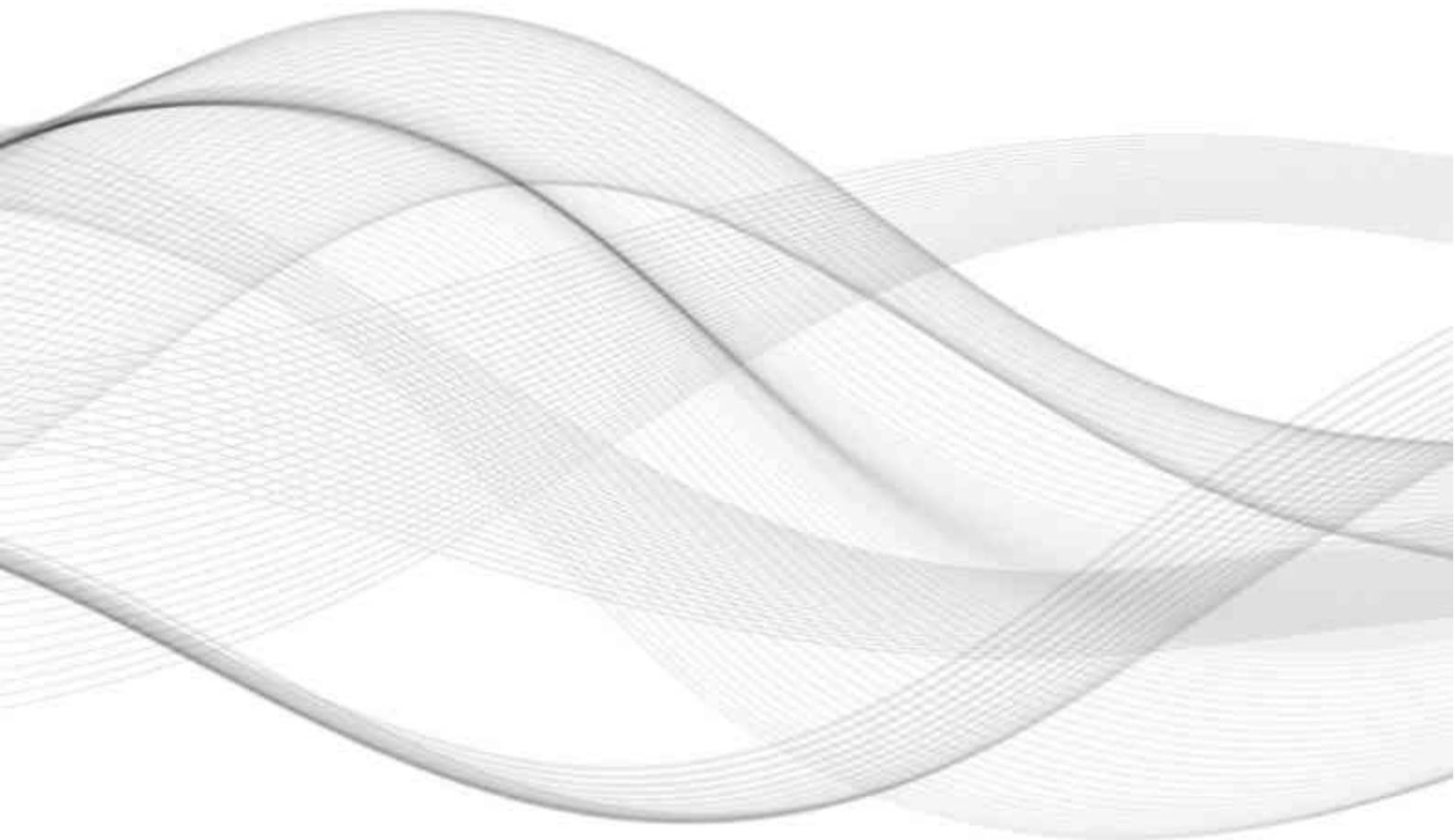



inventronics

5kW Hybrid Inverter

Installation Manual



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Caution

Due to product version upgrades or other reasons, the content of this document will be updated periodically. Unless otherwise agreed, the content of this document cannot replace the safety precautions on product labels or in the user manual. All descriptions in this document are for use guidance only.

Instructions for Use







To protect your legitimate rights and interests, please read the operating procedures and safety instructions carefully before using this product and please be sure to operate the product in accordance with the operating procedures and safety instructions provided in this manual.

Once you start to use this product, you are deemed to have read, understood, acknowledged, and accepted all terms and contents of the operating procedures and safety instructions for this product. The users undertake to be responsible for their own actions and all consequences arising therefrom. The users undertake to use this product for legitimate purposes and agree to comply with these terms and the relevant policies or guidelines of the country in which they are located.



When you use this product, please be sure to observe and implement the requirements including but not limited to the operating procedures and safety instructions. For any personal injury, accidents, property damage, legal disputes, and other adverse events causing conflicts of interest resulting from actions that violate the safety instructions or due to irresistible factors, the users shall bear the relevant responsibilities and losses themselves. The company shall not bear any responsibility.


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Risk Notification

	Caution! Failure to observe the warnings in this manual may result in personal injury.
	Danger of high voltage and electric shock!
	Please refer to the operating instructions.
	To ensure safety, please perform installation operations after the inverter has been turned off and disconnected for 5 minutes. Otherwise, there is a risk of electric shock.
	Be cautious of surface temperatures to prevent burns!
	Protective grounding.

Installation Risk Notification

	Warning: When handling the equipment manually, wear protective gloves to prevent cuts from sharp objects.
	Caution: Before connecting cables, confirm that the cable labels are correct.

	Danger: Construction operations involving high-voltage circuits may lead to fires or electric shock accidents. The installation and routing of AC cables must comply with local regulations and codes.
---	--

Please perform construction in accordance with relevant construction safety regulations and standards to avoid safety accidents;



Personnel responsible for installing this product must undergo rigorous training and master the correct installation methods of the system and various safety precautions before performing any operations on the product;

The installation site should be selected in a well-ventilated location and should maintain a safe distance from surrounding facilities with fire and explosion hazards and underground pipelines. The installation location should be away from open flames, high temperatures, dust, and corrosive environments. The selected product enclosure protection level should be compatible with the installation environment;

The cables, terminal blocks, and other components selected for installation should meet the current requirements. Before and after installation, ensure that all wiring related to the charging equipment is securely fastened, well insulated, correctly wired, and free from wear and tear, risk of crushing or damage, otherwise there is a risk of fire and electric shock; Before powering on the product, please ensure that the system grounding is good to avoid electric shock accidents;

If any components are damaged during installation, they should be repaired or replaced promptly to avoid using them in a faulty state.

Operation and Maintenance Risk Notification

	Danger: During system operation, there are hazardous voltages inside the equipment. Non-professionals should not attempt to operate or maintain it.
	Danger: During system operation, there are hazardous voltages inside the equipment. Non-professionals should not attempt to operate or maintain it.

Operation and maintenance of the equipment must comply with electrical safety operating procedures to avoid risks of electric shock or fire;

Personnel responsible for operating and maintaining this product must possess qualifications for working with high voltage and AC power. They must undergo rigorous training and master the correct operation methods and all safety precautions before performing any operations on the equipment. Otherwise, there may be a risk of electric shock;

It is prohibited to operate and maintain the system without power down, otherwise there may be electric shock;

During operation, it is strictly prohibited to wear watches, bracelets, rings, or other easily conductive objects on the wrists;

It is prohibited to disassemble or modify the product or its wiring without authorization, otherwise it may lead to fires or electric shock accidents;

Keep flammable and combustible materials away from the product. Maintenance personnel should promptly clean up any such materials to avoid the risk of fire.

Usage Risk Notification

It is strictly prohibited to use the system in case of equipment failure, and never operate without authorization when the system is abnormal;

Strictly follow the operating procedures and prompts in this manual and adhere to industry safety standards to avoid risks of electric shock and fire. In the event of fires, water immersion, or other accidents, it is strictly prohibited to approach the product and immediately contact maintenance personnel for handling.

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1. Receipt and Storage

1.1 Pre-receipt Inspection

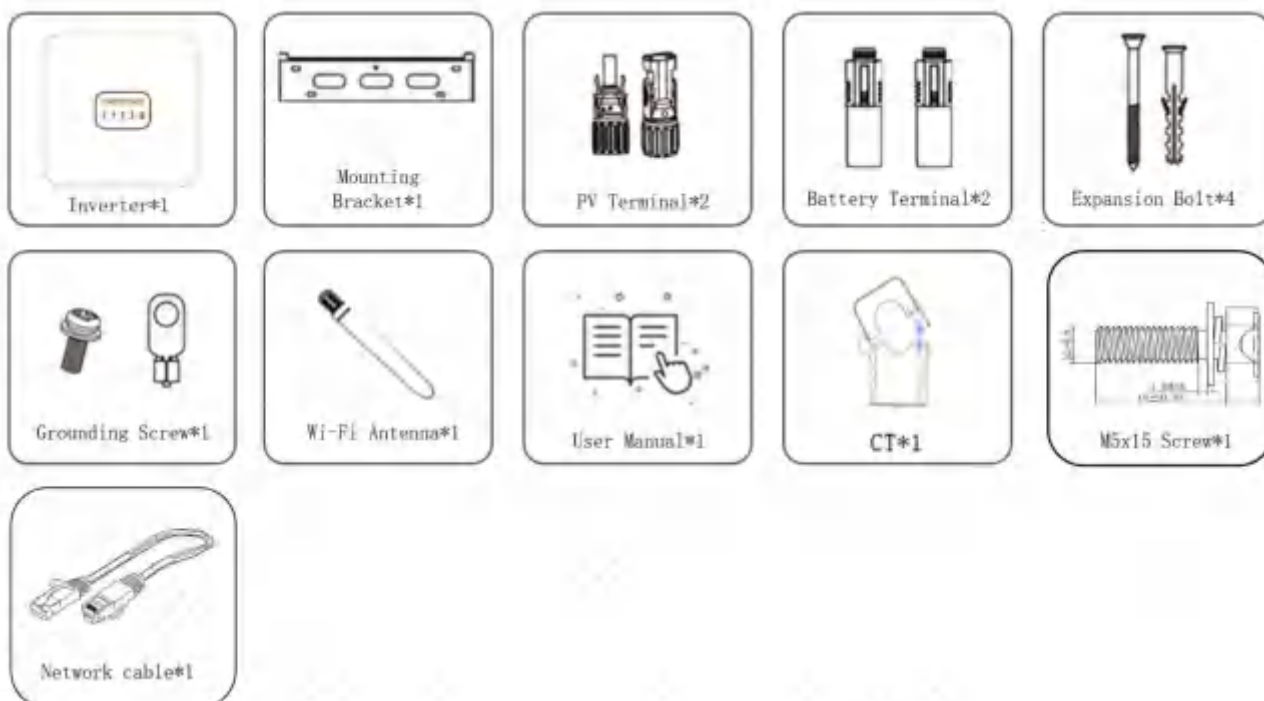
Before signing for receipt, carefully inspect the following:

1. Check whether the outer packaging is intact. In case of deformation, rupture, or other obvious damage, please do not accept the delivery and contact the local dealer.
2. Check whether the inverter model is correct. If there is any discrepancy, please do not open the package and contact the local dealer.
3. Check whether all accessories are present. If any are missing or damaged, please contact the local dealer.

