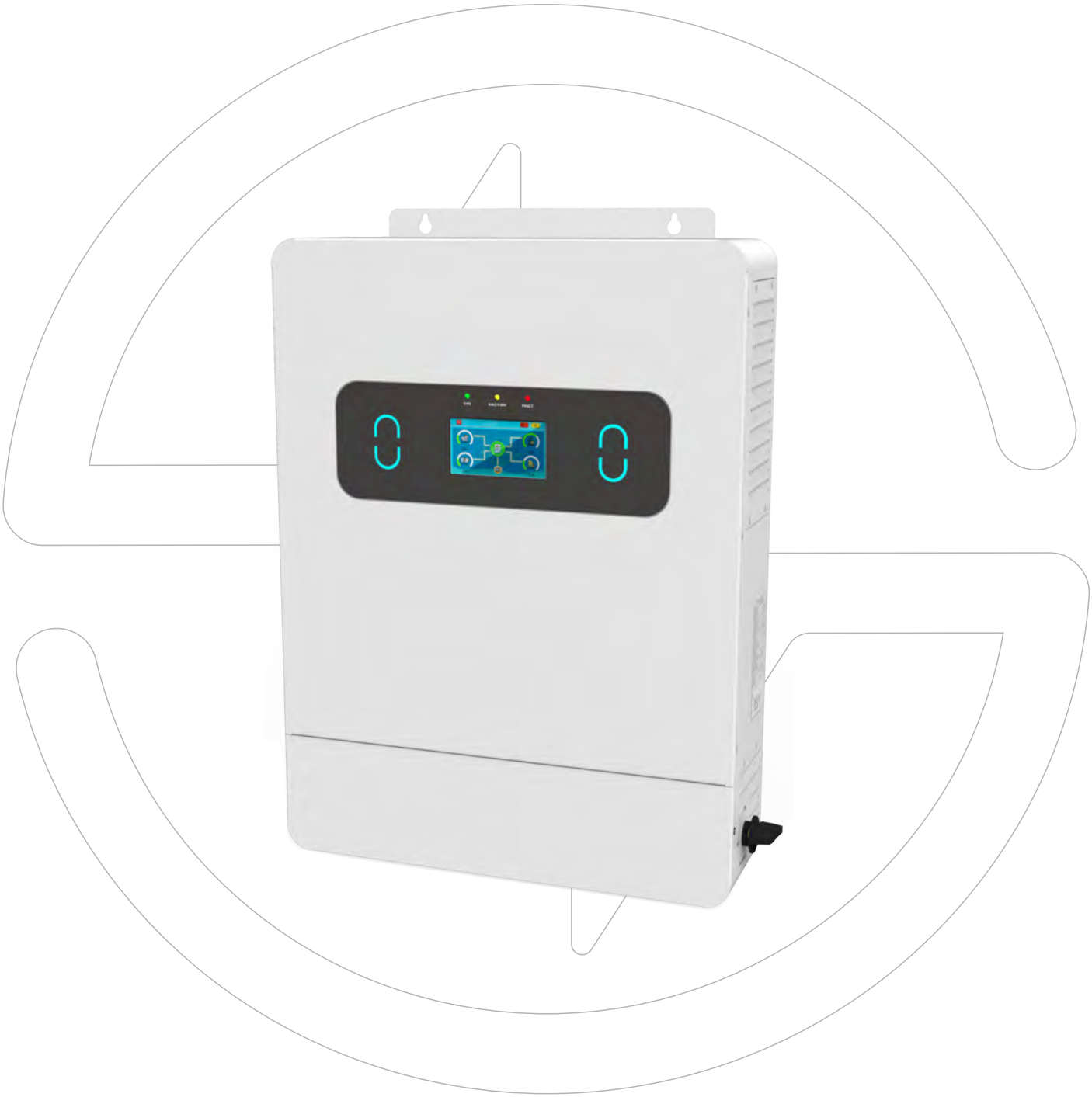

User Manual

Off-grid Split Phase PV Energy Storage Inverter
HS Series
8.5-12kW

V1.0-2024-07-10

Notice

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

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1 Preface

This document mainly introduces the product information, installation wiring, configuration testing, troubleshooting, and maintenance content of inverters. Before installing and using this product, please carefully read this manual, understand product safety information, and familiarize yourself with the product's functions and features. The document may be updated periodically. Please obtain the latest version information and more product information from the official website.

1.1 Applicable Model

This document applies to the following models of inverters:

Off-grid PV Energy Storage Inverter

- HS2085UH48L
- HS2105UH48L
- HS2105UH48P
- HS2114UH48L
- HS2114UH48P
- HS2120UH48L

1.2 Applicable Personnel

Only applicable to professionals who are familiar with local regulations, standards, electrical systems, have undergone professional training, and are familiar with the relevant knowledge of this product.

1.3 Symbol Definition

To better utilize this manual, the following symbols are used to highlight important information. Please read the symbols and instructions carefully.

⚠ DANGER
Indicates a highly potential danger that, if not avoided, could result in death or serious injury to personnel.
⚠ WARNNING
Indicates a moderate potential danger, if not avoided, could lead to death or serious injury.
⚠ CAUTION
Indicates a low potential danger that, if not avoided, may result in moderate or mild injury to personnel.
NOTICE
Emphasizing and supplementing the content may also provide tips or tricks for optimizing product usage, which can help you solve a problem or save you time.

1.4 Updates

V1.0 2024-07-10

- First Issue

2 Safety Precautions

The safety precautions contained in this document must be followed at all times when operating the device.

NOTICE
The inverter has been designed and tested in strict accordance with safety regulations, but as an electrical device, it is necessary to follow relevant safety instructions before performing any operations on the device. Improper operation may result in serious injury or property damage.

2.1 General security

NOTICE
• Due to product version upgrades or other reasons, the content of the document may be updated irregularly. Unless otherwise agreed, the content of the document cannot replace the safety precautions in the product label or user manual.All descriptions in the document are only intended as a guide for use. • Please read this document carefully before installing the device to understand the product and precautions. • All operations of the equipment must be conducted by professional and qualified electrical technicians, who are familiar with relevant standards and safety regulations in the project location. • When operating the inverter, it is necessary to use insulating tools and wear personal protective equipment to ensure personal safety.When touching electronic devices, it is necessary to wear electrostatic gloves, electrostatic wristbands, anti-static clothing, etc. to protect the inverter from static damage. • Equipment damage or personal injury caused by the failure to install, use, and configure the inverter according to the documentation requirements is not within the scope of responsibility of the equipment manufacturer.

2.2 PV String Safety

⚠ WARNNING
• Photovoltaic modules used with inverters must comply with IEC61730 Class A standards. • Do not connect the same PV string to multiple inverters, as this may result in damage to the inverters. • After connecting the DC cable, make sure that the cable is firmly connected and not loose. • Ensure that the component frame and support system are well grounded. • Use a multimeter to measure the positive and negative poles of the DC cable to ensure that the positive and negative poles are correct, that there is no reverse connection, and that the voltage is within the allowable range.

2.3 Inverter Safety

WARNNING

- Ensure that the voltage and frequency of the grid access point meet the the inverter grid specifications.
- It is recommended to add protection devices such as circuit breakers or fuses on the AC side of the inverter, with specifications greater than 1.25 times the rated AC output current of the inverter.
- The protective grounding wire of the inverter must be firmly connected. When multiple inverters are used, ensure that the protective grounding points of all inverter chassis enclosures are connected at equal potential.
- If the inverter has less than 5 arc faults within 24 hours, the alarm can be automatically cleared.After the fifth arc fault, the inverter shuts down for protection, and it can only work normally after the fault is cleared (arc detection device is optional).
- If the system is not configured with a battery, the LOAD function cannot be used, resulting in system power consumption risks that exceed the warranty scope of the device manufacturer.

DANGER

- After the inverter is installed, the labels and warning signs on the box must be clearly visible, and it is forbidden to cover, alter, or damage them.
- The inverter box has the following marks:

	High voltage hazard.There is high voltage when the inverter is running. When operating the inverter, ensure that the inverter is powered off.		After the device is powered off, please wait for 5 minutes until the device is fully discharged.
	Please read the product manual carefully before operating the equipment.		There are potential dangers after the equipment is running.Please take protective measures during operation.
	The surface of the inverter is hot, and it is forbidden to touch it during operation, otherwise it may cause scalding.		The device cannot be disposed of as household waste. Please dispose of the device according to local laws and regulations, or return it to the device manufacturer.
	CE symbol		Connection point of protective grounding wire.

2.4 Battery Safety

WARNNING

- The batteries used with the inverter need to be approved by the inverter manufacturer. For a list of approved batteries, please contact the inverter manufacturer or distributor.
- Please read the user manual corresponding to the battery carefully before installing the device to understand the product and precautions, and please strictly follow the requirements of the battery user manual.
- If the battery is fully discharged, please charge it in strict accordance with the user manual of the corresponding model.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may lead to current limiting of the battery and affect its load carrying capacity.
- If the battery cannot be started, please contact the after-sales service center as soon as possible.Otherwise, the battery may be permanently damaged.
- Use a multimeter to measure the positive and negative poles of the DC cable to ensure that the positive and negative poles are correct and the voltage is within the allowable range.

2.5 Personnel Requirements

NOTE

- The personnel responsible for installing and maintaining equipment must be strictly trained first, understand various safety precautions, and master the correct operation methods.
- Installation, operation, maintenance, and replacement of equipment or components are only allowed to be performed by qualified professionals or trained personnel.

3 Product Introduction

3.1 Product Overview

Function Overview

The inverter controls and optimizes energy flow in the system through an integrated energy management system.It can supply the generated power in the system to the load, store it in the battery, and output it to the grid.

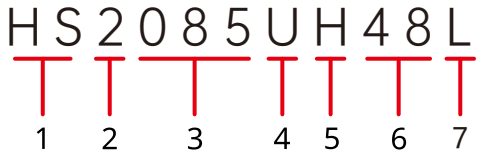
Model Description

This document applies to the following inverter models:

Off-grid PV Energy Storage Inverter

- HS2085UH48L
- HS2105UH48L
- HS2105UH48P
- HS2114UH48L
- HS2114UH48P
- HS2120UH48L

Model meaning



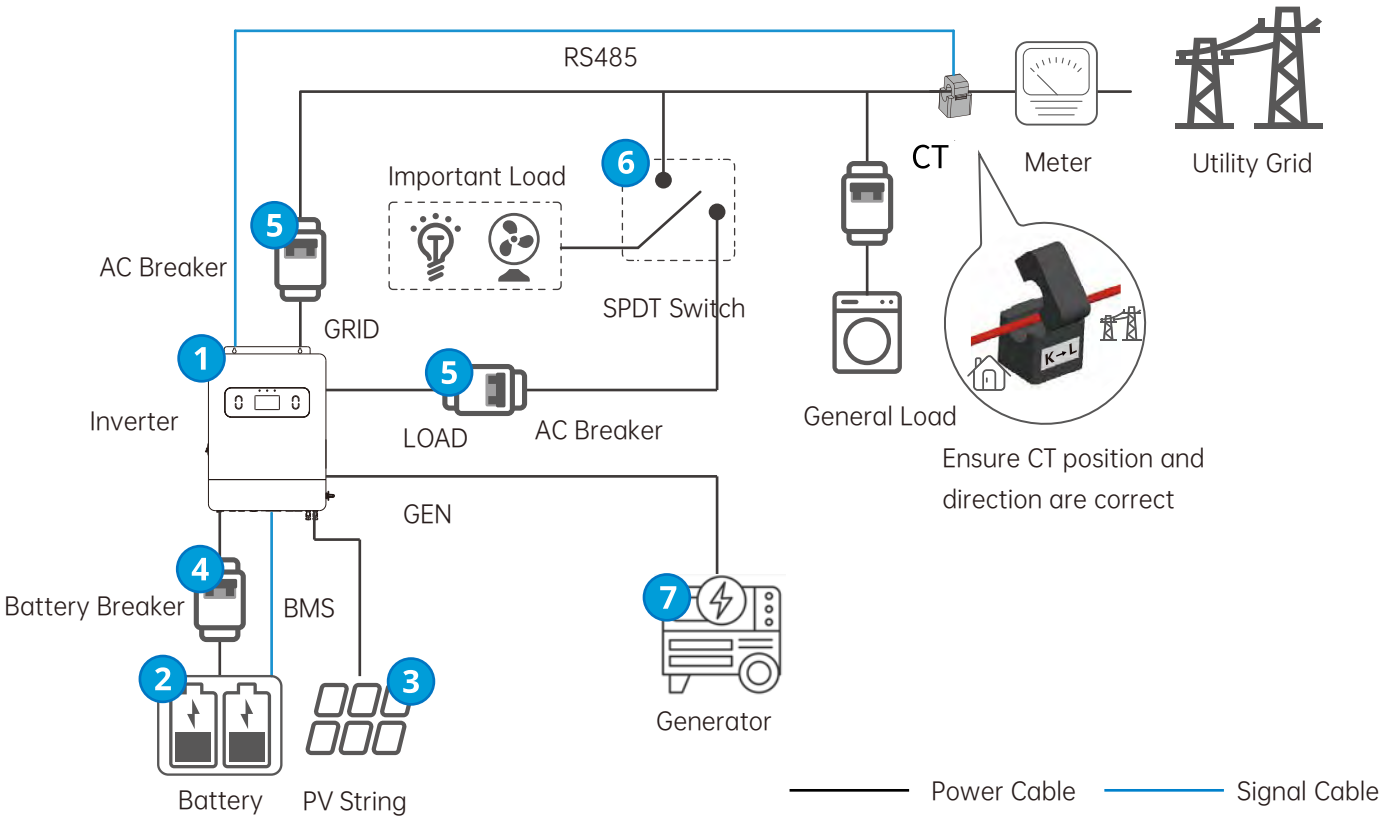
NO.	Meaning	Description
1	Product type	HS: Household off-grid energy storage
2	Product phase number	2:Split phase
3	Rated power	085: Rated power is 8500W
4	Rated output voltage	U: United States grid voltage standards split phase: 120V, single phase: 240V
5	PV input voltage	H:PV input voltage>200V
6	Battery voltage	48: battery voltage 48V
7	Special function definition	P: The product has the function of parallel machine L: The product doesn't have the function of parallel machine

3.2 Application Scenarios

WARNNING

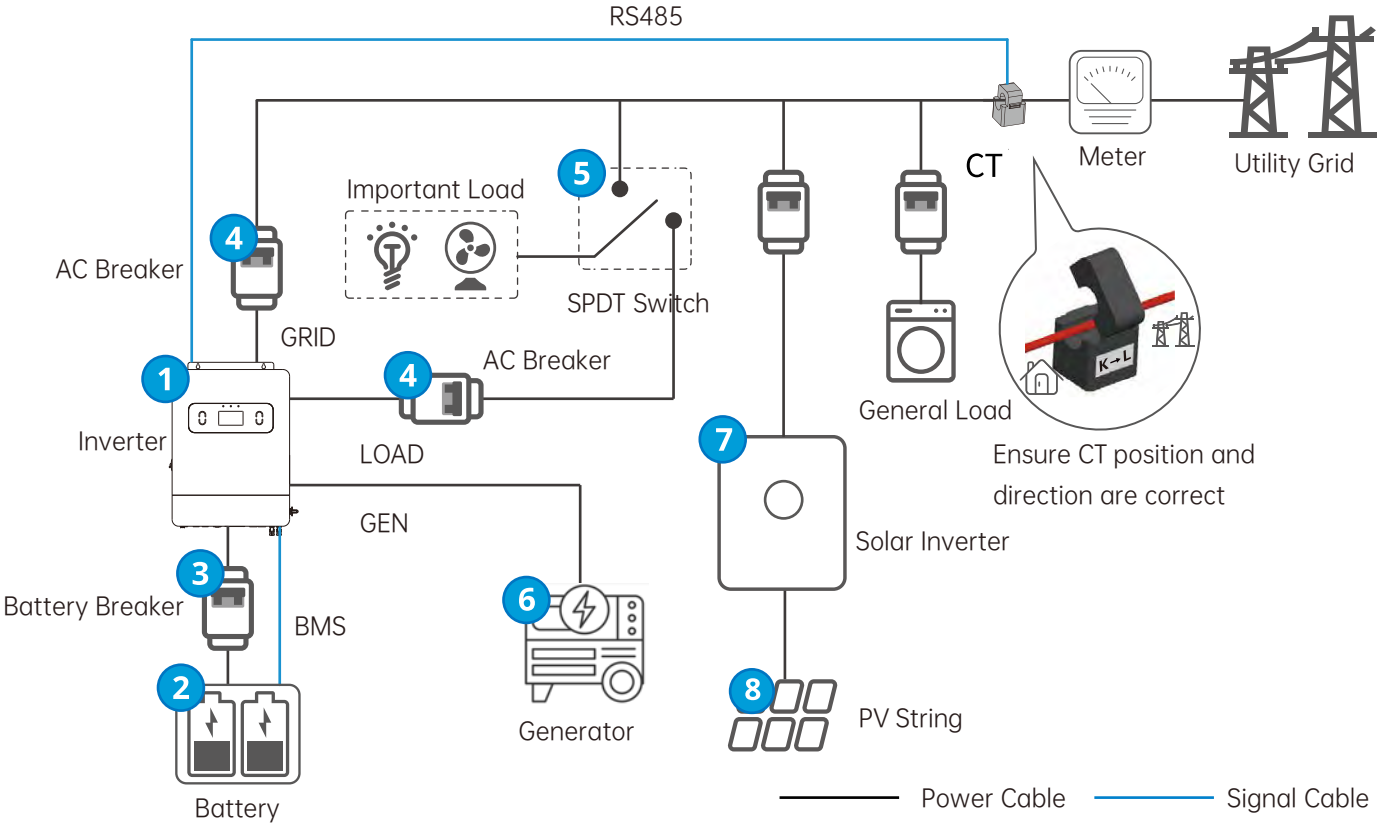
- The system is not suitable for connecting devices that rely on stable power supply, such as life-sustaining medical equipment. Please ensure that personal injury cannot occur when the system is powered off.
- If the system is not configured with a battery, the LOAD function cannot be used, and the resulting system operation risks will exceed the warranty scope of the device manufacturer.
- The battery current may be affected by some factors, such as temperature, humidity, weather conditions, etc., which may lead to current limiting of the battery and affect its load carrying capacity.
- When the inverter is overloaded for a single time, it can automatically restart;if it happens multiple times, the restart time of the inverter will be extended. If you need to restart the inverter as soon as possible, you can power off and then power on the device again.
- When the grid power fails, if the load capacity exceeds the rated power of the inverter, the off-grid function of the inverter will automatically turn off. If it needs to be started, the large load should be turned off to ensure that the load power is less than the rated power of the inverter.
- The inverter's LOAD output port has overload capacity and UPS functionality (switching time <10ms), allowing normal household loads to operate during grid power outages.To ensure UPS switching and load power supply stability, avoid using loads with high starting currents, such as high-power pumps.The supported load sizes are as follows:
  - Inductive load + capacitive load ⩽1.1* rated output power of the inverter.

Self-generation for self-use (Off-grid energy storage inverter)



NO.	Parts	Description
1	Inverter	HS series household off-grid PV energy storage inverter.
2	Battery	Select the model according to the matching list of inverter and battery.
3	PV String	The PV string is composed of photovoltaic modules in series.
4	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HS2085UH48L:rated current≥180A, rated voltage ≥60V. • HS2105UH48L/P:rated current≥200A, rated voltage ≥60V. • HS2114UH48L/P:rated current≥230A, rated voltage ≥60V. • HS2120UH48L:rated current≥230A, rated voltage ≥60V.
5	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers. • To ensure the LOAD is powered by the grid during the inverter maintenance, install a SPDT Switch. • The specification of the breaker and SPDT for the LOAD and GRID loads: • rated current≥63A, rated voltage ≥230V.
6	SPDT Switch	
7	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.

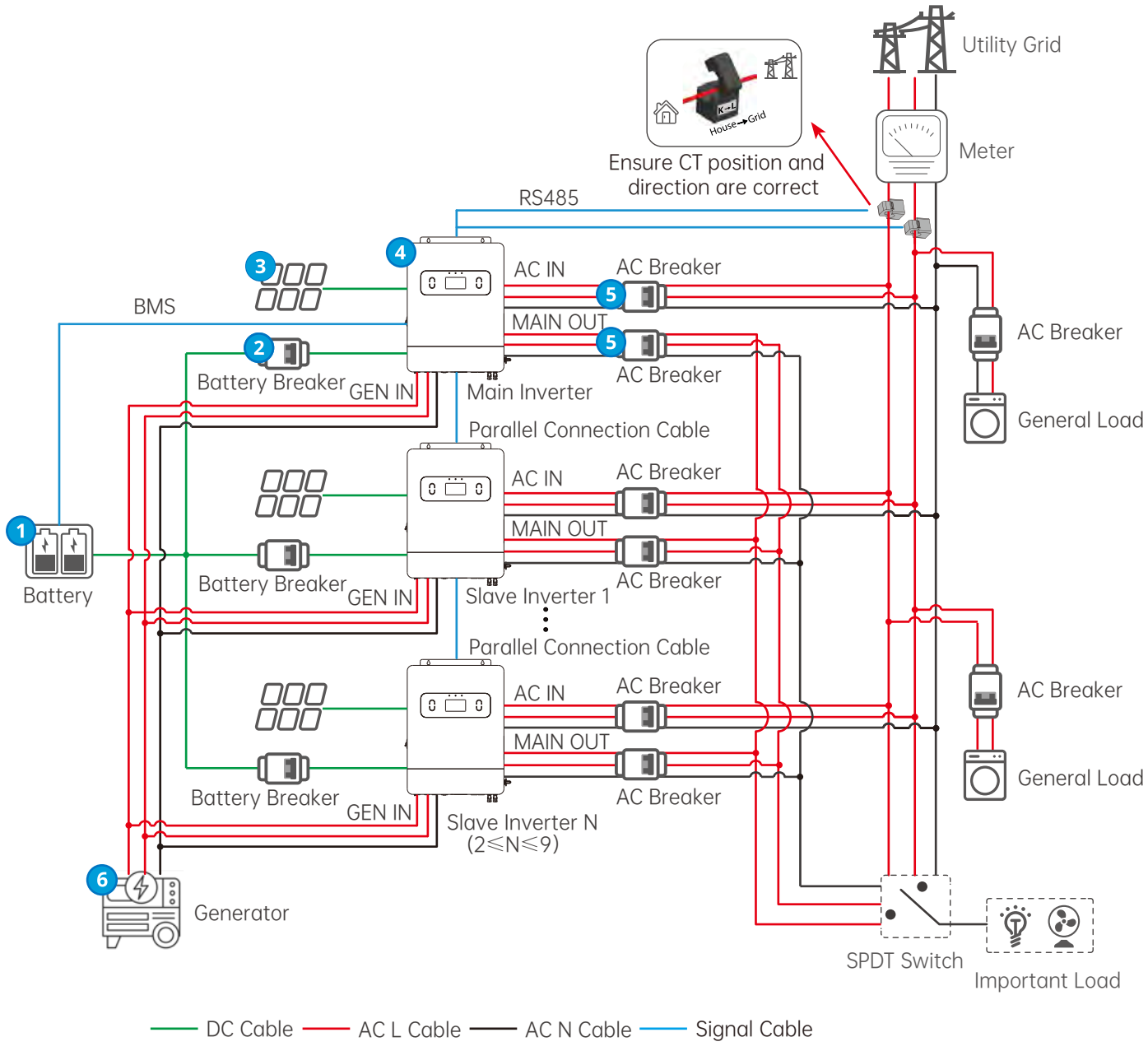
Self-generation for self-use (AC-Coupled Scenario)



NO.	Parts	Description
1	Inverter	HS series household hybrid energy storage inverter.
2	Battery	Select the model according to the matching list of inverter and battery.
3	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HS2085UH48L:rated current≥180A, rated voltage ≥60V. • HS2105UH48L/P:rated current≥200A, rated voltage ≥60V. • HS2114UH48L/P:rated current≥230A, rated voltage ≥60V. • HS2120UH48L:rated current≥230A, rated voltage ≥60V.
4	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers. • To ensure the LOAD is powered by the grid during the inverter maintenance, install a SPDT Switch. • The specification of the breaker and SPDT for the LOAD and GRID loads: • rated current≥63A, rated voltage ≥230V.
5	SPDT Switch	
6	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.
7	Solar Inverter	Support third-party inverters.
8	PV String	The PV string is composed of photovoltaic modules in series.

