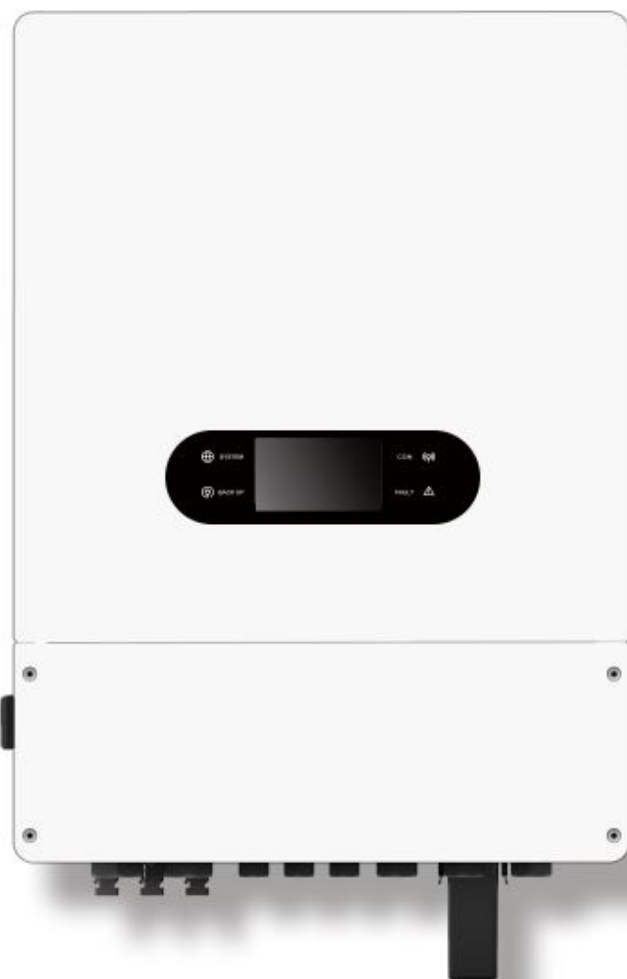


Hybrid Inverter

5/6/7/8/10/12KS48P3



Operating
Manual

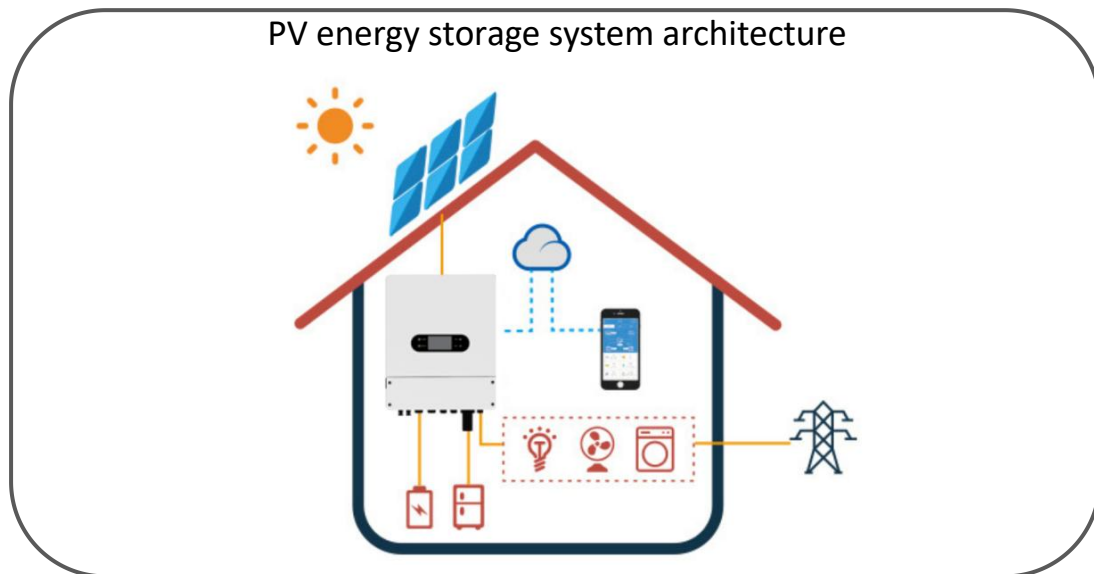
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Hybrid inverter series, also called hybrid or bidirectional solar inverters, apply to solar system with participation of PV, battery, loads and grid system for energy management. The energy produced by PV system shall be used to optimize self-consumption, excess power charge battery and the rest power could be exported to the grid.

Battery shall discharge to support loads when PV power is insufficient to meet self-consumption. If battery power is not sufficient, the system will take power from grid to support loads.



1.1 SAFETY & WARNING

This series of bidirectional energy storage inverters strictly abides by relevant product design and testing safety rules. During installation, operation or maintenance, please carefully read all instructions and precautions on the inverter or user manual. Any improper operation may cause personal or property damage.

• SYMBOLS EXPLANATION

	Caution! Failing to observe a warning indicated in this manual may result in injury.
	DANGER High voltage hazard. Disconnect all incoming power and turn off the product before working on it.
	Danger of hot surface! High-temperature hazard. Do not touch the product under operation to avoid being burnt.
	This side up! The package must always be transported, handled and stored in such away that the arrows always point upwards.

	Product should not be disposed as household waste. Do not dispose of the inverter as household waste. Discard the product in compliance with local laws and regulations or send it back to the manufacturer
	Grounding point.
	Read through the user manual before any operations
	Keep dry! The package/product must be protected from excessive humidity and must be stored under cover.
	Inverter will be touchable or operable after minimum 5 minutes of being turned off or totally disconnected, in case of any electrical shock or injury.

• SAFETY WARNING

Any installation and operation on inverter must be performed by qualified electricians, in compliance with standards, wiring rules or requirements of local grid authorities or companies.

Before any wiring connection or electrical operation on inverter, all DC and AC power must be disconnected from inverter for at least 5 minutes to make sure inverter is totally isolated to avoid electric shock.

The temperature of inverter surface might exceed 60 °C during working, so please make sure it is cooled down before touching it, and make sure the inverter is untouchable for children.

Do not open inverter cover or change any components without authorization, otherwise the warranty commitment for the inverter will be invalid.

Usage and operation of the inverter must follow instructions in this user manual, otherwise the protection design might be useless and warranty for the inverter will be invalid.

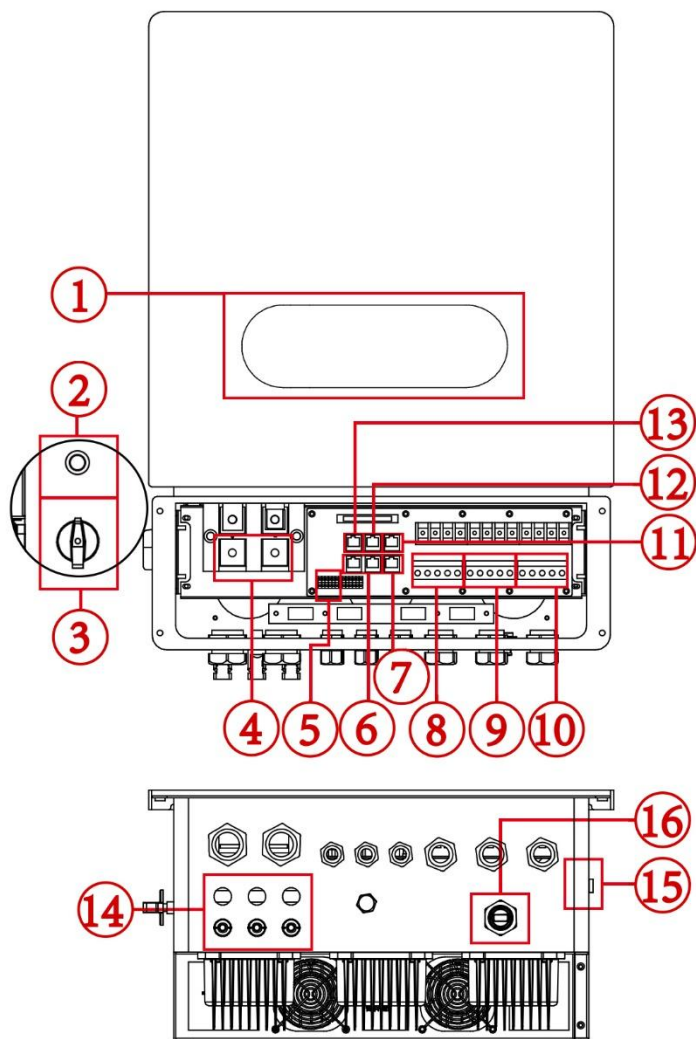
Appropriate methods must be adopted to protect inverter from static damage. Any damage caused by static is not warranted by manufacturer.

PV negative (PV-) on inverter side is not grounded as default design.

The total open-circuit voltage of PV string/array is lower than the maximum rated DC input voltage of the inverter. Any damage caused by PV over-voltage is beyond warranty.

When the inverter is working, it is prohibited to plug PV, battery, and AC connectors.

1.2 PRODUCT OVERVIEW



1. Panel
2. Power on/off button
3. DC Switch(Optional)
4. Battery input connectors
5. Function port
6. Parallel port
7. RS485 port
8. Gen Port
9. Back-Up Port
10. Grid Port
11. DRMs Port
12. BMS 485 Port
13. BMS CAN Port
14. PV Terminals
15. Ground location
16. Wi-Fi Box

• LED INDICATORS

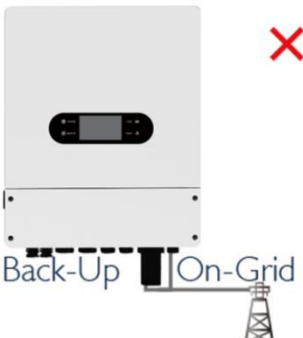
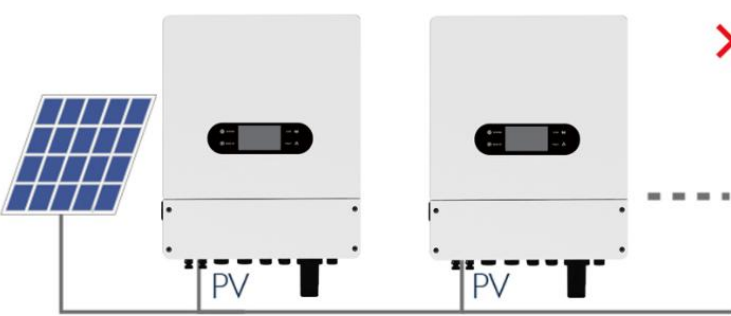
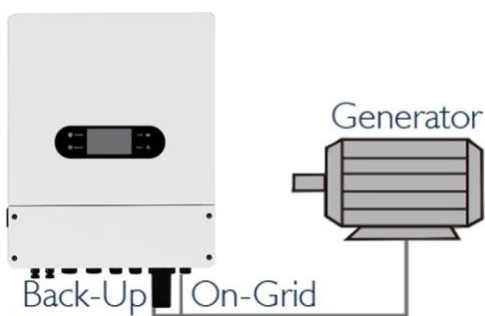
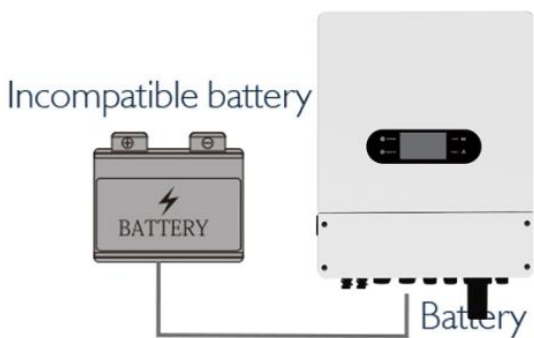
LED INDICATORS		
 SYSTEM		ON = SYSTEM IS READY
		BLINK = SYSTEM IS STARTING UP
		OFF = SYSTEM IS NOT OPERATING
 BACK-UP		ON = BACK-UP IS READY/POWER AVAILABLE
		BLINK = BACK-UP IS LOW
		OFF = BACK-UP IS OFF /NO POWER AVAILABLE
 COM		ON = BMS AND METER COMMUNICATION OK
		BLINK1 = METER COMMUNICATION OK BMS COMMUNICATION FAIL
		BLINK2 = BMS COMMUNICATION OK METER COMMUNICATION FAIL
		OFF = BMS AND METER COMMUNICATION FAIL
 FAULT		ON =FAULT HAS OCCURRED
		BLINK = OVERLOAD OF BACK-UP OUTPUT/ REDUCE LOAD
		OFF = NO FAULT

2

INSTALLATION INSTRUCTIONS

2.1 UNACCEPTABLE INSTALLATIONS

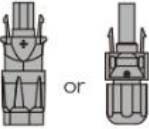
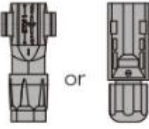
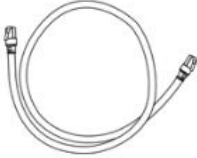
Please avoid the following installations, which will damage the system or the inverter.