1.2 Deliverables

Upon receiving the inverter, confirm that the exterior is intact and open it to check whether the following items are present. If not, contact the local dealer.

Figure 1.1 Accessories



1.3 Inverter Storage

1. Ensure the outer packaging box is securely sealed, and the dryer and waterproof bag are intact;
2. Maintain the storage environment within the specified temperature and humidity range;
3. Store the box with the indicated orientation upright;
4. For inverters stored for more than 6 months, consult professionals before normal use.

2. Product Introduction

2.1 Appearance and Dimensions

2.1.1 Dimension Introduction

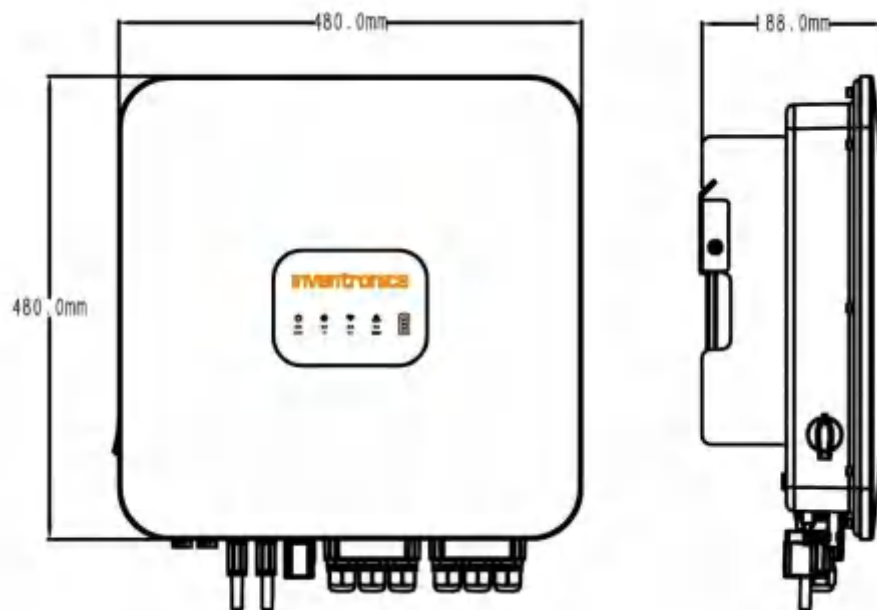
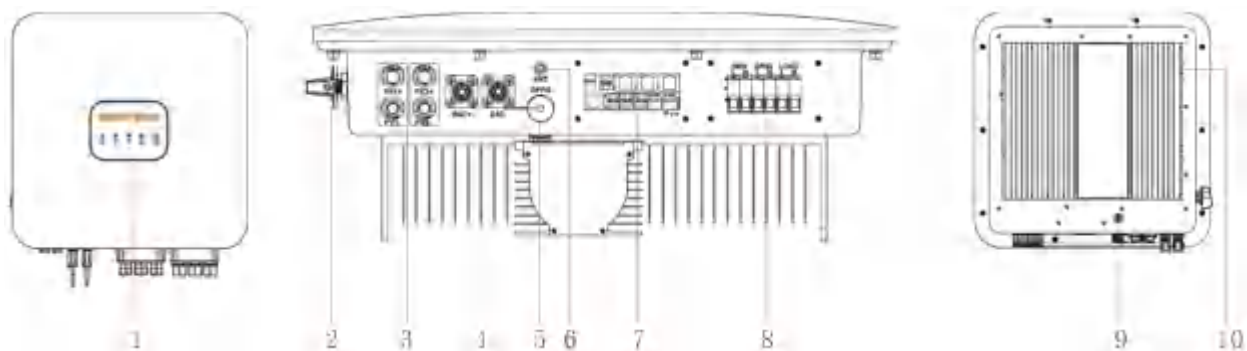


Figure 2.1 Dimensions of Hybrid Inverter

2.1.2 Appearance Introduction



Serial Number	Component	Description
1	Indicator Light	Indicates the current operating status of the device
2	PV DC Switch	Controls the connection or disconnection of PV DC input
3	PV Connection Terminal	Connects PV modules
4	Battery Connection Terminal	Connects batteries
5	GPRS Interface	GPRS communication port/RS485 communication debugging port
6	WIFI Antenna	Used for WIFI connection
7	Communication Terminal Interface	CT/Battery communication/DRED function/(and other reserved functions)
8	AC Side Interface	The inverter connects to corresponding interfaces based on application scenarios, which can connect to the grid, diesel generator, critical loads, etc.
9	Waterproof Venting Valve	Balances the internal pressure of the device
10	Hook	Fixes the inverter

Table 2.1 Product Features

2.2 Application Scenarios

Photovoltaic hybrid grid-connected inverter products are typically used in photovoltaic energy storage systems. The system mainly consists of PV arrays, batteries, PV energy storage converters, local loads, and the grid. It achieves grid-connected power generation, battery energy storage, uninterrupted power supply to loads, and peak-shaving and valley-filling revenue through energy management, maximizing the utilization of the inverter. The following are the main application scenarios of PV inverters.

