USER'S MANUAL

Energy Storage Inverter

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4200-050024-0000

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1.Notes on this manual

1.1 Effectiveness

This user manual describes instructions and detailed steps for installation, operation, maintenance and troubleshooting of the following energy storage inverters: 5KW, 6KW, 8KW, 10 KW

Please keep this manual with you in case of emergency.

This manual does not cover equipment connected to the unit (e.g. photovoltaic modules) of any details. Information about the connected device can be obtained from the device manufacturer.

1.2 Instructions for use

- Only professionals who have read and fully understood all the safety rules in this manual can install, maintain and repair this inverter. The operator must be aware that this is a high voltage device. Qualified personnel must be trained to handle the hazards of installing electrical equipment.
- Before using the inverter, please carefully read all labels and warning labels and instructions on the unit, and store the instructions in an easy-to-find place. We are not responsible for any damage caused by failure to follow these instructions.
- The energy storage inverter strictly abides by local laws and regulations when testing and designing.
- The inverter should comply with local safety standards during installation, operation and maintenance.
- Incorrect operation may cause electric shock or damage to the inverter.

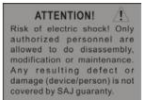
1.3 Symbols

Pay attention to the relevant labels on the product manual and product packaging.

1.3.1 Markings in the manual

SYMBOL	DESCRIPTION
 DANGER	**Danger** indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	**WARNING** indicates a hazardous situation which, if not avoided, could result in death or serious injury or moderate injury.
 CAUTION	**CAUTION** indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
 NOTE	**NOTICE** indicates a situation that can result in potential damage, if not avoided.
	Read the manual.

1.3.2 Markings on this product

Symbol	Description
	**Warning regarding dangerous voltage** The product works with high voltage. All work on the product must only be performed as described in its documentation.
	**Beware of hot surface** The product can become hot during operation. Do not touch the product during operation.
	**Observe the operating instructions** Read the product's documentation before working on it. Follow all safety precautions and instructions as described in the documentation.
	**CE Mark** Equipment with the CE mark fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	**CQC Mark** Equipment standard with China Quality Inspection Center safety directive.
	No unauthorized perforations or modifications Any unauthorized perforations or modifications are strictly forbidden, if any defect or damage(device/person) is occurred, The company shall not take any responsibility for it.
	**Point of connection for grounding protection**
	**Direct Current (DC)**
	**Alternating Current (AC)**
	Signals danger due to electrical shock and indicates the times (5 minutes) to allow after the inverter has been turned off and disconnected to ensure s afety in any installation operation.

2 Safety and conformity

SYMBOL	INSTRUCTIONS
 DANGER	**Danger to life due to lethal voltages!** Lethal voltages are present within the unit and on the power supply lines. Therefore, only authorized electricians may install and open the unit. Even when the unit is disconnected, high contact voltages may still be present within the unit.
 DANGER	**Danger of burn injuries due to hot enclosure parts!** During operation, the four sides of the enclosure lid and the heat sink may become hot. Only touch the front enclosure lid during operation.

 **CAUTION**	The effects of radiation can cause damage to health! In special cases, although standardized emission limits are maintained (for example, when sensitive equipment is installed or installed close to radio or television receivers), interference may still occur in areas of designated application. In this case, the operator is obliged to take appropriate action to rectify the situation. Do not keep less than 20 cm away from the inverter at any time.
 **NOTE**	Photovoltaic generator is grounded! Observe local grounding requirements for PV modules and PV generators. We recommend connecting generator frames and other conductive surfaces in a manner that ensures continuous conduction to the ground to provide the best possible protection for the system and personnel.
 **NOTE**	Capacitor discharge current! Photovoltaic modules with a large capacitance relative to ground, such as thin-film photovoltaic modules with cells on a metal substrate, can only be used if their coupling capacitance does not exceed 470nF. During feed operation, leakage current flows from the cells to the earth, the amount of which depends on how the PV modules are mounted (e.g. foil on a metal roof) and the weather (rain, snow). This "normal" leakage current may not exceed 50mA because otherwise the inverter will automatically disconnect from the grid as a protective measure.

2.1 DC and AC circuit breakers

Securely isolate equipment from the grid, photovoltaic modules, generators, and batteries. DC and AC circuit breakers shall be installed to disconnect all non-grounded conductors.

2.2 Photovoltaic module grounding

This device is an energy storage inverter , do not ground the DC circuit connected to the PV modules of the device. Only the mounting frame of the PV modules should be grounded.
If you connect a grounded PV module to the device, the error message "PV insulation resistance low " will appear or even damage the inverter .

2.3 Technical worker qualifications

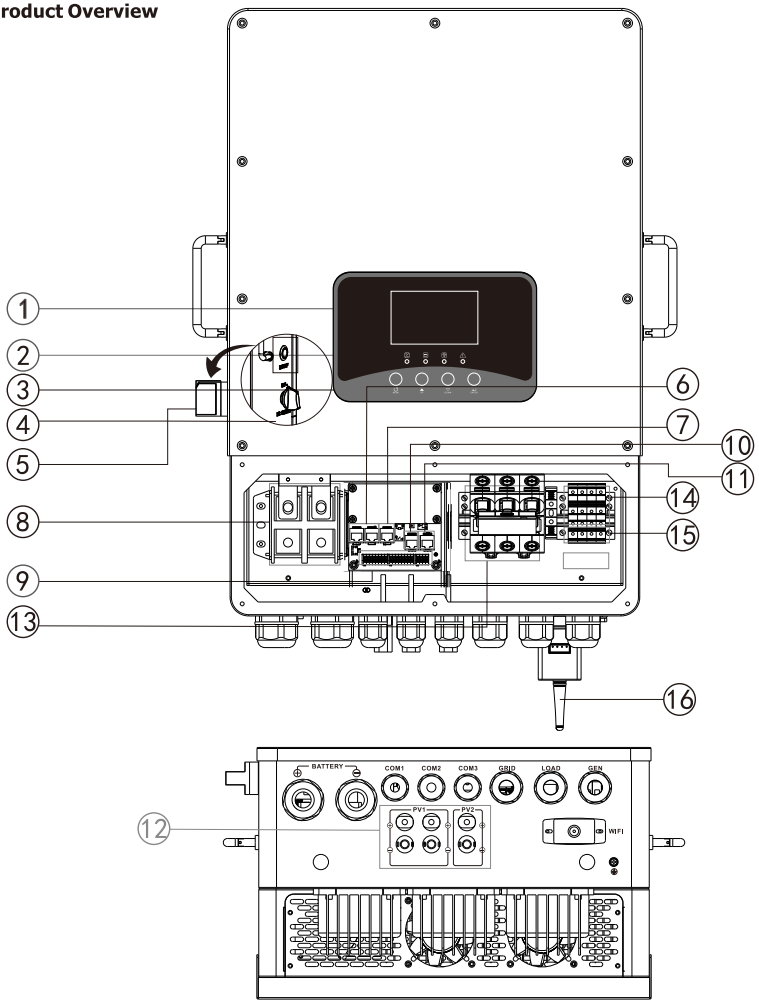
Only workers with the following skills can install this inverter:

- Understand the work and operation of the inverter.
- Be able to handle related electrical hazards and risks that may occur during installation and use.
- Received training on the installation and commissioning of energy storage inverters.
- Know all applicable standards and guidelines.
- Understand and follow this manual and all safety instructions.

3 Product Description

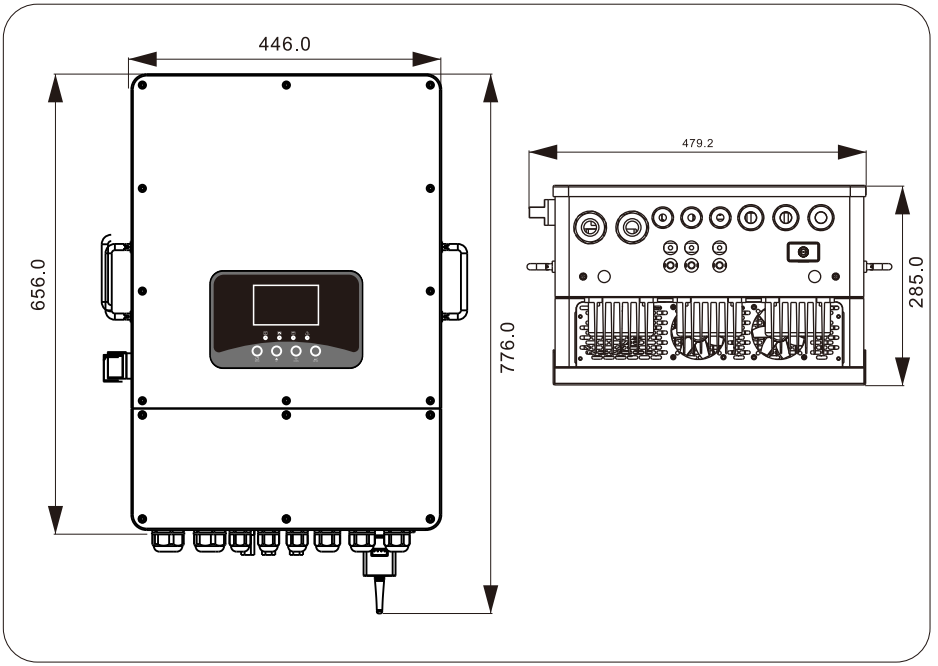
This device is a bidirectional energy storage inverter, suitable for photovoltaic systems with battery energy storage. The energy generated by the photovoltaic system is used preferentially for household loads, with excess energy used to charge batteries and then fed into the public grid when the photovoltaic energy is sufficient. When the photovoltaic energy output is insufficient to support the connected load, the system will automatically draw energy from the battery if the battery capacity is sufficient. If the battery capacity is insufficient to meet its own power needs, it will draw power from the public grid.

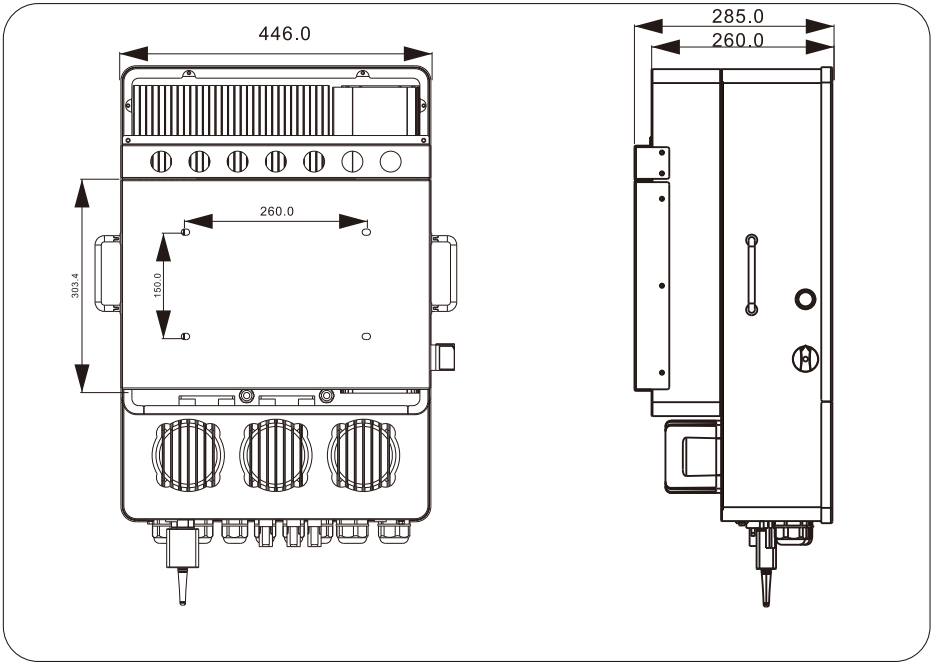
3.1 Product Overview



1: LCD
2: Inverter indicator light
3: Function buttons
4: Power switch button
5: DC switch
6: Parallel port
7: Meter - port 485
8: Battery input port
9: Function port
10: Modbus port
11: BMS port
12:2-way PV input port
13: Grid circuit breaker
14: Load
15: Generator input
16: WiFi interface

3. 2 Product Dimensions





3.3 Product features

1. 120V/240V split-phase pure sine wave inverter;
2. Provide multiple working mode options to support household load use, battery energy storage, feed into the power grid, etc.;
3. Auto restart while AC is recovering;
4. Programmable power supply priority for battery or grid;
5. Configurable battery charging current/voltage based on applications by LCD setting;
6. Configurable AC/Solar/Generator Charger priority by LCD setting;
7. Independent interface for mains power and generator;
8. Overload/over temperature/short circuit protection;
9. Intelligent battery charger design to optimize battery performance;
10. Settable anti-back flow function to prevent excess power from overflowing to the grid;
11. Support WIFI monitoring, built-in 2 strings for 1 MPP tracker, 1 string for 1 MPP tracker;
12. Intelligent and configurable three stages MPPT charging for optimized battery performance;
13. Peak shifting and valley filling applications can be carried out according to time to maximize benefits;
14. Smart loading function.

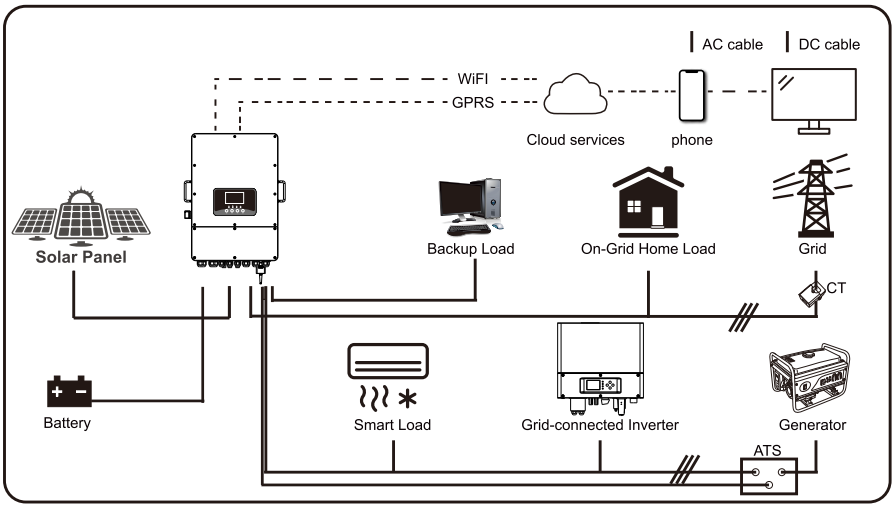
4 Basic system architecture

The diagram below shows the basic application of this inverter.

It also includes the following equipment and a complete operating system.

Please consult your system integrator for other possible system architectures based on your requirements.

The inverter can power a variety of appliances in a home or office environment, including motor type appliances such as refrigerators and air conditioners.



5 Storage of inverter

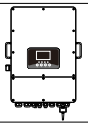
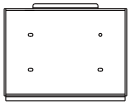
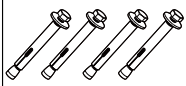
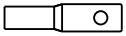
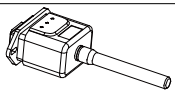
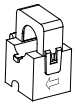
If you want to store your equipment in a warehouse, you should choose a suitable location:

- The equipment must be stored in the original packaging, and desiccant must be left in the packaging.
- Storage temperature should always be between -25°C and +60°C.
- Storage relative humidity should always be between 0 and 95%.
- Up to four units can be stacked vertically.

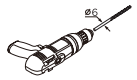
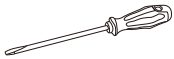
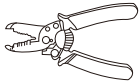
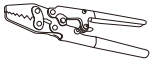
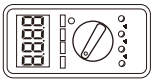
6 installation

6.1 Check packaging

Although the inverter has undergone rigorous testing and inspection before leaving the factory, the performance of the inverter is still uncertain. May be damaged during shipping. Please check the packaging for any obvious signs of damage, if so, do not open the packaging and contact your dealer as soon as possible

Serial number	Picture	Describe	Quantity and unit
1		Inverter	1PCS
2		Wall mount bracket	1PCS
3		Stainless steel anti-collision bolt M8×80	4PCS
4		L- shaped hexagonal wrench	1PCS
5		battery temperature sensor	1PCS
6		User manual	1PCS
7		Wi-Fi plug	1PCS
8		current sensor	2PCS

6.2Tools

Serial number	Picture	Describe	Function
1		The recommended drill bit diameter for impact drills is 6 mm	Drill holes in the wall
2		Screwdriver	Tighten the screws on the mounting frame, battery terminals, and AC terminals
3		Disassembly tools	Dismantle photovoltaic terminal
4		Wire strippers	Stripping
5		Crimping tool	Crimp power cord
6		Multimeter	Measure grid voltage

6.3 Installation and electrical connection
6.3.1 Security

DANGER

Danger to life due to fire or explosion
Despite careful construction, electrical equipment can cause fires. Do not install the inverter on flammable materials or in places where flammable materials are stored.

DANGER

Danger of burns due to overheating of housing parts
Install the inverter so that it cannot be accidentally touched.

DANGER

All electrical installations should be performed in accordance with local and national electrical codes.
Do not remove the casing. The inverter contains no user-serviceable parts. Ask qualified service personnel to perform repairs. All wiring and electrical installation should be performed by qualified service personnel.

Other installation points:

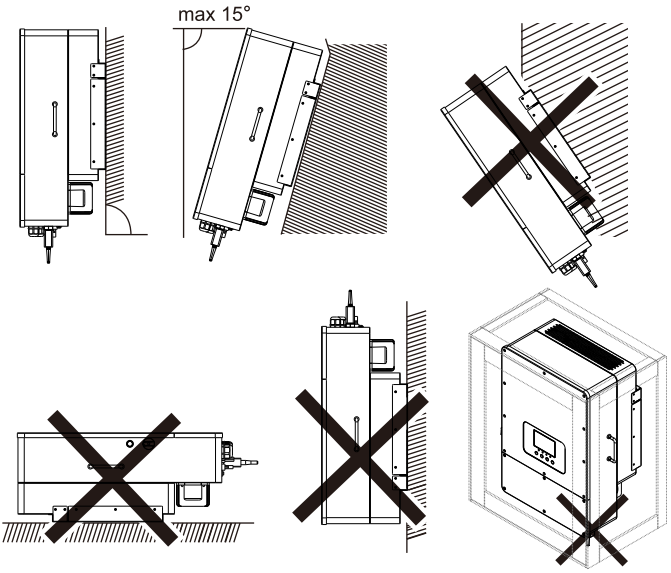
- Carefully remove the device from the packaging and inspect it for external damage. If defective, please contact the installing contractor or supplier.
- Be sure to ground the inverter case to protect property and personal safety.
- The inverter photovoltaic input port can only operate with photovoltaic power generation components . Do not connect to any other power source.
- Both AC and DC voltage sources are terminated inside the photovoltaic inverter. Disconnect these circuits before servicing.
- This device is only designed to supply power to the public power grid (utility). Do not connect this unit to AC power.
- When photovoltaic panels are exposed to light, DC voltage will be generated. When connected to the device, the photovoltaic panels will charge the DC bus capacitor.
- The energy stored in the DC bus capacitor of this equipment presents a risk of electric shock. High voltages may still be present inside the PV inverter even if the unit is disconnected from the grid and the PV panels. Disconnect all power sources for at least 5 minutes before removing the housing source.
- Although the design meets all safety requirements, some parts and surfaces of the inverter remain hot during operation. To reduce the risk of injury, do not touch the heat sink on the back of the PV inverter or nearby surfaces while the inverter is operating.

6.3.2 Select installation location

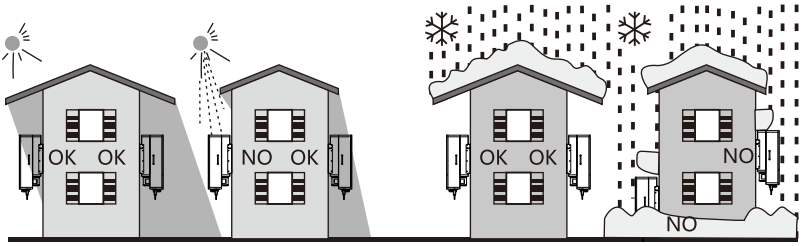
This document guides installation personnel to select an appropriate installation position to avoid potential damage to equipment and operators.

