User Manual

Energy Storage Inverter

Model: KY-1Hybrid-5k0-H

V1.1

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About This Manual

The manual mainly introduces product information, installation guide, operation and maintenance. This manual cannot contain complete information about photovoltaic systems. You can find more information about other devices at www.koyoe.com or on the relevant component manufacturer's web pages.

Scope of application

This manual applies to KY-1HYBRID-5K0-H type inverters. Do not use as reference manual for other products

How to Use the Manual

Before using or operating the inverter, please read this manual and other relevant documents carefully.

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The contents of the manual may be periodically updated or revised as a result of product development. Information in this manual is subject to change without prior notice. The latest handbook is available at www.koyoe.com.

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1. System Introduction

KY-1HYBRID-5K0-H series inverter, also known as hybrid or bidirectional solar inverter, is suitable for energy management of photovoltaic, battery, load, power grid and other solar energy systems. Electricity from the photovoltaic panels is used for residential electricity, and excess power can be stored in batteries. When the battery is fully charged, users can send excess power to the utility grid.

When the photovoltaic power is not enough to meet the user's load demand, the battery will discharge to the load. If there is not enough energy stored in the battery, the grid will supply power to the load through the system.

KY-1Hybrid-5k0-H series are inverters with no transformer topology, and there is no isolation between DC input and AC output. The adaptive PV model must meet IEC61730 Class A. The energy management system is shown in Figure 1-1.

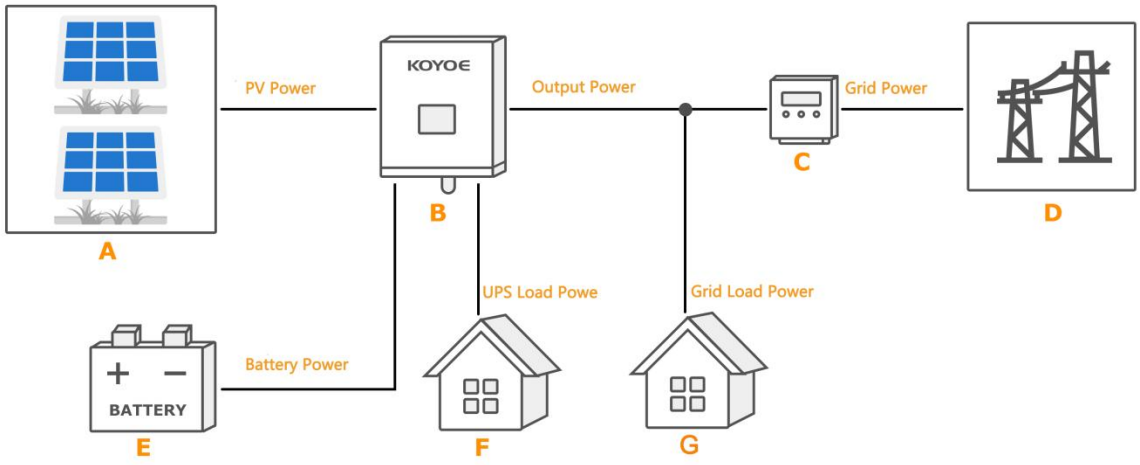


Fig.1-1 PV Energy Storage System

Item	Description	Remark
A	PV strings	Photovoltaic panel
B	Inverter	Model：KY-1Hybrid-5k0-H
C	Energy meter(single-phase)	RS485 communication with inverter
D	Utility grid	Grid grouding system types: TT,TN
E	Battery System	A Li-ion battery or a lead-acid battery.
F	UPS load	User load connected to the inverter EPS port.
F	Grid load	User loads connected to the grid.

Warning!

For the TT utility grid, the N line voltage to ground must be 30V or less.

1.1. Product Introduction

1.1.1 Inverter Introduction

Model Description

The inverter model description is as follows:

KY -1Hybrid -5k0 -H

- -H: High voltage battery（85V~450V）
- -5k0: The inverter power is 5KW
- -1Hybrid: The inverter is single phase hybrid inverter
- KY: Code of KOYOE

Appearance

The following figure shows the inverter appearance, which is for reference only. The actual product that you receive may differ.

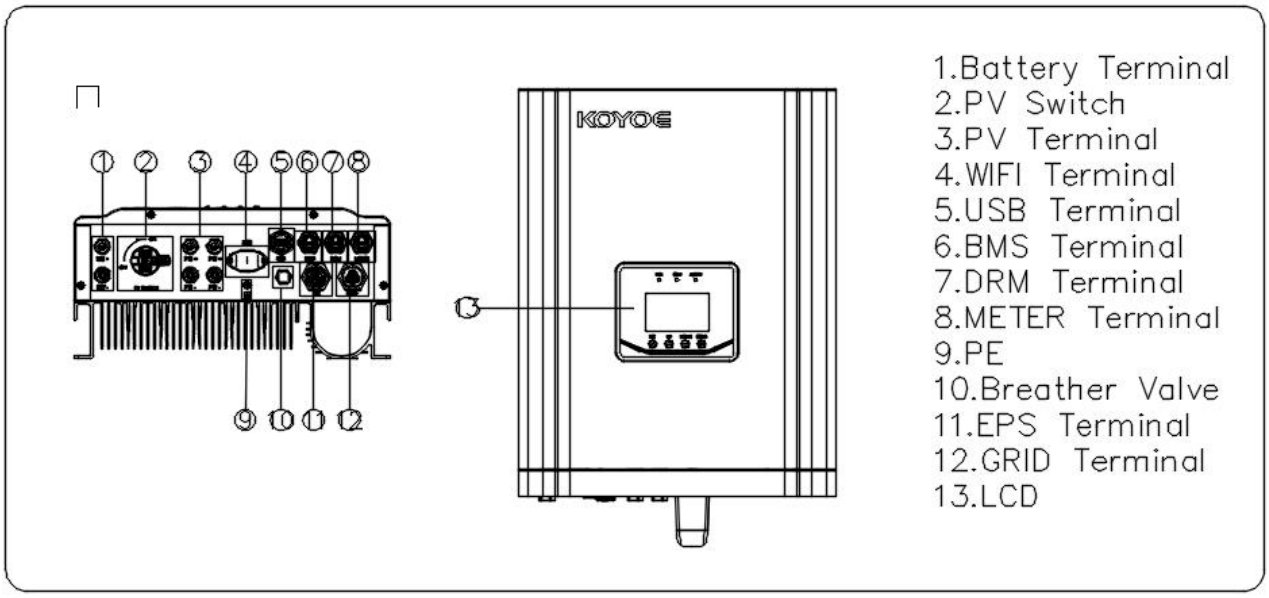


Fig1-2.Appearance

Be careful!

This inverter contains a PV switch. For safety reasons, it is recommended to have a DC switch between the PV array and the inverter PV input terminals (mandatory in some countries).

Dimensions

The following figure shows the dimensions of the inverter. See Figure 1-4 and the following table for the description of LCD panel.

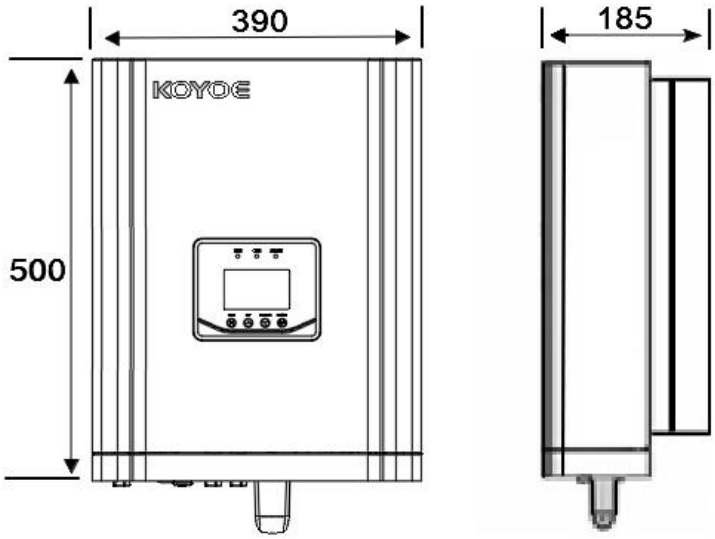


Fig1-3.Dimensions(unit: mm)

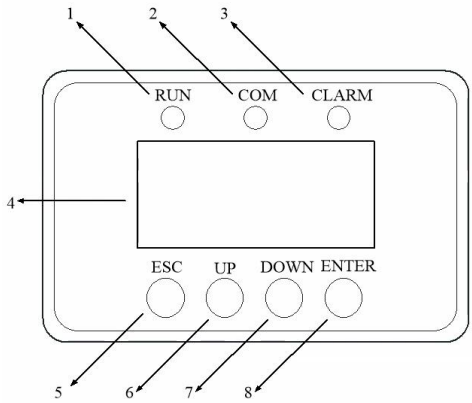


Fig1-4.LCD panel

No.	Name	Description
1	Run LED(Green)	After the inverter is powered on, the LED flashes. When the inverter is in normal mode, the LED will always be bright
2	COM LED(Yellow)	When the inverter communicates through WIFI,GPRS and upper computer, the LED flashes
3	ALARM LED(Red)	When an alarm occurs, the LED flashes. When the inverter fails, the LED will always be on
4	LCD Screen	To display the information
5	ESC Key	Exit the current menu
6	Up Key	Turn the menu up
7	Down Key	Turn the menu down
8	Enter Key	Enter the current menu

1.1.2 Energy Meter

The electricity meter is installed at the household side of the power grid to detect and measure the electrical measurement value of the network point. It communicates with the inverter through RS485. The inverter can support direct meter and CT meter. The following figure is the dimension diagram and schematic diagram of direct meter. For the detailed wiring diagrams of the two meters, please refer to the wiring guide of the meter.
The meter mode is：SDM230-Modbus
The meter manufacture is Zhejiang EASTRON Electronic Co.,Ltd..

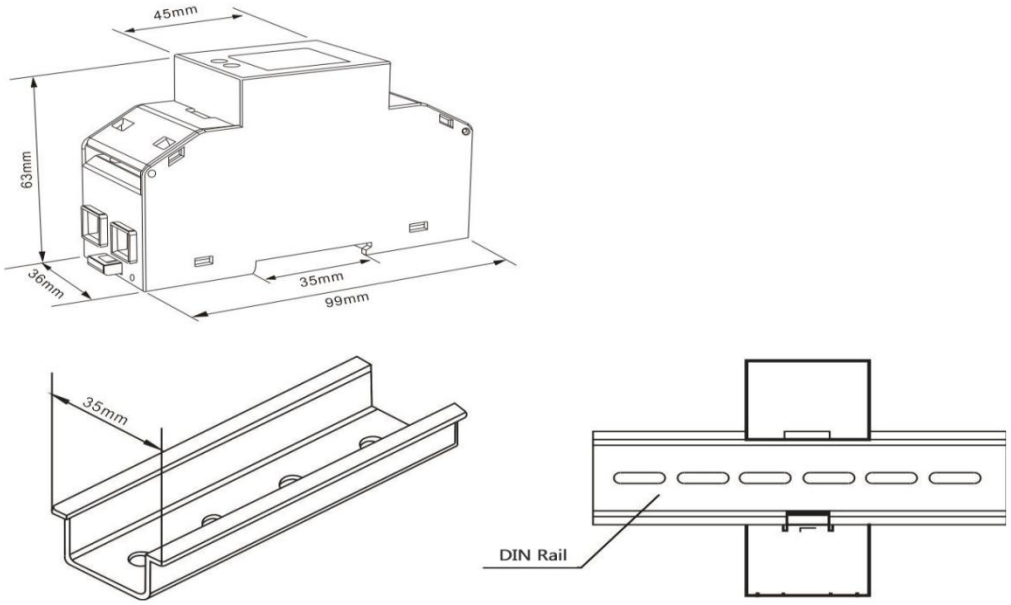


Fig1-5.Single-phase Direct Meter Dimension (unit: mm)

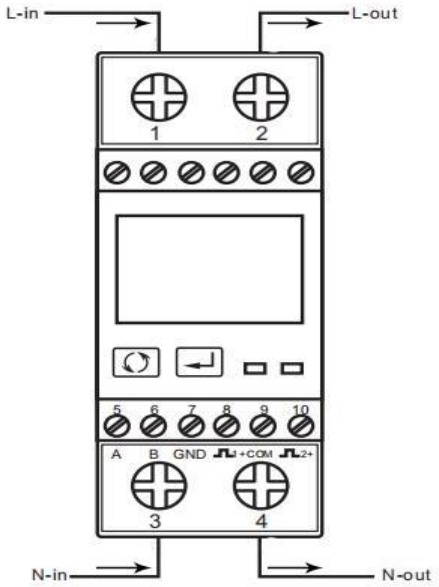


Fig1-6.Single-phase Meter Wiring Diagram

Item	Name	Description
1	L-line input terminal	L-line connected to the Grid port of the inverter
2	L-line output terminal	L-line connected to the power grid
3	N-line input terminal	N-line connected to the Grid port of the inverter
4	N-line output terminal	N-line connected to the power grid
5	485-A terminal	Connect to the METER port of the inverter through the network cable
6	485-B terminal	Connect to the METER port of the inverter through the network cable
7	485-GND terminal	No need to connect with the inverter
8	Pulse 2 terminal	No need to connect with the inverter
9	Pulse-GND terminal	No need to connect with the inverter
10	Pulse 2 terminal	No need to connect with the inverter

Fig1-6.Schematic diagram and interface definition of direct meter

1.1.2.1 Connection diagram

The following is the electrical connection diagram of the electricity meter. For detailed operation of the electricity meter, please refer to the operation manual of the electricity meter in the accessories. If you have any questions, please contact our customer service.

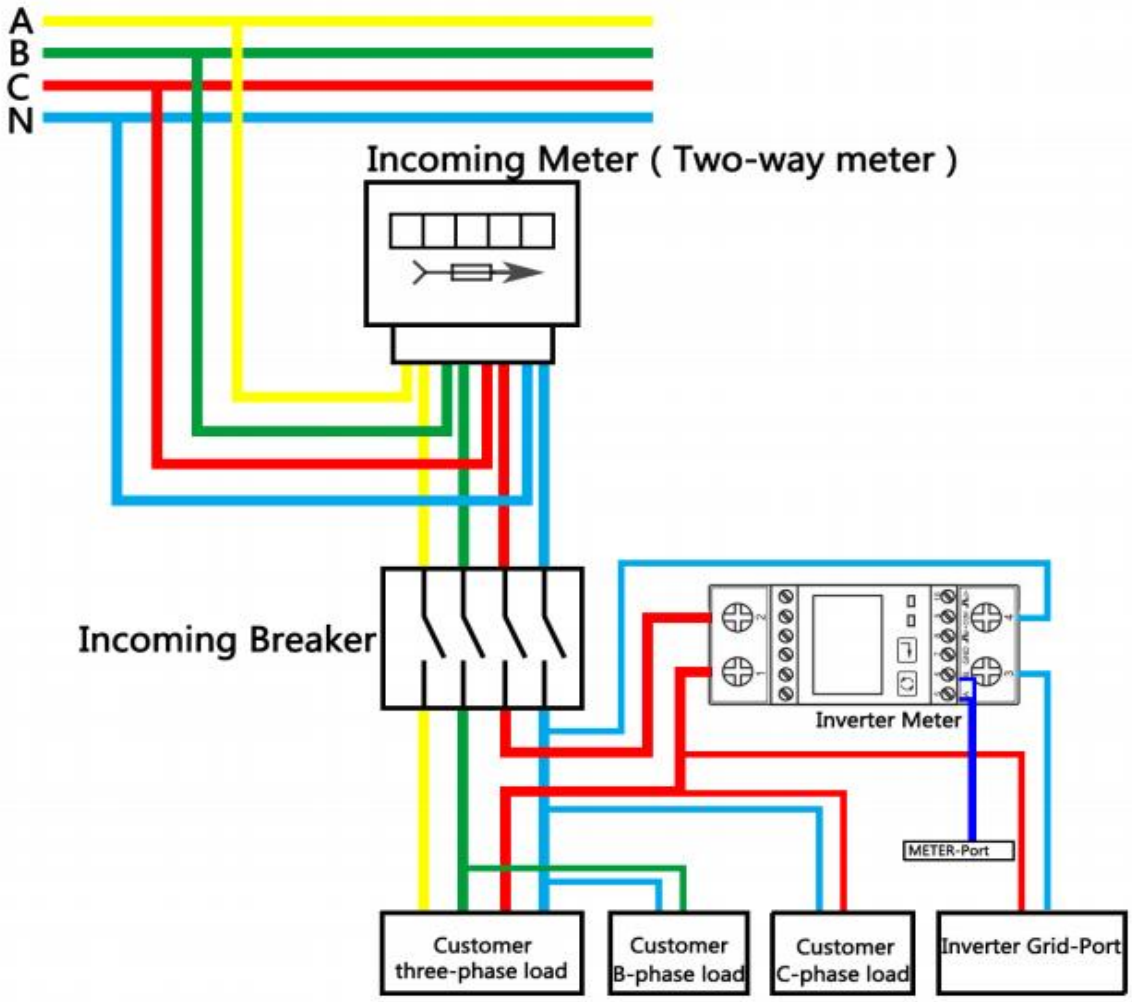


Fig1-7.Wiring diagram of three-phase user inverter meter

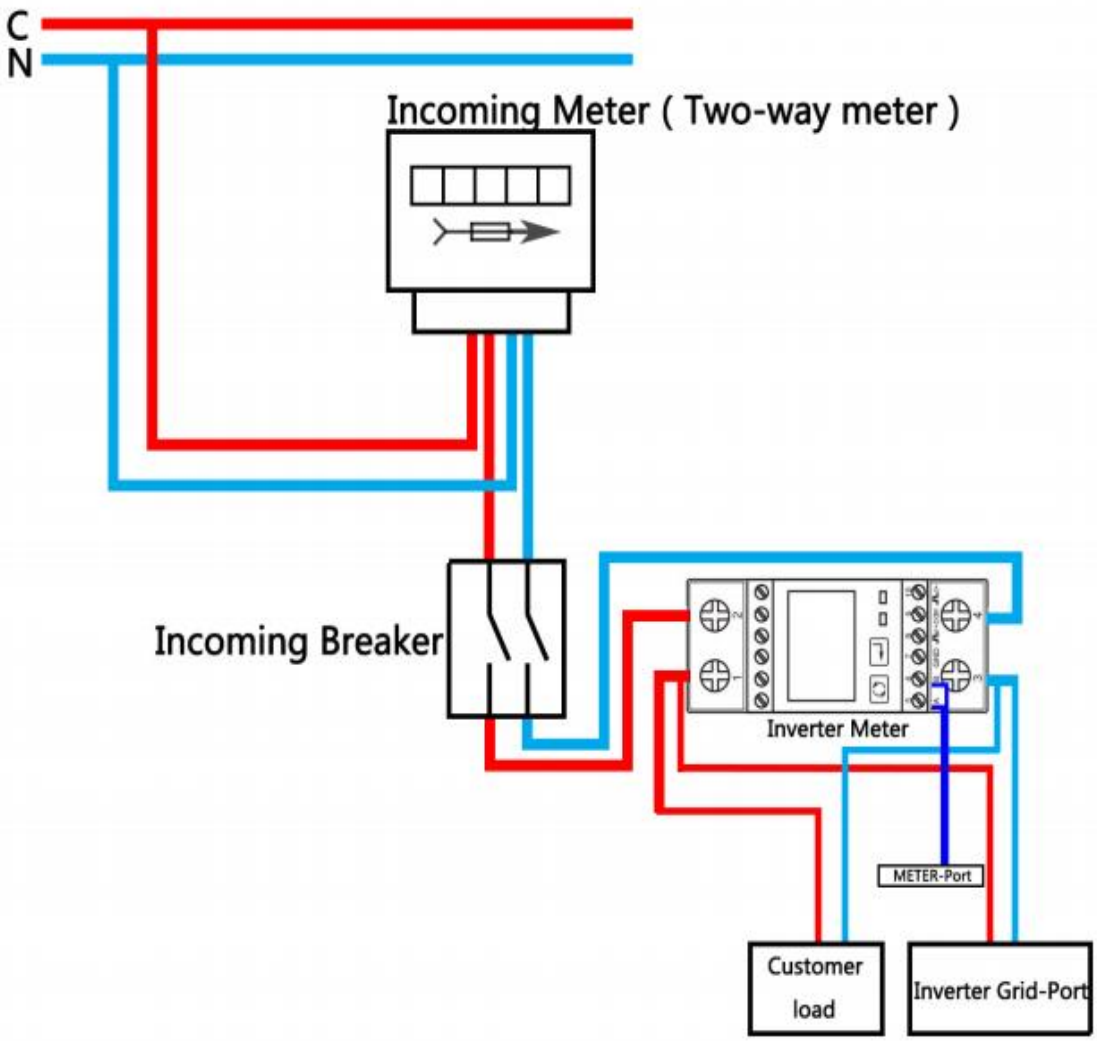


Fig1-8. Wiring diagram of single-phase user inverter meter

Diagram of wiring diagram of three-phase user inverter electricity meter If the power distribution of the user is three-phase, the electrical connection of the electricity meter shall be carried out according to Figure 1-7. The user can select one phase with a heavy load to connect to the inverter electricity meter to obtain the maximum benefit.