	
BACK-UP SIDE CANNOT CONNECT TO GRID.	SINGLE PV STRING CANNOT CONNECT TO TWO OR MORE INVERTERS.
	
ON-GRID OR BACK-UP SIDE CANNOT CONNECT TO ANY AC GENERATOR.	CANNOT CONNECT TO INCOMPATIBLE BATTERIES.

2.2 PACKING LIST

On receiving the inverter, please check to make sure all the components as below are not missing or broken.

			
Inverter × 1	Wall-mounted Bracket I × 1	CT × 3	Data Collector × 1

			
Positive DC Plug×3	Negative DC Plug×3	Net cable×1	Battery terminal×2
			
Expansion Bolts×2	Hexagon head screw×2	Cold terminals×15	Hexagon head screw×2

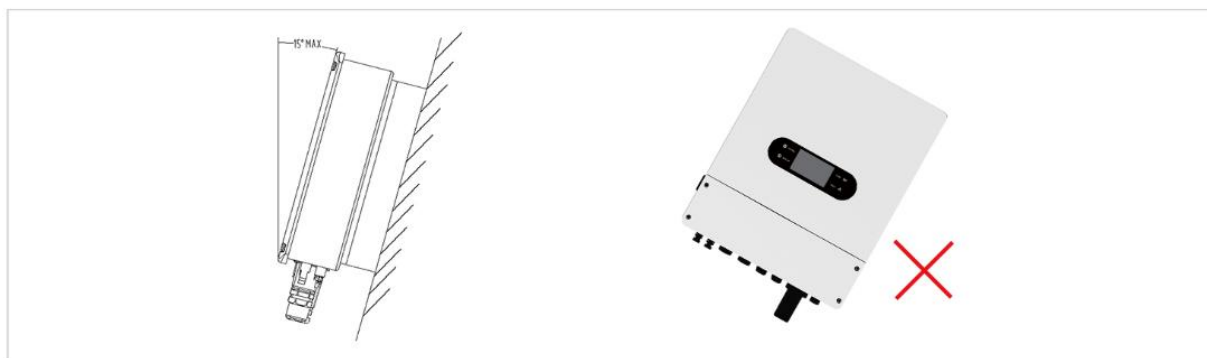
2.3 INSTALLATION

2.3.1 Installation location selection

For inverter's protection and convenient maintenance, mounting location for inverter should be selected carefully based on the following rules:

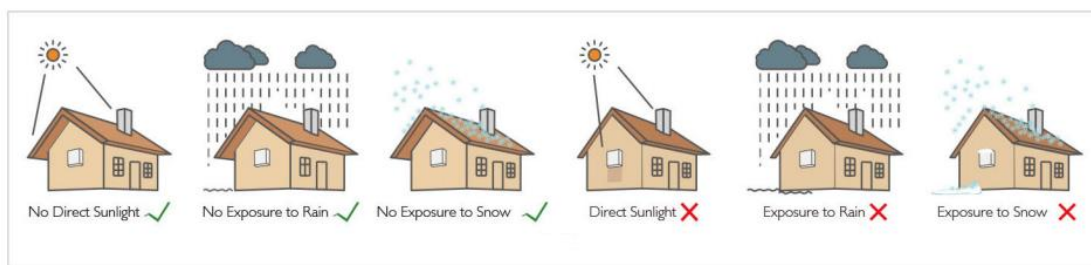
Rule1. Inverter should be installed on a solid surface, where is suitable for inverter's dimensions and weight.

Rule 2. Inverter installation should stand vertically or lie on a slope by max 15° .



Rule 3. Ambient temperature should be lower than 60°C

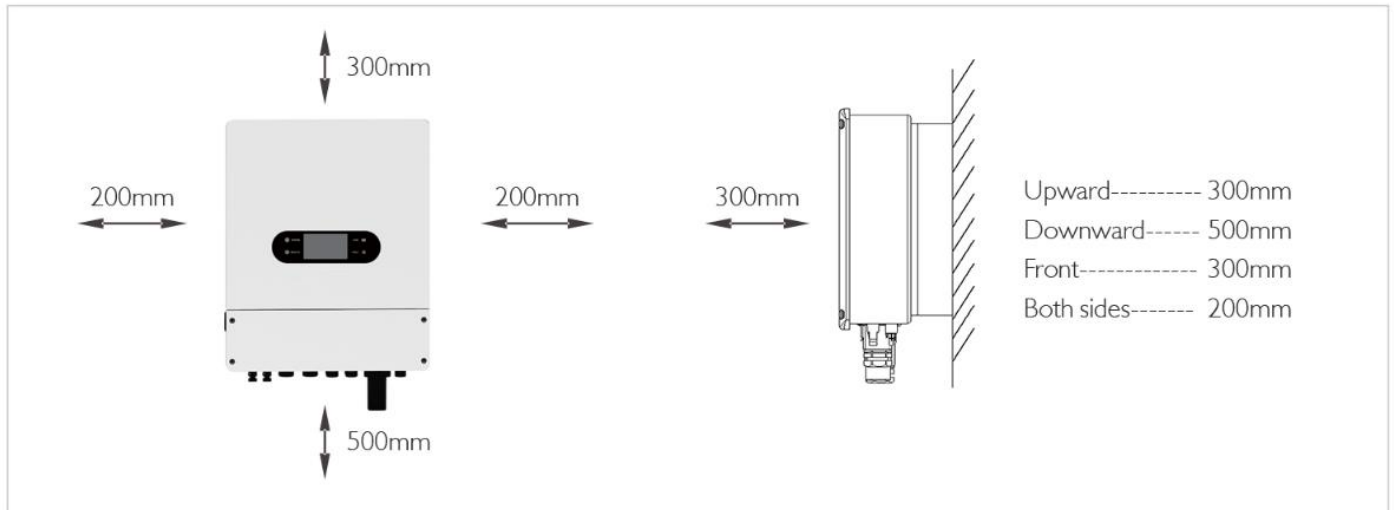
Rule 4. The installation of inverter should be protected under shelter from direct sunlight or bad weather like snow, rain, lightning etc.



Rule 5. Inverter should be installed at eye level for convenient maintenance.

Rule 6. Product label on inverter should be clearly visible after installation.

Rule 7. Leave enough space around inverter following the values on pic 3.



Inverter cannot be installed near flammable, explosive or strong electro-magnetic equipment.

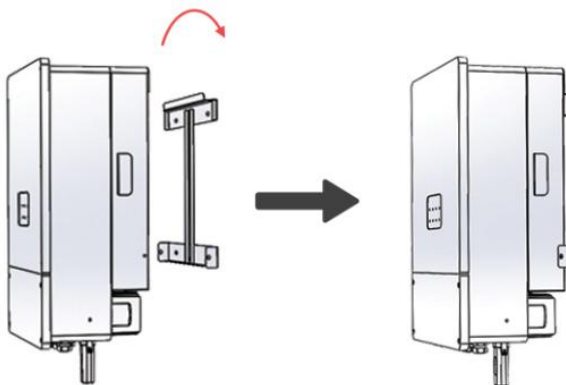
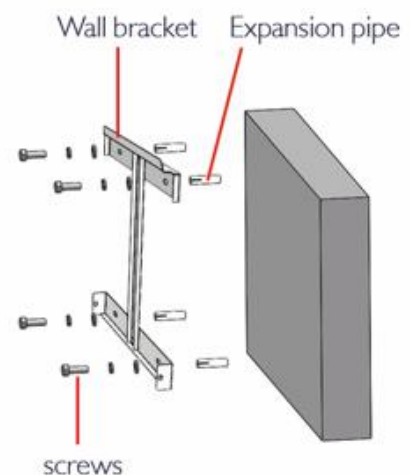
2.3.2 Installation

This inverter can only be installed on a flat surface.

Step1:

Please use the mounting bracket as a template to drill 2 holes on right positions (10mm in diameter, and 35mm in depth)
Use expansion bolts in accessory box and fix the mounting bracket onto the wall tightly

NOTE: Bearing capacity of the wall must be higher than 38KG, otherwise may not be able to keep inverter from dropping



Step2:

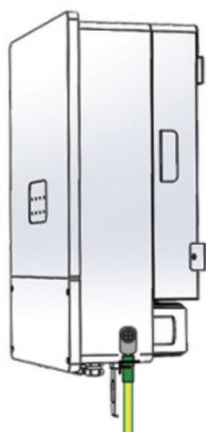
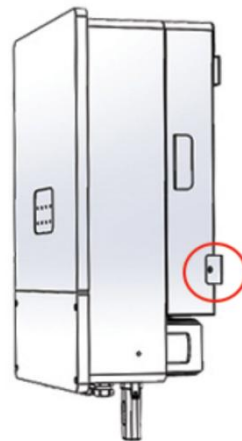
Carry the inverter by grabbing the radiator on both sides and secure the inverter to the mounting bracket.

NOTE: Make sure the heat sink on inverter is rightly joint with mounting bracket.

Step3:

Finally, screw fixation, both screws need to be fixed. Add anti-theft locks as needed

NOTE: Make sure the screws between the inverter and the fixing plate are tightened to prevent them from falling off.

**Step4:**

The ground cable should be connected to the ground location on the side.

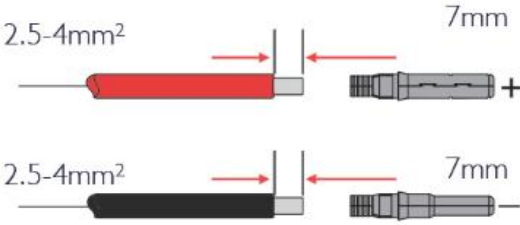
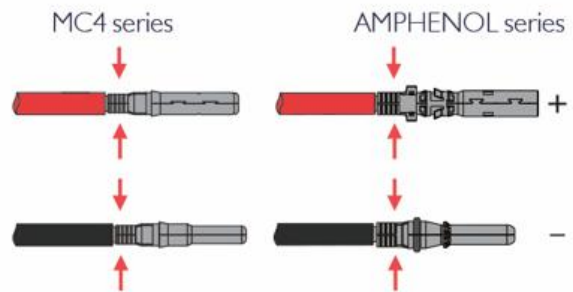
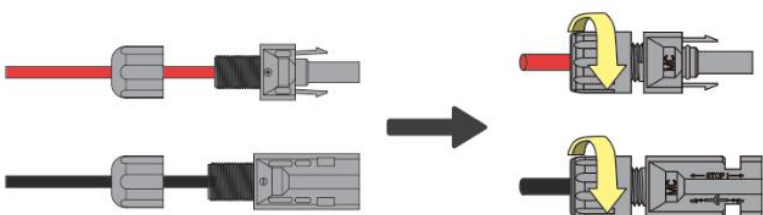
2.4 ELECTRICAL WIRING CONNECTION

2.4.1 PV CONNECTION

Before connecting PV panels/strings to inverter, please make sure requirements are followed as below :

- The total short-circuit current of PV string must not exceed inverter's max DC current
- The minimum isolation resistance to ground of the PV string must exceed $18.33k\ \Omega$ in case of any shock hazard
- PV strings could not connect to earth/grounding conductor
- Use the DC plugs in the accessory box

NOTE: There will be MC4 or Amphenol DC plugs in accessory box, the detailed connection as below:

Step1: Prepare PV cables and DC plugs.	Step2: Connect PV cable to DC connectors.
 NOTE: ● Please use DC plugs and connectors in accessory box ● PV cable should be standard, 2.5-4mm² PV cable	 NOTE: ● PV cable must be tightly crimped into the Connectors. ● For Amphenol connector, the limit buckle cannot be pressed.
Step3: Screw the cap on and plug onto inverter side.	
 NOTE: ● There will be a click sound if connectors are inset correctly into DC plugs	



The polarity of the PV string and the inverter cannot be reversed, otherwise the inverter may be damaged.