The device should be installed at least 914 mm (3 feet) above the ground.

- The installation location must be suitable for the weight and size of the inverter for long-term use.
- Select the installation location to easily view the status display.
- Do not install the inverter on a structure made of flammable or heat-resistant materials.
- The humidity of the installation location should be 0~95%, without condensation.
- The installation location must always be freely and safely accessible.
- The installation must be vertical or tilted backward up to 15° and ensure connection . Inverter down. Never install horizontally . Avoid leaning forward or sideways.
- Make sure to place the inverter out of the reach of children.
- Do not place any objects on the inverter or cover the inverter.
- Do not install the inverter near a TV antenna or any other antenna/antenna cable.
- The inverter requires sufficient space for heat dissipation. Make sure the inverter is well ventilated to ensure adequate heat dissipation. The ambient temperature should be below 45° C to ensure optimal operation.



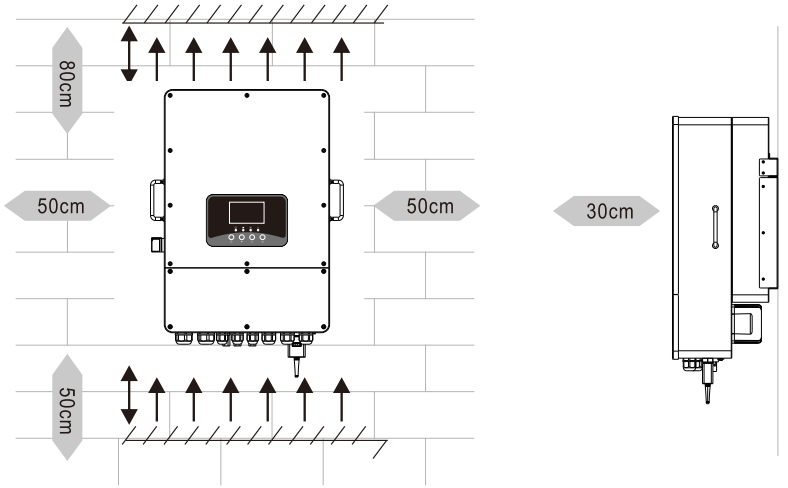
- The inverter should not be installed in the ground of direct sunlight, and should have the protective elements of it:



- Please observe the minimum clearance from walls, other inverters or objects as shown in the picture to ensure adequate heat dissipation.

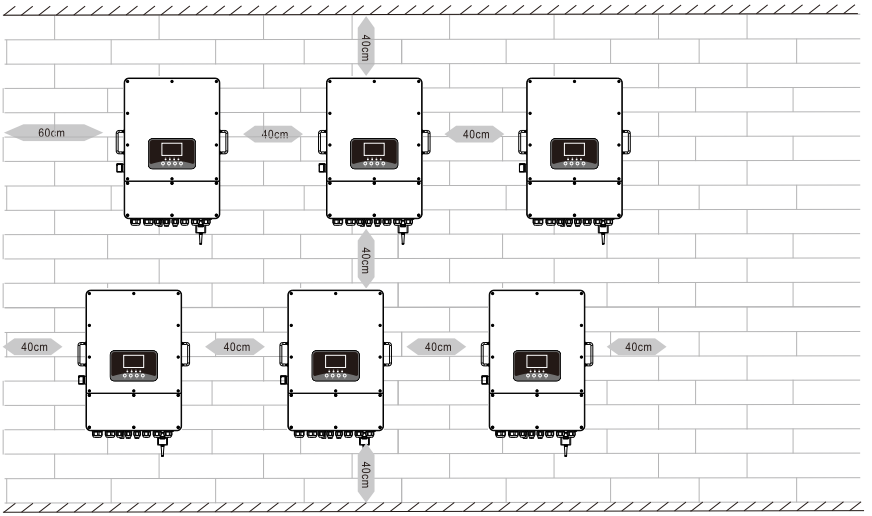
Direction	Min.clearance(cm)
above	80
below	50
sides	50
front	30

Environmental dimensions of an inverter



Series inverter environmental dimensions:

- There must be enough space between each inverter to ensure that adjacent inverters have enough fresh air for heat dissipation .
- If necessary, increase clearance space and ensure adequate fresh air supply. Make sure the inverter has adequate cooling.



6.3.3 Inverter hanging plate installation

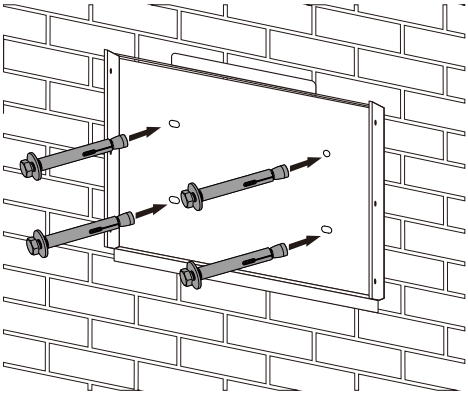
WARNING

To avoid electric shock or other injury, check existing electrical or plumbing fixtures before drilling.

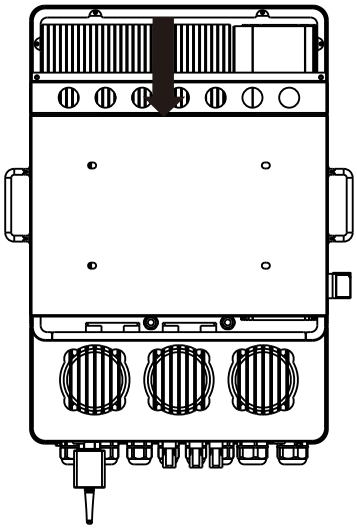
Remember that this inverter is heavy! Please be careful when lifting out from the package.

Choose the recommend drill head(as shown in below pic) to drill 4 holes on the wall, 82-90mm deep.

1. Use a proper hammer to fit the expansion bolt into the holes.
2. Fasten the screw head of the expansion bolt to finish the mounting.
3. Carry the inverter and holding it, make sure the hanger aim at the expansion bolt, fix the inverter on the wall.



Inverter hanging plate installation



6.4 Check the installation status of the inverter

- Check the upper strap of the inverter to ensure it is fixed on the bracket.
- Try to lift the inverter from the bottom and check whether the inverter is installed firmly. The inverter should remain firmly connected.
- Choose a solid installation wall to prevent vibration when the inverter is running.

6.5 Electrical connection

6.5.1 Security

WARNING

Danger to life due to lethal voltage!
The conductive parts of the inverter contain high voltages that may cause electric shock. Before performing any operation on the inverter, please disconnect the electrical connections on the AC side, photovoltaic side, and battery side of the inverter .
Do not connect the battery reversely, otherwise it will damage the inverter

WARNING

Electrostatic discharge has the risk of damaging electronic components.
Take appropriate ESD precautions when replacing and installing the inverter.

WARNING

Ground
Before connecting the power cord, first connect the ground wire.

Note :

- Electrical connections must be made by professional technicians. Before making any electrical connections, it must be remembered that inverters are hazardous to high voltage and high temperatures . Professionals must wear insulating gloves, insulating rubber shoes, safety helmets and other personal protective equipment when making electrical connections.
- Electrical connections should follow appropriate rules such as conductor cross-section, fuses and ground protection.

6.5.2 Connect the battery

For safe operation and compliance, a separate DC overcurrent protector or disconnect device is required between the battery and inverter. In some applications, switching devices may not be required, but overcurrent protectors are still required. See the typical amperage ratings in the table below for the required fuse or circuit breaker size.

model	Wire size	Cable(mm)2	Torque value (maximum)
5kW/6KW	2AWG	33.62	24.5Nm
8kW/10KW	1AWG	42.41	24.5Nm

Figure 6-1 Cable size

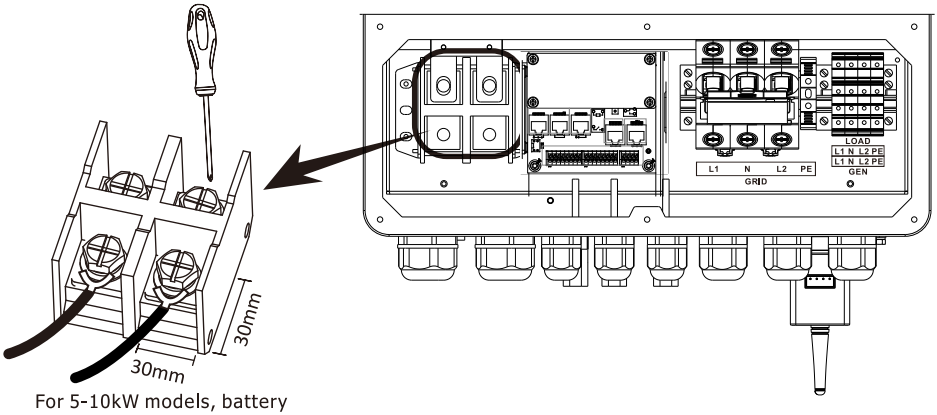
NOTE

All wiring must be performed by professionals

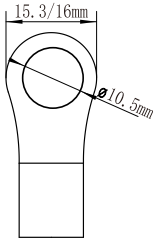
WARNING

Using appropriate cables to connect your batteries is important for safe and efficient operation of your system. To reduce the risk of injury, see Figure 6-1 for recommended cables

Please follow the steps below to connect the battery:
1. Please choose a suitable battery cable with the correct connector that can be plugged into the device well.battery terminals.
2. Use a suitable screwdriver to unscrew the bolts and install the battery connector, then tighten the bolts with a screwdriver, making sure the bolts are tightened clockwise with a torque of 24.5 NM.
3. Make sure the polarity of the battery and inverter are connected correctly.



For 5-10kW models, battery connector screw size: M10



Dc battery input
2/1AWG wire size

4.To prevent children from touching or insects from entering the inverter, make sure the inverter connector is tightened clockwise to the waterproof position.

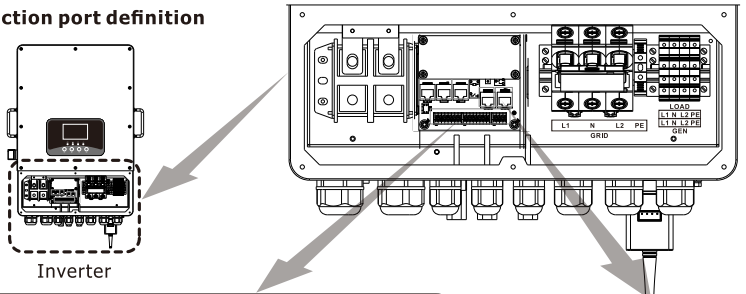
WARNING

Installation must be performed with care.

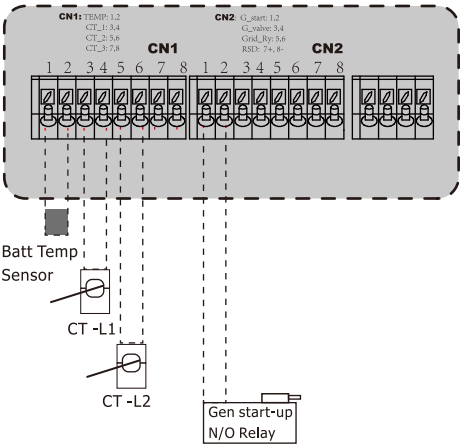
WARNING

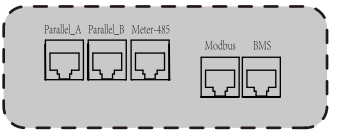
Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter

6.5.3 Function port definition



Inverter

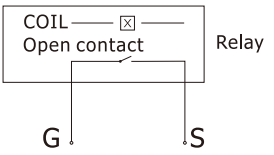




CANA: Parallel communication Port 1 (CAN interface)
CANB: Parallel communication port 2(CAN interface)
Meter-485:for energy meter communication
Modbus: Reserved
BMS: Port for battery communication (CAN/RS485)

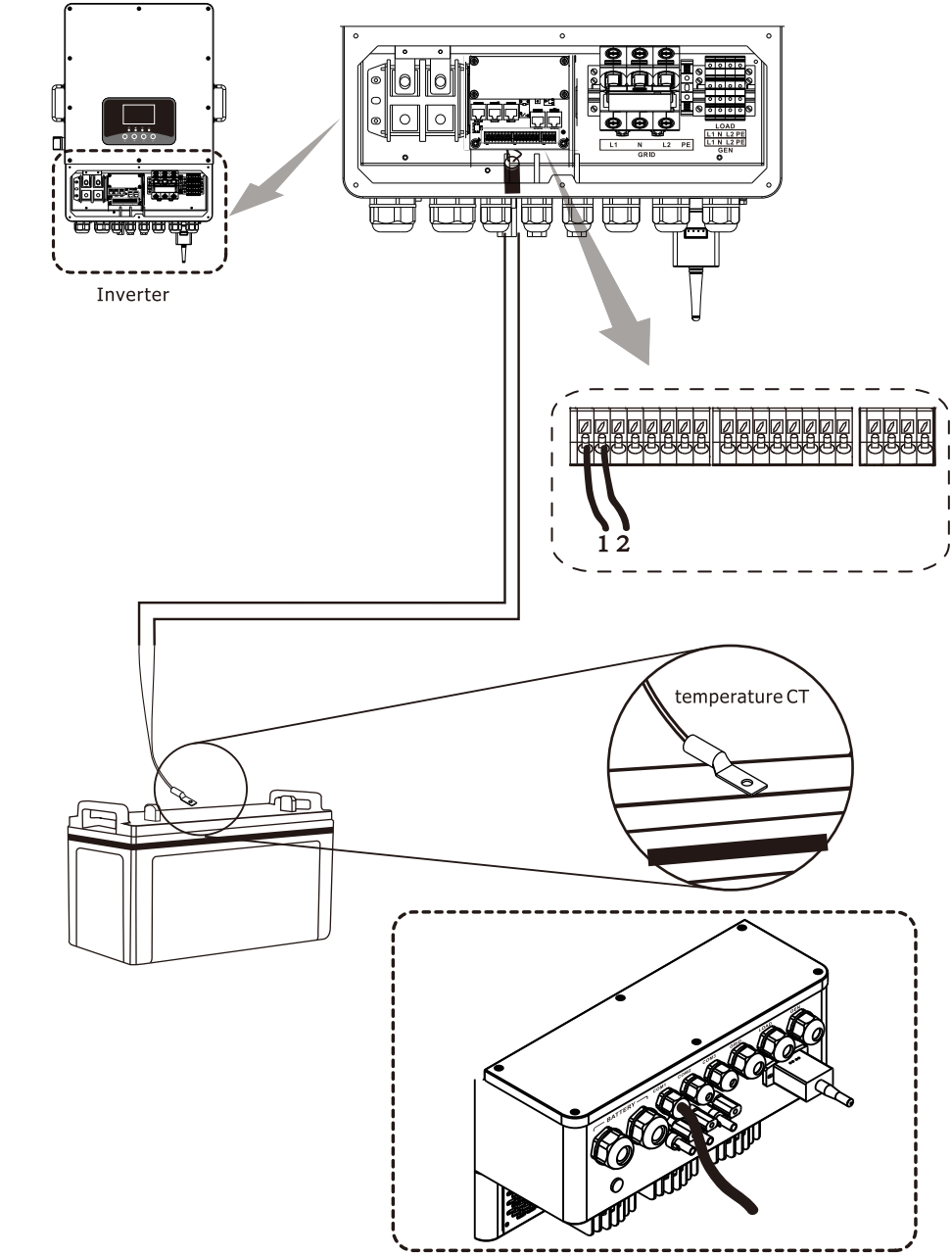
Cn1:
TEMP (1,2):battery temperature sensor for lead acid battery.
CT-L1(3,4):External CT1 current transformer
CT-L2(5,6):External CT2 current transformer

CN2:
G-start（1,2）:Dry contact signal for startup the diesel generator
G-valve (3,4): Dry contact output. When the inverter is in off-grid mode and the "signal island mode" is checked, the dry contact will switch on.
Grid_Ry (5,6): Reserved



GS(diesel generator startup signal)

6.5.4 Lead-acid battery temperature sensor connection



6.5.5 Grid connection and backup load connection

Before grid connection, a separate AC circuit breaker must be installed between the inverter and the grid , and also between the backup load and the inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. The recommended of AC breaker for the load port are 5kW 63A, 6kW 63A, 8kW 63A,and 10kW 63A. Grid connected AC circuit breaker recommended 5kW 100A, 6kW 100A, 8kW 100A, 10kW 100A.

There are three terminal blocks with "Grid" "Load"and "GEN" markings. Please do not misconnect input and output connectors.

WARNING

All wiring must be performed by a qualified personnel.It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below

Grid connection and backup load connection (Copper wires)

model	Wire size	Cable(mm)2	Torque value (maximum)
5/6KW	8AWG	8.37	2.8Nm
8/10KW	4AWG	21.1	4.0Nm

Grid connection and backup load connection (Copper wires) (bypass)

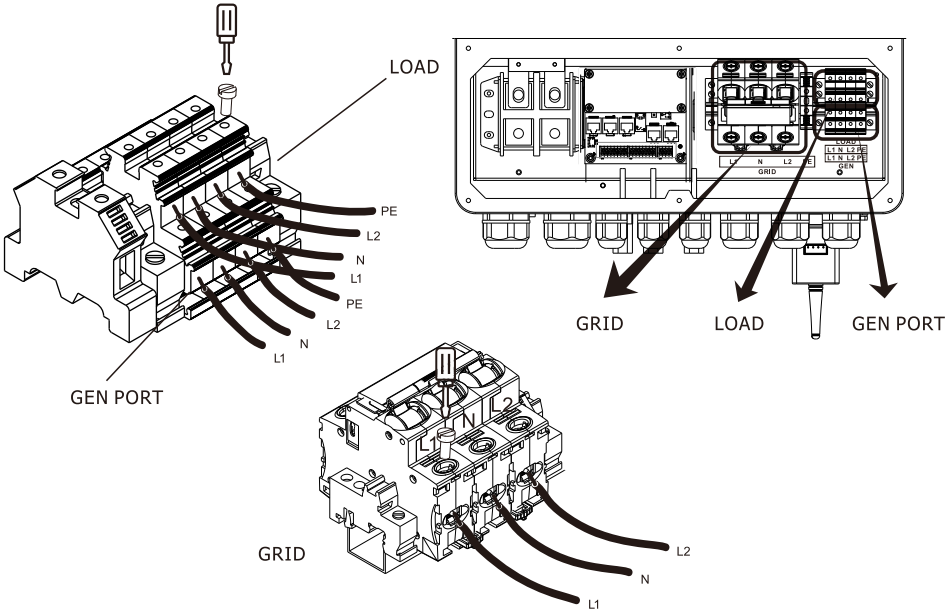
model	Wire size	Cable(mm)2	Torque value (maximum)
5/6KW	8AWG	8.37	2.8Nm
8/10KW	4AWG	21.1	4.0Nm

Figure 6-2 Recommended size for AC wires

Please follow below steps to implement Grid, load and Gen port connection:

1.Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnector first.

2.Remove insulation sleeve 10mm length, unscrew the bolts, insert the wires according to polarities indicated on the terminal block and tighten the terminal screws. Make sure the connection is complete.



WARNING

Be sure that AC power source is disconnected before attempting to wire it to the unit.

3.Then, insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals as well.
4. Make sure the wires are securely connected.
5. Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

6.5.6 Photovoltaic connection

DANGER

Risks of electric shock and fire exist, please make sure the PV array open circuit voltage is within the 600Vdc of the inverter.

DANGER

Due to the risk of electric shock, the DC conductor of this photovoltaic system is prohibited from being grounded. When the inverter detects that the grounding impedance of the photovoltaic array is low,an insulation resistance error will be raised.

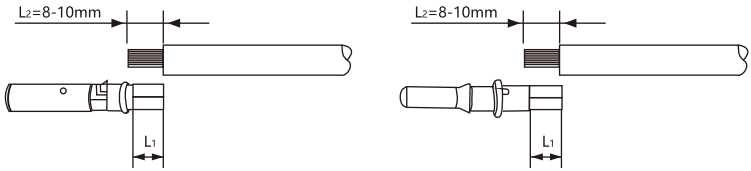
DANGER

Do not disconnect the DC connector under load.