If the user distributes the electricity to a single phase, the electrical connection of the meter is made by referring to Figure 1-8.

1.1.2.2 Operating manual

1. LCD display

Item	Descriptions
1	7 digits used to display measured values or RTC
2	Total value
4	Import information, Export information
5	Max. Demand for Power or Current
6	Pulse output 1 and Pulse output 2
7	Measurement units
8	PF = power factor Hz = frequency
9	Bar display of Power
10	Communication indicator
11	Time information
12	Low battery warning
13	Lock symbol

2. Initialization Display

When it is powered on, the meter will initialize and do self-checking.

3. Scroll display by Button

After initialization and self-checking program, the meter display the measured values. The default page is total kWh. If the user wants to check other information, he needs to press the scroll button on the front panel.

The display order by scroll button :

Total kWh→ import kWh→export kWh→ resettable kWh→ total kVArh→ import kVArh→ export kVArh→ resettable kVArh→Max. power demand→ voltage→ current→W→VAr→ VA→ power factor → frequency→ pulse constant→ Modbus ID → baud rate→ continuous running time.

Page	Display	Descriptions
1		Total active energy Example:70.00kWh
2		Import active energy Example: 50.00kWh
3		Export active energy Example: 20.00kWh
4		Total resettable energy
5		Total reactive energy Example: 10.00kVArh
6		Import reactive energy Example: 5.00kVArh
7		Export reactive energy Example: 5.00kVArh
8		Total resettable reactive energy
9		Total max. power demand Example: 6930W
10		Voltage Example: 229.8V
11		Current Example: 30.156A
12		Active Power Example: 4700W
13		Reactive Power Example: 1030VAr
14		Apparent power Example: 4811VA
15		Power factor Example: 1.000
16		Frequency Example: 49.99Hz
17		Pulse constant Example: 1000
18		Modbus address Example: 001
19		Baud rate Example: 9600
20		Continuous running time(In total)

4. Set-up Mode

To get into Set-up Mode, the user need press the “Enter” button for 3 second.

Page	Display	Descriptions
		The setting is done correctly
		The entering information is wrong. The operation fails.
1		**Password** To get into Set-up mode, it asks a password confirmation. Default password: 1000
2		**Address ID** Default ID is 001 Range: 001~247
2-1		Press the "Enter" button, the first digit flash. Press the "Scroll" button to change the value. After choosing the new address value, the user need pressing the "Enter" button to confirm the setting.
3		**Baud rate** Default value: 2400bps Range: 1200, 2400, 4800, 9600bps.
3-1		Press the "Enter" button, the red digit flash. Press the "Scroll" button to change the value. After choosing the new baud rate, the user need pressing the "Enter" button to confirm the setting.
4		**Parity** Default: None Option: None, Even, Odd
4-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new Parity, the user need pressing the "Enter" button to confirm the setting.
5		**Pulse Output** Default: Export kWh Option: kWh / kVArh / Imp. kWh / Exp.kWh / Imp.kVArh / Exp.kVArh
5-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new Pulse output option, the user need pressing the "Enter" button to confirm the setting.
6		**Pulse Constant** Default: 1000 Option: 1000 / 100 / 10 / 1
6-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new Pulse constant option, the user need pressing the "Enter" button to confirm the setting.

7		**Pulse duration** Default: 100mS Option: 200 / 100 / 60ms
7-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new Pulse duration option, the user need pressing the "Enter" button to confirm the setting.
8		**Demand Integration Time** Default: 15 minutes Option: 5 / 10 / 15 / 30 / 60 / OFF
8-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new DIT option, the user need pressing the "Enter" button to confirm the setting.
9		**Automatic Scroll Time Interval** Default: 0 S Option: 0 ~ 30S
9-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the option. After choosing the new "Scrl" option, the user need pressing the "Enter" button to confirm the setting.
10		Backlit lasting time set-up Default: 60 min Option: 0（OFF）/ 5/ 10/ 20/ 30/ 60 Long press "Enter" button to enter set-up mode.

10-1		Press the "Scroll" button to change the option. After choosing the new "Scrl" option, the user need pressing the "Enter" button to confirm the setting.
11		Clear Long press "Enter" to enter clear interface.
11-1		Clear Max demand of active power Long press "Enter" button to confirm the operation.
11-2		Clear the resettable energy From the "11-1" page, press "Scroll" button enter into the energy reset page. Long press the "Enter" button to confirm the operation.
12		Password Default: 1000
12-1		Press the "Enter" button, the red part flash. Press the "Scroll" button to change the value. After choosing the new password, the user need pressing the "Enter" button to confirm the setting.

2. Safety Instructions

KY-1Hybrid-5k0-H series inverters strictly comply with the relevant safety regulations of product design and testing. In order to use this product more safely and reliably, the following lists the information related to different categories of safety. In the process of installation, operation and maintenance, please carefully read and observe the instructions and precautions of the inverter, otherwise it will cause loss of personal and property.

NOTICE!

-The safety instructions in this manual cannot cover all the precautions that should be followed. Perform operations considering actual onsite conditions.

-KOYOE shall not be held liable for any damage caused by violation of the safety instructions in this manual.

2.1. PV Panels

Users must ask professionals to install the photovoltaic panels according to the user manual. Please pay attention to the following matters during installation:

- Photovoltaic panels generate electricity when they are exposed to sunlight and can cause fatal voltages and shocks.

- The inverter is a multi-power system. Operators must wear appropriate personal protective equipment: safety helmet, insulation wire, gloves, etc.

- The operator must use measuring equipment to ensure that the output cable of the PV panel is free of voltage before contacting it.

- All the warnings on the PV panel and in its manual must be followed.

Warning!

-The inverter must only be operated with PV strings of protection class II in accordance with IEC 61730, application class A.
-It is not permitted for the positive pole or the negative pole of the PV strings to be grounded.
- Damages to the product due to a faulty or damaged PV installation are not covered by warranty.

2.2. Utility Grid

Please comply with the relevant regulations of power grid.

Be careful!

- All electrical connections must comply with local and national standards.

-Only with the permission of the utility grid, the inverter can be connected to the utility grid.

2.3. Battery

Please use the battery recommended by our company and pay attention to the following :

DANGER!

- A short circuit or incorrect installation of a battery can release energy and may result in a combustion or fire hazard.

- There may be fatal voltage in the battery terminals and cables of the inverter. Contact with the cables and terminals in the inverter may cause serious personal injury or even death.

Warning!

Provide sufficient ventilation for the battery system to prevent flames and sparks from the explosive hydrogen gas that the batteries release.

Due to the dangers of hydrogen gas and battery electrolyte:
-locate batteries in a designated area, complying with the local regulations;
-protect the enclosure against destruction;
-do not open or deform the battery;
-whenever working on the battery, wear suitable personal protective equipment (PPE) such as rubber gloves, rubber boots and goggles;
-rinse acid splashes thoroughly with clear water for a long time and consider consulting a doctor.

Warning!

-Improper settings or maintenance can permanently damage the battery.
-Incorrect inverter parameters will lead to the premature aging of battery.

2.4. Inverter

DANGER!

Improper handling can be a danger of electric shock.

Do not open the shell at any time. Opening the shell without authorization will not continue to enjoy the warranty.

Warning!

Inverter operation is prohibited improper operation.

- Do not pull out PV connectors, AC connectors and battery connectors when the inverter is running.

- When turning off the inverter, all power supplies of the inverter, including PV, grid and batteries, must be turned off and wait 10 minutes before operating the inverter.

- Before pulling out any connectors, you must ensure that the connectors have no voltage or current.

Warning!

After completion of installation, all safety instructions, warning labels and nameplates on the inverter must meet the following conditions::

-Must be clearly legible.

-Should not be removed or covered.

Warning!

Risk of burns due to hot components

-Do not touch any hot parts (such as heat sinks) during operation. --Only the LCD panel and the DC switch can safely be touched at any time.

Warning!

- Only professionals can change the type Settings of safety regulations.

- Unauthorized changes to safety regulations lead to damage of the inverter will not enjoy warranty service.

- Please be aware of the risk of static electricity from damaging the inverter.

- Do not disassemble the inverter and contact the internal devices.

- Connectors that contact the inverter directly while the inverter is running are prohibited.

Label

Label	Description
	Caution Failing to observe a warning indicated in this manual may result in injury.
	Danger of high voltage and electric shock!
	Danger of hot surface!
	Components of the product can be recycled.
	This side up! The package must always be transported, handled and stored in such a way that the arrows always point upwards.
	No more than six (6) identical packages being stacked on each other.
	Product should not be disposed as household waste.
	The package/product should be handled carefully and never be tipped over or slung.
	Refer to the operating instructions.
	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 10 minutes of being turned off or totally disconnected, in case of any electrical shock or injury.
	CE Mark。

Attention!

1. When connecting the input and output of the inverter, it is necessary to connect the ground wire of the inverter first, and then connect the DC input and AC output. When disconnecting the inverter wiring, the inverter ground wire must be finally disconnected.

2. Before connecting the inverter to the grid, you need to obtain permission from the local power company and hire a professional to learn how to install it.

3. Please carefully read all the documentation that comes with this product.

4. The maintenance and installation of the inverter must be carried out by professionals in accordance with the correct process.

5. Inverters have no maintainable components. If there is any problem, it must be maintained by a professional.

6. All electrical installations must comply with national standards and local regulation 62109.

7. The inverter is non-isolated type, and the photovoltaic module shall comply with IEC61730 class A.

8. Inverters may be over 18kg without handles and grips. Please be careful when handling and lifting. Equipment or parts weighing more than 18 kg shall be equipped with lifting and handling tools or as indicated in the manufacturer's documentation.

9. Software version information can be read by LCD or computer software.

10. The inverter is non-isolated between DC input and AC output. Product identification must be clearly visible after installation.

- Danger of electric shock. Do not remove the shell. There are no user repairable parts inside. If in doubt, please contact a professional.

- When the PV array is exposed to light, it may generate dangerously high voltages. Do not contact the output terminals or cables directly.

- Note that the PV input voltage must be less than 550V, if the voltage is too high, it will cause damage to the inverter.

11. The N on the off-grid side of the inverter is not directly connected to the N on the grid side. Please install and wire the

inverter according to the requirements of the local power grid.

12. **Please avoid direct sunlight to the inverter.**
13. **When the inductive load of the electric model is connected to the off-grid port, please note that the instantaneous peak current of load starting shall not be greater than 40A.**

2.5. Skills of Qualified Personnel

All installation of the inverter shall be carried out by professionals, and the following conditions shall be met:

- Have received training on installation, commissioning and hazard management of electrical system;

-Be familiar with the contents of this manual and other relevant documents;

- Know local regulations.

3. Energy Management

Depending on your configuration and layout, the inverters usually have the following operation modes:

1) Self use(It is necessary to connect the Grid and save it after power failure)

2) Forced Charging(It is necessary to connect the Grid and not save it after power failure)

3) Forced Discharge(It is necessary to connect the Grid and not save it after power failure)

4) Peak Shaving

5) Maintenance

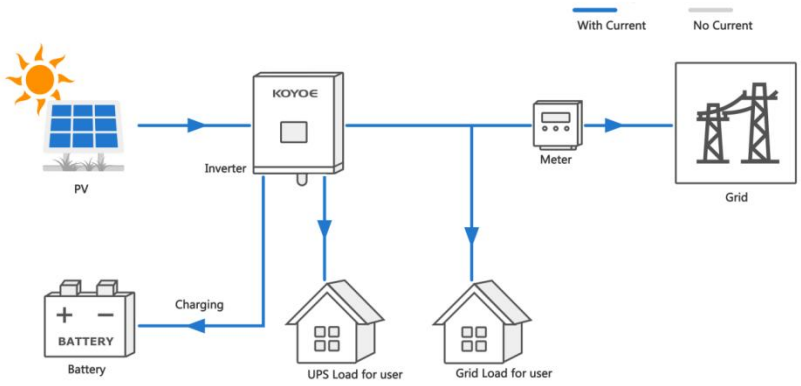
6) Emergency Charging

7) Off Grid

The user can set the inverter to the above working modes according to the actual needs. The detailed mode settings and functions are described as follows:

3.1. Self Use

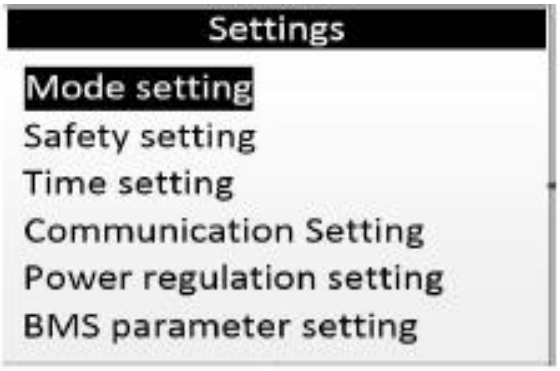
The energy generated by the photovoltaic system shall first meet its own load consumption, then the excess energy is used to charge the battery, and finally the remaining energy can limit the power fed into the power grid by setting and adjusting the power of the network, as shown in the figure below:



The mode setting process is as follows:

1) Press "ENTER" in the main interface to enter the following menu, and then press "UP" and "DOWN" to select "setting".

2) Press "ENTER" in the above interface to enter the following menu, and then press "UP" and "DOWN" to select "Mode setting".



3) Press the "ENTER" button in the above interface to enter the password interface, as shown in the following menu. Enter the password, Press the "ENTER" button to select the cursor and add or subtract the value through the "UP" and "DOWN" buttons, then press the "ENTER" button again to confirm the value at the optical mark, then move the cursor to "OK", and press "ENTER" to confirm the input.

4) In the above interface, after entering the password, press the "ENTER" key to enter the following menu. The interface will display the current working mode. Press the "ENTER" key to select the required working mode through the "UP" and "DOWN" keys. Press the "ENTER" key again to confirm the selected mode, move the cursor to "OK", and press the "ENTER" key to confirm the input.

5) After the above operations, press the "ESC" key to return to the main interface to observe the operation state after changing the mode.

3.2. Forced Charging

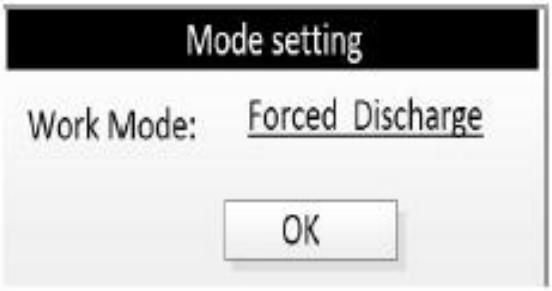
This mode must take effect after being connected to the grid. In the forced charging mode, the inverter selects the appropriate power to charge the battery according to the allowable charging current of BMS and the calculated value of energy management. When the SOC is charged to the upper limit or the working mode is changed, it exits the forced charging mode.

In mode selection, please select the contents shown below to set the forced charging mode. For other steps, please refer to 3.1.

3.3. Forced Discharge

This mode must take effect after being connected to the power grid. In the forced discharge mode, the inverter selects the appropriate power to feed into the power grid according to the allowable discharge current, SOC and energy management calculation value of BMS. After receiving the BMS stop discharge command or changing the working mode, exit the forced discharge mode.

In mode selection, please select the content shown in the figure below to set the strong playback mode. For other steps, please refer to 3.1.

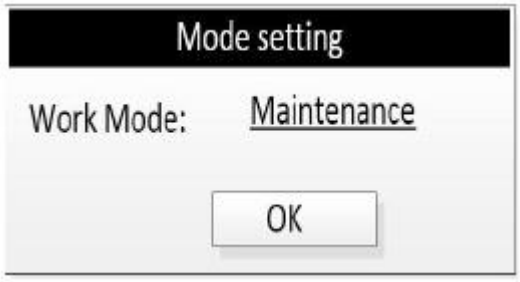


3.4. Peak Shaving

This mode must take effect after being connected to the grid. In peak shaving mode, the inverter can set up up to 10 groups of discontinuous charge and discharge time periods within 24 hours; In this mode, the power of load power supply, charge or discharge will be preferentially adjusted according to the allowable value of BMS and current energy management.

3.5. Maintenance

This mode must take effect after being connected to the grid. In the maintenance mode, the inverter will charge the battery until the SOC is charged to 100% or set to other modes, and automatically exit this mode. The charging power is adjusted according to the allowable value of BMS and the current energy management.



