales service, please prepare the following information to quickly resolve the issue:

1. Battery information, such as: serial number, software version, device installation time, time of failure occurrence, frequency of failure occurrence, etc.;
2. Installation environment of the device, such as: weather conditions, etc. It is recommended to provide photos, videos, etc. as supporting documents for analyzing the problem;
3. Usage history of the device, such as: device usage frequency and duration, charging times, maintenance and servicing conditions, etc. At the same time, clearly specify the type of after-sales service, such as on-site repair, return for repair, or usage guidance, etc.

Fault Alarm Processing Table

Fault Name	Solution
High-temperature Charging Alarm High-temperature Discharge Alarm Low-temperature Charging Alarm	1. Check the installation environment temperature to ensure that the installation temperature of the battery system is with in the range of the battery's operating temperature; 2. Shut down the battery, and then turn it on after the temperature has returned to normal.
Low-temperature Discharge Alarm MOS Tube High-temperature Alarm Environmental High-temperature Alarm Environmental Low-temperature Alarm	1. Check the installation environment temperature to ensure that the installation temperature of the battery system is within the range of the battery's operating temperature; 2. Shut down the battery, and then turn it on after the temperature has returned to normal.
Single cell Overvoltage Alarm Single cell Undervoltage Alarm Total Voltage Overvoltage Alarm Total Voltage Under-voltage Alarm	After leaving the battery idle for 0.5 hours, restart the charging process immediately. If the problem persists, please contact the after-sales service center.
Overcurrent Charging Alarm Overcurrent Discharge Alarm	If the device does not recover after waiting for 5 minutes, it needs to be restarted. If the problem persists, please contact the after-sales service center.
SOC Alarm	After restarting the battery and charging, if the problem persists, please contact the after-sales service center.

Table 4.8

⚠ **Warning:** In case of any faults not listed in Table 4.8, please contact the after-sales service center directly.

4.9 Inspection and Maintenance

1.If you find any issues that may affect the battery system, please contact the after-sales service immediately. Do not attempt to disassemble it by yourself.
2.If you see exposed copper wires of the conductive wire, do not touch it. To avoid high-voltage danger, contact the after-sales service immediately and do not attempt to disassemble it by yourself.
3.In case of other emergencies, contact the after-sales service immediately. Follow their instructions for operation or wait for the after-sales personnel to handle the situation on-site.

Inspection and Maintenance Form

Maintenance content	Maintenance cycle
Check if the installation of the battery system is loose. If so, tighten the corresponding position.	Once every six months
Check if the shell is damaged. If so, repaint it or contact the after-sales service center.	Once every six months
Check if the exposed wires are damaged. If so, replace the corresponding cables.	Once every six months
Check if there are any obstructions around the battery to prevent it from cooling properly.	Once every six months
Check for water or pests to prevent long-term intrusion into the battery.	Once every six months
If the battery is not used for a long time, it must be charged to at least 50% of its State of Charge (SOC) each time.	Once every six months

Table 4.9

05 Warranty service

5.1 Warranty period

When the product is used correctly, the warranty period stipulated in the business contract shall prevail.

5.2 Warranty scope

If the product is within the warranty period and any malfunction is caused by quality issues of the product itself, our company will provide free repair or replacement of the product for the customer. The customer should reserve a reasonable response time for our company's maintenance. The replaced product will be handled by our company. The customer is required to present the relevant proof of product purchase and ensure that the product trademark is clearly visible. Otherwise, our company reserves the right not to provide warranty coverage.

5.3 Disclaimer

In the following cases, the company reserves the right not to provide quality assurance, but can still offer paid repair services.

1. Beyond the warranty period;
2. Unable to provide proof of product purchase;
3. Damage caused during transportation or loading/unloading;
4. Incorrect installation, modification or damage caused by unauthorized personnel's disassembly;
5. Damage resulting from abnormal use conditions or environments;
6. Machine failure or damage caused by using non-Natong components or software;
7. Faults caused by irresistible factors such as fires, earthquakes, floods, etc.