Parallel Inverter System

split-phase system



NO.	Parts	Description
1	Battery	Select the model according to the matching list of inverter and battery.
2	Battery Breaker	2P DC breakers shall be prepared by the customers with the following specifications: • HS2105UH48P:rated current⩾200A, rated voltage ⩾60V. • HS2114UH48P:rated current⩾230A, rated voltage ⩾60V.
3	PV String	The PV string is composed of photovoltaic modules in series.
4	Inverter	Support HS series (10.5/11.4kW) inverters, and the inverter models used in the same system need to be consistent.The split phase networking system supports up to 10 inverters in parallel.
5	AC Breaker	• The breaker specifications for the LOAD and GRID for one inverter type shall be the same. The AC breakers shall be prepared by the customers. • To ensure the LOAD is powered by the grid during the inverter maintenance, install a SPDT Switch. • The specification of the breaker and SPDT for the LOAD and GRID loads: • rated current⩾63A, rated voltage ⩾230V.
6	Generator	The maximum power of the generator shall not be less than the rated power of the inverter.

See the description on page 66 for the settings of the split phase parallel operation mode.

3.3 Working Mode

3.3.1 System working mode

Self-use Mode

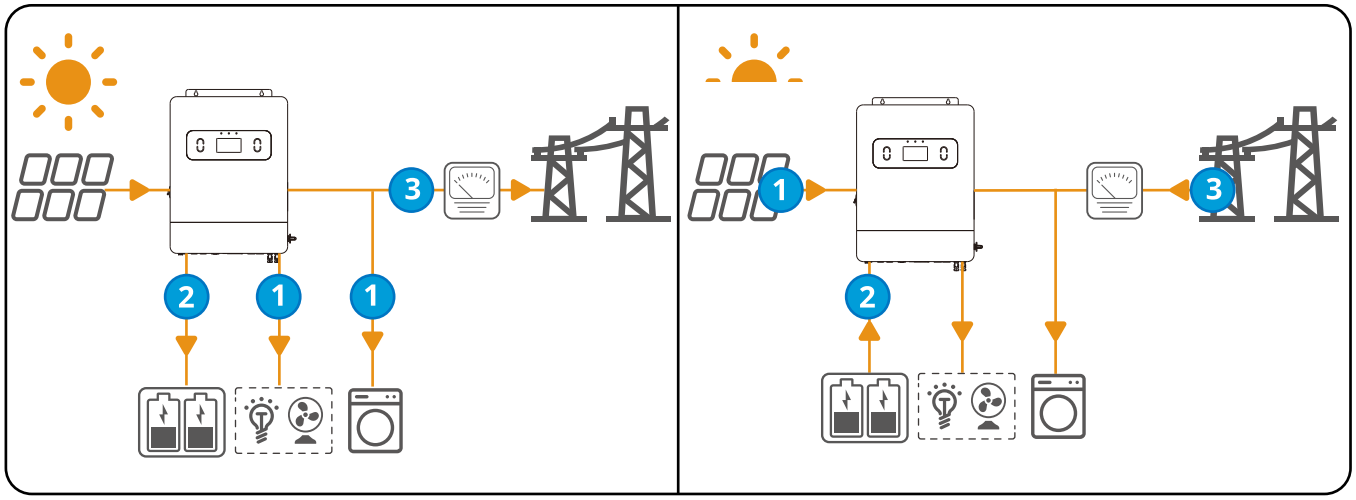
NOTICE
• For solar power, consider self consumption mode as priority: the excess power charges the battery in day time; the battery supplies power to the load when there is no solar power generated at night. It improves the self consumption rate and saves electricity costs. • It is suitable for areas with high electricity prices and little or no solar power generation subsidies.

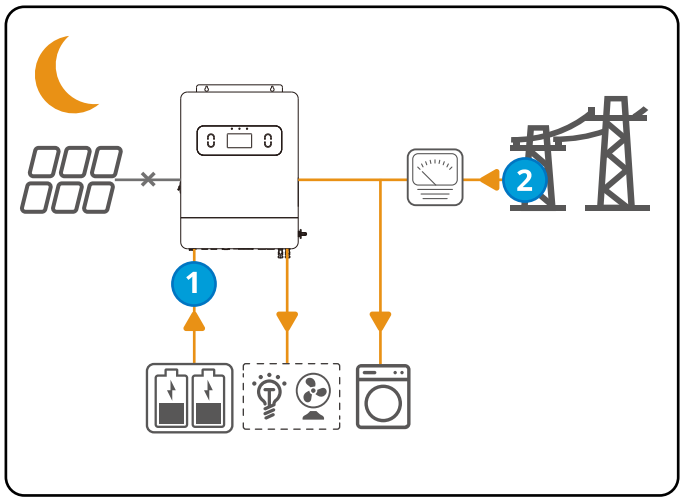
Day:

- When the power generated in the PV system is sufficient, it supplies the household load as priority. And the excess power charges the batteries first. The remaining power will be sold to the grid.
- When the power generated in the PV system is insufficient, use the battery supplies the load first. If the battery power is insufficient, then the load will be powered by the grid.

Night:

- If the battery power is sufficient, the load will be powered by the battery. If the battery power is not enough, the load will be powered by the grid.





Selling First Mode

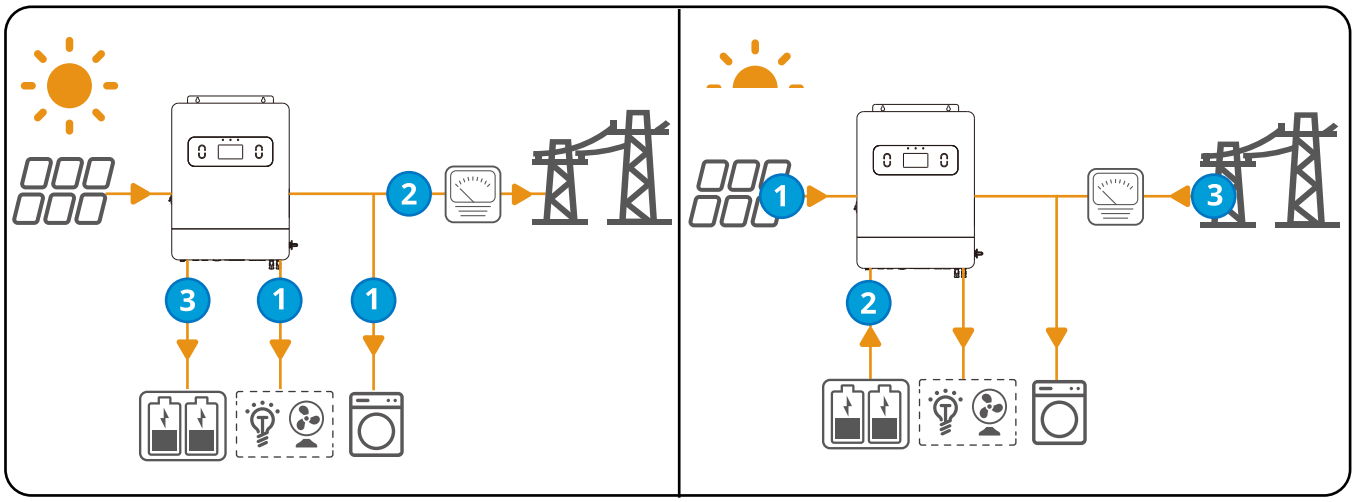
NOTICE
• Solar power generation prioritizes load usage, with excess power sold to the grid; during nighttime when there is no solar power generation, batteries are used to power the load. • This mode is suitable for regions with high feed-in tariffs and electricity sales restrictions.

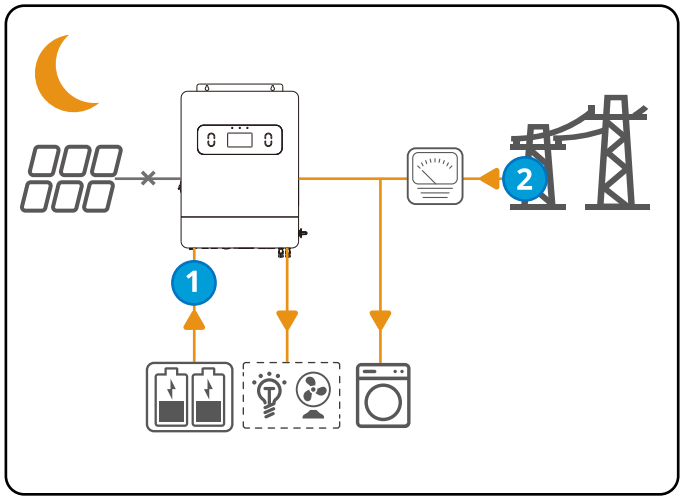
Day:

- When the power generated in the photovoltaic system is sufficient, the power generated in the photovoltaic system is preferentially supplied to household loads, and the excess power is sold to the grid at a set power rate. The remaining power is used to charge the battery.
- When the power generated in the PV system is insufficient, use the battery supplies the load first. If the battery power is insufficient, then the load will be powered by the grid.

Night:

- If the battery power is sufficient, the load will be powered by the battery. If the battery power is not enough, the load will be powered by the grid.



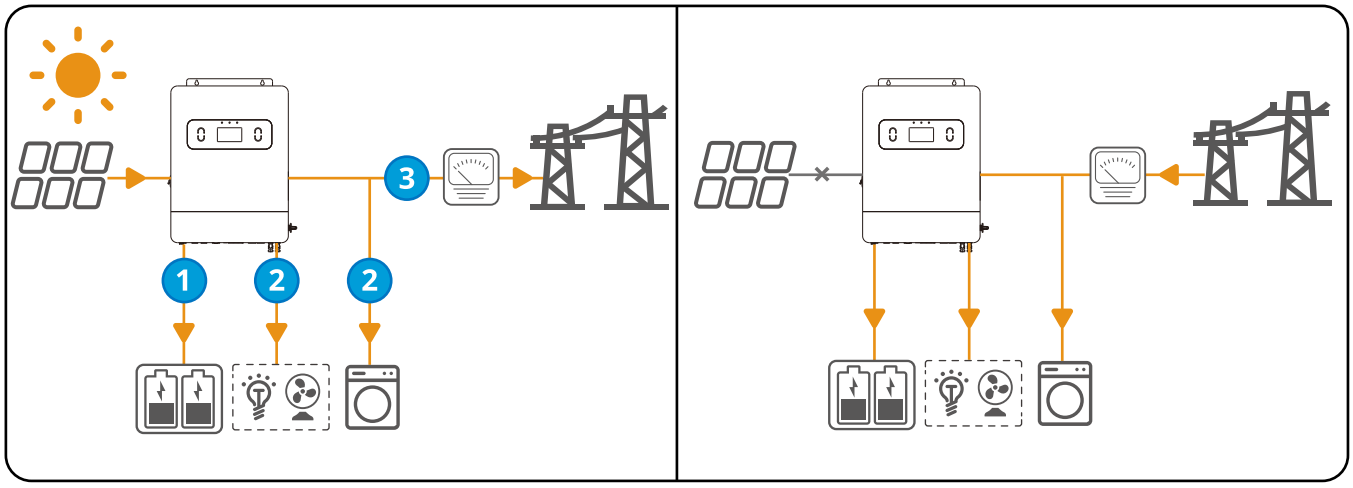


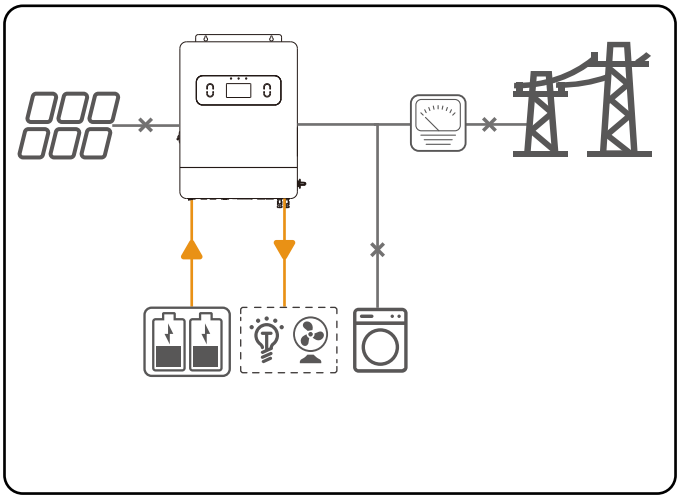
Back-up Mode

NOTICE
• The back-up mode is mainly applied to the scenario where the grid is unstable and there is an important load. When the grid is disconnected, the inverter turns to off-grid mode to • The battery stops discharging when it reaches the cut-off SOC. If the grid is not restored, when there is sunlight the next day,the battery starts to supply power to the load after it is charged to a certain level.

When the power generated in the PV system is sufficient, it charges the battery as priority. And the excess power charges the load. The remaining power will be sold to the grid.
When there is no power generated in the PV system:

- When the grid is normal, the grid can supply load power and battery charging.
- The inverter enters off-grid mode and the battery supplies power to the load when the grid is abnormal.

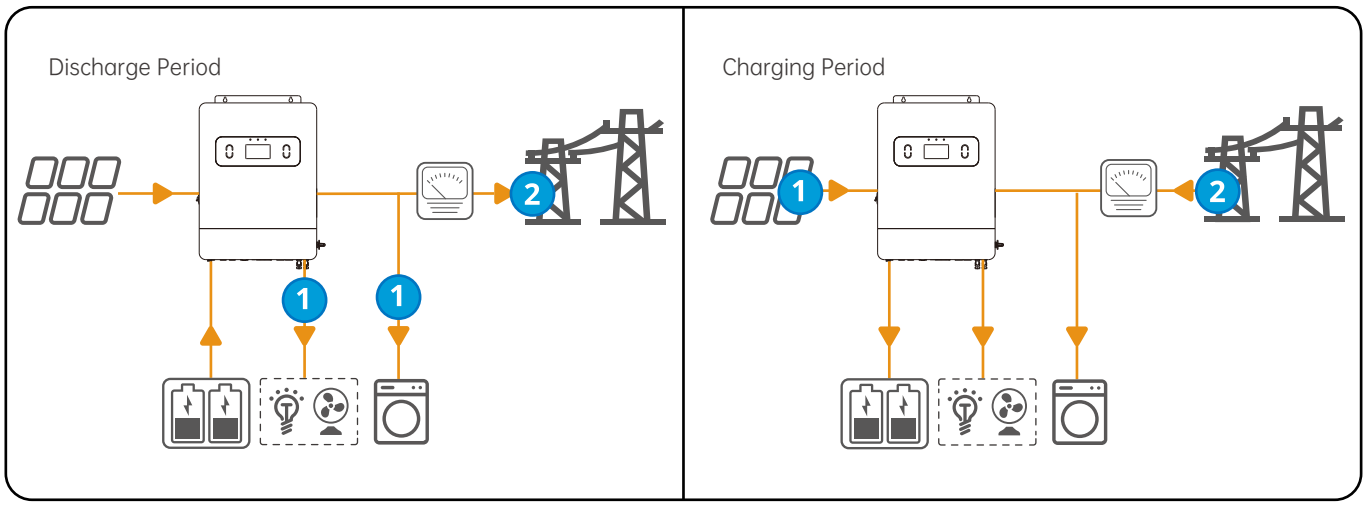




Time-sharing Mode

NOTICE
• The time-sharing mode can only be used if it complies with local laws and regulations, such as whether the power grid is allowed to charge the battery. If not, do not use this mode. • It is recommended to use the time-sharing mode in scenarios where the peak and valley electricity prices vary greatly.

- Discharge period: When the electricity price is at its peak, a discharge period can be set, with photovoltaics and batteries supplying power to the load, with excess energy sold to the grid.
- Charging period: When the electricity price is at its lowest, it can be set as a charging period for the grid and photovoltaic to charge the battery.



Inverter First Mode

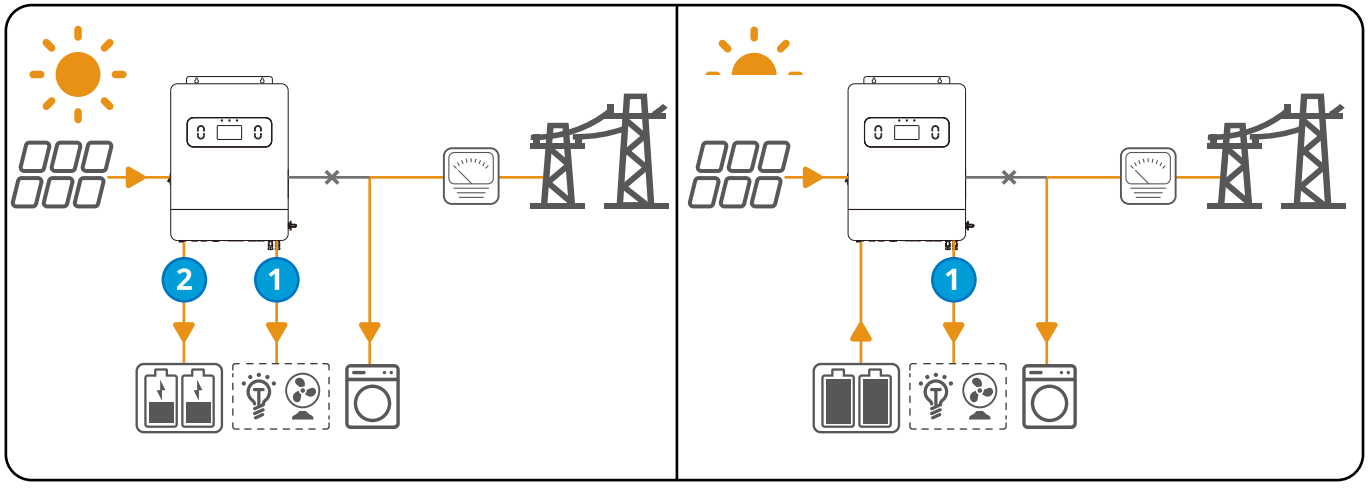
NOTICE
• The inverter priority mode is mainly suitable for scenarios with poor quality, unstable voltage and important load. Solar energy and battery are priority to power supply the load, and only when the battery discharges to the grid to power the low voltage point. • When the battery discharges to the low voltage point, it will no longer discharge. When the grid and solar energy charge the battery to the battery recovery voltage point, switch to the battery and solar energy to supply power to the load.

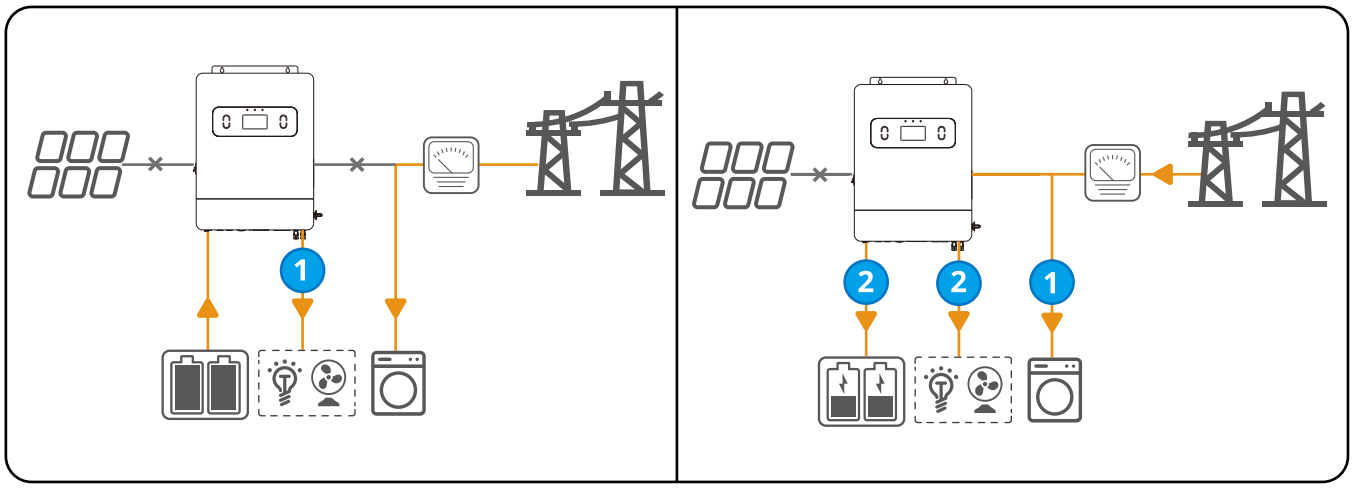
When the power generated in the photovoltaic system is sufficient, the power generated in the photovoltaic system is preferred to the load, and the excess power charges the battery.

When the power generated in the photovoltaic system is insufficient, the power generated in the photovoltaic system is given priority to the load, and the insufficient load is supplied by the battery.

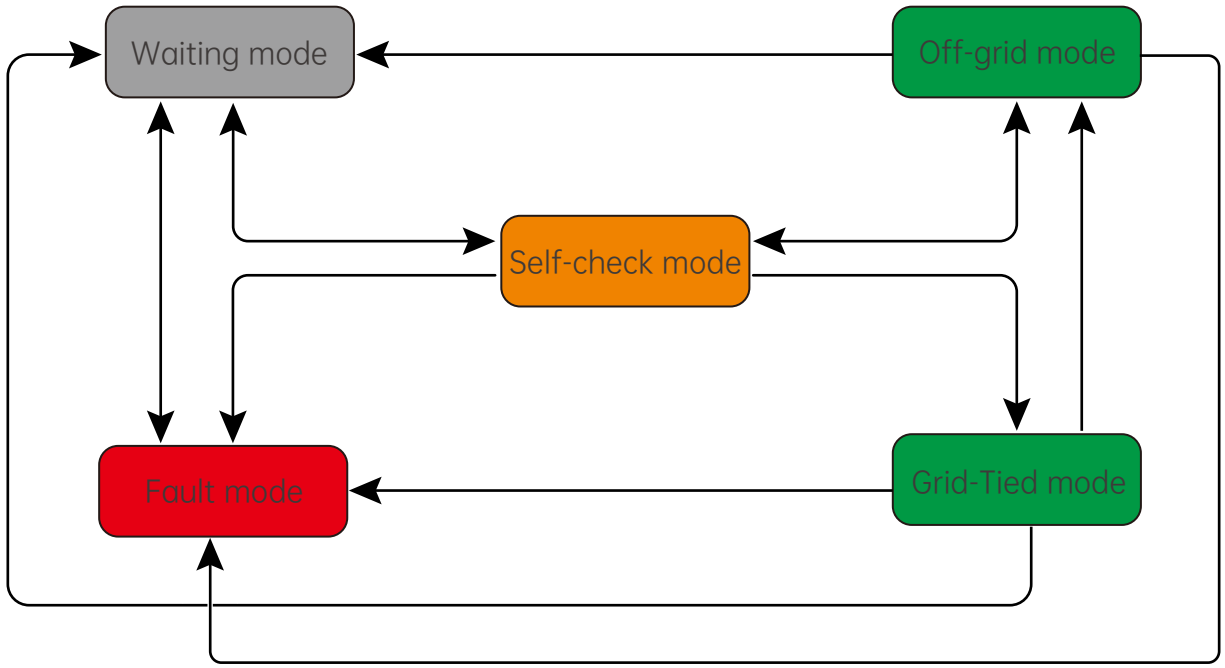
When the PV in the PV system:

- When the battery is normal, the battery inverter the power to the load.
- When the battery is abnormal, the grid supplies power to the load and the grid charges the battery.