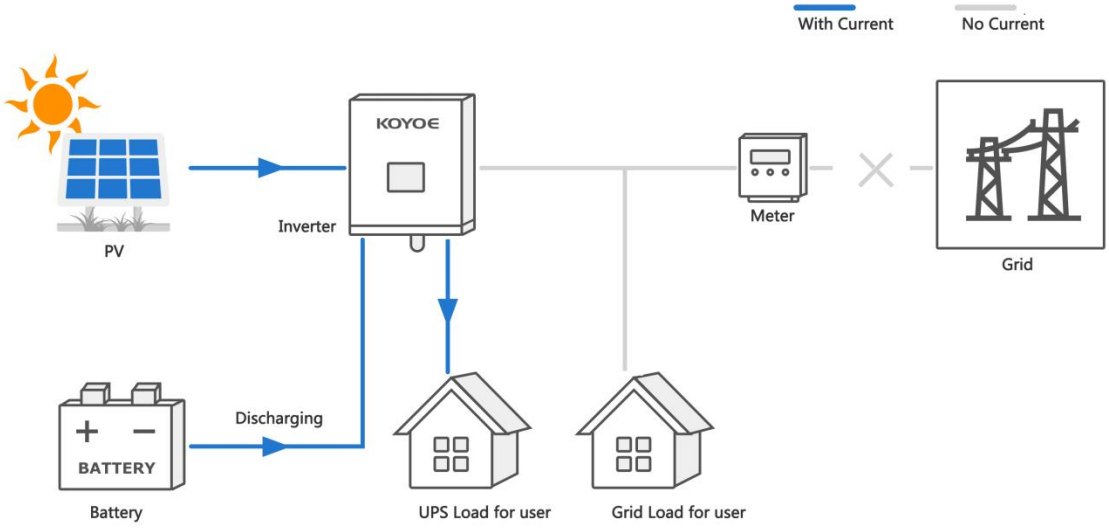
3.6. Emergency Charging

This mode must take effect after connecting to the power grid. In the emergency charging mode, the inverter will charge the battery according to the start or stop charging command of BMS until the SOC is charged to the upper limit value or set to other modes, and then automatically exit this mode. The charging power is adjusted according to BMS value and current energy management.

3.7. Off Grid

When the inverter has only batteries or photovoltaic cells, the inverter will be Off Grid mode after normal operation. When the Grid is connected, the inverter will automatically switch to grid connection, and automatically enter the "Self Use" or "Peak shaving" mode according to the user's settings.

When the Grid is disconnected, the inverter will automatically switch to Off Grid state.



Attention:

-The utility grid must be an off-grid application of the TN system;

-This mode is not suitable for the supply of life-sustaining medical equipment, which may cause personal injury in case of power failure;

-When the inverter is only connected to photovoltaic and power grid, the inverter can also be connected to the grid.

4. Working Stetes

4.1 Waiting

When the inverter is only connected to the power grid or photovoltaic, the inverter enters the standby state. At this time, the LCD displays "waiting", and the inverter will always detect the current working state. When the conditions are met, the inverter will automatically return to normal.

4.2 Checking

After the inverter is powered on or restarted from a recoverable fault, the check self-test will be carried out. At this time, the LCD displays "checking 60s". If there is a fault or warning in the self-test, the inverter will prompt.

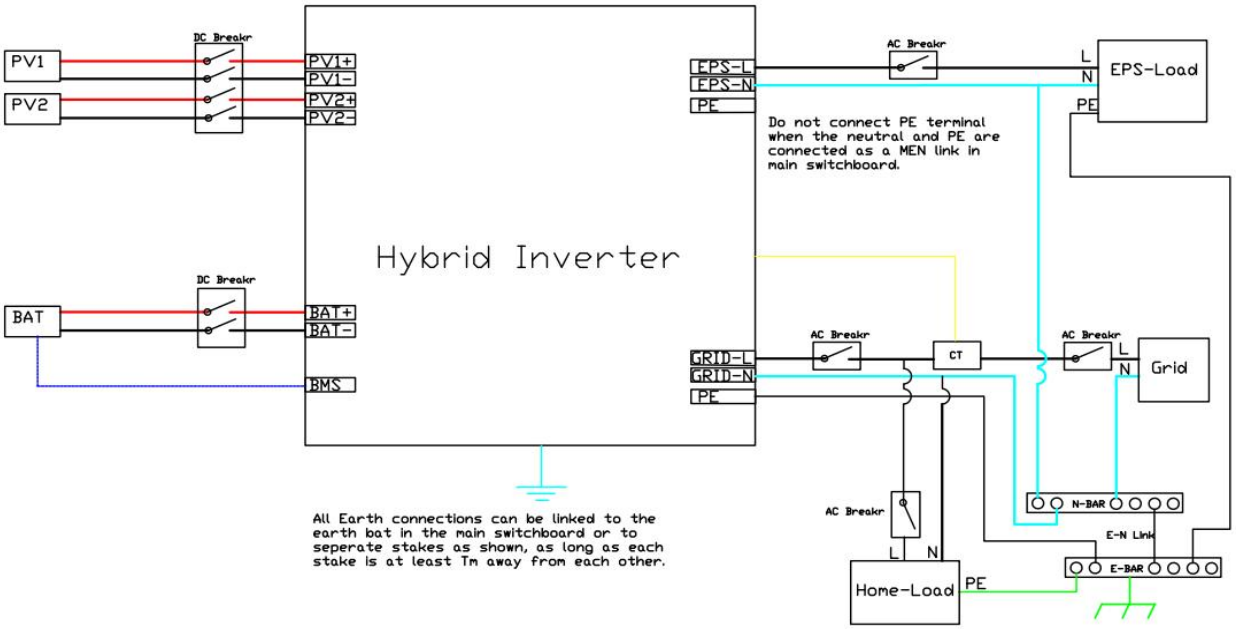
4.3 Normal

After the inverter self inspection is successful, the inverter will enter the normal working state. At this time, the LCD operation light is always on, and the user can view relevant information through the LCD.

4.4 Fault

When the inverter fails, the inverter will automatically stop output and enter the fault mode, and the fault information will be displayed on the LCD. Before entering the fault mode, the inverter will automatically save relevant information. If the fault is a recoverable fault, the inverter will automatically resume operation. In case of unrecoverable fault, the inverter will stop in the fault mode until relevant technicians handle the fault.

Please refer to the following figure for the wiring diagram of neutral point continuity



Our inverter does not support multi-machine parallel mode temporarily

Warning!

-In case of inverter failure, it must be repaired by professionals

- The error codes displayed on the LCD can be viewed in the appendix

4.5 Upgrade

Regardless of the working mode of the inverter, when the system meets the conditions for updating software, the inverter will enter the upgrade state and rewrite the firmware.
Users can download the latest upgrade operation guide from the official website of KOYOE Energy.

5. Function Description

5.1 Safety Function

The protective functions are integrated in the inverter, including short circuit protection, grounding insulation resistance surveillance, residual current protection, anti-islanding protection, DC overvoltage / over-current protection, etc.

Warning!

-There is an integrated leakage current detection unit inside the inverter. When the inverter detects the leakage current greater than the allowable value, it will be disconnected from the grid quickly

-If RCD(Leakage Current Protector) or Leakage Current Switch is installed externally, the operating current must be ≥300mA.

Users can set the working mode of the inverter through LCD. In general, the factory setting is the default parameter of the corresponding country.

Users can set safety rules according to the actual environment they are using. The operation of setting safety rules is shown in the figure5-1(Australia_A):

Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Safety Parameters" through the"Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Safety information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After the password is entered correctly, the user can Enter the following menu. The user can select the safety rules that need to be set through the "up" and "down" keys, and then press the "ENTER" button to confirm. After successful setting, "OK" will be prompted, and then press the "Esc" key to return to the main screen.

The figure5-2 correspond to Australia respectively_ A、Australia_ B、Australia_ C、Newzealand

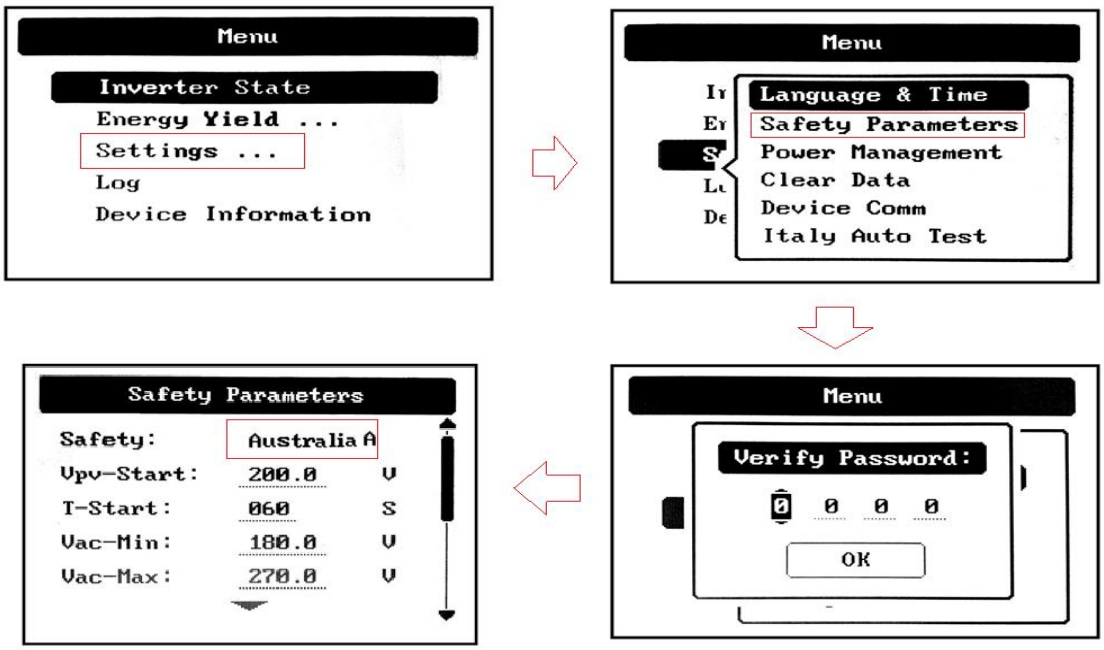


Figure5-1 Safety Setting

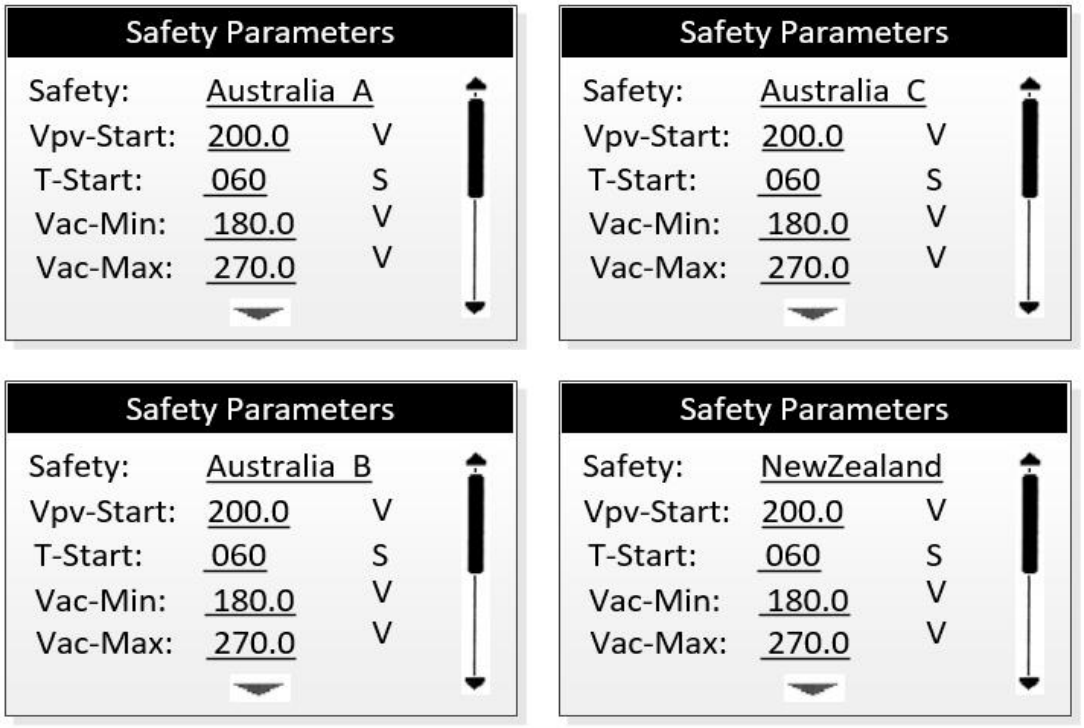


Figure5-2

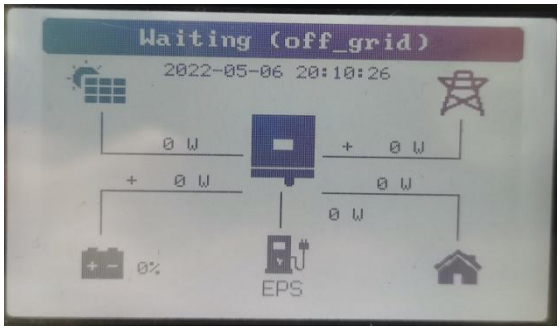
Once power quality and grid Settings are selected during debugging, they should be locked, non-editable (unless password is used), and used only for viewing. Passwords are not always available. You are advised to obtain passwords from the manufacturer and the importer or exporter as required for independent maintenance

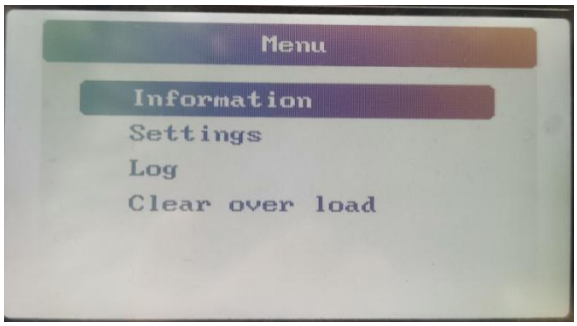
You can perform the following steps to view the configured country code/firmware version and power quality response mode. (Do not need access permission to view)

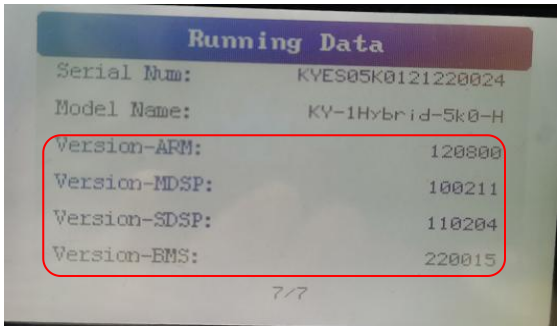
Please refer to the following steps:

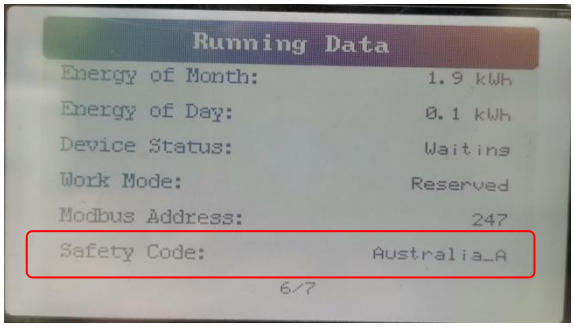
Step 1: Press "OK" on the main interface to enter the next interface, then display "Information" under the "Menu" Menu, and then press "OK" to enter the next Menu.

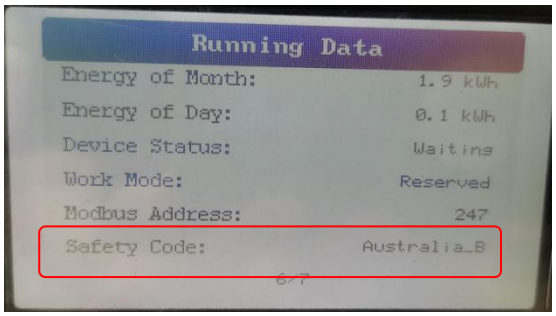
Step 2: Enter the menu of "Running Data" and click "Up" and "Down" to view the firmware version/country code and power quality response mode after setting.

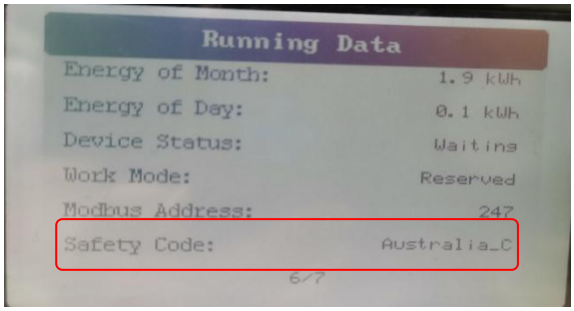


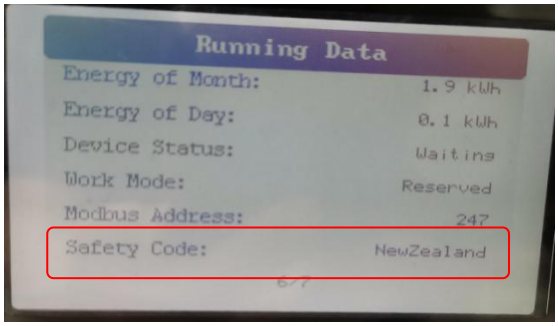


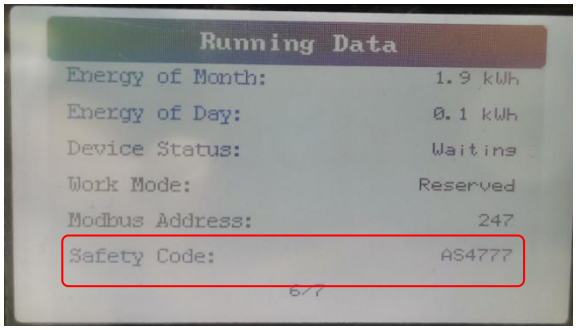












5.2 Power quality response modes

User can set the power quality mode through the following steps.