Appendix

Appendix A-Logo Description

Identification Instructions

	Please read the endorsed documentation carefully
	Danger. Risk of electric shock!
	Hazardous Substance Labeling
	CE certification
	Transportation Safety Certification
	Flammability risk
	Keep the battery away from open flame or ignition sources.
	Recycling
	The danger of 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

Appendix B-Inverter support protocol

Default setting: CANBUS - Victron, RS485-Pylon.

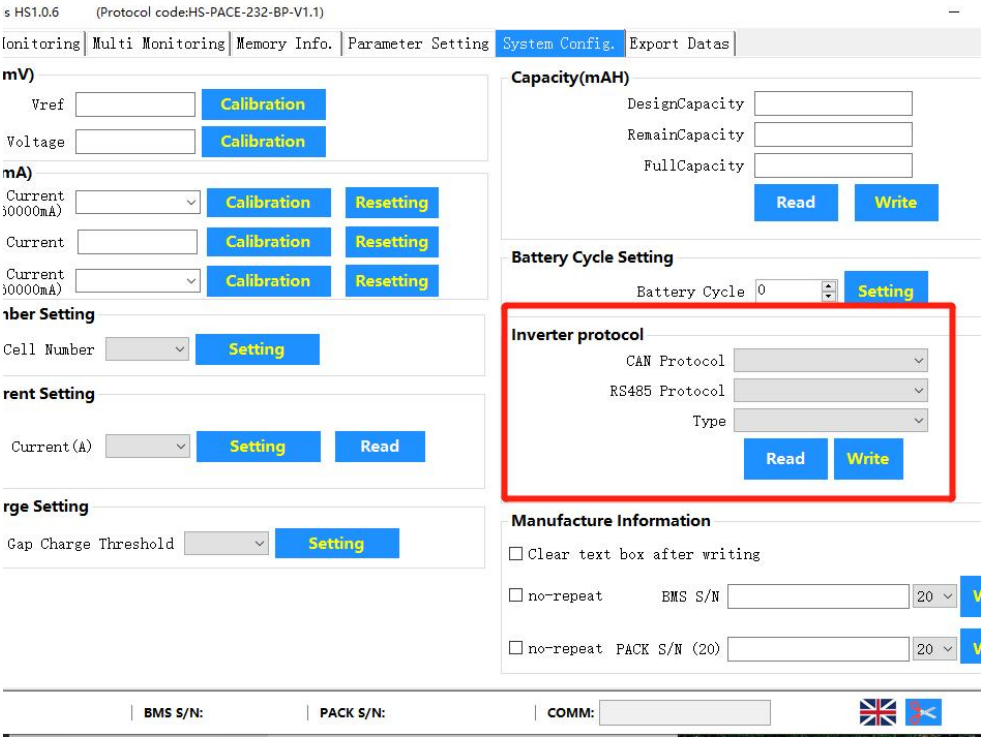
NO	Type	Inverter		Protocol
1	CAN	Pylon	PYLONTECH	PYLON CAN LV V1.3-2019.03.01
2	CAN	DEYE/Sunsynk	Deye 德業	PYLON CAN LV V1.3-2019.03.01
3	CAN	Growatt	GROWATT 古瑞瓦特	Growatt CAN LV V1.09-2020.10.22
4	CAN	Victron	victron energy BLUE POWER	Victron CAN 2021.01.07
5	CAN	Luxpower	LUXPOWERTEK	Luxpowertek CAN V1.0-2020.02.11
6	CAN	SMA	SMA	SMA CAN V2.0
7	CAN	Goodwe	GOODWE 固德威	GoodWe CAN Inverter LV V1.7-2020.02.28
8	CAN	Studer	STUDER	STUDER CAN V1.02-2018.06.14
9	CAN	Sofar	SOFAR 首航新能源	SofarSolar CAN inverter V6
10	CAN	Ginlong/Solis	锦浪科技 GINLONG	GINLONG CAN LV V1.0-2019.12.28
11	CAN	TBB_LITHIUM	TBB POWER	TBB CAN V1.05-2021.04.20 TBB CAN V1.1-2021.10.21
12	CAN	Daneng	DONNERGY	DANENG CAN V10-2022.10.10
13	CAN	Aiswei	爱士惟 AISWEI	AISWEI CAN V1.0