3.3.2 Inverter Operation Mode



NO.	Mode	Description
1	Waiting mode	Waiting stage after the inverter is powered on. • When the conditions are met, it enters the self-check mode. • If there is a fault, the inverter enters the fault mode.
2	Self-check mode	Before the inverter starts up, it continuously performs self-check, initialization, etc. • When the conditions are met, it enters the grid-tied mode, and the inverter starts on grid connection. • If the grid is not detected, it enters the off-grid mode and the inverter runs off-grid, If the inverter does not meet the conditions for off-grid operation, it enters the waiting mode. • If the self-check is not passed, it enters the fault mode.
3	Grid-Tied mode	The inverter is grid-tied successfully. • If the grid is not detected, it enters the off-grid mode. • If a fault is detected, it enters the fault mode. • If it is detected that the grid conditions do not meet the grid connection requirements and the inverter does not meet the off-grid operation conditions, it will enter the waiting mode.
4	Off-grid mode	When the grid is out of power, the inverter working mode switches to off-grid mode, and the LOAD port continues to supply power to the load. • If a fault is detected, it enters the fault mode. • If it is detected that the off-grid operating conditions are not met, it will enter the waiting mode. • If the conditions meet grid-tied requirements and and the off-grid output function is turned on, it enters the self-check mode.
5	Fault mode	If a fault is detected, the inverter enters the fault mode. When the fault is cleared, it enters the wait mode.

3.4 Functionality

Power derating

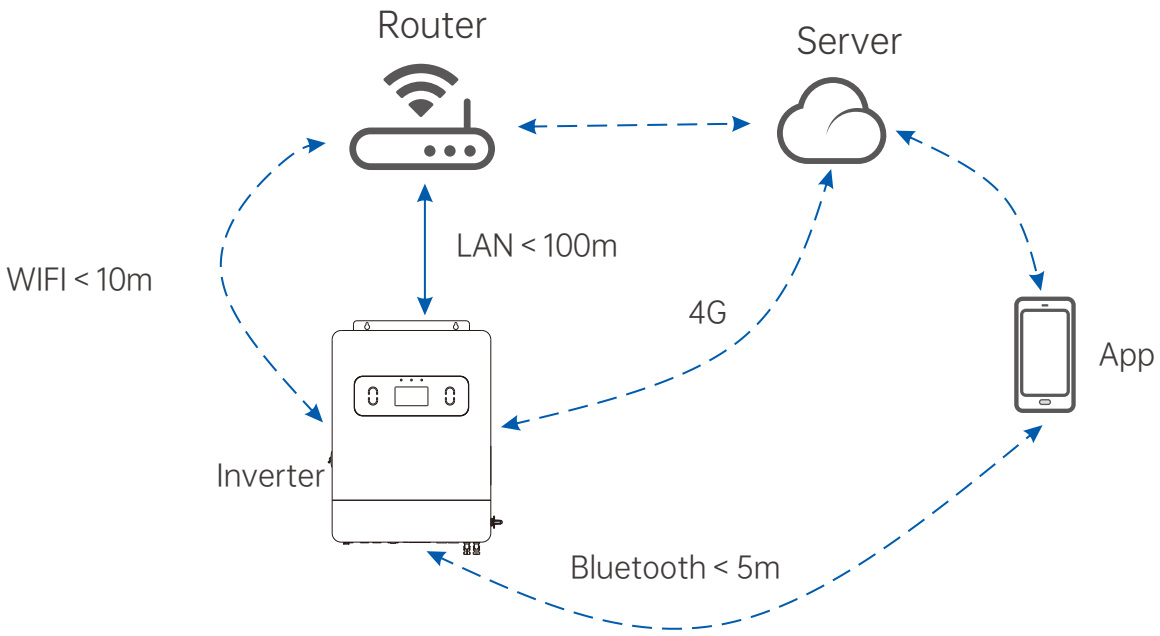
For a safe operation, the inverter will automatically reduce the output power when the operating. environment is not ideal.
The following are the factors that may occur power derating. Please try to avoid them during usage.

- Unfavorable environmental conditions, e.g., direct sunlight, high temperature, etc.
- Inverter's output power percentage has been set.
- High altitude.

Communication

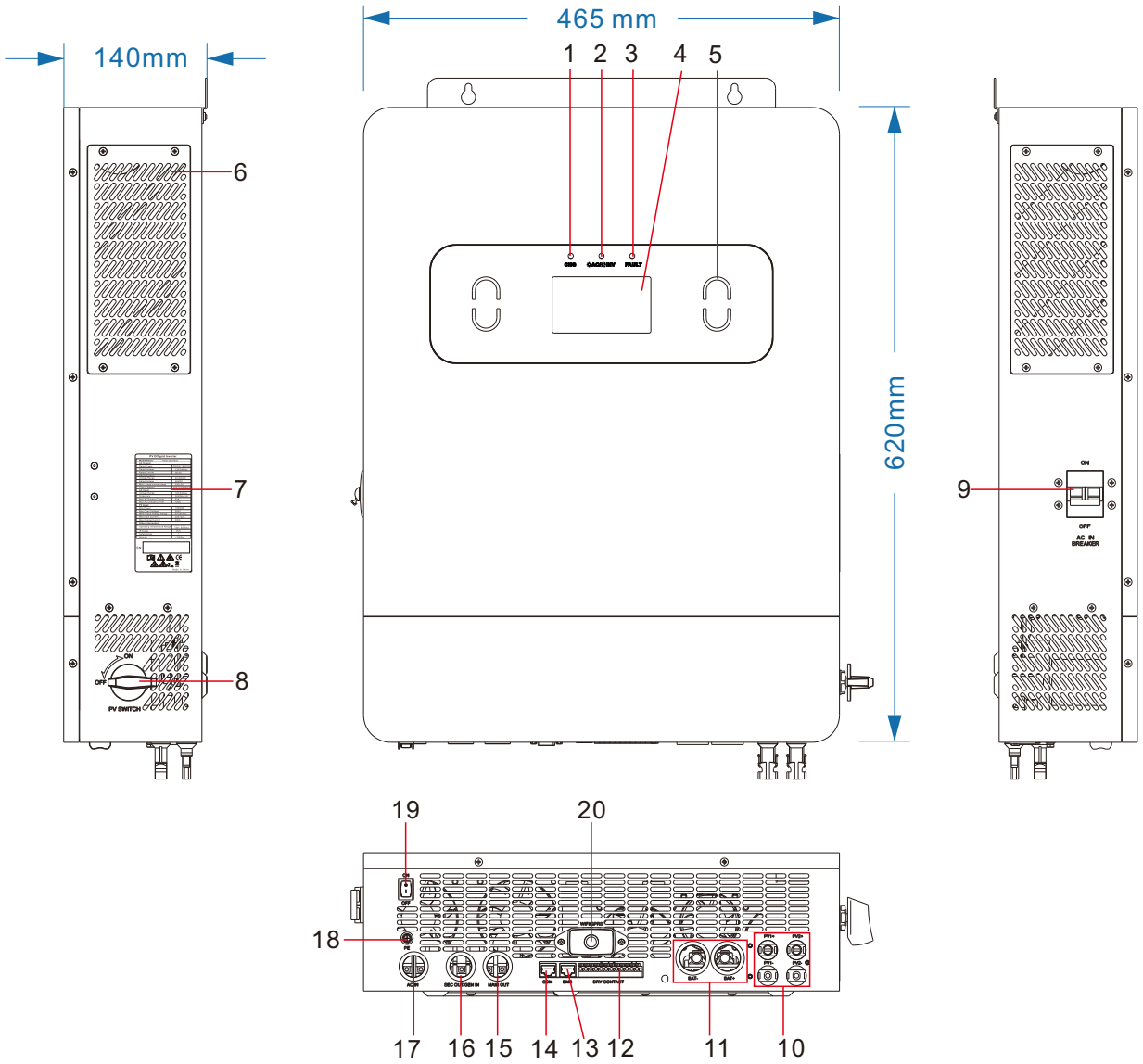
The inverter supports setting via WiFi or Bluetooth in a short distance: connected to the Server via WiFi or LAN to monitor the inverter operations, etc.

- Bluetooth: meets Bluetooth 5.1 standard
- WiFi: supports 2.4G frequency band. Set the router to 2.4G or 2.4G/5G coexistence mode.
  - User can set 40 bytes for router wireless signal name maximumly.
  - It is able to check the WiFi signal intensity via App. It is recommended to move the router close to the inverter or clear the signal blocking objects to enhance the signal intensity when it is less than -60.
- LAN (optional): support connecting to the router via LAN communication and then connecting to the Server.
- 4G: support connected to the Server via 4G communication. For 4G module information, please refer to the 4G module manual.



3.5 Appearance Description

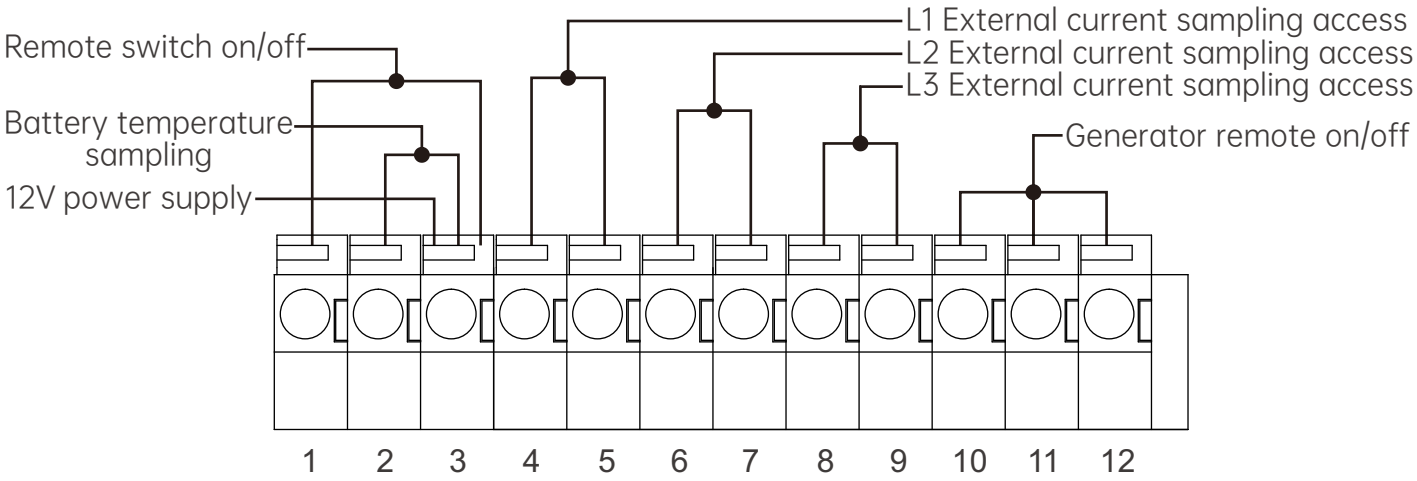
3.5.1 Appearance Introduction



1	Charge lamp	2	AC or inverter indicator lamp
3	Fault indicator lamp	4	Display Screen
5	Robot eyes	6	Dust guard
7	Parameter labeling	8	PV switch
9	AC IN switch	10	PV Port
11	Battery Port（+/-）	12	Dry junction port
13	BMS communication port	14	COM communication port
15	AC main output	16	AC second output port/ Generator port
17	AC input port	18	AC output ground
19	ON/OFF push-button switch	20	Communication stick(optional)

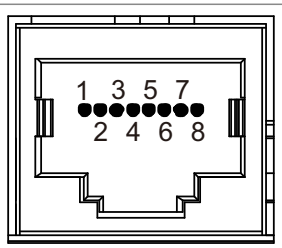
3.5.2 Dry junction port description

1. Remote switch on/off
2. Battery temperature sampling
3. 12V power supply
4. L1 External current sampling access
5. L2 External current sampling access
6. L3 External current sampling access
7. Generator remote on/off

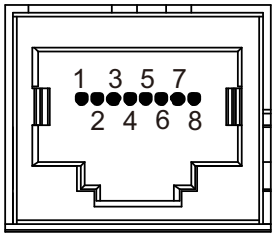


Function	Description
Remote switch on/off	When Pin 1 is connected with pin 3, the inverter will switched off the AC output. When pin1 is disconnected from pin 3, the inverter outputs normally.
Battery temperature sampling	Pin 2 & Pin 3 can be used for battery temperature sampling compensation.
12V power supply	Pin 3 is +12V.
L1 External current sampling access	Pin 4 is connected to CT+, Pin 5 is connected to CT -;can be used for external current sampling signal access.
L1 External current sampling access	Pin 6 is connected to CT+, Pin 7 is connected to CT -;can be used for external current sampling signal access.
L1 External current sampling access	Pin 8 is connected to CT+, Pin 9 is connected to CT -;can be used for external current sampling signal access.
Generator remote on/off	Under normal circumstances, pins 10 and 11 are normally open, and pins 12 and 11 are normally closed. When the battery voltage reaches the low voltage alarm, pin 10 and pin 11 are closed, and pin 12 and pin 11 are disconnected. The dry contact can withstand 230Vac port flow current 1A.

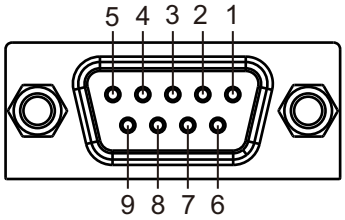
3.5.3 BMS communication function

Pin definition, as shown in the figure: Pin 4 is CAN_H, Pin 5 is CAN_L, Pin 7 is BMS_RS485_A, Pin 8 is BMS_RS485_B	

3.5.4 COM communication Port

Pin definition, as shown in the figure: Pin 1 is RS485_B, Pin 2 is RS485_A, Pin 4 is 5V, Pin 8 is GND	

3.5.5 Communication rod interface

Pin definition, as shown in the figure: WiFi/GPRS ,Pin 2 and Pin 8 is RS485-B3; Pin 3 and Pin 7 is RS485-A3;Pin 5 is GND; Pin 5 is 5V power supply.	

3.5.6 Nameplate

The nameplate is for reference only, please refer to the actual product.

PV Off-grid Inverter

Model Name:	HS2120UH48L
AC Output:	
Rated Power	12000W/12000VA
Rated Voltage	120/240Vac
Rated Current	50.0A
Battery Input:	
Voltage Range	40-60VDC
Rated Voltage	48VDC
Max.charge current range	200A
Type of battery	Lead-acid/Lithium
AC Input:	
Voltage Range	120/240Vac
Frequency	50/60Hz
Max.AC Bypass Current	63A
Max.AC Charge Current	120A
PV Input:	
Max.Power	15000W
Max.Open Voltage	500V
MPPT Input Voltage Range	90-500VDC
Max.Input Current	22A+22A
Max.Charge Current	200A
Other information:	
Operating Temperature Range	-25℃~60℃, >45℃ derated
IP Grade	IP20
Safety Class	I
Altitude	<2000m

SN:

RoHS COMPLIANT

Made In China

Product type and model

Product technical parameters

Serial number information

Product safety symbols and certification marks

4 Check and Storage

4.1 Check Before Receiving

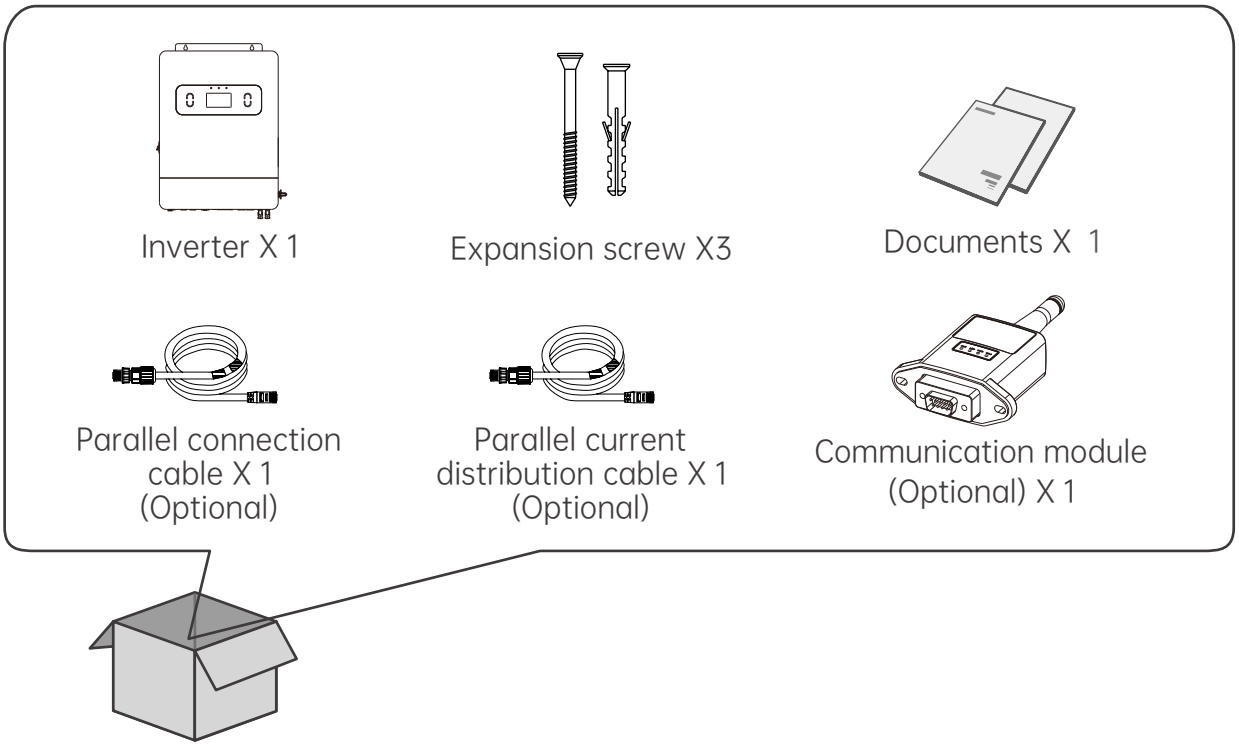
Check the following items before receiving the product.

1. Check the outer packing box for damage, such as holes, cracks, deformation, and others signs of equipment damage. Do not unpack the package and contact the supplier as soon as possible if any damage is found.
2. Check the inverter model. If the inverter model is not what you requested, do not unpack the product and contact the supplier.
3. Check the deliverables for correct model, complete contents, and intact appearance. Contact the supplier as soon as possible if any damage is found.

4.2 Deliverables

WARNING

- Connect the DC cables with the delivered terminals. The manufacturer shall not be liable for the damage if other terminals are used.
- N represents the accessories' quantity delivered varies depending on the specific inverter type.



4.3 Storage

If the equipment is not to be installed or used immediately, please ensure that the storage environment meets the following requirements:

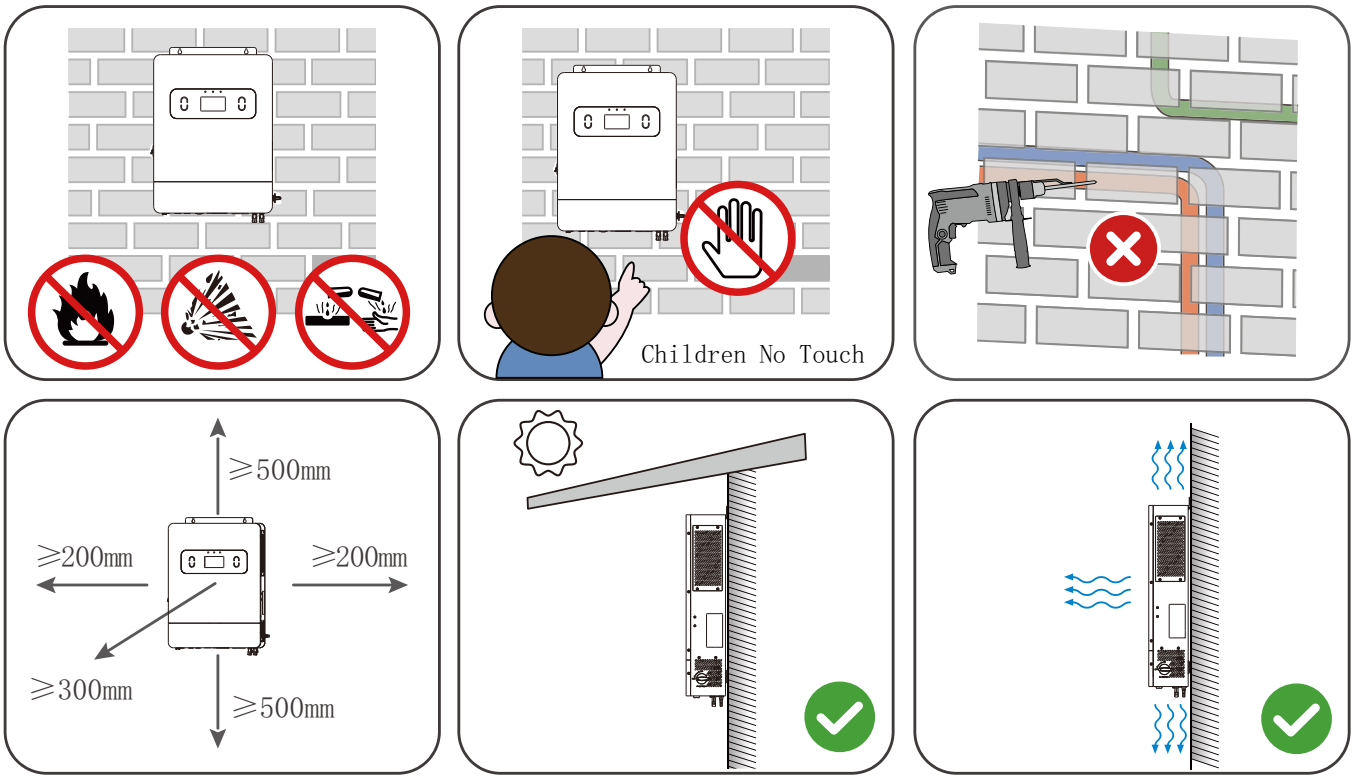
1. Do not unpack the outer package or throw the desiccant away.
2. Store the equipment in a clean place. Make sure the temperature and humidity are appropriate and no condensation.
3. The height and direction of the stacking inverters should follow the instructions on the packing box.
4. The inverters must be stacked with caution to prevent them from falling.
5. If the inverter has been long term stored, it should be checked by professionals before being put into use.

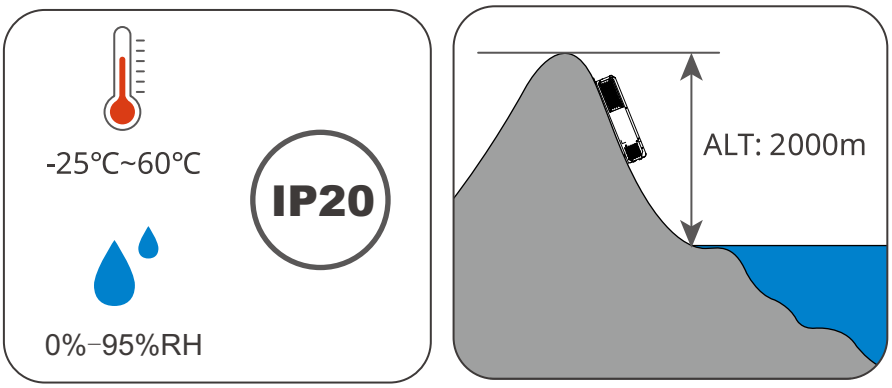
5 Installation

5.1 Installation Requirements

Installation Environment Requirements

1. Do not install the equipment in a place near flammable, explosive, or corrosive materials.
2. The protection level of the equipment only meets the indoor installation, and the installation environment temperature and humidity should be within the suitable range.
3. The place to install the equipment shall be well-ventilated for heat radiation and large enough for operations.
4. Avoid the water pipes and cables buried in the wall when drilling holes.
5. Install the equipment in a sheltered place to avoid direct sunlight, rain, and snow.
6. Do not install the equipment in a place that is easy to touch, especially within children's reach. High temperature exists when the equipment is working. Do not touch the surface to avoid burning.
7. Install the equipment at a height that is convenient for operation and maintenance, electrical connections, and checking indicators and labels.
8. The altitude to install the inverter shall be lower than the maximum working altitude 2000m.
9. Install the equipment away from electromagnetic interference. If there are radio stations or wireless communication equipment below 30 MHz near the installation location, please install the equipment as follows:
   - Add a multi-turn winding ferrite core at the DC input line or AC output line of the inverter, or add a low-pass EMI filter.
   - The distance between the inverter and the wireless EMI equipment is more than 30m.