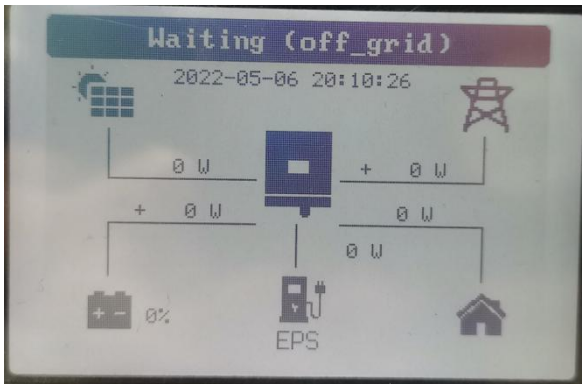
Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

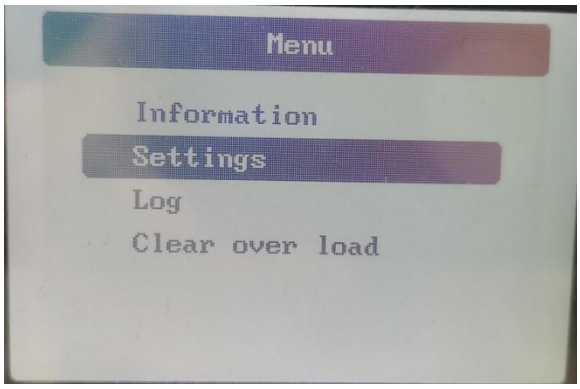
Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

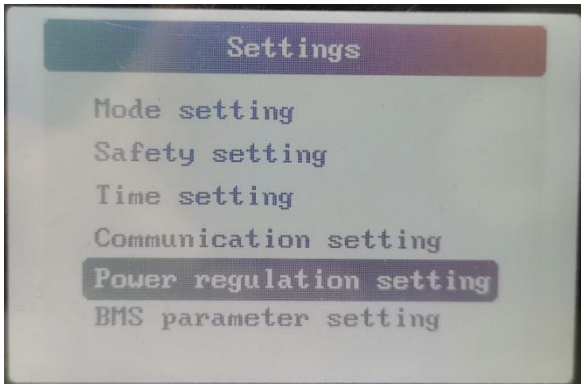
Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

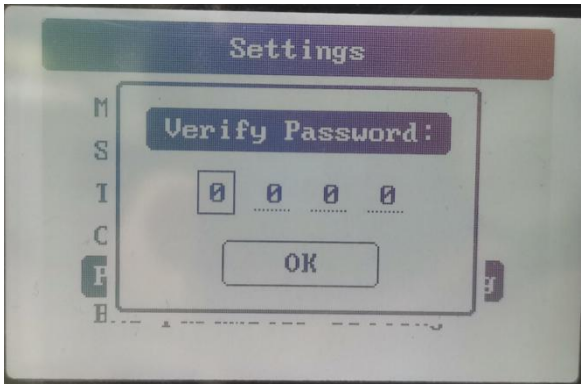
Step 4: Enter the correct password, enter the following menu.

The user can select the power quality mode to be set by "up" and "Down" , and then press "ENTER" to confirm. After the Settings are successful, the system displays OK, and press Esc to return to the home screen.





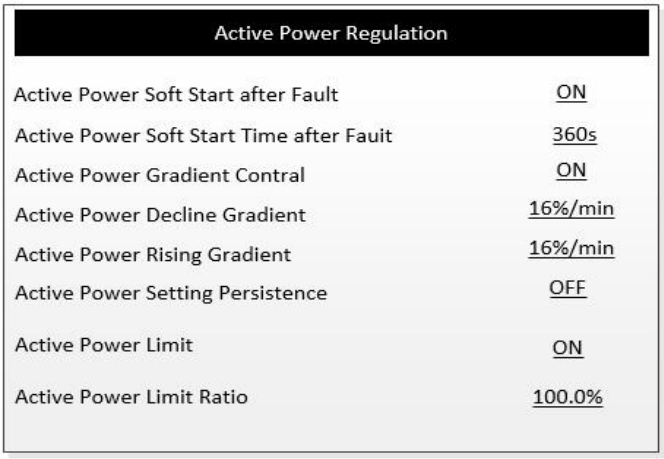




5.2.1 Power Regulation Parameters

1. Active Power Regulation

Tap **Settings→Power Regulation Setting→Active Power Regulation** to enter the screen, as shown in the following figure.



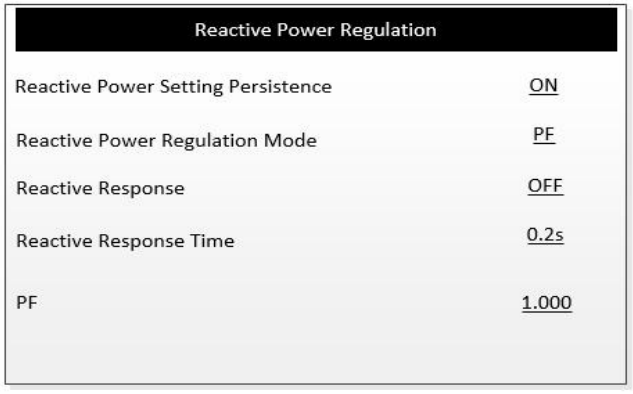
Reactive Power Regulation

Description of Active Power Regulation Parameters

Parameter	Description	Range
Active Power Soft Start after Fault	Switch for activating/deactivating the function of active power soft start after a fault occurs	On/Off
Active Power Soft Start Time after Fault	The soft start time required for raising active power from 0 to rated value after a fault occurs	1 s–1200 s
Active Power Gradient Control	Set whether to enable active power gradient control	On/Off
Active Power Decline Gradient	Decline gradient of inverter active power per minute	1 %/min–6000 %/min
Active Power Rising Gradient	Rising gradient of inverter active power per minute	1 %/min–6000 %/min
Active Power Setting Persistence	Switch for activating/deactivating the function of active power setting persistence	On/Off
Active Power Limit	Switch for limiting active power	On/Off
Active Power Limit Ratio	The ratio of active power limit to rated power in percentage	0.0 %–100.0 %

2. Reactive Power Regulation

Tap **Settings→Power Regulation Setting→Reactive Power Regulation** to enter the screen, as shown in the following figure.



Reactive Power Regulation

Description of Reactive Power Regulation Parameters

Parameter	Description	Range
Reactive Power Setting Persistence	Switch for activating/deactivating the function of reactive power setting persistence	On/Off
Reactive Power Regulation Mode	Off/PF/Qt/Q(P)/Q(U)	Off/PF/Qt/Q(P)/Q(U)
Reactive Response	Switch for activating/deactivating the function of reactive response	On/Off
Reactive Response Time	Time for reactive response	0.1 s-600 s

"Off" Mode

The reactive power regulation function is disabled. The PF is fixed at +1.000.

"PF" Mode

The power factor (PF) is fixed and the reactive power is regulated by the parameter PF. The PF ranges from 0.8 leading to 0.8 lagging.

• Leading: the inverter is sourcing reactive power to the grid.

• Lagging: the inverter is injecting reactive power into the grid.

"Qt" Mode

In the Qt mode, the reactive power can be regulated by the parameter Q-Var limits (in %). The system rated reactive power is fixed, the system injects reactive power according to the delivered reactive power ratio. The "Reactive Power Ratio" is set through the App.

The setting range of the reactive power ratio is from -100 % to 100 %, corresponding to the ranges of inductive and capacitive reactive power regulation respectively.

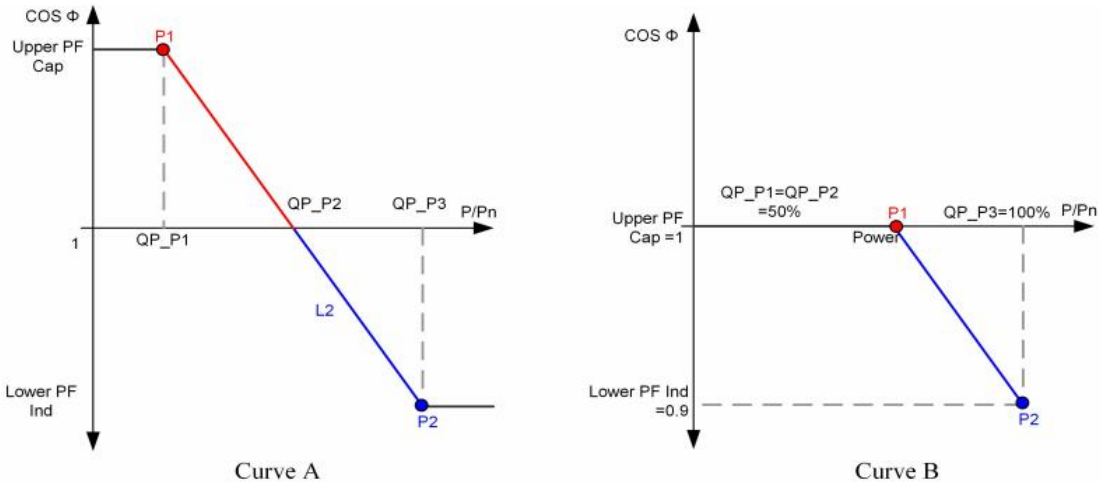
"Q(P)" Mode

The PF of the inverter output varies in response to the output power of the inverter.

"Q(P)" Mode Parameters Explanation

Parameter	Explanation	Range
Q(P) Curve	Select corresponding curve according to local regulations	A, B, C*
QP_P1	Output power at point P1 on the Q(P) mode curve (in %)	0.0 %–100.0 %
QP_P2	Output power at point P2 on the Q(P) mode curve (in %)	20.0 %–100.0 %
QP_P3	Output power at point P3 on the Q(P) mode curve (in %)	20.0 %–100.0 %
QP_K1	Power factor at point P1 on the Q(P) mode curve	Curve A/C: 0.800 to 1.000 Curve B: -0.600 to 0.600
QP_K2	Power factor at point P2 on the Q(P) mode curve	
QP_K3	Power factor at point P3 on the Q(P) mode curve	
QP_ EnterVoltage	Voltage for Q(P) function activation (in %)	100.0 %–110.0 %
QP_ ExitVoltage	Voltage for Q(P) function deactivation (in %)	90.0 %–100.0 %
QP_ ExitPower	Power for Q(P) function deactivation (in %)	1.0 %–100.0 %
QP_ EnableMode	Unconditional activation/deactivation of Q(P) function	Yes, No

* Curve C is reserved and consistent with Curve A currently.



Reactive Power Regulation Curve in Q(P) Mode

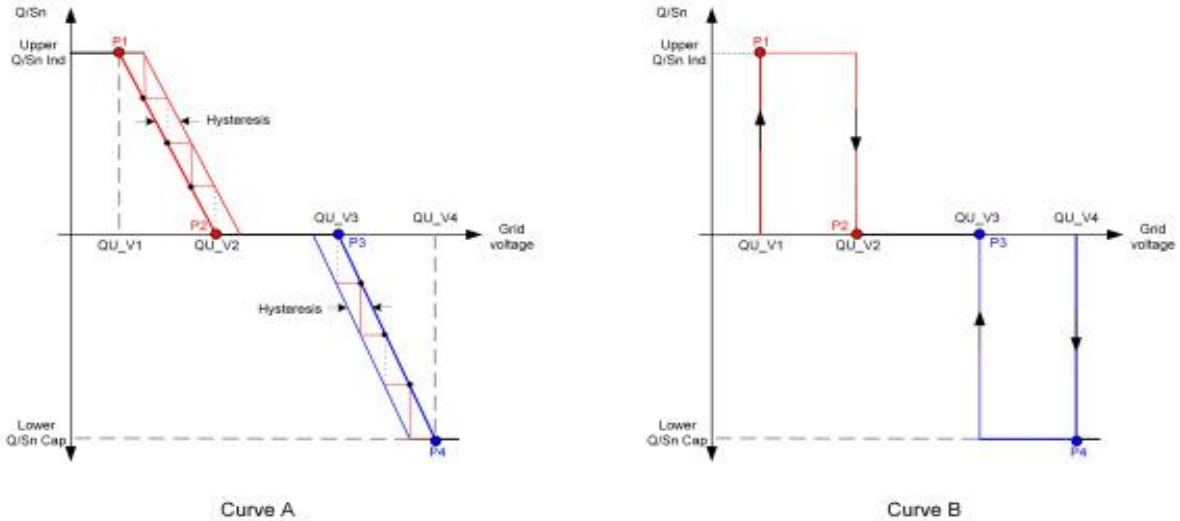
"Q(U)" Mode

The reactive power output of the inverter varies in response to the grid voltage.

"Q(U)" Mode Parameter Explanation

Parameter	Explanation	Range
Q(U) curve	Select corresponding curve according to local regulations	A, B, C*
Hysteresis Ratio	Voltage hysteresis ratio on the Q(U) mode curve	0.0 %–5.0 %
QU_V1	Grid voltage limit at point P1 on the Q(U) mode curve (in %)	80.0 %–100.0 %
QU_V2	Grid voltage limit at point P2 on the Q(U) mode curve (in %)	80.0 %–100.0 %
QU_V3	Grid voltage limit at point P3 on the Q(U) mode curve (in %)	100.0 %–120.0 %
QU_V4	Grid voltage limit at point P4 on the Q(U) mode curve (in %)	100.0 %–120.0 %
QU_Q1	Value of Q/Sn at point P1 on the Q(U) mode curve (in %)	-60.0 % to 0.0 %
QU_Q2	Value of Q/Sn at point P2 on the Q(U) mode curve (in %)	-60.0 % to 60.0 %
QU_Q3	Value of Q/Sn at point P3 on the Q(U) mode curve (in %)	-60.0 % to 60 %
QU_Q4	Value of Q/Sn at point P4 on the Q(U) mode curve (in %)	0.0 % to 60.0 %
QU_ EnterPower	Active power for Q(U) function activation (in %)	20.0 %–100.0 %
QU_ ExitPower	Active power for Q(U) function deactivation (in %)	1.0 %–20.0 %
QU_ EnableMode	Unconditional activation/deactivation of Q(U) function	Yes, No, Yes (Limited by PF)
QU_Limited PF Value	Preset PF value	0–1

*Curve C is reserved and consistent with Curve A currently.



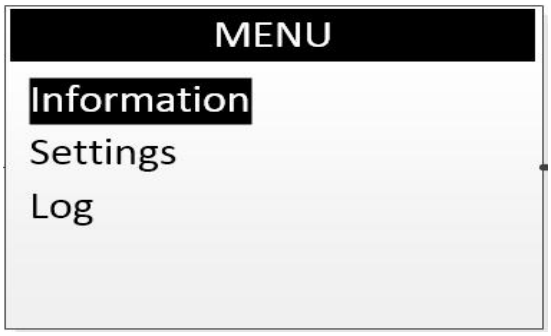
Reactive Power Regulation Curve in Q(U) Curve

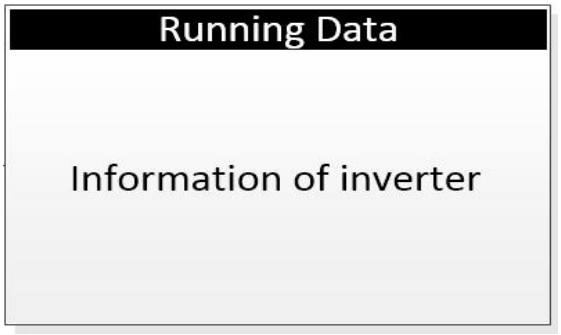
5.2.2 View Power Regulation Parameters

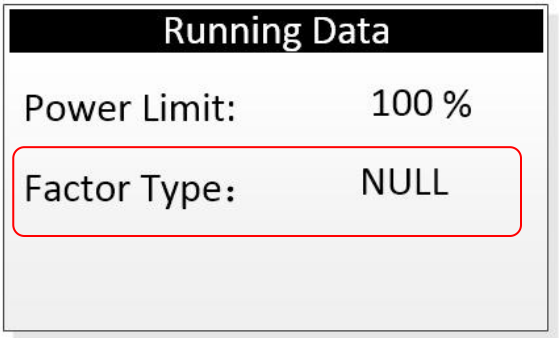
After setting the power quality response mode, user can view the parameters on the information of LCD.

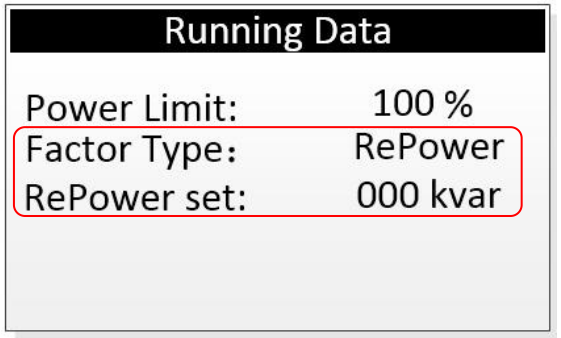
Step1：Press “ENTER” into Menu of LCD，chose the “information” and press “ENTER” into Running Date of LCD.

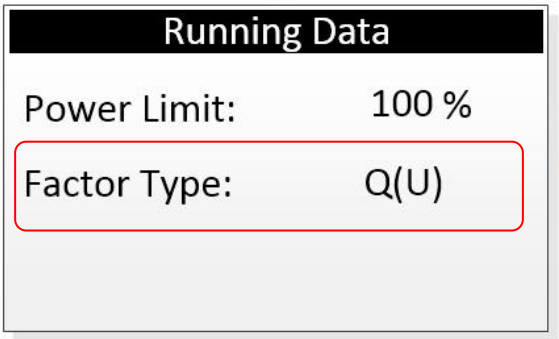
Step2：Press “DOWN” or “UP” to view the data of Inverter.

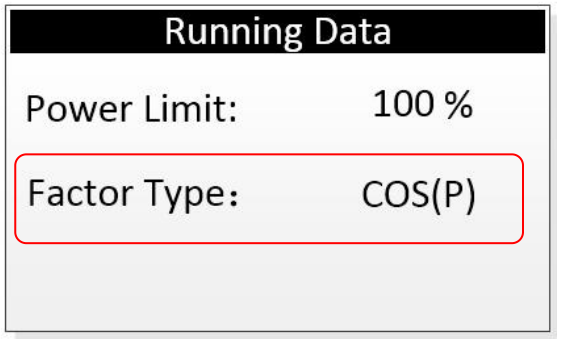


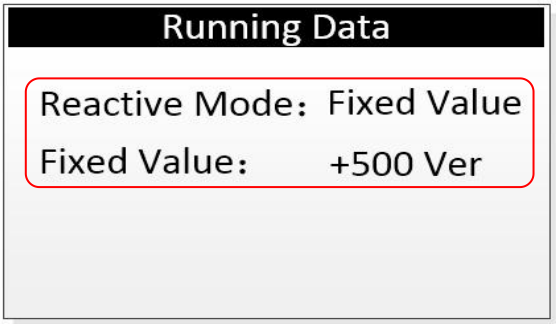


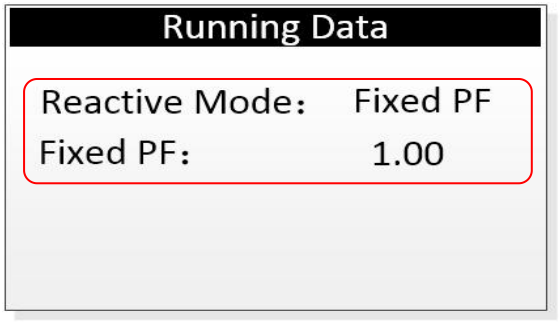












5.3 Energy Conversion and Management

The inverter converts the DC power from the PV strings or the battery to the AC power, which conforms to the grid requirements. It also transmits the DC power from the PV panel to the battery.