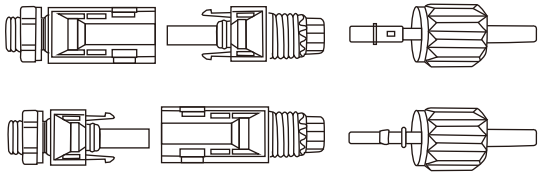
DANGER

Due to the transformerless design, the DC positive and DC negative poles of the PV array are not allowed to be grounded.

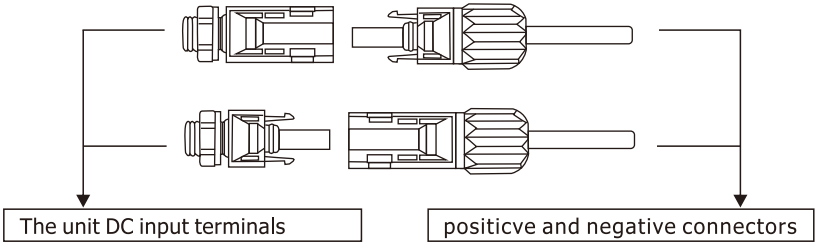
Connect the photovoltaic input power cord
Step 1. Remove the cable glands from the positive and negative connectors.
Step 2. Take out the metal terminals from the accessory bag and connect them as shown in the picture.



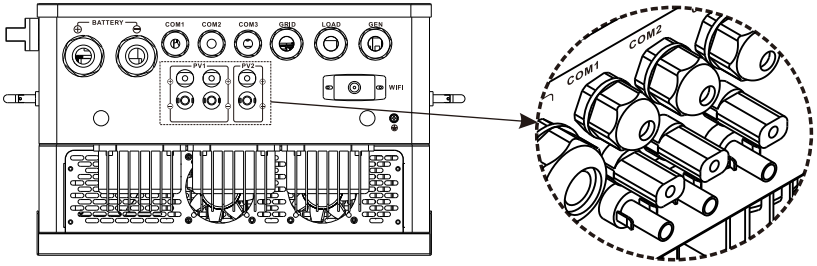
Step 3. Insert the positive and negative power cables into the corresponding cable connectors.
Step 4. Insert the stripped positive and negative power cables into the positive and negative metal terminals respectively, and crimp them with a clamping tool. Make sure the cable is crimped until it cannot be pulled out with less than 400 N force as shown in the picture



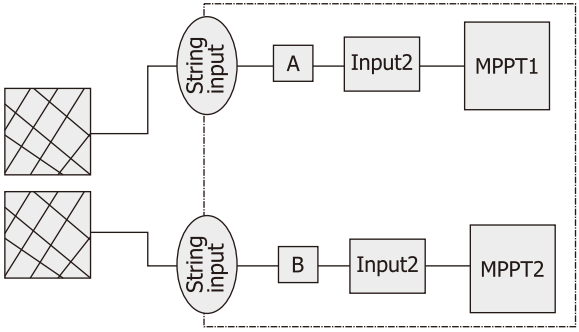
Step 5. Insert the positive and negative connectors into the corresponding DC input terminals of PH 1100PRO-L2 until you hear a "click" sound.



DC connection conditions
PH1100 -L2 energy storage inverter has 2 independent inputs: input A and input B.



The DC side schematic is shown below, note that the connectors are in pairs (male and female connectors). The connectors between the photovoltaic array and the inverter are H4 (Yunfan) connectors.



Recommendations for PV modules of connected strings:
A.Same specifications
B.The same number of photovoltaic modules connected in parallel

CAUTION

If the inverter is not equipped with a photovoltaic switch, but it is mandatory in the country of installation, install an external photovoltaic switch.
The inverter PV input must not exceed the following limits:

model	Maximum input current A	Maximum input current B
5KW	16A	16A
6KW		
8KW	32A	16A
10KW		

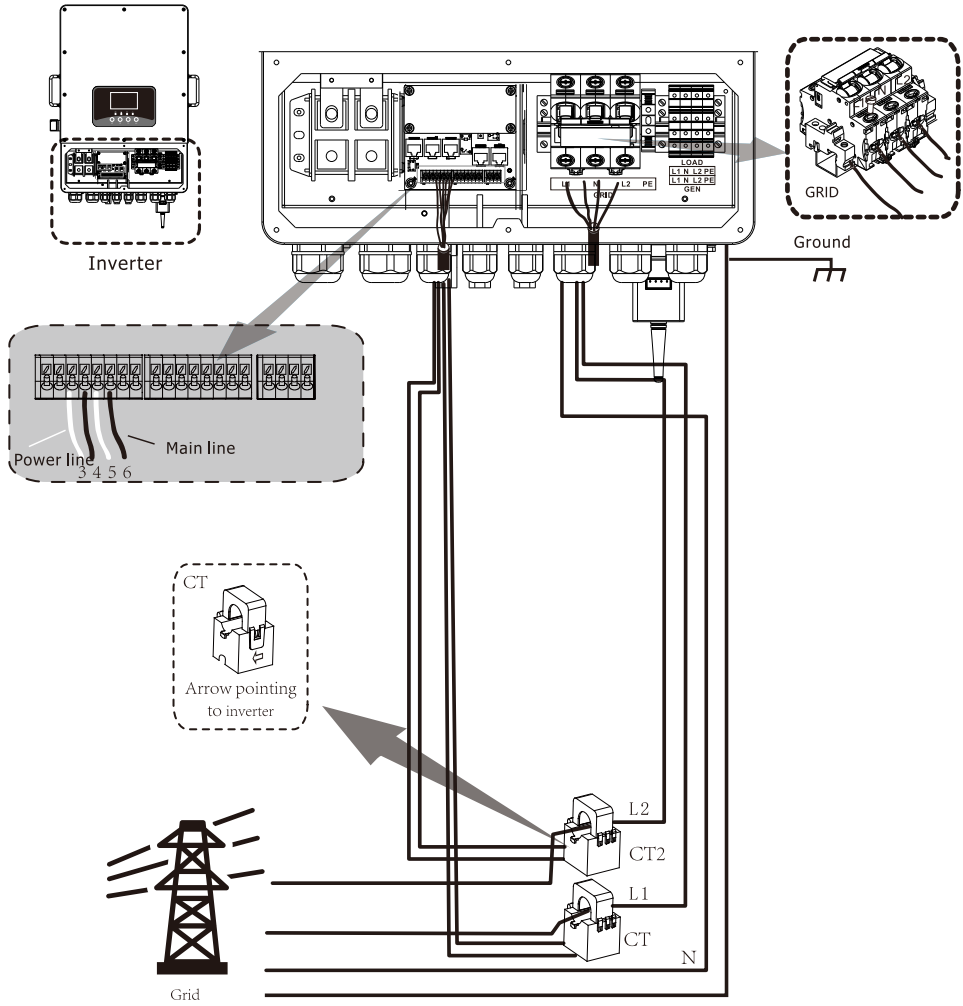
- DC connection conditions

CAUTION	Before connecting the PV array, make sure the DC switch and AC circuit breaker are disconnected from the inverter. Never connect or disconnect the DC connector under load. Ensure that the maximum open circuit voltage (Voc) of each PV string is less than 600Vdc. Check the design of the photovoltaic power plant. maximum. The open circuit voltage that may occur when the solar panel temperature is -10 ° C shall not exceed the maximum input voltage of the inverter.
WARNING	Improper operation during wiring may result in fatal injury to the operator or irreparable damage to the inverter. Only qualified personnel should perform wiring work.
WARNING	Due to the transformerless design, the DC positive and DC negative poles of the PV array are not allowed to be grounded.

Cable requirements:

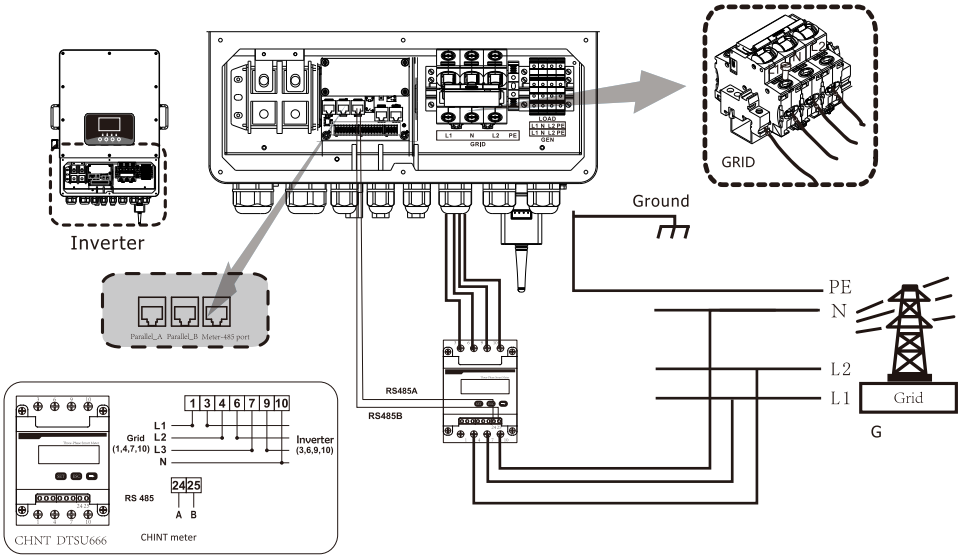
Cable type	Section (mm) 2	
Industrial general photovoltaic cable (Model: PV1-F)	scope	Recommended value
	4.0~6.0 (12~10AWG)	4.0(12AWG)

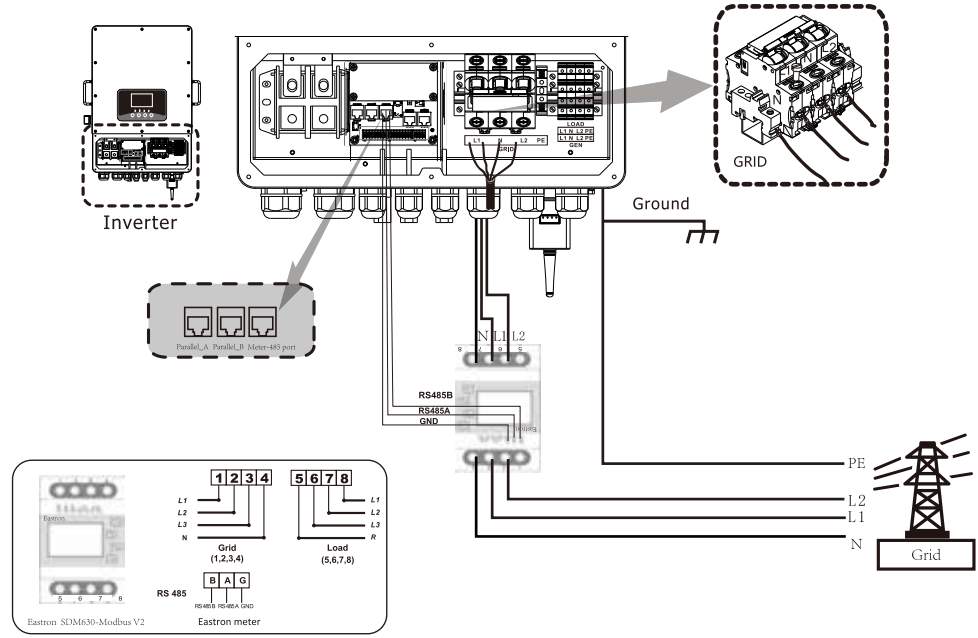
6.5.7 CT connection



Note: when the load power reading isincorrect on the LCD, reverse the ct arrow.

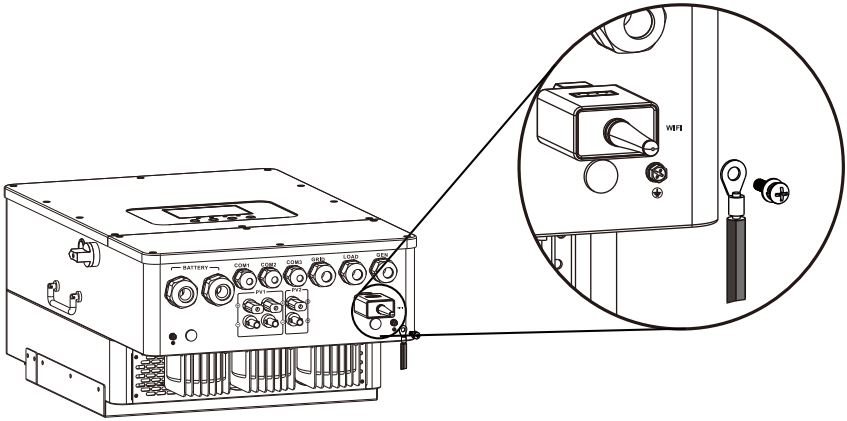
6.5.8 Instrument connection





6.5.9 Grounding (mandatory)

The ground cable should be connected to the ground plate on the grid side to prevent electric shock when the original protective conductor fails.

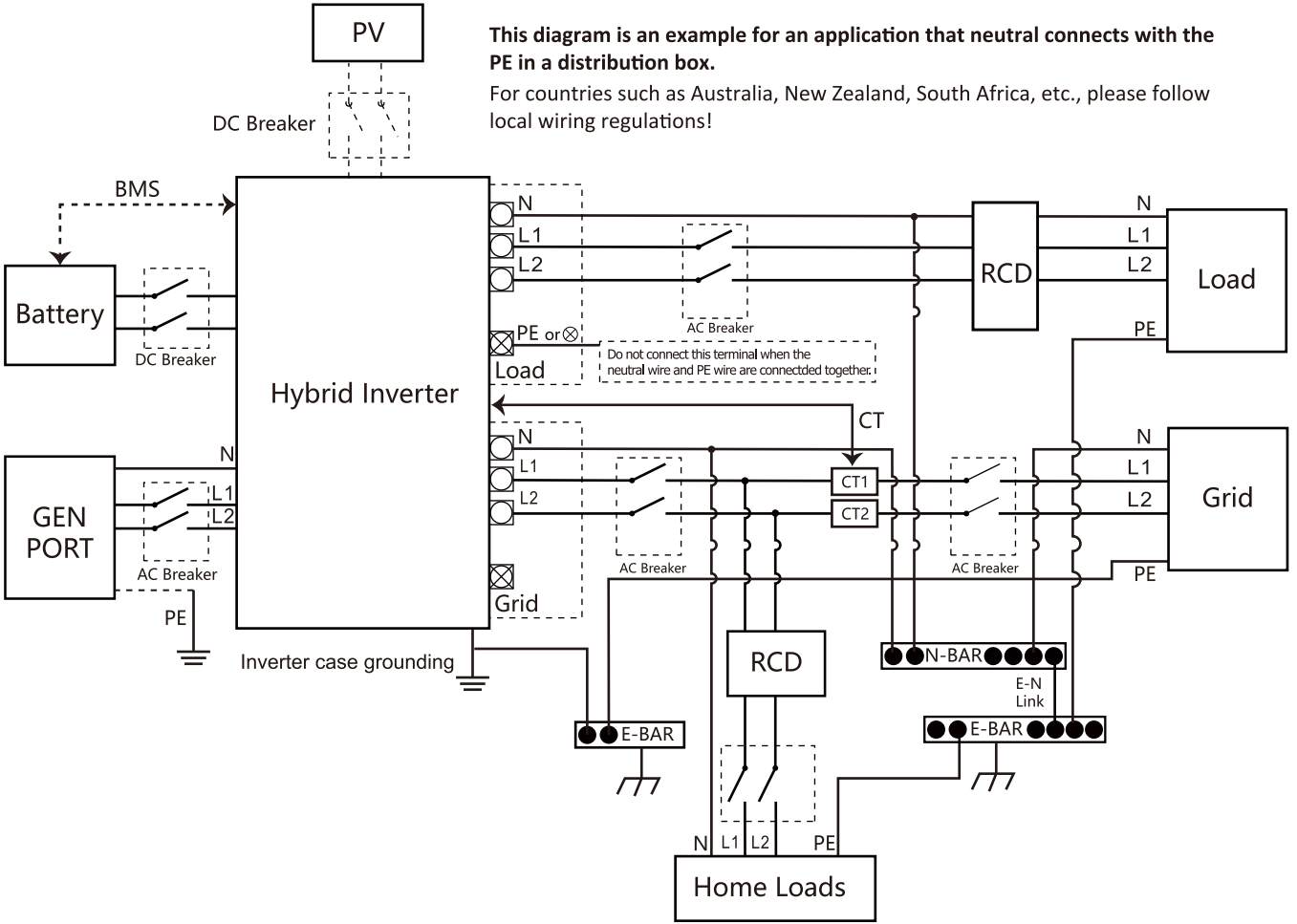


6.6.0 WIFI connection

For configuration of the WiFi plug, see the illustration of the Wi-Fi plug. The WiFi plug is not standard but is optional.

This diagram is an example for an application that neutral connects with the PE in a distribution box.

For countries such as Australia, New Zealand, South Africa, etc., please follow local wiring regulations!

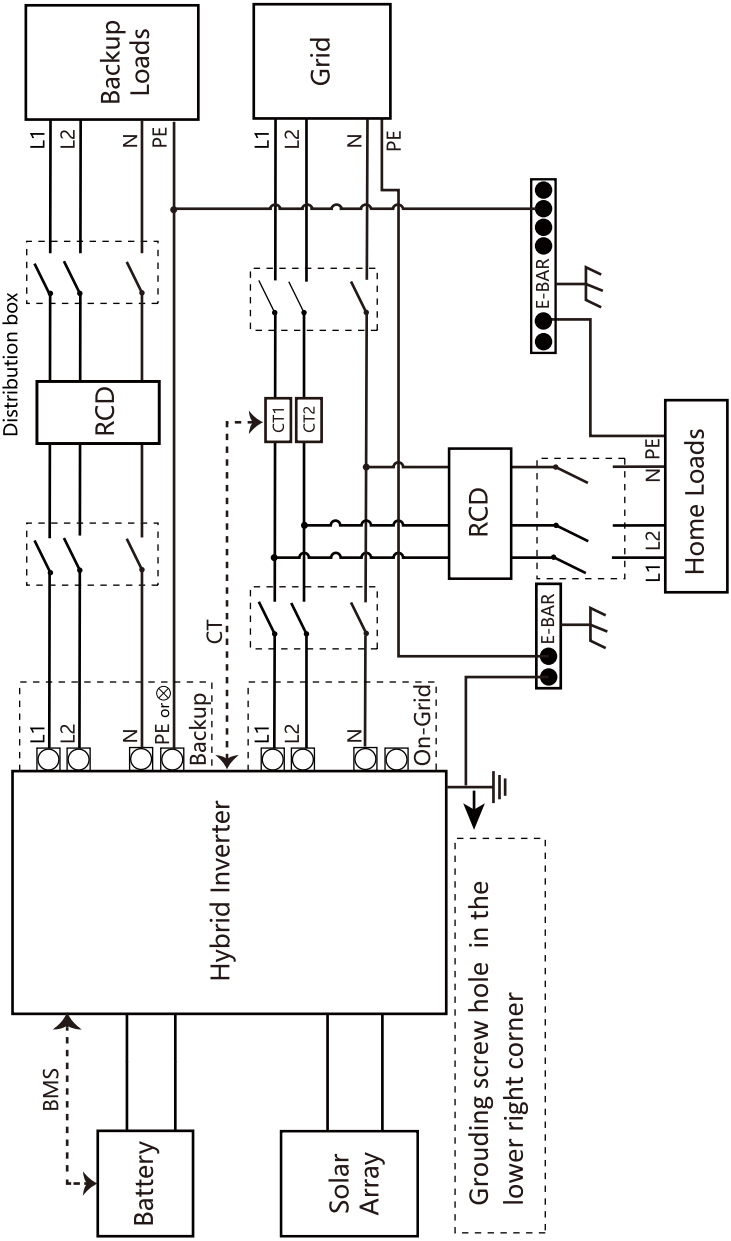


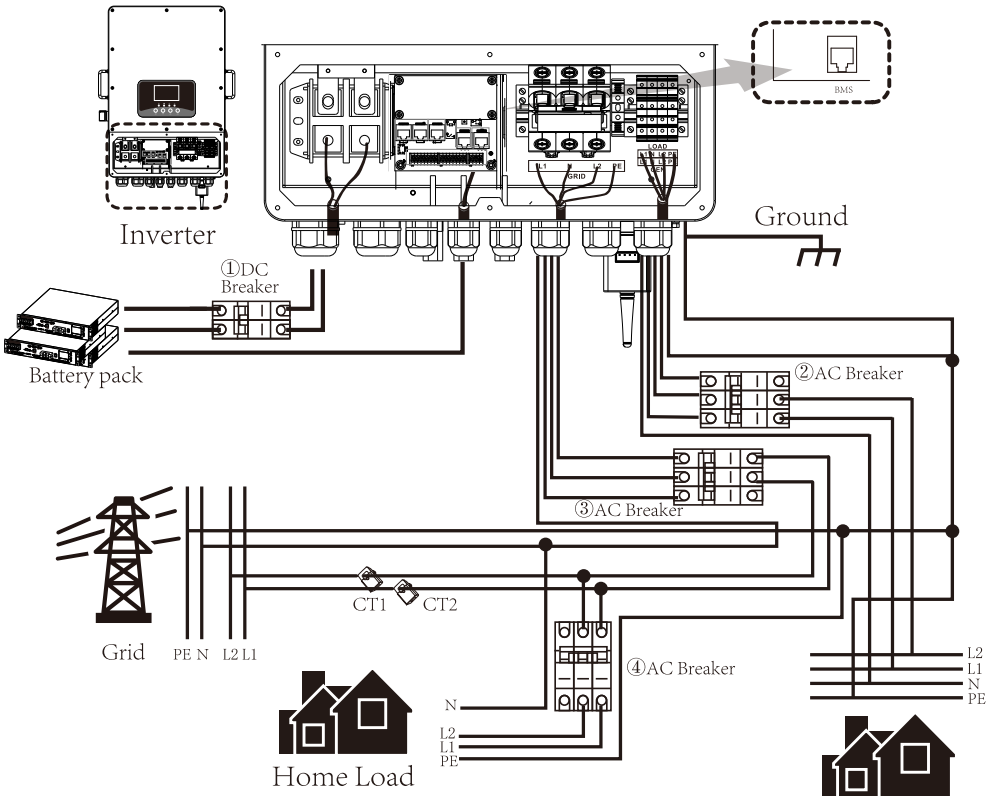
7.2 Wiring diagram

This diagram is an example for an application in which neutral is separated from the PE in the distribution box.