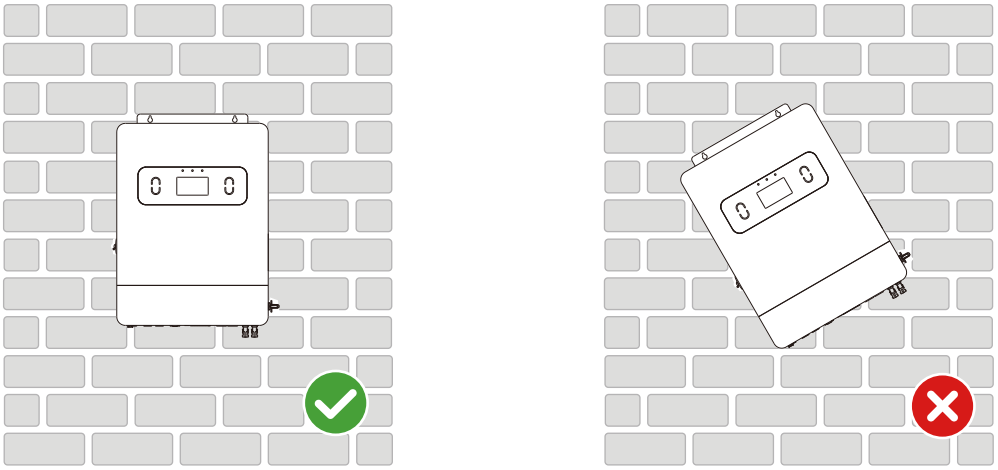


Mounting Support Requirements

- The mounting support shall be nonflammable and fireproof.
- Install the equipment on a surface that is solid enough to bear the inverter weight.
- Do not install the product on the support with poor sound insulation to avoid the noise generated by the working product, which may annoy the residents nearby.

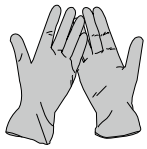
Installation Angle Requirements

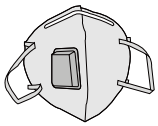
- Do not install the inverter upside down.



Installation Tool Requirements

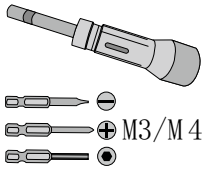
The following tools are recommended when installing the equipment. Use other auxiliary tools on site if necessary.


Safety gloves

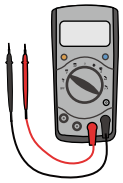

Dust mask

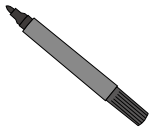
Goggles

Safety shoes



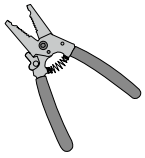
Torque wrench


Multimeter

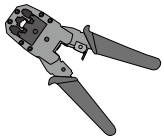

Marker

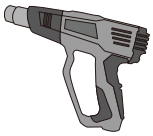
Level

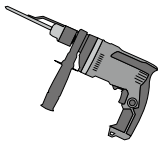
Diagonal pliers


Wire stripper

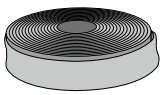
Hydraulic tongs

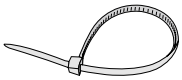

Rj45 crimping tool


Heat gun


Hammer drill

Vacuum cleaner


Heat shrink tube


Cable tie

Rubber hammer

5.2 Inverter Installation

5.2.1 Moving the Inverter

WARNING

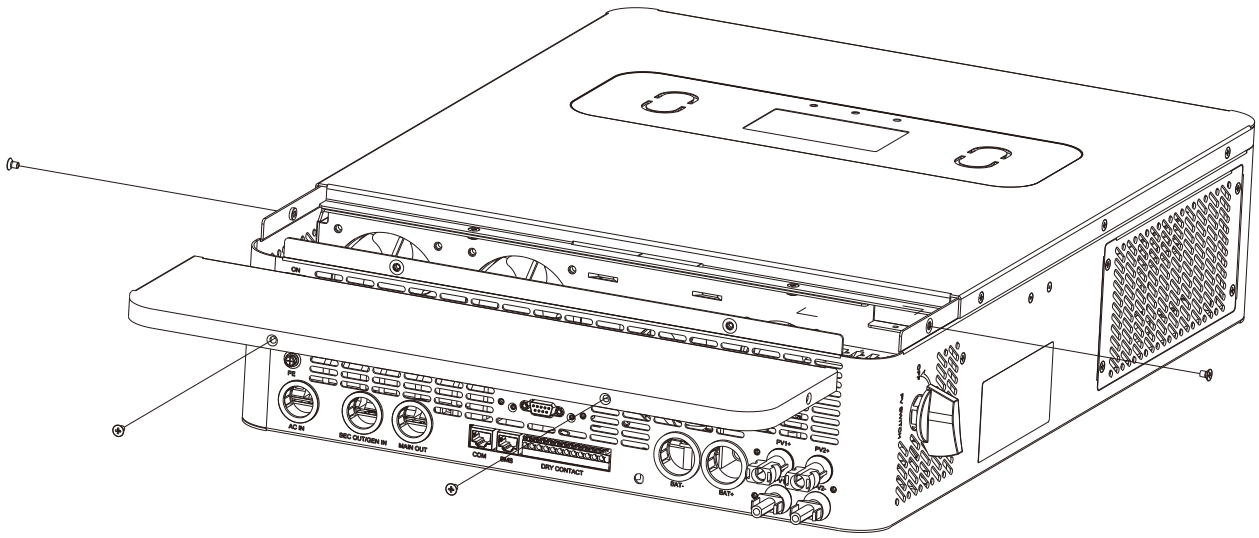
- Operations such as transportation, turnover, installation and so on must meet the requirements of the laws and regulations of the country or region where it is located.
- Move the inverter to the site before installation. Follow the instructions below to avoid personal injury or equipment damage.
  1. Consider the weight of the equipment before moving it. Assign enough personnel to move the equipment to avoid personal injury.
  2. Wear safety gloves to avoid personal injury.
  3. Keep the equipment in balance during moving to avoid its falling down.

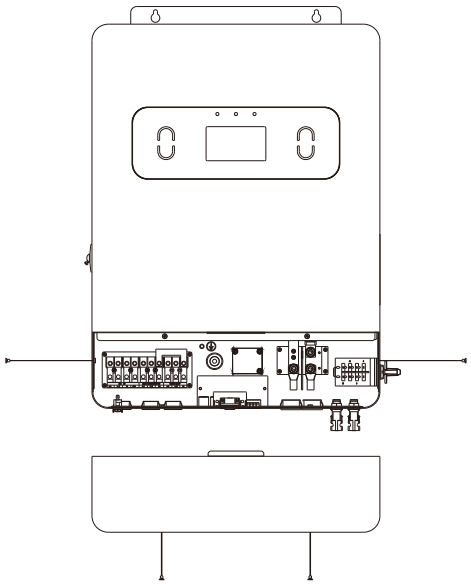
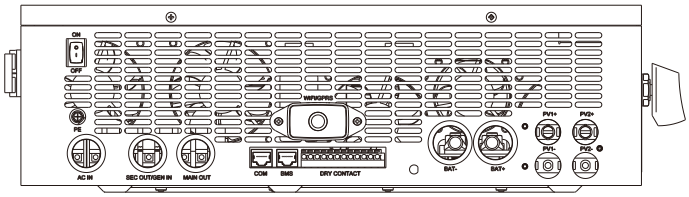
5.2.2 Installing the Inverter

5.2.2.1 Check the equipment before installation. Ensure that there are no damaged items in the package. You will receive the following items in the package:

- Machine * 1.
- Self-tapping screw M6X50*3 and its supporting expansion pipe *3.
- Communication stick * 1(optional), User manual * 1, Quality insurance policy * 1, Factory inspection report.

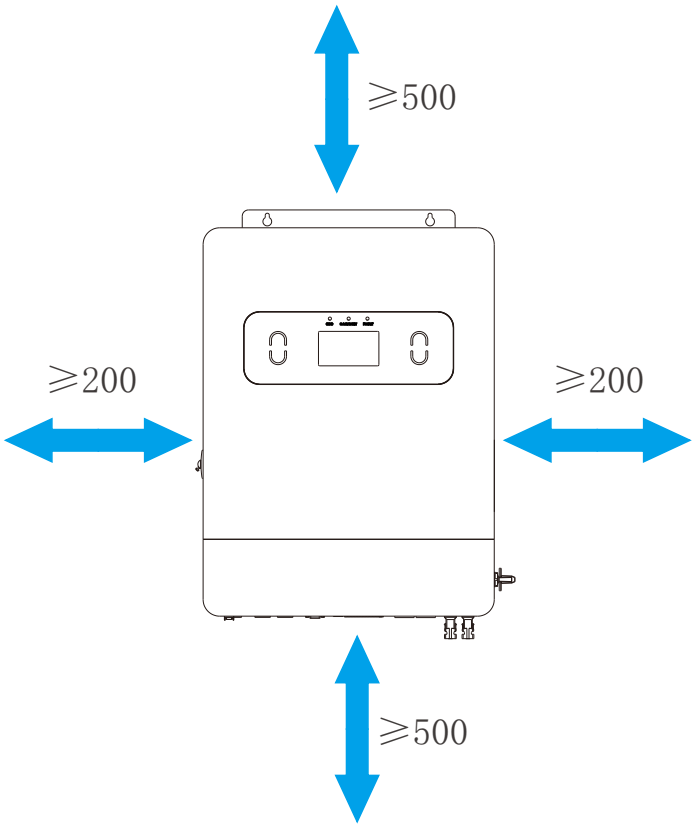
5.2.2.1 Before installing and connecting all wiring, remove the repair cover screws and remove the cover as shown in the figure.



Front view	Bottom view
	

5.2.3 Install machinery:

1. Mounted on a solid and non-combustible wall, install the inverter on the line of sight height and can reach the display start button to read the LCD display and start equipment at any time. In order to ensure the optimal operation condition, with additional protection during the indoor and outdoor installation, the installation ambient temperature shall be between -25℃ and 60℃.
2. When installing the off-grid PV energy storage inverter, ensure that there is enough space for installation. The off-grid PV energy storage inverter has at least 500mm space and at least 200mm space left and right to ensure heat dissipation space. Refer to the whole machine installation schematic diagram as shown below.
3. The detailed fixing and installation steps are as follows:



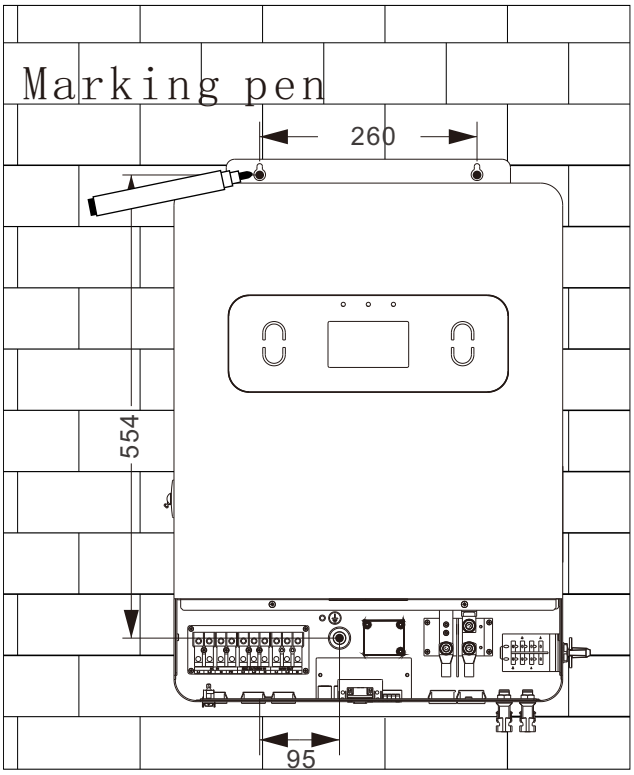
WARNING

- Danger of explosion! Don't place the off-grid solar inverter with the lead-acid liquid battery in a closed space! Don't be installed even in closed places where battery gas may accumulate.

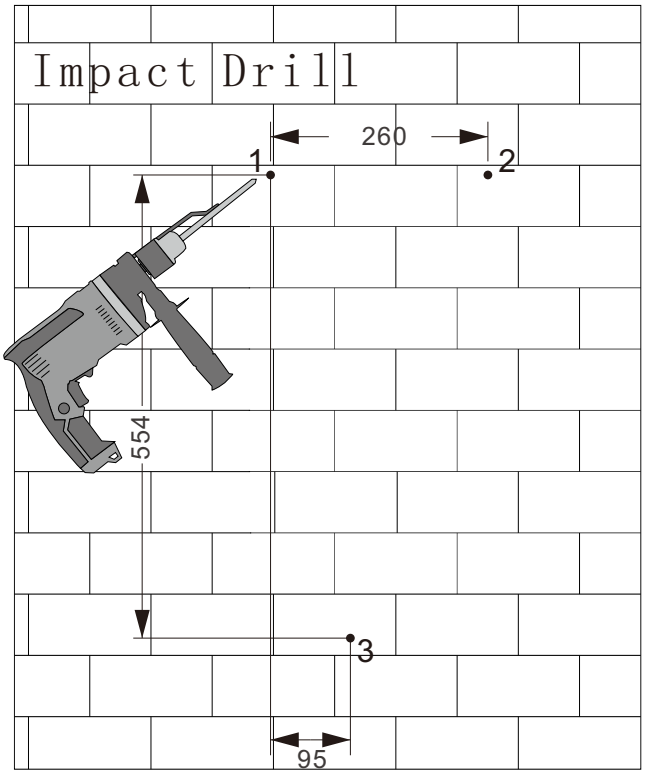
NOTICE

- Avoid the water pipes and cables buried in the wall when drilling holes.
- Wear goggles and a dust mask to prevent the dust from being inhaled or contacting eyes when drilling holes.
- Make sure the inverter is firmly installed in case of falling down.

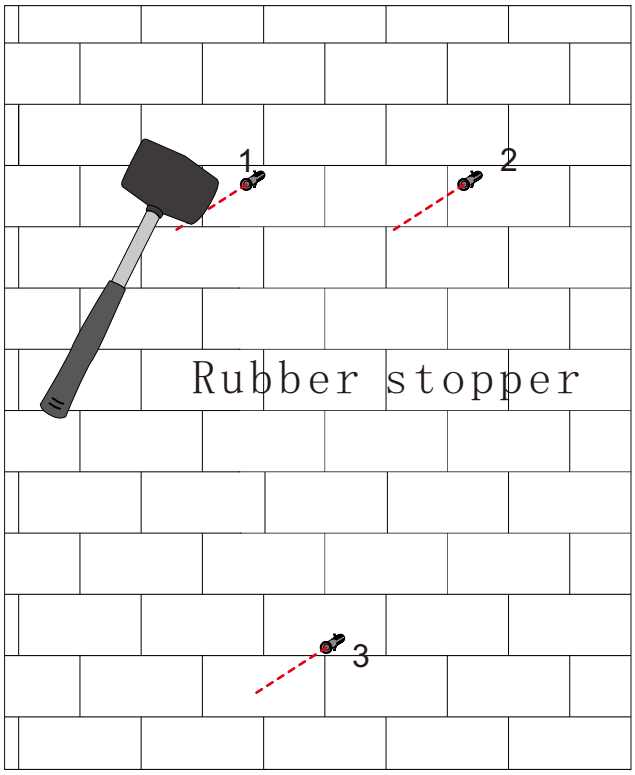
1: Positioning hole mark: mark "◎" on the wall according to the size of the following picture or using the equipment;



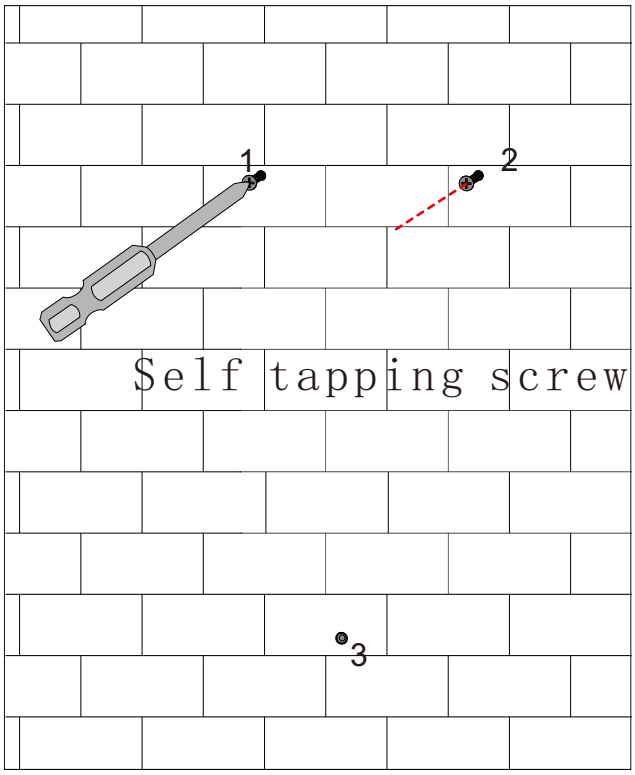
2: Drilling: With Impact drill on the wall mark drilling (3 PCS), drill diameter 10mm and drill depth 60mm;



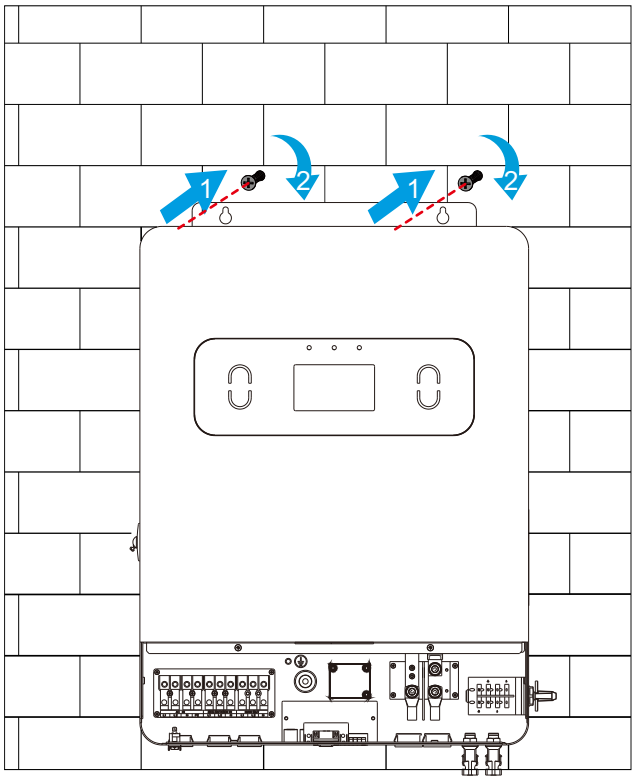
3: Embedded expansion pipe: Embed the expansion pipe in the drilled hole with a hammer, and the end surface of the rubber plug is flush with the wall (3 places);



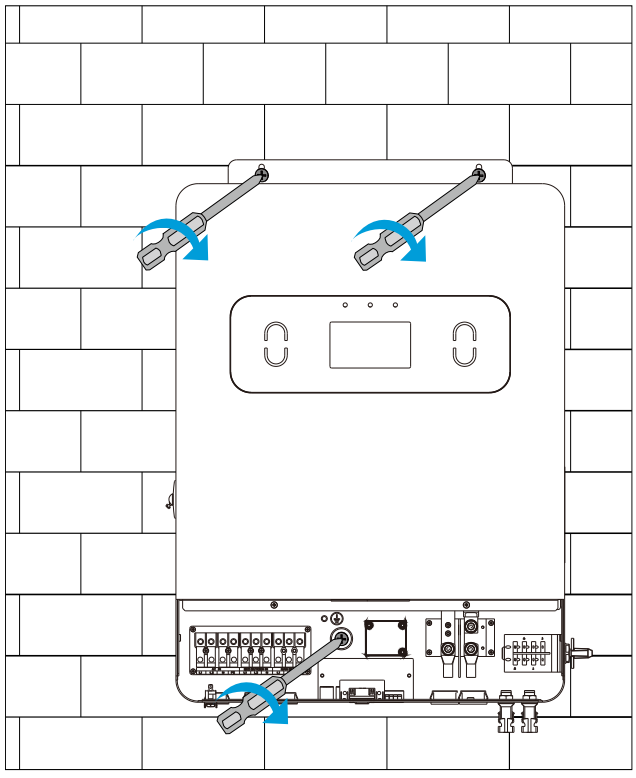
4: Screw in the upper two screws (not all of them are screwed in so that the machine can be hooked up in the next step);



5: Hang the device into the upper two screws;



6: Tighten the 3- M6X50 self-tapping screws so that the fixation is complete.



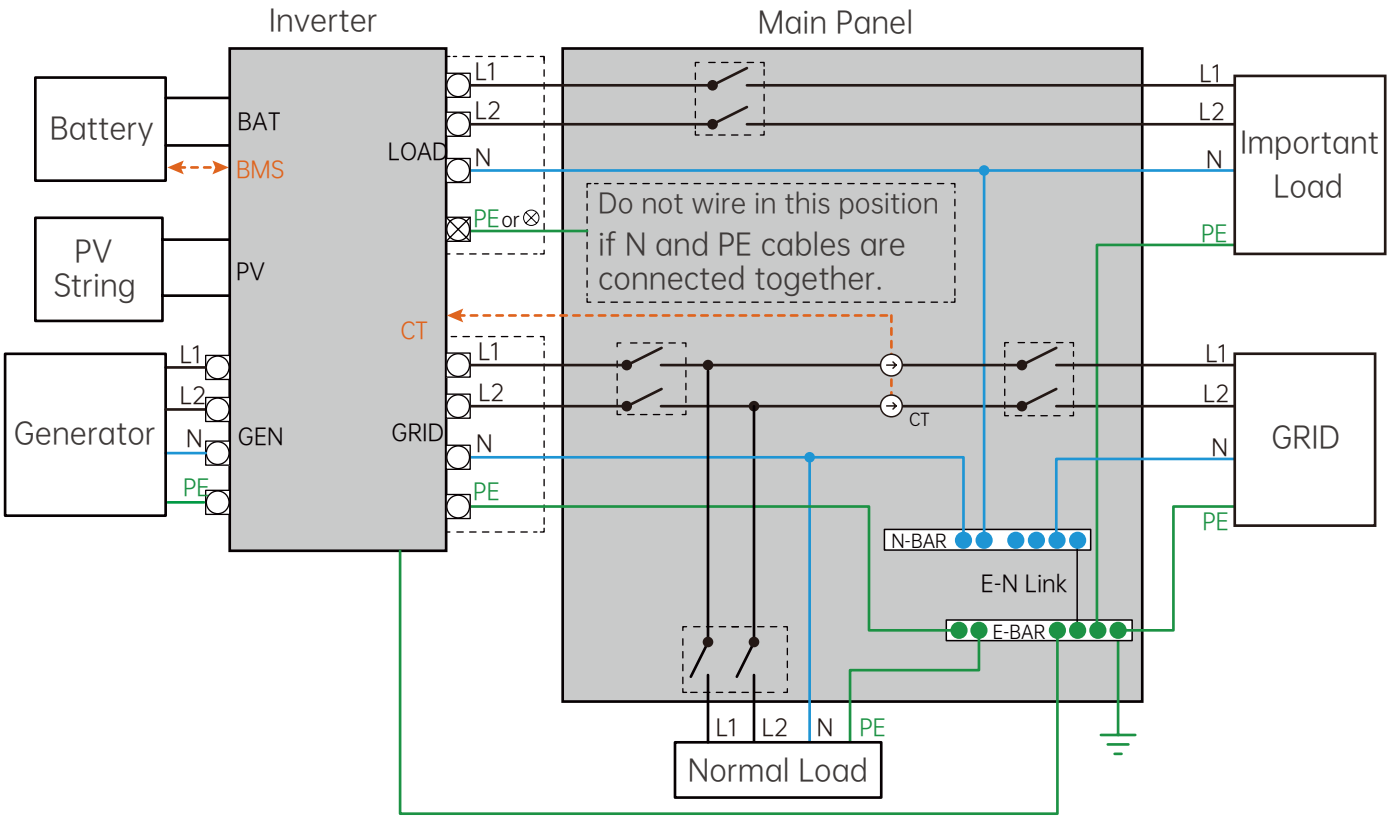
6 Electrical Connection

6.1 Circuit Diagram

NOTICE

- N and PE wiring via ON-GRID and BACK-UP ports of the inverter are different based on the regulation requirements of different regions. Refer to the specific requirements of local regulations.