The inverter is integrated with a bidirectional converter, which can charge or discharge the battery.

Two string MPP trackers can be utilized to maximize the power from PV strings with different orientations, tilts, or module structures.

5.4 Power Derating

-

Power derating is a way to protect the inverter from overload or potential faults. In addition, the derating function can also be activated by the requirements of the utility grid. Situations requiring inverter power derating are:

-grid dispatching;

-over-temperature (including ambient temperature and module temperature);

-grid under-voltage;

-export power limit setting;

-power factor.

Grid Dispatching Derating

Adjust the output power according to the remote scheduling instructions and the inverter operates with the power derating.

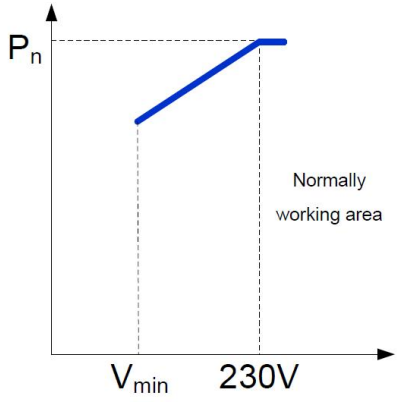
Over-temperature Derating

A high ambient temperature or poor ventilation will lead to a power derating of the inverter.

When the internal temperature or module temperature exceeds the upper limit, the inverter will reduce the power output until the temperature drops within the permissible range.

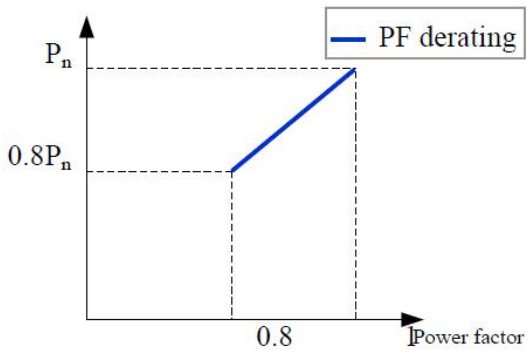
Grid Under-voltage Derating

When the grid voltage is too low, the inverter will reduce the output power to make sure that the output current is within the permissible range. The following figure shows the under-voltage derating curve.



Power Factor Derating

When the power factor PF<1.0, the inverter will reduce the output power within a specified range. The following figure shows the power factor derating curve.



5.5 External Demand Response（DRMs）

The inverter provides a terminal block for connecting to a Demand Response Enable Device (The DRED device needs to be prepared by the customer). Dred asserts a requirement response pattern(DRMs). The inverter detects and responds to all supported demand response commands within 2S.

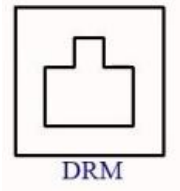
The DRM supported by the inverter is shown in the following table.

Mode	Explanation
DRM0	The inverter is in the state of “Disconnect Output”.
DRM1	The import power from the grid is 0.
DRM2	The import power from the grid is no more than 50% of the rated power.
DRM3	The import power from the grid is no more than 75% of the rated power.
DRM4	The import power from the grid is 100% of the rated power, but subject to the constraints from other active DRMs.
DRM5	The export power to the grid is 0.
DRM6	The export power to the grid is no more than 50 % of the rated power.
DRM7	The export power to the grid is no more than 75 % of the rated power.
DRM8	The export power to the grid is 100 % of the rated power, but subject to the constraints from other active DRMs.

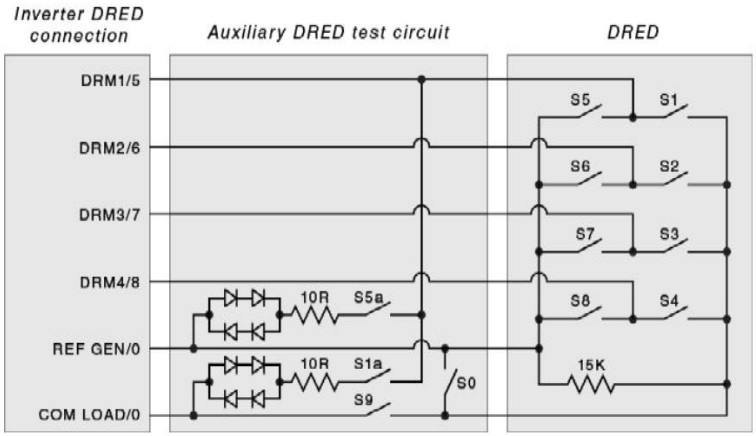
The DRED may assert more than one DRM at a time. The following shows the priority order in response to multiple DRMs.

Multiple Modes	Priority Order
DRM1…DRM4	DRM1 > DRM2 > DRM3 > DRM4
DRM5…DRM8	DRM5 > DRM6 > DRM7 > DRM8

DRM Connects to the DRM Port of the inverter



RJ45 SOCKET PIN ASSIGNMENT	
PIN	Assignient for inverters capable of both eharging and discharging
1	DRM1/5
2	DRM2/6
3	DRM3/7
4	DRM4/8
5	REF GEN/0
6	COM LOAD/0
7	NA
8	NA



6. Unpacking and Storing

6.1. Unpacking and Inspecting

The inverter is thoroughly tested and strictly inspected before delivery. Damage may still occur during shipping. Therefore, the first thing you should do after receiving the device is to conduct a thorough inspection.

1. Check the packaging for any visible damage.

2. Check the delivery contents for completeness according to the packaging list.

3. Check the inner contents for any visible damage.

Contact SUNGROW or the supplier in case there is any damage or incompleteness.

Do not dispose of the original packing case. It is recommended to store the inverter in it.

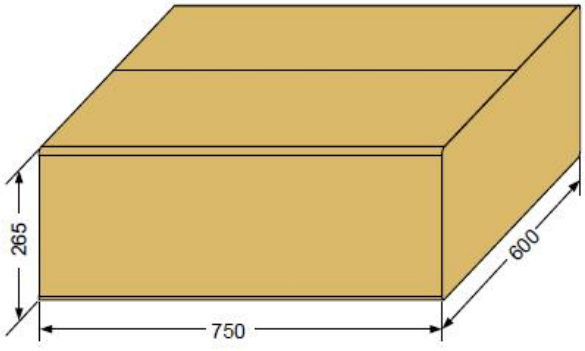


Fig. 6-1 Single Inverter in Original Packing Carton (unit: mm)

6.2. Packing List

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

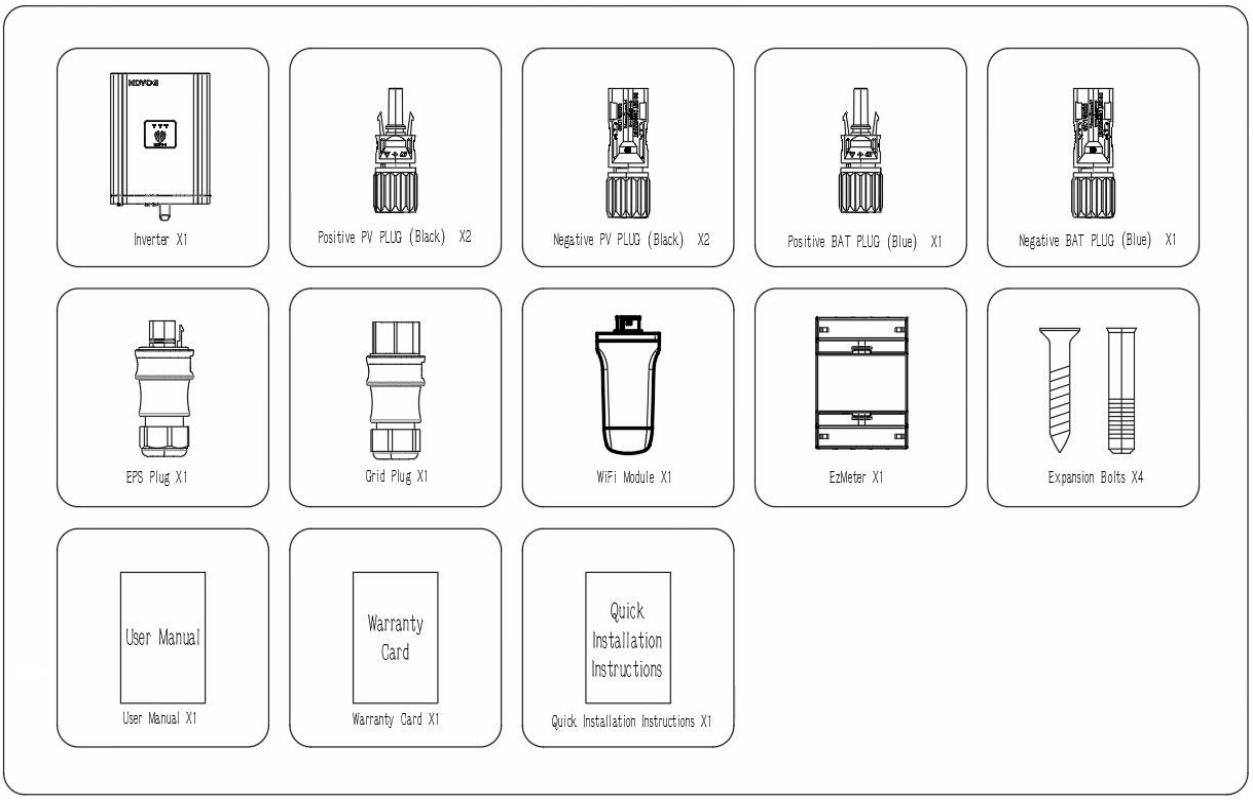


Fig. 6-2 Packing List

6.3. Inverter Storage

Proper storage is required if the inverter is not installed immediately.

-Store the inverter in the original packing case with the desiccant inside.

-The storage temperature should be always between -30°C and +85°C, and the storage relative humidity should be always between 5 and 95 %.

-In case of stacking storage, the number of stacking layers should never exceed the limit marked on the outer side of the packing case (6 layers for KY-1Hybrid-5k0-H).

-The packaging must be upright.

-If the inverter has been stored more than a year, the qualified personnel should thoroughly check and test it before using.

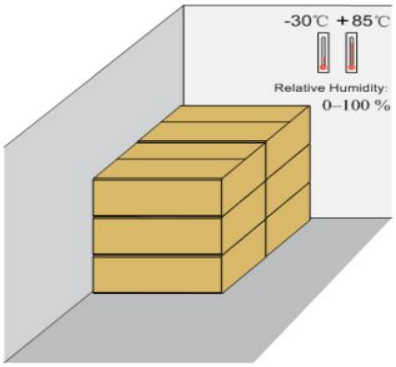


Fig. 6-3 Example of Inverter Storage

7. Mechanical Mounting

7.1. Safety during Mounting

Warning!

Make sure there is no electrical connection before installation.

In order to avoid electric shock or other injury, be sure there is no electricity or plumbing installations before drilling holes.

Warning!

The following improper practices may cause personal injury.

- When moving and positioning the inverter, it must be operated according to the instructions.

- System performance may deteriorate due to poor ventilation.

- To ensure safety, do not open the top cover.

Warning!

Wear gloves to avoid scratches when mounting the inverter.

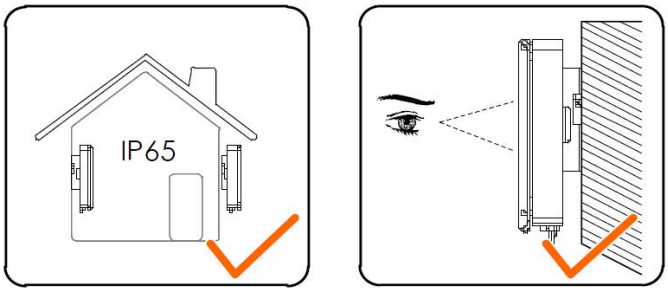
The inverter must be installed by professionals.

7.2. Mounting Location

Choose an optimal installation location to facilitate safe operation and maximize the performance and long life of the inverter.

IP65 inverters can be installed indoors and outdoors.

Install the inverter in a place that facilitates electrical connection, operation and maintenance.



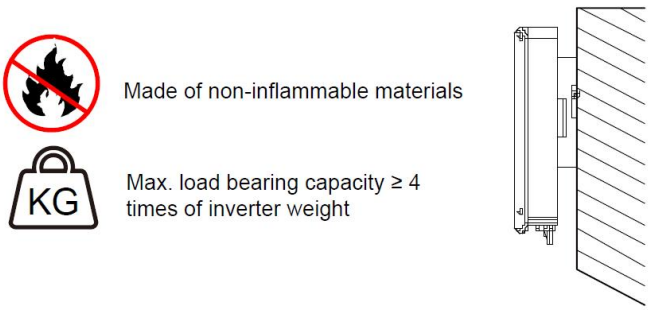
7.2.1. Installation Environment Requirement

The installation environment of the inverter must meet the following requirements:

- The installation environment must be away from flammable and explosive dangerous goods.
- Inverters must be installed in an environment out of reach of children.
- Ambient temperature (-25℃~ + 60℃) and relative humidity (4% ~ 95% without condensation).
- Direct exposure of the inverter to sunlight, rain and snow is prohibited.
- The inverter should be well ventilated to ensure air flow to the radiator.
- Do not install inverters in living areas, otherwise the inverter will produce noise during operation, affecting daily life.

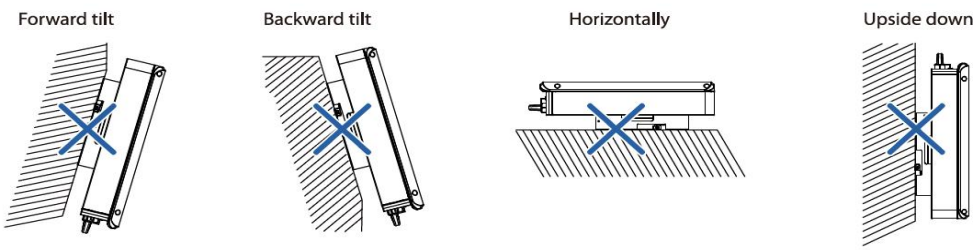
7.2.2. Installation Carrier Requirement

The installation carrier should meet the following requirements:



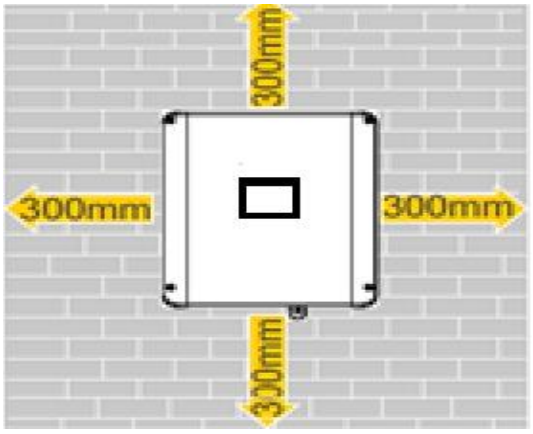
7.2.3. Installation Angle Requirement

Never install the inverter horizontally, or with a forward tilt or with a backward tilt or even with upside down. The horizontal installation can result in damage to the inverter.



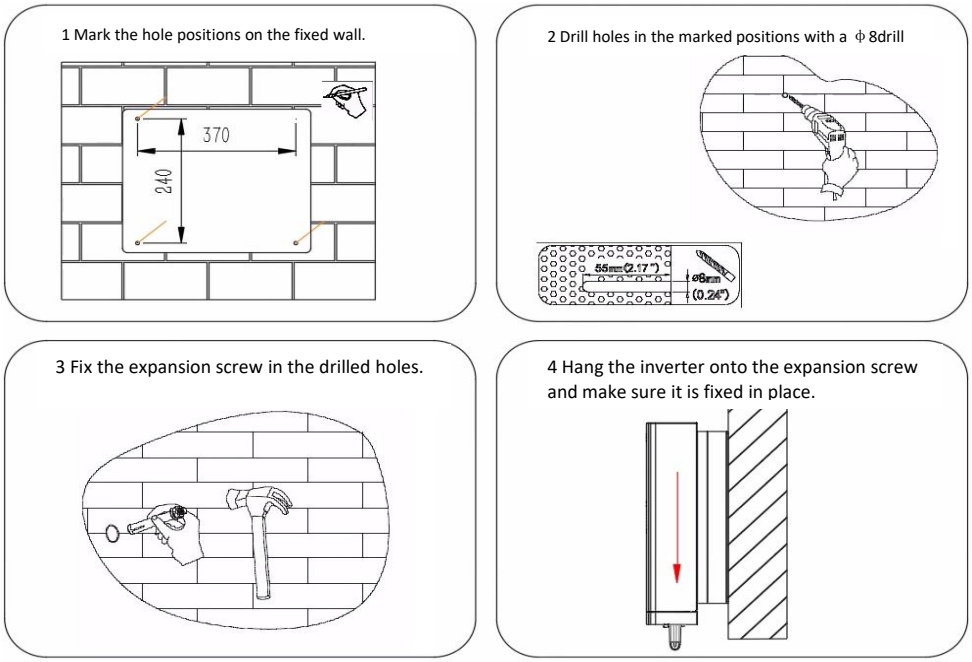
7.2.4 Installation Clearance Requirements

Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation.
Clearance requirement：



7.2.5 Mounting the Inverter

Remember that this inverter is heavy! Please be careful when lifting out from the package. The inverter is suitable for mounting on concrete or other non-combustible surface only. The maximum load bearing of the carrier must be greater than or equal to four times the weight of the inverter.



Step1：Mark the hole positions on the fixed wall;

Step2：Drill holes in the marked positions with a ϕ 8 drill bit.

Step3：Fix the expansion screw in the drilled holes.

Step4：Hang the inverter onto the expansion screw and make sure it is fixed in place.

8. ELECTRICAL WIRING CONNECTION

8.1. Safety Instruction

Before any electrical connection, remember that this inverter is multi-power supplied. Electrical connections must be made by a professional and personal protective equipment must be worn.

Warning!

Inverter has lethal high voltage inside, please pay attention to safety when operating.

- PV panels can produce lethal high voltage in sunlight. Do not touch PV output cables or interfaces.

- Confirmed that the DC and AC circuit breakers have been disconnected and that they are not inadvertently reconnected before starting electrical connections.

- Before connecting cables, make sure all cables are free of voltage or current.

Warning!