For countries such as China, Germany,the Czech Republic, Italy, etc., please follow local wiring reguations!

Note:Backup function is optional in German market.please leave backup side empty if backup function is not available in the inverter.





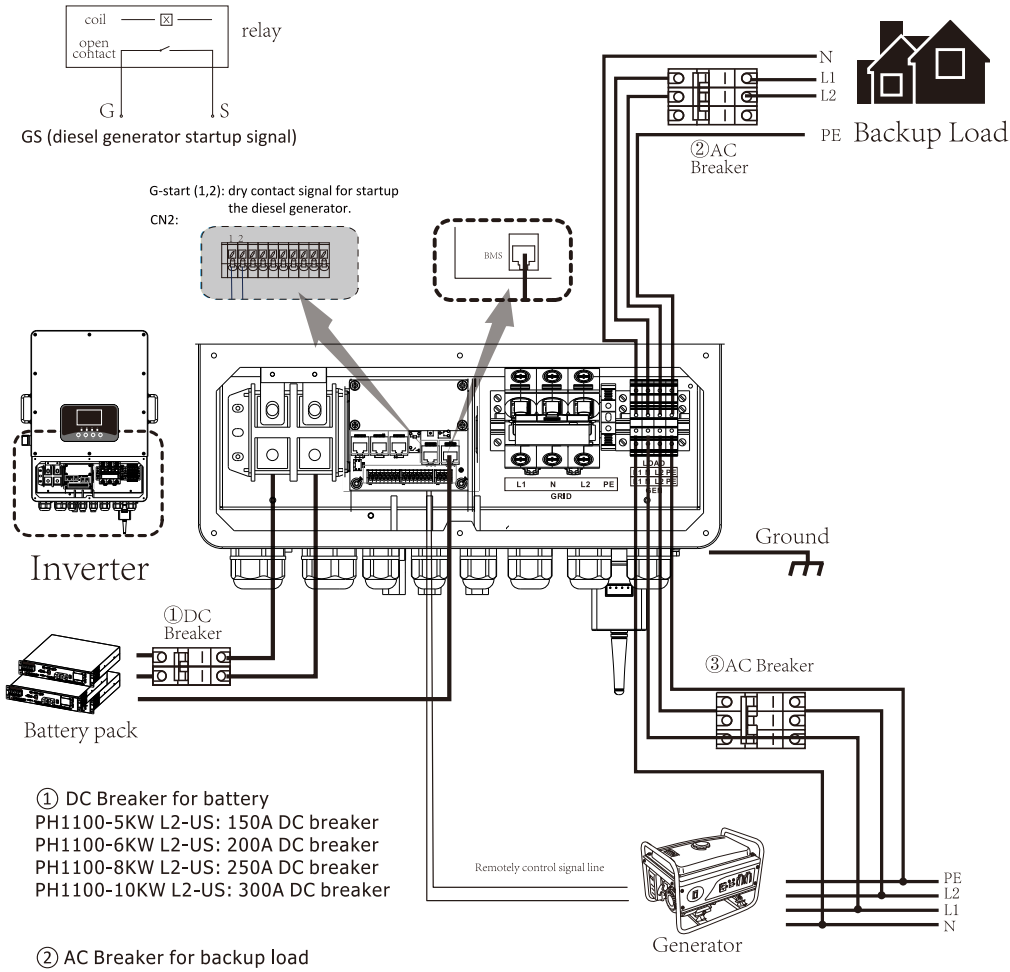
① DC Breaker for battery
PH1100-5KW L2-US: 150A DC breaker
PH1100-6KW L2-US: 200A DC breaker
PH1100-8KW L2-US: 250A DC breaker
PH1100-10KW L2-US: 300A DC breaker

② AC Breaker for backup load
PH1100-5KW L2-US: 63A AC breaker
PH1100-6KW L2-US: 63A AC breaker
PH1100-8KW L2-US: 63A AC breaker
PH1100-10KW L2-US: 63A AC breaker

③ AC Breaker for grid
PH1100-5KW L2-US: 100A AC breaker
PH1100-6KW L2-US: 100A AC breaker
PH1100-8KW L2-US: 100A AC breaker
PH1100-10KW L2-US: 100A AC breaker

④AC Breaker for home load
Depends on household loads

7.3 Typical diesel generator



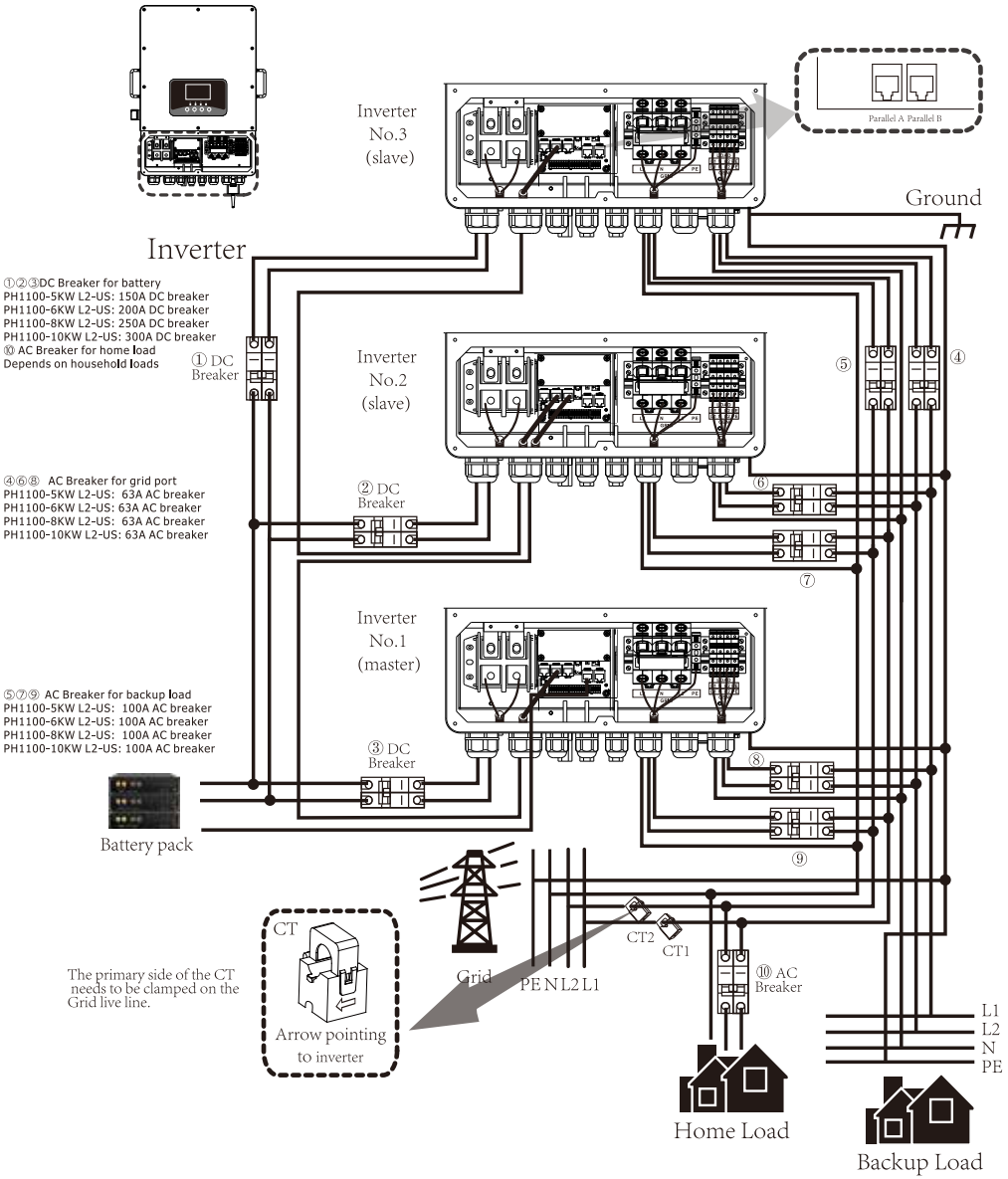
① DC Breaker for battery
PH1100-5KW L2-US: 150A DC breaker
PH1100-6KW L2-US: 200A DC breaker
PH1100-8KW L2-US: 250A DC breaker
PH1100-10KW L2-US: 300A DC breaker

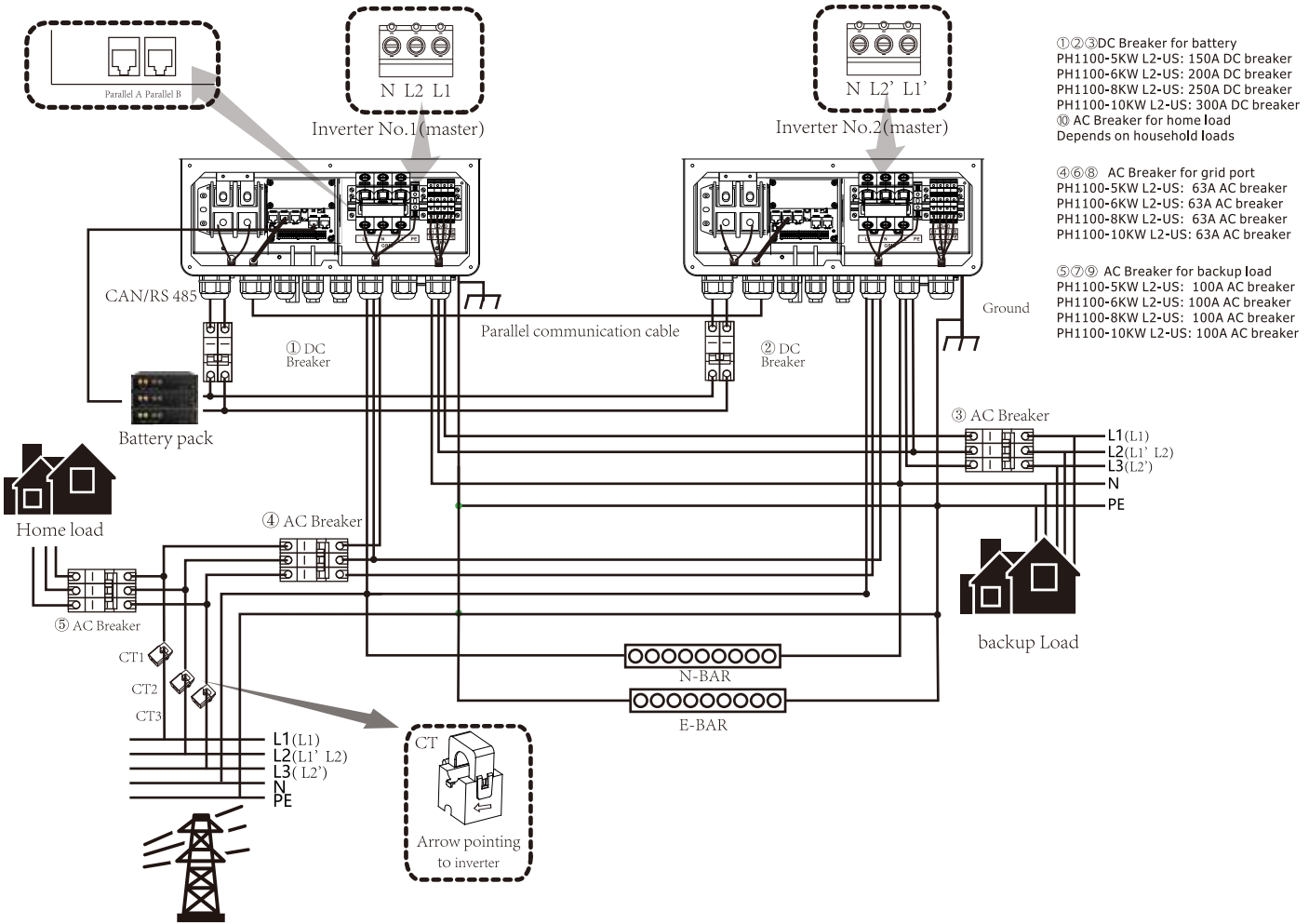
② AC Breaker for backup load
PH1100-5KW L2-US: 63A AC breaker
PH1100-6KW L2-US: 63A AC breaker
PH1100-8KW L2-US: 63A AC breaker
PH1100-10KW L2-US: 63A AC breaker

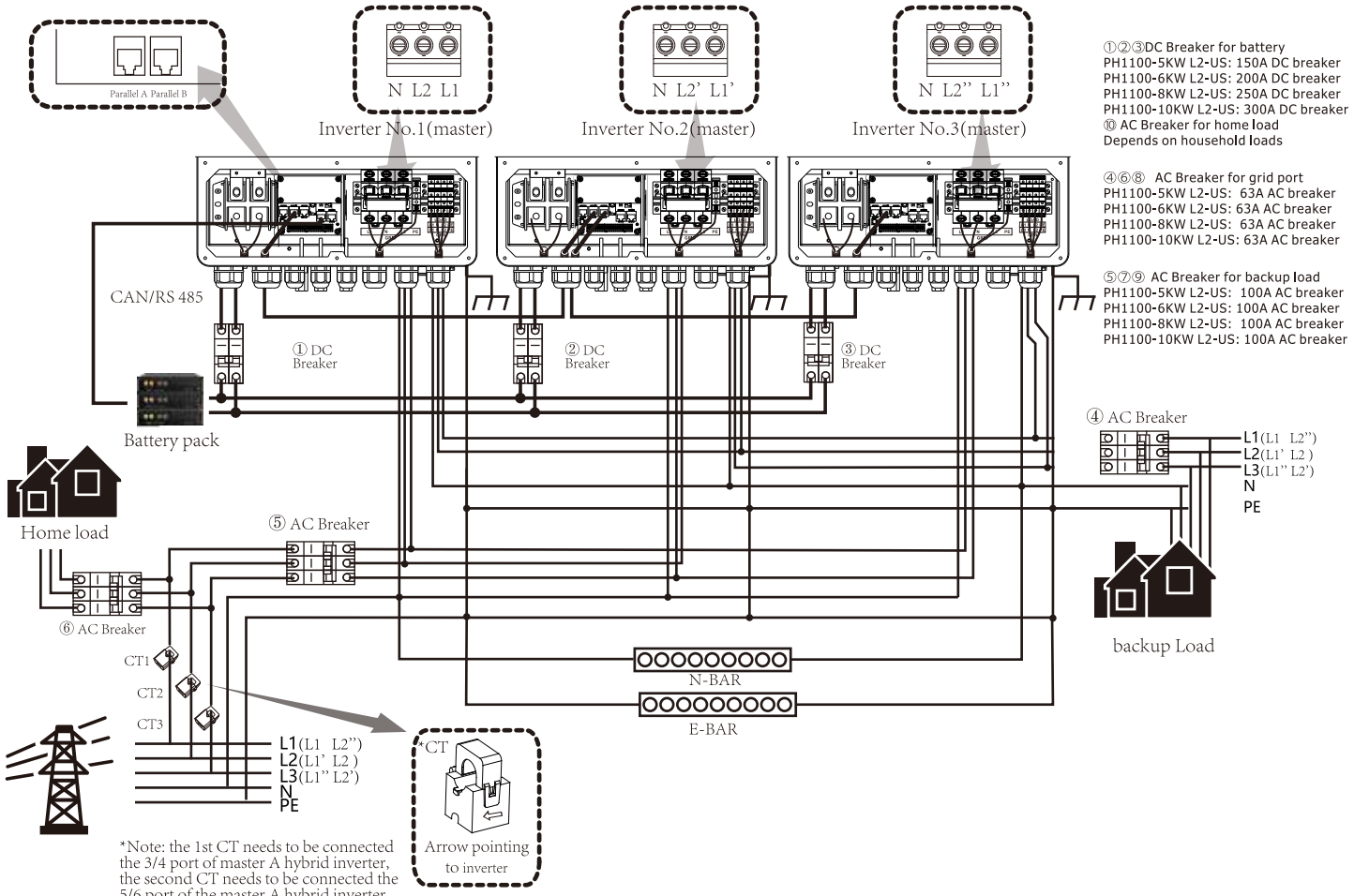
③ AC Breaker for grid
PH1100-5KW L2-US: 100A AC breaker
PH1100-6KW L2-US: 100A AC breaker
PH1100-8KW L2-US: 100A AC breaker
PH1100-10KW L2-US: 100A AC breaker

7.4 Parallel connection diagram

Supports up to 10 PCS parallel machines




Parallel A Parallel B
N L2 L1
Inverter No.1(master)
N L2' L1'
Inverter No.2(master)
①②③DC Breaker for battery
PH1100-5KW L2-US: 150A DC breaker
PH1100-6KW L2-US: 200A DC breaker
PH1100-8KW L2-US: 250A DC breaker
PH1100-10KW L2-US: 300A DC breaker
⑩ AC Breaker for home load
Depends on household loads
④⑥⑧ AC Breaker for grid port
PH1100-5KW L2-US: 63A AC breaker
PH1100-6KW L2-US: 63A AC breaker
PH1100-8KW L2-US: 63A AC breaker
PH1100-10KW L2-US: 63A AC breaker
⑤⑦⑨ AC Breaker for backup load
PH1100-5KW L2-US: 100A AC breaker
PH1100-6KW L2-US: 100A AC breaker
PH1100-8KW L2-US: 100A AC breaker
PH1100-10KW L2-US: 100A AC breaker
CAN/RS 485
Parallel communication cable
Ground
① DC Breaker
② DC Breaker
Battery pack
③ AC Breaker
L1(L1)
L2(L1' L2)
L3(L2')
N
PE
Home load
④ AC Breaker
⑤ AC Breaker
CT1
CT2
CT3
N-BAR
E-BAR
backup Load
L1(L1)
L2(L1' L2)
L3(L2')
N
PE
CT
Arrow pointing
to inverter



*Note: the 1st CT needs to be connected the 3/4 port of master A hybrid inverter, the second CT needs to be connected the 5/6 port of the master A hybrid inverter. The thrid CT needs to be connected to 5/6 port of the master B hybrid inverter.