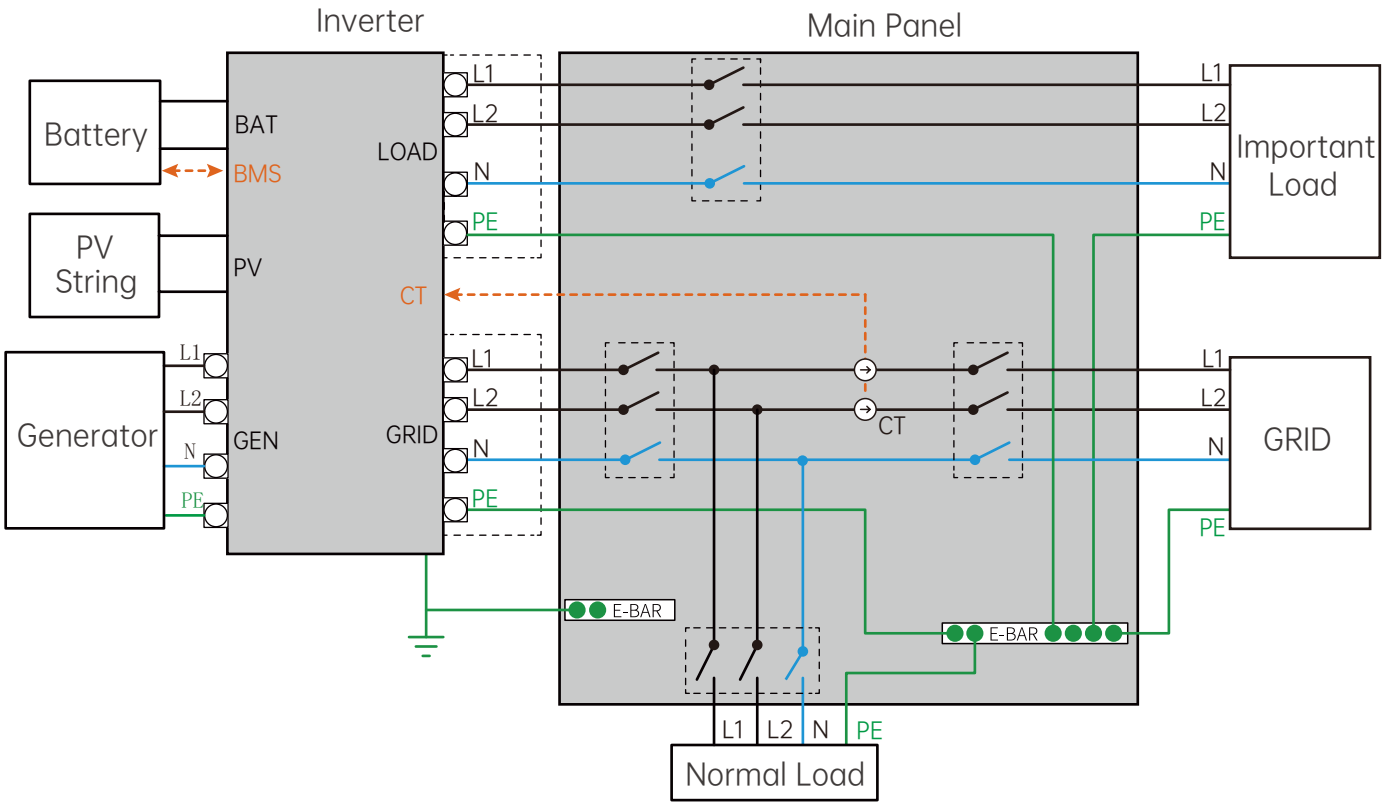
N and PE cables are connected together in the Main Panel for wiring



N and PE cables in the Main Panel shall be wired separately

NOTICE

- Ensure that the grounding of BACK-UP is correctly and tightened. Otherwise, the BACK-UP function may be abnormal in case of grid failure.



6.2 Safety Precaution

DANGER

- All operations, cables and parts specification during the electrical connection shall be in compliance with local laws and regulations.
- Disconnect the DC switch and the AC output switch of the inverter to power off the inverter before any electrical connections. Do not work with power on. Otherwise, an electric shock may occur.
- Tie the same type cables together, and place them separately from cables of different types. Do not place the cables entangled or crossed.
- If the cable bears too much tension, the connection may be poor. Reserve a certain length of the cable before connecting it to the inverter cable port.
- When crimping the terminals, ensure that the conductor part of the cable is in full contact with the terminals. Do not crimp the cable jacket with the terminal. Otherwise the inverter may not operate, or its terminal block getting damaged due to heating and other phenomenon because of unreliable connection after operation.

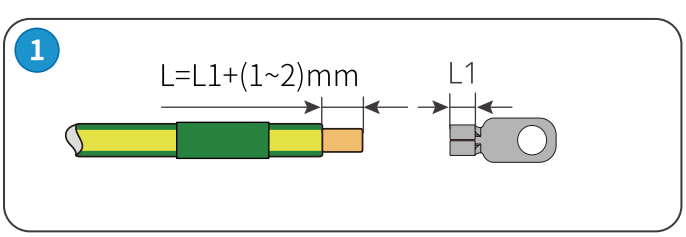
NOTICE

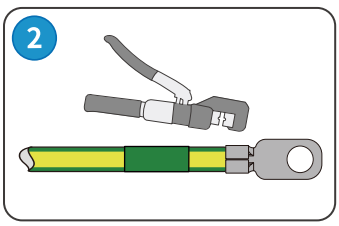
- Wear personal protective equipment like safety shoes, safety gloves, and insulating gloves during electrical connections.
- All electrical connections should be performed by qualified professionals.
- Cable colors in this document are for reference only. The cable specifications shall meet local laws and regulations.

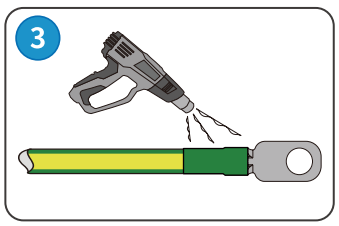
6.3 Connecting The PE Cable

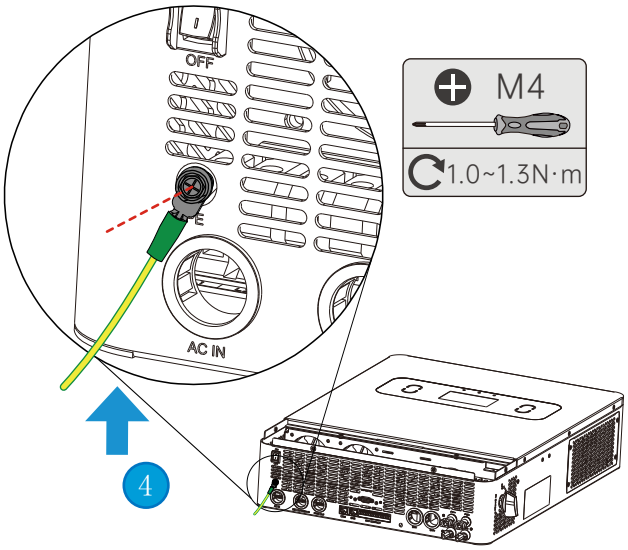
WARNING

- The PE cable connected to the enclosure of the inverter cannot replace the PE cable connected to the AC output port. Both of the two PE cables must be securely connected.
- Make sure that all the grounding points on the enclosures are equipotential connected when there are multiple inverters.
- To improve the corrosion resistance of the terminal, it is recommended to apply silica gel or paint on the ground terminal after installing the PE cable.
- Prepare PE cables with the recommended specification:
  - Type: Outdoor single-core copper wire
  - Cross-sectional area: 6AWG(American Standard);16mm²(European Standard)









6.4 Connecting The AC Cable

NOTICE

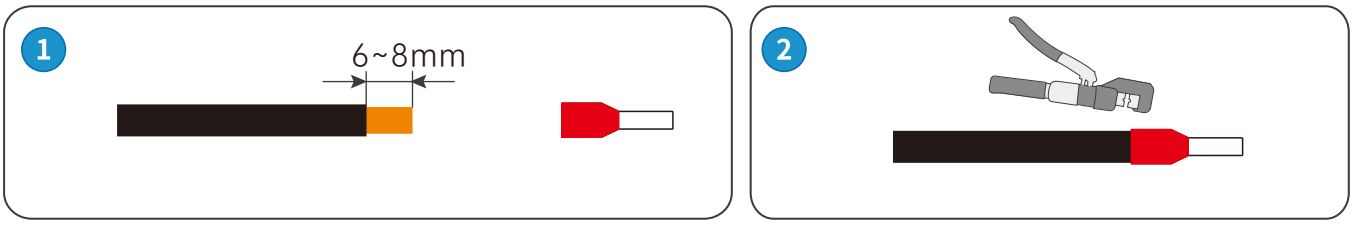
- Before AC input / output wiring, first disconnect the external circuit breaker, and confirm whether the cables used are qualified. For the selection of cables and circuit breaker, Please refer to the following "6.4.1" wiring specification and circuit breaker selection";
- According to the cable order and terminal position shown in the figure below, correctly connect the AC input line, please first ground wire, then connect the live wire and null line;
- According to the cable order and terminal position shown in the figure 2 below, correctly connect to the live wire and null line of the AC main output line;
- According to the cable sequence and terminal position shown in figure 3 below, correctly connect to the live wire and null line of the AC secondary output line;

6.4.1 Wiring specifications and circuit breaker selection

➢ Recommended AC input / output line diameter and switch selection please refer to the following table:

Model	The AC input / output is recommended Wiring diamete (American Standard)	The AC input / output is recommended Wiring diamete (European Standard)	Max bypass communication input / output current	Recommended air switch or circuit breaker model
HS2085UH48L	6AWG	16mm²	63A	3P-63A
HS2105EH48L/P	6AWG	16mm²	63A	3P-63A
HS2114UH48L/P	6AWG	16mm²	63A	3P-63A
HS2120UH48L	6AWG	16mm²	63A	3P-63A

The above wiring line diameter and circuit breaker are only recommended, please select the appropriate wiring line diameter and circuit breaker according to the actual situation. It is suggested that the input and output cable length of the off-grid solar inverter is consistent with the line diameter.The recommended cable length is no more than 10 meters.



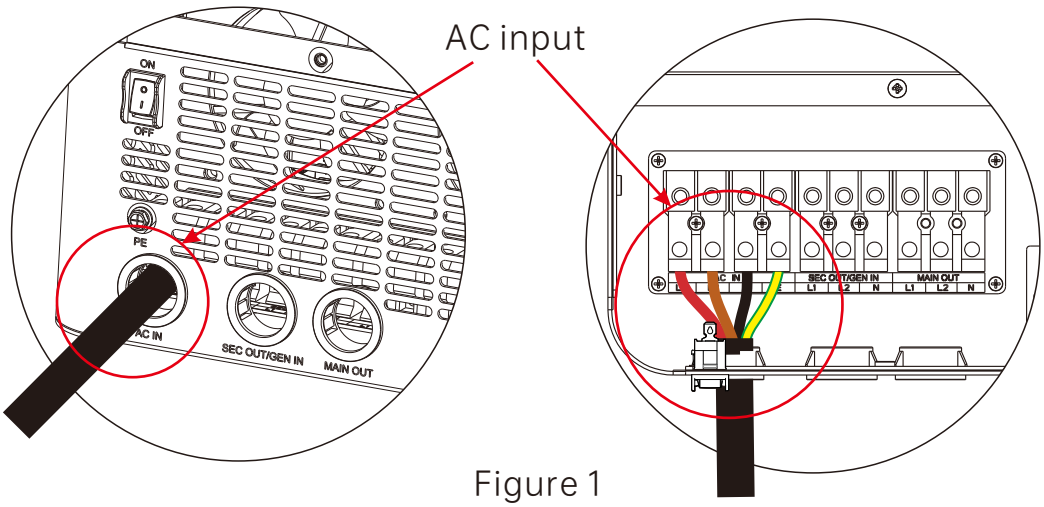


Figure 1

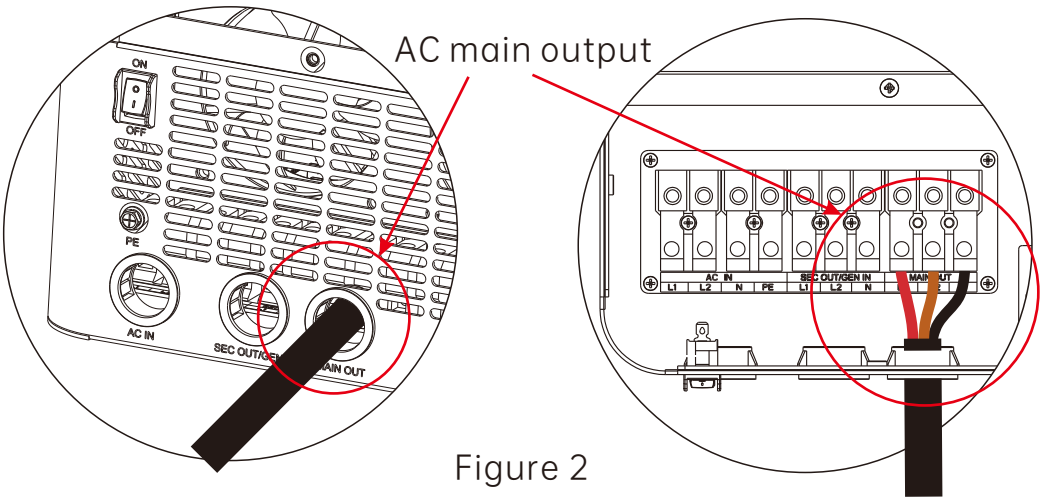


Figure 2

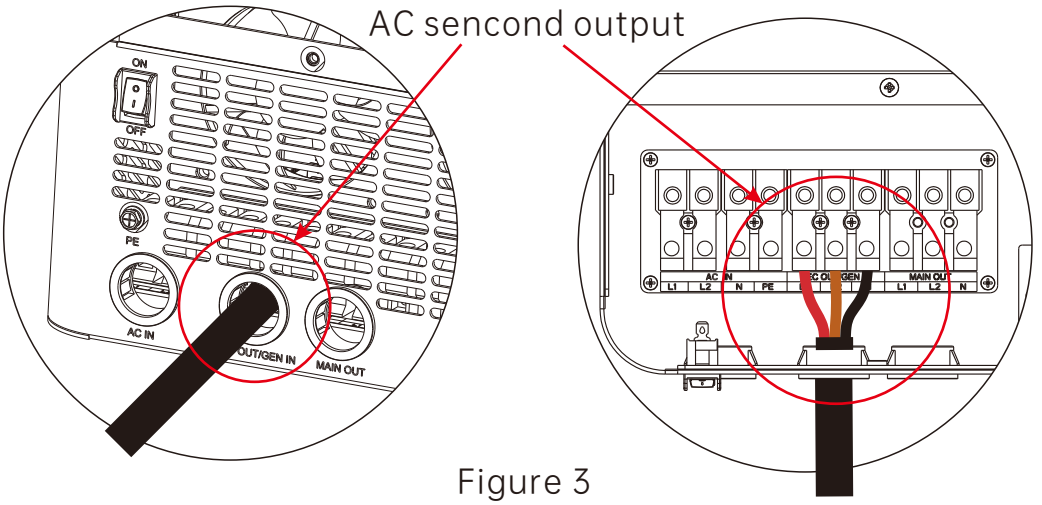


Figure 3

PE:ground wire L:Live wire N:Null line

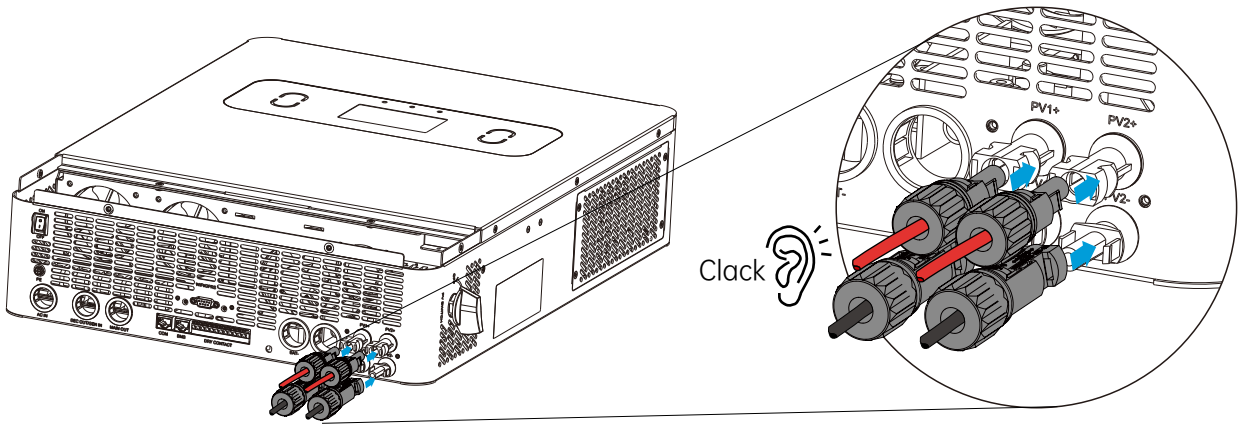
6.5 Connecting The PV Cable

NOTICE
• Before PV input wiring, disconnect the external circuit breaker and confirm whether the cables used are qualified. For the cable and circuit breaker selection, please refer to the following "6.5.1" wiring specification and circuit breaker selection ";

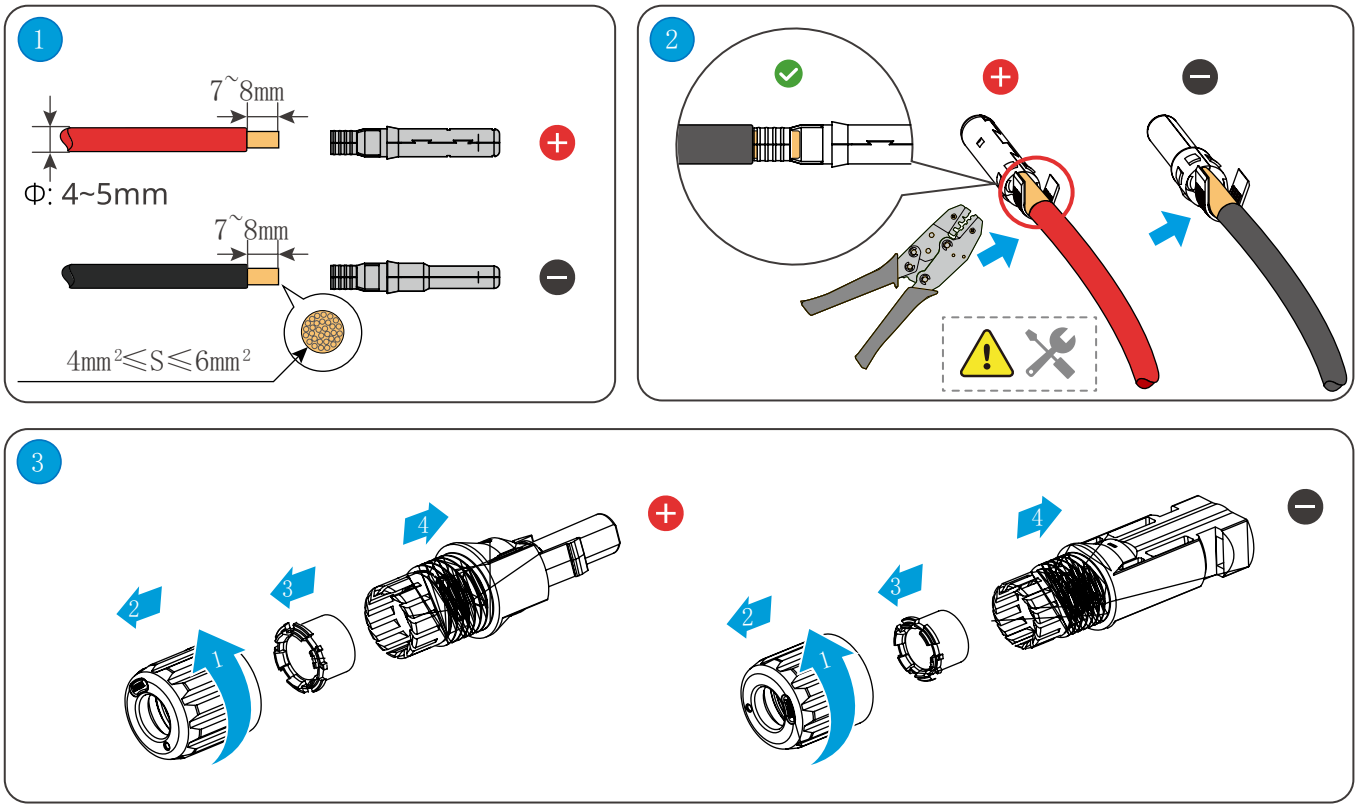
6.5.1 Wiring specifications and circuit breaker selection

➢ Please refer to the following table for the recommended PV input line diameter and switch selection:

Model	The PV input is recommended Wiring diamete (American Standard)	The PV input is recommended Wiring diamete (European Standard)		Maximum PV input voltage/current	Recommended air switch or circuit breaker model
		One string	Two strings		
HS2085UH48L	10AWG	4mm²	6mm²	500V/22A	2P-25A
HS2105UH48L/P	10AWG	4mm²	6mm²	500V/22A	2P-25A
HS2114UH48L/P	10AWG	4mm²	6mm²	500V/22A	2P-25A
HS2120UH48L	10AWG	4mm²	6mm²	500V/22A	2P-25A
The voltage shall not exceed the maximum PV input open circuit voltage in series. When the PV cable uses 4mm², it is only applicable when only one module is connected, and 6mm² cable is used when two PV branches are connected in parallel.					



MC4



6.6 Connecting The Battery Cable

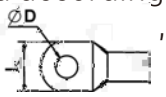
DANGER

- The battery used with the inverter shall be approved by the inverter manufacturer. The approved battery list can be obtained through the official website.
- A short circuit in the battery may cause personal injury. The instantaneous high current caused by a short circuit can release a large amount of energy and may cause a fire.
- Before connecting the battery cable, ensure the inverter and the battery, and downstream& upstream switches, are all disconnected.
- It is forbidden to connect and disconnect the battery cables when the inverter is running. Otherwise it may cause electric shock.
- It is forbidden to connect loads between the inverter and batteries.
- When connecting battery cables, use insulated tools to prevent accidental electric shock or short circuit to the batteries.
- Ensure that the open circuit voltage of the battery is within the permissible range of the inverter.
- Install a DC switch between the inverter and the battery.