2.4.2 BATTERY CONNECTION

For lithium battery (pack) the capacity should be 100Ah or larger. Battery cable requirement as below.

	Grade	Description	Value
	A	OD	10-12mm
	B	Isolation section	NA
	C	Conductor Core	50-75mm ²

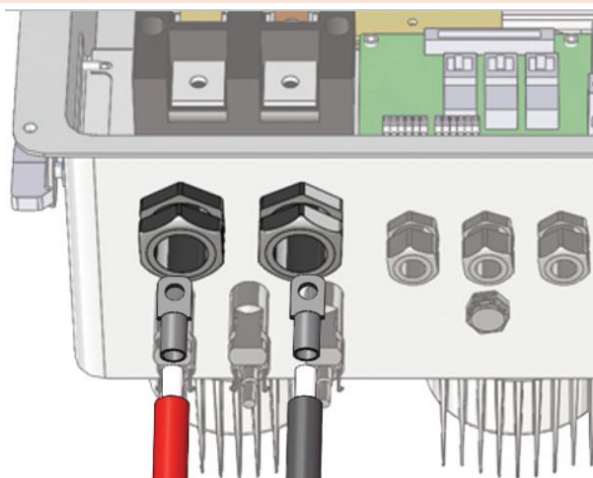
• Please be careful against any electric shock or chemical hazard

• Battery wiring connection steps as below:



Before connecting the battery to the inverter, ensure that the battery switch is turned off and the battery's nominal voltage reaches the product technical parameters, and ensure that the inverter is completely isolated from PV and AC power sources.

Step1: Prepare battery cables and accessories and put battery power cable through battery cover.



NOTE:

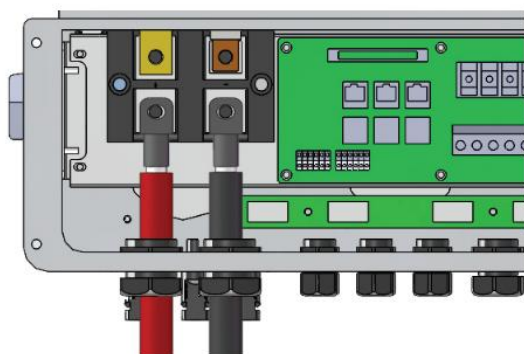
1. Please use accessories from box
2. Battery power cable should be 50~70mm²

Step2: Make battery terminals.



- Ribbon cable jacket, exposing 10mm long metal core. Use a special crimper to compress the battery terminals.

Step3: Connect battery terminals onto inverter.



NOTE:

Please make sure polarity (+/-) of battery are not reversed

•FOR LEAD-ACID BATTERIES

Lead-Acid and other similar older-technology battery types require experienced and precise design, installation and maintenance to work effectively.

For lead-acid battery bank, the inconformity between battery cells might lead to battery cell over-charge or discharge, and further might damage battery cells and shorten battery bank life.

For this series inverters there is no temperature compensation, thus customers need do battery settings based on the real working temperature of battery.

For lead-acid battery settings on App, please honestly refer to battery specifications and the actually battery work condition like work temperature and battery age. Unsuitable settings will lead to higher SOC deviation, weaker battery lifespan and further battery damage.

For lead-acid batteries, battery SOC calculation might not be so accurate result from like battery inconformity between cells, battery aging or other specifications of lead-acid battery etc.

We will keep the right for explanation on all the settings suggested and all the problems happened on lead-acid batteries or the whole system. And we are not responsible for any damage caused by unsuitable settings, battery beyond warranty or battery quality etc.

•BATTERY PROTECTION DESCRIPTION

Battery will act a protective charge/discharge current limitation under any condition as below:

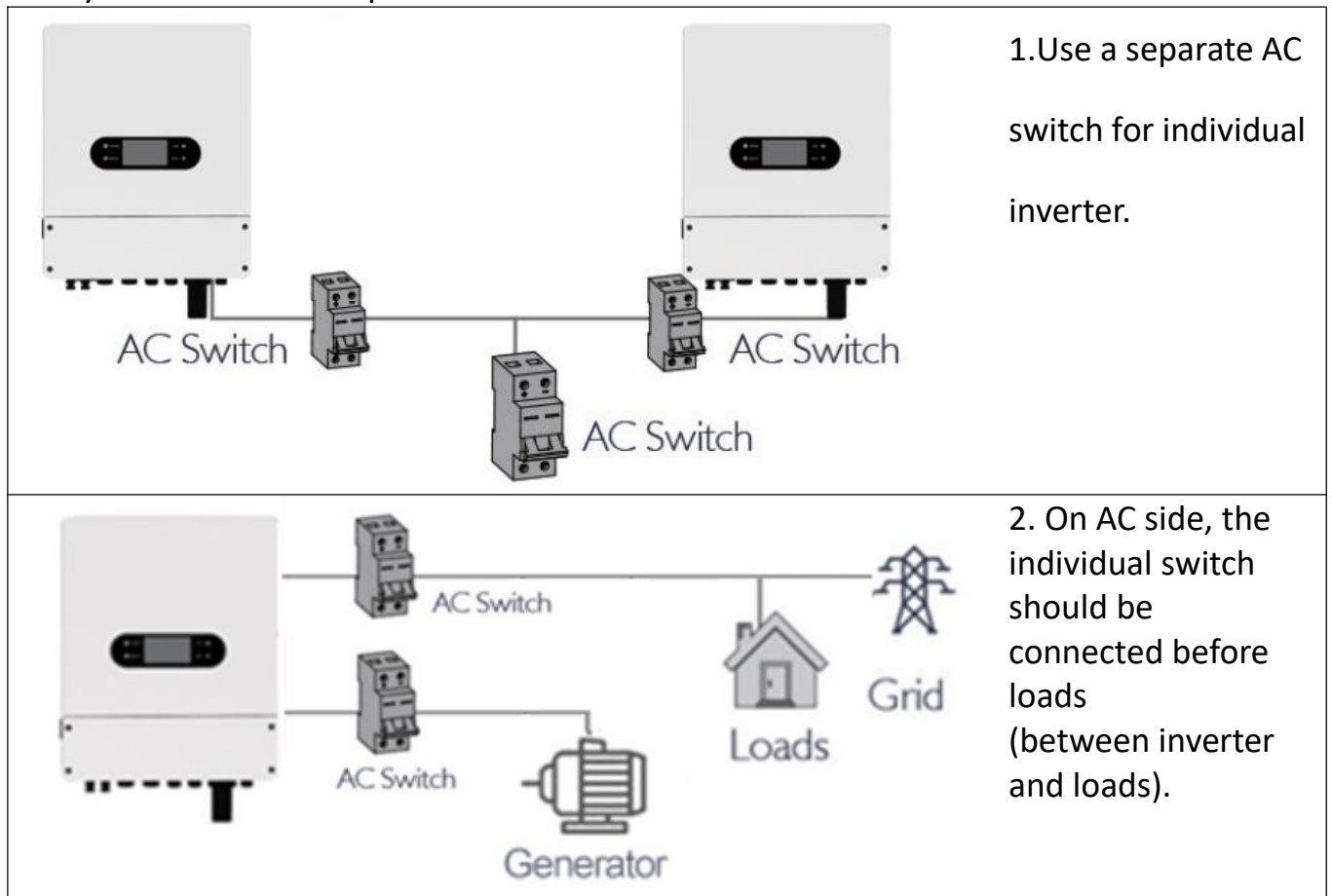
- Battery SOC is lower than SOC Protection
- Battery voltage lower than discharge Cut-off Voltage
- Battery over temperature protection
- BMS limitation for lithium battery

When charge/discharge current limitation protection happens:

- Under on-grid mode, battery charge/discharge operation could be abnormal
- Under off-grid mode, Back-Up supply will shut down

2.4.3 ON-GRID & BACK-UP & GEN CONNECTION

An external AC switch (>32A) is needed for On-Grid connection to isolate from grid when necessary. Below are the requirements on AC switch use:



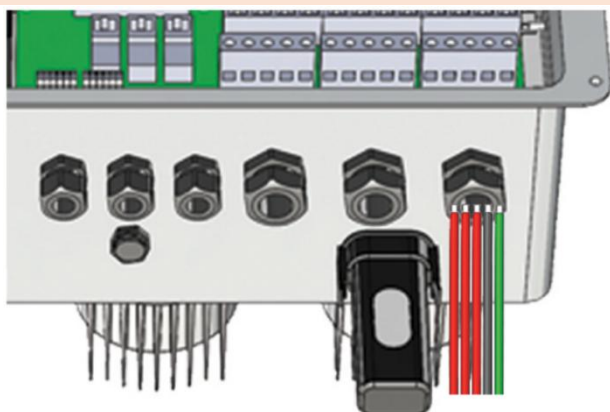
•On-Grid wiring connection process is as below:



Make sure inverter is totally isolated from any DC or AC power before connecting AC Cable.

Step1:

1. Prepare the terminals and AC cables.
2. Put AC cable through terminal cover and screw the five cables tightly on the connectors.



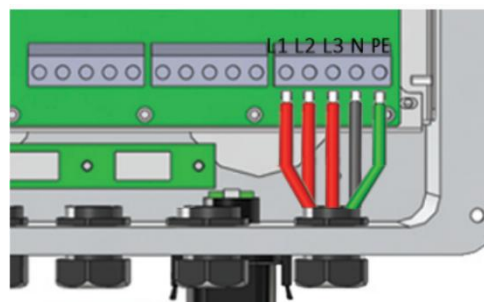
4mm² Copper Conductor Material

NOTE:

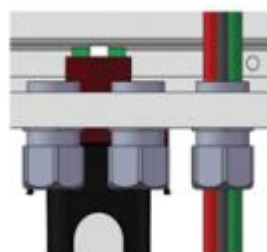
- Please use the terminals in components box;
- Make sure cable jacket is not locked with conductor

Step2: Lock terminal cover and screw up the terminal cap

Note: Make sure the terminal cover is rightly locked onto the terminal



Step3 : Connect the assembled AC terminals onto inverter.



Note: Make sure it is connected to 'On-Grid' side

•**Back-Up wiring connection process is as below:**

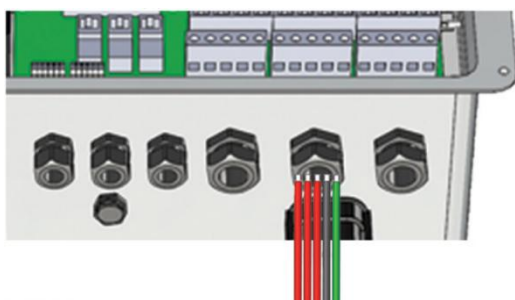
An external AC switch (>32A) is needed for Back-Up connection to be isolated when necessary.



The absence of AC breaker on Back-Up side will lead to inverter damage if only electrical short-circuit happened on Back-Up side. And Back-Up function cannot turn off under on-grid condition.

Step1:

1. Prepare the terminals and AC cables.
2. Put AC cable through terminal cover and screw the five cables tightly on the connectors.



