



BSL NEW ENERGY TECHNOLOGY CO., LTD

User Manual

AIO HESS EU 6K10/16

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Version History

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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.



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

1.2 General Security



Illustrate:

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

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

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

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



Danger:

Elevated voltage is present in the equipment. Non-compliant operation may cause electric shock or fire, leading to death, serious personal injury, or significant property damage. Comply with the operating sequence and safety precautions provided in this manual and other relevant documents, and operate properly:

1. Check that the pre-installed cable connections are secure. Check the equipment for damage, such as holes, dents, or other signs of possible internal damage. Check that components inside the equipment have not shifted. Do not modify the structure or installation sequence of the equipment without authorization.

2. Do not clean electrical components inside the equipment with water. If liquid enters the equipment, immediately press the emergency stop button and notify the on-site manager.

3. Do not perform installation, wiring, maintenance, or replacement operations on live equipment. Before touching any conductor surface or terminal, measure the voltage at the contact point, confirm that the protective grounding wire of the equipment or the component requiring maintenance is reliably grounded, and confirm there is no electric shock risk.

4. Except for personnel operating the equipment, other personnel should not approach the equipment. Do not power on the equipment before installation is complete or without confirmation by a professional. During initial power-on or live main circuit operations, at least two personnel must be present on site.



Illustrate:

1. User operations and tools used during transportation, handling, installation, wiring, and maintenance must comply with the laws, regulations, and applicable standards of the relevant country or region.

2. Reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the device software are prohibited. It is forbidden to investigate the internal implementation of the device, obtain the source code of the device software, misappropriate intellectual property rights in any way, or disclose the results of any device software performance testing.

1.3 Personal Safety



Danger:

1. Wear appropriate personal protective equipment during equipment operation. If faults that may cause personal injury or equipment damage are detected, immediately terminate operations, report to the responsible person, and implement effective protective measures.

2. Before using tools, master their correct operation methods to avoid personal injury or equipment damage.

3. During equipment operation, certain internal surfaces may reach high temperatures posing burn hazards. Do not touch.
4. Ensure reliable grounding before use to guarantee personal safety and normal operation.
5. When battery modules fail, temperatures may exceed burn thresholds on touchable surfaces. Avoid contact.
6. Do not open or damage battery modules. Released electrolytes are harmful to skin and eyes. Avoid exposure.
7. Do not place unrelated objects on top of or insert into any part of the equipment.
8. Do not place flammable materials near the equipment.
9. Never expose batteries to fire to prevent explosion and personal danger.
10. Do not immerse battery modules in water or other liquids.
11. Never short-circuit battery module terminals. Short-circuiting may cause combustion.
12. Batteries may pose electric shock and high short-circuit current risks.
13. Do not clean internal or external electrical components with water or detergents.
14. Do not stand, lean, or sit on the equipment.
15. Do not damage any modules of the equipment.
16. If a battery module is dropped or subjected to severe impact during installation, discontinue use immediately. Continued operation poses safety risks (e.g., electrolyte leakage, electric shock).



Warning:

1. Remove watches, rings, or other metal objects.
2. Use tools with insulated handles.
3. Wear rubber gloves and boots.
4. Do not place small tools or metal parts on top of battery modules.
5. Disconnect charging power before connecting or disconnecting battery terminals.
6. Determine whether the battery is accidentally grounded. If accidentally grounded, remove the power source from the ground. Contact with any part of a grounded battery may cause electric shock. If such grounding is removed during installation and maintenance, the possibility of electric shock can be reduced.

1.4 Battery Leakage Handling Measures



Caution:

In the event of electrolyte leakage, take the following emergency measures according to the severity of the leakage.

1. Ensure adequate ventilation. Remove all ignition sources.
2. Quickly evacuate personnel to a safe area, away from the leakage zone and upwind.
3. Use personal protective equipment (PPE). Avoid inhaling vapors, fumes, gases, or dust.
4. If safe to do so, take measures to prevent further leakage or spillage.
5. For minor leaks, use dry sand or inert absorbent materials to contain the leakage. For major leaks, construct barriers to control spread.
6. Contaminated materials or collected residue must be stored in sealed containers and disposed of in compliance with local regulations.
7. Eliminate all ignition sources and use spark-proof tools and explosion-proof equipment.



Danger:

Avoid contact with leaked liquid or gas during leakage incidents. The electrolyte is corrosive and may cause skin irritation or chemical burns. If exposed to battery electrolyte, take these immediate actions.

1. Inhalation: Evacuate the contaminated area immediately; move to fresh air; maintain clear breathing; administer oxygen if breathing is difficult; do not perform mouth-to-mouth resuscitation if the victim ingested/inhaled the substance; if breathing stops, begin CPR immediately; seek urgent medical assistance.

2. Eye Contact: Flush eyes with copious clean water for at least 15 minutes (hold eyelids open); do not rub eyes; obtain immediate medical help.

3. Skin Contact: Remove contaminated clothing immediately; wash affected area thoroughly with plenty of water and soap; seek prompt medical aid.

4. Ingestion: Do NOT induce vomiting; never give oral substances to unconscious persons; seek emergency medical care.

5. First Responder Protection: Ensure medical personnel are informed of the electrolyte's hazards; implement personal protective measures to prevent exposure and cross-contamination.

1.5 Electrical Safety

1.5.1 General Requirements



Illustrate:

1. All electrical connections must comply with the electrical standards of the country/region where the equipment is located.

2. Installation, operation and maintenance must strictly follow the manual procedures. Unauthorized equipment modifications or installation sequence changes are prohibited.

3. Temporary fencing and "No Entry" signs must be installed in work areas. Unauthorized personnel are strictly prohibited from entering.

4. Tools must be registered and inspected for completeness before operation, and counted after operation to prevent being left inside the equipment.



Danger:

Before performing electrical connections, ensure the equipment is undamaged to prevent electric shock or fire hazards. Prior to installing power cables, verify the cable labels are correct and terminal insulation protections are intact. Do not energize the equipment until installation is complete and verified by qualified personnel.

1.5.2 Wiring Requirements

1. Select cables that comply with local laws and regulations. Cables of the same type shall be bundled together, while different types shall be routed separately. Intertwining or cross-routing of cables is strictly prohibited.

2. Remove sharp edges from cable trays/conduit holes. Install protective sleeves at wire penetration points to prevent insulation damage.

3. Maintain a minimum distance of $\geq 30\text{mm}$ between cables and heat-generating components to prevent insulation degradation due to high temperatures.

4. When installing cables in environments below 0°C :

- All cables must be installed in environments above 0°C ;

- If storage temperature was below 0°C, relocate cables to a warm environment ($\geq 0^{\circ}\text{C}$) for at least 24 hours prior to installation.



Danger: Never install or remove power cables while energized. Contact between power conductors and terminals may generate electric arcs/sparks, potentially causing fire or personal injury.

1.5.3 Grounding Requirements

1. The equipment must be permanently connected to a protective grounding conductor. Verify reliable grounding before operation.
2. Do not operate the equipment without installing the grounding conductor. Damaging the grounding conductor is strictly prohibited.
3. Grounding impedance must comply with local electrical standards. Regularly test grounding reliability.
4. For three-core socket equipment: Ensure the grounding terminal connects to protective earth. For equipment with high touch current: Ground before connecting to power supply.

1.5.4 Maintenance Requirements

1. Before connecting or disconnecting cables, disconnect the protective switch of the corresponding circuit.
2. Use a multimeter rated for the applicable voltage level to verify de-energization and ensure complete power-off.
3. Hang "Do Not Close" tags on upstream/downstream switches and post warning signs during maintenance. Re-energize only after the malfunction is fully resolved.



Illustrate:

1. Before connecting cables, confirm that the cable labels are correct before proceeding with the connection.
2. For equipment with multiple inputs, disconnect all inputs to the equipment. Operation may only be performed after the equipment is fully powered down.
3. After completing maintenance, remove the grounding wire between the maintenance circuit and the grounding circuit.

1.6 Mechanical Safety

1. When manually handling equipment, assess weight-bearing capacity and wear protective gear including gloves and safety toe boots.
2. Move equipment carefully during handling to prevent impact or drops. Avoid scratching surfaces, damaging components, or compromising cables.
3. During transportation, large equipment may obstruct operator's view; assign assistants to ensure safe movement.

1.7 Maintenance and Replacement

Perform equipment maintenance only after thoroughly understanding this manual and with appropriate tools/testing devices.

1. Before maintenance work, de-energize the equipment and wait for the duration specified on the delayed-discharge label to ensure complete power-off before operation.

1. During maintenance, restrict access to unauthorized personnel. Erect temporary warning signs or barriers for isolation.
 2. Contact your distributor immediately for equipment malfunctions.
 3. Do not re-energize until malfunctions are fully resolved. Failure to comply may cause expanded failures or equipment damage.
 4. Unauthorized opening of covers is prohibited due to electrocution risks. Resulting damages void warranty coverage.
 5. Operators and technicians must receive comprehensive safety and maintenance training. Perform tasks only with adequate precautions and personal protective equipment.
 6. When relocation or rewiring is required, the power input must be disconnected. After waiting 5 minutes for complete internal energy discharge and verifying the absence of hazardous voltage on DC busbars and maintenance areas using a multimeter, maintenance may commence.
 7. Battery maintenance must be performed/supervised by personnel trained in battery handling and safety protocols.
 8. Replace batteries only with identical types.
 9. After maintenance, immediately verify no tools or components remain inside the equipment.
- For prolonged storage: Follow battery preservation and recharging procedures specified in this manual.

02 Product Introduction

2.1 Product Overview

The AIO HESS Series is a floor-standing energy storage device. It can be installed directly against the wall using a simple method, and the installation process is quick and easy. Its elegant design and compact size enable it to easily fit into any small space in the home. At the same time, it supports various application modes, such as solar self-generation and self-use systems, helping families achieve the goal of green electricity consumption.

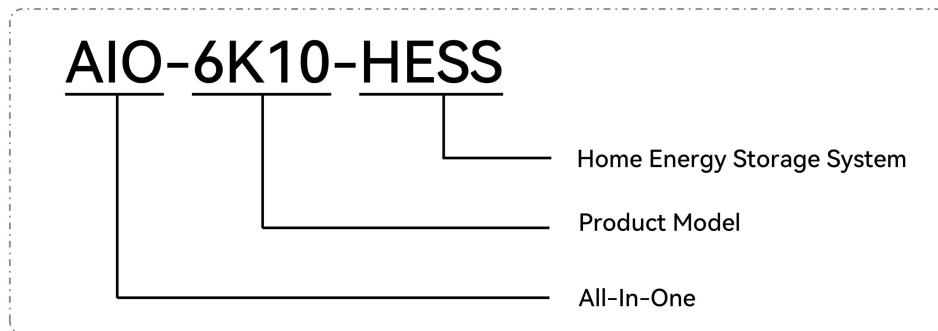


Figure2.1

2.2 Product Appearance

AIO-6K10-HESS:

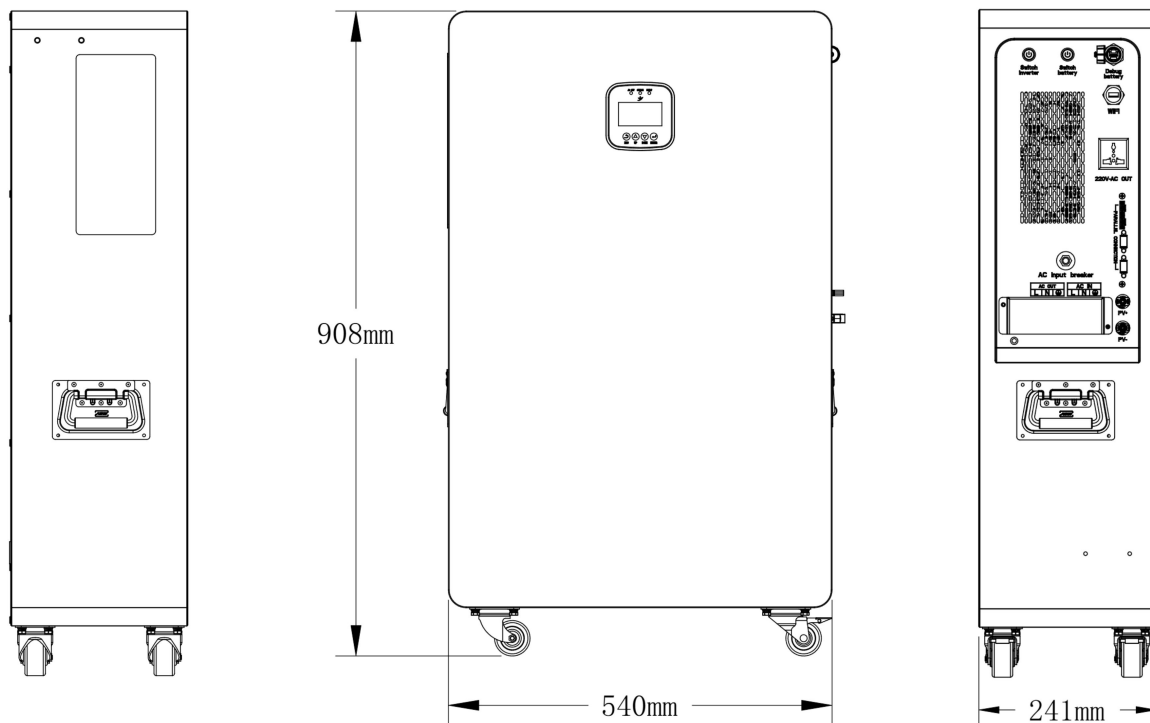


Figure2.2-2

AIO-6K16-HESS:

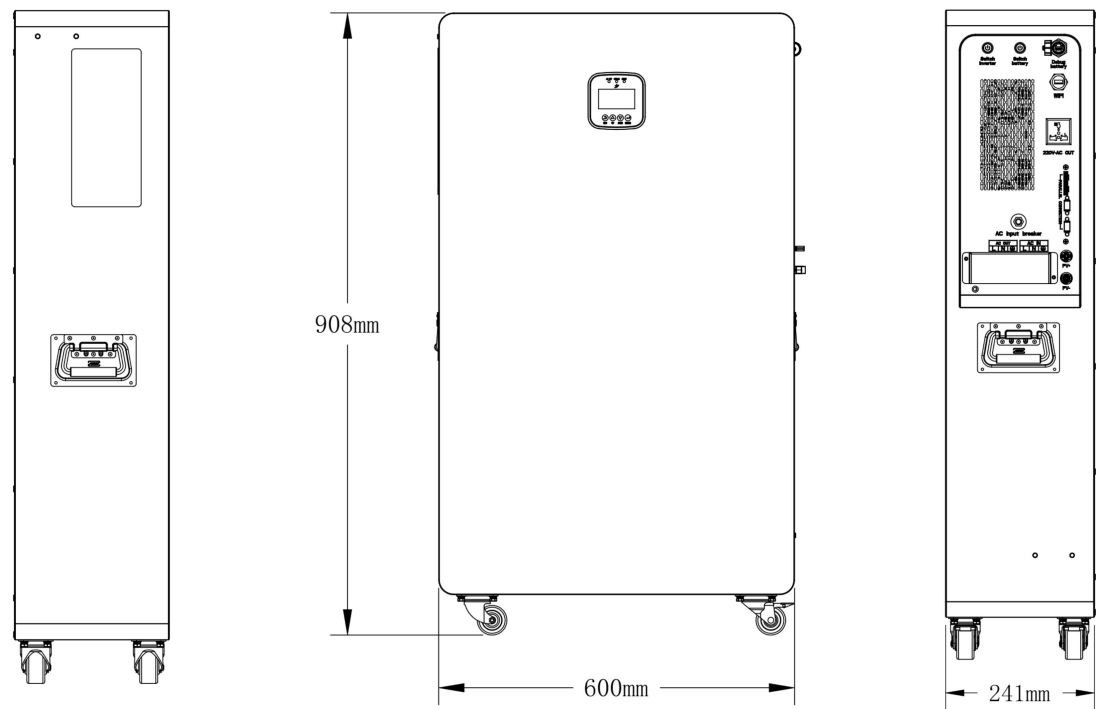


Figure2.2-3

2.3 Product Specification

Item	General Parameter	
Model	AIO 6K10 HESS	AIO 6K16 HESS
Battery Side Parameters		
Cell Type	205Ah / 3.2V Prismatic LFP Cell	314Ah / 3.2V Prismatic LFP Cell
Cell Configuration	1P16S	
Normal Voltage	51.2V	
Nominal Capacity	205Ah	314Ah
Nominal Energy	10.49kWh	16.07kWh
Operating Voltage Range	44V~56.8V	
Standard Charge Current	100A	
Standard Discharge Current	100A	
Cycle Life	≥6,000 cycles (at 80% DOD, 0.5C rate, 25°C)	
PV Side Parameters		
Max. DC Input Power	6.5kW	

Rated DC Input Voltage		500V
MPPT Operating Voltage		90V~450V
Number of MPPT Trackers		1
Grid Side Parameters		
Rated AC Output Power		6.2kW
Maximum AC Output Current		27A
Rated AC Voltage		220/230V(±5%)
Rated AC Frequency		50/60Hz
Load Side Parameters		
Rated Output Power		6.2kW
Rated Output Voltage		230V(±5%)
Rated Output Frequency		50/60Hz
Rated Output Current		27A
General Parameters		
Operating Temperature Range		-20°C~55°C
Operating Humidity Range		10% to 90% RH (Non-condensing)
Storage Temperature Range		0°C~35°C
Cooling Method		Natural Convection
Fire Safety / Fire Protection	Pack-Level Aerosol Fire Suppression Device (Optional)	
Communication Interface		RS232/WiFi
Operating Altitude		< 3000m
Ingress Protection (IP) Rating		IP20
Dimensions (W*D*H, mm)	540*241*908(±5)	600*241*1048(±5)
Weight	100kg±3%	130kg±3%

Table 2.3-1



Illustrate: Actual usable energy may vary depending on charge/discharge rates, environmental conditions (e.g., temperature), transportation, and storage factors.