WARNING

- Connect the battery cables to the corresponding terminals such BAT+, BAT- and grounding ports correctly. Otherwise it will cause damage to the inverter.
- Ensure that the whole cable cores are inserted into the terminal holes. No part of the cable core can be exposed.
- Ensure that the cables are connected securely. Otherwise it will cause damage to the inverter due to overheat during its operation.

NOTICE

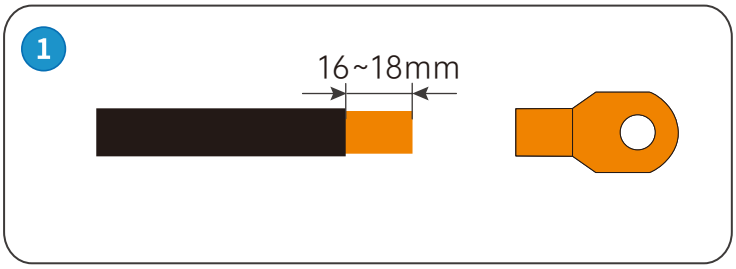
- Before wiring, the external circuit breaker must be disconnected, and confirm whether the cable used is qualified. Please refer to the following "6.6.1" wiring specification and circuit breaker selection "; the BAT line needs to be connected to the machine through the OT terminal. For the OT terminal, see the third below, the T-type terminal must firmly press the BAT line to prevent excessive heat caused by excessive contact impedance;
- Connect the BAT line correctly according to the cable sequence and terminal position shown in the figure below. BAT cable fixing nut torque 100kgf.cm;
- The OT terminal specifications and models are selected according to the cable specifications and models, and the size requirements: 

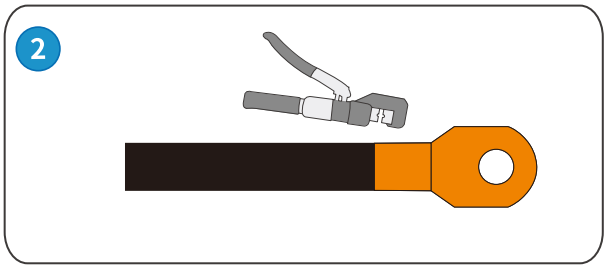
,L≤23mm, D=8~10mm

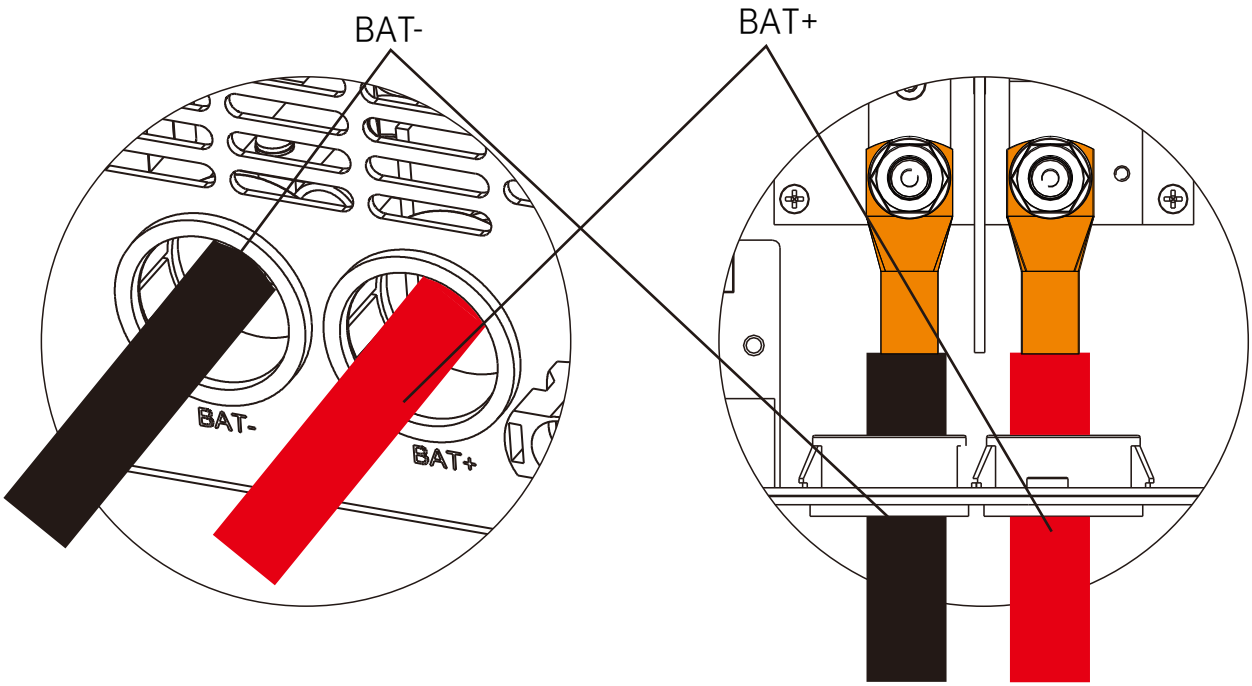
6.6.1 Wiring specifications and circuit breaker selection

➢ Refer to the following table for the recommended battery input line diameter and switch selection:

Model	Battery wiring wire diameter is recommended (American Standard)	Battery wiring wire diameter is recommended (Chinese Standard)	Maximum charging current	Recommended air switch or circuit breaker model
HS2085UH48L	1AWG	35mm²	180A	2P-250A
HS2105UH48L/P	0AWG	50mm²	200A	2P-250A
HS2114UH48L/P	0AWG	50mm²	200A	2P-250A
HS2120UH48L	0AWG	50mm²	200A	2P-250A
Note: The wiring diameter is for reference only. If the distance between the off-grid solar inverter and the battery is far away, the use of a thicker line can reduce the system loss. It is recommended that the cable length between the off-grid solar inverter and the battery should not exceed 3m.				

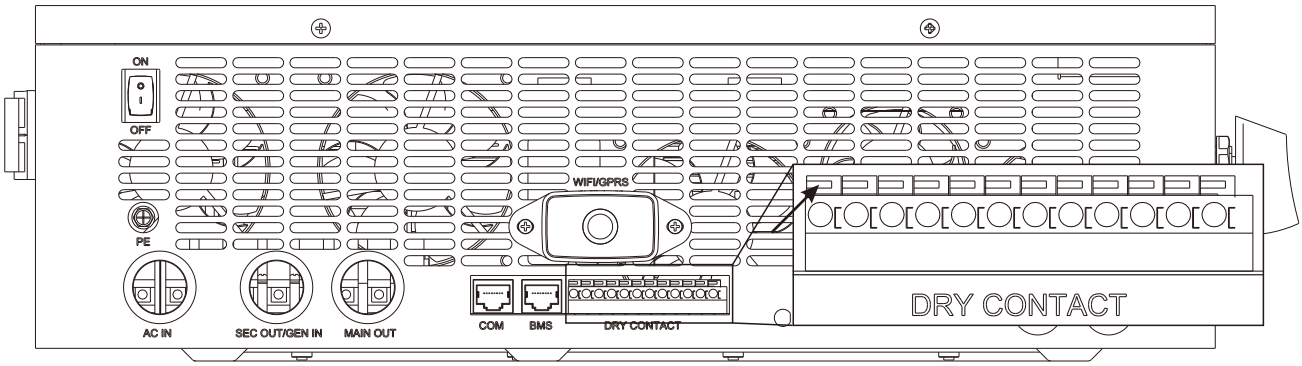






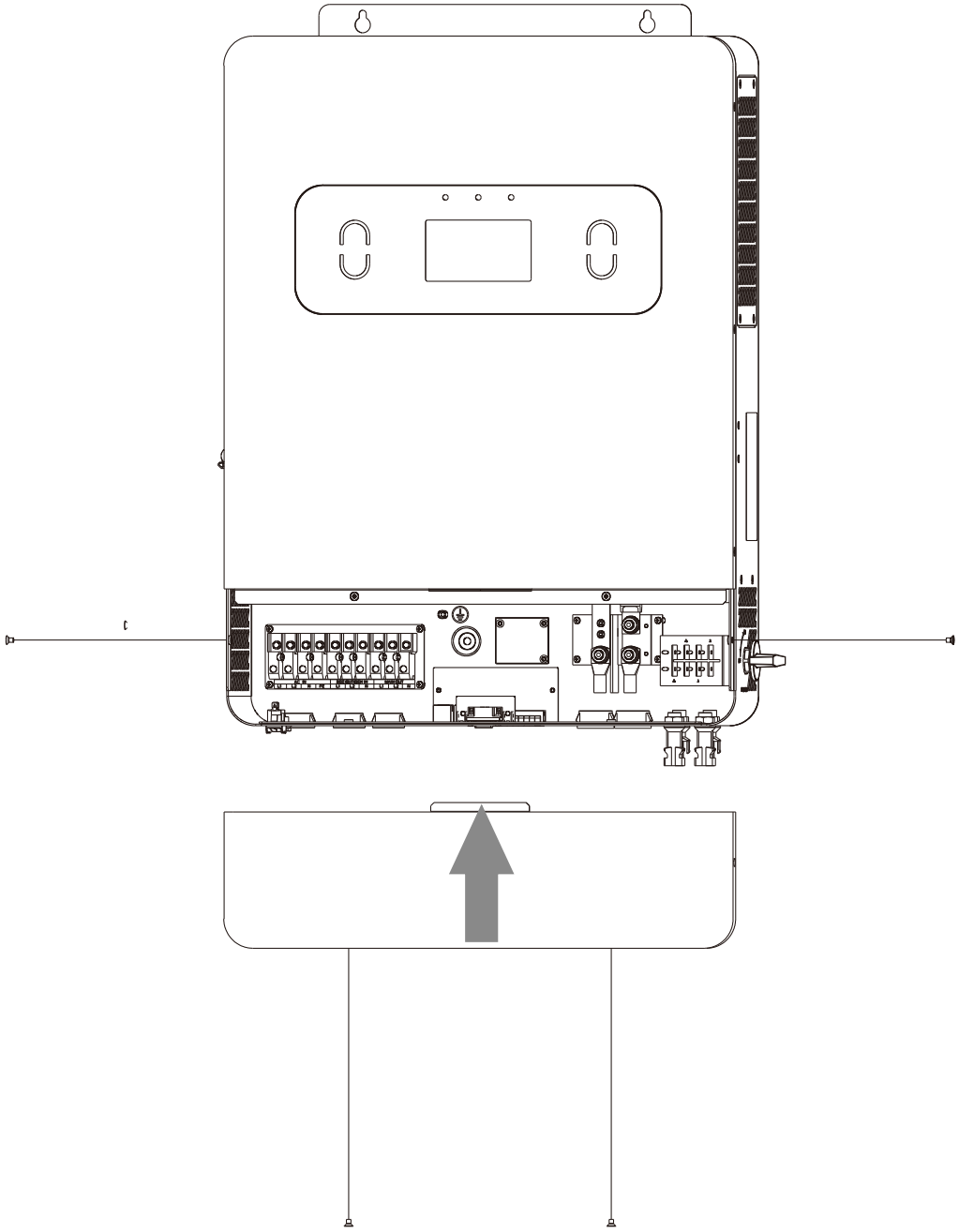
6.7 Dry contact cables are connected

Use a small flat-head screwdriver to push back in the direction indicated, insert the communication cable into the dry contact port, and release the screwdriver. (Communication line section 0.2~1.5mm²)



6.8 Install the terminal protection cover

1. Check whether the battery input is positive and negative is connected, whether the PV input is positive and negative is connected, and whether the screw is firm.
2. Check that the AC input and AC output terminals are connected correctly and securely.
3. If there is no abnormality, use the tool to secure the screw protecting the cover.



7 Equipment Commissioning

7.1 Check Before Power ON

NO.	Checking Item
1	The product is firmly installed at a clean place that is well-ventilated and easy-to operate.
2	The PE, DC input, AC output, and communication cables are connected correctly and securely.
3	Cable ties are intact, routed properly and evenly.
4	Unused cable holes are fitted using the waterproof nuts.
5	The electrical conduit holes are sealed.
6	The voltage and frequency at the connection point meet the inverter grid connection requirements.

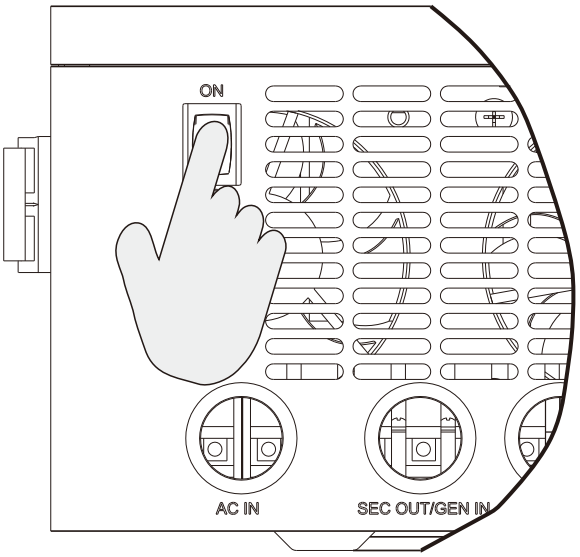
7.2 Power On

Step 1: Turn on the AC breaker on the GRID side of the inverter.

Step 2: Turn on the AC breaker on the LOAD side of the inverter.

Step 3: Turn on the battery breaker between the inverter and the battery.

Step 4: Press the button switch at the bottom of the machine to "ON" state, "AC / INV" indicator flashing means that the inverter works normally, the photovoltaic array and mains circuit breaker are closed again, and then turn on the AC load from the open load at the same time, off-grid solar inverter works normally according to the set mode.



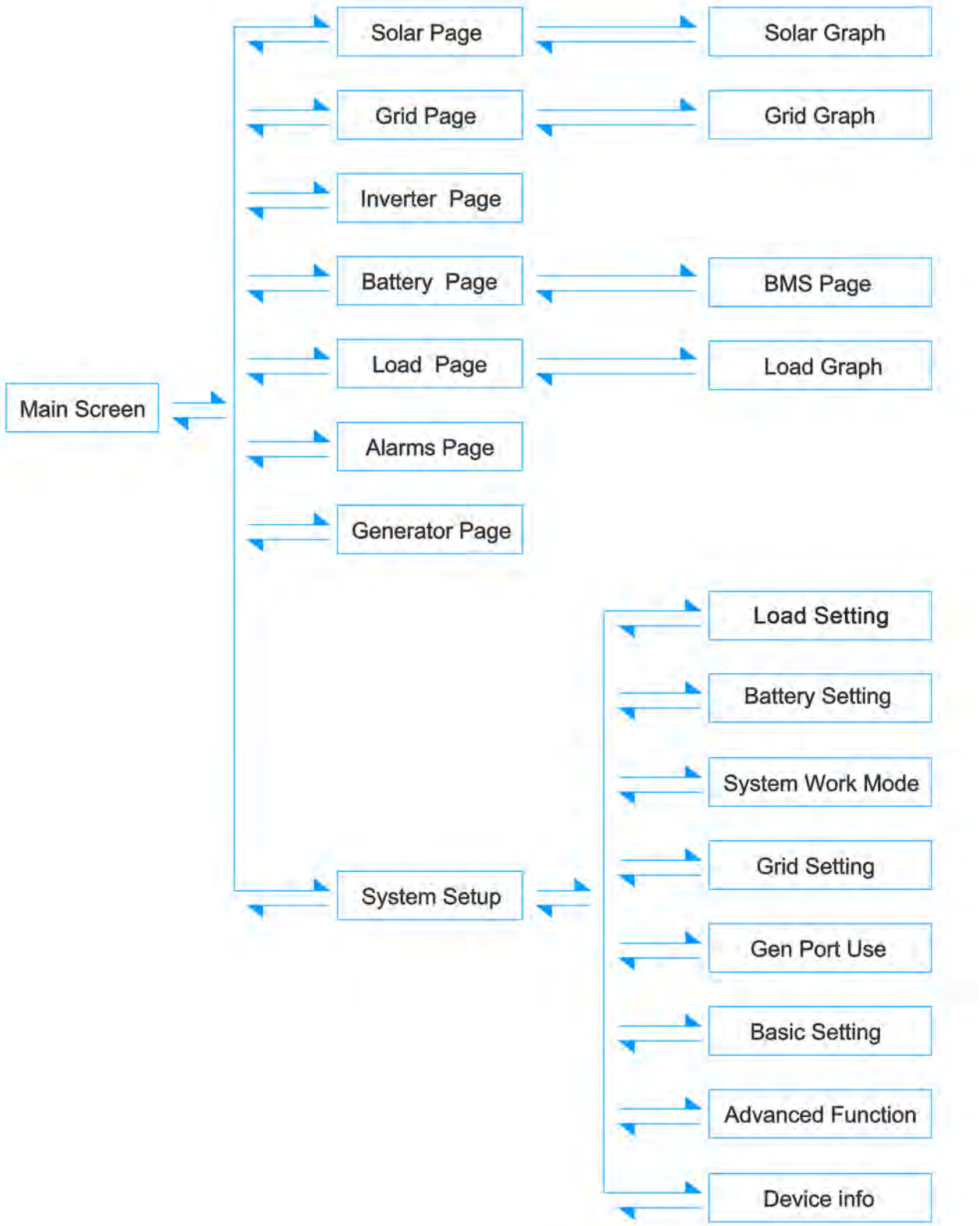
8 System Commissioning

8.1 Indicators

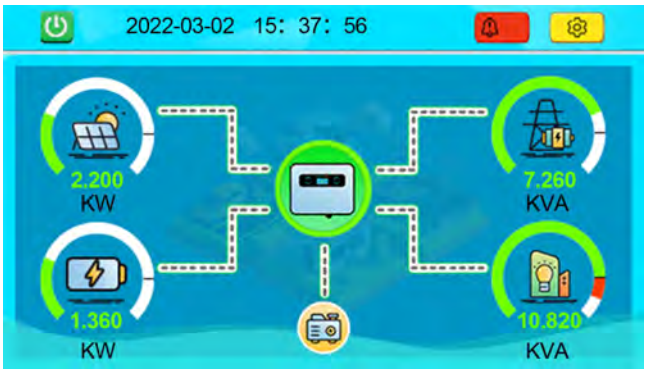
Indicator	Status	Description
Charging		The battery is fully charged.
		The battery is Charging.
		The battery not charged.
Inverter		The inverter works normally.
		Abnormal or shutdown of inverter.
Fault		Inverter alarm.
		Inverter fault.

8.2 System Information

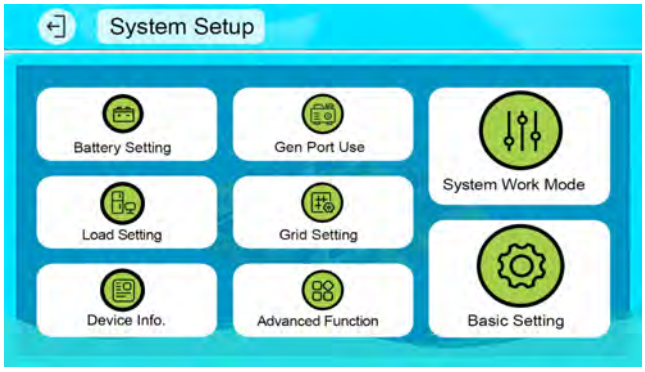
8.2.1 Screen Interface Operation Flow Chart



8.2.2 Main Screen



1. The green background of the inverter in the middle of the main page represents that the inverter is in normal operation. If it turns gray , If it turns orange , the device is in a "self-check wait" state. If it turns red , it indicates that the device is faulty. You can click on the alarm icon above the main page to view the current specific alarms and faults.
2. The information displayed on the main page includes photovoltaic strings inverters , power grids , loads , and batteries . It also displays the direction of energy flow through arrows. When the power dial shows that the current power exceeds the rated power, the color on the dial will change from green to red, vividly displaying system information on the main screen.
3. The generator parameter information on the main page needs to be set to open the generator port and connect to the generator in order to display the connection status and parameter information of the generator.
4. The button in the upper right corner of the screen is the system settings button . Clicking this button will take you to the system settings page, which includes basic settings, battery settings, load settings, power grid settings, system working mode, generator port usage, advanced functions, and device information.



5. The photovoltaic power and load power remain positive at all times.
6. A negative battery power indicates battery charging, and a regular power indicates battery discharge.

8.2.3 Equipment Operation Status

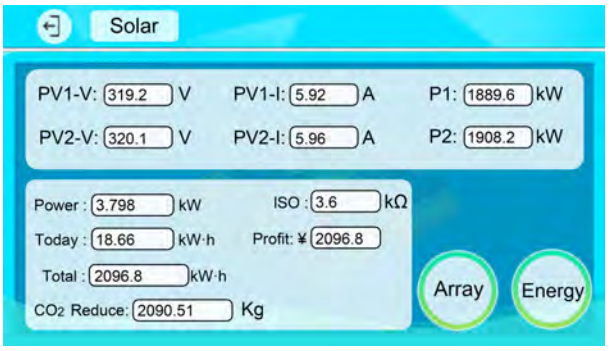
Operation status of inverter

Click the icon of inverter on the home screen to enter the detail page

1. Display the power values of the inverter.
2. Display the current voltage and current values of the inverter.
3. Displays the current inverter operating state and the bus voltage and leakage current.
4. Display the current inverter frequency and internal temperature.

Click the icon to return to the main page.

Solar operation status



Click the solar icon on the home screen to enter the detail page

1. Display the voltage, current, power, and ISO insulation impedance of the current two independent MPPTs.
2. The current total power of two PV strings.
3. The total daily power generation and historical total power generation of the two PV srings.

Click the Energy icon to enter the power chart page.

Click the icon to return to the main page.

Press the Array icon to enter the PV module configuration design page.

Power grid operation status

Click the icon of power grid on the home screen to enter the detail page

1. The current working status, power value, and frequency value of the power grid.
2. Current grid voltage, current, external meter power, home load power.
3. Display the daily purchased electricity and historical total purchased electricity, as well as the daily sold electricity and historical total sold electricity.

Click the Energy icon to enter the power chart page.

Click the icon to return to the main page.

Load operation status

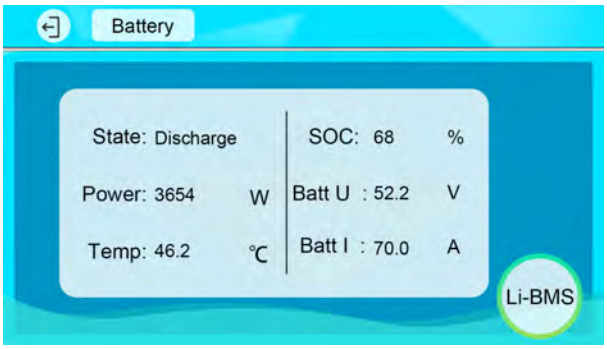
Click the load icon on the home screen to enter the detail page

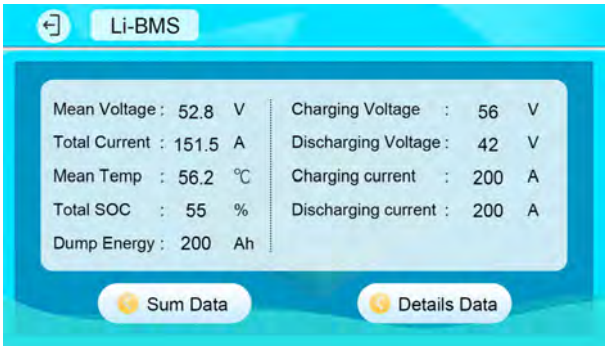
1. Current load power factor, voltage, current, frequency.
2. Current load power value.
3. The daily electricity consumption and historical total electricity consumption of the load.