7.5 Operation

7.5.1 Power switch

Once the device has been correctly installed and the battery is in place, you can easily activate the device by pressing the power button, which is conveniently located on the left side of the casing. If the system is not connected to a battery but is linked to a photovoltaic source or the electrical grid, and the power button is in the off position, the LCD screen will remain illuminated (indicating "OFF" on the display). In such a scenario, when the power button is switched on and the "No Battery" option is selected, the system can continue to operate seamlessly.

7.5.2 Operation and Display Panel

The operation and display panel is situated at the front of the inverter, as depicted in the accompanying figure. This panel comprises four indicator lights, four function keys, and an LCD screen that provides real-time information about the operational status and power metrics, including input and output levels.

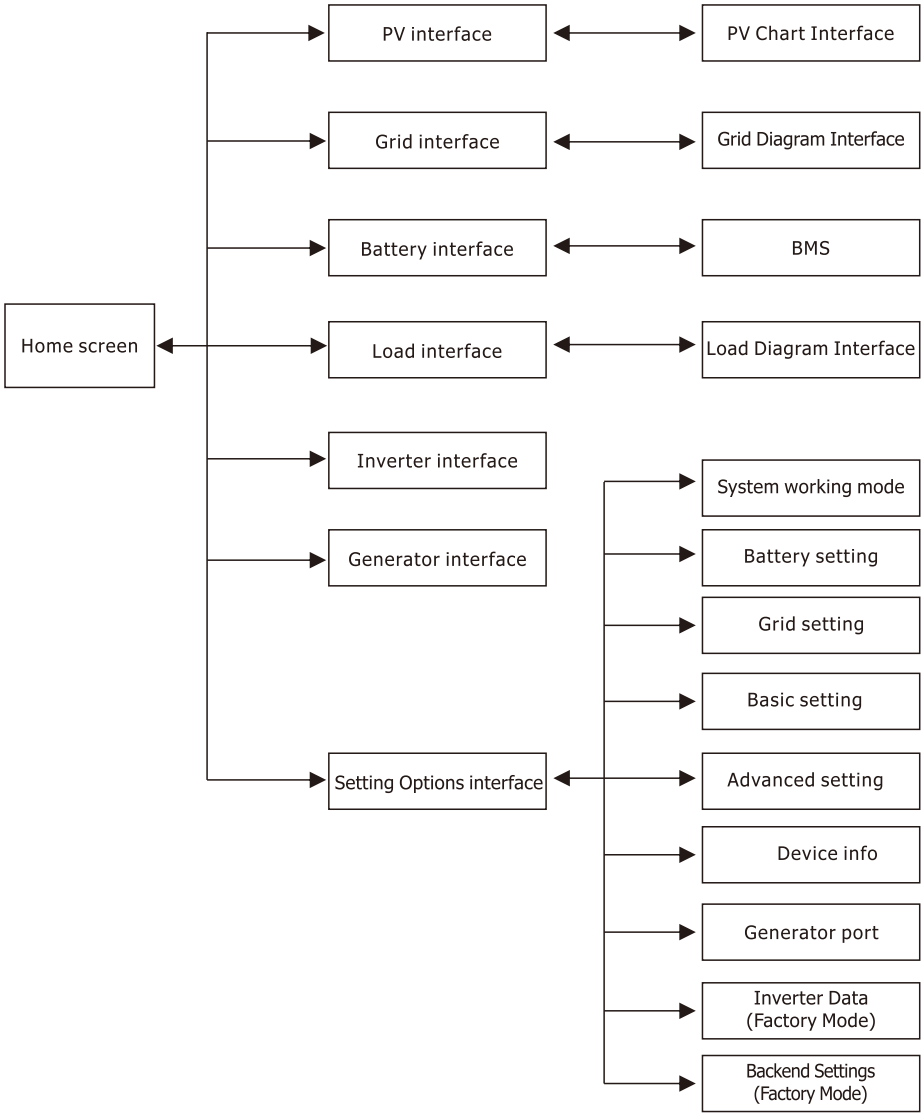
LED indicator light		Description
Yellow LED	Always on	Battery voltage is normal
Blue LED	Flashing	WIFI or RS485 communication
Green LED	Always on	The inverter is running normally
Red LED	Always on	Faults and warnings

Figure 7-1 LED indicator light

Function keys	Description
ESC	Exit settings
UP	Go to previous selection
DOWN	Go to next selection
CONFIRM	Confirm selection

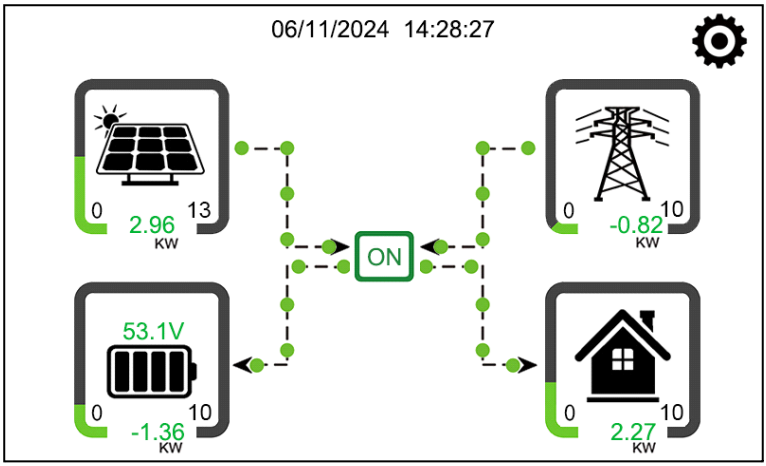
Figure 7-2 Function buttons

8 LCD display interface
8.1 LCD operation flow chart



8.2 Main Interface

This is a touch-operated LCD screen that displays the overall information of the inverter.

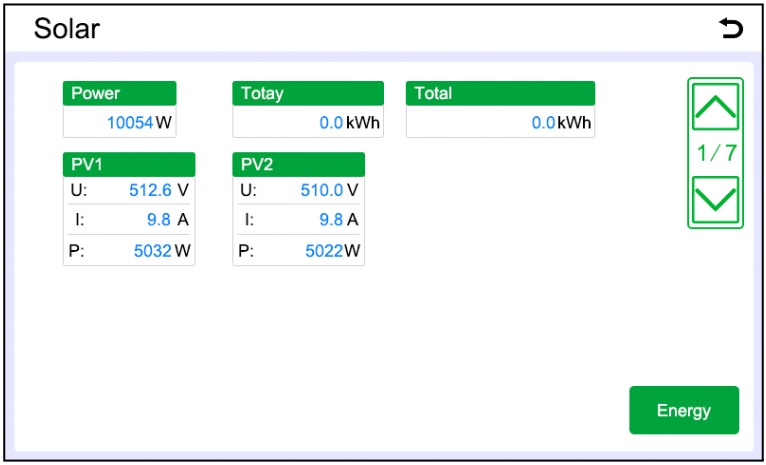


1.The time and date are displayed at the top of the main interface. The icon in the middle shows "ON" to indicate that the inverter is operating normally. If the inverter detects a fault or warning event, a fault code or warning code will be displayed between the icon and the time. Detailed information can be viewed in the device information interface.

2.The gear icon in the upper right corner of the main interface is the settings button, which allows you to enter different settings interfaces to adjust parameters and view information, including system operating mode, battery settings, AC power settings, basic settings, advanced settings, device information and generator settings.

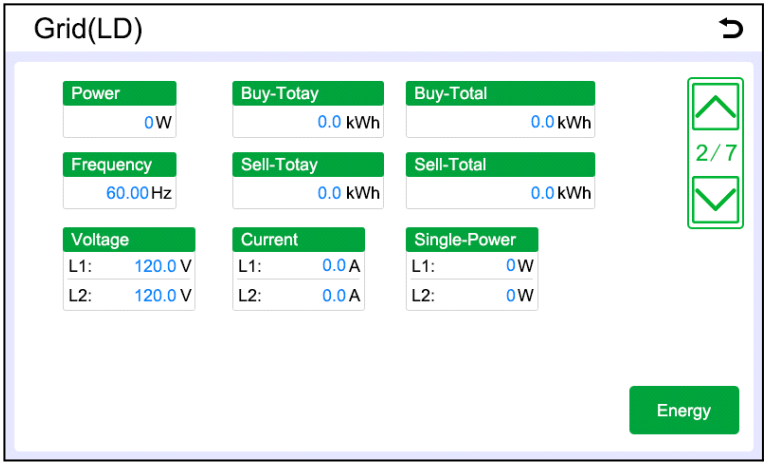
3.The main screen displays information including solar power, mains power, load and battery. It also shows the direction of energy conversion in the subsystem through arrows and flow effects. By clicking on each icon, you can enter the information interface of each subsystem to view specific information

8.3.1 PV interface.

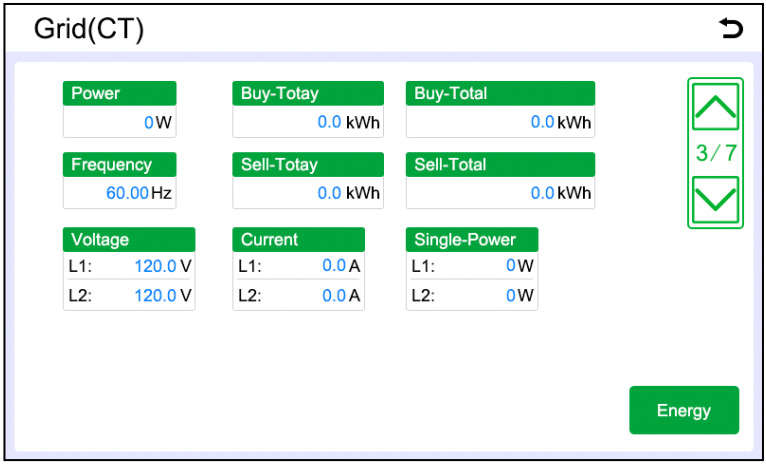


Parameter	Describe
Power	Displays the total power of solar power generation, which is the sum of PV1 and PV2 powers.
Today	Displays the power generation for the day.
Total	Displays the accumulated power generation.
PV1	Displays the voltage, current and power input at the PV1 terminal.
PV2	Displays the voltage, current and power input at the PV2 terminal.
Energy	Energy button, click it to enter the PV chart interface.

8.3.2 Mains interface

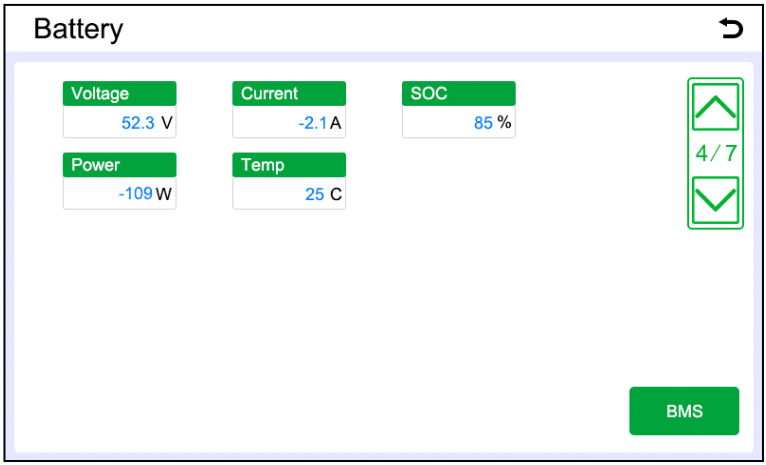


Parameter	Describe
Power	Displays the total power of the mains detected inside the inverter. A positive number indicates selling power, and a negative number indicates buying power.
Frequency	Displays the frequency of the AC power.
Buy-Today	Displays the amount of electricity purchased from the grid into the inverter on that day.
Buy-Total	Displays the accumulated amount of electricity purchased from the grid into the inverter.
Sell-Today	Displays the amount of electricity sold from the inverter to the grid on that day.
Sell-Total	Displays the accumulated electricity sold from the inverter to the grid.
Voltage	Displays the voltage of each phase of the AC power.
Current	Displays the current of each phase detected inside the inverter.
Single-Power	Displays the power of each phase detected inside the inverter.
Energy	Energy button, click it to enter the mains electricity chart interface.



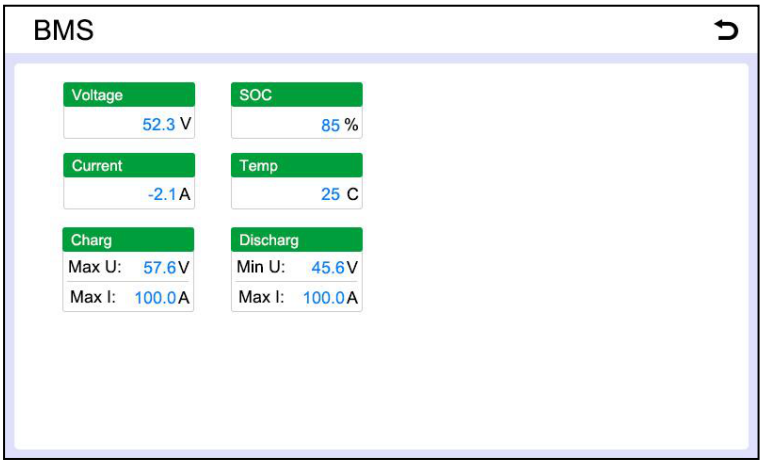
Parameter	Describe
Power	Displays the total power of the AC power detected outside the inverter. When a positive number is displayed, it means selling power, and when a negative number is displayed, it means buying power.
Frequency	Displays the frequency of the AC power.
Buy-Today	Displays the purchased electricity amount collected by the external CT on the day.
Buy-Total	Displays the accumulated purchased electricity amount collected by external CT.
Sell-Today	Displays the electricity sales amount collected by the external CT on the day.
Sell-Total	Displays the accumulated electricity sold by the external CT.
Voltage	Displays the voltage of each phase of the AC power.
Current	Displays the current of each phase detected by the external CT.
Single-Power	Displays the power of each phase detected by the external CT.
Energy	Energy button, click it to enter the mains electricity chart interface.

8.3.3 Battery Interface



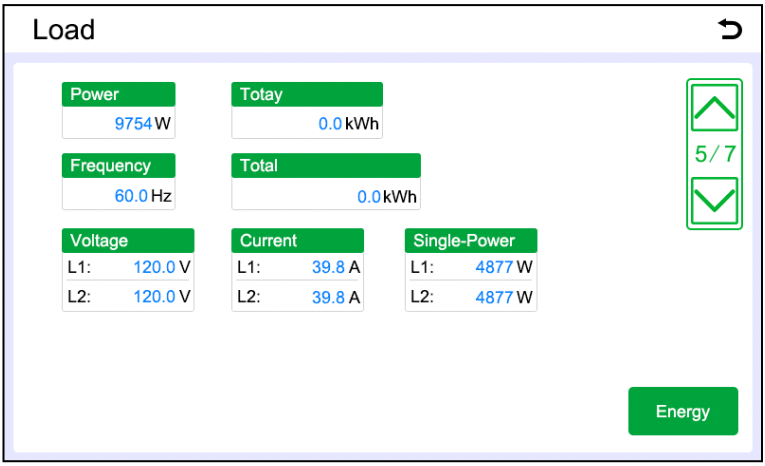
Parameter	Describe
Voltage	Displays the battery voltage.
Current	Displays the battery current, which is negative when charging and positive when discharging.
SOC	Displays the battery charge level.
Power	Displays the battery power, which is negative when charging and positive when discharging.
Temp	Displays the battery temperature.
BMS	BMS button, click it to enter the BMS interface.

When the battery is a lithium battery with BMS function, the battery data can be transmitted to the inverter through the communication line, and the battery data can be viewed by entering the BMS interface by clicking the BMS button.



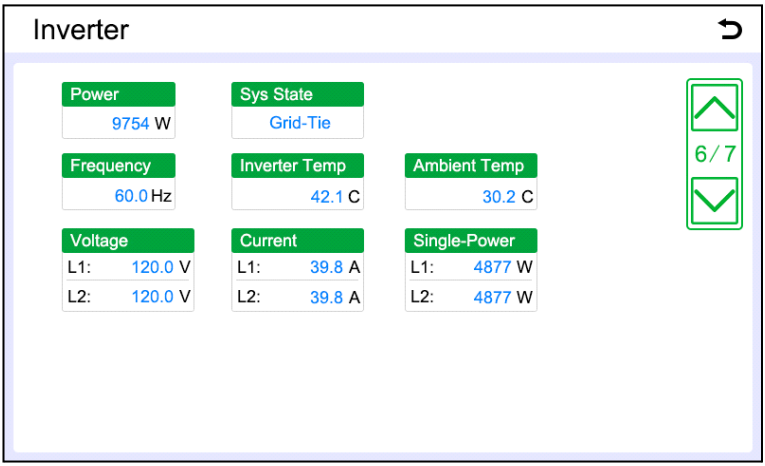
Parameter	Describe
Voltage	Display the voltage detected by BMS;
Current	Displays the current detected by the BMS, which is negative when charging and positive when discharging;
SOC	Display the power detected by BMS;
Temp	Display the temperature detected by BMS;
Charge	The maximum charging voltage and current allowed by the BMS;
Discharge	The minimum discharge voltage and maximum discharge current allowed by the BMS;

8.3.4 Load interface



Parameter	Describe
Power	Displays the total power of the load.
Frequency	Displays the frequency of the load.
Today	Displays the amount of electricity consumed for the day.
Total	Displays the cumulative power consumption.
Voltage	Displays the voltage of each phase of the load.
Current	Displays the current of each phase of the load.
Single-Power	Displays the power of each phase of the load.
Energy	Energy button, click it to enter the load chart interface.

8.3.5 Inverter interface

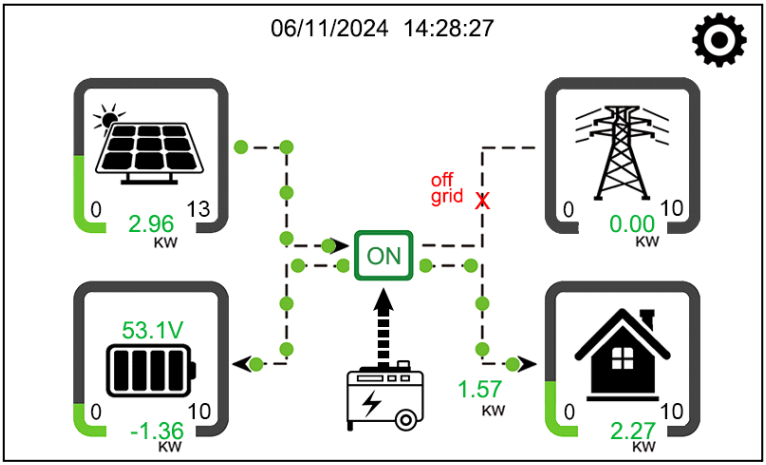


Parameter	Describe
Power	Displays the total inverter power.
Frequency	Displays the inverter frequency.
System State	Displays the status of the system.
Inverter Temp	Displays the internal temperature of the inverter.
Ambient Temp	Displays the ambient temperature of the inverter.

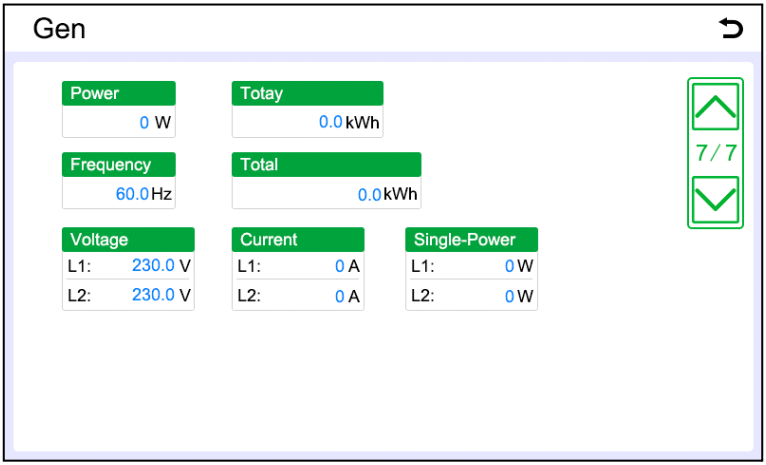
Voltage	Displays the inverter voltage of each phase.
Current	Displays the inverter current of each phase.
Single-Power	Displays the inverter power of each phase.