2.4 Product application

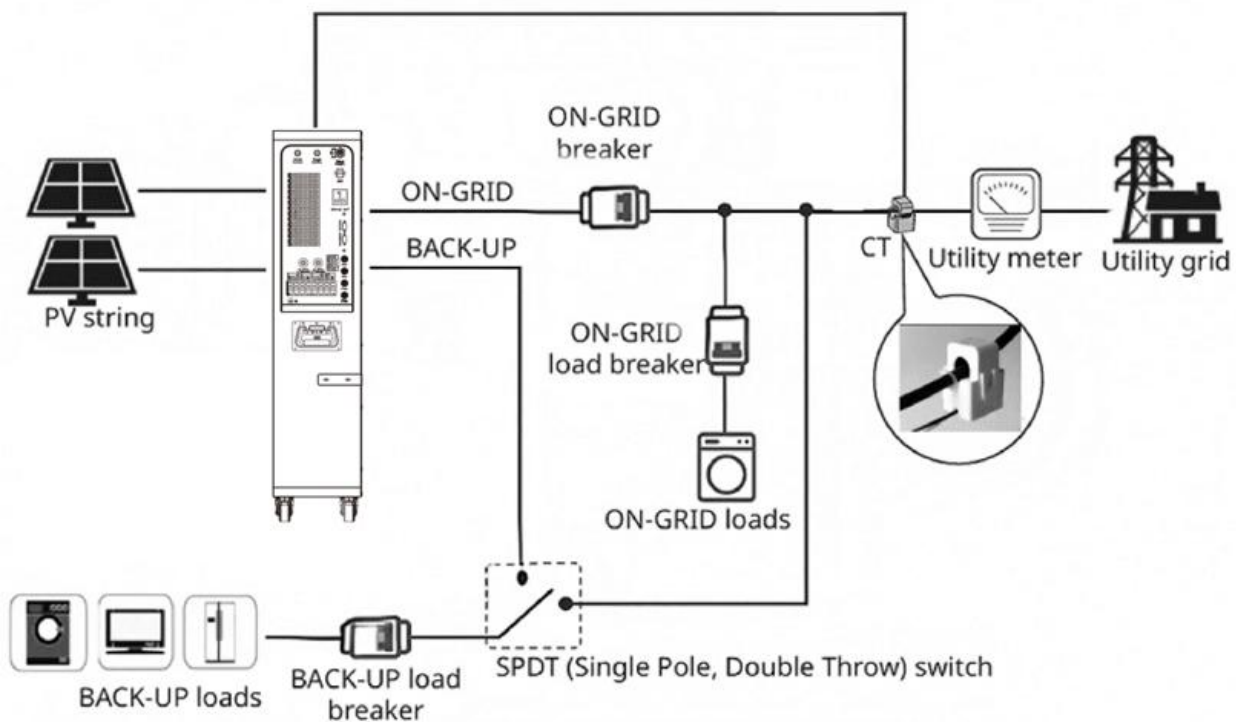


Figure2.4

The above figure illustrates the application scenario of the device (specific functions depend on the actual application). A complete application system consists of the following components:

Photovoltaic (PV) array: PV input. Sunlight generates DC power through the photovoltaic effect. This energy can be used by the inverter to charge the battery, or directly inverted into AC output power to supply loads.

Utility grid or diesel generator: AC input. It can supply power to loads and simultaneously charge the battery. When the AC input is lost, the inverter automatically switches to battery and PV array to power the loads, thereby providing an uninterruptible power supply (i.e., loads do not stop operating due to power loss).

All-in-one machine: Provides energy storage and discharge functions according to system requirements, as well as safety management.

Household loads: Supports both linear and nonlinear loads, such as computers, refrigerators, air conditioners, televisions, water heaters, and other household appliances.

WiFi or GPRS: Enables remote monitoring and management via a computer or mobile app.

2.5 Interface Description

Component Introduction-1

NO.	Remarks
1	All-in-one enclosure
2	Control panel
3	Folding handle
4	Dust filter
5	All-in-one electrical side
6	Folding handle
7	Bottom wheels

Table 2.5-1

Component Introduction-2

NO.	Name	Remarks
A	AC OUT(Green)	Status indicator(Steady on:Mains output;Flash:Inverter output)
B	CHARGE(Yellow)	Charging indicator(Flash:Fast charging;Steady on:Floating charge)
C	FAULT(Red)	Fault indicator(Flash :Fault state)
D	LCD display	View the real-time data of the all-in-one machine
E	ESC	To exit setting mode
F	UP	Previous choice
G	DOWN	Next choice
H	ENTER	To confirm the selection in setting mode or enter setting mode

Table 2.5-2



Illustration: The AIO-6K10/16-HESS is currently intended for stand-alone use only, not for parallel operation.

Component Introduction-3

NO.	Name	Remarks
a	Inverter Switch	Inverter starts up
b	Battery Switch	battery starts up
c	Air outlet	Forced heat dissipation to prevent heat accumulation
d	AC input breaker	Circuit Breaker for Equipment (CBE)
e	AC OUT	Connect the AC lines, connect the critical loads
f	Debug battery	Host computer connection for battery
g	WIFI	For remote monitoring
h	220V-AC OUT	Household socket (revisability)
i	PARALLEL CONNECTION	Current sharing port (Disabled)
j	PARALLEL CONNECTION	Parallel communication port (Disabled)
k	AC IN	Connect the AC lines, connect the grid
l	PV+	PV+ port
m	PV-	PV- port
m	PE	Connect protective earth to enclosure
o	Guard cover plate	Prevent people from accidentally touching

Table 2.5-3

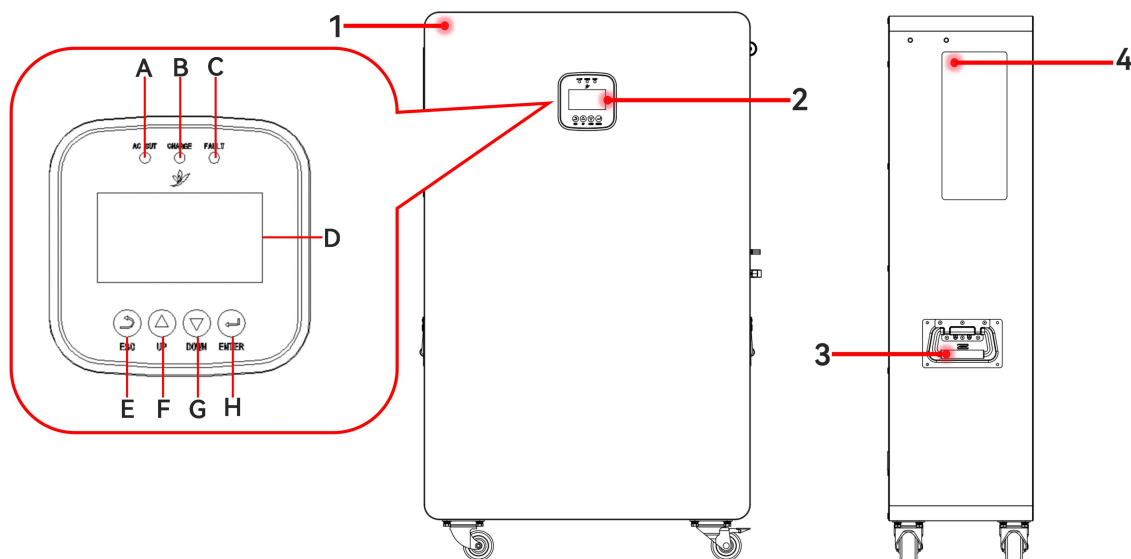


Figure2.5-1

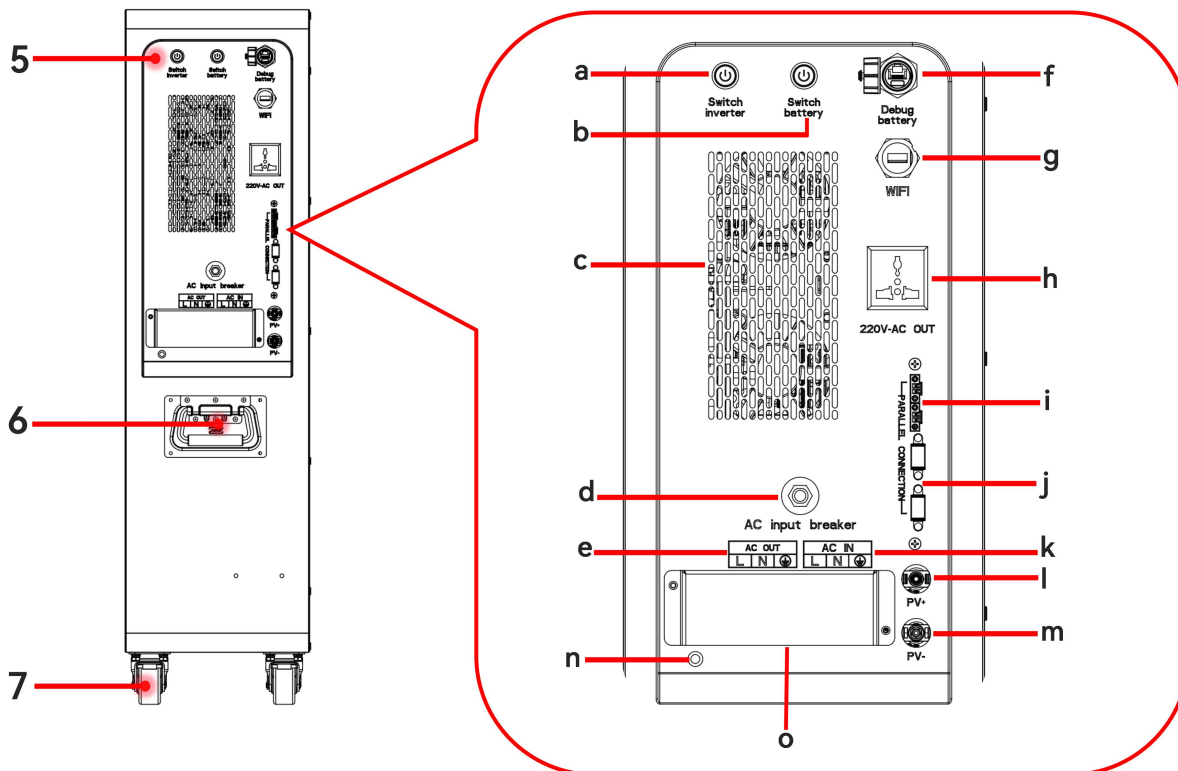


Figure2.5-2

2.6 Configuration List

Configuration List Table

Name	Qty	Remarks
Battery Pack	1 set	10kWh or 16kWh PACK (built-in)
Hybrid inverter	1 set	6.2kW single-phase (built-in)
User's Manual	1 copy	Electronic version
Matching accessories	1 set	AC terminals, PV terminals and communication components, etc.
Anti-tilt support mechanism	1 set	Complementary M8*50mm expansion screws

Table 2.6

03 Product Installation

3.1 Storage before installation

- 1. Preparation before storage :** Make sure the outer packaging box of the equipment is intact and do not dismantle it ; make sure the desiccant in the box is not lost to keep the inside dry.
- 2. Storage environment requirements:** When storing the equipment, keep it away from flammable, explosive, corrosive and other items ; store the equipment in a cool place and avoid direct sunlight ; ensure that the storage environment is clean, the temperature and humidity range is appropriate, and there is no condensation.
- 3. All-in-One System storage requirements:** The SOC (state-of-charge) range of the stored AIO should be 25%~50% SOC ; the AIO needs to be charged and discharged once every 6 months of storage.
- 4. Storage temperature range:** When the temperature is between -10 °C and 0°C, the storage time shall not exceed 1 month ; when the temperature is between 0°C and 35°C, the storage time shall not exceed 1 year ; when the temperature is between 35°C and 45°C, the storage time shall not exceed 1 month.
- 5. Storage humidity range:** The storage humidity range is 15 ~ 90 % RH, without condensation . If moisture and condensation are found on the battery interface, the AIO system cannot be installed and should be handled properly.

3.2 Pre-installation inspection

- 1. Outer packaging inspection:** Verify whether the outer packaging is intact, including whether there are deformations, holes, cracks or other signs that may cause damage to the internal equipment.
- 2. Equipment model and delivery parts inspection:** Check whether the equipment model is consistent with the order ; confirm whether the type and quantity of the delivery parts are correct, and check whether there is any damage on 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.



Figure3.3-1

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.

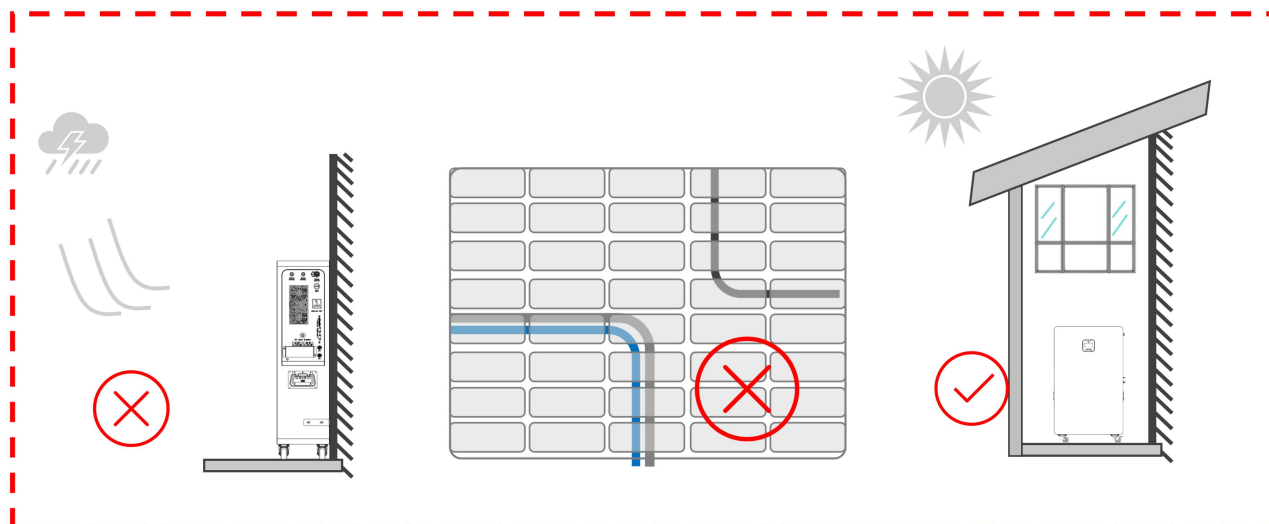


Figure3.3-2

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 AIO, a distance of at least 300mm should be left on both sides of the equipment.

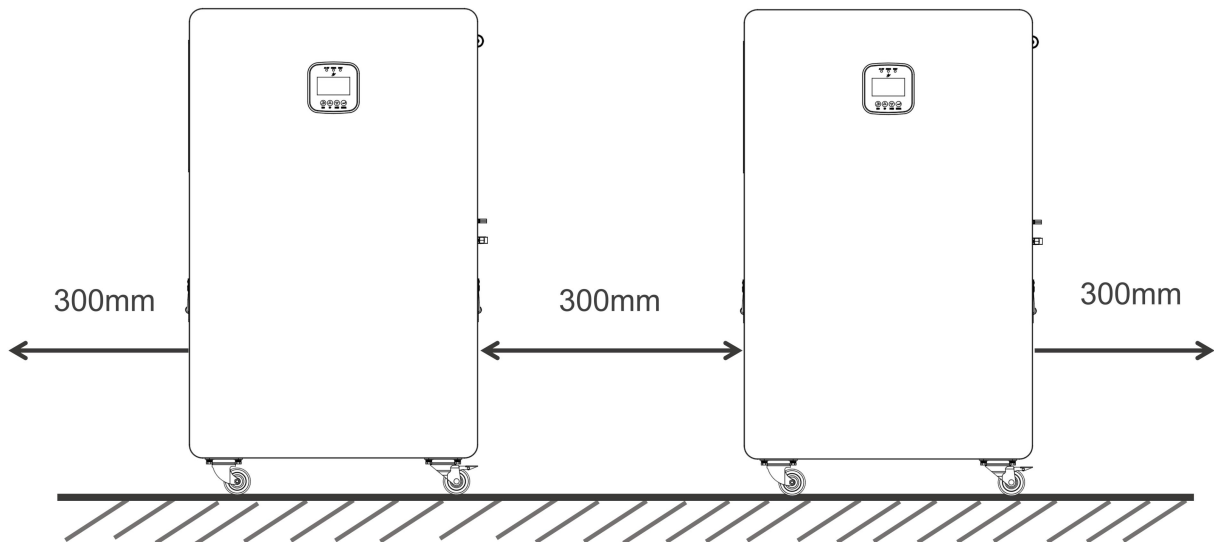


Figure3.3-3

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.

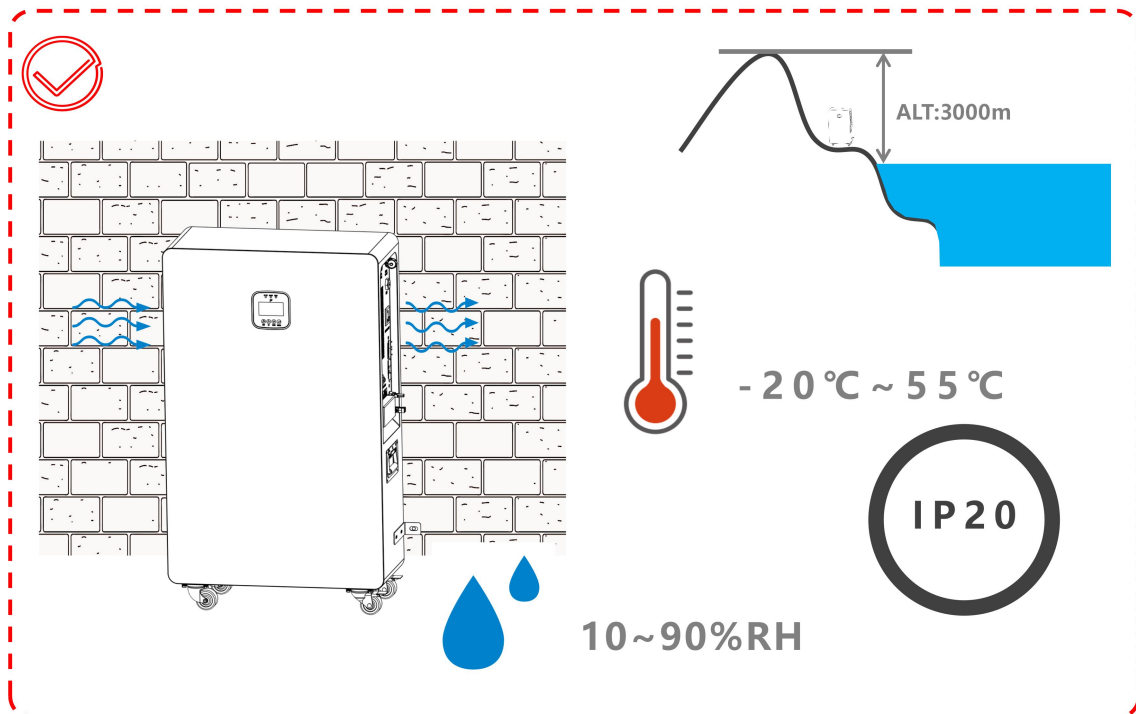


Figure3.3-4

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.