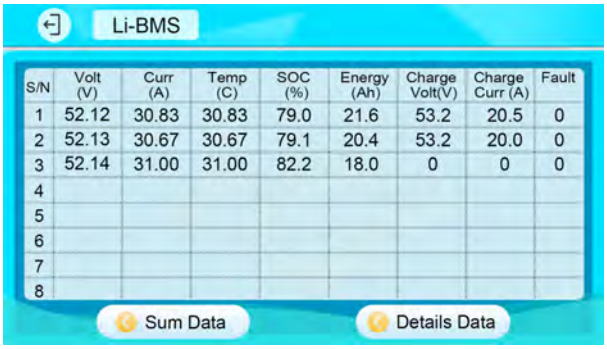
Click the Energy icon to enter the power chart page.

Click the icon to return to the main page.

Battery operating status







Click the battery icon on the home screen to enter the details page

1. Current battery operating status, power, battery temperature, remaining capacity of battery pack, battery voltage, battery current value and other parameter information.

Click on the Li-BMS icon to enter the BMS system page.

Click the ← icon to return to the main page.

BMS details page

1. Click the Sum Data icon to display the total parameters of the entire battery cluster.

Click the ← icon to return to the main page.

Note: The data on the Li BMS page will only be available if the device successfully communicates with the lithium battery BMS system.

BMS details page

1. Click on the Details Data icon to display the parameters of each battery pack within the battery cluster.

Click the ← icon to return to the main page.

Note: The data on the Li BMS page will only be available if the device successfully communicates with the lithium battery BMS system.

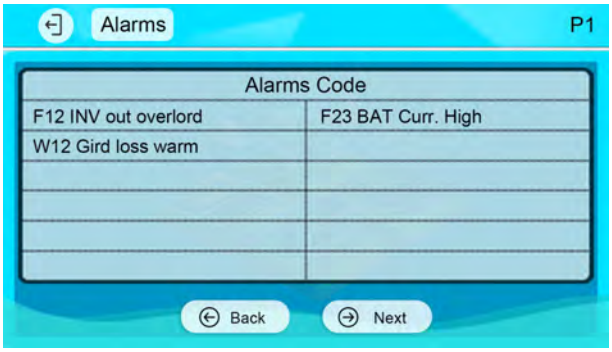
Generator operation status (requires equipment to be connected to the generator)

Click the generator icon at the bottom of the main page to view the current generator parameters (the generator is not enabled)

1.View the power value, current value, voltage value, frequency, daily generation and total generation of the current generator.

Click the ← icon to return to the main page.

Equipment fault alarm



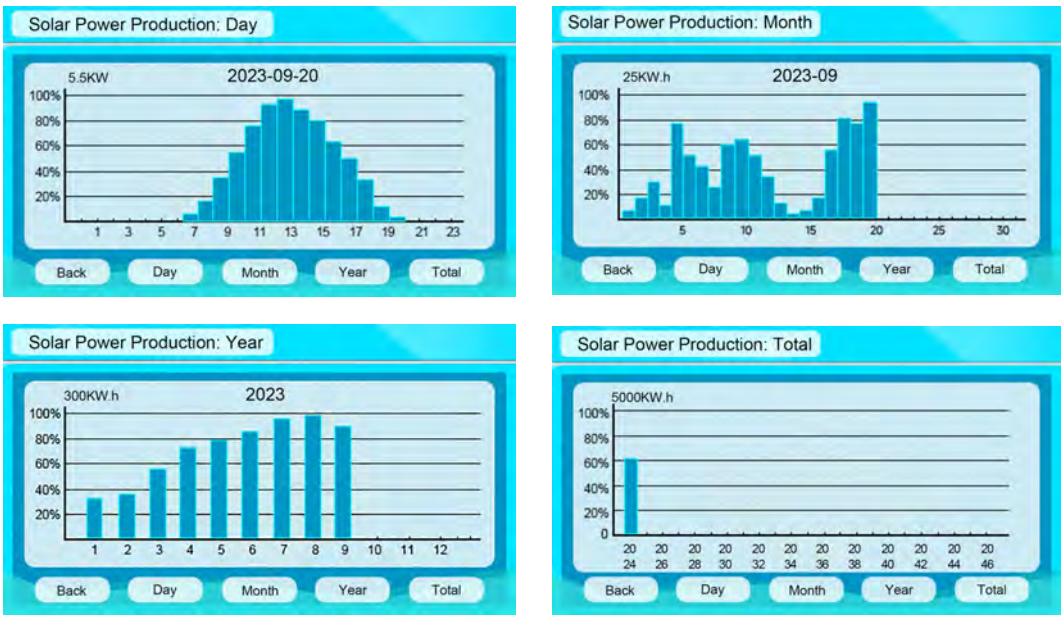
Click on the red alarm icon 3 in the upper right corner of the main screen to enter the current alarm and fault page.

1. The alarm icon will display the current number of alarms.
2. The fault is displayed as "Fxx" and the alarm is displayed as "Wxx".

Click the icon to return to the main page.

8.2.5 Electricity Charts

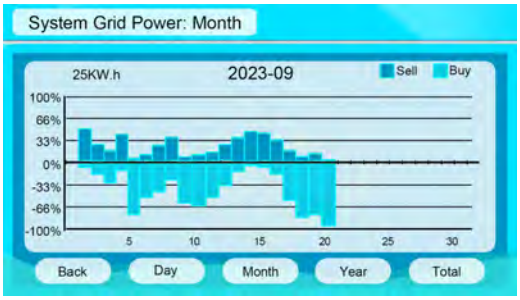
Chart of solar power generation



Click the Energy icon on the solar energy details page to enter the solar power generation chart.

You can choose to view the daily, monthly, annual, and total power generation charts of solar energy.

Chart of power grid purchase and sale



Click the Energy icon on the grid details page to enter the solar power generation chart.

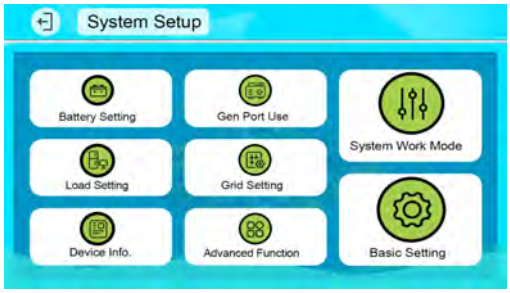
You can choose to view the daily, monthly, annual, and total grid purchasing and selling electricity charts of the power grid.

Chart of load power consumption

Click the Energy icon on the load details page to enter the Load electricity consumption generation chart.

You can choose to view the daily, monthly, annual, and total load electricity consumption charts of the load.

8.3 System Settings

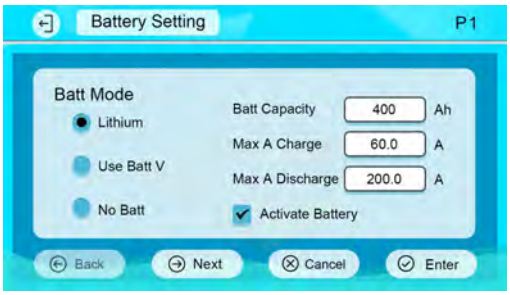


Click the gear icon on the top right corner of the main page to enter the system settings page

1. After setting all parameters on the settings page, you need to click the key Enter to confirm and save the settings. Otherwise, the settings will not take effect.Otherwise, the settings will not take effect.
2. Click the key Cancel on the function settings page to return to the system settings page.

Click the icon to return to the main page.

8.3.1 Battery parameter setting



Click "Battery Setting" to enter the battery setting page

Set battery type and battery parameters, which are divided into 3 types,But only one option can be selected for setting.

A. Lithium: Lithium battery

B. Use Battery V: Other batteries use voltage as a unit

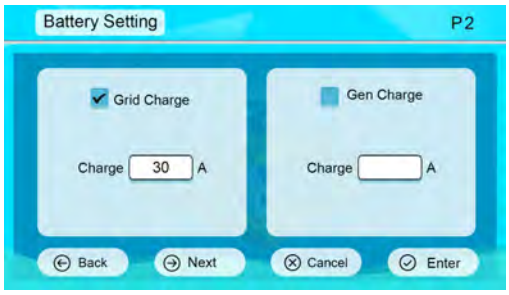
C. No Batt: Not connected to the battery, used for photovoltaic grid connected inverters

1.1 Battery capacity: Set the total capacity value of the battery pack, which is usually marked on the battery pack device.

1.2 Max A Charge: The maximum charging current for the battery range 0-200A. For AGM or wet batteries, it is recommended to set the maximum charge and discharge current to 20% A of the battery capacity, and for lithium batteries, it is recommended to set the current to 50% A. For gel batteries, please refer to the battery specification settings.

1.3 Max A Discharge: Battery discharge maximum current range is 230A, combined with battery parameter setting).

1.4 When "Activate Battery" is selected, After battery protection, the inverter will automatically repair the battery.



After clicking Next , enter the battery P2 settings page

Set the power grid and generator to control the charging of batteries. The parameter for this setting is the same for all battery types. The reference settings are as follows:

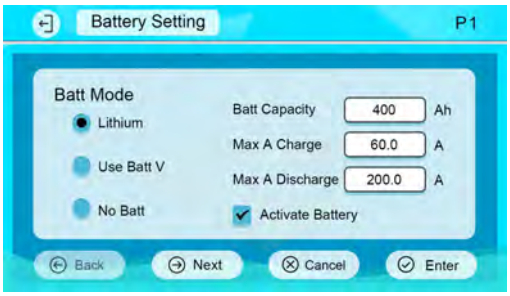
2.1 When "Grid Charge" is selected, it allows the grid to charge the battery. When the battery reaches the set low voltage or low capacity threshold, the system will automatically use the grid to charge the battery.

Charge: Set the maximum current allowed by the power grid to charge the battery, in units of A.

2.2 When "Gen Charge" is selected, it allows the generator to charge the battery. When the battery reaches the set low voltage or low capacity threshold, start the generator to charge the battery. (If grid charging is also checked, grid charging will be prioritized)

Charge: Set the maximum current allowed by the generator to charge the battery, in units of A.

Lithium battery mode



Select "Lithium" battery type, click on Enter

Click Next to enter the lithium battery P3 settings page. The battery parameter settings are as follows:

BMS protocol: This is the BMS protocol.

Please refer to the protocol command corresponding to the document, BMS communication methods include RS485 and CAN.

BMS protocol code

0: no BMS protocol
1: BMS protocol 1 #
2: BMS protocol 2 #
3: BMS protocol 3 #
4: BMS protocol 4 #
5: BMS protocol 5 #
6: BMS protocol 6 #
7: BMS protocol 7 #

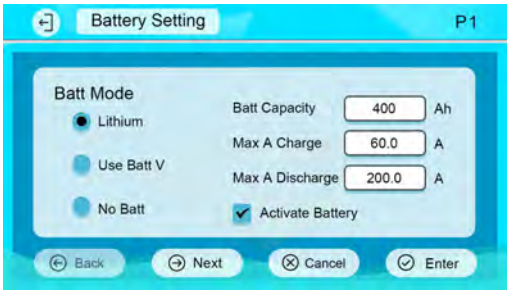
Nominal V: Set the nominal voltage of the battery pack and refer to the battery specification label.

Shutdown: Set the battery discharge termination capacity threshold. If the threshold is reached, the inverter will shut down.

Low Batt: Set the low capacity threshold for battery discharge. If the threshold is reached, the inverter will give an alarm and the battery pack voltage will be low.

Restart: Set the battery discharge recovery capacity threshold. If the threshold is reached, the battery can resume discharge function.

Use Batt V/Use Batt % battery mode



Select Use Batch V/Use Batch% and click Enter

Click Next to enter the battery P3 settings page. The battery parameter settings are as follows:

1. The parameter settings for the three stages of battery charging vary depending on the type of battery. The parameter settings can be found in the attached table.

2. Battery discharge parameter settings, if "Use Batt V" is set, the parameter unit set is V.

Shutdown: If the set remaining battery capacity is% or the battery voltage reaches this threshold, the inverter will shut down.

Low Batt: If the set remaining battery capacity% or battery voltage reaches this threshold, the inverter will give an alarm and report a low voltage alarm for the battery pack.

Restart: If the remaining capacity or voltage of the set battery returns to this threshold, the battery can resume its discharge function.

3.TEMPCO: Battery temperature compensation setting, which needs to be set by professionals and may not be set.

4.Battery Resistance: Setting the internal resistance parameter of the battery, which needs to be set by professionals and can be omitted.

Battery Charging Parameter Setting Table

Battery type	Float charging	Constant voltage	Equal charging
Lithium	Follow its BMS voltage parameters		
AGM	53.6V (13.4V)	56.4V(14.1V)	57.6V (14.4V)
Gel	54.0V(13.5V)	56.4V(14.1V)	/
Wet	54.8V(13.7V)	57.6V(14.4V)	58.8V(14.7V)

8.3.2 Basic Settings

Click "Basic Setting" to enter the basic setting P1 page

Time Syncs: switch time synchronization.
Touch Beep: switch the screen touch sound.
Display: Pop-up window to adjust screen brightness and sleep time.
Alam Beep: switch the alarm sound.
Set the date, time, month, day, hour, and hour.
After setting up, click the Enter icon to confirm and save the set parameters.
Click the Cancel icon to return to System Settings Page.

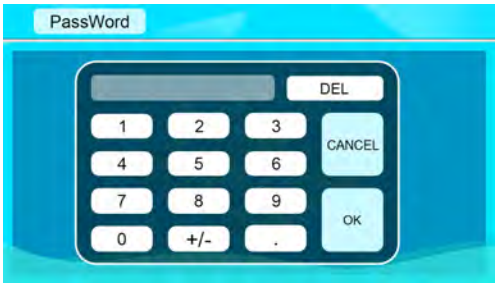
Manual switch system

Check "Manual Swith" on page P1 of the basic settings and click the Enter button (close to uncheck the settings).
The on/off case chart button is displayed in the upper left corner of the main page. After turning on the manual power on/off function of the system, it is necessary to manually click on the power on button every time the device system starts up.
Click the power on button, a pop-up window will prompt to turn on or off, click the confirm button to proceed.

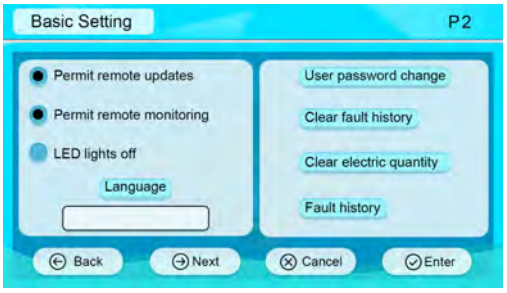
Lock all setting parameters

On the basic settings page P1, select "Lock out all changes" and click Enter . In the pop-up window, enter the user password to complete the setting. All setting parameters cannot be set, but can only be viewed. To unlock, select the function again and enter the user password to unlock.
Factory default user password: 123456

Reset to factory settings



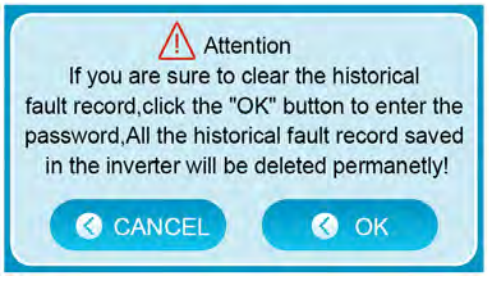
On the Basic Settings P1 page, select "Factory Reset" and click Enter to pop up a risk prompt explanation. Once you know it, please confirm and enter the user password to complete the factory settings of the device.Factory default user password: 123456

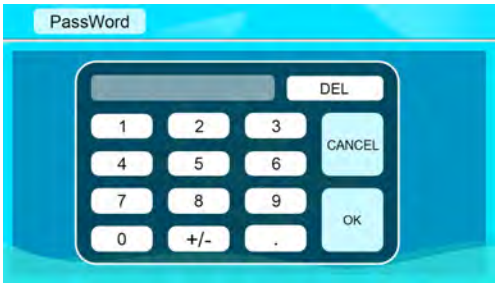


Basic parameter settings P2 page (press Next to enter)

Permit remote updates: Allow remote Permit remote monitoring: Allow remote monitoring
LED lights off: LED lights off
Language: Using language selection settings
After setting up, click the Enter icon to confirm and save the set parameters.
Click the Cancel icon to return to System Settings Page.

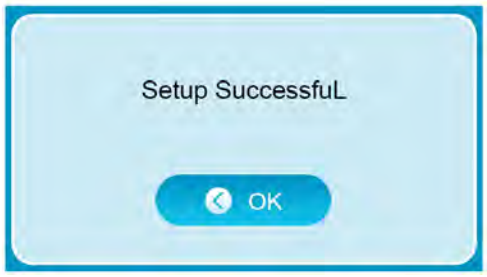
Clear the historical fault records

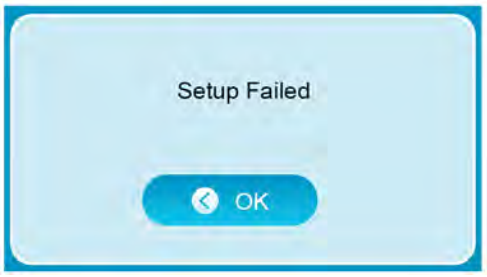




Click on "Clear fault history" on page 2 of the basic settings. Please confirm reading the risk warning instructions. Once you know it, please confirm and enter the user password to confirm. This will complete the clearing of the device's historical fault record.
Factory default user password: 123456

User password change



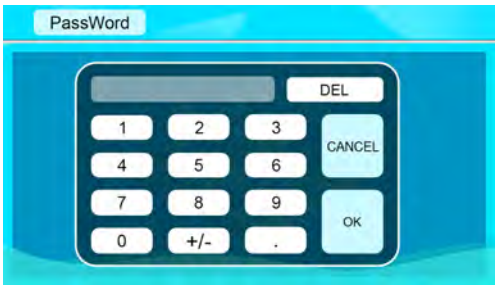


Click on "User password change" on the Basic Settings P2 page, and a pop-up window will appear to enter the password modification page.

To confirm the modification, please enter the old user password first, then enter the new 6-digit user password. Click confirm, and the password will be prompted to confirm whether the modification was successful. If not, please check if the old and new passwords are entered correctly.

Factory default user password: 123456

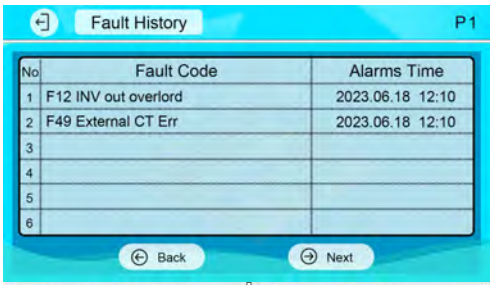
Clear electric quantity record



Click on "Clear electric quantity" on the basic settings page 2. Please confirm reading the risk warning instructions. Once you are aware, click "OK" and enter the user password to confirm. This will complete the clearing of all device power records.

Factory default user password: 123456

View historical fault records

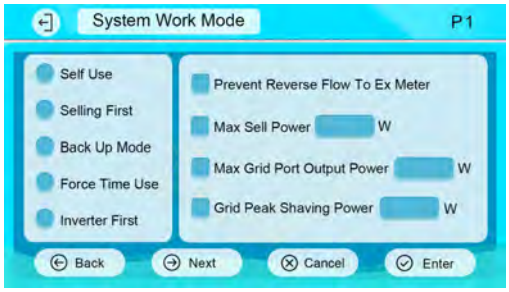


Click on "Fault history" on the P2 page of the basic settings to enter the historical fault record page. You can view the historical faults and occurrence time recorded by the current device.

The display screen can currently display up to 66 historical faults, which can be viewed by flipping up and down. When space is insufficient, it will overwrite the earliest fault records.

Click the Cancel icon to return to System Settings Page.

8.3.3 Work mode



Click "System Work Mode" to enter the system work mode P1 setting page

Debugging selects the device's working mode and related parameters. The device currently has five working modes and can only be selected individually.

Self Use: self-use mode

Selling First: the priority mode of selling electricity

Back Up Mode: Backup mode

Force Time Use: Time-sharing mode

Inverter First: Inverter First mode

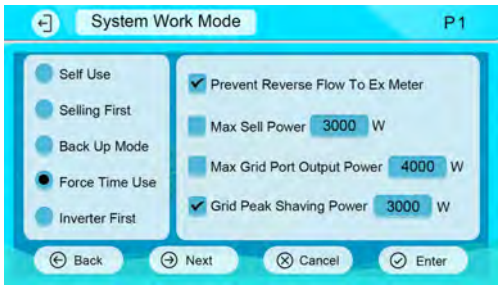
Prevent Reverse Flow To Ex meter: When open, prevent the equipment from selling excess electricity to sell electricity through the external meter; when closed, allow the excess power to sell electricity to the Internet through the external meter.(This feature requires the installation of external meters)

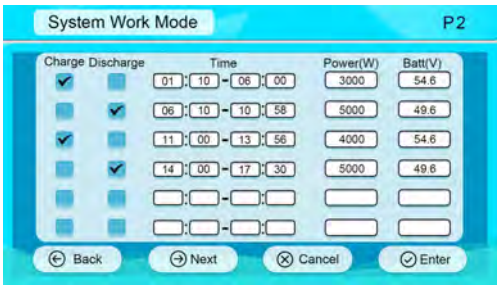
Max Sell Power: The maximum power limit allowed to be sold to the grid, which cannot be opened when the counter current is turned on.(This feature requires the installation of external meters)

Max Grid Port Output Power: Maximum power limit for the allowed output of the device grid port when turned on. When shutdown, the equipment will be output according to the rated power value.

Grid Peak Shaving Power: The peak regulation function of the grid is turned on, and the power purchased from the grid will be limited to the set value. If the load power exceeds the allowable value, the batteries are used as a supplement. If the current load requirements are still not met, the grid power will be increased to meet the load requirements. When shutdown, the equipment will be operated from the grid at the rated power rating.

Force time use mode





When selecting the Force Time Use work mode

The charging and discharging time period of the P2 page battery that needs to be set for the working mode and the weekly date and time used on the P3 page.

1.Prevent Reverse:Whether to allow excess solar energy to sell electricity to the Internet, if prohibited, to prevent the grid (this function requires the installation of external meters).

2.Max Sell Power:Whether to limit the maximum power of solar power sales online. If necessary, check this item and set the limit power value (this function requires the installation of an external meter).

3.Max Grid Port Output Power:Whether to limit the maximum power output by the grid port of the device, check this item if necessary, and set the limit power value.

4. Grid Peak Shaving Power:Whether you need to limit the power value the equipment buys from the grid, check this and set the limit power value.

After completing the settings, click Enter to save the set parameters.

Click Next to enter the P2 charging and discharging time period setting page

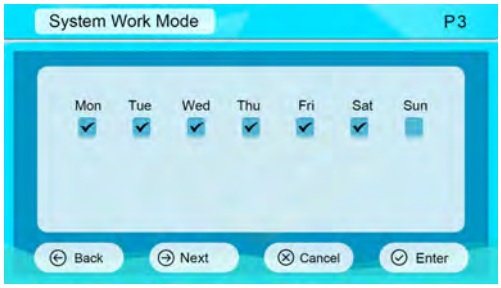
First, turn on the Time or Use time-sharing setting.

Set the battery charging and discharging time period and power parameters, and other unset time periods will allow the device to automatically operate in self use and sell electricity mode. After completion, click Enter enter to save the settings. For example:

1. Set the battery charging to a maximum power of 3000W from 01:10 to 06:00, stop charging when the battery voltage reaches 54.6V.

2.Set the battery discharge to a maximum power of 5000W from 06:10 to 10:58, stop discharging when the battery voltage reaches 49.6V.