14	CAN	SAJ		SAJ CAN V1.9-2022.06.30
15	CAN	Sorotec		Sorotec CAN Inverter V1.22-2017.11.28
16	CAN	MUST		MUST CAN V2.0.2-2021.06.02
17	CAN	Megarevo		PYLON CAN LV V1.3-2019.03.01
18	CAN	Schneider		Schneider can2.0
19	CAN	Afore		Afore Communication protocol CAN
20	CAN	Solax		PYLON CAN LV V1.3-2019.03.01

NO	Type	Inverter		Protocol
1	RS485	Pylon		PYLON RS485 LV-BPB V3.5-2019.08.07
2	RS485	DEYE/Sunsynk		PYLON RS485 LV-BPB V3.5-2019.08.07
3	RS485	Growatt		Growatt RS485 V2.01-2019.02.13
4	RS485	Voltronic		Voltronic RS485 Inverter V1.0-2018.09.11
5	RS485	Phocos		Phocos RS485 2021.04.07
6	RS485	Luxpower		Luxpowertek RS485 inverter V0.3-2020.07.06
7	RS485	SRNE		WOW RS485 Modbus V1.3-2017.06.27
8	RS485	Sorotec		Sorotec RS485 Inverter V1.22-2017.11.28

9	RS485	Hypon	HYPONTECH ENERGIZING FUTURE	HYPONTECH RS485 Modbus V2.0-2023.06.29
10	RS485	SUNPLAIN	LU 欧陆电气	Communication protocol for 8-11KW energy storage inverters
11	RS485	Epever	EPEVER	Lithium Battery BMS-Link Communication Address Table V1.6
12	RS485	TALEGENT	Talegent 赋勤创新	B Communication Protocol from Inverter to BMS
13	RS485	ELTEK	ELTEK A Delta Group Company	BatteryModbusDataDefinitions (REV14)
14	RS485	Techfine	Techfine 泰菲	PYLON 485 Communication Protocol V3.5
15	RS485	SMKSOLAR	SMK SOLAR Energy · Anytime · Anywhere	Lithium Battery Agreement GT Version 24 Year 7 1.0 Version
16	RS485	Gospower	Gospower	PYLON 485 Communication Protocol V3.5
17	RS485	AOHAI	AOHAI	PYLON 485 Communication Protocol V3.5
18	RS485	SUNGERY	SUNGERY	PYLON 485 Communication Protocol V3.5