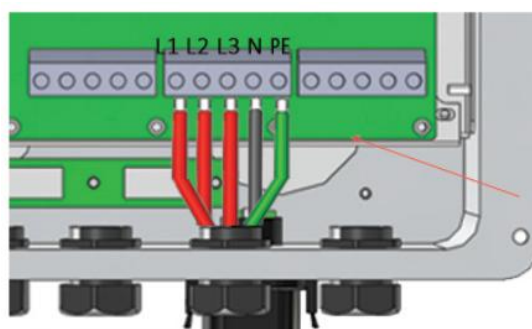
4mm² Copper Conductor Material

NOTE:

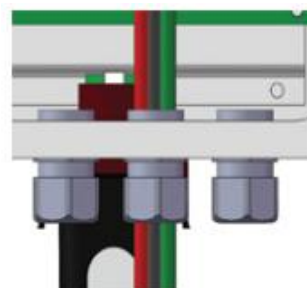
- Please use the terminals in components box;
- Make sure cable jacket is not locked with conductor

Step2: Lock terminal cover and screw up the terminal cap

Note: Make sure the terminal cover is rightly locked onto the terminal



Step3 : Connect the assembled AC terminals onto inverter.

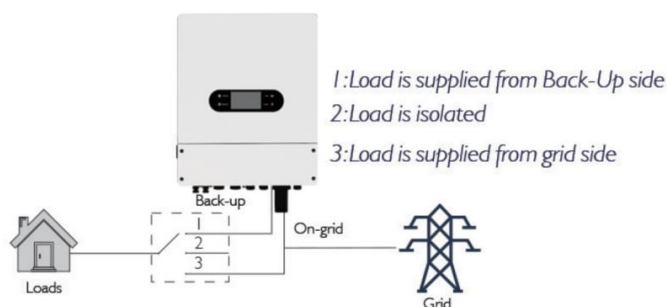


Note: Make sure it is connected to 'back-up' side

Declaration For Back-Up Loads

Inverter is able to supply a continuous rated power output or max twice the rated power in less than 15 seconds on Back-Up side to support Back-Up loads. And the inverter has self-protection derating at high ambient temperature.

For a convenient maintenance, a switch could be installed on Back-Up and On-Grid side. Then it is adjustable to support load by Back-Up or by grid or just leave it there



Declaration For Back-Up Overload Protection

Inverter will stop. you need to reduce the load and then operate the APP to “Overload Reset”

to clear the overload fault; or restart after a complete power outage.

•**GEN wiring connection process is as below:**

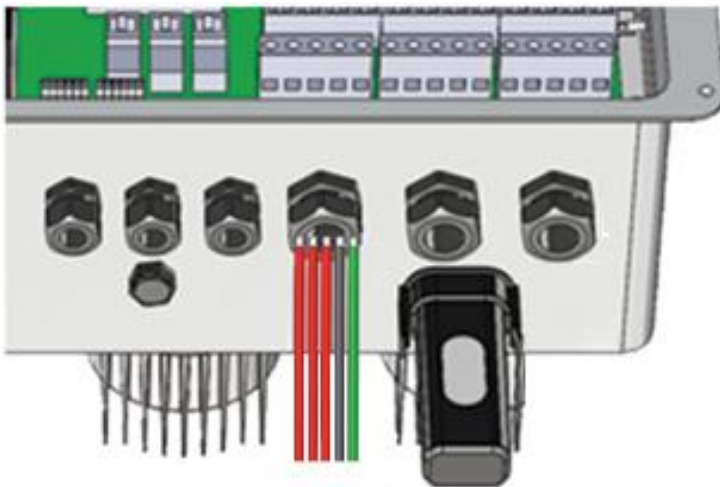
An external AC switch (>32A) is needed for Back-Up connection to be isolated when necessary.



The absence of AC breaker on GEN side will lead to inverter damage if only electrical short-circuit happened on Back-Up side.

Step1:

1. Prepare the terminals and AC cables.
2. Put AC cable through terminal cover and screw the five cables tightly on the connectors.



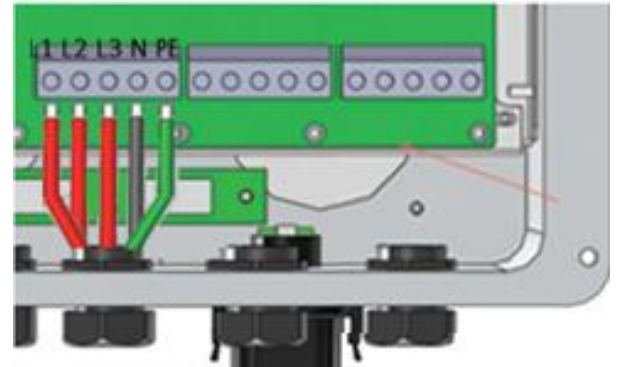
4mm² Copper Conductor Material

NOTE:

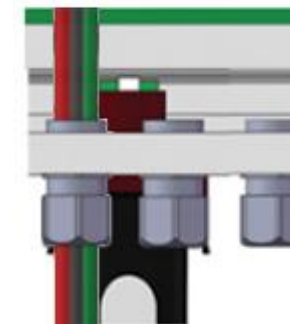
- Please use the terminals in components box;
- Make sure cable jacket is not locked with conductor

Step2: Lock terminal cover and screw up the terminal cap

Note: Make sure the terminal cover is rightly locked onto the terminal



Step3 : Connect the assembled AC terminals onto inverter.

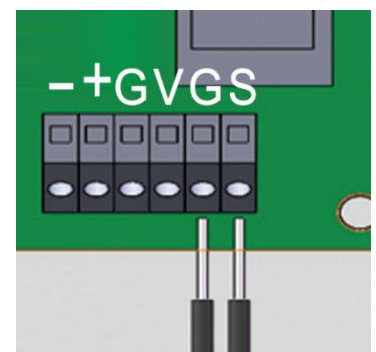
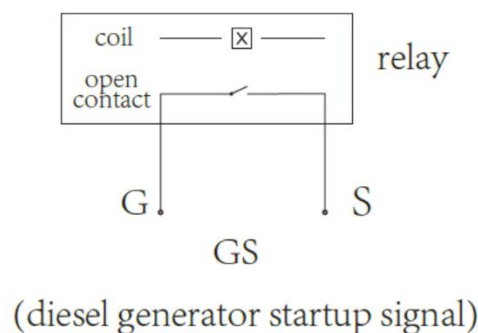


Note: Make sure it is connected to 'GEN' side

•**GS Indications**

GS: dry contact signal for startup the diesel generator.

When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).



Note: When the Smart Load Output function is turned on, the GEN port can be used as an output port to connect to the load. Smart load output or generator input functions cannot

be set simultaneously.

•CT Indications



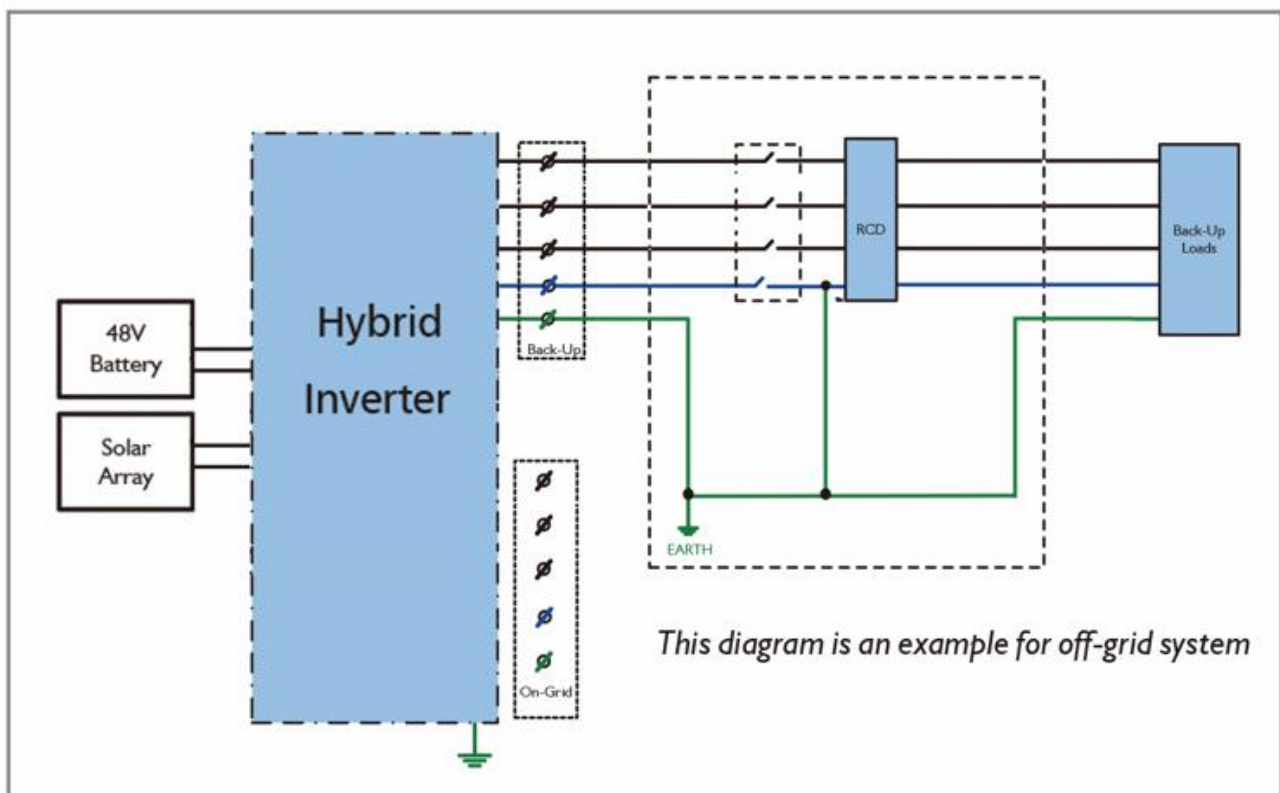
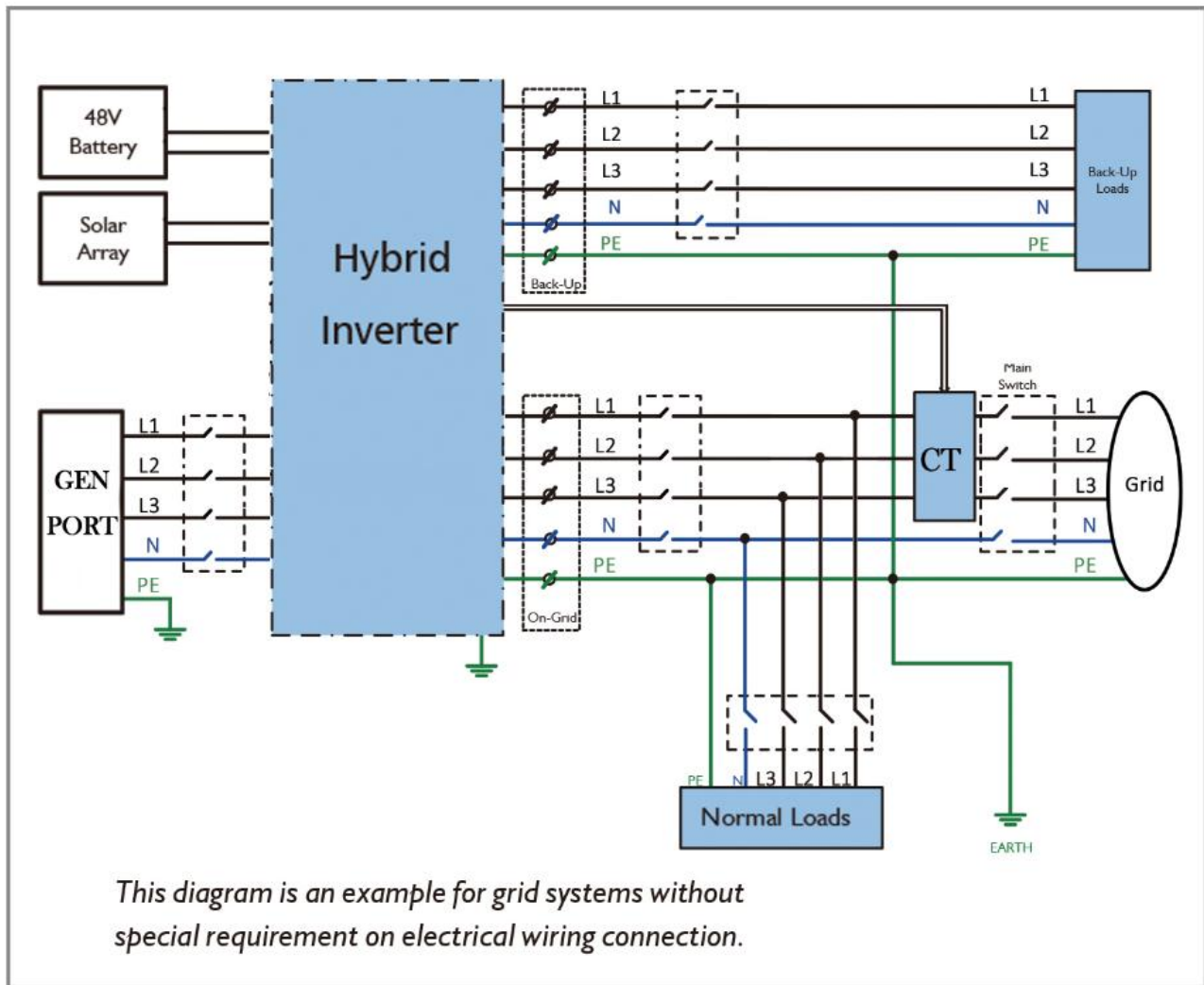
All work should be performed by trained and qualified operators using safe and suitable tools.