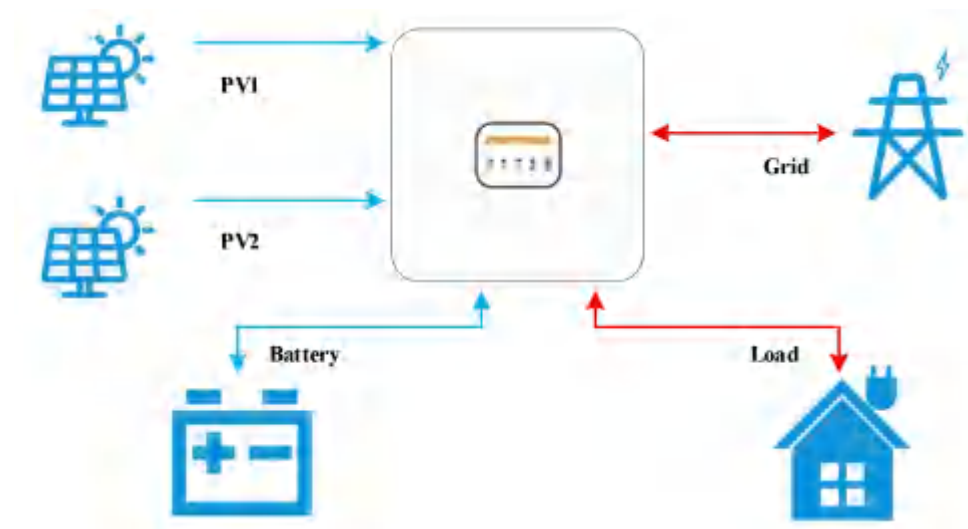


Figure 2.2 Application Scenarios

2.3 Circuit Block Diagram

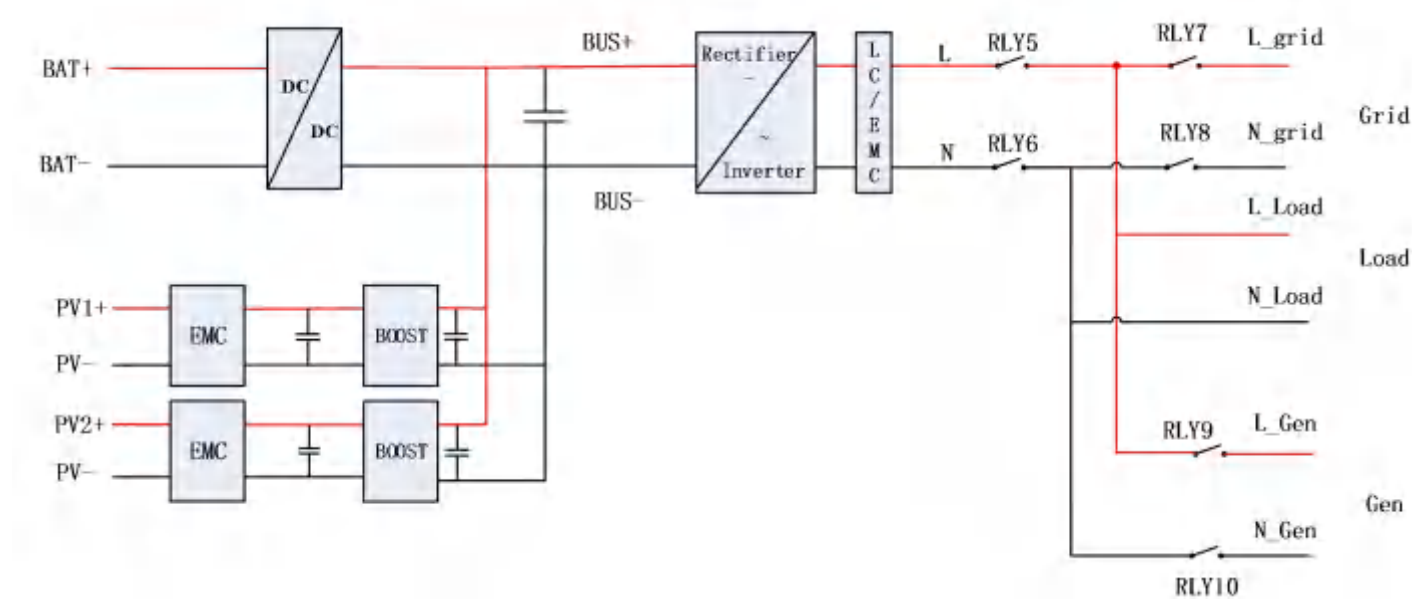


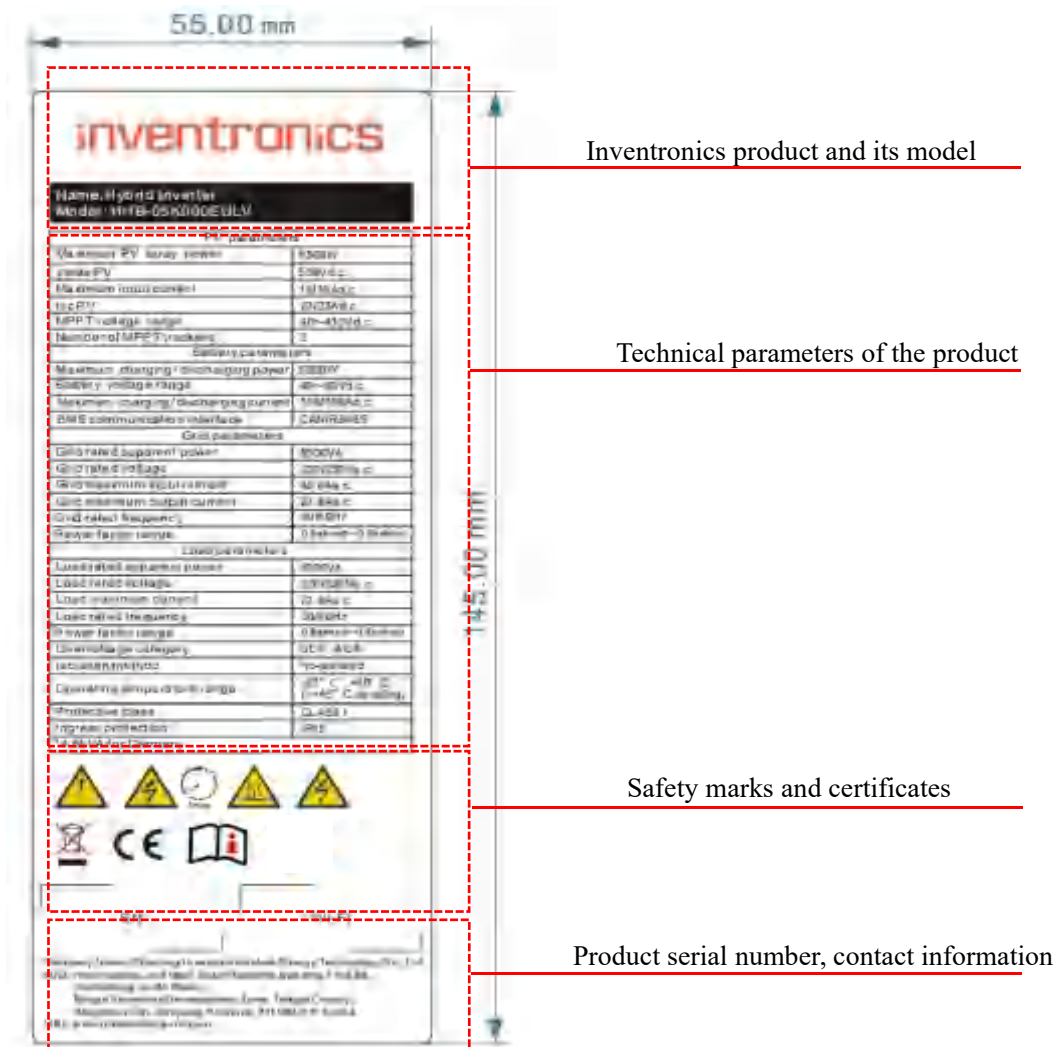
Figure 2.3 Simplified Circuit Diagram

2.4 Indicator Light Instructions

		Fast Flash (Off-grid): 1.5s/flash
		Steady On: Grid-connected
		Off: Shutdown
		Fast Flash: Single PV
		Steady On: Two PVs
		Off: No PV or low PV voltage
		Fast Flash: Connecting to cloud platform (1.5s/flash)
		Slow Flash: Cloud platform mode (3s/flash)
		Steady On: WIFI local mode / Power-on state
		Steady On: Fault
		Off: No fault
		1 Light On: 0-24% SOC
		2 Lights On: 25-49% SOC
		3 Lights On: 50-74% SOC
		4 Lights On: 75-100% SOC
		Top Light Flashing: Charging
		All Lights Off: Communication failure / No battery

Table 2.2 Indicator Light Instructions

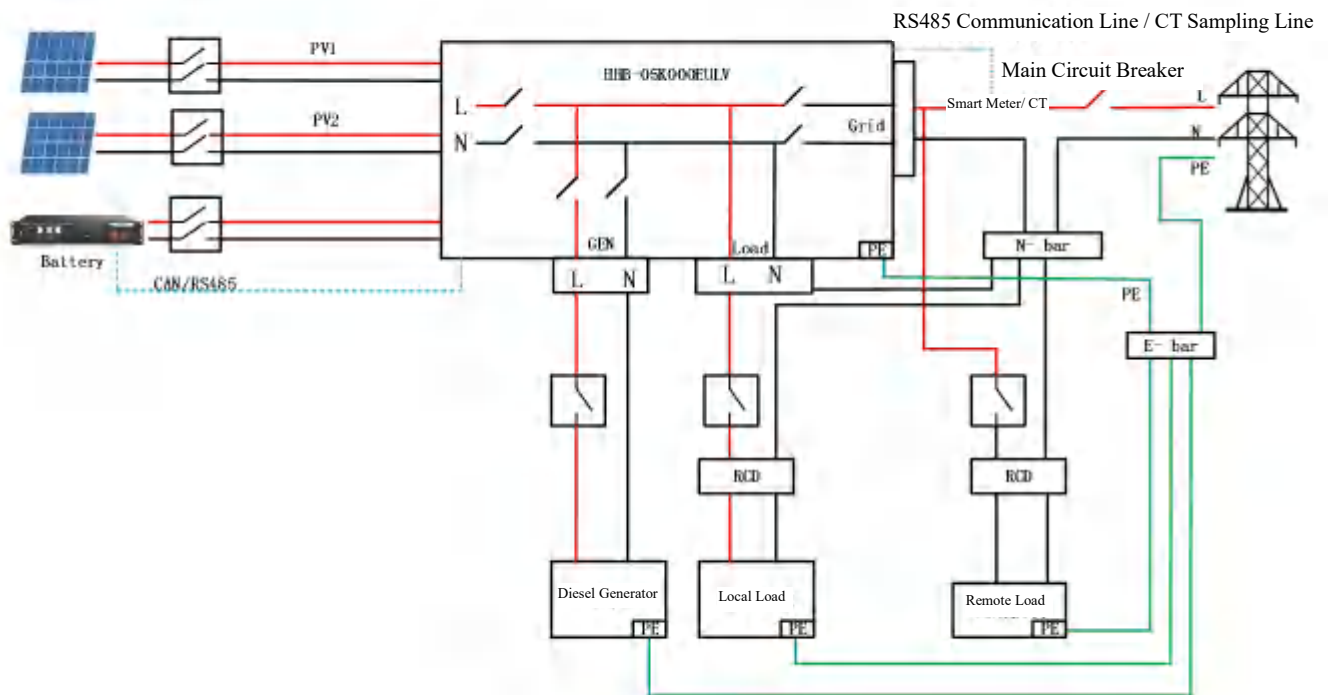
2.5 Rating Plate Instructions



3. Installation

3.1 Wiring Diagram

1. Australian Grid



2. Other countries

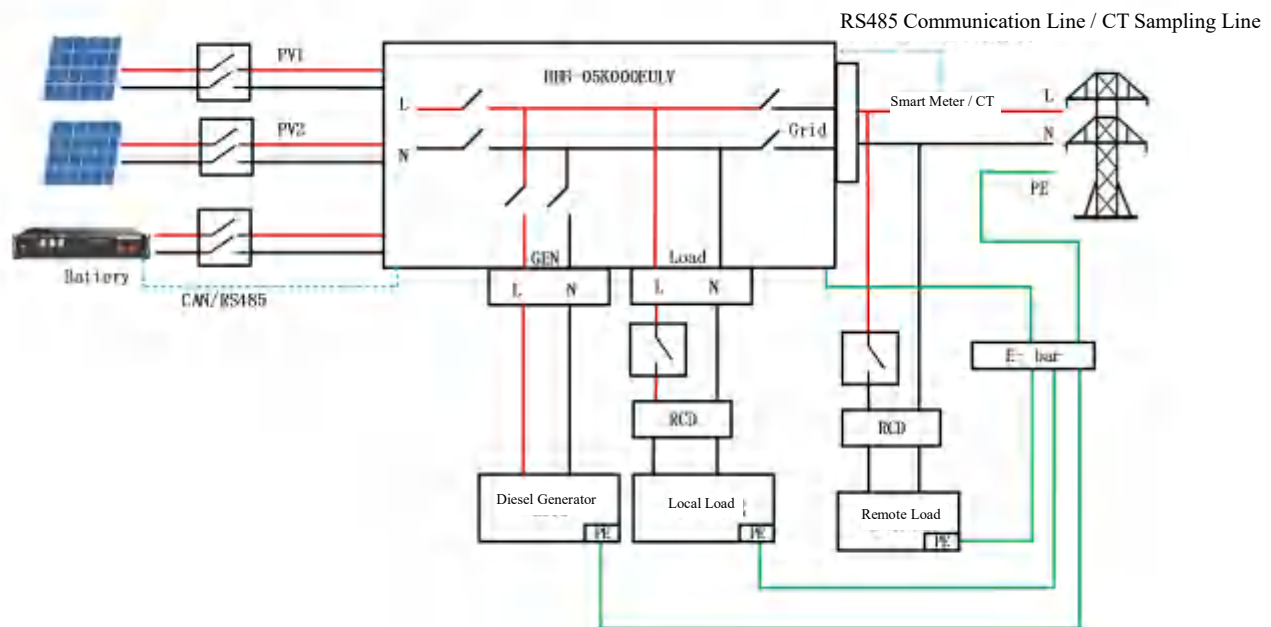


Figure 3.1 Wiring Diagram

3.2 Preparation for Installation

3.1.1 Preparation before Installation

Cable Preparation					
Serial Number	Name	Recommended model	Cross-sectional area (mm²)	Cable Color	Cable Outer Diameter (mm)
1	Photovoltaic Input	UL10269 12AWG	4~6	Red, black	4.00±0.15
2	Battery Input	UL10269 4AWG	16~25	Red, black	10.00±0.30
3	Ac Output	UL1015 10AWG	4~6	Red, black, yellow-green	4.60±0.20
Installation Tools					
Serial Number	Name	Recommended model	Specification	Function	
1	Electric Drill	/	Drill bit φ8mm	Drills holes for expansion screws	
2	Screwdriver	M3(Phillips), M6(Phillips)	/	Fixes cable screws	
3	Wire Stripper	/	4 ~ 6mm²	Strips cable insulation	
4	Crimping Pliers	/	4 ~ 10mm²		
5	Hydraulic Crimping Pliers	/	10 ~ 16mm²		
6	MC4 Wrench	/	/	Removes PV MC4 terminals	
7	Multimeter	/	/	Measures electrical parameters	
Recommended Circuit Breaker Models					
Serial Number	Name	Recommended Specifications		Function	
1	PV Circuit Breaker	25A		Over-current protection function on the photovoltaic side. When issues arise with the photovoltaic system or machinery, it promptly disconnects the power supply.	
2	BAT Circuit Breaker	120A		Over-current protection function on the battery side. When issues arise with the battery or machinery, it promptly disconnects the power supply.	
3	Grid Circuit Breaker	60A		Over current protection function on the grid side. When issues arise with the grid or machinery, it promptly disconnects the power supply.	