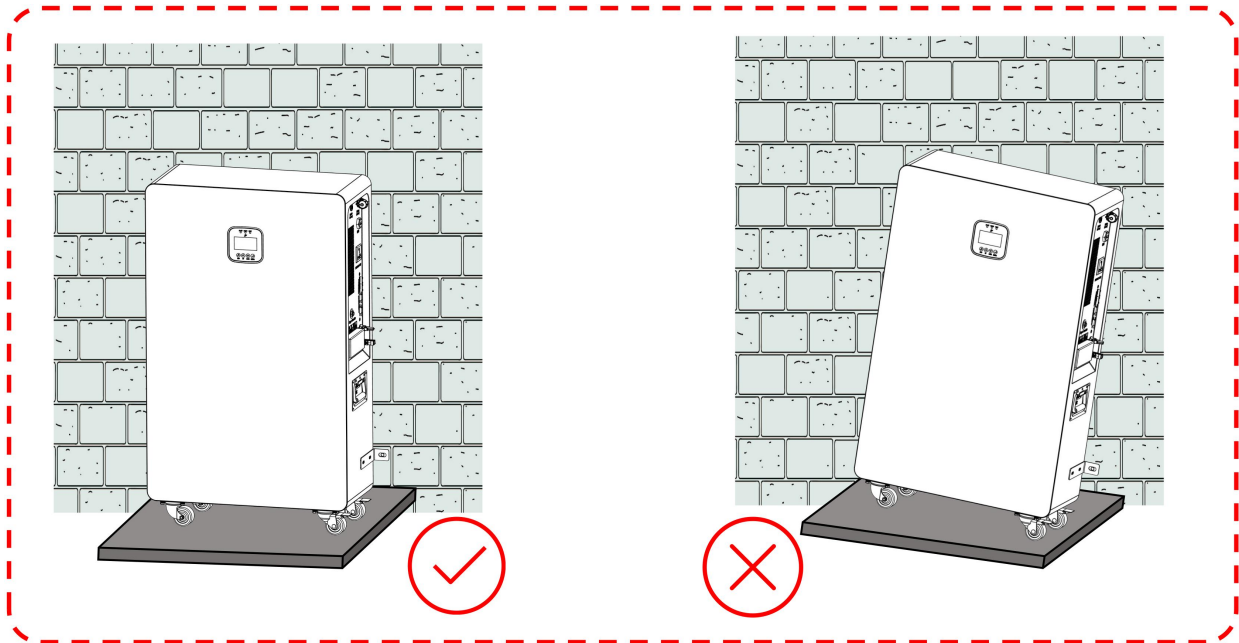


Figure3.3-5

3.4 Prepare tools

Installation Tools Table

No.	Tool Name	Legend
1	Insulating gloves	
2	Safety goggles	
3	Insulating shoes	
4	Work clothes	
5	Safety helmet	
6	Screwdriver	

7	Wire stripper	
8	Hydraulic clamp	
9	Heat gun	
10	Multimeter	
11	Torque wrench	
12	Marker pen	

Table 3.1



Illustration: This table is for reference only. Actual tools required shall comply with local installation standards.

3.5 Mechanical installation



Danger:

Installation of this equipment requires the cooperation of at least two persons. Please strictly follow the installation steps! The company shall not be held liable for any personal injury or property damage resulting from 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.

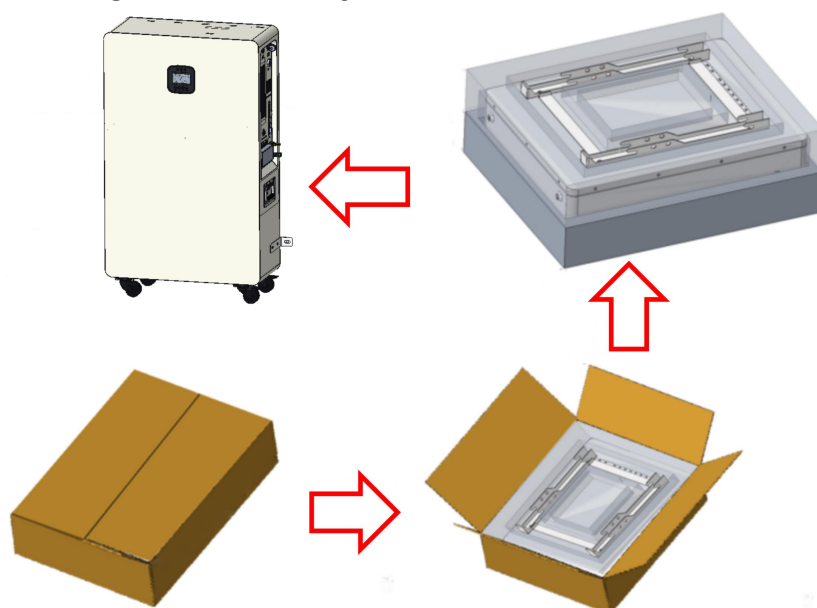


Figure3.5-1

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 3.1 for storage.

Step 2: Mounting Bracket Installation

To ensure the anti-tip bracket is securely installed, follow the steps below:

1. Attach the anti-tip bracket to the AIO device and verify that the bracket is firmly fixed.
2. Press the bracket flat against the wall, observe the level in the center of the base, and ensure the device is not tilted.
3. Adjust the bracket to the desired position and confirm the levelness. Then, use a marker to mark the drilling positions. After marking, move the device away.
4. Drill holes at the marked positions, install expansion anchors (screws), and secure the anti-tip bracket to the expansion anchors.

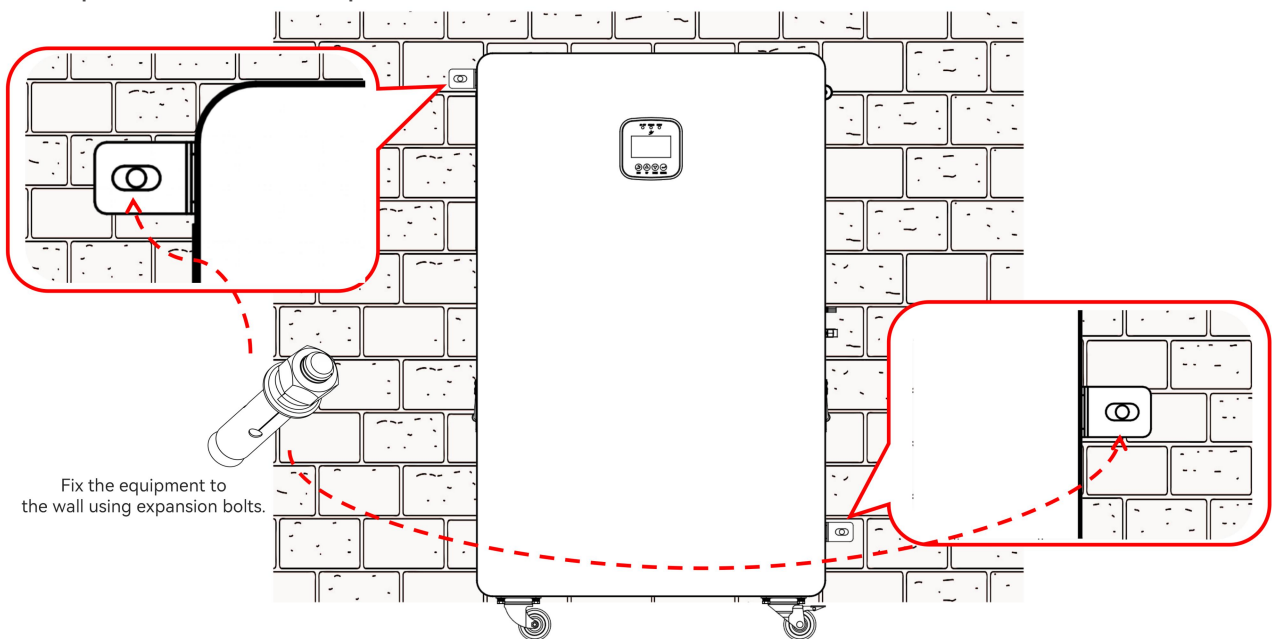


Figure3.5-2



Danger:

1. When drilling, ensure the drilling positions avoid water pipes, cables, or other utilities inside the wall to prevent hazards.
2. Wear safety goggles and a dust mask during drilling to avoid inhaling dust or having it fall into your eyes.
3. During equipment installation, ensure the device is level and securely mounted. When placing the AIO device, confirm that the upper and lower mounting holes are aligned.
4. The anti-tip bracket must be vertically flush against both the floor and the wall.
5. When using an impact drill, cover the AIO device with cardboard or other protective material to prevent foreign objects from entering the device and causing damage.

3.6 Electrical Connection



Danger :

1.Safe power-off operation

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

Strictly abide by the safety precautions in this manual and the safety signs on the equipment.

2.Electrical connection specifications

During the electrical connection process, cables and components that meet the requirements of local laws and regulations must be used.

Cables of the same type should be bound together, and arranged separately from cables of different types to avoid mutual entanglement or crossing of cables.

3.Precautions for crimping of terminal blocks

When crimping the terminal blocks, ensure that the conductor part of the cable is in full contact with the terminal blocks.

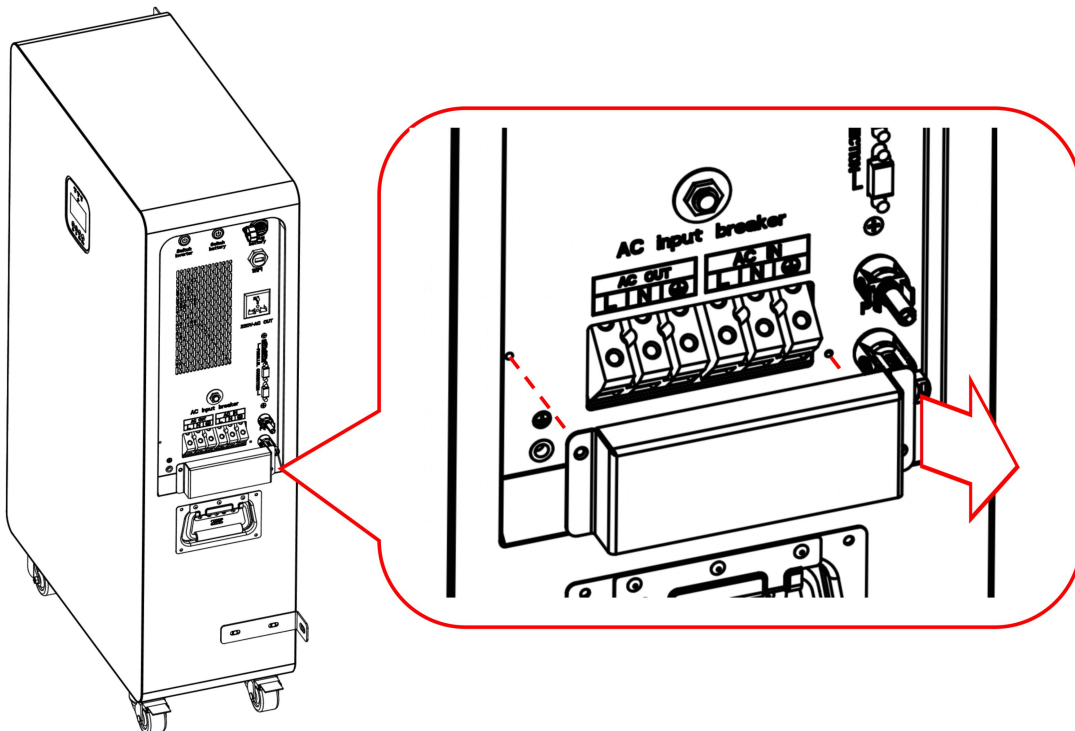
It is strictly forbidden to crimp the cable insulation with the terminal blocks. This may cause the equipment to fail to operate normally, or cause heat due to unreliable connection during operation, which may further damage the inverter terminal block.



Caution :

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

The protective cover must be removed before wiring:



3.6.1 Protective earth connection

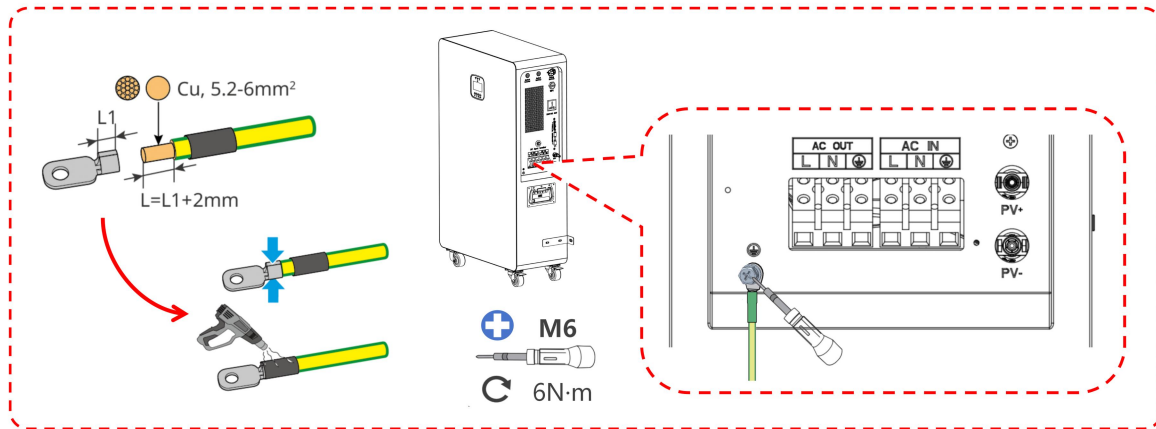


Figure3.6.1



Caution :

The protective earthing of the equipment enclosure cannot replace the protective earth (PE) conductor at the AC output port. When performing wiring, ensure that the protective earth conductors at both locations are reliably connected. To improve the corrosion resistance of the terminals, it is recommended to apply silicone sealant or paint on the outside of the grounding terminals after the protective earth conductors have been connected and installed. When installing the equipment, the protective earth conductor must be connected first; when removing the equipment, the protective earth conductor must be disconnected last.

3.6.2 PV cable connection



Caution :

Do not connect the same PV string to multiple AIO units; otherwise, equipment damage may occur. Ensure that the maximum short-circuit current and maximum input voltage of each MPPT are within the allowable range of the inverter. Also, ensure that the positive terminal of the PV string is connected to PV+ of the inverter, and the negative terminal of the PV string is connected to PV- of the inverter.

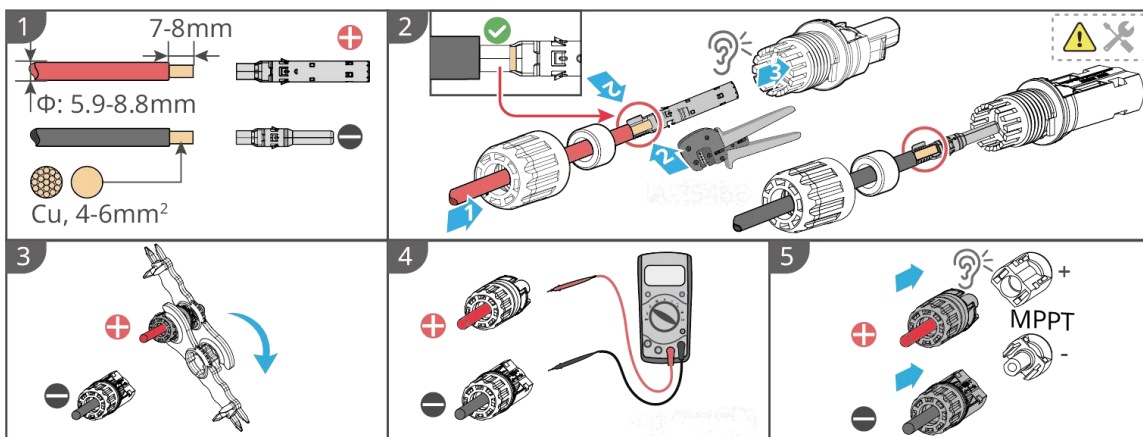


Figure3.6.2



Illustration:

The output of the PV string is not grounded. Before connecting the PV string to the inverter, ensure that the minimum insulation resistance to ground of the PV string meets

the minimum insulation impedance requirement ($R = \text{maximum input voltage} / 30 \text{ mA}$). After completing the DC cable connections, ensure that the cables are securely tightened and free from looseness. Use a multimeter to measure the positive and negative terminals of the DC cables, verifying that the polarity is correct without reverse connection, and that the voltage is within the permissible range. For each MPPT, the PV strings must use the same module model, the same number of modules per string, the same tilt angle, and the same azimuth angle to maximize efficiency.

3.6.3 Connect the AC cables



Caution :

During wiring, the AC cables must correctly match the AC-IN, AC-OUT, and ground terminals of the AC terminal block. Incorrect cable connections may cause equipment damage. Ensure that the wire cores are fully inserted into the terminal holes without any exposed conductor. Also, ensure that the cable connections are tight; otherwise, the terminals may overheat during equipment operation, leading to equipment damage.