Since this product is a split type transformer, please pay attention to the cleanliness of the magnetic core surface during installation. If there is dirt on the core surface, the accuracy of the product will be deteriorated.

1. Before the transformer is connected to any equipment, please ensure that the circuit is powered off to prevent clicks.
2. Open CT, see figure 1.
3. Clip the CT on the cable under test. Make sure that the maximum current in the wiring does not exceed the maximum input current of the CT; The current flows in the direction of the arrow on the CT housing.
4. Fasten the CT again, the cable under test should be inside the CT window now (see figure 2)
5. Fix the CT on the cable under test with nylon cable ties to prevent the CT from sliding see figure 3)
6. Connect the CT output white wire to the positive terminal of the measuring device, and the CT output black wire to the negative terminal of the measuring device (see figure 4).
7. After checking that the circuit is correct, turn on the power and the CT starts to measure the current in the circuit.

figure 1	figure 2	figure 3	figure 4
			

•SYSTEM CONNECTION DIAGRAMS



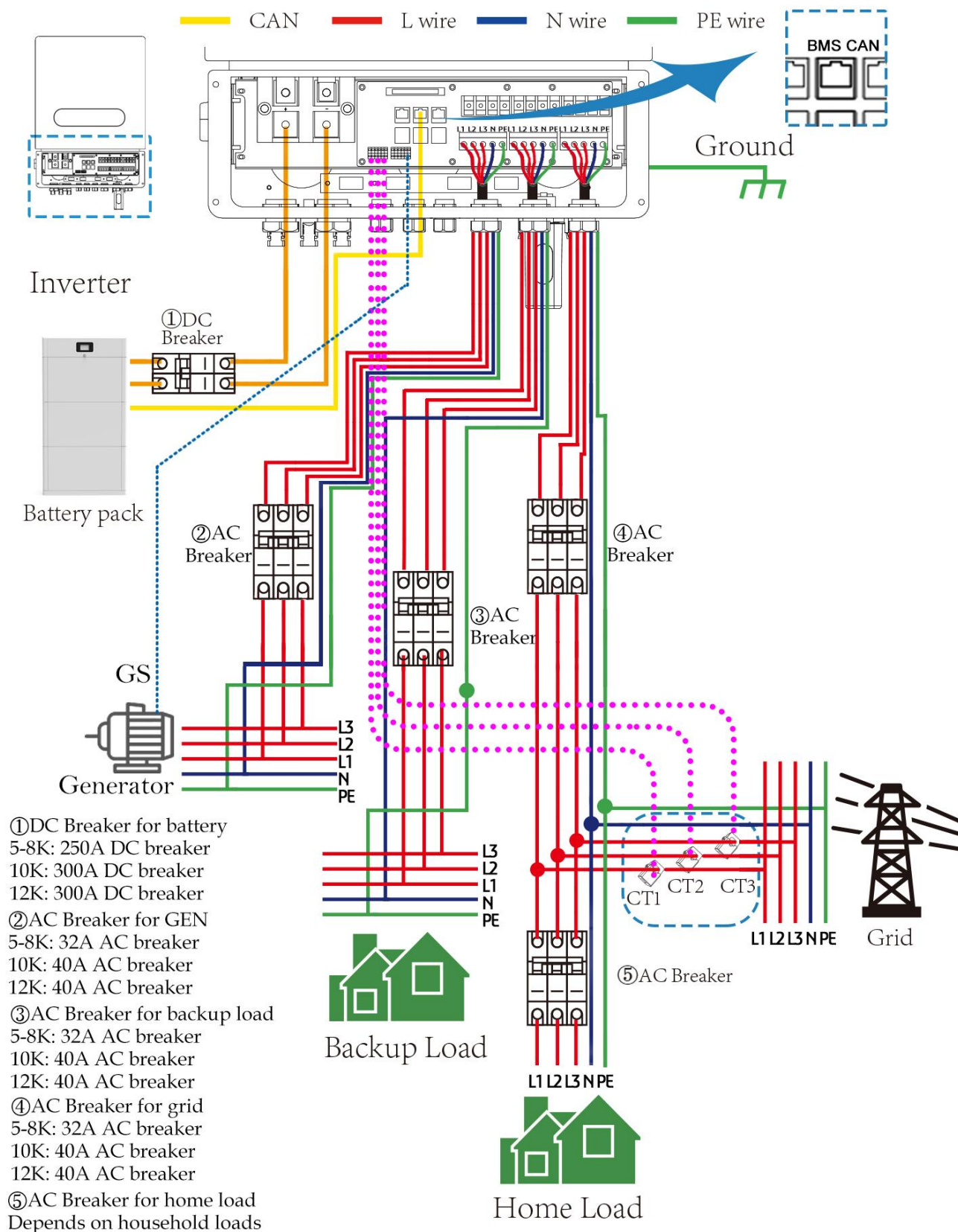
NOTE

Meter communication cable (RJ45) is attached on the inverter "To Meter" cable, could be extended to max 100m, and must use standard RJ45 cable and plug as below:

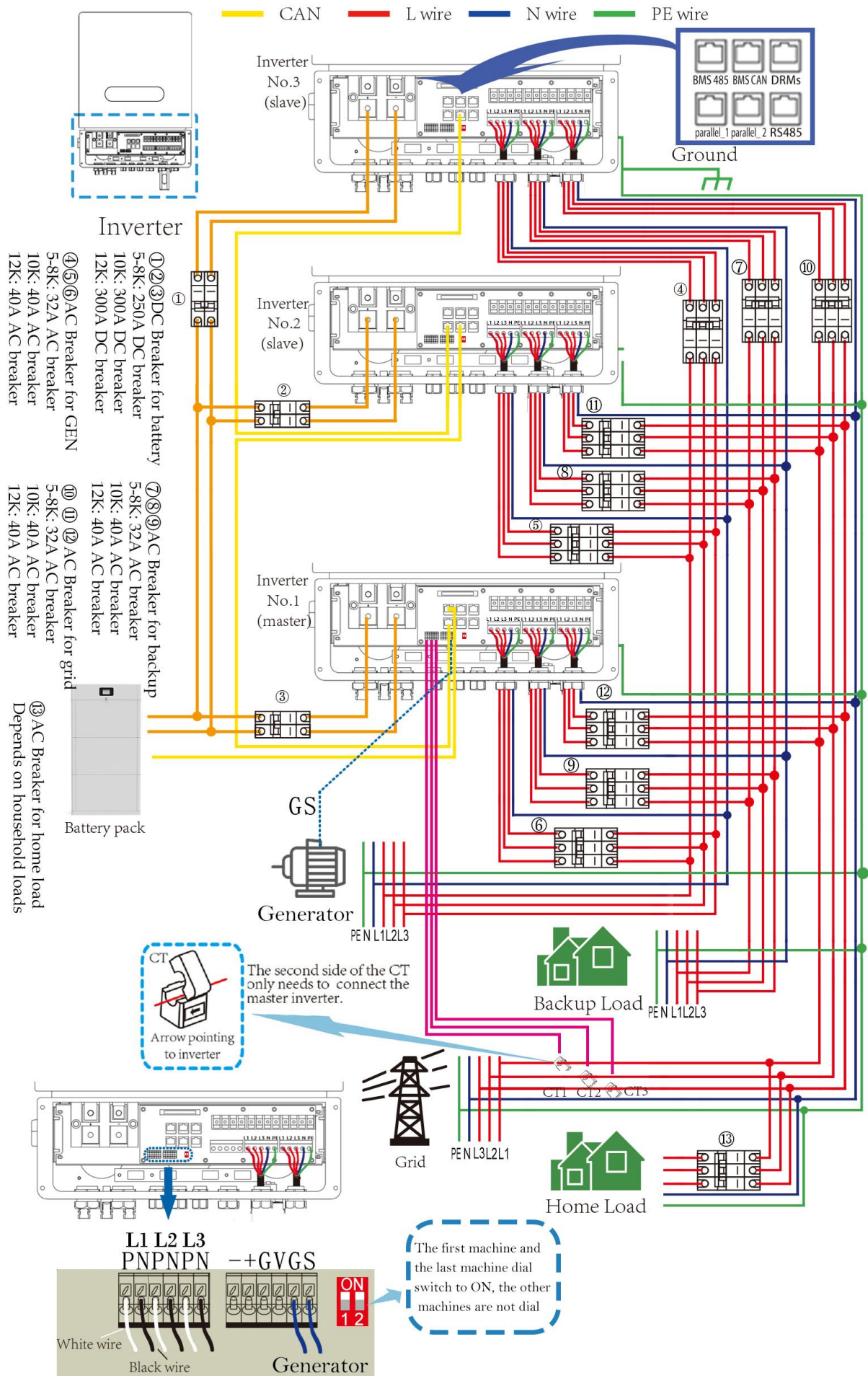


Position	Color	BMS(CAN) Function	BMS(485) Function	Meter Function
1	Orange&white	NC	485_B	NC
2	Orange	NC	485_A	NC
3	Green&white	NC	NC	485_BI
4	Blue	CAN_H	NC	NC
5	Blue&white	CAN_L	NC	NC
6	Green	NC	NC	485_AI
7	Brown&white	NC	485_A	485_BI
8	Brown	NC	485_B	485_AI

•Three phase connection diagram

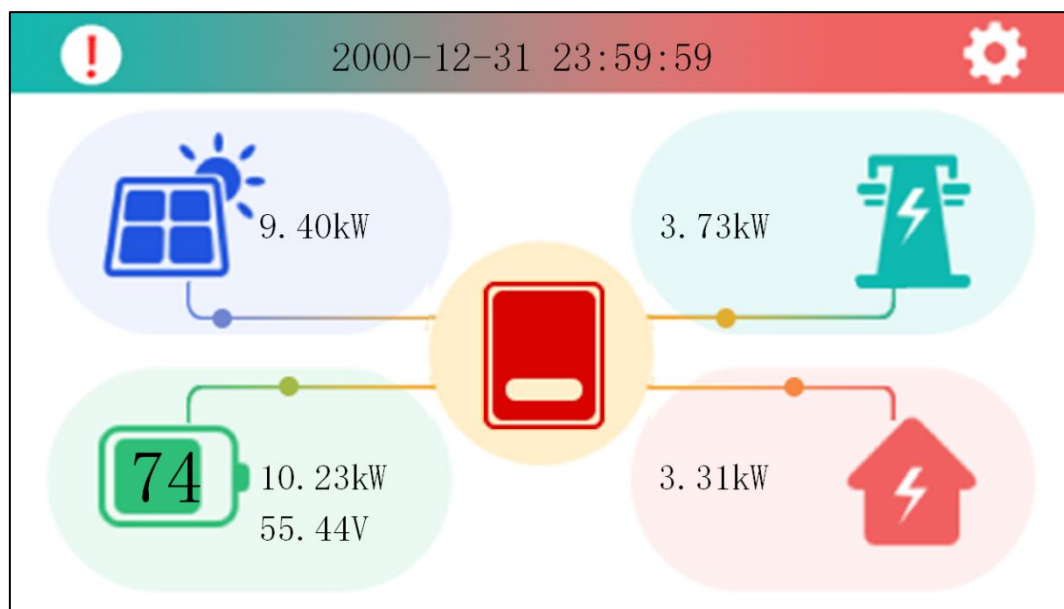


2.5 THREE PHASE PARALLEL CONNECTION DIAGRAM



3.1 MAIN PAGE

The LCD is a touchscreen, please touch the screen to operate.