Table 3.1

3.1.2 Installation Space Requirements

1. Wall-mounted installation is mandatory, with an installation angle less than 15°;
2. It should be hung horizontally, preferably perpendicular to the ground, avoiding significant inclination;

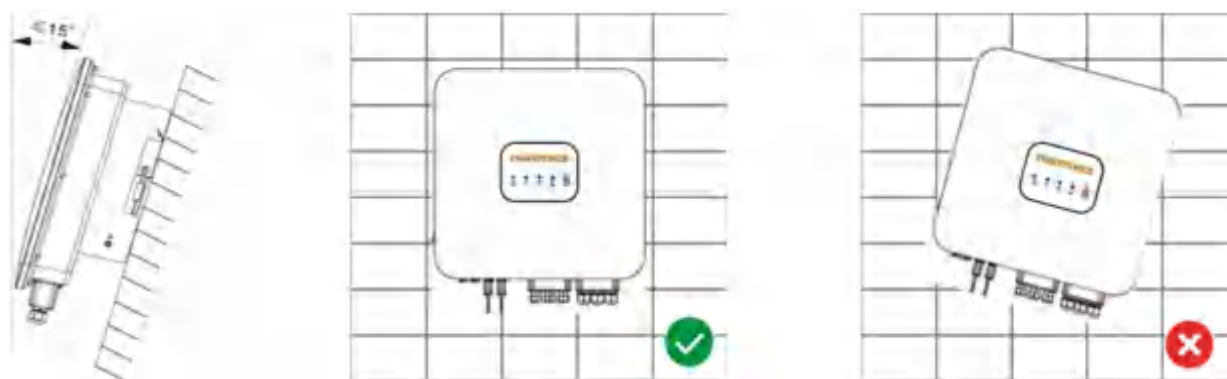


Figure 3.2

3. Installation Space Requirements

- 1) The equipment must not be installed in flammable, explosive, or corrosive environments. Avoid exposure to sunlight, rain, snow, etc. It is recommended to install in locations with shielding. Based on the protection rating, it can be installed indoors or outdoors.
- 2) The installation surface must be able to support the weight of the inverter.
- 3) Adequate ventilation space should be maintained around the inverter, with at least 200mm on both sides, 300mm upwards and forwards, and 500mm downwards, ensuring no obstructions.
- 4) The operating temperature range is $-25^{\circ}\text{C} \sim 60^{\circ}\text{C}$, with humidity below 85%. The protection rating of this product is IP65, and it should be installed at altitudes below 3000m.
- 5) Keep the inverter away from strong magnetic fields, maintaining a distance of over 30m from sources of strong electromagnetic interference.

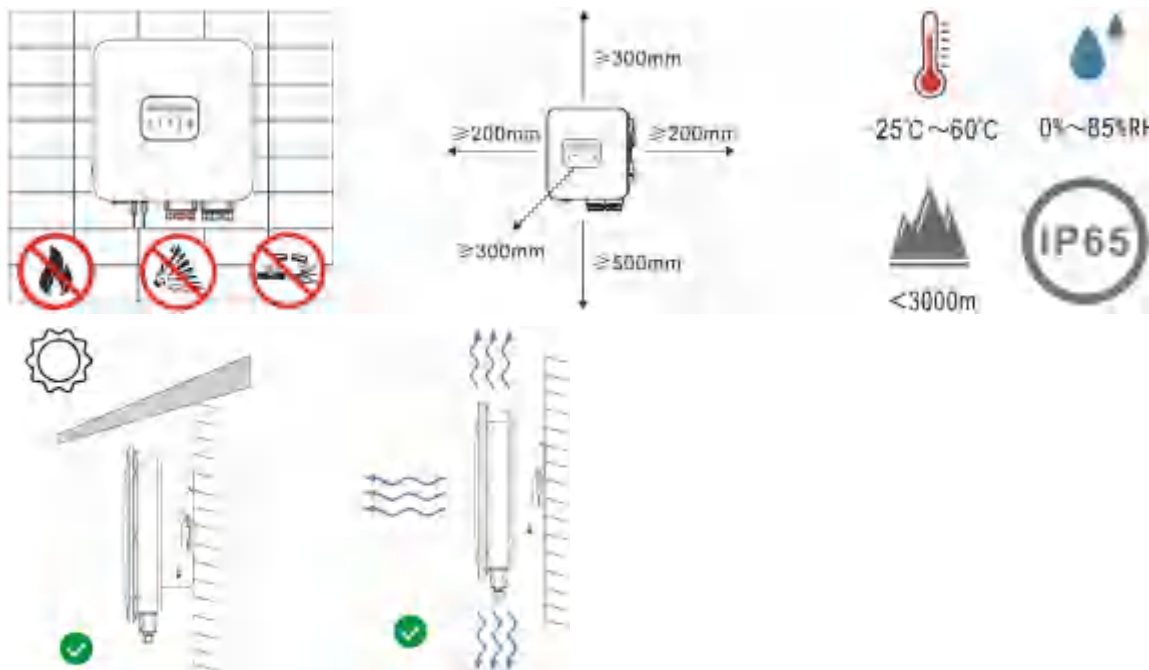
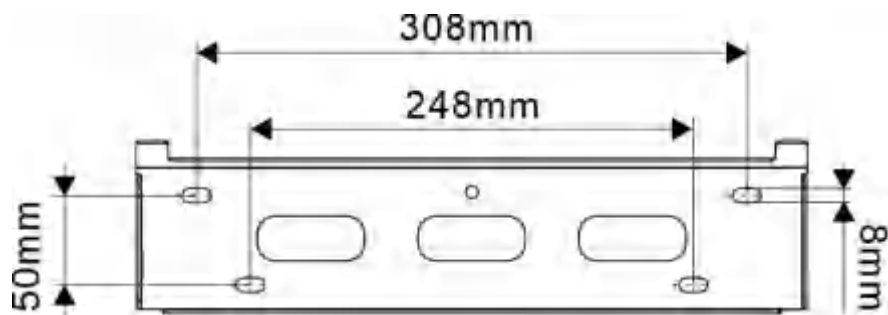


Figure 3.3

3.3 Installation of Inverter

The size of the inverter backplate is as follows:



1. Place the backplate horizontally on the wall or mounting bracket and mark the fixing holes with a marker;
2. Drill holes at the marked points using a 10mm drill bit, ensuring a depth of approximately 80mm;
3. Secure the backplate to the wall using expansion screws;
4. Hang the inverter on the backplate, paying attention to the position of the hooks.

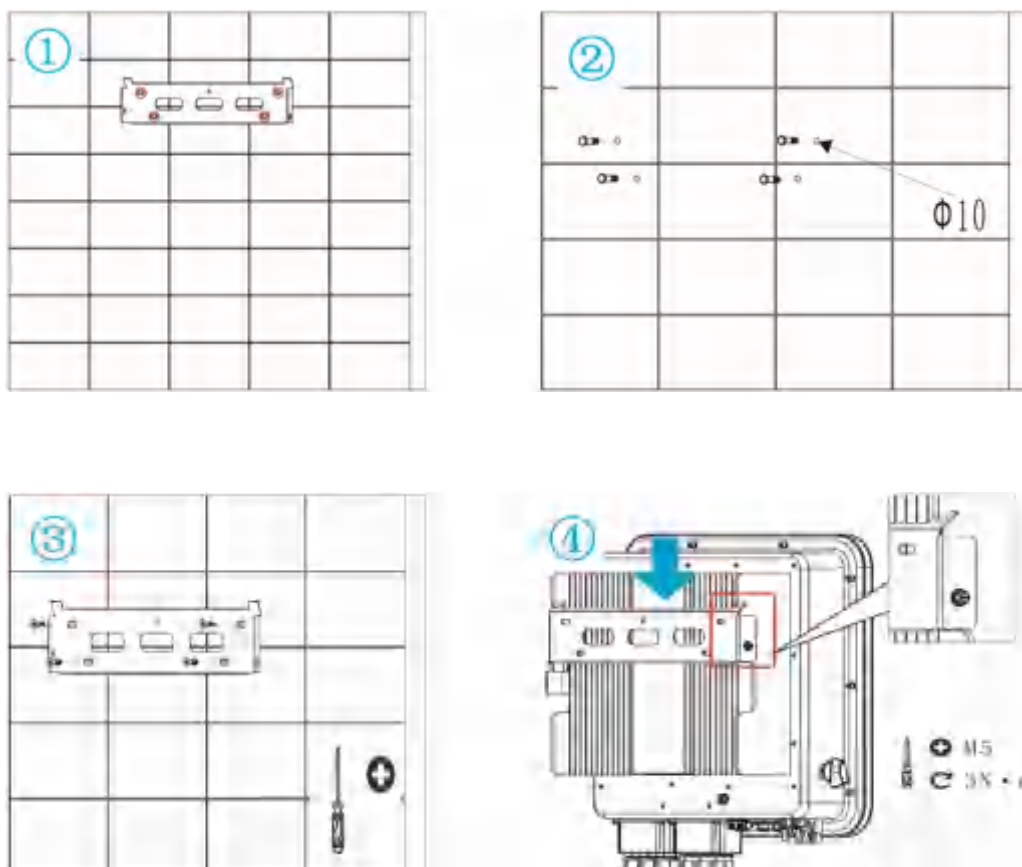
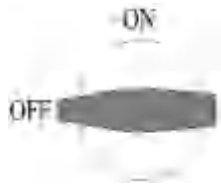


Figure 3.4

3.4 Electrical Connections for the Inverter

3.4.1 Safety Instructions and Preparations before Wiring

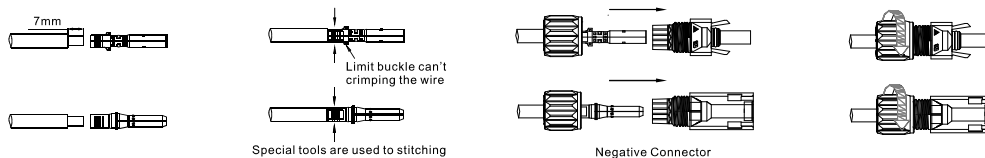
1. Before electrical connections, set all switches to the “OFF” position;
2. Installation of AC and DC input cables should only be performed by professionals;
3. Never reverse or mix the DC positive (PV1+, PV2+, BAT+) and negative (PV1-, PV2-, BAT-) terminals, as this may affect normal operation or even damage the product. Never connect one PV array to two PV inputs;
4. The recommended external wiring length for the PV and battery sides is less than 30m;
5. The positive and negative terminals of the PV array should not be connected to the ground;
6. Ensure the insulation resistance of the PV array is greater than 33.3k; otherwise, there is a risk of electric shock;
7. Check and ensure the PV rotary switch is set to the “OFF” position;



8. Reliably crimp the H4 connectors provided in the accessories to the cables as required;

PV Connection steps:

PV cable size: 4~6mm²



9. Use a multi-meter to measure the PV side voltage, check the polarity, and ensure the open-circuit voltage does not exceed 500V;



10. Use a multi-meter to measure the battery side voltage, verify the correct polarity, and ensure the open-circuit voltage is less than 60V;
11. Use a multi-meter to measure the grid voltage to ensure it does not exceed 265V;
12. Use a multi-meter to measure the load voltage to ensure it does not exceed 10V.

3.4.2 Electrical Wiring

Connect the prepared terminals to the inverter terminals. Listen for a “click” sound to confirm the terminals are properly installed. Be cautious to avoid reversing the polarity! Connect AC side cables according to the silkscreen printing, and connect the grounding wire after connecting the power cables.