Any improper operations during cable connection can cause device damage or personal injury.

Only qualified personnel can perform cable connection.

All cables must be undamaged, firmly attached, properly insulated and adequately dimensioned.

Warning!

Comply with the safety instructions related to the PV strings and the regulations related to the utility grid.

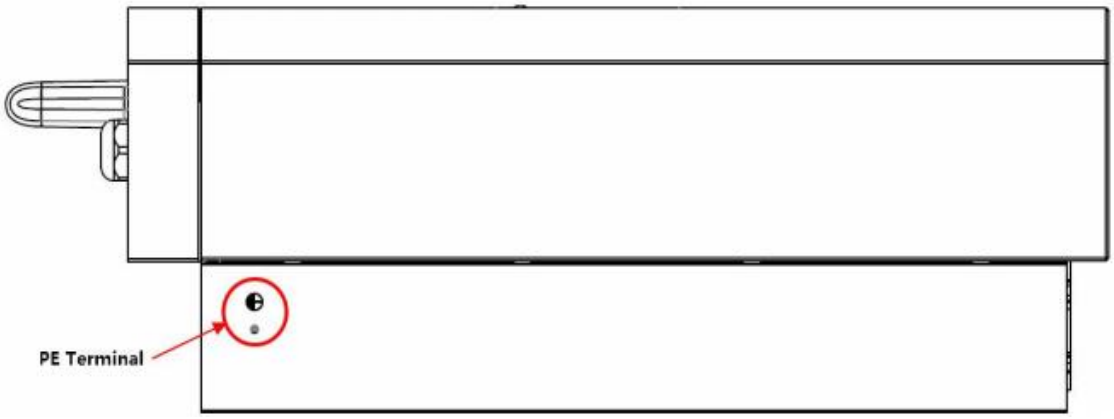
All electrical connections must be in accordance with local and national standards.

Only with the permission of the utility grid, the inverter can be connected to the utility grid.

8.2. Grounding Connecton

All non-current carrying metal parts and device enclosures in the PV power system should be grounded, for example, brackets of PV modules and inverter enclosure.

The additional grounding terminal is equipped at the side of the inverter. Be sure to connect this additional grounding terminal to the PE bar for reliable grounding and ensure that the grounding resistance should be less than 10 Ohm.

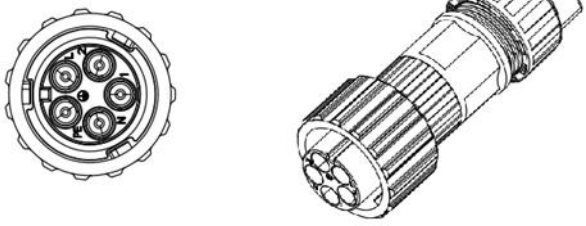


PE Terminal Terminals connected to the earth

Warning!

Because the inverter is a non-isolated inverter without a transformer, the negative and positive poles of the photovoltaic group series can not be grounded. Otherwise, the inverter will not work properly.
- Before connecting AC cables, photovoltaic cables and communication cables, the protective ground wire of the inverter must be connected first.
- The protective ground wire of the inverter cannot replace the ground wire of the AC cable. It is necessary to ensure that both terminals are reliably grounded.

a) System grounding (First PE at AC connector L, N，PE)
A single inverter system needs to ground the "PE" cable;
Multiple inverter systems need to connect all inverter "PE" cables and the metal frame of photovoltaic array to the same grounding copper bar to realize equipotential connection.



b) Protective earthing (second PE at external enclosure)

The inverter is required to add protective earthing connection port. Users can choose to connect the grounding protection line according to their needs. The grounding port is located next to the AC output port at the bottom of the inverter. The installation method is shown in Fig.

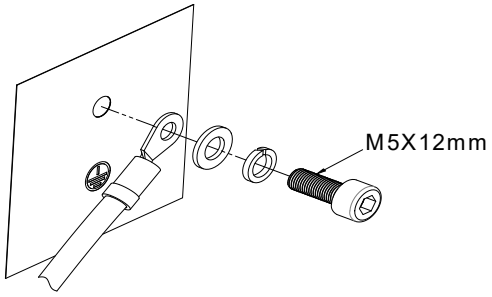
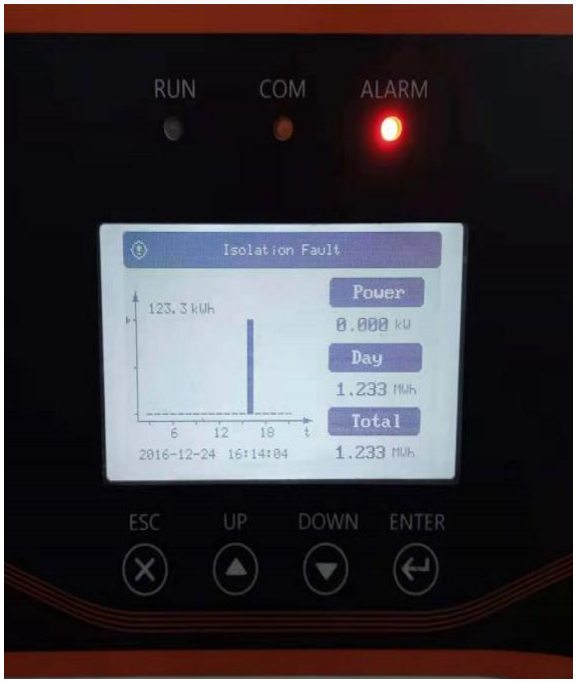


Figure connecting grounding protection wire

c) Earth fault alarm

Our inverters provide a ground fault alarm function. If there is bad grounding or ungrounding phenomenon, there are three phenomena can be observed:

1. The screen shows "isolation fault", and the red indicator lights up during startup self-check.Figure1
2. After the inverter triggers the grounding fault, there will be an audio signal (the buzzer), and the alarm sound will continue until the fault is removed ;
3. Phone APP remote monitoring error notification; As shown in Figure2



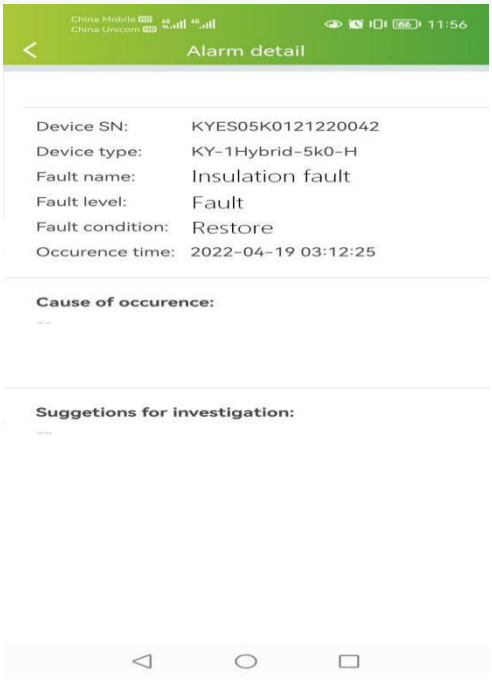


Figure 1

Figure 2

Warning!

For easy maintenance, install the inverter at eye level. Please install the product in heavy traffic areas, as ground fault alarms may be noticed by LCD,APP and Buzzer.

8.3. PV CONNECTION

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

The minimum isolation resistance to ground of the PV string must exceed 18.33kΩ in case of any shock hazard;

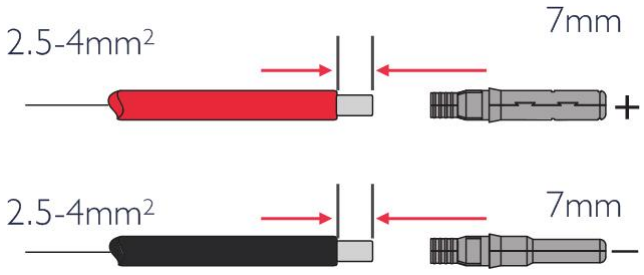
PV strings could not connect to earth/grounding conductor;

Use the DC plugs in the accessory box. The mode is:VP-D4B-CHSF4(Positive poles+

) ,VP-D4B-CHSM4(negative poles-)

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

Step1: Prepare PV cables and DC plugs

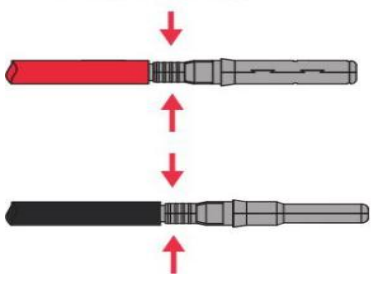


Be careful!

-Please use DC plugs and connectors in KOYOE accessory box

-PV cable should be standard, 2.5-4mm2 PV cable

Step2: Connect PV cable to DC connectors

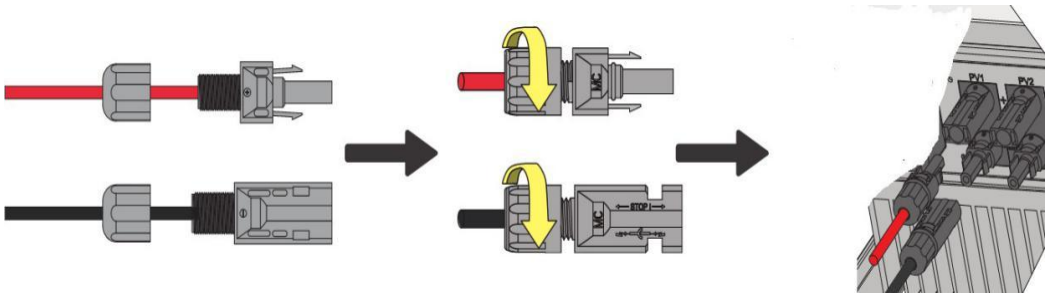


Be careful!

-PV cable must be tightly crimped into the connectors;

-For Amphenol connector, the limit buckle cannot be pressed;

-There will be a click sound if connectors are inset correctly into DC plugs.



Step3: Screw the cap on and plug onto inverter side

Be careful!

Rotate the DC switch at the bottom of the inverter to the "off" position before inserting the terminals

Check that the PV string wiring polarity is correct and that in any case the open circuit voltage does not exceed the inverter input limit of 550V.

Check the positive and negative polarity of the PV string to ensure correct polarity, and then connect the PV to the corresponding terminal. KOYOE does not accept any responsibility for arc or contactor overheating that may occur if the PV connector is not securely installed.

8.4. Battery CONNECTION

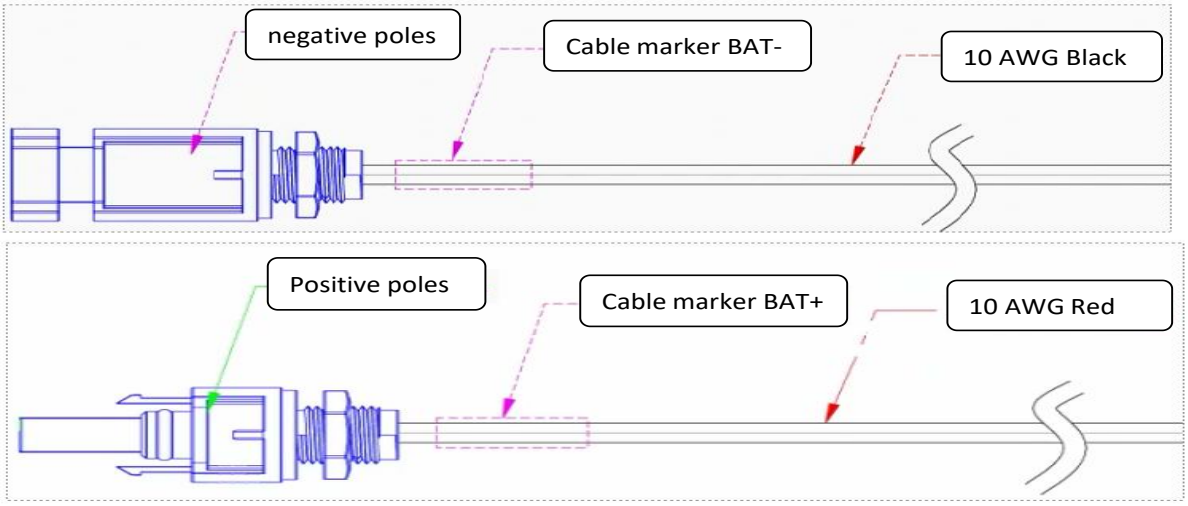
The battery side interface can be installed according to the above method. If you have any questions, please consult the customer service personnel.

Lead-acid batteries are supported, but not recommended, because the external NTC detection function is unavailable to monitor the high temperature caused by battery consistency.

An inverter with storage connections will need to provide a means for temperature compensation of the battery charge voltages. This is particularly important for use with lead acid batteries in warm climates, to avoid damage to battery banks by overcharging in hot weather, and related

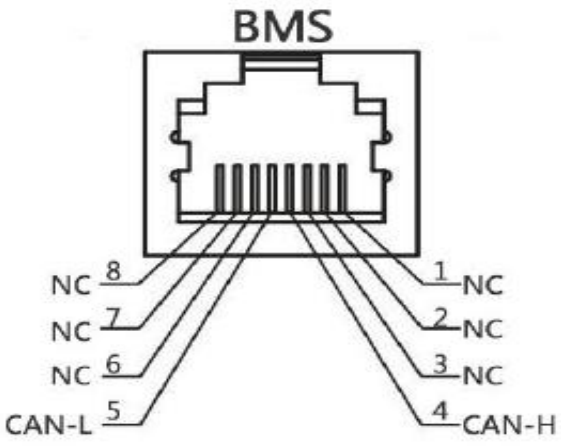
hazards due to release of hydrogen gas and cell rupture. Most stand-alone inverters control this function via a remote temperature sensor which is attached to the battery bank.
The KY-1Hybrid-5k0-H does not include a connection terminal for a remote battery temperature sensor. If installing KY-1Hybrid-5k0-H with lead acid batteries please check with Jiangsu Koyoe Energy Technology Co., Ltd. for advice regarding charge settings.

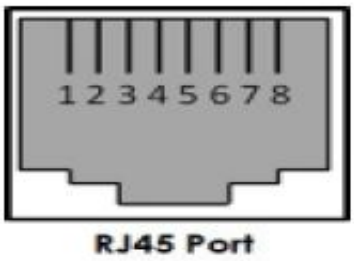
The inverter supports lithium batteries. When connecting the lithium battery, connect the communication line between the lithium battery and the inverter. The inverter BMS communication interface is defined as shown in the following figure



Be careful!

-Please use the battery plug and connector in the KOYOE accessory box -Battery cables should be standard 10AWG(6mm2) pv cables





Connect the BMS and inverter to the corresponding RJ45 port using a network cable

Be careful!

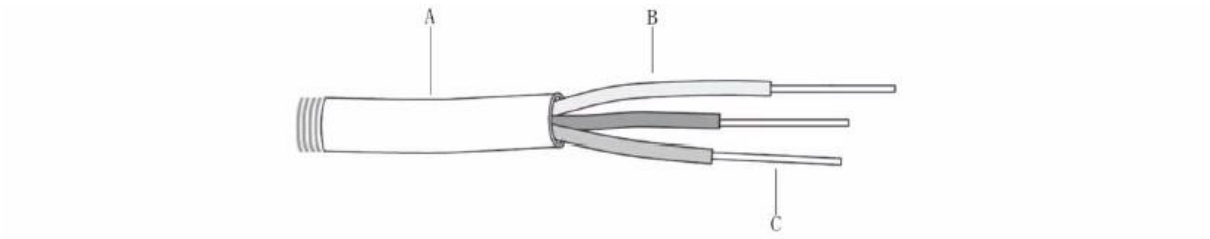
- Please close the battery switch before plugging into the battery interface to ensure no voltage on the cable
- Make sure the electromagnetic voltage is within the inverter input rated range before plugging into the battery interface
- If using lithium batteries, please connect the BMS communication line to the inverter. For different battery interface signals, please refer to the Battery Connecting Instructions Manual

8.5. ON-GRID&OFF-GRID CONNECTION

An external AC switch (≥40A) is needed for on-grid connection to isolate from grid when necessary.

Please conduct wiring according to the identification on the interface, 6 mm2 cable is recommended for connection.

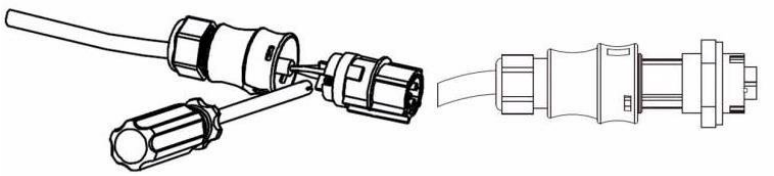
Step1: For the safe operation of system, the recommended wire specifications are shown in the figure.



Label	Description	Data
A	Wire Outer Diameter	11-12mm
B	Wire Cross-sectional Area	6mm²
C	Bare Wire Length	10mm

Step2: Prepare supporting AC terminals

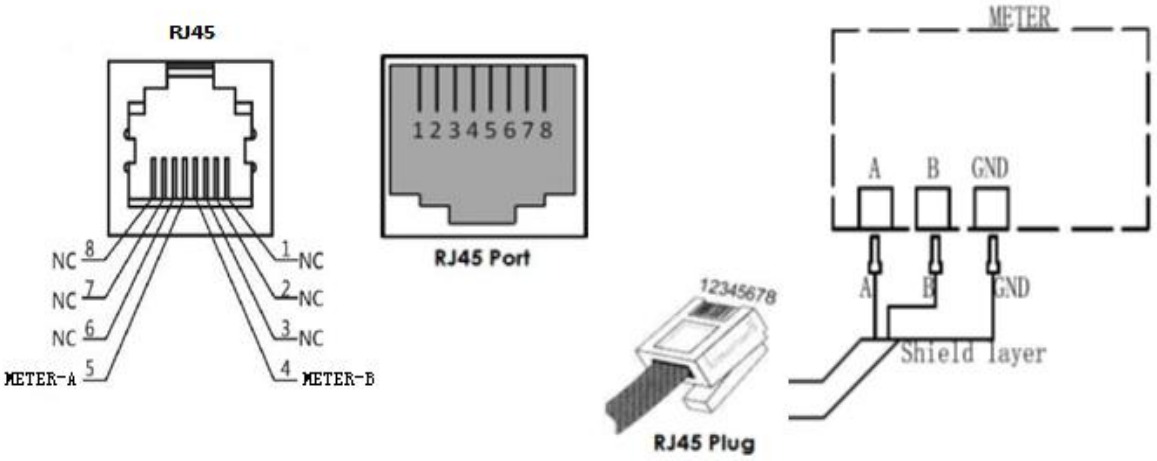
Step3: Make sure that the city power is disconnected and connected to the L, N and ground terminals of the city power and fixed with screwdriver.