This is the main page. Power on the LCD to show the flow chart on the main page. When powering on, data refreshing exists a little delay, so please wait for a few seconds before operation until the real time appears directly above on the screen.

The main page displays PV, grid, battery, load power, battery voltage and SOC. At the same time, the color of the inverter icon indicates the real time operation status. Based on the real-time power changes, the battery icon changes, and through the signal dots flow direction to show the dynamic flow of power relationship.

• Description of Touch Functions

Icons	Functions
	Click to enter the PV page, and view real-time data for the PV section.
	Click to enter the Grid page, and view real-time data for the Grid section.
	Click to enter the GEN page, and view real-time data for the GEN section.
	Click to enter the Battery page, and view real-time data for the Battery section.
	This icon means that the Battery SOC ranges from 0 to 10 percent.
	This icon means that the Battery SOC ranges from 10 to 20 percent.
	This icon means that the Battery SOC ranges from 20 to 30 percent.

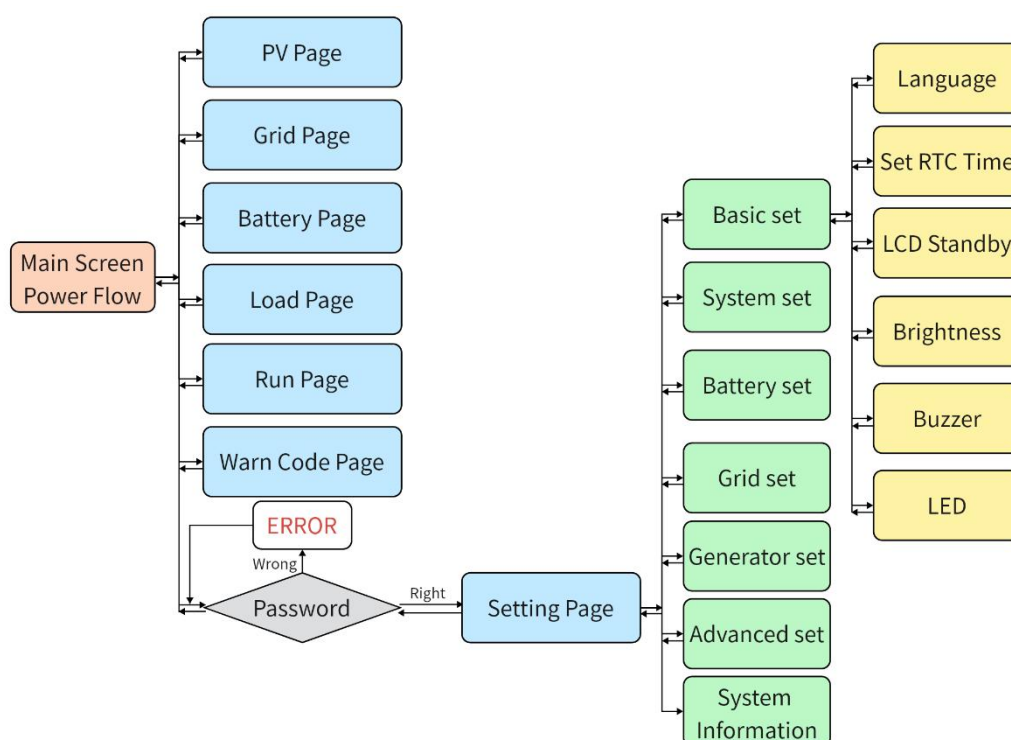
	This icon means that the Battery SOC ranges from 30 to 50 percent.
	This icon means that the Battery SOC ranges from 50 to 75 percent.
	This icon means that the Battery SOC ranges from 75 to 100 percent.
	Click to enter the Load page, and view real-time data for the Load section.
  	Click to enter the Run page, and overview the basic information of each section. If the icon is orange, it indicates current normal operation. If the icon is red, it means current alarm faults.
	Click to enter the Error Code page, and view the latest alarm records (up to 99). The content includes the number of messages, alarm time, and error code.
	Click to enter the Setting page, but you need to enter the password correctly at first.
	Home-return button.
	Back button.
 	Page-up button. When the button turns transparent, it means untouchable.
 	Page-down button. When the button turns transparent, it means untouchable.
 	Save button. When the button turns transparent, it means untouchable.
 	It indicates that the password is correct, click to enter the Setting page. It indicates the password is wrong and you need to re-enter, or it shows ERROR.
 	It means unselected. It means selected.
 	It means off. It means on.

Click on the icons of each section to view real-time data, as shown in the table above.

Click on the gear icon in the upper right corner of the Main screen to enter the Setting interface. In order to protect the information security and prevent misuse, each time you enter the Setting interface, you need to enter the password once. The default password is 1234. There is a delay of a few seconds in the judgment of the password, please be patient and wait for the entry icon to turn on and change to green, click and enter Setting menu interface, select the system set, battery set, grid set, generator set, basic set, advanced set and others. Enter the sub-setting interface for parameter modification (If the password is wrong, the entry icon closes and turns red, you need to re-enter the correct password. If you click on the icon at this time, it will display "Error", you can only click on the home_return button or back button to re-enter the password interface and enter the correct password).

In each sub-setting interface, the selection way is to click on the hollow circle to make it become a solid circle or click on the box to make the check mark appear, and the input way is to click on the rectangular input box to use the keyboard to input the numbers (there is no need to input the unit), and then click on save button to take effect. After successful setting, it will return back to the previous interface automatically. Any parameter modification needs to click save to take effect, otherwise the modification will not work. LCD brightness and standby time are adjusted by clicking the plus/minus icon or dragging the slider, and system time is adjusted by clicking the plus/minus icon. Similarly, you need to save after modification. The parameter settings have limited the range of input values to protect against accidental touch, so you can operate with peace of mind.

• Operation Flow Chart



3.2 REAL-TIME INFORMATION PAGE

• PV PAGE

PV		
DC Voltage 1	0.0V	
DC Current 1	0.00A	
DC Voltage 2	0.0V	
DC Current 2	0.00A	
DC Power 1	0W	
DC Power 2	0W	
E-PV-Day	0.0kWh	
E-PV-Month	0.0kWh	
E-PV-Year	0.0kWh	
E-PV-All	0.0kWh	

This is **PV** Page, one page in total.

① Real-time data: It can display the two-channel DC voltage, current, and power in real time, and simultaneously display the current day, current month, current year, and cumulative power generation.

② Button: The right area of the screen is the button area, the top one to return to the home page, next to return to the previous page button, page-up button, page-down button, save button. When the button turns transparent, it means untouchable.

• GRID PAGE

Grid		
Grid VoltageA	0.0V	
Grid VoltageB	0.0V	
Grid VoltageC	0.0V	
Grid CurrentA	0.00A	
Grid CurrentB	0.00A	
Grid CurrentC	0.00A	
Grid Frequency	0.00Hz	

1/4

Grid		
Output PowerA	0W	
Output PowerB	0W	
Output PowerC	0W	
Total Output Power	0W	
Reactive PowerA	0W	
Reactive PowerB	0W	
Reactive PowerC	0W	
Total Reactive Power	0W	

2/4

Grid		
Power FactorA	0.000	
Power FactorB	0.000	
Power FactorC	0.000	
Grid Power Status	Sell	
Meter PowerA	0W	
Meter PowerB	0W	
Meter PowerC	0W	
Meter Total Power	0W	
Meter COM Status	Failure	

3/4

Grid		
E-Buy-Day	0.0kWh	
E-Buy-Month	0.0kWh	
E-Buy-Year	0.0kWh	
E-Buy-All	0.0kWh	
E-Sell-Day	0.0kWh	
E-Sell-Month	0.0kWh	
E-Sell-Year	0.0kWh	
E-Sell-All	0.0kWh	

4/4

This is **Grid** Page, four pages in total. The number of pages is displayed in the lower left corner.

① Real-time data: Real-time display of three-phase grid voltage, current, AC output power and reactive power, power factor, meter power, display of grid frequency, status and meter COM status, statistics of total AC output and reactive power, total power of the meter, and the day, month, year, and the cumulative amount of bought/sold energy.

② Grid Power Status: Balance; Sell; Buy.

③ Meter COM Status: Failure; OK.

• BATTERY PAGE

Battery		
Battery Voltage	0.00V	
Battery Current	0.00A	
Battery Power	0W	
Battery working Status	Discharge	
Battery Test Status	Both allowed	
BMS COM Status	OK	
BMS Temperature	0.0°C	
BMS Max Charge Current	0.00A	
BMS Max Discharge Current	0.00A	

1/2

Battery		
E-Charging-Day	0.0kWh	
E-Charging-Month	0.0kWh	
E-Charging-Year	0.0kWh	
E-Charging-All	0.0kWh	
E-Discharging-Day	0.0kWh	
E-Discharging-Month	0.0kWh	
E-Discharging-Year	0.0kWh	
E-Discharging-All	0.0kWh	

2/2

This is **Battery** Page, two pages in total. The number of pages is displayed in the lower left corner.

- ① Real-time data: Real-time display of battery voltage, current, power, power, working status, detection status, BMS COM status, temperature, Max. charging and discharging current, and statistic of the day, month, year, and the cumulative amount of charged/discharged energy.
- ② Battery working Status: Standby; Charge; Discharge.
- ③ Battery Test Status: Disconnect; Charging allowed; Both allowed; Discharging allowed.
- ④ BMS COM Status: Failure; OK.

• LOAD PAGE

Load		
Back-Up VoltageA	0.0V	
Back-Up VoltageB	0.0V	
Back-Up VoltageC	0.0V	
Back-Up CurrentA	0.00A	
Back-Up CurrentB	0.00A	
Back-Up CurrentC	0.00A	

1/2

Load		
Back-Up Power A	0W	
Back-Up Power B	0W	
Back-Up Power C	0W	
Back-Up Power	0W	
E-Load-Day	0.0kWh	
E-Load-Month	0.0kWh	
E-Load-Year	0.0kWh	
E-Load-All	0.0kWh	

2/2

This is **Load** Page, two pages in total. The number of pages is displayed in the lower left corner.

- ① Real-time data: Real-time display of three-phase load voltage, current, AC output power, statistics of total power consumption, and the day, month, year, and the cumulative amount of consumed energy.

• GEN PAGE

Gen		
Gen Voltage A	0.0V	
Gen Voltage B	0.0V	
Gen Voltage C	0.0V	
Gen Current A	0.00A	
Gen Current B	0.00A	
Gen Current C	0.00A	
Gen Power A	0W	
Gen Power B	0W	
Gen Power C	0W	
Gen Total Power	0W	
Gen Frequency	0.00Hz	

This is **GEN** Page, one page in total.

- ① Real-time data: Real-time display of the voltage, current, power, frequency and total power of the GEN.

• RUN PAGE

Load	Grid	Inverter	
OW	OW	OW	
0.0V OW	0.0V OW	0.0V OW	
0.0V OW	0.0V OW	0.0V OW	
0.0V OW	0.0V OW	0.0V OW	
Battery	PV 1	PV 2	
OW	OW	OW	
0.00V	0.0V	0.0V	
0.00A	0.00A	0.00A	

This is **Run Page**, one page in total.

① Real-time data: Real-time display of the voltage, power and total power of the load, the grid, the inverter output, the battery, and the two PVs.