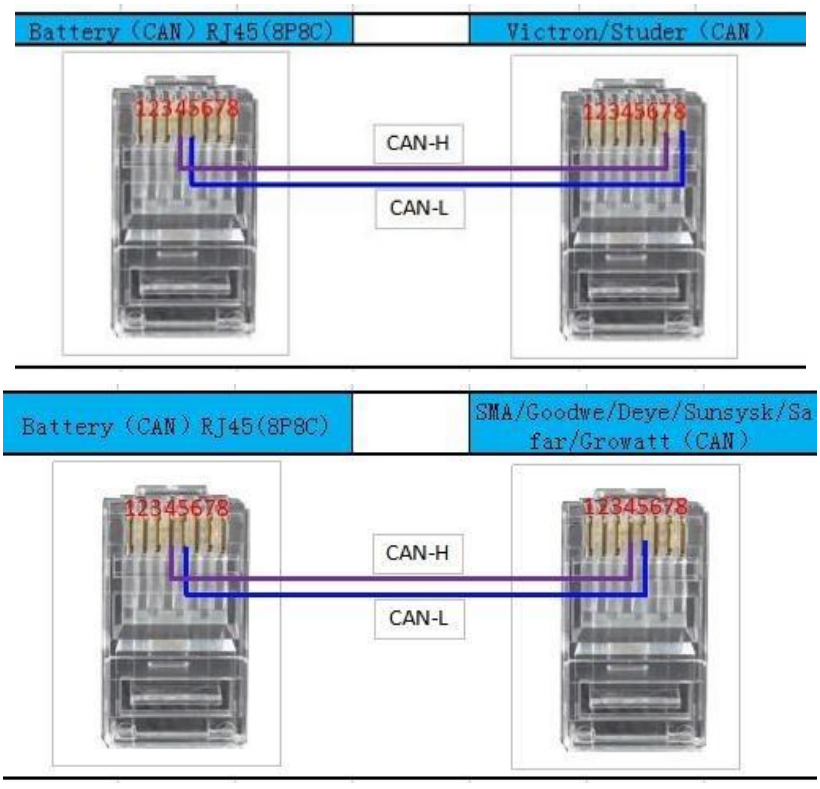
Default setting: CANBUS – Victron, RS485-DEYE.

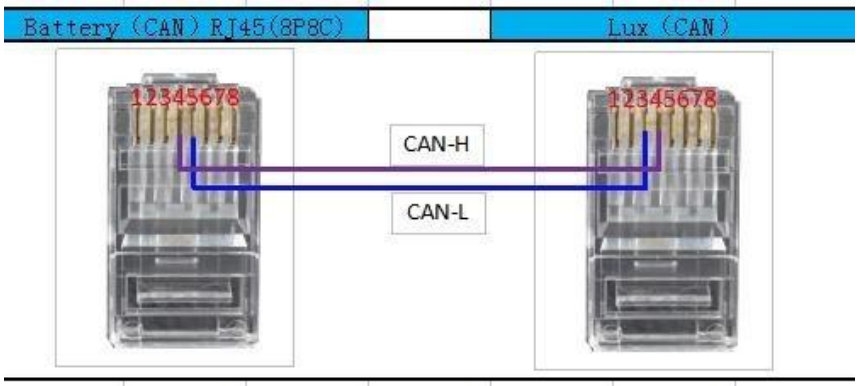


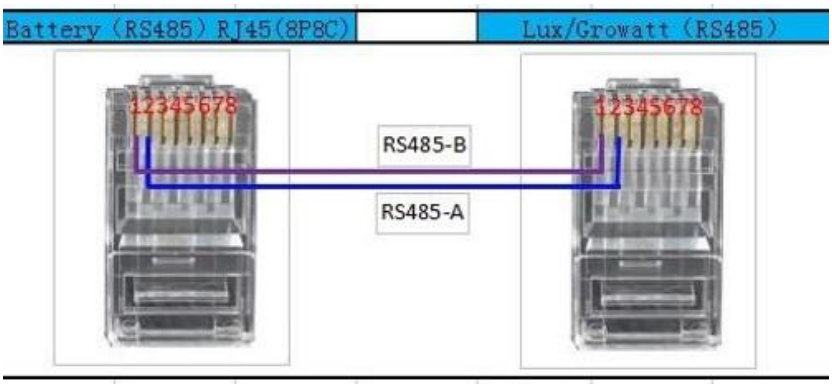
The login password for the host software management can be obtained by contacting the sales team.