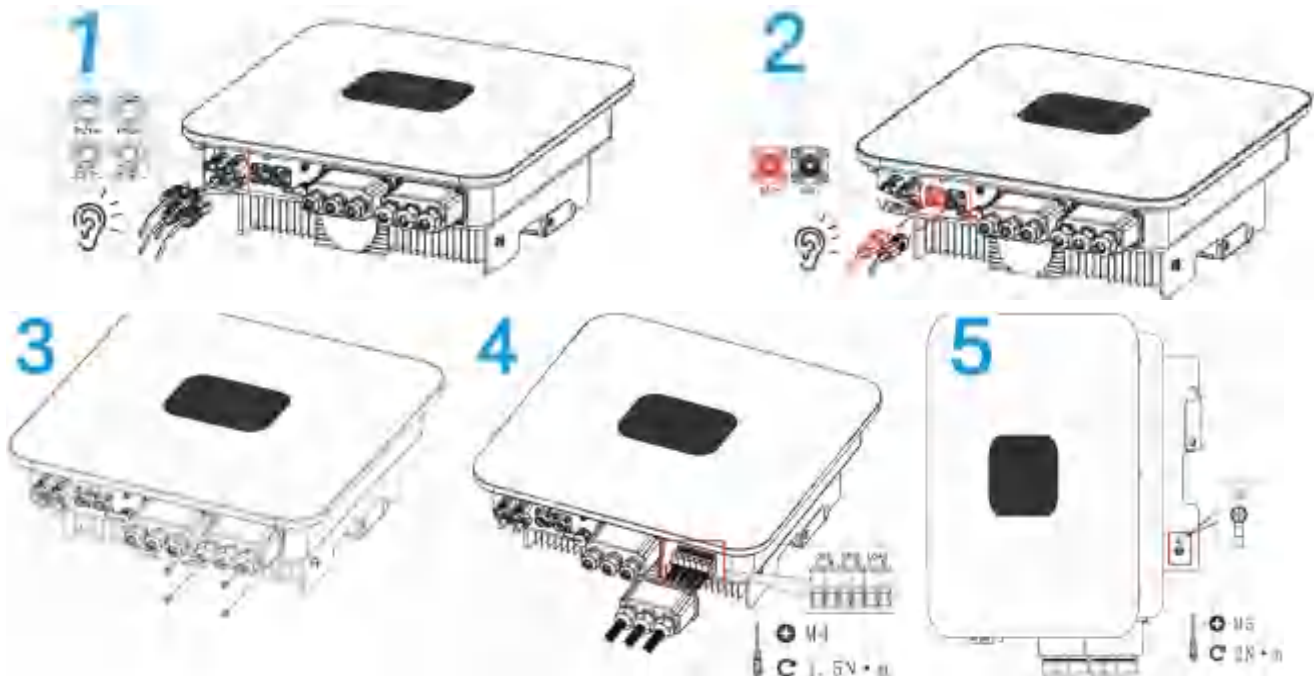
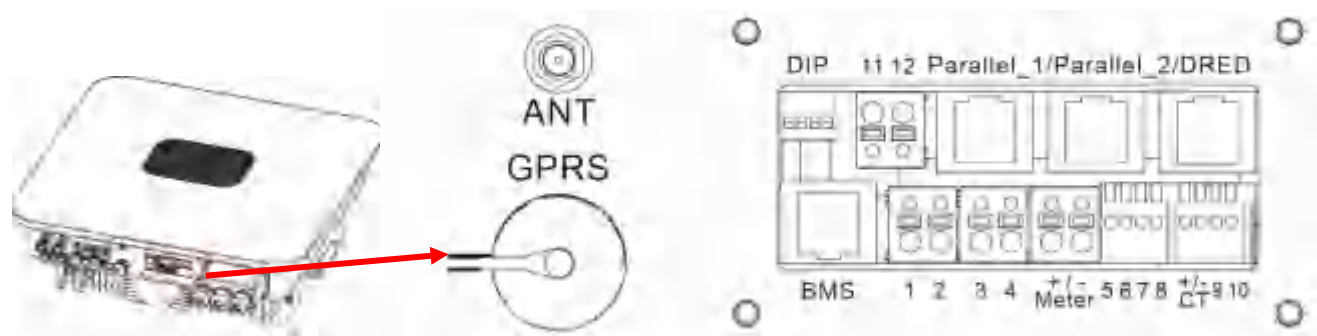


Figure 3.5

3.4.3 Communication Wiring

1. Remove the waterproof cover plate provided with the product;
2. Install the network cable connector of the accessory waterproof cover plate to the corresponding communication interface. The BMS interface is pre-connected, and other signal terminals are connected as needed;
3. After connecting the cables, tighten the waterproof lock and secure it with screws;



Terminal Name	Terminal Definition
ANT	WiFi antenna installation point
GPRS	GPRS communication port
DIP	1: DRED function; 2: CANa matching resistor for parallel operation; 3: CANb matching resistor for parallel operation; 4: WIFI hardware reset
Parallel_1/ Parallel_2	Parallel communication port 1/2, RJ45 interface
DRED	The inverter should detect and initiate a response to all supported demand response commands, RJ45 interface
BMS	Battery communication (pre-installed), RJ45 interface
Meter	RS485 communication port +/- corresponds to A/B
CT	Sampling port for current transformers. One CT is included in the shipment for sampling grid current and enabling anti-reverse flow functionality. When installing the CT, connect the red/white wire to the “+” terminal and the black wire to the “-” terminal. The CT should be connected to the live wire, with the arrow on the CT pointing towards the grid.
1, 2	Diesel generator dry contacts
3, 4	Reserved dry contacts
5, 6	Reserved CAN communication ports (5: H; 6: L)
7, 8	Reserved input ports
9, 10	Reserved CT ports (9: +; 10: -)
11, 12	DRED5

Table 3.2

The following provides detailed descriptions of the functions and signals corresponding to various signal terminals.

DRED		
PIN	Signal Name	Cable Color
1	DRM 1/5	Orange-white
2	DRM 2/6	Orange
3	DRM 3/7	Green-white
4	DRM 4/8	Blue
5	RefGen	Blue-white
6	Com/DRM0	Green
7	N/A	Brown-white
8	N/A	Brown

RS485		
PIN	Signal Name	Cable Color
1	NC	Orange-white
2	NC	Orange
3	485B_B	Green-white
4	COM	Blue
5	COM	Blue-white
6	485B_A	Green
7	485B_B	Brown-white
8	485B_A	Brown

BMS		
PIN	Signal Name	Cable Color
1	485A_B	Orange-white
2	485A_A	Orange
3	COM	Green-white
4	CAN_H	Blue
5	CAN_L	Blue-white
6	COM	Green
7	485A_A	Brown-white
8	485A_B	Brown

GPRS	
PIN	Signal Name
1	VCC
2	GND
3	485A
4	485B

4. APP Introduction

Users need to select WiFi or a communication stick when using the APP.

For the operation and use of EnergyStoragePro, please contact the manufacturer and refer to the EnergyStoragePro operation and user manual.

iOS version: Scan the QR code below or search for EnergyStoragePro in the App Store to download.

Android version: Scan the QR code below or search for EnergyStoragePro in Google Play to download.



Android QR code

iOS QR code

Please refer to the manual for APP usage.



5. System Integration and Parallel Operation

The hybrid storage system currently supports three types of batteries: lithium batteries (BMS), lead-acid batteries, and flow batteries. It supports three system types: standalone, parallel operation (1~4 units), and system integration (three single-phase machines combined to operate as a three-phase machine). It also supports two battery wiring methods: battery independence (each inverter uses a separate battery) and battery sharing (using one battery for parallel operation and system integration).

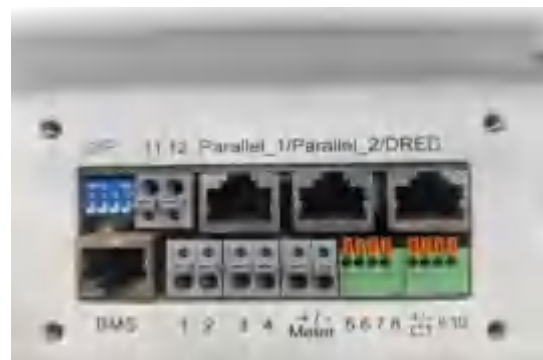
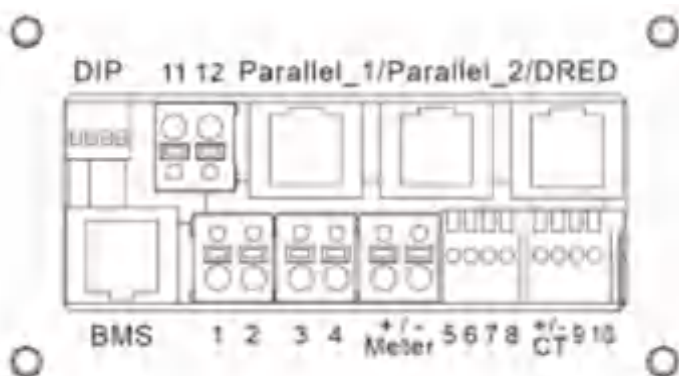
5.1 Precautions for System Integration and Parallel Operation

1. Electricity Meter

Connect one single-phase electricity meter for standalone and parallel operations, and one three-phase electricity meter for system integration. For parallel or integrated systems, the meter communication line must be connected to the master. The meter voltage sampling line and current sampling Hall sensor must be correctly connected for normal operation. Standalone and parallel operations support meter self-test functions, but system integration does not.

2. Parallel Communication Line

Each machine has two parallel network ports. After connecting the parallel network cables, flip the DIP switches 2 and 3 (towards the arrow/upward direction) to enable CAN communication.



3. Grid

(1) System Integration

Connect the N-lines of the machine's grid ports together and to the grid's N-line. Connect the L-line of the Master (Phase A), the L-line of Slave Machine 1 (Phase B), and the L-line of Slave Machine 2 (Phase C) to the corresponding ABC phases of the grid. The phase sequence must not be incorrect. To prevent reverse phase sequence connection, perform a grid connection for the first startup, and the machine will perform a phase sequence self-check.

(2) Parallel Operation

Connect the L-lines of the machine's grid ports together and to the grid's L-line. Connect the N-lines of the machine's grid ports together and to the grid's N-line.

4. Load

(1) System Integration

Connect the N-lines of the machine's load ports together as the common load N-line. Connect the L-line of the Master (Phase A), the L-line of Slave Machine 1 (Phase B), and the L-line of Slave Machine 2 (Phase C) as the corresponding load ABC phases. The phase sequence must not be incorrect.

(2) Parallel Operation

Connect the L-lines of the machine's load ports together as the common load L-line. Connect the N-lines of the machine's load ports together as the common load N-line.

5. PV

The PV connection is the same as for a standalone machine, with one-to-one connections to the PV ports. Note: It is strictly prohibited to connect one PV circuit to multiple PV inputs of the PV-storage machines simultaneously. Violating this will cause irreversible consequences!

6. Battery

When batteries are shared, connect the battery power lines simultaneously to the battery interfaces of each PV-storage machine. The lithium battery BMS communication line must be connected to the Master, lead-acid and flow batteries ignored.

When batteries are independent, connect the battery power lines one-to-one to the corresponding battery interfaces of the PV-storage machines. The lithium battery BMS communication line must be connected correctly one-to-one, lead-acid and flow batteries ignored.

7. Diesel Generator

Connect the L-lines of the diesel generator ports together as the common diesel generator L-line. Connect the N-lines of the machine's diesel generator ports together as the common diesel generator N-line.