• ERROR CODE PAGE

Error Code			
No	Time	Error Code	
01	20-00-00 00:00:00	W_1:1:Under Ugrid	
02	20-00-00 00:00:00	W_1:3:Under Fr	
03	20-00-00 00:00:00	F_1_15:Remote shutdown	
04	20-00-00 00:00:00	W_1:5:Under Upv	
05	20-00-00 00:00:00	W_1:1:Under Ugrid	
05	20-00-00 00:00:00	W_1:3:Under Fr	
07	20-00-00 00:00:00	W_1:5:Under Upv	
08	20-00-00 00:00:00	F_1_15:Remote shutdown	
09	20-00-00 00:00:00	W_1:1:Under Ugrid	
10	20-00-00 00:00:00	W_1:3:Under Fr	
11	20-00-00 00:00:00	W_1:5:Under Upv	

This is **Error Code Page**, nine pages in total. The number of pages is displayed in the lower left corner.

① Real-time data: Real-time display of latest alarms (up to 99, 1 page stores 11), the latest is displayed at top, and it doesn't show if there is none. Specific contents include serial number, alarm time, corresponding fault codes.

3.3 PASSWORD ENTER PAGE

Enter the password

0000

Enter the password

1234

This is **Password Enter Page**, you need to enter the password correctly before entering the Setting Page.

① The default password is 1234.

② If the password is wrong, the entry icon in the lower right corner turns red, the door closes and an "X" appears; if the password is correct, the entry icon in the lower right corner turns green and the door opens.

③ If the password is correct, you can enter the setting page by clicking on the "door icon". If you click on the wrong password, "ERROR" will pop up, and you can only go back to the home page or the previous page by clicking on the button, and then go back to the password page to re-enter.

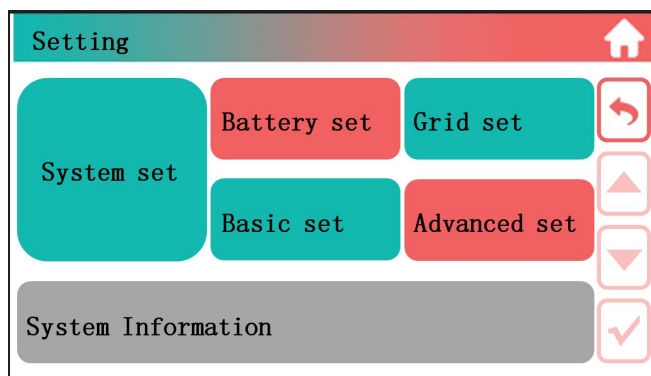
④ When the settings are changed and you back out to the main page, the password will be cleared automatically.



This is **Keyboard Input** Page.

① "0-9" is used to input numbers, "." is used to input decimal, "+/-" is used to switch between positive and negative values, "←" is used to delete, "Esc" is used to quit or cancel input, "OK" is used to confirm.

3.4 SETTING PAGE



This is **Setting** Page, six buttons in total.

① System set: switch on/off; anti-reflux source; max. power selling; PV energy mode; charging and discharging periods, power, battery SOC, voltage settings.

② Battery set: Protocol Selection; Discharge Protection; BAT Activation Mode; Equal Charge Configuration; Float Charge Configuration.

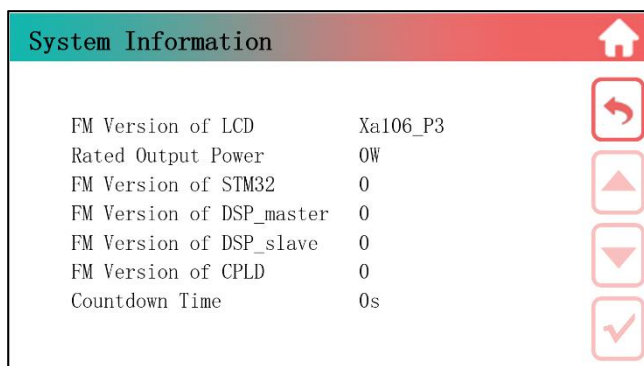
③ Grid set: frequency selection; upper and lower limits of grid voltage; reconnection time.

④ Basic set: language; time; standby; brightness; buzzer; LED.

⑤ Advanced set: battery paralleling; forced off-grid mode; PCS paralleling address; PCS paralleling quantity; active/reactive power adjustment; power factor adjustment; PV shadow scanning; islanding protection; low-voltage ride-through; clearing overload faults.

⑥ System information: rated output power; FM version of LCD; program version of STM32, DSP_slave/master, CPLD; startup countdown time.

3.5 SYSTEM INFORMATION PAGE



This is **System Information** Page, one page in total.

① Real-time data: Real-time display of rated output power; machine serial number; program version of STM32, DSP slave/master, CPLD; startup countdown time.

3.6 SYSTEM SET PAGE

System set 

Switch ☐ OFF ☐ ON 

☐ Selling First
☐ Anti-reflux to grid ☐ Solar Sell
☐ Anti-reflux to CT ☐ Solar Sell
☐ Max Sell Power Zero-export Power

Energy Mode ☐ Batt First ☐ Load First 

1/2

System set 

Gen	Grid	Grid	Time	Power	Battery
CHG	CHG	EDC			
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V
☐	☐	☐	0 : 0 ~ 0 : 0	0W	0.0% 0.0V

2/2 

This is **System Set** Page, two pages in total. The number of pages is displayed in the lower left corner.

① **Switch**: Controls the power on and off of the inverter. ☐ means unselected, ☒ means selected.

② **Work Mode**:

i) **Selling First**: PV is used to power loads and battery, allowing the inverter to sell excess energy generated by the solar panels back to the grid. If it is during a discharging period, energy of battery can also be sold back to the grid. Prioritization of power supply sources for loads : PV>Grid>Battery.

ii) **Anti-reflux to grid**: The inverter only supplies power to the connected backup load. It neither supplies power to household loads nor sells power to the grid. The built-in CT will detect the power flowing back to the grid and will reduce the power of the inverter, only to supply local loads and charge for battery.

iii) **Anti-reflux to CT**: The inverter supplies power to connected backup loads and household loads. If PV power and battery power are insufficient, they will be supplied with grid power. The inverter won't sell power to the grid. In this mode, a CT is required and an external CT will detect the power flowing back to the grid and will reduce the power of the inverter, only to supply local and household loads, charge for battery.

③ **Solar Sell**: It is a special pattern in the Anti-reflux to grid or Anti-reflux to CT mode. If this pattern is on, excess energy can be sold back to the grid. At this time PV is prioritized for use as follows: loads, charging battery, grid. ☐ means off, ☒ means on.

④ **Max Sell Power**: The maximum output power allowed to flow into the grid.

⑤ **Zero-export Power**: The maximum amount of power flowing into the grid with the "Solar Sell" off.

⑥ **Energy Mode**: Prioritization of PV energy supply.

i) **Batt First**: PV energy supply is first used to charge the battery and then used to power the load. If the PV energy is insufficient, the grid will supply both the battery and the load.

ii) **Load First**: PV energy supply is first used to power the load and then used to charge the battery. If the PV energy is insufficient, the grid will supply both the battery and the load.

Note: If operating on off-grid status, the PV energy mode is always load first.

⑦ **Charging and Discharging Periods:** Up to six charging and discharging time periods can be set, click the circle to select charging(CHG) and discharging(EDC) mode, solid circle means selected. For convenience, hours and minutes are set separately, click on the input box and enter with the keyboard, set the start time first and then set the end time. Moreover, charge and discharge power can be set, as well as battery cut-off SOC and voltage. In order to avoid generating program conflicts, the two time periods front and rear are configured with a continuous relationship, where the end time of the previous period is the start time of the subsequent period.

In addition, if the battery protocol is a Pb Acid, the battery cut-off SOC item can only be set to 0% or 100% when setting the period parameter. Charging needs to be set to 100% and discharging needs to be set to 0%.

⑧ **GEN Charge:** utilize diesel generator to charge the battery in a time period.

3.7 BATTERY SET PAGE

This is **Battery Set** Page, two pages in total. The number of pages is displayed in the lower left corner.

① **Protocol Setting:** Select battery BMS protocol, currently supports Pb Acid and CAN-Bus-proto-PYLON-v1.3. Click to sub-page to select, and click save, back to Battery set page.

② **Discharging Protection:**

i) Cut-off: Set the battery discharge to stop only when it reaches the given conditions (battery SOC and voltage in on-grid/off-grid state).

ii) Restored: Set the power supply to load to restore only when it reaches the given conditions (battery SOC and voltage in on-grid/off-grid state).

iii) Discharge Max. Current: The maximum value of current allowed to be reached in the discharging state of the battery.

③ **Active BAT Mode enable:** Restore the battery from its over-discharged state by slowly charging it from the PV array or the grid. This feature needs to be set up when the inverter is down.

④ **Equal Charge:** Battery equal charge voltage and current can be set.

⑤ **Float Charge:** Battery float charge voltage, current and time (in minutes) can be set.

⑥ **Grid Charge:** The inverter draws energy from the grid to charge the battery, allowing the battery's capacity to reach Reserve SOC.

3.8 GRID SET PAGE

Grid set

Grid Frequency

☐ 50Hz
 ☐ 60Hz

Grid Voltage Upper limit

0.0V

Grid Voltage Lower limit

0.0V

Grid Frequency Up limit

0.00Hz

Grid Frequency Low limit

0.00Hz

Grid Reconnect delay

0

1/2

↶

▲

▼

✓

Grid set

Grid level

☐ LN:230VAC LL:400VAC
 ☐ LN:133VAC LL:230VAC

2/2

↶

▲

▼

✓

This is **Grid Set** Page, two pages in total.

- ① Frequency select: please select your local grid frequency, you can choose 50Hz, 60Hz.
- ② Grid Voltage: Upper and lower grid voltage limits can be set.
- ③ Grid Frequency: Upper and lower grid frequency limits can be set.
- ④ Grid Reconnect delay: The reconnection time can be set in the on-grid state.
- ⑤ Grid Level: There're several voltage levels for the inverter output voltage.

LN:230VAC LL:400VAC

LN:133VAC LL:230VAC

Note: The grid frequency and grid level need to be selected when the inverter is down, and the inverter needs to be powered back on after the selection is completed.

3.9 BASIC SET PAGE

Basic set

Language

Set RTC Time

LCD Standby

Brightness

Buzzer

LED

↶

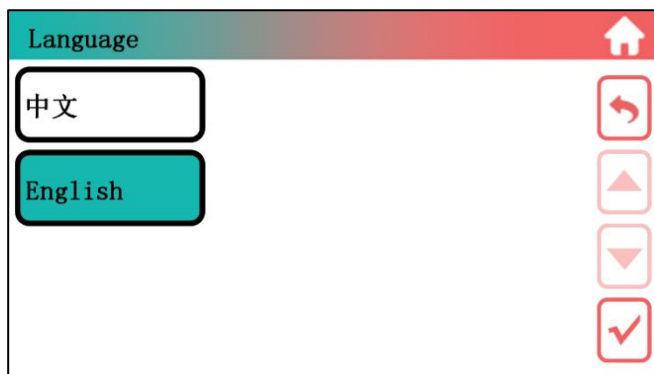
▲

▼

✓

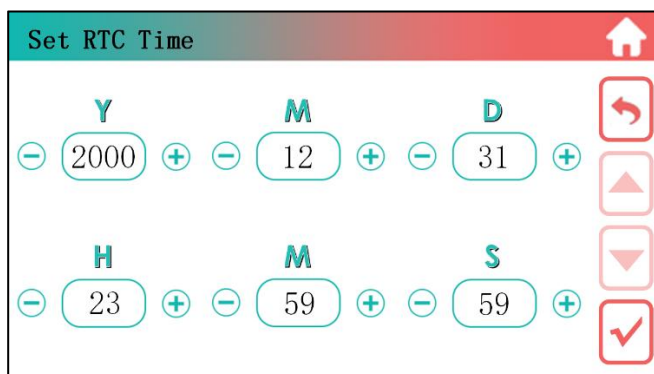
This is **Basic Set** Page, six buttons in total.