8.3.6 Generator interface

The main interface will display the generator icon when there is generator input.



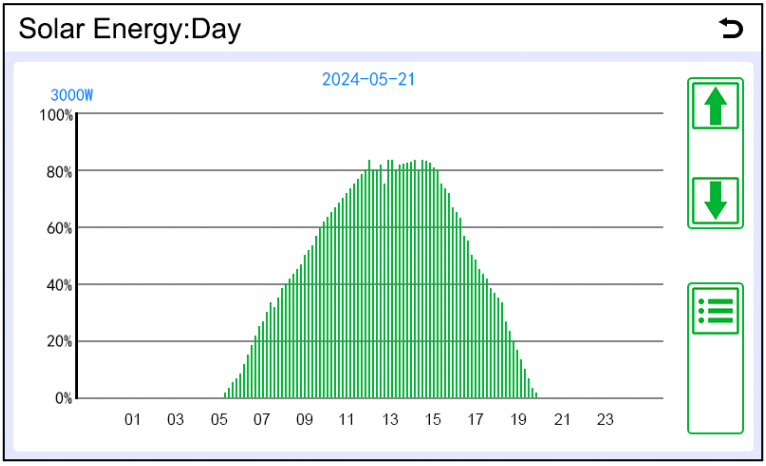
Enter the generator interface by clicking the generator icon on the main interface.



Parameter	Describe
Power	Displays the total output power of the generator.
Frequency	Displays the generator frequency.
Today	Displays the power generation of the generator for the day.
Total	Displays the accumulated power generation of the generator.
Voltage	Displays the voltage of each phase of the generator.
Current	Displays the current of each phase of the generator.
Single-Power	Displays the power of each phase of the generator.

8.4 Chart interface

The modules with chart recording function are PV input, mains input, mains output and load output.



1." Energy " button on each data interface ;

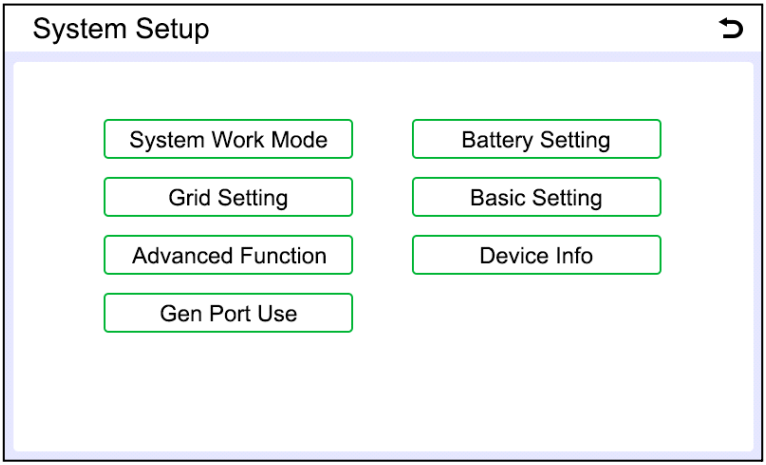
2.The chart interface displays the recorded data in a bar graph, and the energy situation can be roughly judged by the changes in the bar graph;

3.Each module has daily records, monthly records, annual records and total records;

4.The icon arrows on the right side of the interface can switch between records of different time periods, and the horizontal bar icon can switch between monthly records, yearly records, and total records;

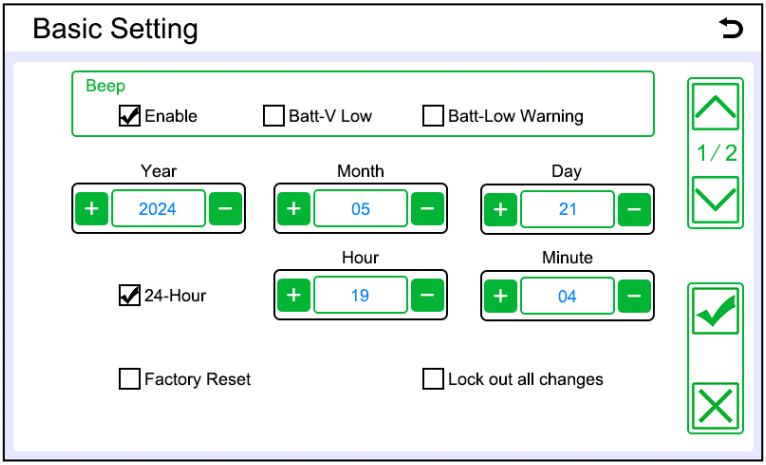
8.5 Inverter Setting Interface

8.5.1 Setting options

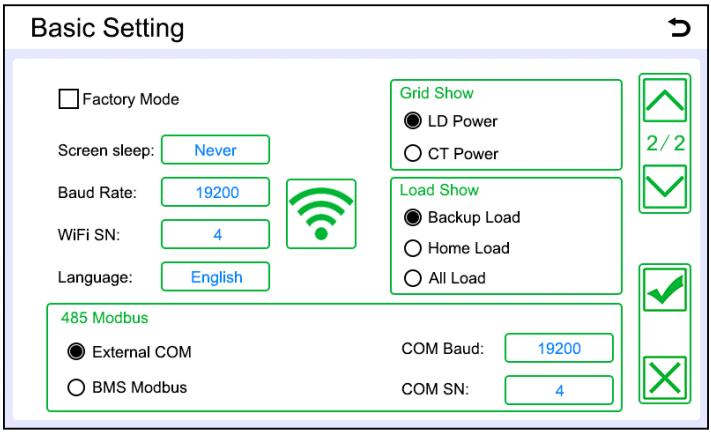


1.This is the system setting interface. Click to enter different sections to set different functional parameters of the inverter.

8.5.2 Basic Settings

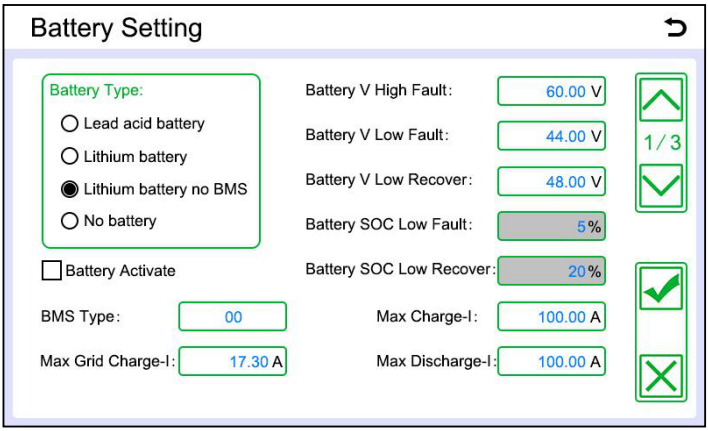


Parameter	Describe
Beep	Provides an audible reminder of inverter fault or warning events. 1." Enable " is the sound reminder function switch option. Check it to turn on the sound reminder; 2." Batt-V Low " is the battery low voltage fault sound reminder switch option; 3." Batt-Low Warning " is a low-battery warning sound reminder switch option;
Year, Month, Day	Modify the inverter date;
24-Hour	Used to switch between 24-hour and 12-hour formats;
Hour、Minute	Modify the inverter time;
Factory Reset	The option to restore factory settings needs to be enabled with a password, which is 999999;
Lock out all changes	Lock setting: the inverter parameters cannot be modified through the LCD without unlocking. The lock can only be unlocked by the password, which is 777777;

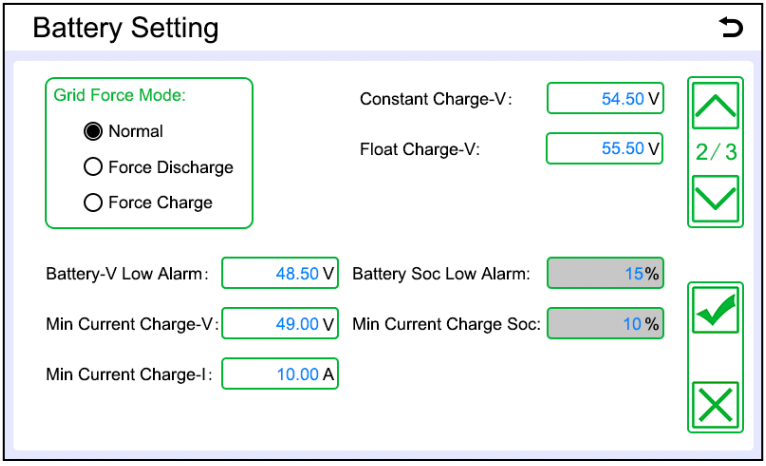


Parameter	Describe
Factory Mode	Factory mode, only for factory use, without operation;
Screen sleep	After no operation, the screen goes into sleep mode and can be awakened by tapping the screen or pressing a button.
Baud Rate	The communication rate between the inverter and the Wifi module or the host computer must be the same for normal communication;
WiFi SN	The communication address between the inverter and the wifi module or the host computer must be properly set to communicate. The icon on the right can directly restore the Baud Rate and WiFi SN of the factory.
Language	Choose a different language;
Grid Show	Select the display object of the Grid power in the main interface. 1.LD Power: The grid power of the inverter itself. 2. CT Power: The grid power sampled by CT.
Load Show	1.Backup Load: Load power output of inverter. 2.Home Load: Load power outside the inveter. 3. All Load: Total power of Backup Load and Home Load.
485 Modbus	The second 485 Modbus has two different function to choose from. 1.Extemal COM: It is used for optional external 485 communication while WiFi module is connecting. COM Baud is the optional communication rate, and COM SN is the address of the devive theat communicates. 2. BMS Modbs: Used to communicate with the battery BMS.

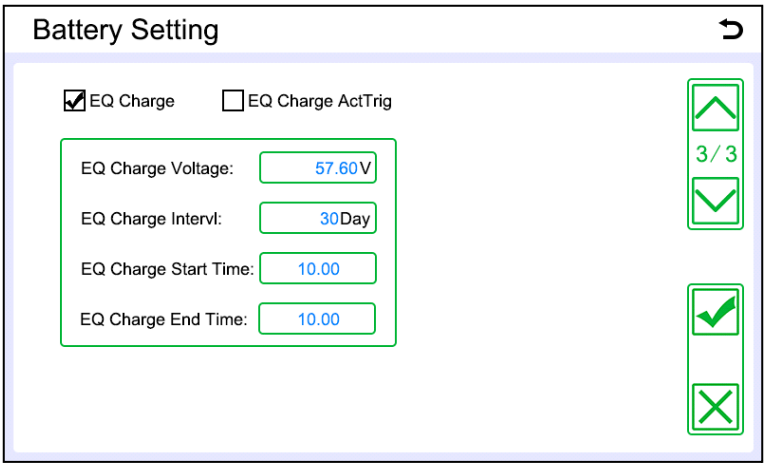
8.5.3 Battery Settings



Parameter	Describe
Battery Type	The second 485 Modbus has two different function to choose from. 1.Extemal COM: It is used for optional external 485 communication while WiFi module is connecting. COM Baud is the optional commun ication rate, and COM SN is the address of the devive theat communicates. Choose the appropriate option based on the type of battery 1. " Lead acid battery " is a lead acid battery. In some options, only the battery voltage setting parameters are valid; 2. " Lithium battery " is a lithium battery with BMS, which requires BMS to provide battery data to the inverter. In some options, only the setting parameters of battery SOC are valid; 3. " Lithium battery no BMS " means a lithium battery without BMS. In some options, only the battery voltage setting parameters are valid. 4. " No battery " is the option to start the inverter without battery power;
Battery Activate	Enable option for lithium battery activation. Check this option to enable the battery activation function.
Battery V High Fault	Battery voltage high protection value, to prevent overvoltage from damaging the battery. " Lead acid battery " and " Lithium battery no BMS " type batteries are effective;
Battery V Low Fault	Battery voltage low protection value, to prevent undervoltage from causing damage to the battery. " Lead acid battery " and " Lithium battery no BMS " type batteries are effective;
Battery V Low Recover	Battery voltage low recovery value. After detecting battery undervoltage, the inverter will charge the battery voltage to this value before normal charging and discharging. This value is only valid for " Lead acid battery " and " Lithium battery no BMS " type batteries;
Battery SOC Low Fault	Battery SOC low protection value, to prevent the battery SOC from being too low and causing damage to the battery life. This value is only valid for " Lithium battery " type batteries;
Battery SOC Low Recover	Battery SOC low recovery value. After detecting that the battery SOC is too low, the inverter will charge and discharge normally only after the battery SOC reaches this value. This value is only valid for " Lithium battery " type batteries;
BMS Type	The communication protocol between the inverter and the lithium battery BMS;
Max Charge-I	The maximum value of the charging current when the inverter is charging the battery;
Max Grid Charge-I	The maximum value of the mains current when the inverter uses the mains to charge the battery;
Max Discharge-I	The maximum value of the discharge current when the inverter uses the battery;

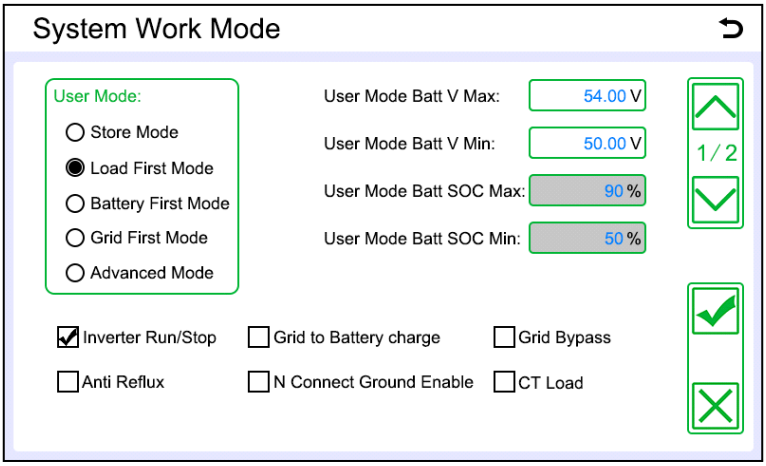


Parameter	Describe
Grid Force Mode	Option of forced charging and discharging mode of mains power 1. " Normal " means turning off this function; 2. " Force Discharge " is a forced discharge mode. This option will force the battery to discharge and reduce the battery SOC to the value of " Battery Soc Low Alarm " or the battery voltage to the value of " Battery-V Low Alarm " ; 3. " Force Charge " is the forced charging mode. This option will force the battery to charge, increase the battery SOC to 100% or charge the battery voltage to the value of " Constant Charge-V " ;
Constant Charge-V	Battery constant voltage charging voltage
Float Charge-V	Battery float charge voltage
Battery-V Low Alarm	Battery voltage low warning value, this value is only valid for " Lead acid battery " and " Lithium battery no BMS " type batteries;
Battery SOC Low Alarm	Battery SOC low warning value, this value is only valid for " Lithium battery " type batteries;
Min Current Charge-V	Low current charging voltage, this value is only valid for " Lead acid battery " and " Lithium battery no BMS " type batteries;
Min Current Charge Soc	Low current charging SOC, this value is only valid for " Lithium battery " type batteries
Min Current Charge-I	Low current charging current value;



Parameter	Describe
EQ Charge	The battery equalization charging enable option, after checking it, the setting parameters of the equalization charging will take effect;
EQ Charge ActTrig	The trigger option of battery equalization charging, after checking, triggers a equalization charge;
EQ Charge Voltage	Battery equalization charging voltage;
EQ Charge Interver	The number of days between battery equalization charges;
EQ Charge Start Time	The start time of battery equalization charging;
EQ Charge End Time	End time of battery equalization charging;

8.5.4 System working settings



Parameter	Describe
User Mode	Select different modes to control the operation logic of the inverter 1. " Store Mode " is the battery storage energy mode, PV and mains are charged first, mains is used for load, and excess PV is used for selling power; 2. " Load First Mode " is the load priority mode, PV priority order: load, battery, selling electricity; 3. " Battery First Mode " is the battery priority mode, PV priority order: battery, load, selling electricity; 4. " Grid First Mode " is the mains priority mode, PV priority order: load, electricity sales, battery; 5. " Advanced Mode " is an advanced mode that maximizes profits by turning on different modes in 6 time periods;
User Mode Batt V Max	User battery voltage upper limit, which provides comparison data for different modes and is only valid for " Lead acid battery " and " Lithium battery no BMS " type batteries;
User Mode Batt V Min	User battery voltage lower limit, which provides comparison data for different modes and is only valid for " Lead acid battery " and " Lithium battery no BMS " type batteries;
User Mode Batt SOC Max	User battery SOC upper limit, which provides comparison data for different modes and is only valid for " Lithium battery " type batteries;
User Mode Batt SOC Min	User battery SOC lower limit value, which provides comparison data for different modes and is only valid for " Lithium battery " type batteries;
Inverter Run/Stop	Inverter switch option, used to manually turn on or off the inverter on the LCD;
Grid to Battery charge	The AC charging enable option can only be used to charge the battery with AC power after it is checked;
Grid Bypass	The AC bypass enable option can only be used after it is checked, and the AC bypass function will be used to supply power when the inverter fails;
Anti Reflux	The anti-backflow enable option, after checking, will turn on the anti-backflow function and prohibit the sale of electricity;
N Connect Ground Enable	Used to connect the N line to the PE line when the power grid is disconnected;
CT Load	Use CT load instead of LD load;

The inverter operation logic in different user modes is different, and the reference data used by different types of batteries are also different. When using "Lithium battery" type batteries, " User Mode Batt SOC Max " and " User Mode Batt SOC Min " are used as reference values. For the convenience of reading, SOC_H and Soc_L are used in the following text, and the battery SOC is referred to as SOC Batt ; When using " Lead acid battery " and " Lithium battery no BMS " type batteries, " User Mode Batt V Max " and " User Mode Batt V Min " are used as reference values, which are referred to as V_H and V_L in the following text, and the battery voltage is referred to as V Batt .

1. When selecting " Store Mode " in " User Mode "

(1)When there are only batteries and AC power, the load enters bypass mode and the AC power charges the battery;

(2)When PV, battery and AC power are all present, the load enters bypass mode, and PV charges the battery first. Depending on the battery type, it starts selling electricity when SOC Batt reaches 100% or V Batt reaches the set value of " Constant Charge V " ;

2. When " Load First Mode " is selected in " User Mode "

(1) When SOC Batt > SOC_L or V Batt > V_L, when there is only AC power and battery, the battery supplies power to the load; when all three are present, the battery and PV supply power to the load together. When the power of both is insufficient, the AC power will be used to supplement it. The power of PV will be provided to the load first, followed by charging the battery. The AC power selling power is the lowest.

(2) When SOC Batt < SOC_L or V Batt < V_L, when there is only mains and battery, the load is powered by the mains; when all three are present, the load is powered by both the mains and PV, with PV energy being provided to the load first, followed by battery charging. The mains sells the lowest amount of electricity. When " Grid to Battery Charge " is turned on, the battery can be charged by the mains, charging the SOC Batt to SOC_L or charging the V Batt to V_L.

3. When selecting " Battery First Mode " in " User Mode "

(1) When SOC Batt > SOC_H or V Batt > V_H, when there is only AC power and battery, the battery supplies power to the load; when all three are present, the battery and PV supply power to the load together, and the AC power is used to supplement when the power is insufficient. The energy of PV is first provided to the load, followed by charging the battery, and the AC power selling power is the lowest;

(2) When SOC Batt < SOC_H or V Batt < V_H, when there is only mains and battery, the load is powered by the mains; when all three are present, the battery is charged by PV and the load is powered by the mains, in which the energy of PV is first provided to charge the battery, followed by the load, and the mains sells the lowest electricity. When " Grid to Battery Charge " is turned on, the battery can be charged by the mains, charging the SOC Batt to SOC_H or charging the V Batt to V_H;

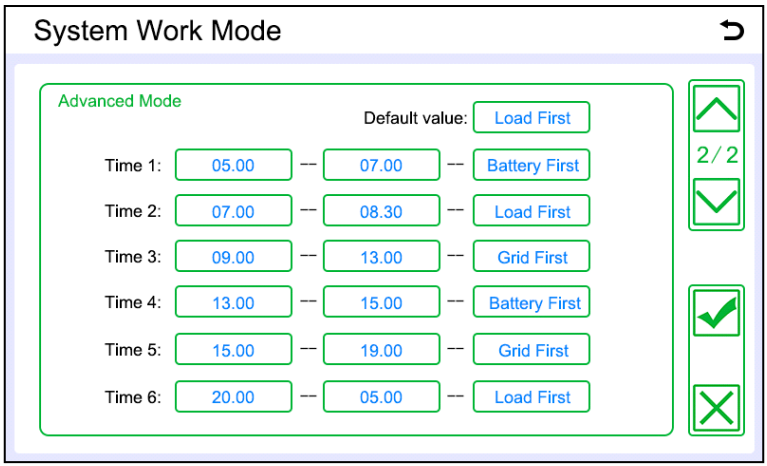
4. When selecting " Grid First Mode " in " User Mode "

(1) When SOC Batt > (SOC_H + SOC_L) / 2 or V Batt > (V_H + V_L) / 2, when there is only AC power and battery, the battery sells electricity at full power. The power sold is independent of the load power; when all three are present, the inverter sells electricity at full power, PV sells electricity first, and the battery is charged when the PV power is greater than the inverter power.