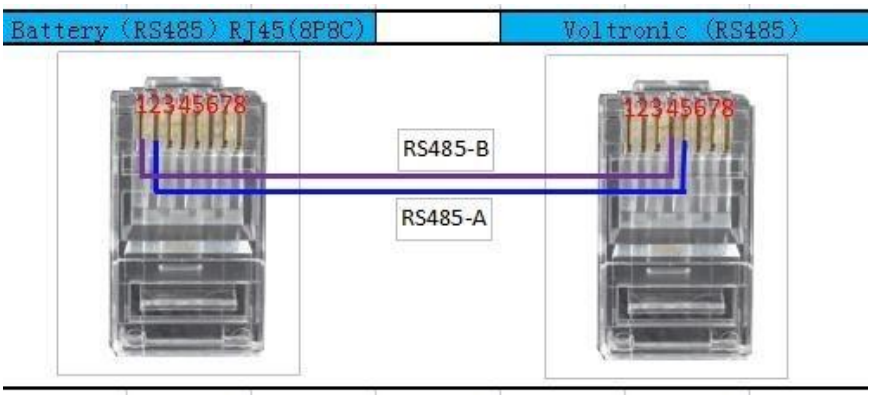
The pin definitions for different inverters are different. For details on the RJ45 network cable connection, please consult the inverter supplier.

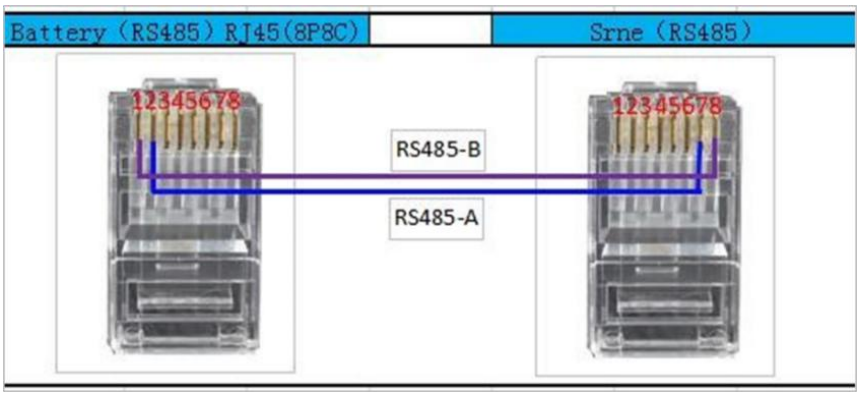
The connector pin configurations of the above-mentioned inverter manufacturers are listed below:




Battery (CAN) RJ45(8P8C)
Lux (CAN)
12345678
12345678
CAN-H
CAN-L


Battery (RS485) RJ45(8P8C)
Lux/Growatt (RS485)
12345678
12345678
RS485-B
RS485-A


Battery (RS485) RJ45(8P8C)
Voltronic (RS485)
12345678
12345678
RS485-B
RS485-A


Battery (RS485) RJ45(8P8C)
Srne (RS485)
12345678
12345678
RS485-B
RS485-A

Appendix C-Emergency handling

When the battery drops or is subjected to a strong impact

- During installation, if the battery falls or is subjected to strong impact, it may cause internal damage. Do not continue to use it.
- If there is a noticeable odor, damage, smoke or fire, immediately evacuate the personnel and promptly call the police. Professional personnel should use fire-fighting equipment to extinguish the fire and handle the situation under the condition of ensuring safety.
- If there is no obvious deformation or damage to the appearance and no noticeable odor, smoke or fire occurs, contact professional personnel to transfer the battery to an open and safe place, or contact the company for recycling treatment.

When a flood occurs

- Ensure personal safety first, then immediately cut off the power supply of the system.
- If any part of the battery is submerged in water, do not touch it to avoid electric shock. Evacuate the scene and report it in time.
- The flooded battery has a risk of electrolyte contamination. It cannot be reused and needs to be recycled and scrapped by a professional institution.