Step4: Assemble the housing, the terminal block and cable gland. Make sure that the rib of the terminal block and the groove on the housing engage perfectly until a “Click” is heard or felt.

8.6 Meter Connection

When the inverter is connected to the grid, it must be connected to the supporting electricity meter. The inverter is connected with the lectricity meter through RS45 communication mode. The wiring of the electricity meter is
Shown in the figure below：



The meter mode is：SDM230-Modbus
The meter manufacture is:：Zhejiang EASTRON Electronic Co.,Ltd..

8.7 Generation Limit and Export Limit Control

User can set the mode through the following steps Generation Limit and Export Limit Control, These two functions are in accordance with of AS/NZS 4777.2:2020 section 6.

⚠	**Be careful!** TO use this setup，the meter must peproprly connected

8.7.1. Soft export Limit Control

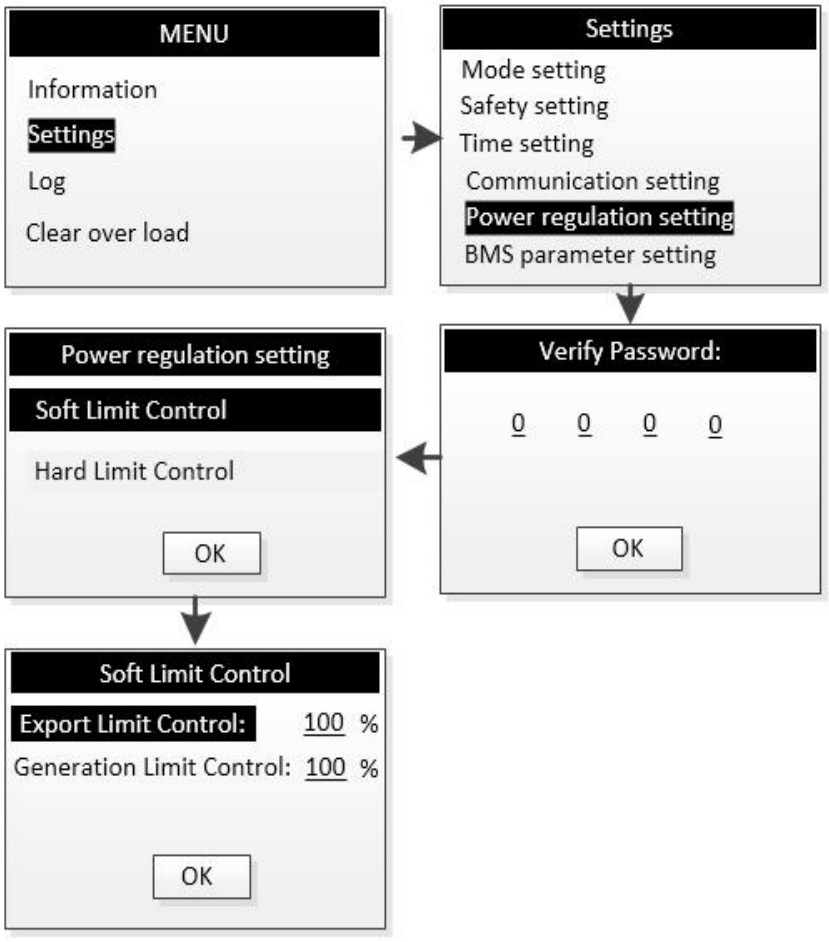
Users can set the output power of the inverter through THE LCD (Soft export Limit Control); The operation steps are as follows:
Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the

"Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After entering the password correctly, the user can access the following menu. You can use up or down keys to select "Soft Limit Control " and press ENTER. Press the up or down key to select "Export Limit Control " to limit the power output. After the Settings are complete, OK is displayed. Press Esc to return to the home screen. The reference steps are shown below:



8.7.2 Hard export Limit Control

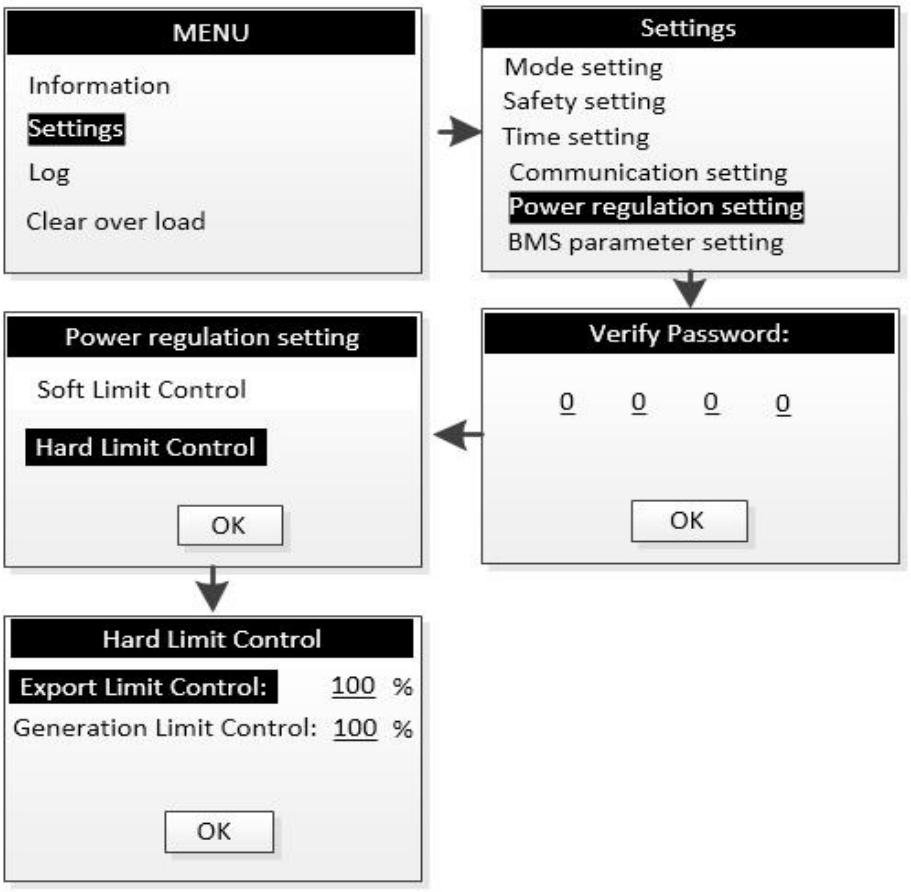
Users can set the output power of the inverter through THE LCD (Hard export Limit Control);
The operation steps are as follows:

Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After entering the password correctly, the user can access the following menu. You can use up or down keys to select "Hard Limit Control " and press ENTER. Press the up or down key to select "Export Limit Control " to limit the power output. After the Settings are complete, OK is displayed. Press Esc to return to the home screen. The reference steps are shown below:



8.7.3 Soft generation limit control

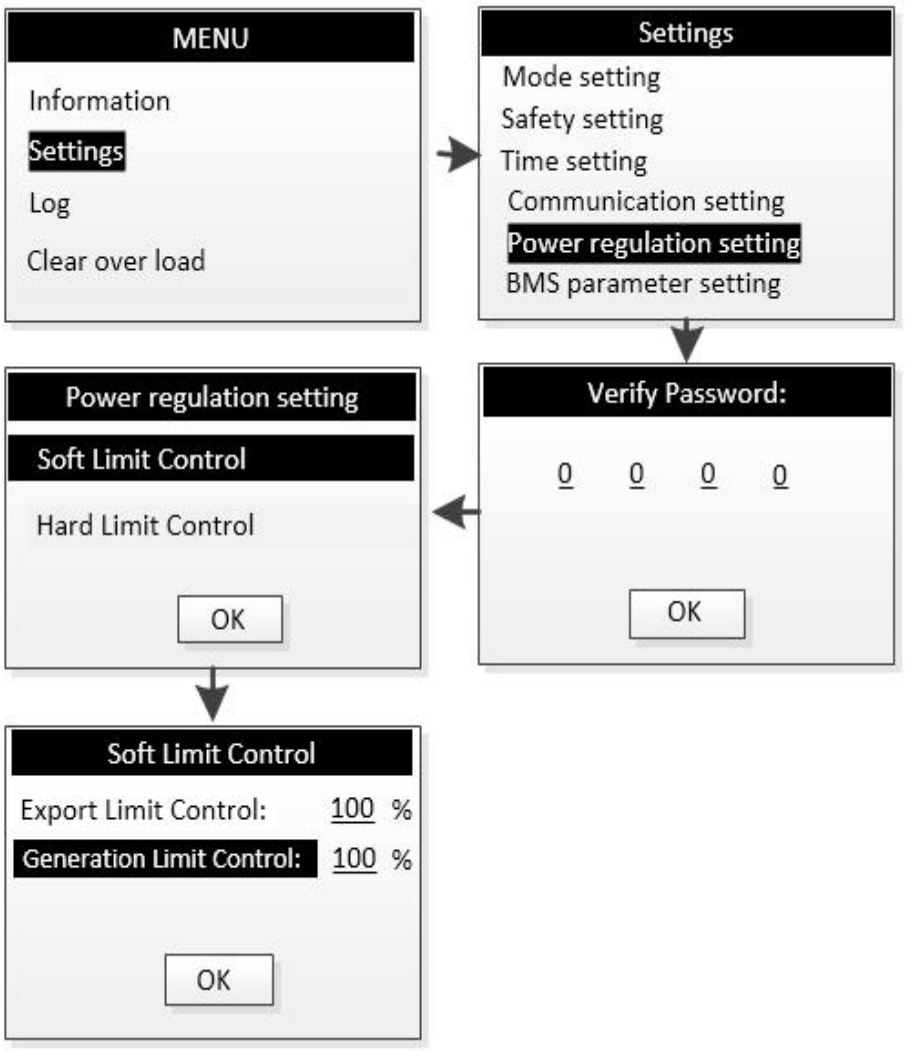
Users can set the output power of the inverter through THE LCD (Soft generation limit control);
The operation steps are as follows:

Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After entering the password correctly, the user can access the following menu. You can use up or down keys to select "Soft Limit Control" and press ENTER. Press the up or down key to select "Generation Limit Control " to limit the power output. After the Settings are complete, OK is displayed. Press Esc to return to the home screen. The reference steps are shown below:



8.7.4 Hard generation limit control

Users can set the output power of the inverter through THE LCD (Hard generation limit control);
The operation steps are as follows:

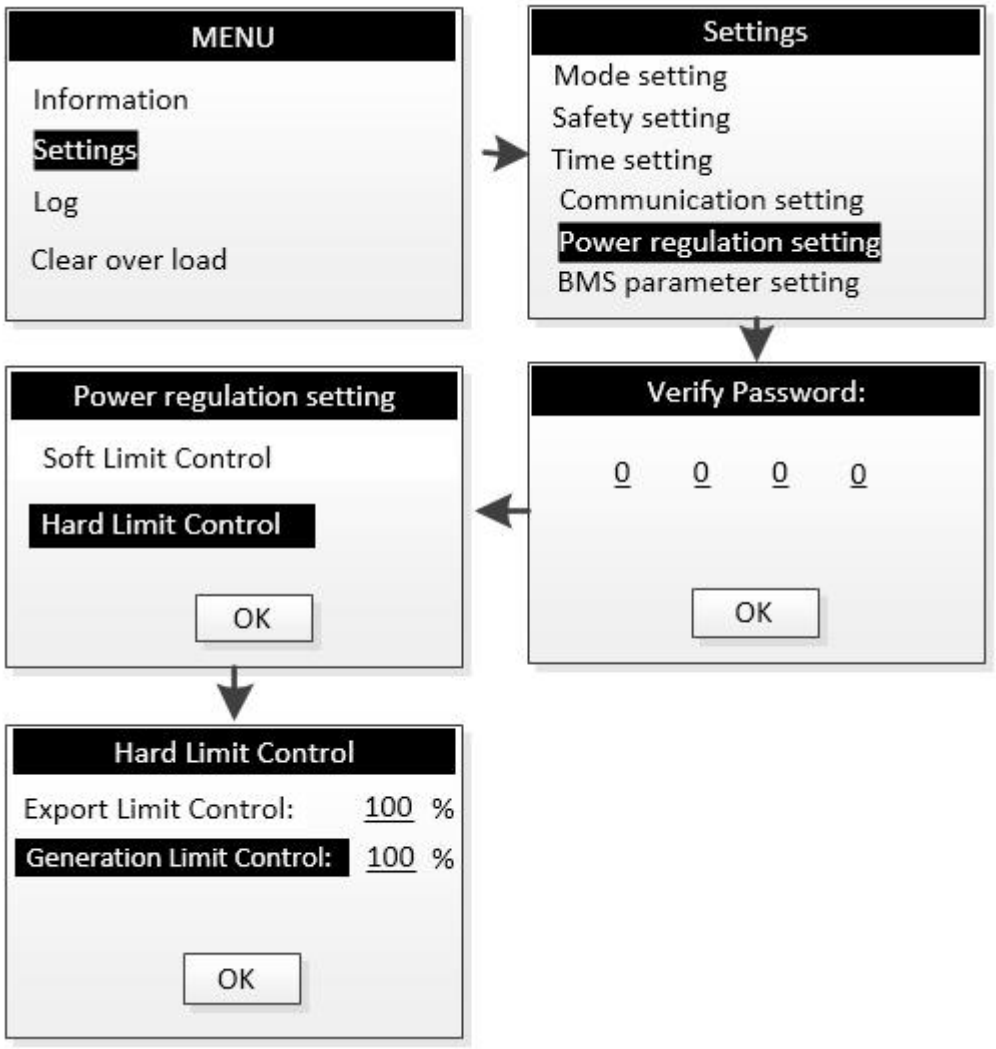
Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter,

in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After entering the password correctly, the user can access the following menu. You can use up or down keys to select "Hard Limit Control" and press ENTER. Press the up or down key to select "Generation Limit Control " to limit the power output. After the Settings are complete, OK is displayed. Press Esc to return to the home screen. The reference steps are shown below:



9. Commissioning

9.1. Inspection before Commissioning

Check the following items before starting the system:

1. The inverter DC switch and external circuit breaker are disconnected.
2. The inverter should be accessible for operation, maintenance and service.
3. Nothing is left on the top of the inverter or battery.
4. The inverter is correctly connected to the external devices, and the cables are routed in a safe place or protected against mechanical damage.
5. The selection of the AC circuit breaker is in accordance to this manual and all applicable local standards.
6. All unused terminals at the bottom of the inverter are properly sealed.
7. Warning signs and labels are suitably affixed and durable.
8. For EPS application, check the cable connections of inverter. Risk of inverter damage if the grid power wires are wrongly connected to the EPS LOAD terminals.

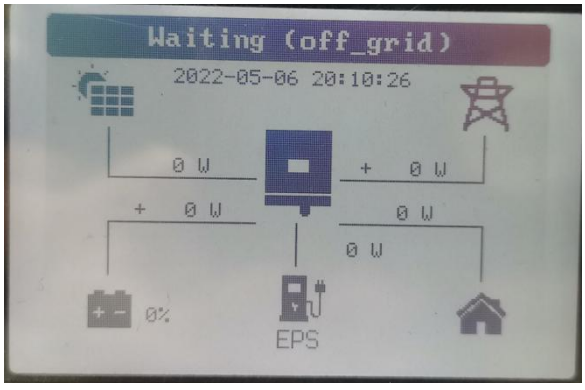
Can set the power quality mode through the following steps.

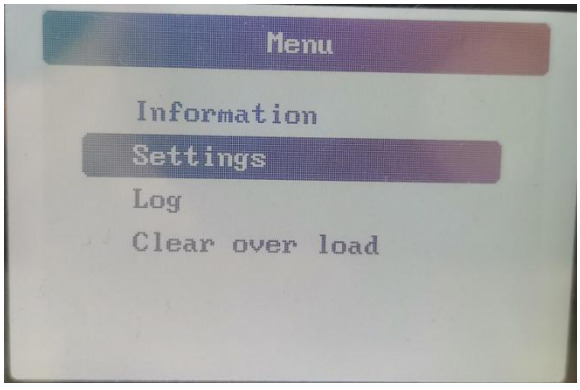
Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Power regulation setting" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Power management information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: Enter the correct password, enter the following menu. The user can select the power quality mode to be set by "up" and "Down" (there are two modes, as shown in Figure 9-1-2), and then press the "ENTER" button to confirm. After successful setting, "OK" will be prompted, and then press the "Esc" key to return to the main screen,the general steps are shown in Figure9-1-1





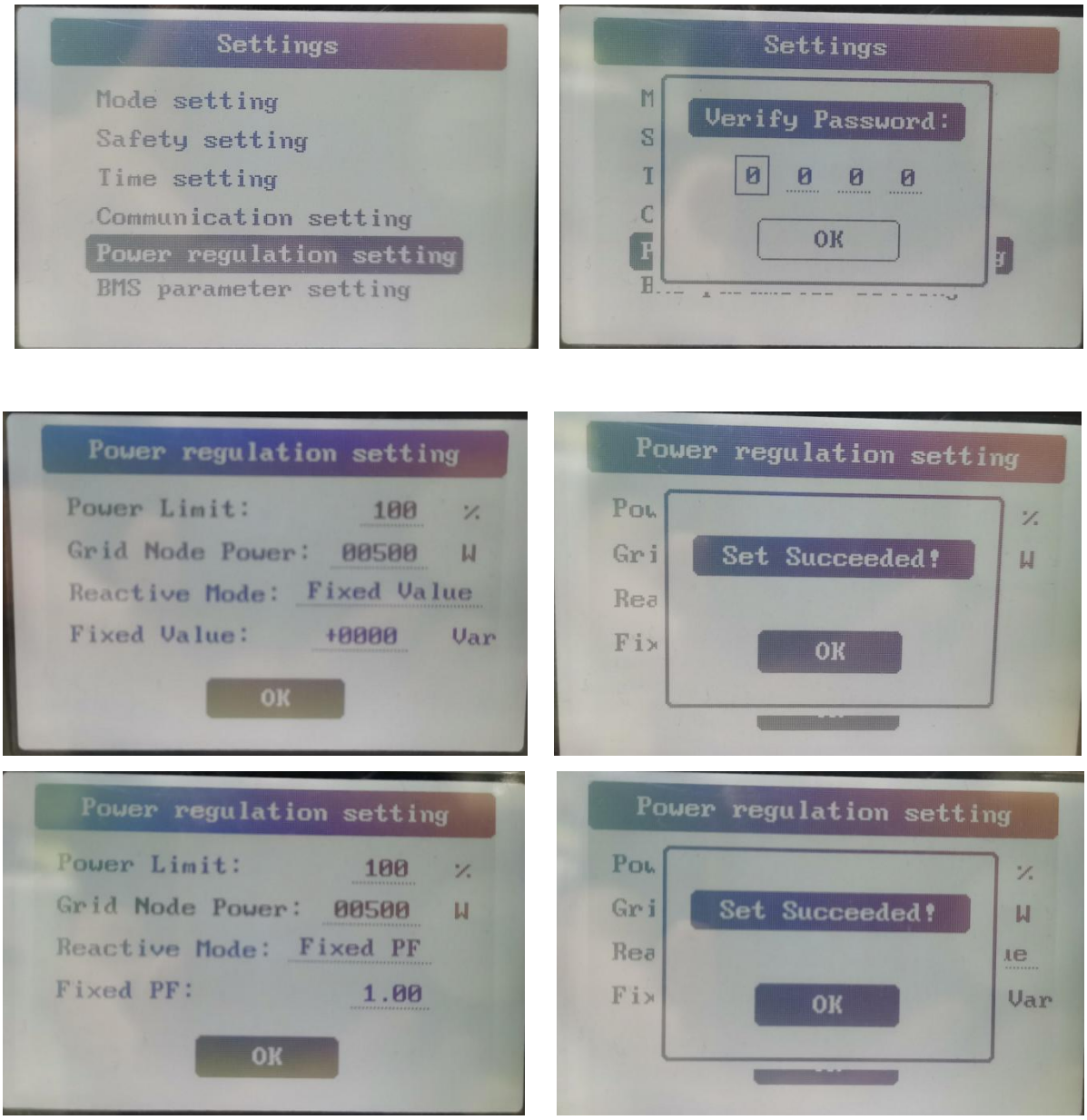

Settings
Mode setting
Safety setting
Time setting
Communication setting
Power regulation setting
BMS parameter setting
Settings
Verify Password:
0 0 0 0
OK
Power regulation setting
Power Limit: 100 %
Grid Mode Power: 00500 W
Reactive Mode: Fixed Value
Fixed Value: +0000 Var
OK
Power regulation setting
Set Succeeded!
OK
Power regulation setting
Power Limit: 100 %
Grid Mode Power: 00500 W
Reactive Mode: Fixed PF
Fixed PF: 1.00
OK
Power regulation setting
Set Succeeded!
OK

Figure9-1-1

9.2. Power on the System

If all the items mentioned in section 7.1 are OK, proceed as follows to start the inverter for the first time.