The following diagrams are wiring diagrams:

Standalone Machine

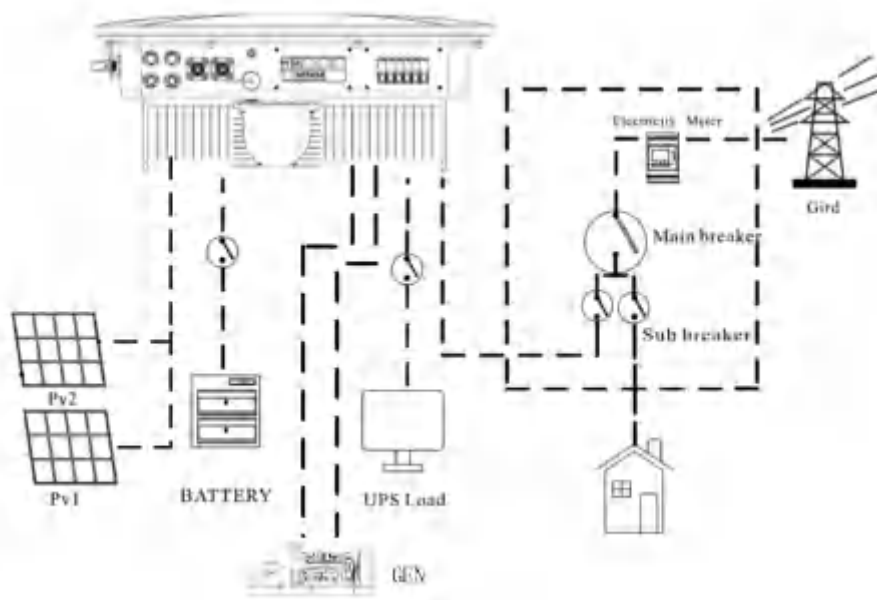


Figure 5.1

5.2 Grouped Machines

Grouped machines currently support only 3 machines, forming ABC three-phase connections, and strictly following the composition of the Master, Slave Machine 1, and Slave Machine 2 into ABC three-phase! There are currently two battery connection methods for grouped machines.

1. Grouped Machines (Independent Batteries)

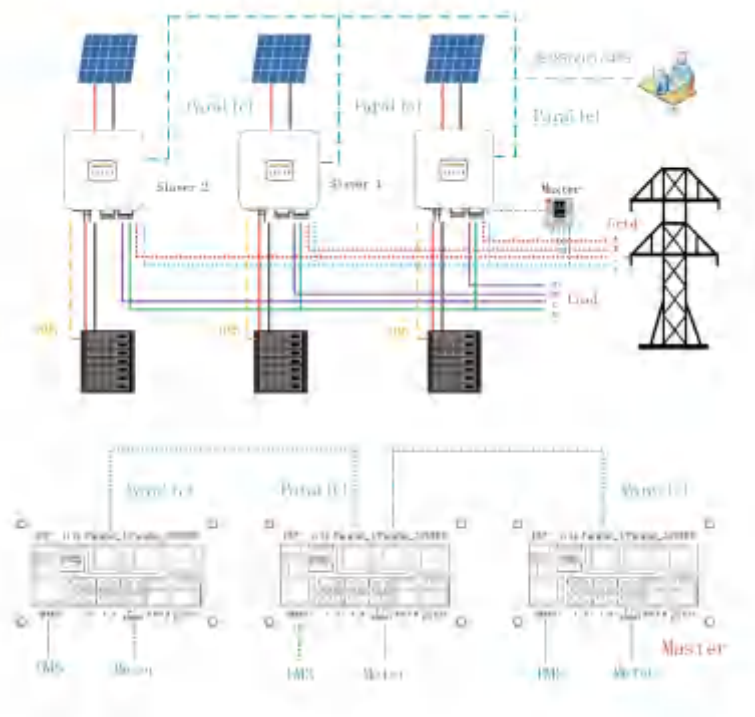


Figure 5.2

2. Grouped Machines (Shared Batteries)

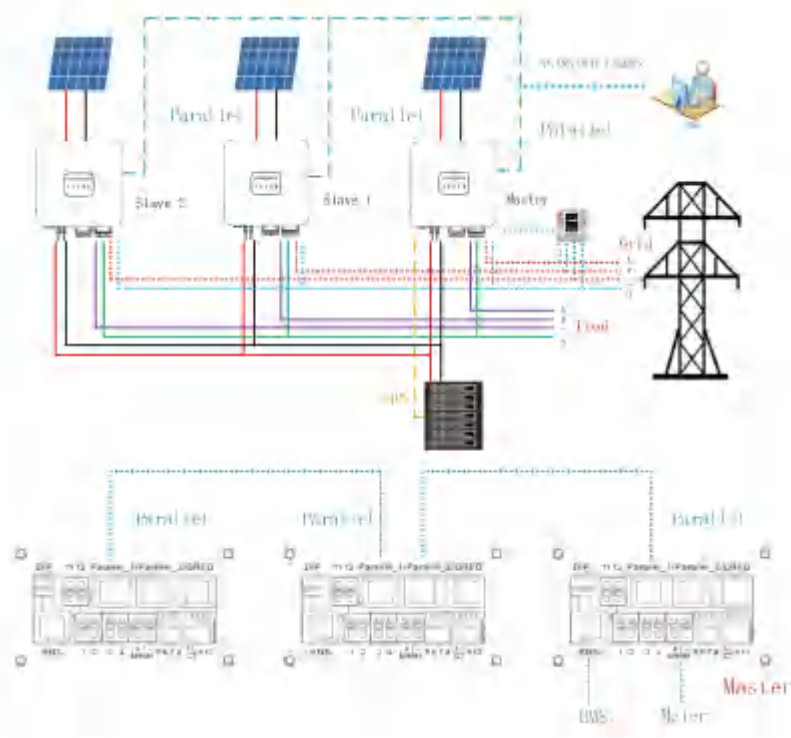


Figure 5.3

5.3 Parallel Machines

The wiring method for parallel machines is the same, currently supporting up to 4 parallel connections.

1. Parallel Machines (Independent Batteries)

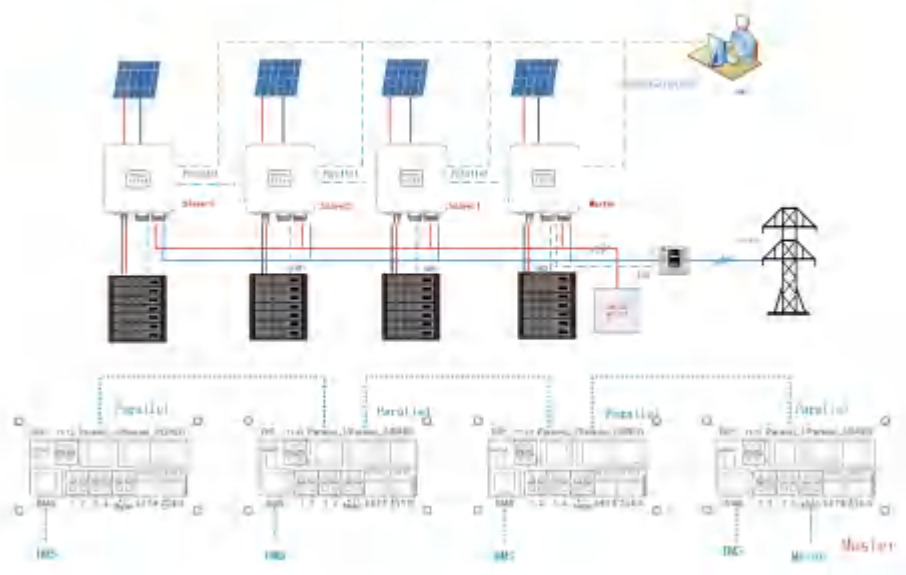


Figure 5.4

2. Parallel Machines (Shared Batteries)

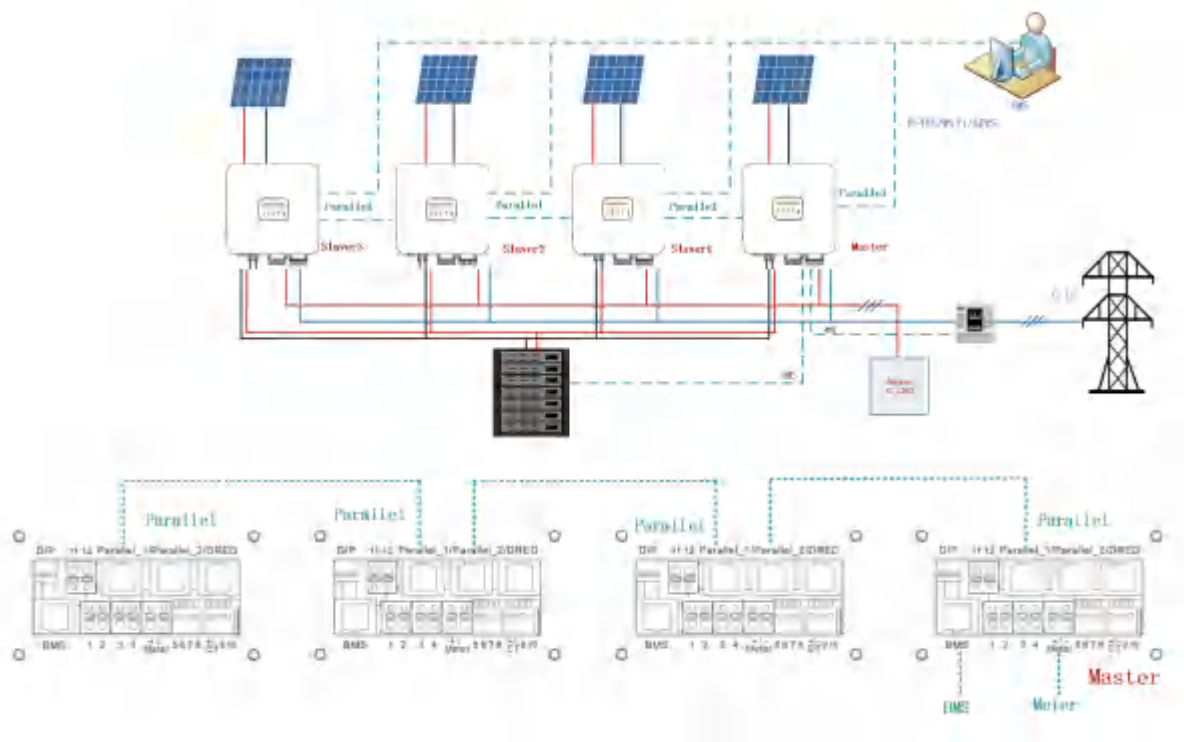


Figure 5.5

6. Product Usage

This chapter introduces the routine maintenance and usage of the product.



Danger

1. During product maintenance, safety regulations must be followed;
2. Operations must be performed by trained professionals with electrical knowledge.
3. During system cleaning, electrical connections, grounding reliability, and other maintenance, perform system power-down operations.

Power-down steps:

a. Operate the APP to execute the shutdown command

b. Disconnect the following switches in order

- ①PV side switch
- ②Battery side switch
- ③PV side switch of the optical storage module itself
- ④AC side switch
- ⑤Load side switch

6.1 Routine Maintenance

Inspection Content	Inspection Method	Maintenance Interval
System Cleaning	Regularly check for obstructions and dust accumulation on the cooling fins.	Once every six months to a year
System Operation Status	<ol style="list-style-type: none"> 1. Observe whether the appearance of the inverter is damaged or deformed. 2. Listen for abnormal sound during the operation of the inverter. 3. Check whether the parameters of the inverter are set correctly when the inverter is running. 	Once every six months
Electrical Connections	<ol style="list-style-type: none"> 1. Check whether cable connections are loose or falling off. 2. Check whether there is any damage to the cables, focusing on the electric cables. 3. Check cables for damage, focusing on any cuts on the surface in contact with metal. 4. Check whether the waterproof covers of unused DC input terminals and GPRS interfaces are securely locked. 	Half a year after the initial adjustment and testing, then once every six months to a year

Grounding Reliability	Check whether the grounding cables are reliably grounded.	Half a year after the initial adjustment and testing, then once every six months to a year
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6.2 Introduction to Operating Modes

Five operating modes: General Mode, Storage Mode, Microgrid Mode, Peak-Shaving Mode, and AC Coupling. Before powering on the inverter, configure the following in the APP: operating parameters (grid standards, DC-side battery type, battery protocol, meter protocol), operating mode (operating mode, grid electricity price, cycle settings), and other necessary parameters.