- ① Language: LCD language can be set, switching between 中文 and English.
- ② Set RTC Time: The RTC time can be changed.
- ③ LCD Standby: Screen standby time can be set, that is to say, how long there is no touch to apply to the screen, its brightness is automatically reduced to lowest. The settable range is 1~240s.
- ④ Brightness: The current brightness of the screen can be set. The settable range is 1~100%.
- ⑤ Buzzer: Buzzer can be set to sound or not when touching.
- ⑥ LED: Support LED night mode function, you can set whether to enable or not and time period.



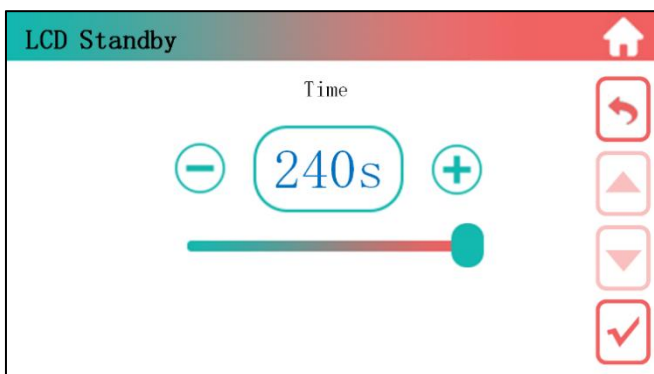
This is **Language** Page.

- ① 中文 and English languages are supported.
- ② The current language is displayed in real time by the color of the option block, blue is selected, white is not.
- ③ When you change the language, you can judge whether the click is effective or not by whether the color of the option block changes to blue, and then click Save.
- ④ After changing the language, it will take a few seconds for all the text to be changed to the new language, so please don't click it too often.



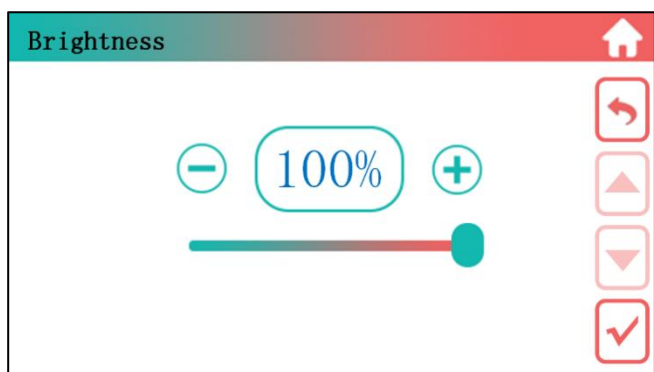
This is **Set RTC Time** Page.

- ① RTC time can be set to meet the needs of different areas of use.
- ② For ease of operation, the year, month, day, hour, minute, and second are added and subtracted respectively. Y-M-D H:M:S means Year-Month-Day Hour: Minute: Second.
- ③ After changing the time, you can return to the main page to see that the system time has been changed to the newly set time.



This is **LCD Standby** Page.

- ① Screen standby time can be set, that is to say, how long there is no touch to apply to the screen, its brightness is automatically reduced to lowest.
- ② There are two ways to adjust, clicking on the plus or minus icon or dragging the slider to adjust.
- ③ The settable range is 1~240s. The default value is 240s.



This is **Brightness** Page.

- ① The current brightness of the screen can be set to be displayed as a percentage of the maximum brightness.
- ② There are two ways to adjust, clicking on the plus or minus icon or dragging the slider to adjust.
- ③ The settable range is 1~100%. To protect the screen, upper and lower limits are set for the actual display brightness. The default value is 64%.

Buzzer

OFF

ON

↶

▲

▼

✓

This is **Buzzer** Page.

- ① Buzzer can be set to sound or not when touching.
- ② The current buzzer setting is displayed in real time by the option block color, blue is the current buzzer selected state.
- ③ When changing the buzzer switch, you can judge whether the click is valid by whether the option box color changes to blue, and then click save setting.

LED

○ LED Night Mode

Time

0: 0

 ~

0: 0

↶

▲

▼

✓

This is **LED** Page.

- ① For settings related to controlling the LED light off at night.
- ② You can set whether to enable the LED night mode or not.
- ③ You can set the time period to use the night mode and enable the control function, to realize automatic control of LED light off.

3.10 ADVANCED SET PAGE

Advanced set

○ Force Off-grid Mode

○ Only PV Off-grid enable

○ Gen Signal

PCS Parallel address

0

PCS Parallel quantity

0

CT Ratio

0

↶

▲

▼

✓

1/3

Advanced set

○ Overload Reset

○ Smart Load Output

SOC

Voltage

Protection

0%

0.0V

Restored

0%

0.0V

Active Power

0.0%

○ Reactive Power

0.0%

○ Power Factor

0.00

↶

▲

▼

✓

2/3

Advanced set

○ Factory Reset

○ Default Reset

↶

▲

▼

✓

3/3

This is **Advanced Set** Page, two pages in total. The number of pages is displayed in the lower left corner.

① Force Off-grid Mode : Use this function to force a switch to the off-grid state, which prioritizes power to the load in this mode.

② Only PV off-grid enable: Inverter In the off-grid state with only PV input, if this function is enabled, the machine can start to supply power to the load. This feature needs to be set up when the inverter is down.

③ GEN Signal: If this function is turned on, then when the power grid suddenly disappears, the inverter will send a dry contact signal to control the generator to start running; When the power grid returned to normal, the dry contact signal was disconnected and the generator stopped working.

④ PCS Parallel: Support PCS parallel function, you can set the address and quantity of parallel machine. (Multiple machines in parallel: the address of each machine must start from 1, consecutive and less than or equal to parallel quantity). This function needs to be set when the inverter is down, and the inverter needs to be powered back on after the setup is completed.

⑤ Overload Reset: After an alarm occurs, while other kinds of fault can be cleared automatically, only overload faults need to be cleared manually with this function. The operation way is to click on the hollow circle to change it to a solid circle, click on the Save button, and return to the Setting page automatically, then the overload fault is cleared successfully once. The next time you need to clear it, just repeat the operation above.

⑥ Smart Load Output: This mode utilizes the Gen input connection as an output witch only receives power when the battery SOC and Voltage is above a user programmable threshold. This feature needs to be set up when the inverter is down.

⑦ Power Regulation: Active power regulation, reactive power regulation and power factor regulation are available.

⑧ CT Ratio: Set CT Ratio.

⑨ Factory Reset: Reset all parameters of the inverter and reset the power generation data to zero.

⑩ Default Reset: Reset all parameters of the inverter without clearing the power generation data.

4

BUTTON OPERATION

4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press ON/Off button (located on the left side of the case) to turn on the unit. The power ON/OFF button functions are as follows:

Test condition	Functionality
Only Battery	When the button is turned on, the indicator light stays on, battery power is connected, the screen lights up, and the machine starts; when the button is turned off, the indicator light turns off, battery power is disconnected, the screen goes dark, and the machine stops.
Only PV	The button does not work, and the indicator light remains off; the inverter can operate off-grid.
Only Grid	The button does not work, and the indicator light remains off; the grid supplies power to the load via bypass.
PV + Grid	The button does not work, and the indicator light remains off; the inverter can operate.
Battery + PV	When the button is turned on, the indicator light stays on, and the machine starts operating; when the button is turned off, the indicator light turns off, and the machine stops.
Battery + Grid	When the button is turned on, the indicator light stays on, and the machine starts operating; when the button is turned off, the indicator light turns off, and the machine stops.
PV + Battery + Grid	When the button is turned on, the indicator light stays on, and the machine starts operating; when the button is turned off, the indicator light turns off, and the machine stops.

Note: The button is a self-locking type with a ring indicator light.

6.1 DISCLAIMER

The hybrid inverters are transported, used and operated under environmental and electrical conditions. We have the right not providing after-sales services or assistance under following conditions:

- Inverter is damaged during transferring
- The inverter has expired the warranty year and no extended warranty has been purchased.
- Inverter is installed, refitted or operated in improper ways without authority from us
- Inverter is installed or used under improper environment or technical condition mentioned in this user manual, without authority from us
- Installation or configuration of the inverter does not follow requirements mentioned in this user manual
 - The inverter is installed or operated against the requirements or warnings that are mentioned in this user manual
- Inverter is broken or damaged by any force majeure like lightning, earthquake, fire hazard, storm and volcanic eruption etc.
- Inverter is disassembled, changed or updated on software or hardware without authority from us
- Inverter is installed, used or operated against any related items in international or local policies or regulations.
- Any non-compatible batteries, solar panels, loads or other devices connected to Hybrid inverter system



We will keep right to explain all the contents in this user manual.

*Maintenance

The inverter requires periodically maintenance, details as below:



Make sure inverter is totally isolated from all DC and AC power for at least 5 mins before maintenance

Heat sink: please use clean towel to clean up heat sink once a year

Torque: please use torque wrench to tighten AC and battery wiring connection once a year

DC switch: check DC switch regularly, active the DC switch 10 times in a row once a year.

Operating DC switch will clean contacts and extend lifespan of DC switch

Appendix: Protection Category Definition

Environment Category Definition

Environment Condition	Ambient Temperature	Relative Humidity	Applied to
Outdoor	-20~+50℃	4%~100%	PD3
Indoor Unconditioned	-20~+50℃	5%~95%	PD3
Indoor Conditioned	0~+40℃	5%~85%	PD2

Pollution Degree Definition

Pollution Degree I	No pollution or only dry, non-conductive pollution occurs. The pollution has no influence
Pollution Degree I	Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.
Pollution Degree II	Conductive pollution occurs, or dry, non-conductive pollution occurs, which becomes conductive due to condensation which is expected.
Pollution Degree IV	Persistent conductive pollution occurs, for example, the pollution caused by conductive dust, rain and snow.

6.2 TECHNICAL PARAMETERS

MODEL	5KS48P3	6KS48P3	7KS48P3	8KS48P3	10KS48P3	12KS48P3
PV input						
Vmax PV (Vdc) (absolute Max.)	1000 V					
Isc PV (absolute Max.) (A)	22.5A	22.5A	22.5A	22.5 A/ 22.5A	45A/ 22.5A	45A/ 22.5A
Max. PV input current / strings (A)	18A	18A	18A	18A/18A	36A/18A	36A/18A
Number MPP trackers	1			2		
MPPT Range (Vdc)	200~800					
Vdc range @ full power (Vdc)	350~800					
P pv Max(kW)	10	12	14	16	20	24
Battery (charge/discharge)						
Battery type	Li-ion/Lead-acid					
Battery Norma Voltage (Range) (Vdc)	48V(40-60V)					
Max charge/discharge Current(A)	120	125	150	190	210	250

Max charge/discharge Power(W)	5000	6000	7000	8000	10000	12000
AC Grid (input and output)						
Normal AC Voltage (VAC)	380/400(3W+N+PE)					
Frequency (Hz)	50/60					
Max. cont output current (A)	8.3	10	11.6	13.3	16.7	20
Max. cont output Power (W)	5000	6000	7000	8000	10000	12000
Max. cont. Apparent Power (VA)	5500	6600	7700	8800	11000	13200
Power factor(adjustable)	0.8 leading to 0.8 lagging					
AC Load output (stand alone)						
Normal Voltage (VAC)	380/400(3W+N+PE)					
Frequency (Hz)	50/60					
Nominal Current(A)	8.3	10	11.6	13.3	16.7	20
Max. cont. Power (W)	5000	6000	7000	8000	10000	12000
Overload Capability (off grid)	>200% for 15 sec					
Output Power Factor(off grid)	0.8 leading to 0.8 lagging					
Output Current Harmonic Distortion	THD<3%(Nonlinear load); THD<1.5%(Linear load)					
Others						
Ingress protection (IP)	IP66					
Protective class	Class I					
Temperature (℃)	-25℃~+60℃					
Inverter Isolation	Non-isolated PV- AC					
	High frequency isolated(Battery Side)					
Overvoltage category	OVC III (AC Main), OVC II (PV)					
Dimensions,D*W*H(mm)	475*683*256					
Weight (kg)	38					
Altitude	2000m					