(2) When SOC Batt <(SOC_H+SOC_L)/2 or V Batt >(V_H+V_L)/2, when there is only AC power and battery, the battery is not charged and the battery output power is equal to the power supplied to the load ; when all three are present, the battery output power is equal to the power supplied to the load , and PV sells electricity at full power. When the PV power is greater than the inverter power, PV charges the battery.

(3) In the case of SOC Batt < " Battery SOC Low Alarm " or V Batt < " Battery-V Low Alarm " ,
When there are only mains and battery, only mains supplies power to the load ; when all three are present, PV charges the battery and mains supplies power to the load, in which PV energy is first provided to the load, followed by charging the battery, and mains sells the lowest electricity. When " Grid to Battery Charge " is turned on, the battery can be charged by mains, and the SOC Batt is charged to " Battery SOC Low Alarm " or the V Batt is charged to " Battery-V Low Alarm " ;

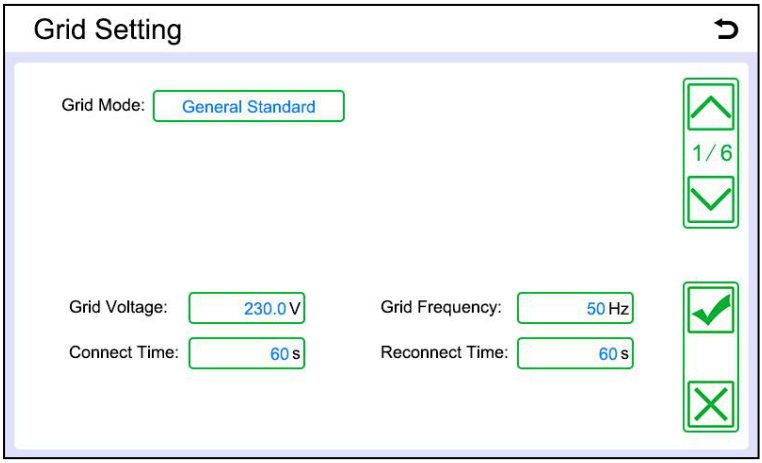
5. When you select " Advanced Mode " in " User Mode " , you can set different modes for different time periods in the interface below .Set the default mode for times outside of the six time periods .



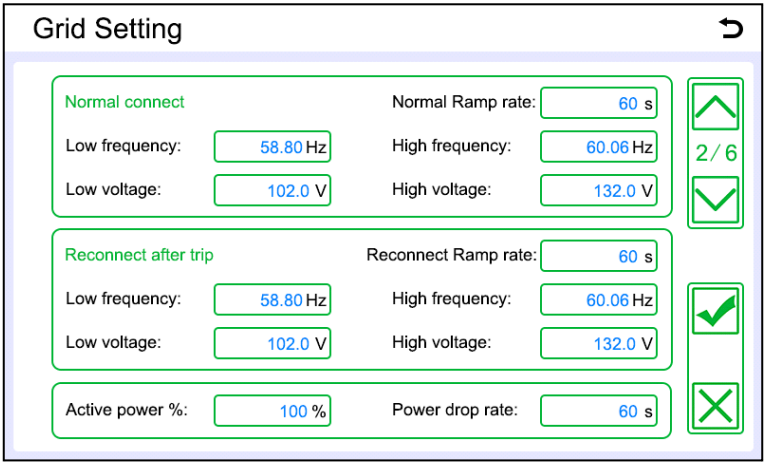
Parameter	Describe
Default value	The default mode used outside the 6 time periods;
Time 1-6	Set the start time, end time and mode to be used;

(1) default mode used outside the 6 time periods is "Load First " ;
the mode used from 5:00 to 7:00 is " Battery First " ;
the mode used from 7:00 to 8:30 is " Load First " ;
Between time periods 2 and 3, 8:30 to 9:00, the default mode is " Load First " ;
the mode used from 9:00 to 13:00 is " Grid First " ;
the mode used from 13:00 to 15:00 is " Battery First " ;
the mode used from 15:00 to 19:00 is " Grid First " ;
Between time periods 5 and 6, from 19:00 to 20:00, the default mode used is " Load First " ;
the mode used from 20:00 to 05:00 the next day is " Load First " ;

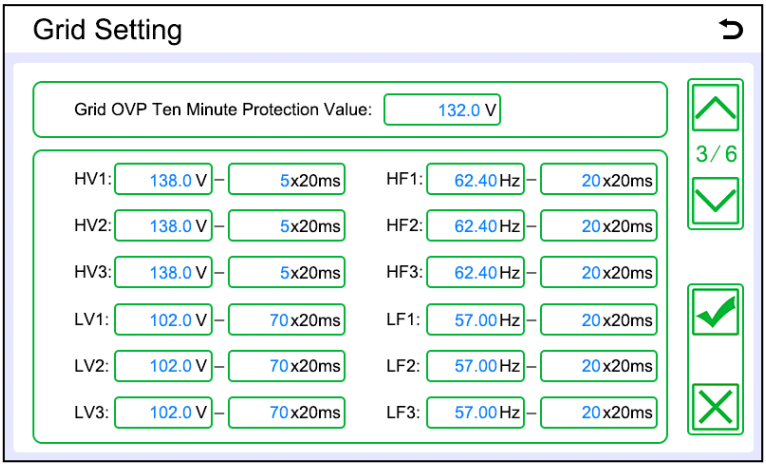
8.5.5 Mains power settings



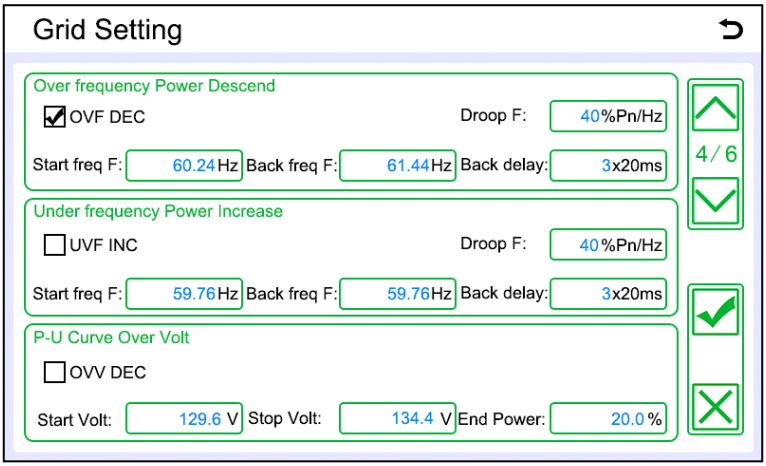
Parameter	Describe
Grid Mode	Switch to different power industry standards, please select according to local regulations;
Grid Voltage	The mains voltage value, and the power supply voltage to the load is also this value. Please adjust it according to local regulations. It is not recommended to adjust it separately.
Grid Frequency	The mains frequency value, and the power supply frequency to the load is also this value. Please adjust it according to local regulations. It is not recommended to adjust it separately.
Connect Time	The mains connection time is the time it takes for the inverter to detect and connect to the mains after normal startup;
Reconnect Time	Mains reconnection time is the time it takes for the inverter to reconnect to the mains after being disconnected from it;
Grid Type	1."Single Phase": The power output mode is output to single phase output; 2."120/240V Split Phase": The power output mode is output to split phase output ; "120/208V 3 Phase": Combined output three-phase electricity in parallel mode.

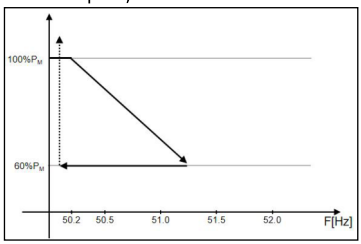
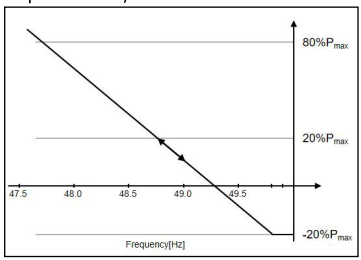


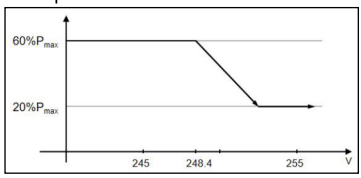
Parameter	Describe
Normal connect	When the inverter is turned on, the voltage frequency range and starting rate allowed for grid connection of the mains power;
Normal Ramp rate	The grid-connected power rise rate when the inverter is turned on;
Reconnect after trip	When the inverter is reconnected to the mains, the voltage and frequency range and startup rate allowed for grid connection;
Reconnect Ramp rate	The grid-connected power rise rate when the inverter is reconnected to the mains;
Low frequency	The lower frequency limit for allowing the mains to be connected to the grid;
High frequency	The upper limit of the frequency allowed for mains grid connection;
Low voltage	The lower voltage limit for connecting the mains to the grid
High voltage	The upper limit of voltage allowed for mains grid connection;
Active power %	The maximum active power limit ratio, which is the ratio of the selling power to the output power when connected to the grid;
Power drop rate	The rate of power reduction when reducing the limit ratio of the maximum active power sold;

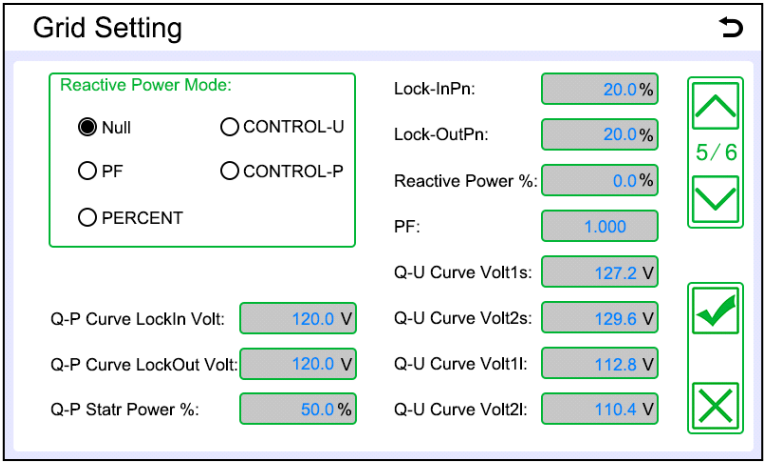


Parameter	Describe
Grid OVP Ten Minute Protection Value	Mains 10-minute overvoltage protection point;
Hv1, HV2, Hv3	Overvoltage protection points and protection times for mains power levels 1 to 3;
Lv1 ,LV2, Lv3	Mains power level 1 to 3 undervoltage protection points and protection times;
HF1,HF2 ,HF3	Over-frequency protection points and protection times for mains power levels 1 to 3;
LF1,LF2,LF3	Mains power level 1 to 3 under-frequency protection points and protection times;



Parameter	Describe
Over frequency Power Descend	Over-frequency load reduction setting is used to reduce the output power of the inverter when the mains frequency is too high; 1." OVF DEC " is the enabling option of this function, check it to enable this function; 2." Droop F " is the rate of descent when adjusting the inverter power; 3." Start freq F " is the frequency starting point for power adjustment; 4." Back freq F " ends the power adjustment recovery point and restores the original power frequency. If the value is 0.00Hz, the frequency of the original power is consistent with " Start freq F " ; 5." Back delay " is the delay time for restoring the original power; Taking the parameter setting in the above figure as an example, the functional diagram is as follows. The arrow is the running track of the mains power under the influence of frequency. The mains power starts to decrease after the frequency increases to the value of " Start freq F ", and the decrease rate is " Droop F ". After the power drops to 60% of the original power, the frequency starts to decrease. The power will not rise until the frequency returns to " Back freq F " ; 
Under frequency Power Increase	Under-frequency loading setting is used to increase the inverter output power when the mains frequency is too low; 1." UVF INC " is the enabling option of this function. Check it to enable this function. 2." Droop F " is the rate of descent when adjusting the inverter power; 3." Start freq F " is the frequency starting point for power adjustment; 4." Back freq F " ends the power adjustment recovery point and restores the original power frequency. If the value is 0.00Hz, the frequency of the original power is consistent with " Start freq F " ; 5." Back delay " is the delay time for restoring the original power; Taking the parameter setting in the above figure as an example, the functional diagram is as follows, and the arrow is the operating trajectory of the mains power under the influence of frequency. At the beginning, the inverter draws power from the grid at 20% of the rated power, and the mains frequency gradually decreases from 50Hz. When the frequency drops to 49.8Hz, the power draw begins to decrease. Finally, as the mains frequency continues to decrease, the inverter begins to output power to the mains at a ratio of 40%Pn/Hz; then the frequency gradually returns to normal, and the power also gradually recovers with the frequency. Finally, after the frequency rises to " Back freq F " , it switches to normal mode for power draw; 

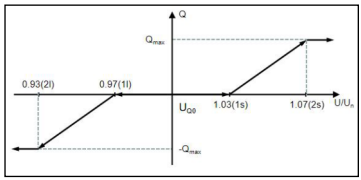
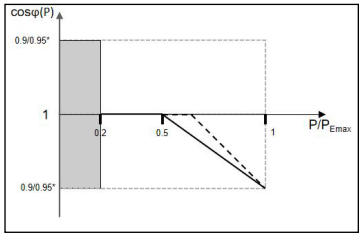
PU Curve Over Volt	Overvoltage load reduction curve setting is used to reduce the output power of the inverter when the mains voltage is too high; 1.“ OVV DEC ” is the enabling option of this function. Check it to enable this function. 2.“ Start Volt ” is the voltage starting point for overvoltage load reduction; 3.“ Stop Volt ” is the voltage stop point for overvoltage load shedding; 4.“ End Power ” is the stop power percentage of overvoltage load reduction. When the power reduction ratio reaches this value, it stops reducing. Taking the above figure as an example, the function diagram is as follows. The arrow is the running track of the mains power under the influence of voltage. The running power of the inverter is the rated power. 

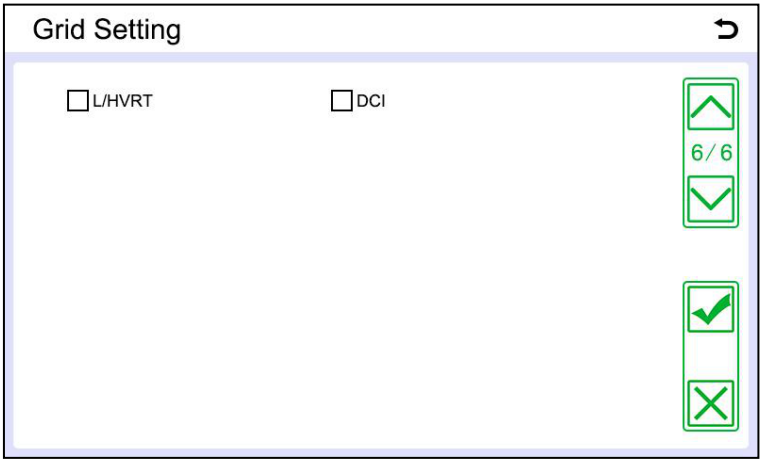


Parameter	Describe
Reactive Power Mode	Provides different modes for reactive power compensation 1.“ Null ” means this function is not enabled; 2.“ PF ” is to adjust reactive power according to power factor; 3.“ PERCENT ” is to adjust the reactive power according to the reactive power percentage; 4.“ CONTROL-U ” is to adjust the reactive power by means of QU characteristic curve control; “ CONTROL-P ” is to adjust the reactive power by cos ϕ -P/Pn characteristic curve control ;
Lock-InPn	When the inverter output power accounts for a larger proportion of the rated power than this value, the inverter will enter reactive power adjustment;
Lock-OutPn	When the inverter output power accounts for a larger proportion of the rated power than this value, the reactive power adjustment will be terminated;
Active Power%	Reactive power percentage;

PF	Power Factor;
QP Curve LockIn Volt	cos ϕ -P/Pn characteristic curve entry point;
QP Curve LockOut Volt	cos ϕ -P/Pn characteristic curve exit point;
QP Statr Power %	cos ϕ -P/Pn characteristic curve starting power as a percentage of the rated power;
QU Curve Volt1s	The lowest point at which the QU characteristic curve is adjusted above the rated voltage;
QU Curve Volt2s	The highest point at which the QU characteristic curve is adjusted above the rated voltage;
QU Curve Volt1l	The highest point of the QU characteristic curve when adjusted below the rated voltage;
QU Curve Volt2l	The lowest point at which the QU characteristic curve is adjusted below the rated voltage;

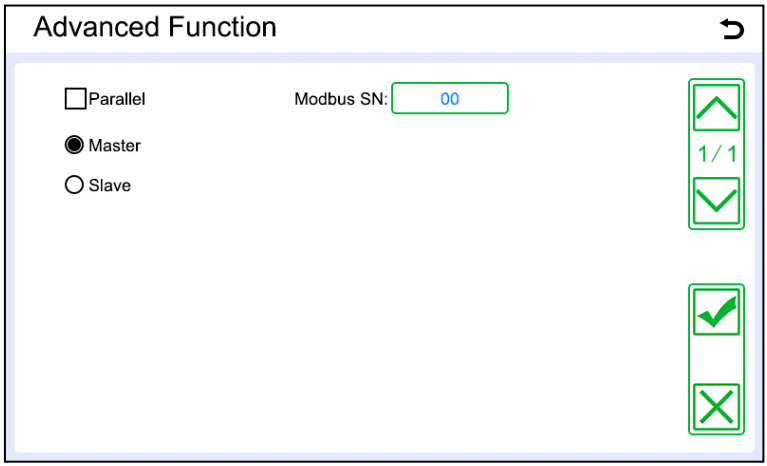
The reactive power compensation is adjusted as follows:

Reactive Power Mode	describe
PF	After entering reactive power adjustment, the reactive power is adjusted according to the power factor;
PERCENT	After entering reactive power adjustment, the reactive power is adjusted according to the reactive power percentage;
CONTROL-U	The QU characteristic curve is as shown in the figure below. When the floating value of the mains voltage and the rated voltage is between 1.03 and 1.07 (QU Curve Volt1s~QU Curve Volt2s) or between 0.97 and 0.093 (QU Curve Volt1l~QU Curve Volt2l), the reactive power is adjusted according to " Peactive Power% " . When the floating value is greater than 1.07 or less than 0.93, the reactive power maintains the maximum value Q max ; 
CONTROL-P	cos ϕ -P/Pn characteristic curve 



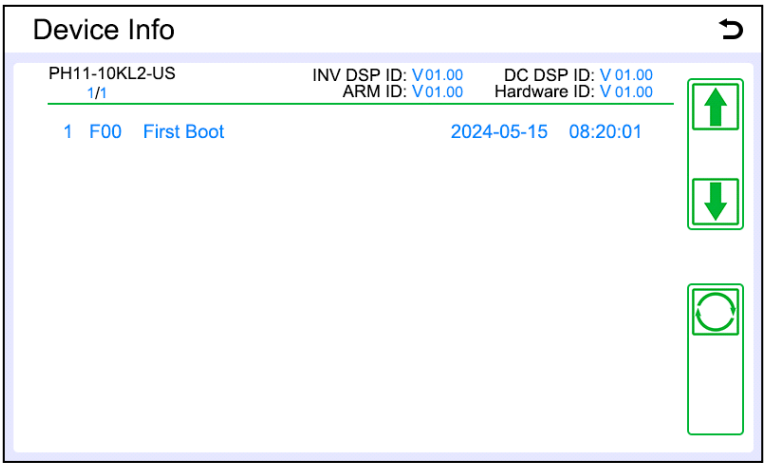
Parameter	Describe
L/HVRT	High and low voltage ride through;
DCI	DC current suppression;