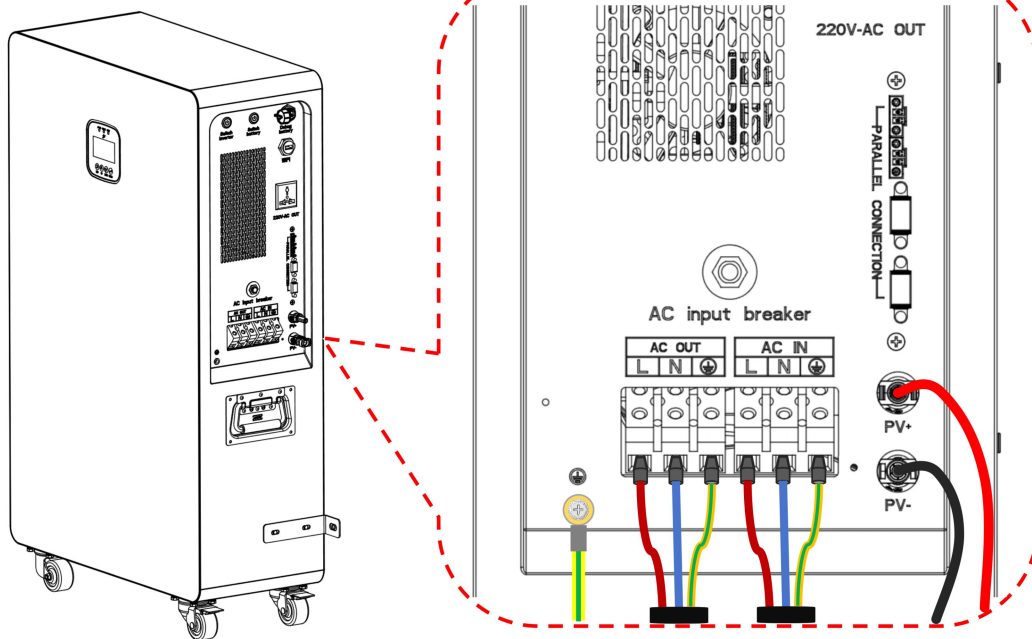
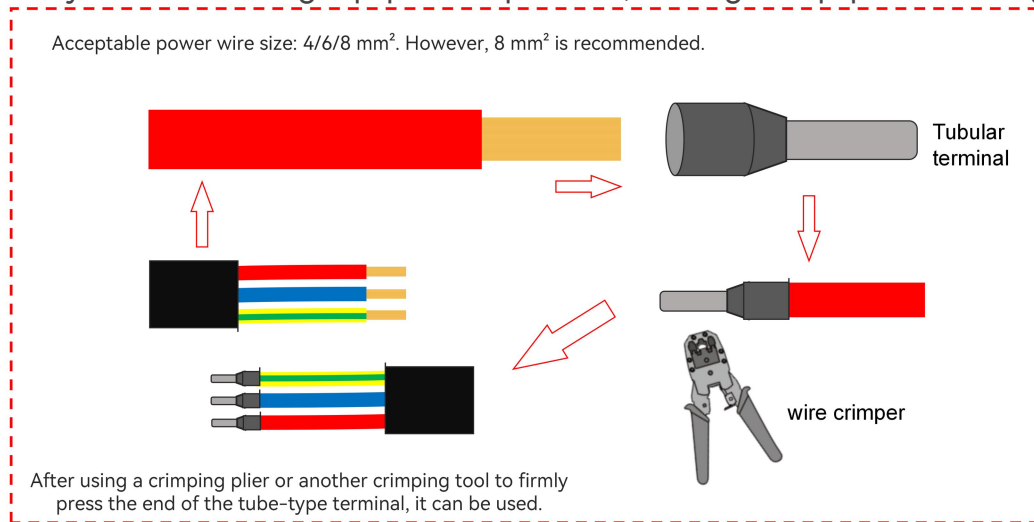


Figure3.6.3

3.6.4 Single-Unit Wiring Schematic

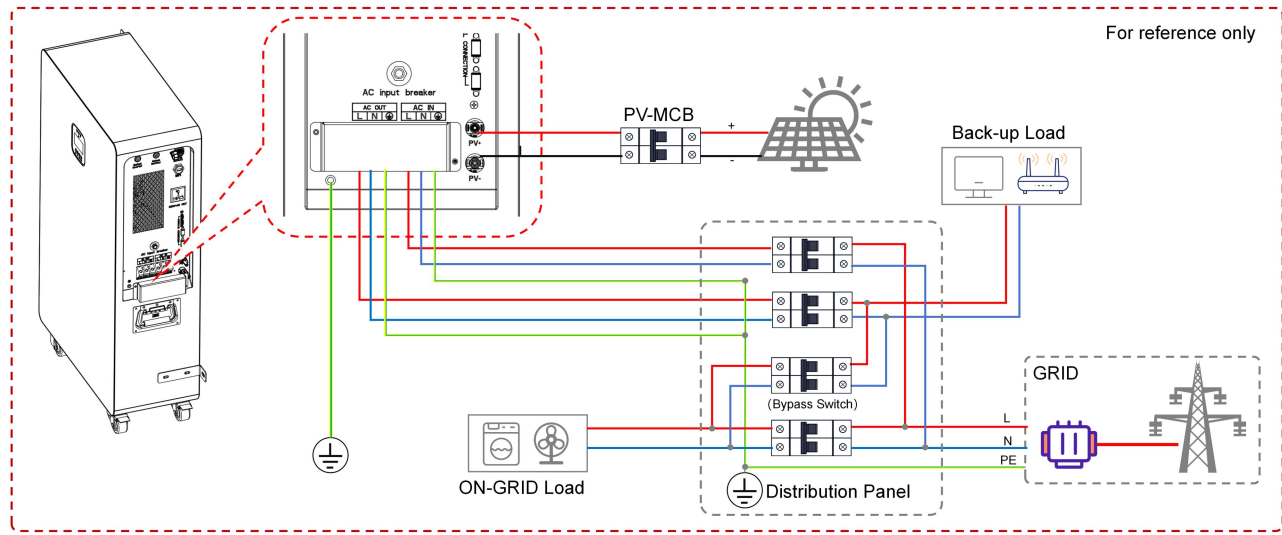


Figure 3.6.4



Caution :

The AIO (All-In-One) unit is only supported for use in stand-alone scenarios. Please decide whether to install it based on actual application requirements. For the bypass maintenance switch, an SPDT (manual transfer switch) is also acceptable. Furthermore, the selection of the connection switch (MCB) must comply with local regulations and standards applicable at the installation site.

04 Operation and Maintenance



Danger:

Please use special protective equipment and special insulating tools to prevent electric shock injuries or short-circuit faults.



Caution :

1. During energization, monitor continuously. Immediately de-energize the AIO (All-In-One) if abnormalities occur, investigate the cause, and resume energization only after resolution.
2. After AIO installation, debugging, de-energization, or complete discharge, recharge promptly to prevent damage from over-discharge.

4.1 Pre-energization Inspection

Checklist

No.	Inspection Items
1	Equipment is securely installed, positioned for easy operation and maintenance, with adequate ventilation and heat dissipation space; the installation environment is clean and tidy.
2	Protective earth (PE) cable, DC cables, AC cables, and WiFi communication stick are correctly and securely connected.
3	Cable bundling complies with routing requirements, with proper distribution and no damage.
4	Ensure that the provided terminals are used for reliable connections and that protective measures have been applied.
5	The voltage and frequency at the inverter grid-connection point meet grid interconnection requirements.

Table 4.1

4.2 System Power-Up

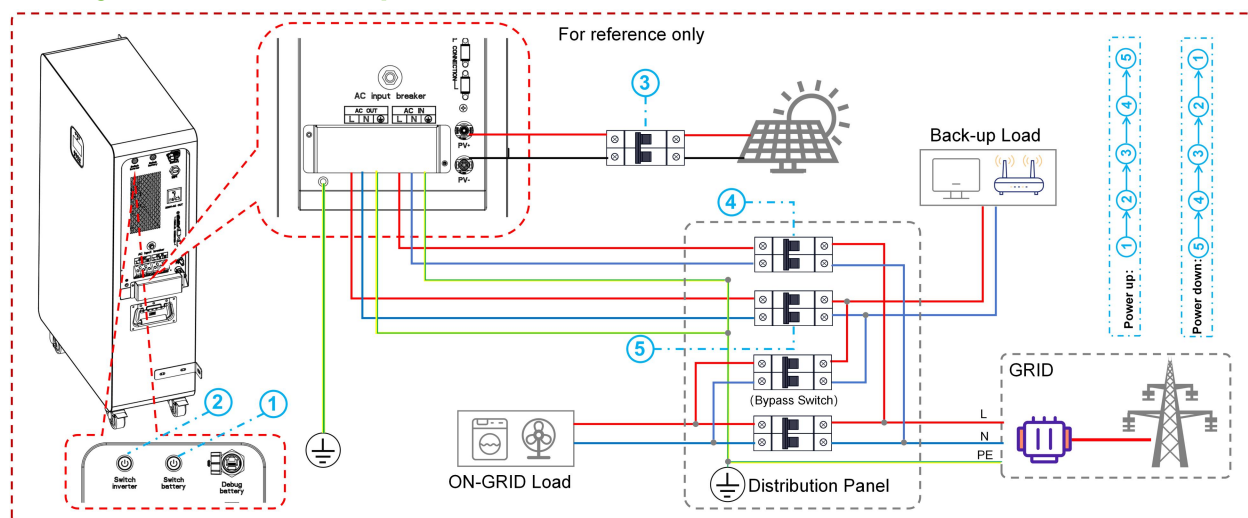


Figure 4.2

Step One:

Press the Battery Switch and Inverter Switch buttons on the AIO unit sequentially.

Step Two:

After the system main interface appears on the AIO display, optionally close the DC circuit breaker between the PV modules and the inverter.

Step Three:

First close the AC-IN side circuit breaker (MCB), then close the AC-OUT side circuit breaker (MCB).

Step Four:

Finally, set the desired operating mode on the Human-Machine Interface (HMI). After the system runs continuously for 15 minutes without any abnormality, this procedure is complete.



Illustration: System power-down: reverse procedure.

4.3 Display Panel Introduction

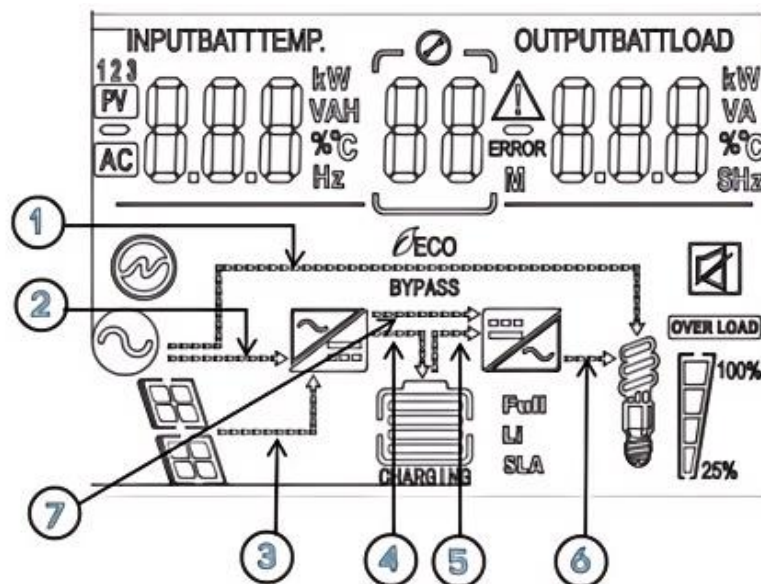
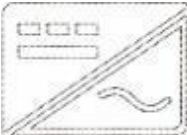


Figure 4.3

Icons	Functions	Icons	Functions
	Indicates that the AC input terminal has been connected to the grid.		Indicates that the inverter circuit is working.
	Indicates that the AC input mode is in APL mode.(wide voltage range)		Indicates that the machine is in the Mains Bypass mode.
	Indicates that the PV input terminal has been connected to the solar panel.		Indicates that the AC output is in an overload state.

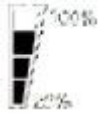
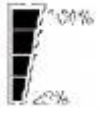
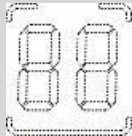
	Indicates that the machine has been connected to the battery:		Indicates the percentage of AC output loads:
	Indicates that the remaining battery is 0%~24%;		Indicates that the load percentage is 0%~24%;
	Indicates that the remaining battery is 25%~49%;		indicates that the load percentage is 25%~49%,
	Indicates that the remaining battery is 50%~74%;		indicates that the load percentage is 50%~74%,
	Indicates that the remaining battery is 75%~100%.		indicates that the load percentage is ≥75%
	Indicates that the battery type of the machine is a lithium battery.		Indicates that the buzzer is not enabled.
	Indicates that the current battery type of the machine is a lead-acid battery.		Indicates that the machine has an alarm.
	Indicates that the battery is in charging state.		Indicates that the machine is in a fault condition.
	Indicates that the AC/PV charging circuit is working.		Indicates that the machine is in setup mode.
	Indicates that the AC output terminal has an AC voltage output.		The parameters displayed in the middle of the screen: 1. In the non-setup mode, the alarm or fault code is displayed. 2. In the setup mode, the currently set parameter item code is displayed.
	In parallel operation, this icon indicates that this inverter is the host, which is only valid in parallel mode.		

Table 4.3-1

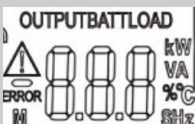
Parameters display on the left side of the screen: input parameters	
	Indicates AC input
	Indicates PV input
	Indicates the PV1 /PV 2 input
	Display battery voltage, battery charge total current, mains charge power, AC input voltage, AC input frequency, PV input voltage, internal heat sink temperature, software version
Parameters display on the right side of the screen: Output parameters	
	Indicates output voltage, output current, output active power, output apparent power, battery discharge current, software version; in setup mode, displays the set parameters under the currently setparameter item code.
Arrow display	
①	Indicates the grid supplying power to the load.
②	Indicates grid supplying power to the charging circuit.
③	Indicates PV module supplying power to the charging circuit.
④	Indicates the charging circuit charging the battery terminal.
⑤	Indicates the battery terminal supplying power to the inverter circuit.
⑥	Indicates the inverter circuit supplying power to the load.
⑦	The arrow is not displayed

Table 4.3-2

Real-time data viewing method

On the LCD main screen, press the “UP” and “DOWN” buttons to scroll through the real-time data of the machine

Page number	The left side of the screen parameter	In the middle of the screen parameters	The right side of the screen parameter
0	Cell voltage; Battery voltage	Fault code	Output voltage
1	Battery voltage collected by the BMS (Display only after BMS communication is normal)	Fault code	Battery capacity rate acquired by BMS (Display only after BMS communication is normal)
2	battery current	Fault code	power of battery [cell]
3	AC output	Fault code	AC output active power
4	AC output frequency	Fault code	The AC output sees the power
5	AC input currenton	Fault code	AC input voltage
6	AC incoming frequency	Fault code	AC input depends power
7	The PV1 input voltage	Fault code	PV1 input power
8	PV2 input voltage	Fault code	PV2 input power
9	PV heat sink temperature	Fault code	The PV is input to the total power
10	Inverter heat sink temperature	Fault code	busbar voltage
11	Program larger version	Fault code	Program version
12	Battery rated voltage	Fault code	Output rated power
13	PV rated voltage	Fault code	PV rated charging current
14	Machine ID No.	Fault code	Inverter in parallel machine mode

Table 4.3-3

4.4 Parameter Setting Instructions

Setup parameters description

Buttons operation instructions: Press the “SET” button to enter the setup menu and exit the setup menu. After entering the setup menu, the parameter number [00] will flash. At this point, press the “UP” and “DOWN” buttons to select the code of parameter item to be set. Then, press the “ENT” button to enter the parameter editing mode, and the value of the parameter is flashing. Adjust the value of the parameter with the “UP” and “DOWN” buttons. Finally, press the “ENT” button to complete the parameter editing and return to the parameter selection state.



Illustration: In parallel mode, all machines will synchronize the setting parameters of the host (the machine with "M" is displayed on the display screen) before startup. After startup, the setting parameters of any machine will be synchronized to other machines in the system.

Parameter no.	Parameter name	Settings	Description
00	Exit setting menu	[00] ESC	Exit the setup menu
01	Output source priority	[01] PV	PV priority mode, switching to the Mains when the PV fails or the battery is lower than the set value of parameter [16].
		[01] GID (default)	Mains priority mode, switching to inverter only when the mains fails.
		[01] BAT	Battery priority mode. Switch to mains power only when the battery is under voltage or lower than the setting value of parameter [16]; Switch to battery discharge only when the battery is fully charged or higher than the setting value of parameter [17].
		[01] HBR	Hybrid mode, you can set this mode through the [33] setting item.
02	AC output voltage setting	[02] 230V	Allow to set to 200Vac/208Vac/220Vac/230Vac/240 Vac, default 230V. The rated output power will be reduced= (Power Rate)*(Vset/230).

03	Output Frequency	[03] 50.0HZ	Bypass self-adaptation; when the mains is connected, it automatically adapts to the mains frequency; when the mains is disconnected, the output frequency can be set through this menu. The default output frequency to 50Hz of the 230v.
		[03] 60.0HZ	
04	AC Input Voltage Range	[04] UPS (default)	Narrow mains input voltage range of 230Vac machine: 170~280Vac; Frequency range: 47~ 55Hz (50Hz);57Hz ~ 65Hz (60Hz);
		[04] APL	Wide mains input voltage range of 230Vac machine: 90~280Vac; Frequency range: 47~ 55Hz (50Hz); 57Hz ~ 65Hz (60Hz);
		[04] GEN	Diesel generators input, need to set this mode, at this time: Narrow Ac input voltage range of 230Vac machine: 90~280Vac Frequency range: 40~ 70Hz
05	Power saving mode	[05] DIS (default)	Power saving mode disabled.
		[05] ENA	After the power saving mode is enabled, if the load is null or less than 25W, the inverter output is turned off after a delay for a certain period of time. When the load is more than 50W, the inverter automatic restart.
06	Charger source priority	[06] OSO	PV priority charging; only when the PV charging fails, the mains charging is started.
		[06] OUO	Mains priority charging; only when the mains charging fails, the PV charging is started.
		[06] SNU (default)	PV and Mains hybrid charging; PV charging is a priority, and when the PV energy is insufficient, the Mains charging supplements. When the PV energy is sufficient, the Mains charging stops. Note: Only when the Mains bypass output is loaded, the PV charging and the mains charging can work at the same time. When the inverter works, only the PV charging can be started.
		[06] NUC	Only PV charging, with the Mains charging not activated.

07	Max total charging current	[07] 80A (default)	Maximum total charging current setting. 5.6KW-6.2KW Setting range: 0~100A; 8KW-11KW-12KW Setting range: 0~150A;
08	Max PV charger current	[08] 80A (default)	Max PV charger current. 5.6KW-6.2KW Setting range:0~100A; 8KW-11KW-12KW Setting range:0~150A;
09	Max AC charger current	[09] 60A (default)	The maximum current setting that allows the mains to charge the battery, 5.6KW-6.2KW Setting range: 0~80A; 8KW Setting range: 0~120A; 11KW-12KW Setting range: 0~150A;
10	Battery fully charging current setting	[10] 3A (default)	When the battery type is lead-acid, when the battery voltage is greater than or equal to the floating charge value, and the charging current is less than the setting value, the battery is considered to be fully charged and the charging is stopped; If the battery type is lithium battery, when the battery voltage is greater than or equal to the constant voltage charging value and the charging current is less than the set value, the battery is considered to be fully charged and the charging is stopped.
11	Battery Type	[11] USE	User-defined; all battery parameters can be set.
		[11] SLd	Sealed lead-acid battery; constant-voltage charge voltage: 57.6V, floating charge voltage: 55.2V.
		[11] FLd	Vented lead-acid battery; constant-voltage charge voltage: 58.4V, floating charge voltage: 55.2V.
		[11] GEL	Colloidal lead-acid battery; constant-voltage charge voltage: 56.8V, floating charge voltage: 55.2V.
		[11] LF14/LF15/LF16 (default)	"Lithium iron phosphate battery LF14/LF15/LF16, corresponding to 14strings ,15 strings and 16 strings of lithium iron phosphate battery; for 16 strings, default constant-voltage charge voltage is 56.8V; for 15 strings, default constant-voltage charge voltage is 53.2V; for 14 strings, default constant-voltage charge voltage is 49.2V; allow adjustable."