When there is smoke or fire

- When there is a large amount of smoke in the storage room for batteries, it is strictly prohibited to open the door and enter to prevent the risk of explosion and inhalation of toxic gases by personnel.
- During the extinguishing process, all firefighters should wear full heat-insulating fireproof suits, wear fire-fighting filtering respirators or air respirators, fire helmets and masks, and insulated protective equipment such as insulated shoes. Use inert gas or Class D dry powder fire extinguishers. It is forbidden to use water-based fire extinguishing agents (initially).
- After extinguishing the fire, continuous water spraying for cooling is still required. Wait until the battery temperature cools to within ±10℃ of the room temperature, and monitor for several hours to ensure there are no signs of temperature rise before removing.

When electrocuted

- Set up warning tapes to isolate the scene and ensure that people stay away from the power source.
- Do not directly touch the victim until they have been disconnected from the power source. Avoid getting yourself electrocuted. Wear professional insulating gloves and shoes, and use insulating tools to separate the victim from the power source.
- If the injury is severe, immediately call the emergency number. Have the victim lie flat, monitor changes in their consciousness, breathing, and heartbeat. For those with severe injuries, no breathing, or no heartbeat, trained personnel with certification should perform cardiopulmonary resuscitation until medical personnel arrive.

When the battery bulges

- Immediately stop using and disconnect the power supply. Stop charging and discharging, and disconnect the power source of the device. Do not attempt to charge, freeze or puncture the battery. If you notice the device is overheating or smoking, place it in a fireproof container (metal box/sandbox) and keep it away from the device.
- For handling methods based on the degree of battery bulging:
(1) Slight deformation, no heating - safely remove and send to the recycling point
(2) Shell rupture/leaking - isolate and hand over to the hazardous waste agency for handling
(3) Accompanied by high temperature/smoke - place in the sandbox for monitoring, use water to cool down and sound the alarm.
All operations should prioritize personal safety. If unsure, evacuate immediately and contact professionals.

Appendix D-Exceptional Situation Explanation

1. What should be done if the battery pack fails to function properly after being connected to the power supply?

Answer: The most straightforward method is to connect to the host computer. Through the host computer, the fault phenomenon can be detected. Information such as alerts, protection, and faults can be displayed on the host computer interface, allowing for a rough analysis of the cause. This can also provide necessary references for further testing.

2. Under what circumstances will RS232 communication fail?

Answer: The following steps can be taken to eliminate this problem:

1) Ensure that at least one indicator light on the battery pack is on or flashing, indicating that the battery pack is in normal operation.

2) Confirm that the upper computer software selects the correct COM port (refer to the device manager).

3) Confirm that the RS232 communication line is fully inserted into the corresponding communication interface of the battery pack.

3. Under what circumstances will RS485 be unable to perform parallel battery communication?

Answer: The possible causes of parallel battery communication failure are as follows: First, confirm whether the parallel RS485 communication ports are properly connected. Then, ensure that the address dialing position of the battery pack is correct, and make sure that the RS485 terminal plug is in the correct position.

4. What is the fault alarm mechanism?

A: The battery pack has a fault alarm function, which can be checked through the upper computer software.

Faults include:

1) Sampling fault: Communication failure between the analog front-end and the main control chip. When the fault occurs, the charging and discharging function is turned off, and the fault alarm can be automatically cleared after the fault is eliminated.

2) Temperature NTC fault: Mainly detects whether the temperature NTC is short-circuited or disconnected. When the fault occurs, the charging and discharging function is turned off, and the fault alarm can be automatically cleared after the fault is eliminated.

3) Unit fault: The voltage difference between the unit is greater than 1V, or the difference between the total voltage detected and the total voltage of the unit is greater than 5V, or the minimum voltage is less than 0.5V. A broken voltage sampling line also reports the same fault. When the fault is cleared, the fault alarm can be automatically cleared.

After the battery is connected to the system, it exhibits overcurrent protection or short-circuit protection. This is not a problem of the battery pack, but rather an excessive capacity load of the electrical equipment. Charging can eliminate the alarm or extend the pre-charging circuit delay time of the battery pack.

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Best Solution Lithium Battery

User Manual

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