6.2.1 General Mode

Self-generation and self-consumption:

- 1) When PV is sufficient, PV power is prioritized for load supply, then charges the battery, and excess energy can be grid-connected for power generation.
- 2) When PV is insufficient, the battery prioritizes supplying power to the load. When the battery is low, the grid supplies power to the load.
- 3) Anti-reverse flow function is not used by default.

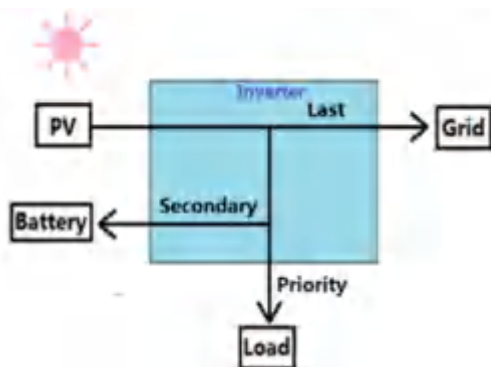


Figure 6.1 PV Sufficiency

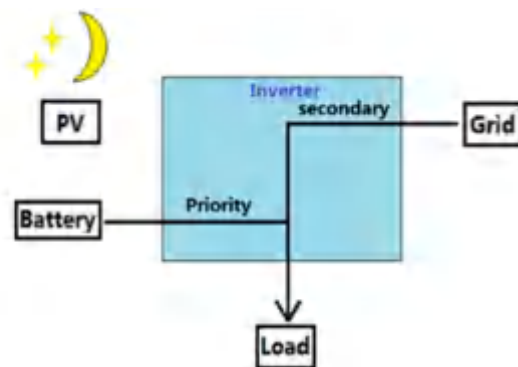


Figure 6.2 No PV

6.2.2 Energy Storage Mode

Battery backup mode:

- 1) When PV is sufficient, PV and the grid first meet the load demand, with excess energy charging the battery, keeping the battery's SOC always full.

- 2) When there is no PV and the grid is normal, the grid first meets the load demand. If the battery is not fully charged, it charges the battery, keeping the battery's SOC always full.
- 3) When there is no grid and no PV, the battery supplies power to the load.

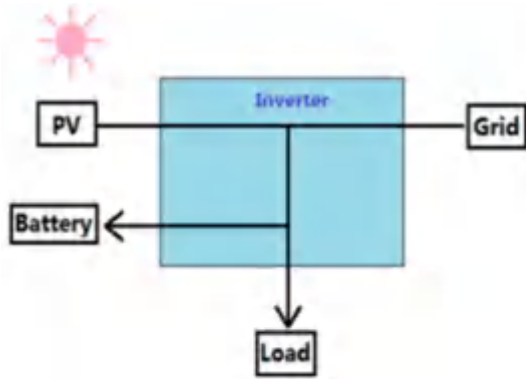


Figure 6.3 PV Sufficiency

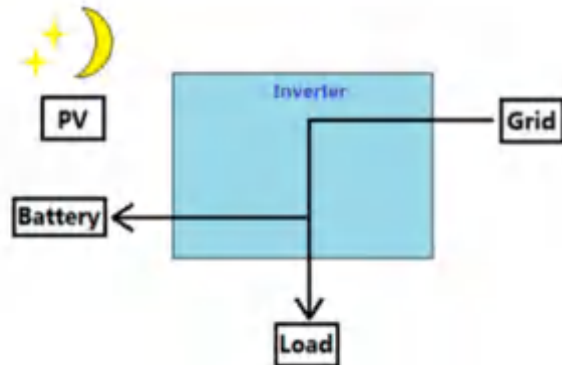


Figure 6.4 No PV

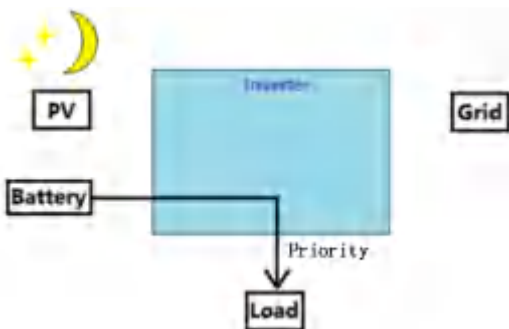


Figure 6.5 PV and Grid Both Abnormal

6.2.3 Micro-grid Mode

Suitable for off-grid scenarios, where PV and batteries form a pure off-grid system:

- 1) If PV is sufficient, PV is prioritized for load supply, with excess energy charging the battery.
- 2) If PV is insufficient, the battery supplies power to the load.

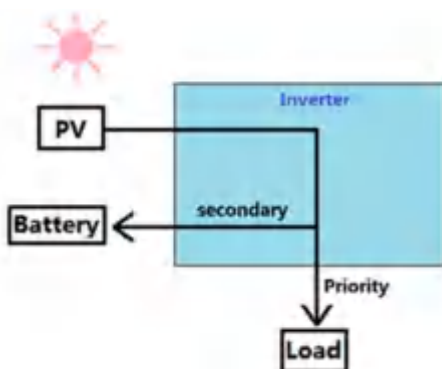


Figure 6.6 PV Sufficiency

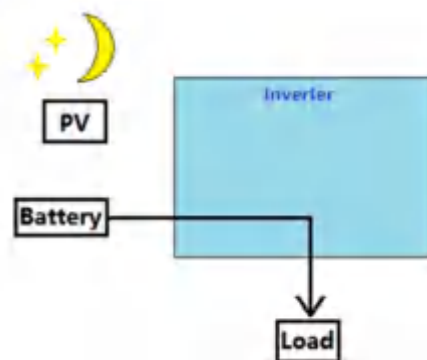


Figure 6.7 No PV

6.2.4 Peak-Shaving Mode

Based on different electricity prices, a day can be divided into four time periods: peak, high, normal, and low:

- 1) During the low-price period, the grid and PV charge the battery, with an operating logic similar to storage mode.
- 2) During the normal-price period, when PV is sufficient, PV first supplies power to the load, then discharges to the grid, and finally charges the battery.
- 3) During peak or high-price periods, when PV is sufficient, PV and the battery prioritize supplying power to the load, with excess energy transmitted to the grid.

During the low-price period:

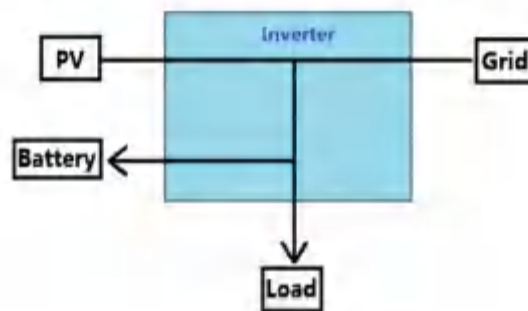


Figure 6.8 Low-Price Period

During the normal-price period:

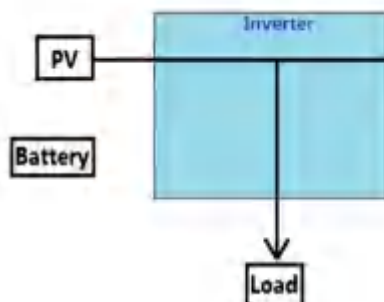


Figure 6.9 PV Insufficiency

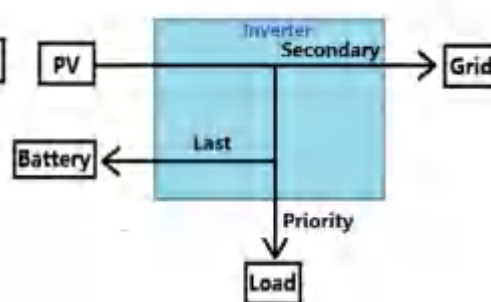


Figure 6.10 PV Sufficiency

During peak or high-price periods:

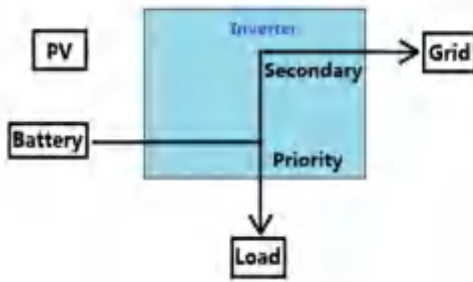


Figure 6.11 No PV

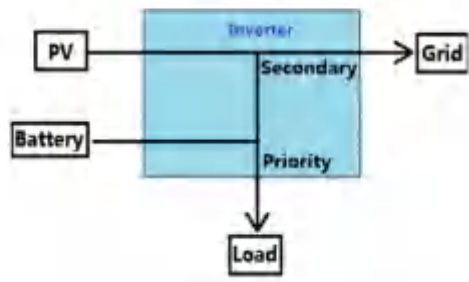


Figure 6.12 PV

6.2.5 AC Coupling

Combined with a PV inverter to build an energy storage system and obtain more energy. The connection point is the grid side or AC terminal. The operating logic is the same as the general mode, without requiring additional information from the PV inverter. This mode must be connected to an electricity meter, with wiring as shown in Figure 6.13.