		[11] N13/N14	"Ternary lithium battery; which is adjustable. The default constant voltage charging voltage of N13 is 53.2V, and the default constant voltage charging voltage of N14 series is 57.6V."
12	Battery boost charge voltage	[12] 56.8V (default)	Boost charge voltage setting; the setting range is 48V~58.8V, with step of 0.1V; it is valid for user-defined battery and lithium battery.
13	Battery floating charge voltage	[13] 56.8V (default)	Floating charge voltage, setting range: 48V~58.8V, step: 0.1V.
14	Battery boost charge time	[14] 120 (default)	Boost charge maximum time setting, which means the maximum charging time to reach the set voltage of parameter [12] during constant-voltage charging. The setting range is 5min~900min, with a step of 5 minutes. It is valid for user-defined battery and lithium battery.
15	Battery recharge recovery point	[15] 53.6V (default)	"After the battery is fully charged, the inverter stops charging, and restarts charging when the battery voltage is lower than the voltage value."
16	Battery Power to Utility Setpoint	[16] 49.2V (default)	When the parameter [01] =Bat, the battery voltage is lower than the set value, and the output is switched from the inverter to the mains. Setting range: 38V~57.2V.
17	Utility to Battery Power Setpoint	[17] 57.6V (default)	When the parameter [01] =Bat, the battery voltage is higher than the set value, and the output is switched from the mains to the inverter. Setting range: 48V~60V.
18	Battery under voltage alarm	[18] 49.6V (default)	Battery undervoltage alarm point; when the battery voltage is lower than the point, an undervoltage alarm is given (01 fault), and the output is not turned off; the setting range is 39V~56V, with a step of 0.1V.
19	Battery over discharge voltage (delay off)	[19] 48.8V (default)	Over-discharge voltage; when the battery voltage is lower than this judgment point, delay the time set by parameter [22] and turn off inverter output. Setting range is 38V~56V, with a step of 0.1V.

20	Battery over discharge voltage (immediately)	[20] 46.4V (default)	Battery discharge limit voltage; when the battery voltage is lower than the point, the output is turned off immediately (02 fault); the setting range is 38V~48.8V, with a step of 0.1V. It is valid for user-defined battery and lithium battery.
21	Battery voltage recovery point after over discharge protection (02 fault)	[21] 52.8V (default)	When the battery over discharge protection disconnects the inverter output, the battery voltage must be greater than this value to restore the inverter AC output.
22	Battery over discharge delay time	[22] 30S (default)	Over-discharge delay time; when the battery voltage is lower than the parameter [19], the inverter output will be turned off after the time set by this parameter is delayed. The setting range is 5S~120S, with a step of 5S.
23	RS485-2 /BMS communication	[23] DIS (default)	RS485-2 Disable the BMS communication. However, our PC and remote monitoring protocol can continue to be used.
		[23] RS485	RS485-2 port for BMS communication.
24	BMS protocol Settings	When the setting Program [23] is RS485, the corresponding lithium battery manufacturer brand needs to be selected for communication.	
		PLN=PYLONTECH, PL3=PYLONTECH-3, PCE=PACE, GXU=GOTION, DAQ, AOG=ALLGRAND, OLT=OLITER, XWD=SUNWODA, CFE, MIT=FOXESS, VOL=Voltronic	
25	SOC discharge alarm (Optional when BMS is enabled)	[25] 15% (default)	After the BMS of the setting item [23] is enabled, the machine will alarm 07 if the battery capacity rate is lower than this value, and the alarm will be cleared if the battery capacity rate is higher than 5% of this value.
26	SOC switching mains (optional when BMS is enabled)	[26] 10% (default)	After the BMS of the setting item [23] is enabled, the machine will switch to the mains when the battery capacity rate is lower than this value and the mains power is available.
27	SOC switching inverter (optional when BMS is enabled)	[27] 100% (default)	After the BMS of the setting item [23] is enabled, it takes effect in battery priority mode. If the battery capacity rate is higher than this value, the machine will switch from the mains to the inverter mode.

28	SOC discharge cut off (optional when BMS is enabled)	[28] 5% (default)	After the BMS of the setting item [23] is enabled, if the battery capacity rate is lower than this value, the machine will report 08 fault and cut off the power supply or output.
29	SOC charging cut off (optional when BMS is enabled)	[29] 100% (default)	After the BMS of the setting item [23] is enabled, when the battery capacity rate is higher than this value, the inverter considers the battery to be full. If the battery priority mode is adopted at this time, the machine will switch the battery back from the mains.
30	Buzzer alarm	[30] DIS (default)	Alarm beep is enabled when the status of the main input source changes or the inverter fails.
		[30] ENA	Buzzer is silent
31	AC output mode (can be set in the standby mode only)	[31] SIG (default)	When single inverter is used, the default is SIG mode.
		[31] PAL	In parallel operation with single phase. Please refer to 8.3 Wiring Diagram .
		[31] 3P1/3P2/3P 3	In split phase operation with three phase. Please refer to 8.4 Wiring Diagram .
		All connected P1-phase inverters are set to "3P1"; All connected P2-phase inverters are set to "3P2"; All connected P3-phase inverters are set to "3P3"; When the parameter [02] setting item=230: AC output line voltage difference is 120 degrees (P1-P2/P1-P3/P2-P3), each line voltage is $230 \times 1.732 = 398\text{Vac}$; Each phase voltage is 230Vac (L1-N; L2-N; L3-N).	
32	RS485 ID setting	[32] 1 (default)	Parallel mode needs to be set in the range of 1-6, the ID cannot be repeated. When the power is first turned on, it will be automatically distributed. Single mode setting range 1-254.
33	Mixed mode (available for some models, Hybrid mode available)	[33] GID	Photovoltaic power generation has enough load power, and the excess is grid-connected power generation.
		[33] LOD (default)	Inverter power generation energy only to the load (generation power < Load power). Note: mixed load, mains and photovoltaic are loaded together, photovoltaic is not enough to supplement the mains.
		[33] CT	Anti-backflow, self-use according to the load power, do not input current to the mains.

34	N-PE connection switchover is enabled	[34] DIS (default)	The PV energy is preferentially used to charge the battery, and the excess energy is then generated to the grid.
		[34] ENA	The PV energy is given priority to the grid for power generation, and the excess energy is then used to charge the battery.
35	Automatic battery activation	[35] DIS	When the battery is dormant or not connected, the PV or mains does not automatically activate the battery to turn on the battery output.
		[35] ENA (default)	When the battery is dormant or not connected, the PV or mains automatically activates the battery to turn on the battery output.
36	Grid-connected active power (Hybrid mode can be set)	[36] 0w	Active power that can be connected to the mains grid, setting range: 0w-8000w(8KW models)/0w-11000w(11KW models) /0w-12000w(12KW models)
38	Mixed network priority enabling (Hybrid mode can be set)	[38] DIS (default)	The energy of PV supplies power to the load, and the excess energy goes to the grid.
		[38] ENA	The energy of the PV is preferentially transmitted to the power grid, and the excess energy is resupplied to the load.
40	Battery pack connection setting	[40] DIS (default)	Parallel use of all battery packs.
		[40] ENA	Battery pack not connected in parallel. Each battery is connected to each inverter.
62	Overload auto-restart is enabled	[62] DIS	Overload automatic restart is prohibited. If overload shutdown output occurs, the machine will no longer start on.
		[62] ENA (default)	Enable overload automatic restart. If overload shutdown output occurs, the machine will restart the output after a delay of 3 minutes. After a total of 5 times in 30 minutes, the startup system is no longer resumed.
63	CT host Settings (The Hybrid mode can be set up)	[63] DIS (default)	
		[63] ENA	Anti-backflow host

65	Charging Logic Setting (Optional when BMS is enabled)	[65]LNU (default)	BMS+inverter,The maximum charging current of the battery is limited according to the descending logic of the machine.
		[65]BMS	BMS only,The maximum charging current of the battery is limited according to the current limit value of BMS.
		[65]SET	Manual setup,The maximum charging current of the battery is limited according to the set value of item [07].

Table 4.4

4.5 Operating mode

4.5.1 Charging mode

1) **PV priority:** PV module will charge the battery preferentially,and the battery is charged by the Mains only when the PV system fails. During the day, solar energy is fully used to charge, while at night, it converts to the Mains. This can maintain battery level, and is ideal for areas where the grid is relatively stable and electricity price is relatively high.

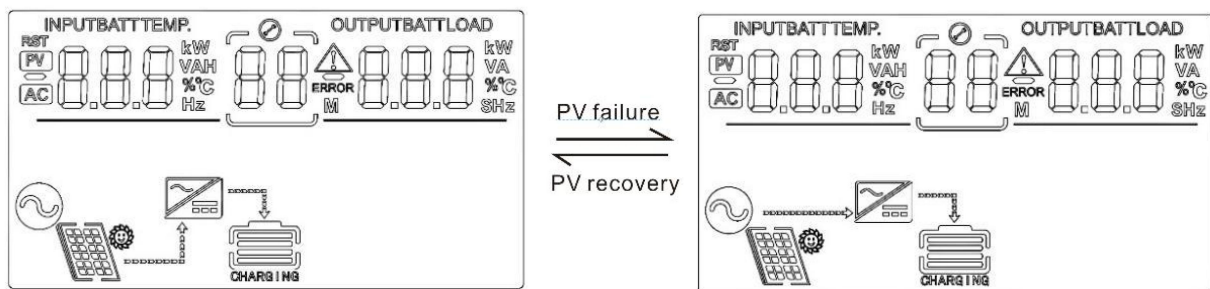


Figure 4.5.1-1

2) **Mains priority:** The Mains supply is preferentially used to charge the battery. Only when the Mains fails, the PV charging can be activated.

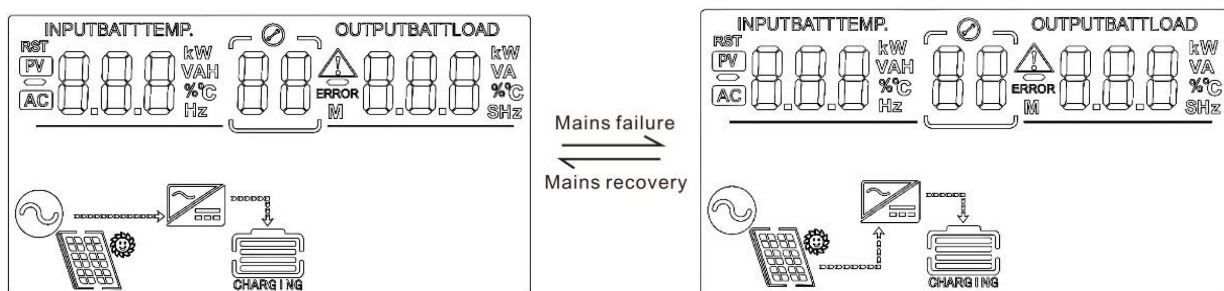


Figure 4.5.1-2

3) **Hybrid charging:** PV and mains hybrid charging. PV MPPT charging is a priority, and when PV energy is insufficient, the mains supply supplements. When the PV energy is sufficient again, the mains stops charging. This is the fastest charging mode, suitable for the areas where power grid is unstable, providing sufficient backup power supply at any time.

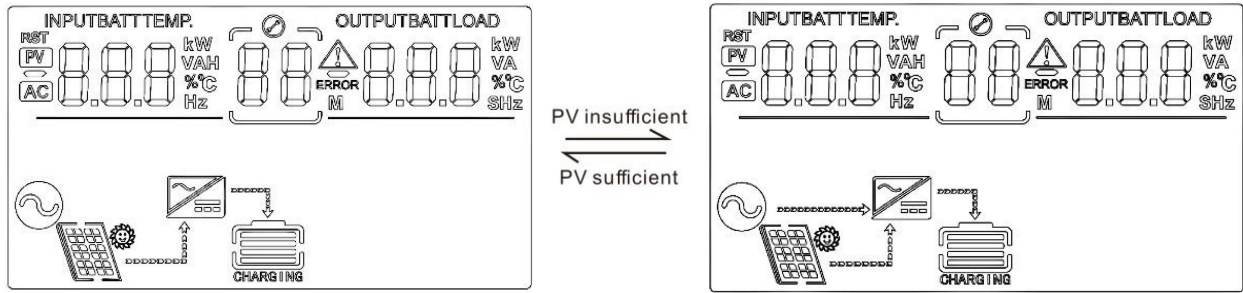


Figure 4.5.1-3

4) Only Solar): Only PV charging, without Mains charging. This is the most energy-efficient way in which battery is charged only by solar panels, and is usually used in areas with good lighting conditions.

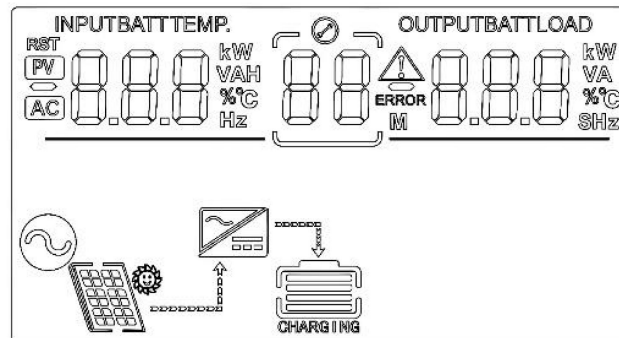


Figure 4.5.1-4

4.5.2 Output mode

PV priority mode:

Photovoltaics and batteries power the load, switch to mains supply when the PV charging fails. This mode maximizes the use of solar energy while maintaining battery power, suitable for use in the areas with relatively stable grid.

Power supply priority: Solar→Battery→Utility

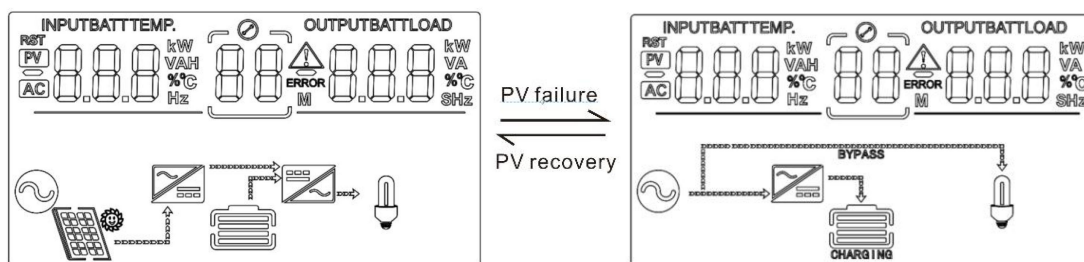


Figure 4.5.2-1

Mains priority mode:

Switch to inverter only when the mains fails (when there was mains power, switch to mains power for charging and power supply). Then, the unit is equivalent to a backup UPS, suitable for areas with unstable grid. Switching does not affect PV charging

Power supply priority: Utility→Solar→Battery.

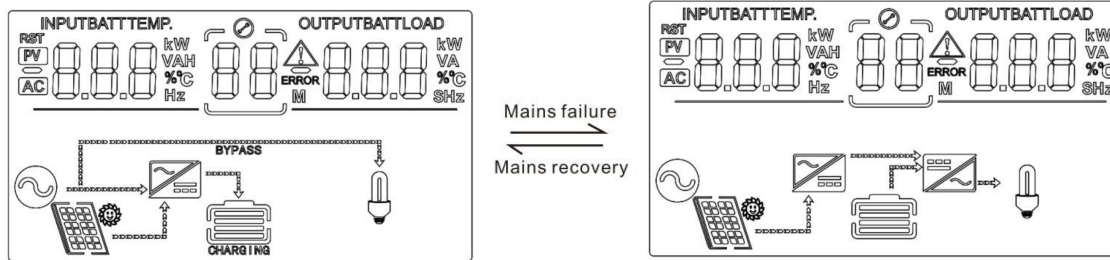


Figure 4.5.2-2

Battery priority mode:

Switch to mains supply only when the battery discharge undervoltage is lower than the set point (item 16). When the charging battery is higher than the set point of (17 setting item), switch to the battery discharge mode. This can cycle the battery charge and discharge. This mode maximizes the use of DC power and is used in the area with stable grid. Switching does not affect PV charging.

Power supply priority: Solar→Battery→Utility.

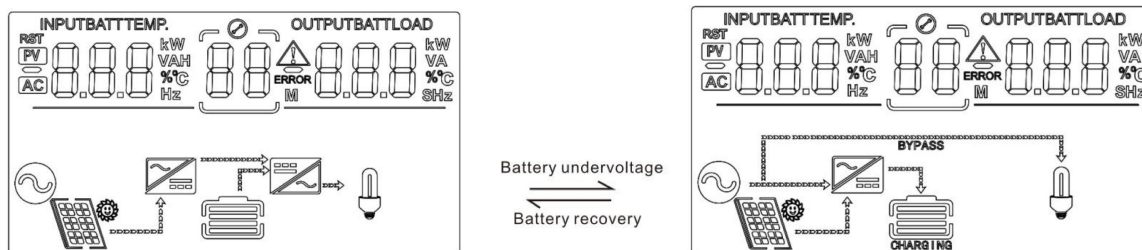


Figure 4.5.2-3

4.5.3 Hybrid model:

LOD: Inverter power generation energy only to the load (generation power < Load power). Note: mixed load, mains and photovoltaic are loaded together, photovoltaic is not enough to supplement the mains

GID: Inverter power generation energy directly connected to the grid (generation power may be greater than the load power).