After completing the settings, click Enter to save the set parameters.



Click Next to enter the P3 date setting page

Set the day of the week for use within a week.

Check the week that needs to be used, and other unset date devices will automatically run.

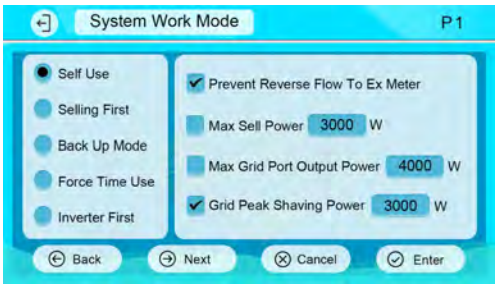
For example:

The current date only selects Monday to Saturday to charge and discharge the battery according to the time sharing. The device will automatically run on Sunday to determine whether to charge and discharge the battery.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Self-use mode



When selecting the Self Use working mode

1.Prevent Reverse:Whether to allow excess solar energy to sell electricity to the Internet, if prohibited, to prevent the grid (this function requires the installation of external meters).

2.Max Sell Power:Whether to limit the maximum power of solar power sales online. If necessary, check this item and set the limit power value (this function requires the installation of an external meter).

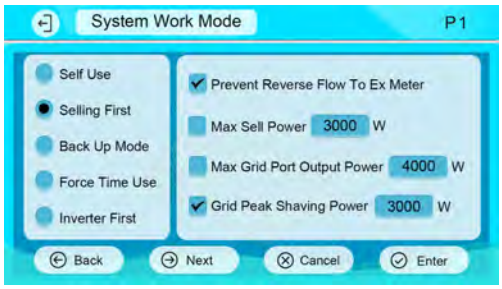
3.Max Grid Port Output Power:Whether to limit the maximum power output by the grid port of the device, check this item if necessary, and set the limit power value.

4.Grid Peak Shaving Power:Whether you need to limit the power value the equipment buys from the grid, check this and set the limit power value.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Selling first mode



When choosing the Selling First work mode

1.Prevent Reverse:Whether to allow excess solar energy to sell electricity to the Internet, if prohibited, to prevent the grid (this function requires the installation of external meters).

2.Max Sell Power:Whether to limit the maximum power of solar power sales online. If necessary, check this item and set the limit power value (this function requires the installation of an external meter).

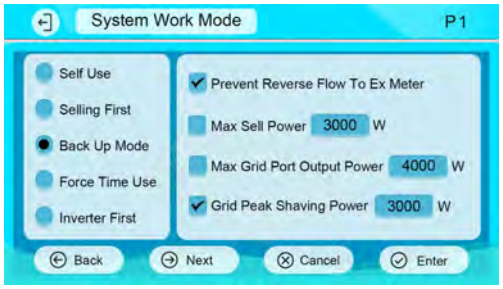
3.Max Grid Port Output Power:Whether to limit the maximum power output by the grid port of the device, check this item if necessary, and set the limit power value.

4.Grid Peak Shaving Power:Whether you need to limit the power value the equipment buys from the grid, check this and set the limit power value.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Back up mode



When selecting the Back Up Mode operating mode

1.Prevent Reverse:Whether to allow excess solar energy to sell electricity to the Internet, if prohibited, to prevent the grid (this function requires the installation of external meters).

2.Max Sell Power:Whether to limit the maximum power of solar power sales online. If necessary, check this item and set the limit power value (this function requires the installation of an external meter).

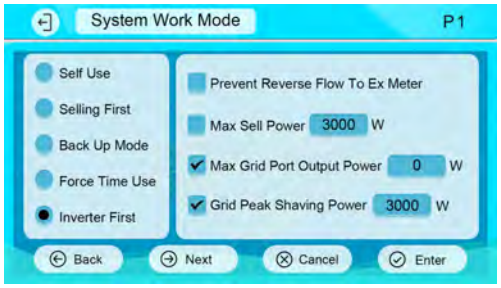
3.Max Grid Port Output Power:Whether to limit the maximum power output by the grid port of the device, check this item if necessary, and set the limit power value.

4.Grid Peak Shaving Power:Whether you need to limit the power value the equipment buys from the grid, check this and set the limit power value.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Inverter first mode



When selecting the Inverter First Mode

1.Prevent Reverse: Current working mode this function is disabled.

2.Max Sell Power: Current working mode this function is disabled.

3. Whether the 'Max Grid Port Output Power' limits the maximum power output by the grid port of the device, check this item if necessary, and set the limit power value.

4. Whether the term Grid Peak Shaving Power needs to limit the power value of the equipment purchased from the grid. If necessary, check this item and set the limit power value.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.4 Viewing device information

Click "Device Info" to view the device information

Model: Product modelInverter

SN: Product serial number

HMI: Monitoring software version number

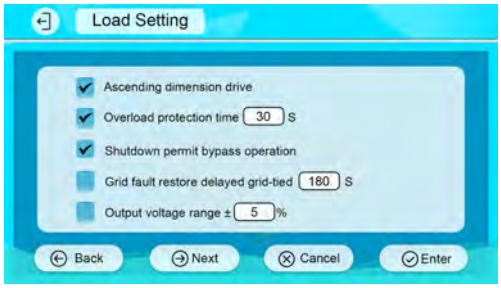
Master: Main control software version number

Slave: From the control software version number

LCD: Display software version number

Hardware: Product hardware version number

8.3.5 Load setting



Click "Load Setting" to enter the load setting page

Ascending dimension drive: The dimension drive is enabled to enhance the load carrying capacity in off grid mode.

Overload protection time: Set the overload protection time for the load output.

Output short circuit locking times: Set the number of times the short circuit protection is locked.

Shutdown permit bypass operation: The inverter allows bypass operation.

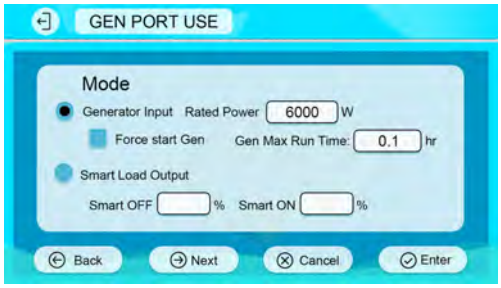
Grid restore delayed grid-tied: The power grid recovery delay of grid connection time setting is enabled.

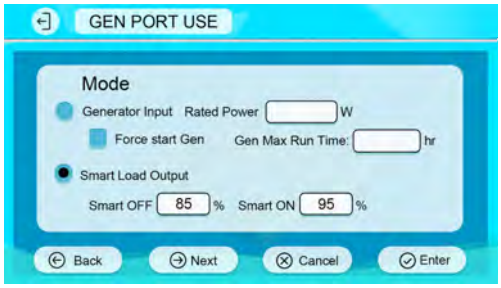
Output voltage accuracy: The range of output voltage accuracy.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.6 Generator port settings





Click "GEN PORT USE" to enter the generator port settings:

Generator Input mode

The Generator Input mode is enabled, indicating that the generator input port is connected to the generator. (If the generator supports self start, the generator self start signal can be connected to the equipment to control the automatic start stop operation of the generator. Otherwise, manual operation of the generator start stop is required.)

Rated Power: Set the maximum output power value of the generator.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

Smart Load Output mode

The Smart Load Output mode is enabled, indicating that the generator input port is used as a controllable smart load output port. This mode assumes that the generator port is not connected to the generator.

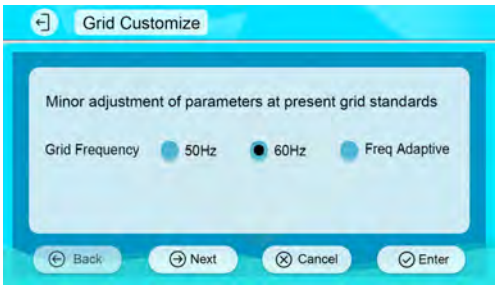
Explanation of intelligent load activation conditions: It is activated when the remaining battery capacity exceeds the set threshold.

For example: Smart ON: 95%, Smart OFF: 85%。When the battery SOC capacity reaches 95%, the intelligent load interface automatically opens to supply power to the connected load. When the SOC capacity of the battery pack is below 85%, the smart load port will automatically close.

After completing the settings, click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

8.3.7 Grid setting



Click "Grid Setting" to enter the grid setting page

Click on "Setting Grid Mode" to enter the device's grid standard settings. (The selected national grid standards will be displayed below)

Click on "Setting Grid Type" to enter the device grid type settings.

Click "Setting Grid Mode" to enter the "Grid Mode" P1 page of the device grid standard setting.

Firstly, select the country or region where the device will be used (click Next to view more countries and regions). When there are multiple power grid standards in the local area, multiple power grid standards will pop up. Please confirm and select the one that meets the local power grid standards, and click "OK" to confirm.

"Customize" goes to "Grid Customize", the frequency setting and "Freq Adaptive"setting, and the frequency is adaptive

After completing the settings, click Enter to save the set parameters.

"Customize" enters the "Freq Adaptive" frequency adaptation interface between frequency setting and grid voltage fine-tuning

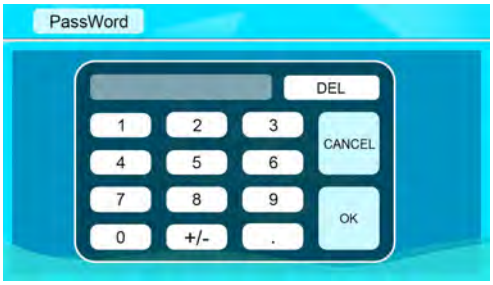
After completing the settings, click Enter to save the set parameters.

When the grid standard is set to custom mode, click Next to enter the grid setting P2 page.

Custom settings for power grid standards are not recommended for those who are not familiar with local power grid standards and non professionals. This may cause equipment and power grid failures, leading to serious damage.

Note: The legend is only a demonstration parameter.

8.3.8 Advanced Settings



Click the "Advanced Function" icon to enter the advanced function settings page

To access the advanced feature settings, it is necessary to verify the user password. Once verified, access the advanced parameter settings.

The default user password is 123456.

AFCI Fault On: DC arc fault detection enabled (optional function, hardware detection equipment needs to be installed).

Clear AFCI Fault: When an arcing fault occurs, the device will shut down for protection. It is necessary to manually confirm whether the arcing fault has been resolved. If it has been resolved, manually click to clear the arcing fault.

DRM: Receive power grid dispatch instructions, only applicable to the following safety standard countries: Australia (As4777), Europe (EN50549), Germany (VDE4105).

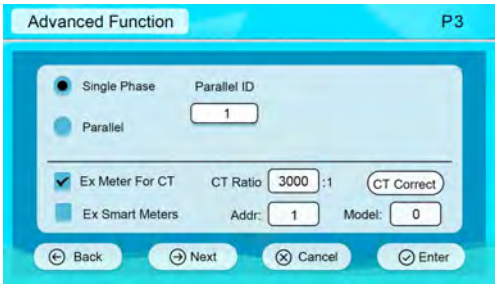
Neutral Connect PE: Connect the neutral wire to the ground wire

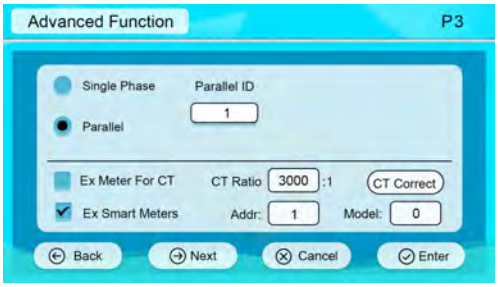
Anti islanding: Anti islanding function

BMS_Err_Stop: After being turned on, when there is a communication interruption between the battery BMS and the inverter, the inverter will stop running and automatically shut down

HVRT/LVRT: High and low voltage ride through function.

SVG: Enable the reactive power compensation function of the device and input the reactive power value.





Click Next to enter the advanced settings P2 page

Single Phase: Indicates that the stand-alone mode is turned on.(Device default is single-alone machine)

Ex-Meter For CT: External test CT is on and set the CT change ratio (note the CT installation direction).

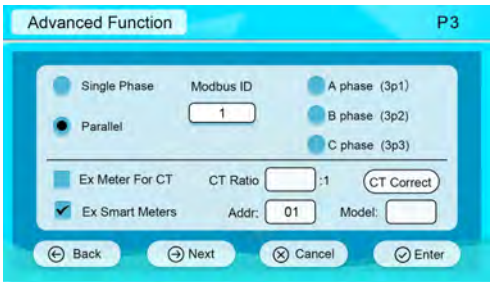
Ex Smart meters: Open the external smart meter, set the address of the smart meter, and pay attention to the wiring direction.

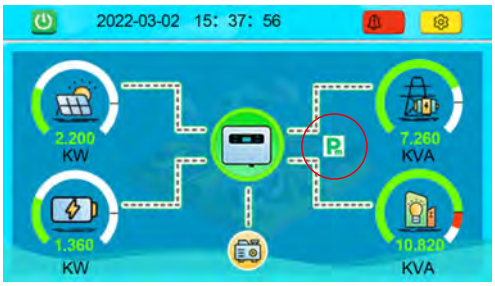
Parallel: Indicates the parallel mode is on.(Set up the system wiring diagram)

Modbus ID: Set the parallel communication address, 001-255.

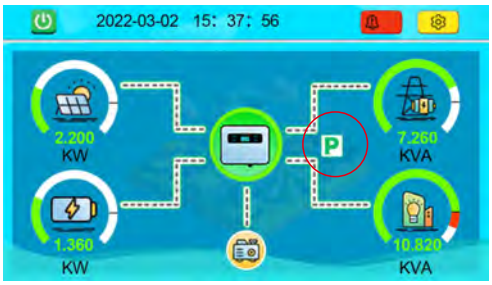
The setting of the unit network system depends on the system wiring diagram, with details.

Split phase parallel mode





Host logo



Slave logo

Enter the "Advanced Function" P2 page

1.In parallel mode, the equipment must check the setting to open "Parallel".

2.Set the parallel address: set the parallel address of each inverter. In a parallel system, each inverter should have a parallel address that does not repeat with other machines, and the parallel address set range is 001-255.

3. In a parallel system, the host is the competitive upper mode, the competition to the host is marked on the home page.

After completing the settings,click Enter to save the set parameters.

Click the Cancel icon to return to System Settings Page.

9 Maintenance

9.1 Power Off the Inverter

DANGER

- Power off the inverter before operations and maintenance. Otherwise, the inverter may be damaged or electric shocks may occur.
- After the inverter is powered off, the internal components need to discharge for 5 minutes. Please wait until the device is fully discharged.

Step 1: Turn off the AC breaker on the GRID side of the inverter.
Step 2: Turn off the AC breaker on the LOAD side of the inverter.
Step 3: Turn off the battery breaker between the inverter and the battery.
Step 4: Turn off the DC switch of the inverter.

9.2 Removing the Inverter

WARNING

- Make sure that the inverter is powered off.
- Wear proper PPE before any operations.

Step 1: Disconnect all the electrical connections of the inverter, including: DC line, AC line, battery wiring, and protective ground wire.
Step 2: Remove the inverter lower cover.
Step 3: The upper two fixing screws are loose, not all out, the lower fixing screws screw out.
Step 4: Remove the inverter and install the lower covers
Step 5: Keep the inverter properly, and if the subsequent inverter needs to be put into use, to ensure that the storage conditions meet the requirements

9.3 Disposing of the Inverter

If the inverter cannot work anymore, dispose of it according to the local disposal requirements for electrical equipment waste. The inverter cannot be disposed of together with household waste.

9.4 Troubleshooting

Perform troubleshooting according to the following methods. Contact the after-sales service if these methods do not work.
Collect the information below before contacting the after-sales service, so that the problems can be solved quickly.

1. Inverter information like serial number, software version, installation date, fault time, fault frequency, etc.
2. Installation environment, including weather conditions, whether the PV modules are sheltered or shadowed, etc. It is recommended to provide some photos and videos to assist in analyzing the problem.
3. Utility grid situation.

Fault code	Cause	Fault type
F01	Bus voltage overvoltage fault	Fault
F02	Bus voltage LV fault	Fault
F03	Bus voltage hardware overvoltage fault	Fault
F08	Unnormal output voltage	Fault
F09	Overflow failure of inverter	Fault
F10	Inverter hardware overcurrent fault	Fault
F11	Inverter short circuit fault	Fault
F12	Inverter output overload fault	Fault
F13	Bypass out overload	Fault
F14	DC component fault of inverter voltage	Fault
F15	Inconsistent voltage fault in the parallel power grid	Fault
F17	PV1 voltage overvoltage fault	Fault
F18	PV2 voltage overvoltage fault	Fault
F19	PV1 overcurrent fault	Fault
F20	PV2 overcurrent fault	Fault
F21	BUS imbalance fault	Fault
F22	Battery charging and discharging hardware overcurrent fault	Fault
F23	Battery charge and discharge overfault	Fault
F28	Battery boost fault	Fault
F29	The voltage difference between batteries in parallel mode is significant	Fault

Fault code	Cause	Fault type
F30	PV1 positive and negative reverse connection fault	Fault
F31	Positive and negative battery reverse connection failure	Fault
F32	PV2 positive and negative reverse connection fault	Fault
F33	Abnormal temperature fault inside the chassis	Fault
F34	Overtemperature failure of DC	Fault
F35	Overtemperature failure of inverter	Fault
F36	Overtemperature fault of the transformer	Fault
F37	Relay fault in power Grid 1	Fault
F38	Relay fault in power Grid 2	Fault
F39	Generator relay failure	Fault
F40	Inverter relay failure	Fault
F41	The HMI board and LCD are faulty	Fault
F42	Communication failure between HMI board and main controller	Fault
F43	Communication failure between HMI board and slave controller	Fault
F44	Parallel CAN communication failure	Fault
F45	Inconsistent version of parallel program	Fault
F46	Parallel current sharing fault	Fault
F47	Parallel mode fault	Fault
F48	Parallel setting address error	Fault
F49	The voltage between N and PE is high	Fault
F50	Ground fault	Fault
F51	The busbar balancing current exceeds the limit	Fault
F52	HMI board external RTC failure	Fault
F53	DC arc fault	Fault
F54	Low voltage ride through fault	Fault

Fault code	Cause	Fault type
F55	High voltage ride through fault	Fault
F56	Drms0 Off	Fault
F57	Fault in ground drain current	Fault
F58	Leakage current detection equipment malfunction	Fault
F59	The BMS equipment was shut down due to a communication failure	Fault
F60	Insulation impedance fault	Fault
F62	External electricity meter malfunction	Fault
F63	HMI program version is inconsistent with the model	Fault
F64	Inconsistent DSP program version and model	Fault
F65	Anti-backflow CT1 connection error	Fault
F66	Anti-backflow CT2 connection error	Fault
F67	Anti-backflow CT3 connection error	Fault
F68	Anti-backflow CT1 transformation ratio error	Fault
F69	Anti-backflow CT2 transformation ratio error	Fault
F70	Anti-backflow CT3 transformation ratio error	Fault
W01	Power grid relay failure	Warn
W02	Generator relay failure	Warn
W03	Inverter relay failure	Warn
W04	Insulation impedance warning	Warn
W05	BMS disconnection warning	Warn
W06	BMS battery pack over temperature alarm	Warn
W07	BMS battery pack low temperature alarm	Warn
W08	Grid overvoltage-high warning	Warn
W09	Grid is too low voltage warning	Warn
W10	High power grid frequency warning	Warn

Fault code	Cause	Fault type
W11	Low power grid frequency warning	Warn
W12	Grid loss warning	Warn
W13	Grid voltage for 10 minutes average overvoltage warning	Warn
W14	PV voltage is too low warning	Warn
W15	Battery pack overvoltage warning	Warn
W16	Battery pack connection disconnection warning	Warn
W17	Battery pack low-voltage warning	Warn
W19	Battery pack low voltage shutdown	Warn
W21	Prevent island protection	Warn
W23	The voltage DC component exceeds the limit alarm	Warn
W24	High temperature derate	Warn
W25	Over frequency derate	Warn
W26	Drms logical load derate	Warn
W27	Generator Loss Warn	Warn
W28	Generator out overload	Warn
W29	Output Load Overload	Warn

9.5 Routine Maintenance

WARNING

- Make sure that the inverter is powered off.
- Wear proper PPE before any operations.

Maintaining Item	Maintaining Method	Maintaining Period
System Clean	Check the heat sink, air intake, and air outlet for foreign matter or dust.	Once 6 months
DC Switch	Turn the DC switch on and off ten consecutive times to make sure that it is working properly.	Once a year
Electrical Connection	Check whether the cables are securely connected. Check whether the cables are broken or whether there is any exposed copper core.	Once 6-12 months
Sealing	Check whether all the terminals and ports are properly sealed. Reseal the cable hole if it is not sealed or too big.	Once a year

10 Technical Parameters

MODEL	HS2085UH48L	HS2105UH48L/P	HS2114UH48L/P	HS2120UH48L
PV INPUT				
Max PV input power	6000W+6000W	7500W+7500W	7500W+7500W	7500W+7500W
Max PV input voltage	500Vdc			
PV input start voltage	90Vdc			
MPPT input voltage	370Vdc(90-500V)			
MPPT full-load voltage range	350-500Vdc			
Max PV input current	22A+22A	22A+22A	22A+22A	22A+22A
PV short-circuit current	25A+25A	25A+25A	25A+25A	25A+25A
Number of MPPT / Strings per MPPT	2/1+1			
AC OUTPUT(Inverter)				
Rated output power	8500W/8500VA	10500W/10500VA	11400W/11400VA	12000W/12000VA
	Single-phase: 7200W/7200VA(Limited by external terminal blocks)			
Rated output voltage	120/240Vac(Can be set)			
Output frequency range	50 / 60 Hz(± 5), intelligent adaptive / setting			
Rated current output	35.4A	43.7A	47.5A	50.0A
Rated grid connected power	8500VA	10000VA	10000VA	10000VA
Max grid-dependent power	8500VA	10000VA	10000VA	10000VA
Max grid-connected active power	8500W	10000W	10000W	10000W
DC Component	<0.5% In			
Grid Type	Split phase 3-wire system 2W+N+PE/ Split phase 2-wire system 2W+PE			
Output Power Factor	>0.99@Rated power(adjustable 0.8 advance~0.8lag)			
THDi	<3%			
THDu	<2% linear load			
Transfer Time	10ms(typical value)			

MODEL	HS2085UH48L	HS2105UH48L/P	HS2114UH48L/P	HS2120UH48L
Off-grid Overload Capability	101%~105% 60s,105%~110% 10s, >110% 1s			
BATTERY INPUT				
Battery Type	Lead-acid / lithium / colloidal batteries, etc			
Charging Mode	3-section type/Equilibrium/Self-adaption BMS			
Battery Voltage	48Vdc 40-60V			
Max Discharge Current	180A	200A	230A	230A
Max Charging Current	180A	200A	200A	200A
CONVENTIONAL PARAMETERS				
Number of parallel machines	None	L:None P:Yes, up to 10 units	L:None P:Yes, up to 10 units	None
Display	Touch Screen+LED			
Communication Mode	RS485, Optional 4G / WIFI			
Noise	<60dB			
Cooling	Built-in fan			
Operating Ambient Temperature	-25℃~60℃,>45℃ derated			
Humidity	0-95%			
Altitude	<2000m			
Electricity Consumption At Night	15W			
Protection Degree	IP20(For indoor use only)			
Installation Method	Wall mounting type			
Dimension. W*D*H(mm)	620*465*140mm			
Weight (kg)	26			
Standard	EN61000-6-1,EN61000-6-3, FCC 15 class B, IEC62109-1.IEC62109-2.UL1741			
ROHS	Yes			

技术要求：单页尺寸142*210mm

材质：封面105g铜版纸，内页80g书写纸

颜色：黑白印刷

内容清晰可见

注：此技术要求不用印刷