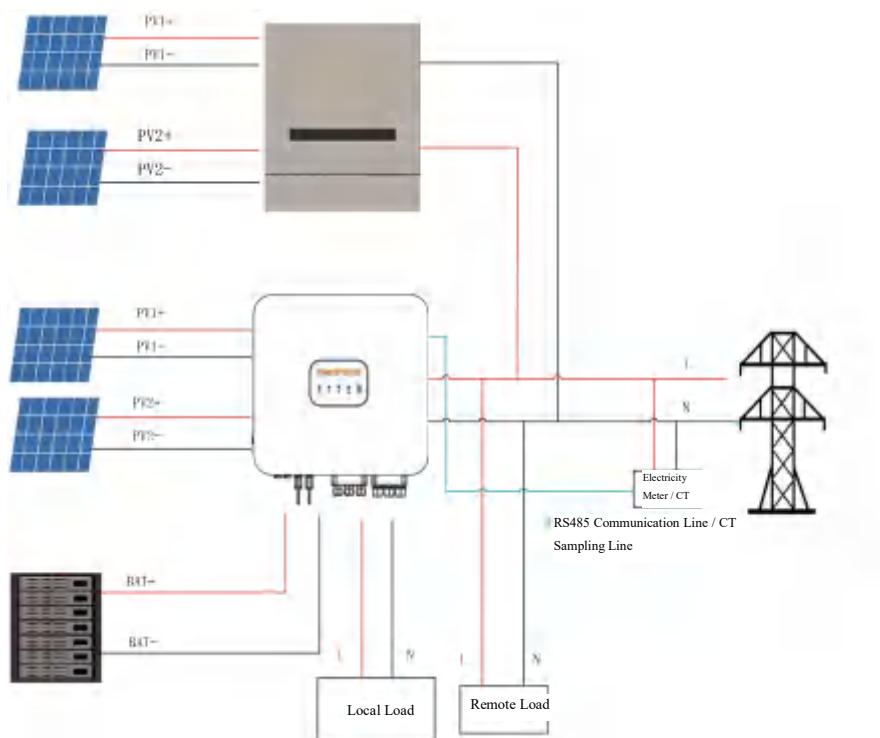


Figure 6.13 AC Coupling

Appendix A

Fault Handling

Serial Number	Fault Name	Fault Cause	Handling Method
1	Battery EOD Undervoltage	Battery not connected to the inverter	1. If no battery is present, this alarm can be ignored; 2. Battery is over-discharged, with voltage below 30V.
2	Inverter Soft Start Failure	Effective value of inverter voltage not within rated range	Turn off the machine, wait for 5 minutes, then turn it back on. If the fault persists, please contact the dealer or after-sales center.
3	Grid Voltage High	Grid voltage above the allowable range	1. If it occurs occasionally, it may be due to short-term grid abnormalities. The inverter will resume normal operation after detecting a normal grid, no manual intervention is required; 2. Check if the grid voltage is consistently operating at a higher voltage. If it occurs frequently, please check if the grid voltage is within the allowable range. If the grid voltage exceeds the allowable range, please contact the local power operator.
4	Grid Voltage Low	Grid voltage below the allowable range	Check the grid. The inverter can be operated again after the grid voltage returns to the allowable range.
5	Grid Frequency High	Grid frequency above the upper limit of the allowable grid frequency range	Check the grid. The inverter can be operated again after the grid frequency returns to the allowable range.
6	Grid Frequency Low	Grid frequency below the lower limit of the allowable grid frequency range	Check the grid. The inverter can be operated again after the grid frequency returns to the allowable range.
7	Grid Phase Sequence Abnormality	1. Incorrect wiring phase sequence; 2. Grid voltage phase abnormality.	1. Check the wiring phase sequence; 2. Check the grid. The inverter can be operated again after the phase sequence is normal.
8	Grid Phase Lock Failure Alarm	The amplitude and phase difference between the inverter voltage and grid voltage are not within the rated range	Turn off the machine, wait for 10 minutes, then turn it back on. If the fault persists, please contact the dealer or after-sales center.
9	AC Output Short Circuit Fault	Load short circuit	Check if the load cables are short-circuited
10	Output Leakage Current Fault	Leakage current above the allowable range	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
11	Output Overload Alarm	AC output power over rated value	Check the total power of the load ports to ensure it does not exceed the rated value on the rating plate.
12	PV Overvoltage	Incorrect configuration of the PV array, with too many PV panels in series, exceeding the input value.	Check the series configuration of the corresponding PV array strings to ensure that the open-circuit voltage of the strings does not exceed the maximum operating voltage of the inverter.
13	PV Undervoltage	PV voltage below the minimum DC voltage limit	1. If it occurs under poor lighting conditions, this alarm can be ignored; 2. Check whether the PV switch is closed.
14	PV Reverse Connection	PV string reverse connection	Check whether the positive and negative terminals of PV1 and PV2 strings are connected inversely.
15	Battery Side Busbar Software Soft Start Failure	Busbar voltage not within the allowable range	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
16	Primary Busbar	Busbar voltage not within the	Turn off all switches of the machine, close the PV or

	Undervoltage Fault	allowable range	battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
17	Primary Busbar Overvoltage Fault	Busbar voltage not within the allowable range	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
18	Weak PV Load Capacity	PV power below load power in pure PV off-grid mode	Check the total power of the load ports to ensure it does not exceed the PV power.
19	Electricity Meter Alarm	1. Electricity meter not connected 2. Communication abnormality of the electricity meter 3. Electricity meter reversely connected	Check the electricity meter
20	Battery SOC below Lower Limit Shutdown Alarm	Battery SOC below the set value	Charge the battery until the SOC is above the lower limit. If the fault persists, please contact the dealer or after-sales center.
21	CAN Communication Fault	1. Parallel machine cable not connected in parallel mode 2. Communication abnormality	1. Check the parallel machine cable 2. Check if the dip switch is closed
22	Grid Overcurrent (Single Phase)	Output current over the allowable range	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
23	Parallel Machine Master Conflict	Duplicate master address settings	Check the master and slave address settings.
24	Parallel Machine Address Over Limit	Slave address setting over the limit	Check the parallel machine settings of the master and slave.
25	Parallel Machine Cable Fault	1. Parallel machine cable not connected in parallel mode 2. Communication abnormality of parallel machine information	1. Check the parallel machine cable 2. Check if the dip switch is closed 3. Check the parallel machine settings of the master and slave
26	Battery Charge/Discharge Current Limit Alarm	Charge/discharge current over the allowable range	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
27	Grid and Load Terminal Reverse Connection (Standalone Machine) Fault	Reverse connection of grid and load terminals	1. Check whether the load and grid terminals are reversely connected; 2. If the grid and load are not reversely connected, turn off the machine and check if there is voltage at the load port. If the fault disappears, turn on the machine for operation. If the fault persists, please contact the dealer or after-sales center.
28	Battery Reverse Connection Fault	Reverse connection of battery side Hall sensor	Turn off all switches of the machine, turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
29	Battery Overvoltage	Battery voltage above the maximum DC voltage limit	Check the energy storage battery configuration to ensure the voltage of the energy storage battery pack is within the range/replace the battery.
30	Battery Undervoltage	1. Battery voltage below the minimum DC voltage limit 2. Battery not connected to the inverter	1. Check the energy storage battery configuration to ensure the voltage of the energy storage battery pack is within the range/replace the battery; 2. Check the specification of the battery side air circuit breaker or if it has tripped; 3. If no battery is present, this alarm can be ignored.
31	Negative Busbar Insulation	Negative busbar insulation impedance below the protection	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the

	Impedance Fault	limit	dealer or after-sales center.
32	Positive Busbar Insulation Impedance Fault	Positive busbar insulation impedance below the protection limit	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
33	DCDCCT1 Overcurrent	Battery current over the allowable range	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
34	PV2 Overcurrent	PV current over the allowable range	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
35	PV1 Overcurrent	PV current over the allowable range	Turn off all switches of the machine, and turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
36	Relay Self-test Fault	Relay self-test abnormality	Turn off all switches of the machine, turn it back on after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
37	Diesel Generator Voltage Frequency Abnormality	1. Generator and grid not connected 2. Voltage frequency of the generator or grid not within the allowable range	1. Check if the generator or grid is connected; 2. If the generator or grid is connected but the fault persists, check the frequency of the generator or grid. If the frequency is normal, please contact the dealer or after-sales center.
38	Model Mismatch Fault	Hardware version and software mismatch	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
39	Grid-Connected and Off-Grid Switching Alarm	5 grid-connected and off-grid switches within 1 hour	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
40	Fan Alarm	1. Abnormal fan power supply 2. Mechanical blockage 3. Fan damage	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
41	IGBT Temperature Imbalance Alarm	Excessive temperature difference between IGBT A and IGBTB	Allow the machine to rest for a period of time before closing the PV or battery-side switch. If the fault persists, please contact the dealer or after-sales center.
42	IGBTB Temperature Sensor Fault	1. Temperature sensor cable not inserted 2. Abnormal temperature sensor	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
43	IGBT A Temperature Sensor Fault	1. Temperature sensor cable not inserted 2. Abnormal temperature sensor	Turn off all switches of the machine, close the PV or battery side switch after 5 minutes. If the fault persists, please contact the dealer or after-sales center.
44	IGBTB Temperature Overheat Alarm	Temperature over the threshold value	Allow the machine to rest for a period of time before closing the PV or battery-side switch. If the fault persists, please contact the dealer or after-sales center.
45	IGBT A Temperature Overheat Alarm	Temperature over the threshold value	Allow the machine to rest for a period of time before closing the PV or battery-side switch. If the fault persists, please contact the dealer or after-sales center.
46	Ambient Temperature Too Low Alarm	1. Ambient temperature over the threshold value 2. Abnormal temperature sensor	1. Check if the ambient temperature is too low; 2. If the ambient temperature is normal, please contact the dealer or after-sales center.
47	Ambient Temperature Overheat Alarm	1. Ambient temperature over the threshold value 2. Abnormal temperature sensor	1. Check if the ambient temperature is too high; 2. If the ambient temperature is normal, please contact the dealer or after-sales center.

Note: If other issues arise, please contact the dealer or after-sales center.

Appendix B

Technical Parameters

Photovoltaic Input (DC)		AC Side Input and Output	
Maximum PV Power (W)	6500	Rated AC Power (VA)	5000 (*)
Maximum DC Voltage (V)	500	Rated Grid Voltage (V)	220/230Va.c.
Rated DC Operating Voltage (V)	300	Electrical Connections	L/N/PE
Maximum Input Current (A)	16/16	Rated Grid Frequency (Hz)	50/60
Maximum Short-Circuit Current (A)	23/23	Rated AC Current (A)	22.8
MPPT Voltage Range (V)	90-430	Maximum AC Current (A)	45.6
PV Full-Load Voltage Range (V)	165-420	Power Factor	0.8 leading ~ 0.8 lagging
Number of MPPT Channels	2	Total Harmonic Distortion THDi (Rated Power)	<3%
Maximum Reflected Current (A)	0	Number of Parallel Machines (Units)	4
Load Side Output		Battery Input/Output	
Rated AC Power (VA)	5000	Battery Voltage Range (V)	40-60
Rated Grid Voltage (V)	220/230Va.c.	Maximum Charge/Discharge Power (W)	5000/5000
Electrical Connections	L/N/PE	Maximum Charge/Discharge Current (A)	100/100
Rated Frequency (Hz)	50/60	BMS Communication Interface	CAN/RS485
Rated AC Current (A)	21.7		
Maximum AC Current (A)	22.8		
Peak Power (W) Continuous @ Ta=25°C (Grid-Connected)	Overload 5.5 kW (30min), 6kW (5min)	Standards	
UPS Switchover Time (ms)	<10	Safety	
Total Harmonic Distortion THDu (Linear Load)	<3%	EMC	
Operating Environment		Certification	
IP Rating (IP)	IP 65	General Parameters	
Protection Class	CLASS I	Cooling Method	Natural Cooling
Operating Temperature Range	-25°C... +60°C (>+45°C, derating)	Isolation Type	Transformerless
Altitude (M)	<3000	Communication Method	WIFI, GPRS (optional), RS485
Storage Temperature Range (°C)	-20 to +60	Indicator Light	LED
Noise (dB)	<30	Warranty (Years)	5
Overvoltage Class	DCII;ACIII		
Efficiency		Power Consumption	
MPPT efficiency (%)	99.9	Standby Power Consumption (W)	<25

European Efficiency (%)	97	Dimensions and Weight	
Maximum Efficiency (%)	97.8	Dimensions (W x H x D) (mm)	480(W)*480(H)*188(D)
Battery Charge/Discharge Efficiency (%)	97.6/96	Weight (kg)	20kg

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