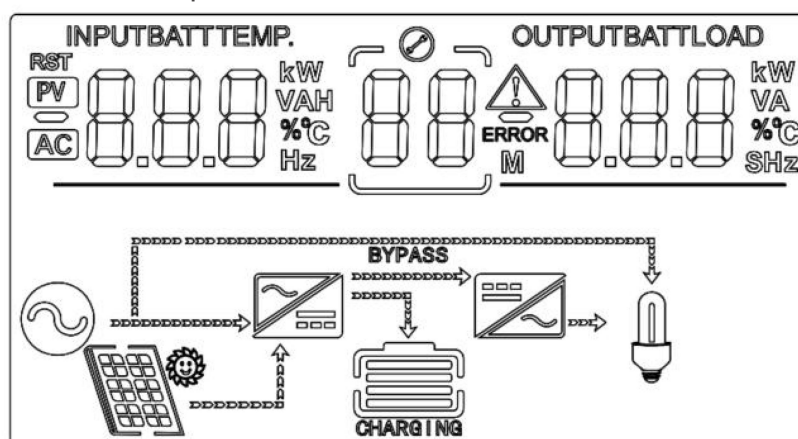


Figure 4.5.3-3

 **Illustration:** Photovoltaic power generation is sufficient load power, excess grid-connected power generation

4.6 SOLARMAN Smart App

Scan the QR code below to download and install:

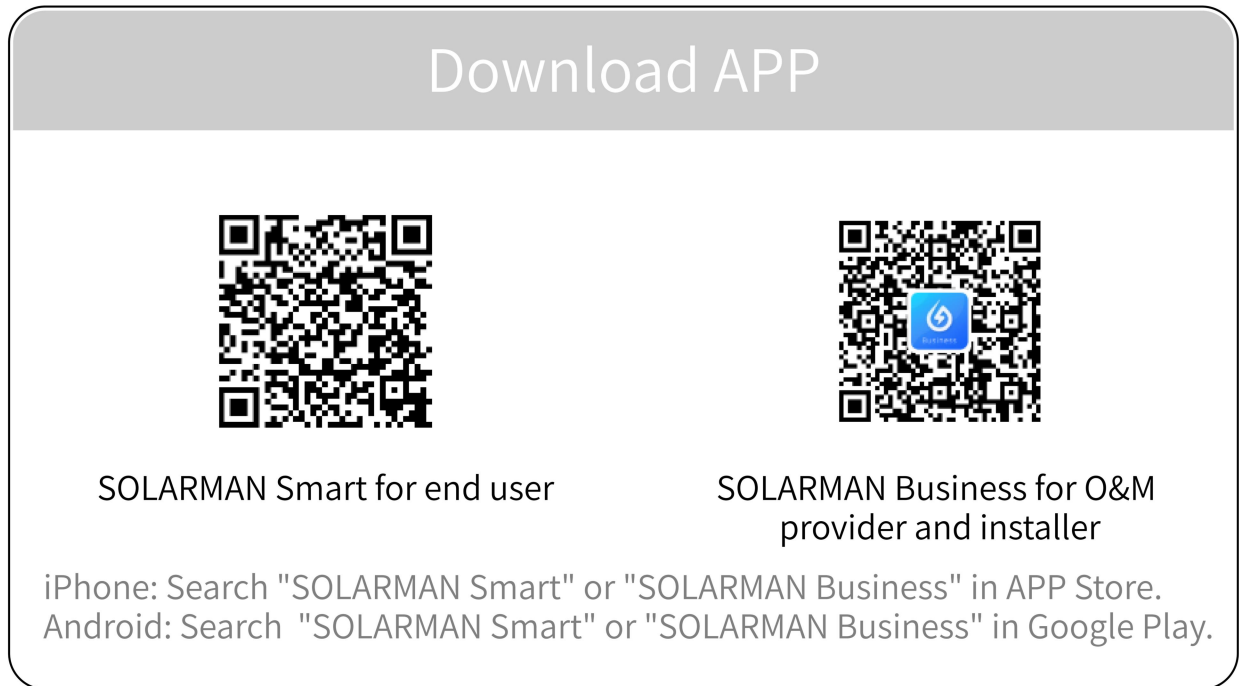


Figure 4.6-1

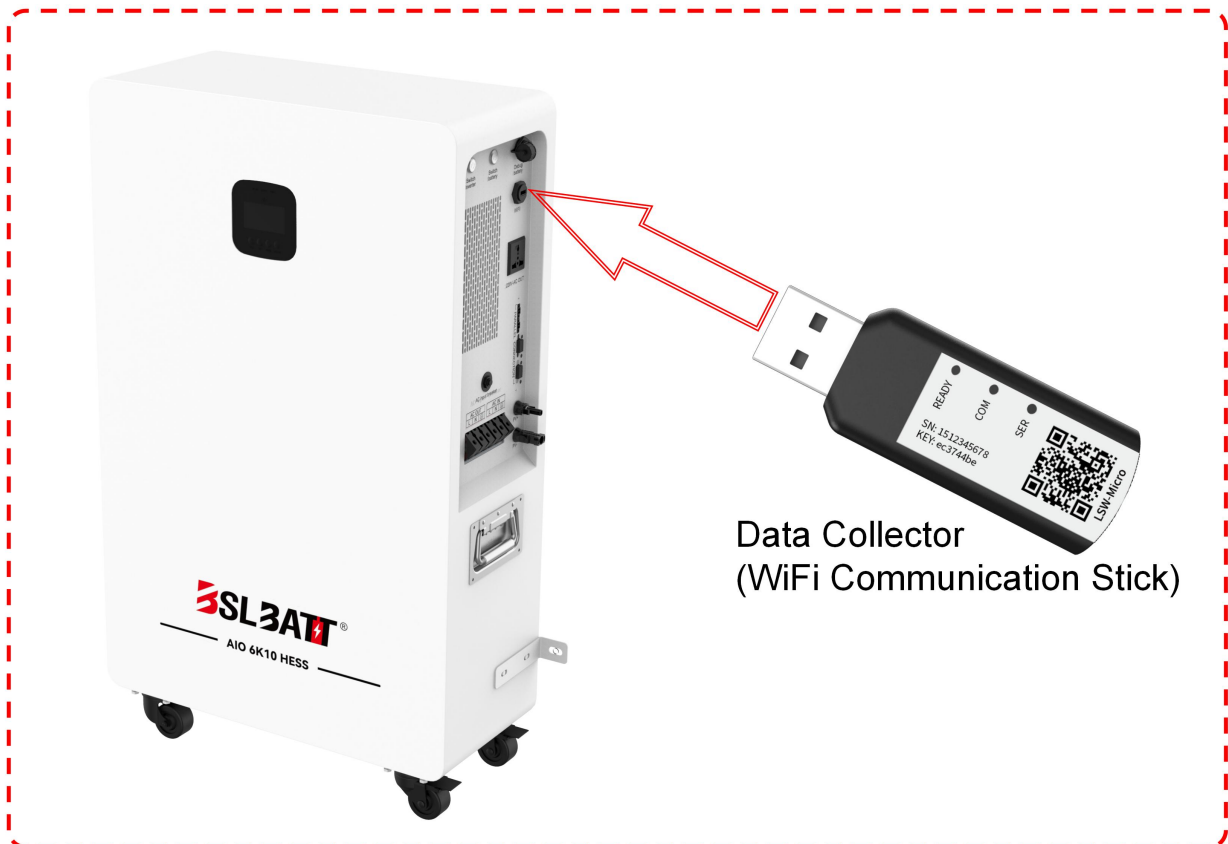


Figure 4.6-2

Once the data collector (WiFi communication stick) is connected to the AIO unit, its working status can be assessed by observing the status of the LEDs.

Indicator	lication	Status Description
READY	Logger running status	1.Light stays on/off: Running abnormally. 2.On 1s/Off 1s (Slow flash): Running normally.
COM	Communication with inverter	1.Light stays on: Logger connected to the inverter. 2.Light off: Connection to the inverter failed.
SER	Communication with server	1.On 500ms/Off 5s (Slow flash): Connect to the router failed. 2.On 1s/Off 1s: Connect to the router succeeded. 3.Light stays on: Connect to the server succeeded.

Table 4.6

Connect to the AIO unit:

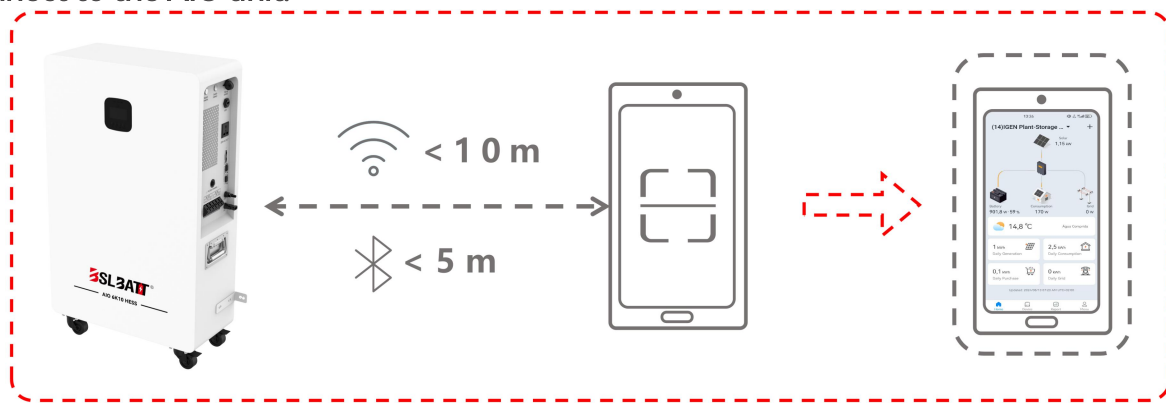


Figure 4.6-3

Please make sure Bluetooth and WiFi are ON and the router can connect to the network normally.

After entering **SOLARMAN Smart App**, please register at SOLARMAN Smart App to ensure the normal function.

You can create your own home at "SOLARMAN Smart" to run a real-time monitoring. System will collect and calculate data from associated devices, which enables a full understanding of PV plant running status.

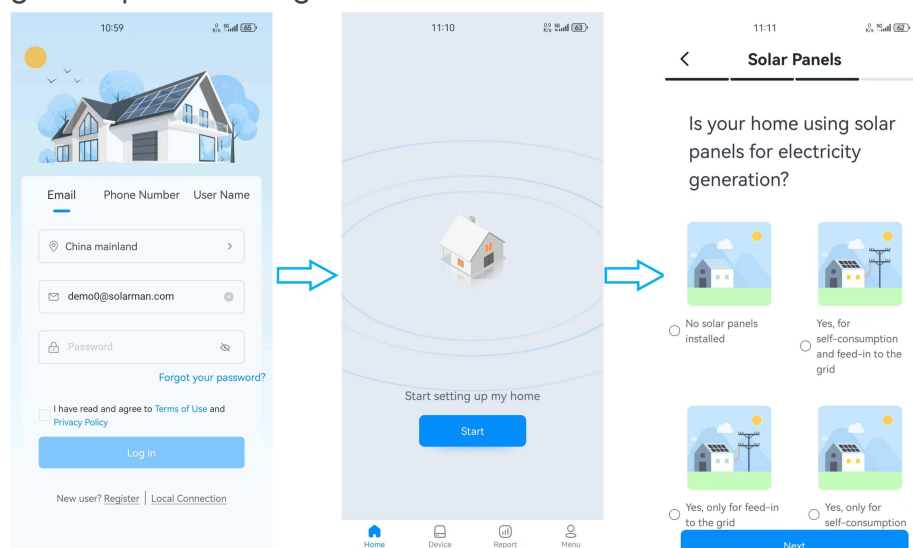


Figure 4.6-4

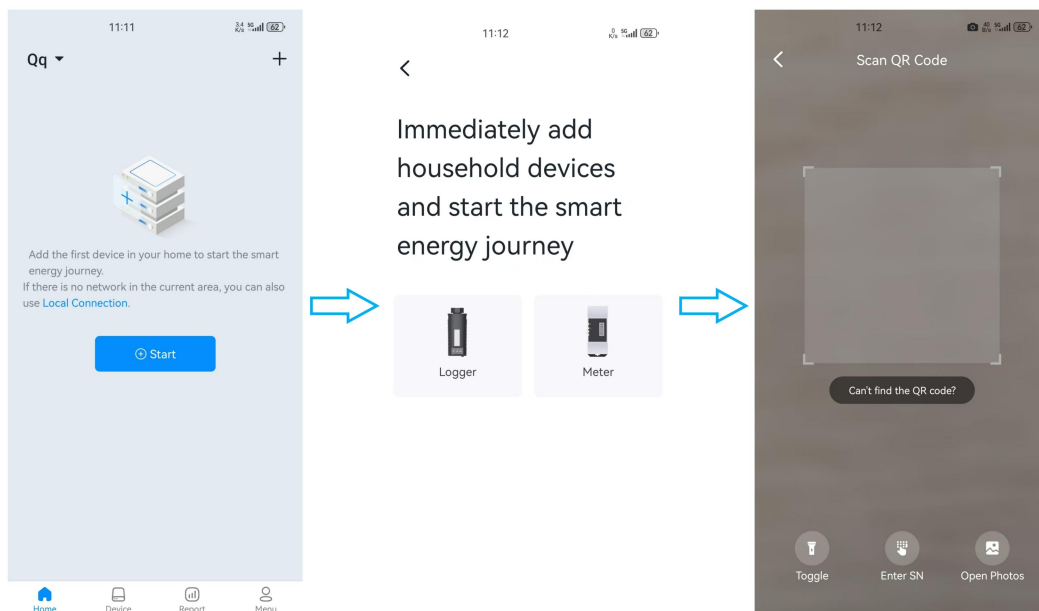


Figure 4.6-5

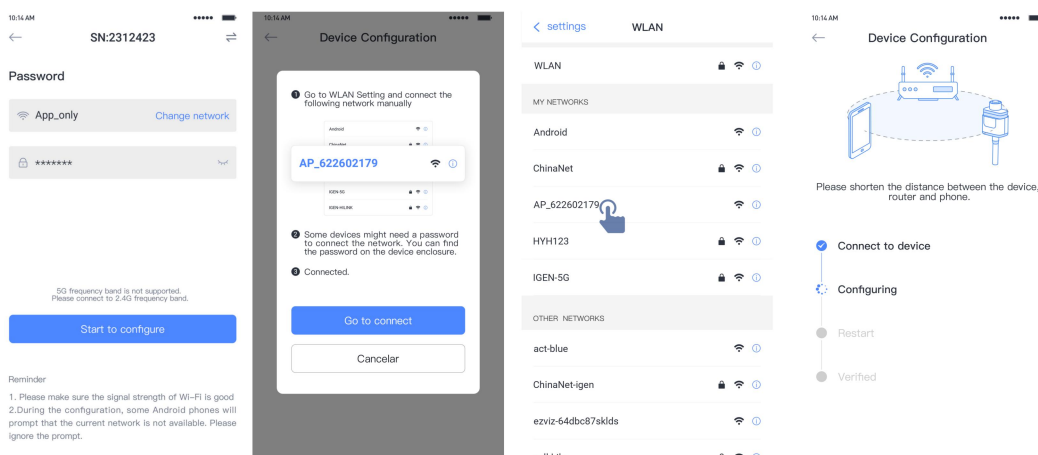


Figure 4.6-6

After home settings and device settings are done, users can check data at this moment.
Notice: The data will be updated in 5-10 mins after the configuration is done.

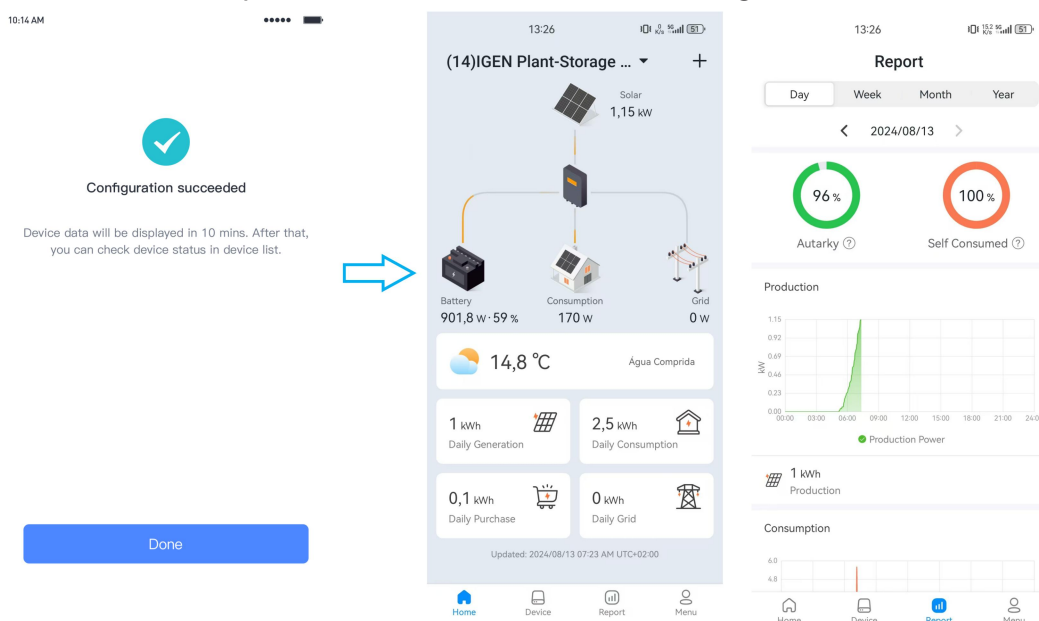


Figure 4.6-7



Illustration: For detailed instructions on the specific operation steps, please refer to the SOLARMAN Smart App User Manual.

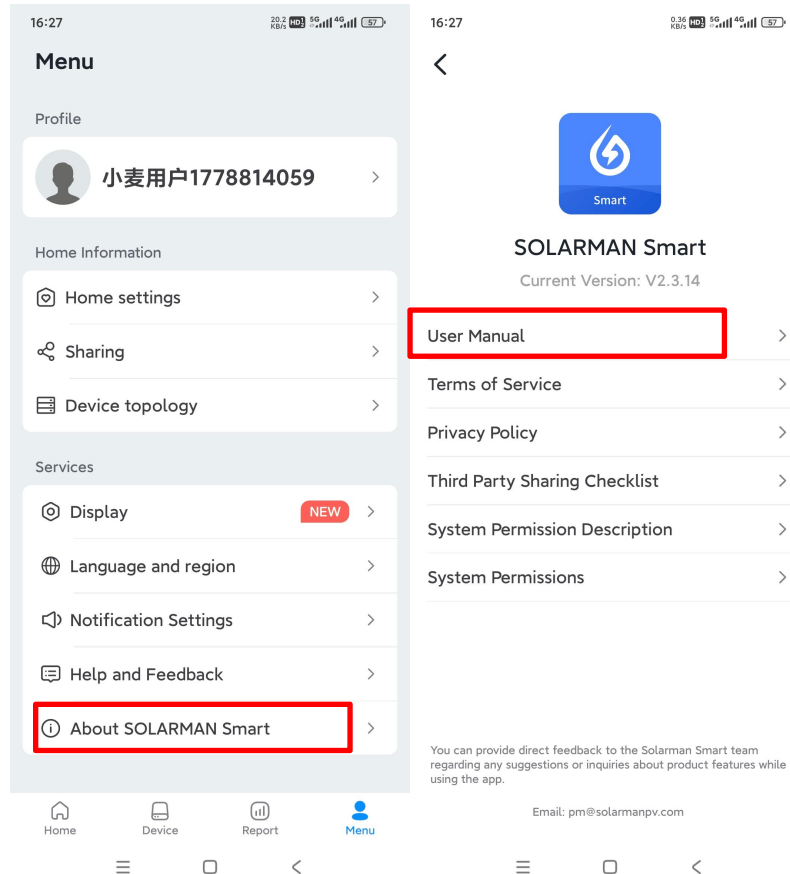


Figure 4.6-8

4.7 SOLARMAN Smart Web Overview

SOLARMAN Smart is specially designed for distributed power station terminal owners. Through Web applications, it can provide more comprehensive and intuitive power station data monitoring, and create the ultimate user experience with extremely simplified product design thinking.