8.5.6 Advanced function settings



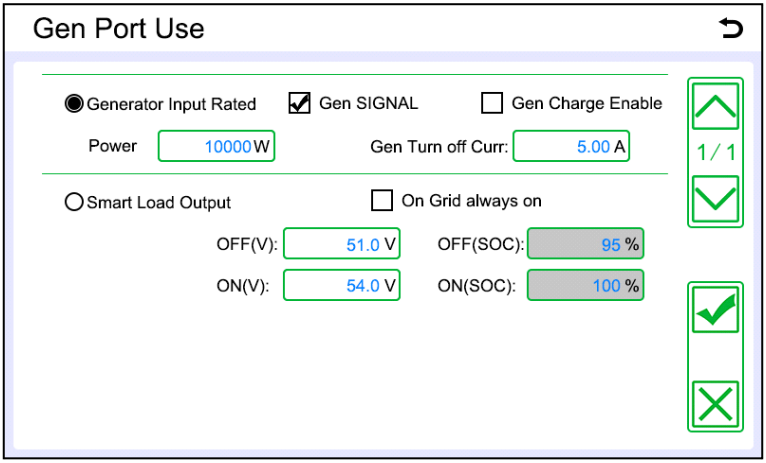
Parameter	Describe
Parallel	Enable parallel mode. Check this box to start the parallel mode.
Master, Slave	In parallel mode, select the master or slave;
Modusv SN	Address allocation in parallel mode;

8.5.7 Device Information Interface



Parameter	Describe
INV DSP ID	The software version of the chip inside the inverter;
DC DSP ID	The software version of the chip inside the inverter;
ARM ID	The software version of the chip inside the inverter;
Hardware ID	Inverter hardware version;

8.5.8 Set up the generator interface



Parameter	Describe
Gen SIGNAL	Generator dry contact enable option, check it to turn on the generator dry contact function;
Gen Charge Enable	The generator can charge the battery. Check this option to enable this function.
Generator Input Rated Power	Use this function according to the rated power of the generator;
Gen Turn off Curr	Generator shutdown current;
Smart Load Output	Smart load mode is turned on when the battery voltage or battery SOC is between preset values. When using the generator interface as output;
On Grid always on	Use smart load mode on mains;
OFF/ON(V)	The battery voltage preset value when the smart load mode is turned on is effective in non-lithium battery mode;
OFF/ON(SOC)	The battery SOC preset value when the smart load mode is turned on is effective in lithium battery mode;

9 Troubleshooting

Error code	Describe	Suggestion
01	Internal communication failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
02	BMS communication failure	1.Check whether the BMS communication interface connection is normal and re-plug the BMS communication line. 2.If the error message persists, contact the installing contractor or supplier.
03	Inverter current TZ fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
04	PV current TZ fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
05	Battery current TZ fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
06	Inverter overcurrent fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
07	Battery overcurrent fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
08	PV overcurrent fault	1.Check whether the PV voltage exceeds the inverter input voltage range. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
09	Busbar overvoltage fault	1.Check whether the PV voltage exceeds the inverter input voltage range. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
10	Busbar low voltage fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
11	Battery overvoltage fault	1.Check whether the battery voltage is normal. 2.Restart the inverter. 3. If the error message persists, contact the installing contractor or supplier.
12	Battery low voltage fault	1.Check whether the battery voltage is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
13	Grid voltage failure	1.Check whether the grid voltage is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
14	Grid frequency failure	1.Check whether the grid frequency is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.

15	Inverter voltage failure	1.Check if the load is overloaded or short-circuited. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
16	PV overvoltage fault	1.Check whether the PV voltage is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
17	Load overload fault	1.Check if the load is overloaded or short-circuited. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
18	PV overload fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
19	Ambient temperature over temperature fault	1.Check the installation environment. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
20	AC side over temperature fault	1.Check the installation environment. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
21	Transformer overtemperature fault	1.Check the installation environment. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
22	DC side over temperature fault	1.Check the installation environment. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
23	DCI High Fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
24	GFCi High Fault	1.Check the solar wiring for damage. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
25	Insulation resistance fault	1.Check the solar wiring for damage. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
26	Ground Fault	1.Check the ground connection. 2.Check the grid L/N connection. 3.Restart the inverter. 4.If the error message persists, contact the installing contractor or supplier.

27	Inverter side electrical appliance failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
28	Grid side relay failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
29	Bypass side relay failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
30	Generator side relay failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
31	Generator voltage failure	1.Check whether the generator voltage is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
32	Generator frequency failure	1.Check whether the generator voltage is normal. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
33	Parallel CAN communication failure	1.Check whether the parallel communication interface is connected normally and re-plug the parallel communication cable. 2.If the error message persists, contact the installing contractor or supplier.
34	Parallel synchronization failure	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
35	Parallel ID conflict fault	1.Check whether the inverter parallel ID is correct. 2.If the error message persists, contact the installing contractor or supplier.
36	Phase sequence fault of parallel mains	1.Check whether the connection between the AC power and the inverter is correct. 2.Restart the inverter. If the error message persists, contact the installing contractor or supplier.
41	Balance BUS current TZ fault (BusOcpTzFault)	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
42	BuckBoos Current TZ Fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.

43	Balance BUS overcurrent fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
44	BuckBoos overcurrent fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
45	Phase sequence fault	1.Check whether the connection between the AC power and the inverter is correct. 2.Restart the inverter. 3.If the error message persists, contact the installing contractor or supplier.
46	ADC Offset fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.
47	Password fault	1.Restart the inverter. 2.If the error message persists, contact the installing contractor or supplier.

Alarm code	Describe	Suggestion
1	Grid discharge power limit	1. Check whether the grid voltage is normal.
2	Over frequency load shedding	1. Check whether the grid frequency is normal.
3	Under frequency loading	1. Check whether the grid frequency is normal.
4	Overvoltage load reduction	1. Check whether the grid voltage is normal.
5	Temperature derating	1. Check the installation environment
6	Fan Warning	1. Check the fan.
07	Low battery warning	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
17	BMS voltage high	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
18	BMS voltage low	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
19	BMS charging overcurrent	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
20	BMS discharge overcurrent	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
21	BMS temperature is high	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
22	BMS temperature is low	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
23	BMS short circuit	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
24	BMS system failure	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.
25	BMS other faults	1.Check the battery pack. 2.Set the inverter parameters according to the battery pack parameters for operation.

Note: If the suggestions do not work, please contact the installation contractor or supplier

10Maintenance and Cleaning

10.1 Check heat dissipation

If the inverter frequently reduces its output power due to high temperature, please improve the heat dissipation conditions. The radiator may need to be cleaned as part of this process.

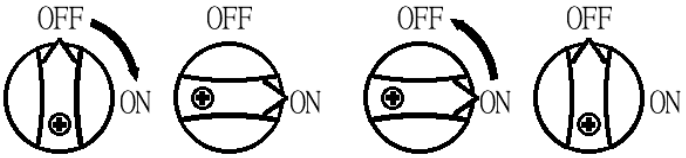
10.2 Clean the inverter

If the inverter is dirty, please turn off the AC circuit breaker and DC switch and wait for the inverter to shut down, then use a damp cloth only to clean the case cover, display and LCD. Do not use any cleaning agents. (e.g. solvent or abrasive)

10.3 Check DC disconnection

Periodically inspect circuit breakers and cables for externally visible damage and discoloration. If there is any obvious damage to the circuit breaker, or if the cables are noticeably discolored or damaged, contact a professional for repair.

Once a year, turn the rotary switch of the DC switch from the ON position to the OFF position 5 times continuously. This cleans the rotary switch contacts and extends the electrical life of the DC disconnect device.



11retired

11.1 Disassemble the inverter

(1) Disconnect the inverter from the power grid, photovoltaic, and battery.

(2) Remove all connecting cables from the inverter.

(3) Unscrew any protruding cable glands.

(4) Lift the inverter from the bracket and unscrew the bracket screws.

WARNING

Risk of burns due to hot housing parts!
Wait 20 minutes for the casing to cool before disassembling.

11.2 Inverter packaging

If possible, be sure to pack the inverter in its original carton and secure it with tension straps. You can also use equivalent cartons if they are no longer available. The box must be able to close completely and support the weight and size of the inverter.

11.3 Storage of inverter

Store the inverter in a dry place where the ambient temperature is always between -25°C and +60°C.

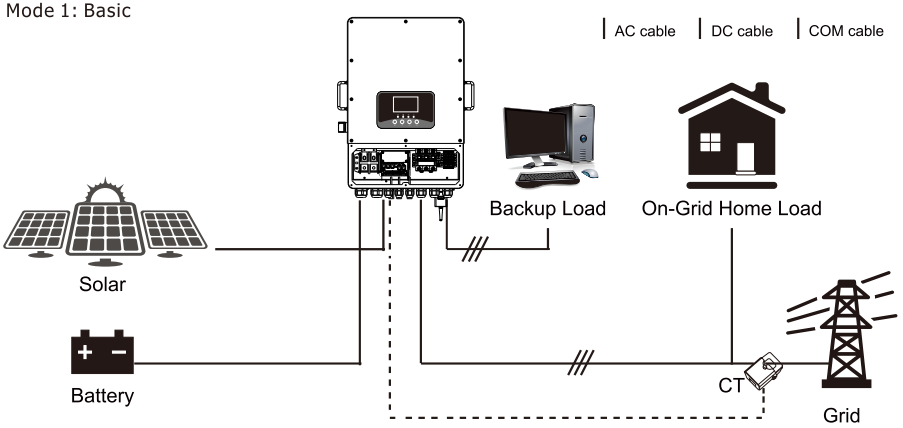
11.4 Disposal of inverter

Do not dispose of faulty inverters or accessories with household waste. Please observe the electronic waste disposal regulations applicable at the installation site at the time. Make sure old equipment and all accessories are disposed of in an appropriate manner.

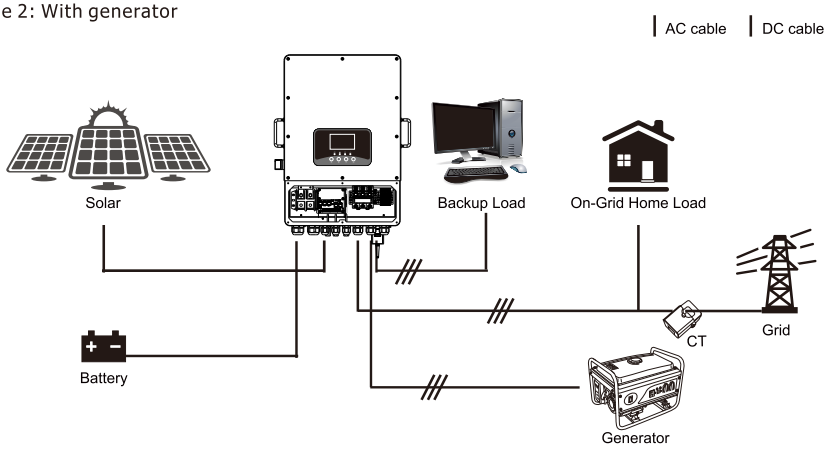
12 working mode

According to different working conditions, the energy storage inverter mainly has the following working states.

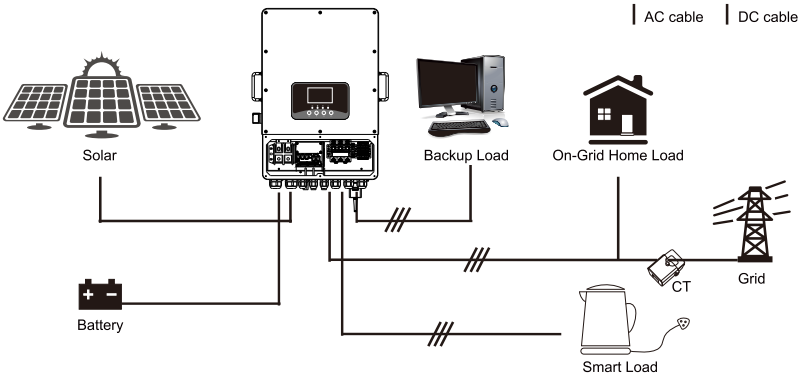
Mode 1: Basic



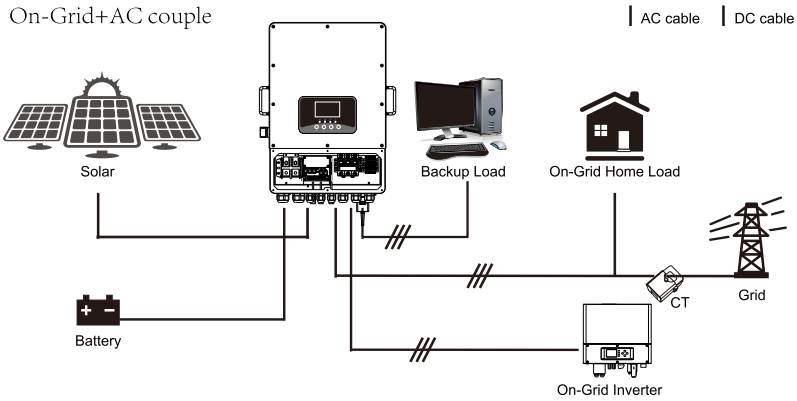
Mode 2: With generator



Mode 3: with smart load



Mode 4: AC coupling



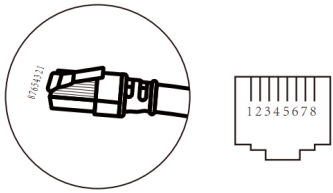
CAUTION

The first priority power source for the system is always the photovoltaic power source, then depending on the settings the second and third priority power sources will be the battery bank or the grid. The last backup power source will be a generator if available.

13 Interface definition

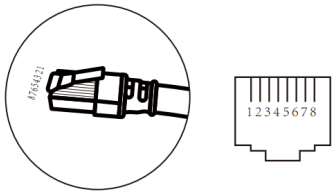
Meter-485

NO	Meter-485
1	Meter_485_B
2	Meter_485_A
3	GND.S
4	--
5	--
6	GND.S
7	Meter_485_A
8	Meter_485_B



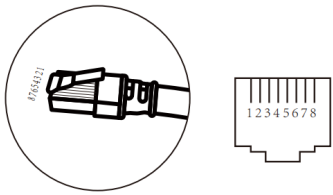
Mode BUS

NO	Mode BUS
1	WIFIRS485-
2	WIFIRS485+
3	GND.S
4	--
5	--
6	GND.S
7	WIFIRS485+
8	WIFIRS485-



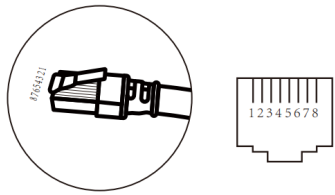
BMS

NO	BMS
1	BMS485-
2	BMS485+
3	GND.S
4	CANH
5	CANL
6	GND.S
7	BMS485+
8	BMS485-



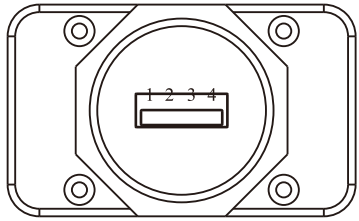
DRMS

NO	DRMS
1	DRM1/5
2	DRM2/6
3	DRM3/7
4	DRM4/8
5	REF
6	COM
7	--
8	--



WIFI

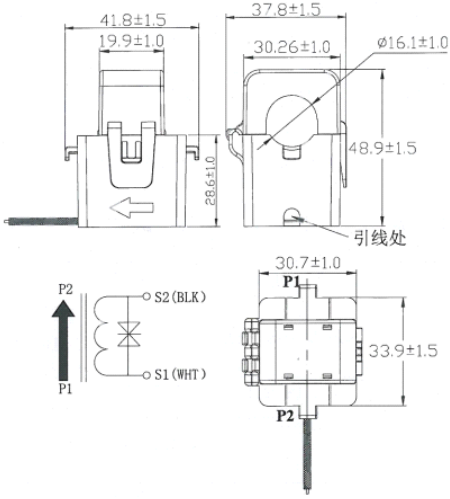
NO	WIFI
1	VCC
2	RS485B/-
3	RS485A/+
4	GND.S



14 CT

1.Split Core Current Transformer (CT) dimension: (mm)

2.Secondary output cable length is 4m.



15 Technical parameters

MODEL	PH11-5KL2-US	PH11-6KL2-US	PH11-8KL2-US	PH11-10KL2-US
Rated power	5000W	6000W	8000W	10000W
BATTERY INPUT DATA				
Battery type	Lead-acid battery/lithium battery			
Battery voltage	48V			
Battery voltage range	40~64V			
Charging curve	3-stage adaptive with maintenance/Equalization			
Charging Strategy for Li-Ion Battery	Self-adaption to BMS			
Over-current protection/Over-temperature protection	Yes/Yes			
Maximum charging/discharging power	5000W	6000W	8000W	10000W
Maximum charging/discharging current	120A	135A	190A	220A
PV STRING INPUT DATA				
Max. DC Input Power	6500W	7800W	10400W	13000W
Maximum DC voltage	600V			
Start-up Voltage	125V			
Full Load DC Voltage Range	150~540V			
Rated PV Input Voltage	370V			
Minimum voltage for grid connection	150V			
Enter high voltage error recovery point	600V			
Maximum input current	16A/16A	16A/16A	32A/16A	32A/16A
No.of MPP Trackers	2	2	2	2
Input terminal type	H4/MC4			
AC INPUT/OUTPUT DATA				
Rated AC Input/Output Power	5000W	6000W	8000W	10000W
Max AC Input/Output Power	5000W	6000W	8000W	10000W
AC Input/Output Rated Current	20.8A/19.2A	25A/23A	33.3A/30.7A	41.6A/38.4A
Rated Input/Output Voltage/ Range	120V/240V:208V			
Rated Input/Output Grid Frequency/ Range	60Hz±5Hz/50Hz±5Hz			
Rated output power factor	1			
Power Factor Adjustment Range	0.8 leading to 0.8 lagging			
Total Harmonics Current Distortion (THDi)	＜3%			
Grid Type	Split Phase			
DC Current Injection	＜0.5%			

EFFICIENCY	
Max. Efficiency	97.5%
Euro Efficiency	96.5%
MPPT Efficiency	99.5%
PROTECTION	
Integrated	Islanding protection, Output overcurrent protection, Output overvoltage protection,PV input polarity reverse protection, DC Switch (optional), Ground Fault Sensing,leakage current monitoringprotection
Surge Protection	DC Type III/AC Type III
Overvoltage Category	DC Type II/AC Type III
GENERAL DATA	
Operating Temperature Range (°C)	-25°C~+60°C, >45°C Derating
Cooling	Fan cooling
Noise (dB)	≤50dB
Altitude	3000m, >3000mDerating
Topology	Battery-side transformer isolation, PV-side non-transformer isolation
Communication	USB/ WiFi/ Enternet(optional)
Display	4.3-inch touch screen
Protection Degree	Ip66
Installation Style	Wall-mounted
MECHANICAL SPECIFICATIONS	
Machine Dimension (W*H*D)(mm)	446*692*260 (excluding connectors and racks)
Package Dimension (W*H*D)(mm)	816*404*567
N.W(kg)	38
G.W(kg)	42
Warranty	5 Year the Warranty Period Depends the Final Installation Site of Inverter, More Info Please Refer to Warranty Policy
CERTIFICATION & STANDARDS	
NBT32004-2013	

16 Contact information

If you have technical questions about our products, please contact your installation contractor or supplier. We need the following information to provide you with the necessary assistance:

Inverter type;

Inverter error message; inverter LED&LCD display;

Type and number of connected PV modules; optional equipment.

GUARANTEECERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		

GUARANTEECERTIFICATE

Serial No.: _____

Customer`s Name				Contact Person	
Address				Telephone No.	
Product/Model:		Post Code		Fax No.	
Date of purchase			Expire Date		
Dealer Signature			Customer Signature		