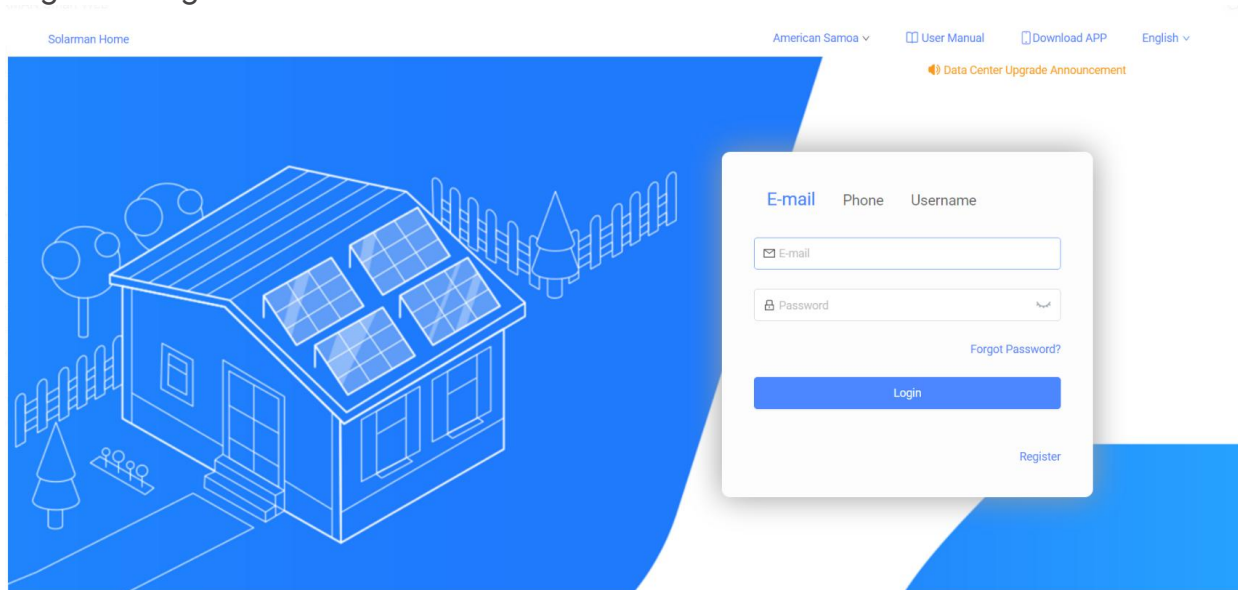


Figure 4.7-1



Figure 4.7-2



Illustration: For detailed instructions on the specific operation steps, please refer to the SOLARMAN Smart Web Overview User Manual.

4.8 Supervisory computer monitoring



Caution : Before upgrading, ensure the BMS (Battery Management System) and battery are in standby mode, turn off the load switch and charger switch, and confirm the RS232-USB line cable is connected as follows.

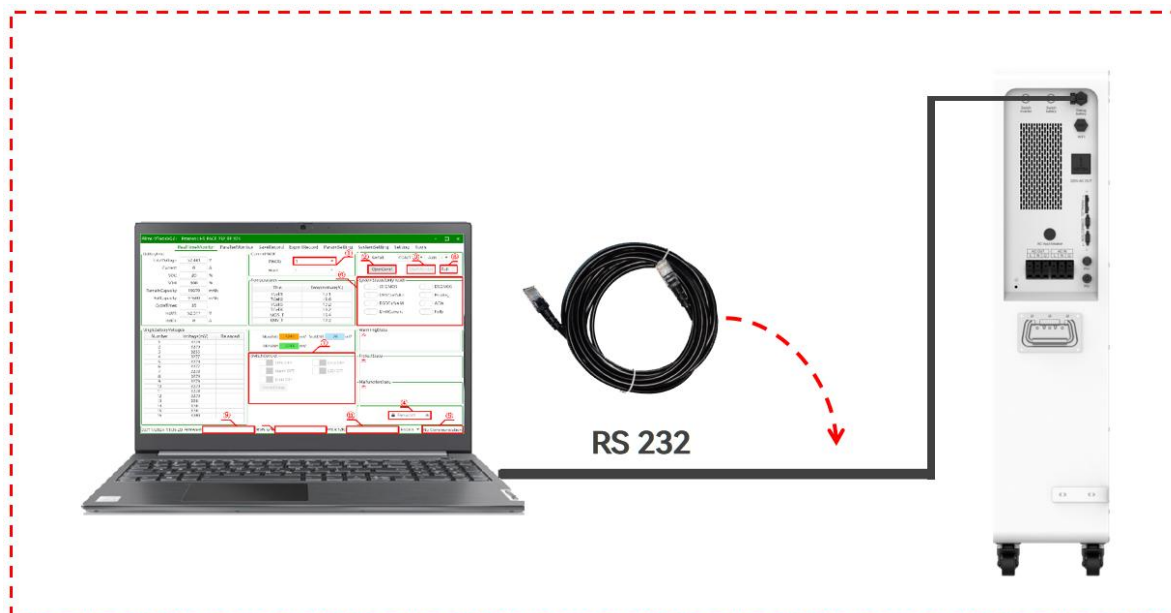


Figure 4.8 Serial port communication device

When the equipment manufacturer confirms that it is necessary, it can authorize to provide the customer with the host software and operating instructions.

4.8.1 Product Upgrade 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.

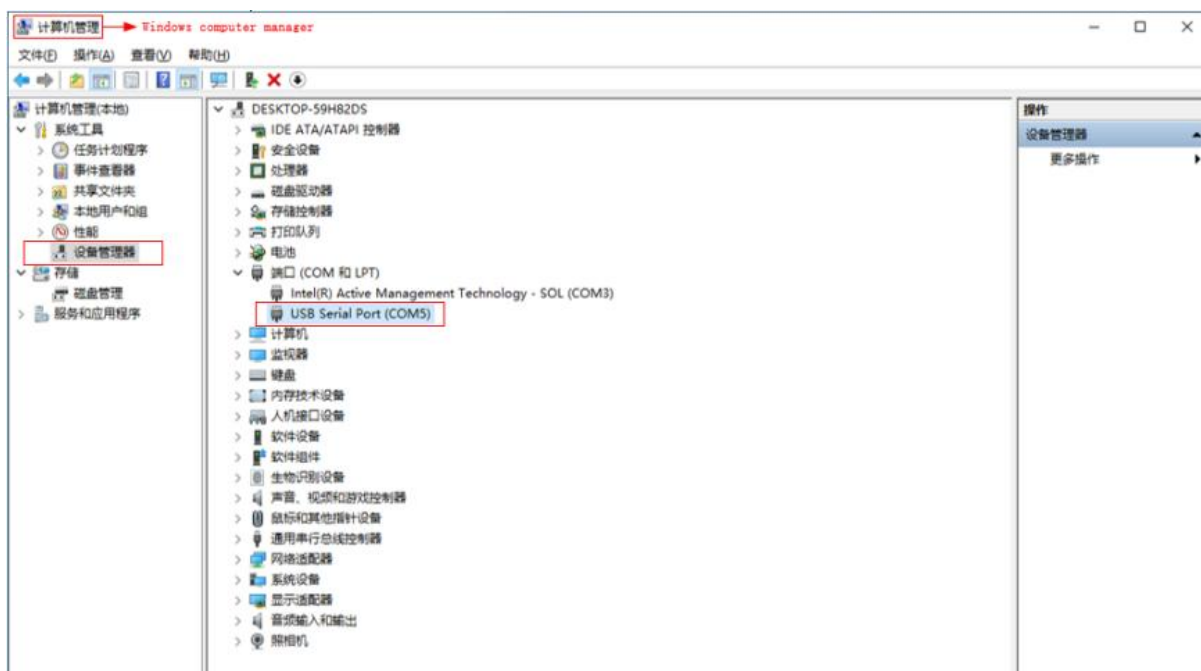


Figure 4.8.1-1



Note: The above image is for reference only.

2.Click on the RS232 driver installation package.

 PL2303_Prolific_GPS_1013_20090319 (1) 2023/9/15 10:04 WinRAR ZIP 压缩... 2,201 KB

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



Figure 4.8.1-2

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

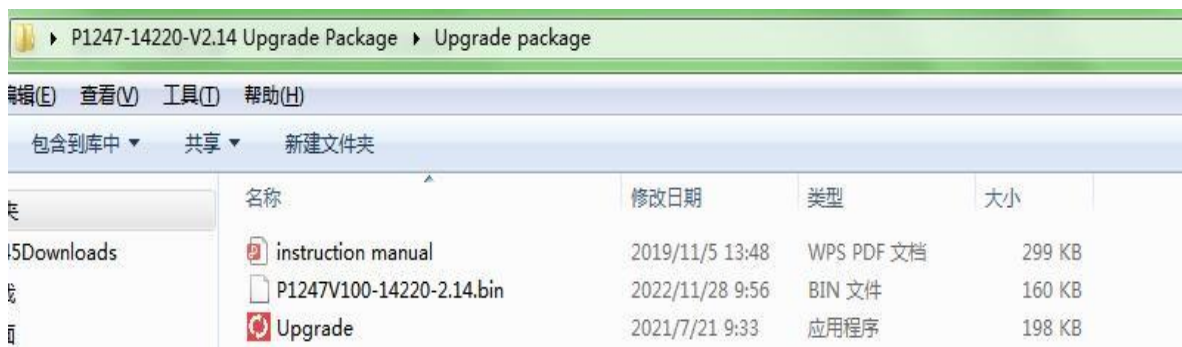


Figure 4.8.1-3

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

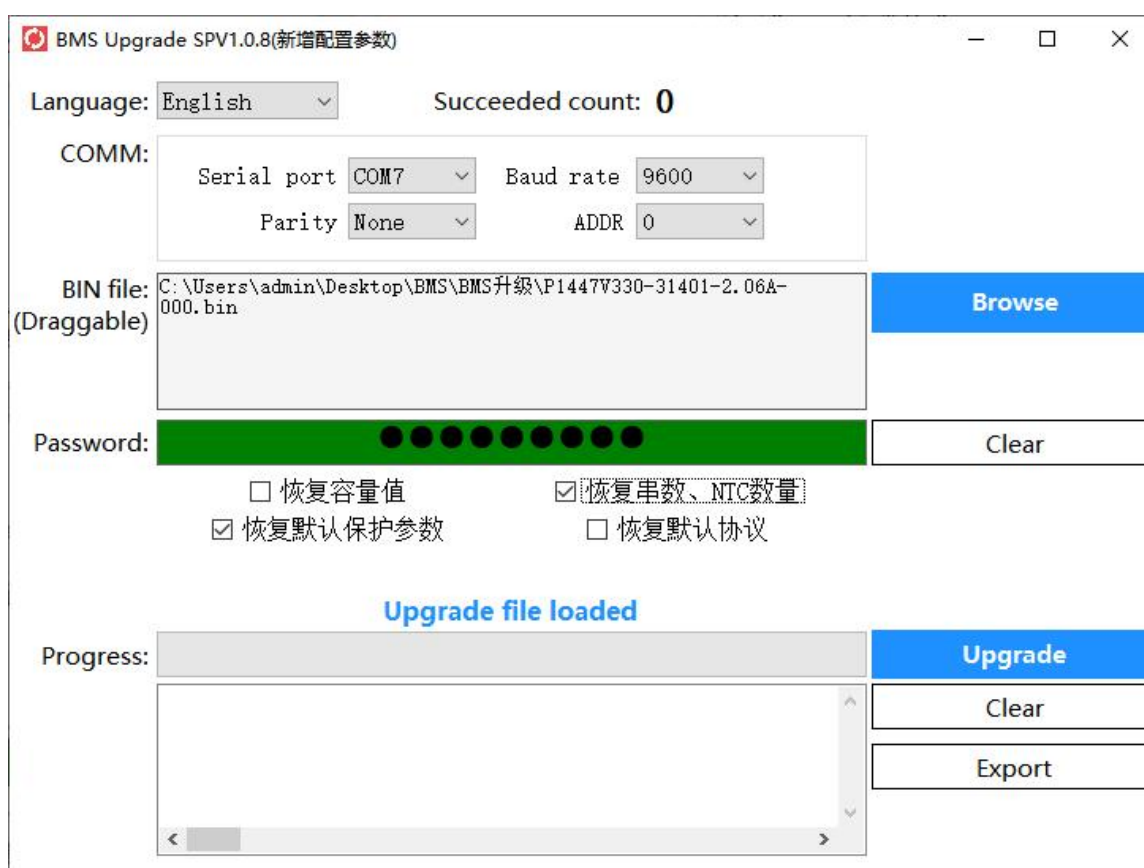


Figure 4.8.1-4

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.

4.8.2 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.

名称	修改日期	类型	大小
PBmsLVTools_V0.61_20240110.exe	2024/3/11 10:02	应用程序	9,319 KB
PL2303_Prolific_GPS_1013_20090319 (...)	2023/9/15 10:04	ZIP 压缩文件	2,201 KB
上位机用户手册.docx	2024/3/11 10:32	DOCX 文档	1,462 KB

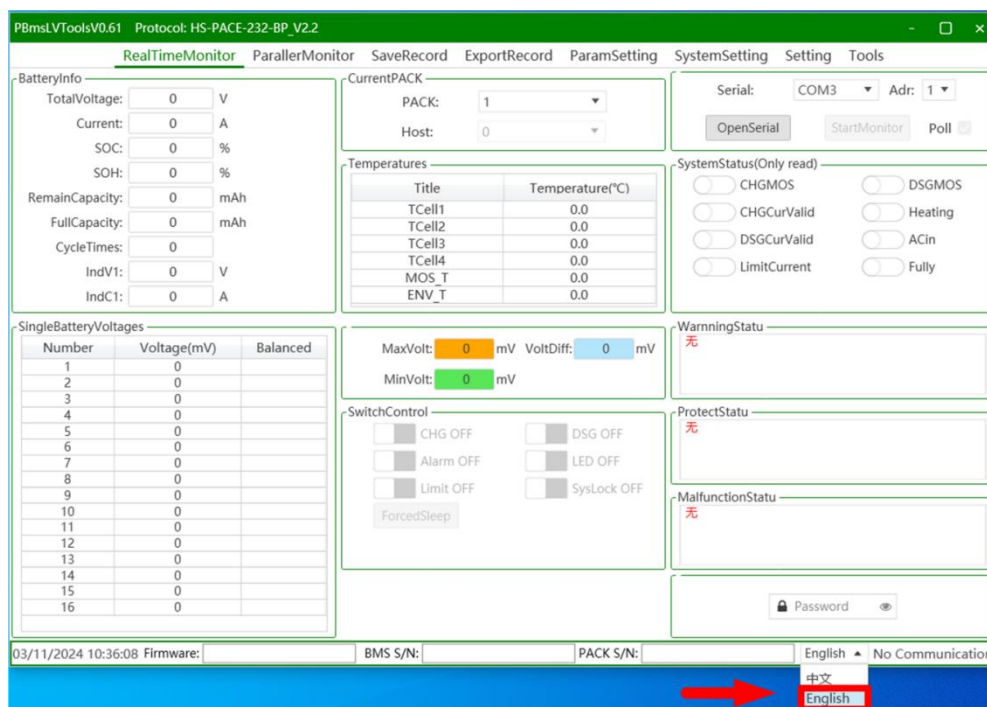


Figure 4.8.2-1

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.

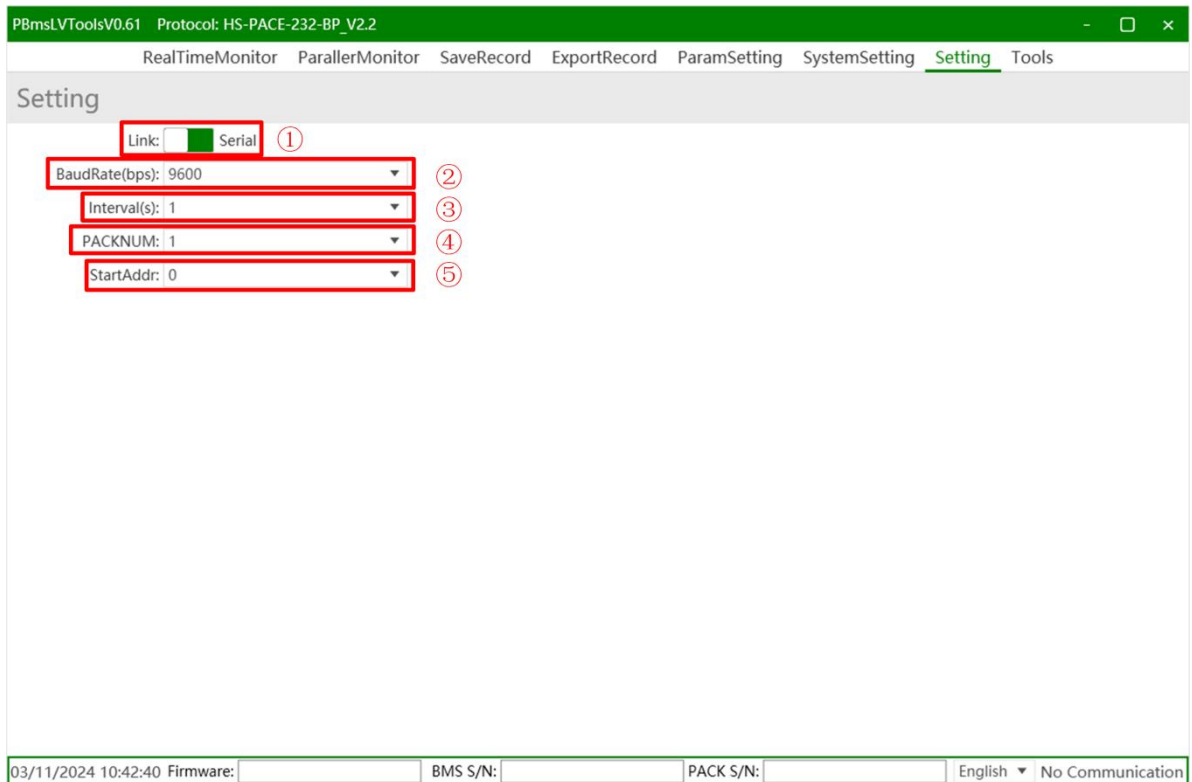


Figure 4.8.2-2

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.

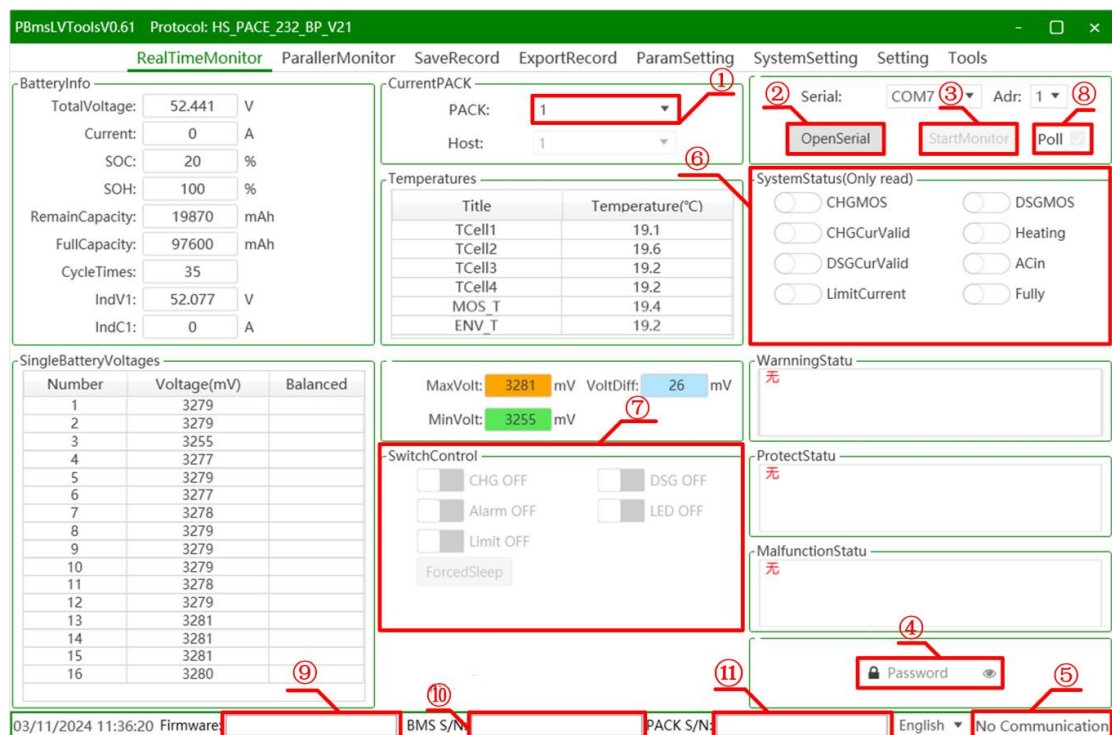


Figure 4.8.2-3

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.

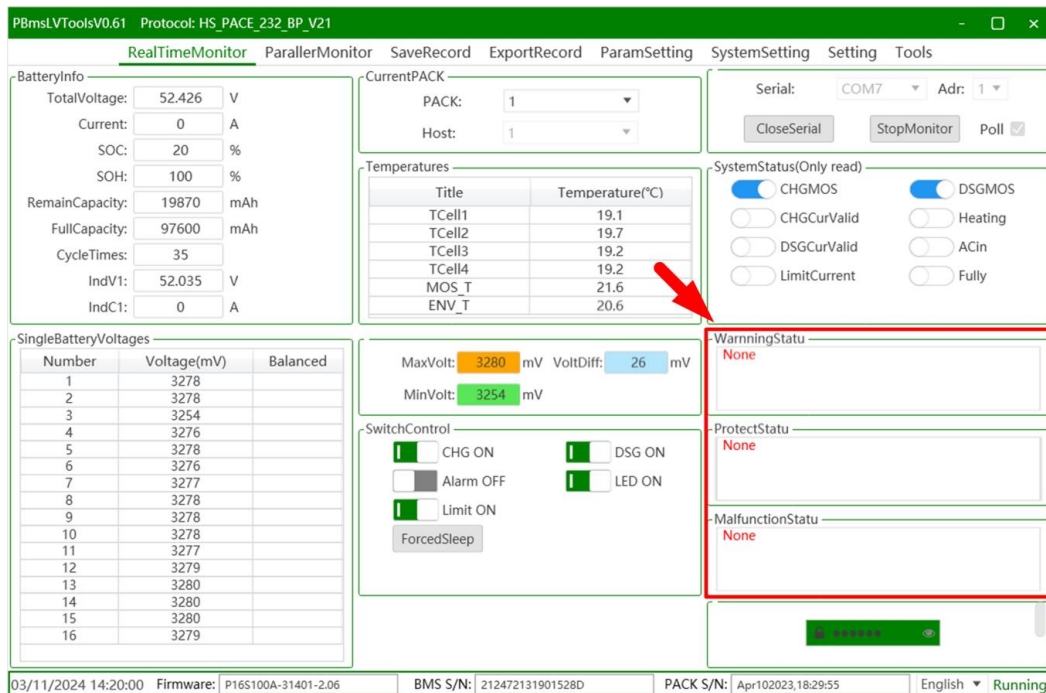


Figure 4.8.2-4

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.)

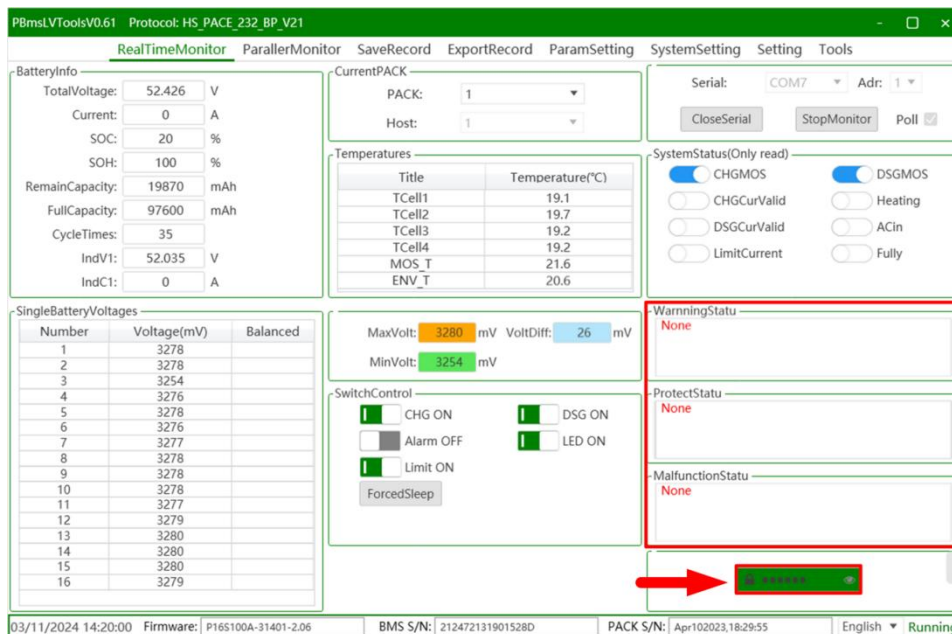


Figure 4.8.2-5

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

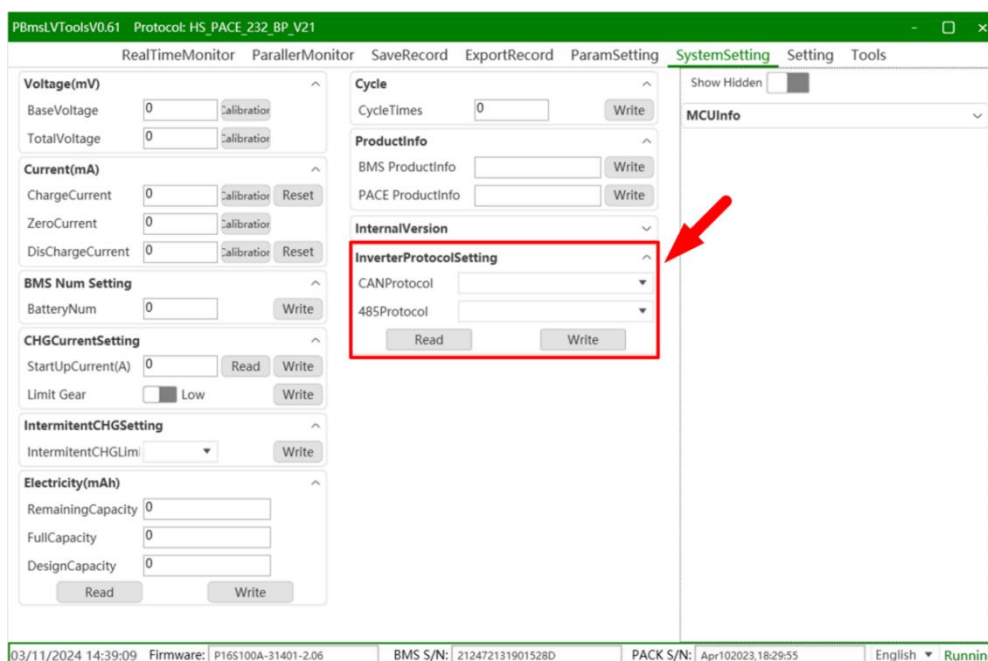


Figure 4.8.2-6

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.

4.9 System Maintenance



Danger:

1. When performing operation and maintenance on equipment in the system, please power off the system. Live operation on equipment may cause equipment damage or electric shock hazard.

2. After the equipment is powered off, internal components require some time to discharge; wait 5 minutes for complete discharge.
3. When the inverter is powered off for maintenance or due to a fault, to ensure normal operation of loads, please set the bypass switch to the grid side and close it, so that the grid supplies power to critical loads.



Danger:

Ensure that the equipment is powered off. When operating the equipment, wear personal protective equipment (PPE). When removing terminal blocks, use standard removal tools to avoid damaging the terminals or the equipment. Unless otherwise specified, the disassembly procedure is the reverse of the installation procedure, and will not be repeated in this document.

4.9.1 Periodic maintenance



Caution :When the equipment can no longer be used and needs to be scrapped, dispose of it in accordance with the electrical waste disposal requirements of the country or region where the equipment is located. Do not dispose of the equipment as household waste.

Maintenance Items	Maintenance Cycle
Check the air inlet/outlet of the equipment for foreign objects or dust. Check whether the installation space meets the requirements, and whether there is any debris accumulation around the equipment.	Once every 6 months
Check whether the equipment is installed securely and whether the fastening screws are loose; check whether the equipment appearance shows any damage or deformation.	Once every 6 months
Check whether the electrical connections are loose, whether the cable sheath is damaged, or if there is any exposed copper.	Once every 6 months
Check for water or pests to prevent long-term intrusion into the AIO	Once every 6 months
If the battery has not been used for a long time or has not been fully charged, it is recommended to charge the battery periodically.	Once every 0.5 months

Table 4.9.1

4.9.2 Troubleshooting



Illustration: Please perform troubleshooting according to the following methods. If these methods do not resolve the issue, please contact the after-sales service center.



Illustration: When contacting the after-sales service center, please gather the following information to facilitate quick resolution of the issue.

Product Information (e.g., serial number, software version, device installation time, fault occurrence time, fault occurrence frequency, etc.);

Installation Environment (e.g., weather conditions, whether components are shaded or obstructed, etc.; photos, videos, or other files of the installation environment may be provided to assist in issue analysis); **Grid Conditions.**



Illustration: If any issue not listed above occurs, or if following the instructions still fails to resolve the problem or anomaly, immediately stop system operation and contact your dealer or manufacturer without delay.

Fault code	Fault name	Whether it affects the output or not	Description
【01】	Battery under voltage warning	No	If the battery voltage is lower than [18], the battery is in the undervoltage state.
【02】	Battery under voltage protection	Yes	When the battery voltage is low, turn off the output to stop the battery discharge protection.
【03】	Average battery discharge current over current protection	Yes	If the average battery discharge current exceeds the maximum input battery current for 1 minute, turn off the output to stop the battery discharge protection.
【04】	Instantaneous battery discharge over current protection	Yes	If the instantaneous value of the battery discharge current is greater than the maximum instantaneous value of the device, turn off the output to stop the battery discharge protection.
【05】	Battery not connected	Yes	Battery not connected warning.
【06】	Battery over voltage	Yes	When the selected battery type or set battery voltage is exceeded, turn off the output to stop the battery charging protection.
【07】	BMS low battery alarm	No	BMS alarm low battery (Set BMS enablement to work)
【08】	BMS low battery protection	Yes	The BMS battery capacity rate is low. Disable the output to stop the battery discharge protection. (Set BMS enablement to work)
【09】	Bypass overload protection	Yes	If the mains is overloaded, turn off the AC output and stop the mains charging.
【10】	Battery output overload protection	Yes	If the battery discharge inverter is overloaded, turn off AC output and stop battery discharge protection.

【11】	Battery inverter output short circuit	Yes	If the AC output of the battery inverter discharge is short circuiting, turn off the AC output and stop the battery discharge protection.
【12】	The AC output of the battery inverter over circuit	Yes	If the AC output of the battery inverter discharge is over circuit, turn off the AC output and stop the battery discharge protection.
【13】	The DC component of the battery inverter voltage is abnormal	Yes	If the DC component of the battery inverter voltage is abnormal, turn off the AC output and stop the battery discharge protection.
【14】	Bus over voltage software sampling protection	Yes	Internal battery boost, boost bus voltage overvoltage software protection, turn off AC output and charge.
【15】	Bus over voltage hardware sampling protection	Yes	Internal battery boost, boost bus voltage overvoltage hardware protection, turn off AC output output and charge.
【16】	Bus under voltage protection	Yes	Internal battery boost, boost bus voltage undervoltage protection, turn off AC output output and charge.
【17】	Bus short circuit protection	Yes	Internal battery boost, boost bus voltage short-circuit protection, turn off AC output output and charge.
【18】	The PV input voltage is over voltage	Yes	The solar input voltage exceeds the maximum allowable input voltage protection.
【19】	The PV current software is overcurrent	—	—
【20】	PV over current protection	No	Solar charging overcurrent hardware protection, turn off solar charging.
【21】	The PV insulation impedance is low	—	—
【22】	The PV heat sink is overheated.	No	If the temperature of the solar charging radiator is too high, turn off the solar charging.
【23】	The AC heat sink is overheated.	Yes	If the temperature of the heat sink is too high, turn off the AC charging or battery inverter discharge.

【24】	The temperature of the main transformer is overheated	Yes	If the internal main transformer temperature is too high, turn off the AC charging or battery inverter discharge.
【25】	Ac input relay short circuit	Yes	Ac input relay short-circuit protection prevents the inverter AC output from being pumped back into the bypass AC input.
【26】	The AC output relay is short-circuit	Yes	AC output relay short circuit protection, turn off the inverter output and all charging functions.
【27】	Fan failure	Yes	If the fan is blocked or fails, disable the inverter output and charging functions.
【28】	EEPROM hitch	—	—
【29】	SPICommunication failure	—	—
【30】	Type detection error	Yes	The model is not set before delivery, and the model identification is wrong.
【31】	The bus fails to soft	—	—
【32】	The leakage current is abnormal	—	—
【33】	Parallel control CAN communication is faulty	Yes	In parallel mode, CAN communication is lost, AC output and charging are turned off.
【34】	communication CAN is faulty	Yes	In parallel mode, CAN communication is lost, AC output and charging are turned off.
【35】	Parallel mode is faulty	Yes	In parallel mode, the system has inconsistent machine parallel mode [31] Settings.
【36】	Parallel current sharing fault	Yes	In parallel mode, the AC output of the battery inverter differs greatly from the non-uniform current output of each machine. Turn off the AC output and charge.
【37】	Parallel ID setting error	Yes	In parallel mode, the RS485 addresses repeatedly conflict. The fault stops the AC output and charge. After the host automatically reallocates the address, the fault is cleared and the host enters the parallel.
【38】	Inconsistent Battery in parallel mode	Yes	In parallel mode, the battery voltage input of each machine varies greatly.
【39】	Inconsistent AC input source in parallel mode	Yes	Parallel mode, inconsistent mains power input source.

【40】	The parallel mode synchronization fails	Yes	Parallel mode, hardware synchronization signal reception failure, stop parallel and AC output.
【41】	Inconsistent system firmware version in parallel mode	Yes	If the program version is inconsistent in the parallel system, stop the parallel and AC output.
【42】	The parallel communication cable is faulty	Yes	The parallel communication line is faulty. Stop the parallel and AC output.
【43】	Serial number error	Yes	The serial number is not set before the factory, or the factory serial number is set repeatedly in the system.
【47】	The external CT host is set incorrectly	No	
【49】	BMS communication error	No	Check whether the communication line is connected correctly and whether [11] is set to the corresponding lithium battery communication protocol.
【50】	BMS other alarm	No	Check the BMS fault type and troubleshoot lithium battery problems.
【51】	BMS battery over temperature alarm.	No	BMS alarm lithium battery over temperature.
【52】	BMS battery over current alarm	No	BMS alarm lithium battery over current.
【53】	BMS battery over voltage alarm	No	BMS alarm lithium battery over voltage.
【54】	BMS battery low voltage alarm	No	BMS alarm lithium battery low voltage.
【55】	BMS battery low temperature alarm	No	BMS alarm lithium battery low temperature.

Table 4.9.2



Danger:

Before performing any inspection or operation, ensure that the equipment is disconnected from all power sources and that the capacitors are fully discharged to avoid the risk of electric shock.

05 Warranty Services

5.1 Warranty Period

Provided that the product is used correctly, the warranty period shall be in accordance with the agreement stipulated in the business contract.

5.2 Warranty Scope

During the warranty period, the company will provide free repair or replacement for any malfunction caused by defects in the product itself. The customer shall allow a reasonable response time for the company to carry out repairs. Replaced products shall be disposed of by the company. The customer must present valid proof of purchase and ensure that the product trademark is clearly visible; otherwise, the company reserves the right to decline warranty coverage.

5.3 Disclaimer Statement

Under the following circumstances, the company shall have the right to decline warranty coverage but may still provide paid repair services.

1. The product has exceeded the warranty period.
2. Valid proof of purchase cannot be provided.
3. Damage caused during transportation or handling.
4. Damage resulting from improper installation, modification, or repairs performed by unauthorized personnel.
5. Damage caused by operation under abnormal conditions or in unsuitable environments.
6. Malfunction or damage resulting from the use of non-Naton components or software.
7. Failures caused by force majeure, such as fire, earthquake, or flood.

06 Appendix

Appendix A-Logo Description

Identification Instructions	
	Please read the endorsed documentation carefully
	Danger. Risk of electric shock!
	Hazardous Substance Labeling
UN38.3	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-Exceptional Situation Explanation

When the battery drops or is subjected to a strong impact

If the battery drops or is subjected to strong impact during installation, it may cause internal damage. Do not use it again.

- If there is a strong odor, damage, smoke or fire, immediately evacuate the people and call the police. Professional personnel should use fire-fighting equipment to extinguish the fire and handle the situation safely.
- If there is no obvious deformation or damage to the appearance, and no strong odor, smoke or fire is present, 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 the safety of personnel first, and 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 immediately and report it to the authorities.
- The flooded batteries carry the risk of electrolyte contamination and cannot be reused. They need to be recycled and disposed of by professional institutions.

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 avoid the risk of explosion and the inhalation of toxic gases by personnel.
- During the firefighting process, all firefighters should wear full thermal insulation fire protection suits, wear fire-fighting filtering respirators or air respirators, fire helmets and face masks, and wear insulating protective gear such as insulated shoes. Use inert gases or Class D dry powder fire extinguishers. Water-based fire extinguishing agents (in the initial stage) are prohibited.
- After extinguishing the open flame, continuous water spraying is still required to cool down the battery. Wait until the battery temperature drops to within $\pm 10^{\circ}\text{C}$ of the room temperature, and monitor it for several hours to ensure there are no signs of temperature rise before removing it.

In the event of a fire extinguishing agent eruption or a fire occurrence

Suggestions for operation and maintenance personnel:

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

Do not re-enter the burning area or open the storage system door. Isolate the scene and keep watch.

Remote power-down the system (ensure your own safety).

Provide product information and user manual to the firefighters.

After extinguishing the fire, have professionals handle it. Do not open the door privately.

Contact the service engineer to assess and maintain.

Advice for firefighters:

Refer to the product information provided by the maintenance personnel.

Do not open the storage system door before ensuring safety.

Use control measures to extinguish the fire to prevent it from spreading to the surrounding storage cabinets.



User Manual

BSL NEW ENERGY TECHNOLOGY CO., LTD

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inquiry@bsl-battery.com

Follow us on:     

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Manufacturing Industrial Park, Tonghu
Ecological Intelligence Zone, Zhongkai,
Huizhou, Guangdong, China

Website



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