Power on:

To turn on the inverter, the following steps must be performed in the order listed.

Step 1: close DC and AC circuit breakers;

Step 2: if the PV panel can provide enough power, the power module will work and light up the LCD panel;

Step 3: the inverter will enter the self-check mode, and the LCD will display the remaining reconnection time;

Step 4: when the inverter enters the normal mode, the power will be fed into the grid, and the LCD will display the power generation.

As long as the inverter operates normally, it will automatically track the maximum output power of photovoltaic cells. At night, the light intensity is not enough to provide energy, the inverter will automatically shut down. The next day, when the input voltage reaches the starting value, it will start automatically.

Be careful!

The surface temperature of the inverter can reach up to 75 ℃

To avoid the risk of burns, do not touch the surface when the inverter is in operation mode.

In addition, the inverter must be installed out of the reach of children.

9.3. LCD Introduction

When the LCD is displayed normally, the user can operate the keys to set the parameters and view them. The detailed menu flow chart is shown in Fig. 9-1.

The important parameters of the inverter must be set by professionals, otherwise it may cause the inverter can not operate normally. Please contact customer service for the password of setting parameters.

On Main Menu>Setting>Safety Setting>Safety Code in Fig. 8-1.

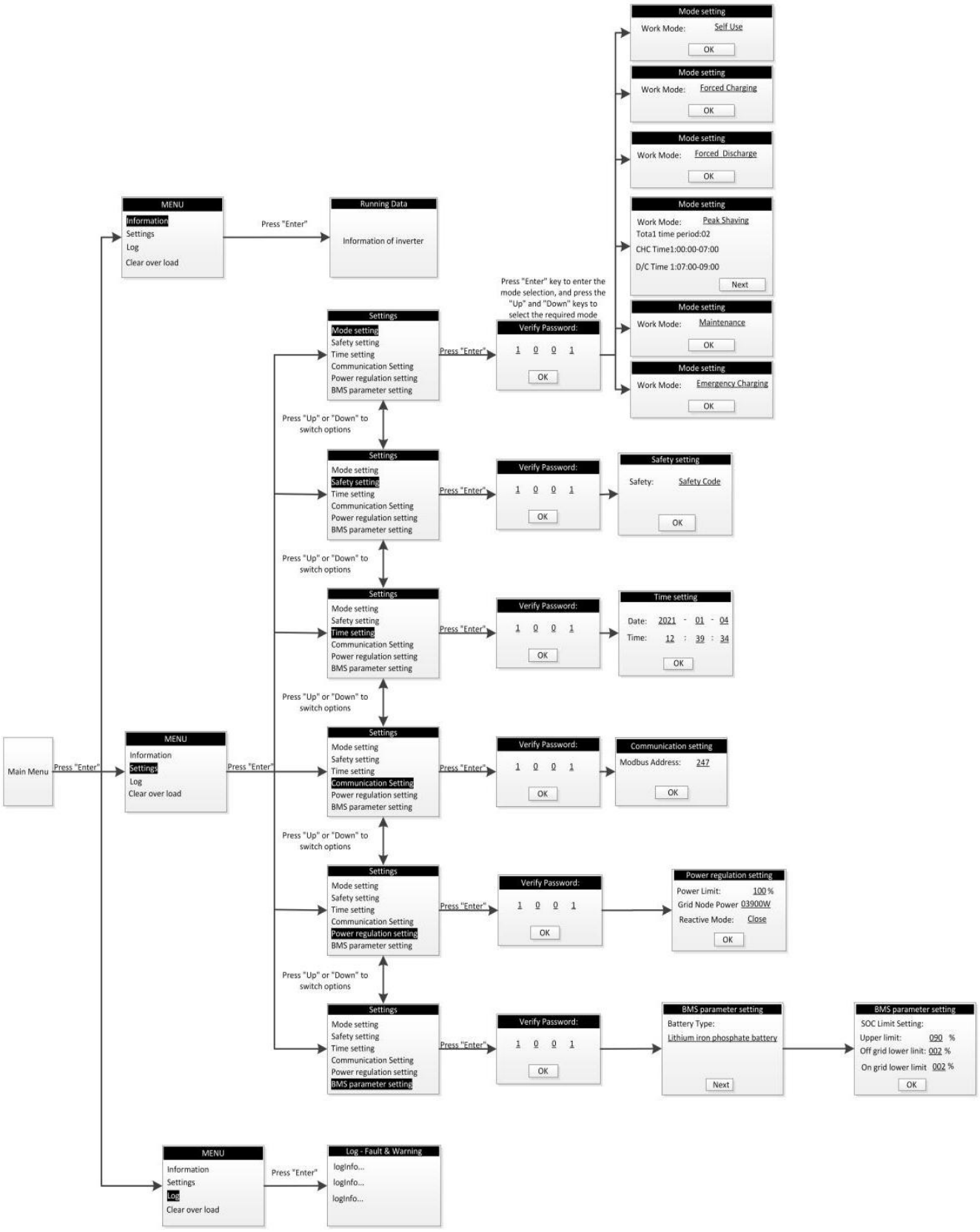


Fig.9-1 LCD operating figure

9.4. Safety Setting

Users can set the working mode of the inverter through LCD. In general, the factory setting is the default parameter of the corresponding country.
Users can set safety rules according to the actual environment they are using. The operation of setting safety rules is shown in the figure9-4-1(Australia_A):

Step 1: Press the "Enter" button in the main interface to ENTER the interface below, select the "Settings" option through the "Up" button and the "Down" button, and then press the "Enter" button to ENTER the next level menu.

Step 2: After entering the following menu, select the option of "Safety Parameters" through the "Up" and "Down" buttons, and then press the "Enter" button to Enter the next menu.

Step 3: After entering the following menu, enter the password through the "Up" button and "Down" button to enter the next menu. Safety information is an important parameter, in order to ensure the safety of users and set, password can be obtained by consulting customer service.

Step 4: After the password is entered correctly, the user can Enter the following menu. The user can select the safety rules that need to be set through the "up" and "down" keys, and then press the "ENTER" button to confirm. After successful setting, "OK" will be prompted, and then press the "Esc" key to return to the main screen.
The figure9-4-2 correspond to Australia respectively_ A、Australia_ B、Australia_ C、Newzealand

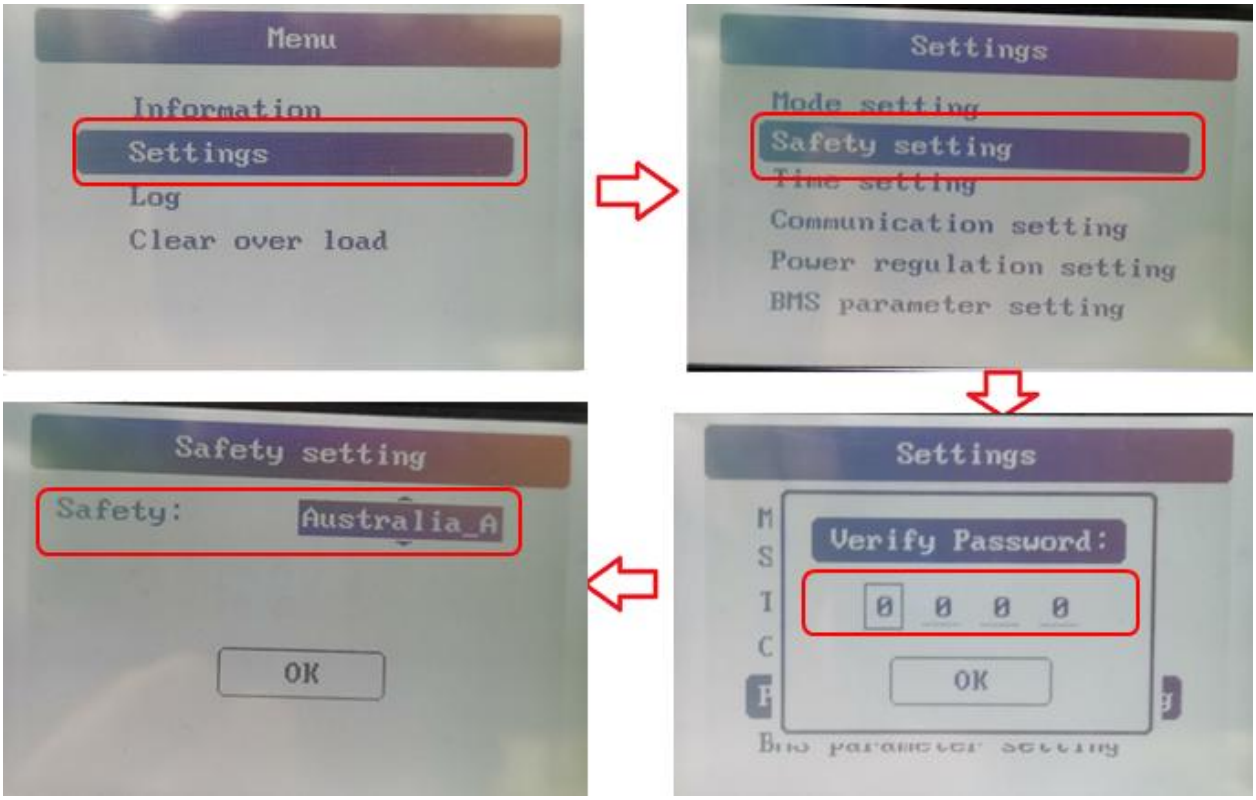


Figure 9-4-1 Safety Setting

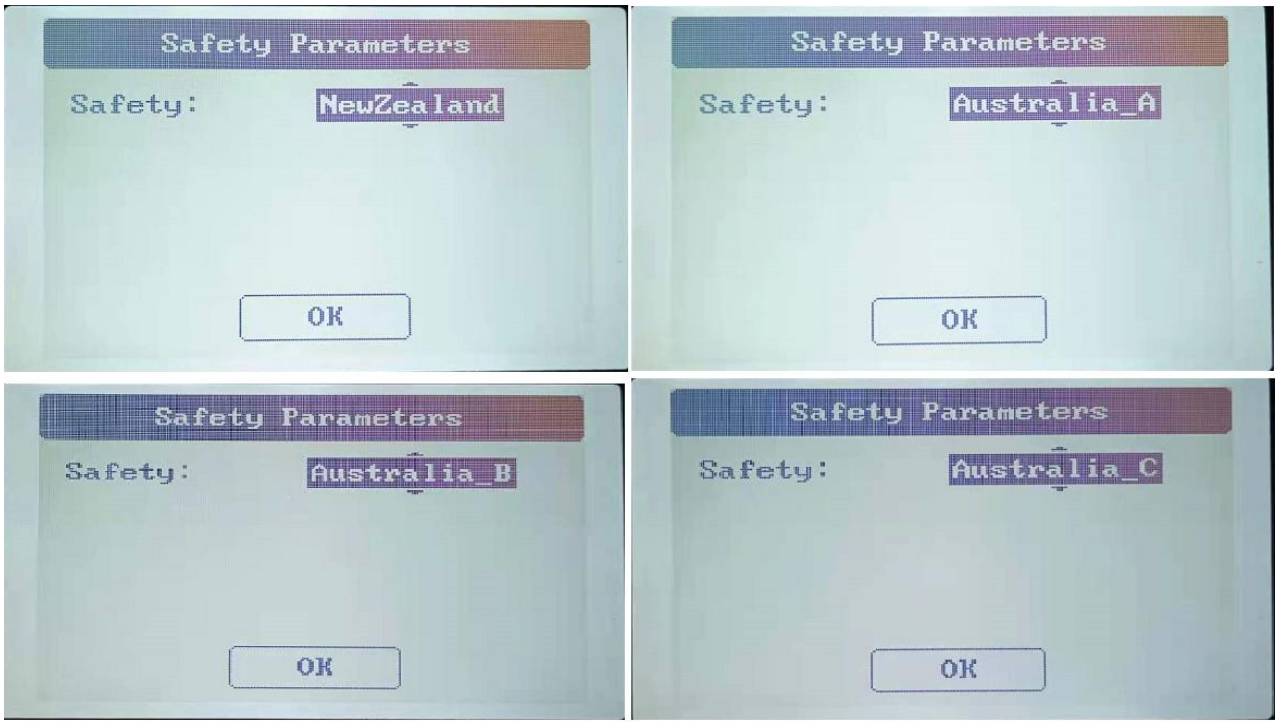

Safety Parameters
Safety:
NewZealand
OK
Safety Parameters
Safety:
Australia_A
OK
Safety Parameters
Safety:
Australia_B
OK
Safety Parameters
Safety:
Australia_C
OK

Figure 9-4-2

10. Decommissioning

10.1. Decommissioning the Inverter

For maintenance or other service work, the inverter must be switched off.

Proceed as follows to disconnect the inverter from the AC and DC power sources. Lethal voltages or damage to the inverter will follow if otherwise.

10.1.1. Disconnecting the Inverter

Shutdown:

To stop the inverter, the following steps must be performed in the order listed.

Step 1: Disconnect the AC switch.

Step 2: Wait for about 30 seconds (during which the capacitor on the AC side is discharged).

If the DC voltage of the inverter is higher than the starting threshold, the red power light will be on. Disconnect the DC switch.

Step 3: Confirm that all indicators are off (about 1 minute).

Be careful!

Although the inverter DC disconnect switch is in the off position and all indicators are off, the operator must wait 5 minutes to open the inverter housing after disconnecting the DC power supply.

10.1.2. Dismantling the Inverter

Be careful!

Risk of burn injuries and electric shock!

Do not touch any inner live parts until at least 10 minutes after disconnecting the inverter from the utility grid and the PV input.

1. Refer to “7 Electrical Connection” for the inverter disconnection of all cables in reverse steps.
2. Dismantle the inverter referring to “6.2 Installing the Inverter” in reverse steps.
3. If necessary, remove the wall-mounting bracket from the wall.
4. If the inverter will be reinstalled in the future, please refer to “5.3 Inverter Storage” for a proper conservation.

10.1.3. Disposing the Inverter

Users should take the responsibility for the disposal of the inverter.

Be careful!

Some parts and devices of the inverter, such as the LCD display, batteries, capacitors, may cause environment pollution.

Do not dispose of the product together with household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.

11. Communication and Monitoring

11.1. Summery

The KY-1Hybrid-5k0-H series inverter provides an RS485 communication interface, which can be connected to WIFI/GPRS module. After configuring the monitoring system, the output voltage, current, grid frequency, fault and other information can be browsed remotely.

Port	Type	Protocl
Wifi/DPRS	Type-c	Yes
USB	USB-A	Yes
RS485	Type-c	Yes
BMS	RJ45	Yes
DRM	RJ45	No

11.2. Communication

Users can browse the data of the inverter remotely through the RS485 communication interface. RS485 is usually used as local monitoring or connected to a third-party data collector: when connected to local monitoring, the RS485 interface of the inverter can be connected to the USB interface of the computer through the USB to RS485 converter. The longest RS485 line should not exceed 1200 meters. When networking and communication, a WIFI/GPRS communication module can be configured to realize the networking of communication.

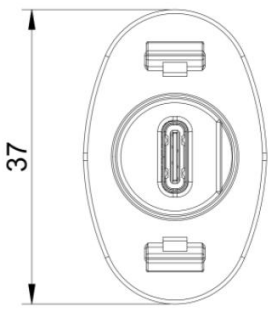


Fig.11-1 RS485 interface of inverter(unit：mm)

Pin	Name	Type	Describe	define	max value
A4,A9,B4,B9	VCC	Power Supply	DC 5V~12V	DC5V – 12V	DC -0.3V~16V
A1,A12,B1,B12	GND	Ground	DC 0V	DC 0V	DC -0.3V
A6,B6	RS485-A	RS485 A line	-	-	-7V ⩽ VCM ⩽ +12V
A7,B7	RS485-B	RS485 B line	-	-	

Be careful!

- Please connect RS485 in the correct line sequence.
- If the customer needs RS485 to communicate with the inverter, it is necessary to purchase a USB to RS485 converter.

11.3 RS-485 Communication

1.Through the purchase of type-C cable, transfer to 485 to USB communication line, and then connect to the computer.

2.Through the purchase of type-C cable, it is connected to the third-party RS485 to Ethernet switch.

3.If you need monitoring software, please ask the salesperson for it and consult usage method.

Be careful:

1. The wiring sequence of 2 terminals of 1 RS-485 cable shall be consistent.

2. If the customer needs RS-485 to communicate with inverter, they need to purchase USB to RS-485 converter.

11.4 WiFi / GPRS Communication

KY-1Hybrid-5k0-H can be configured with a WiFi / GPRS communication module to realize communication networking.The module is shown in the figure11-2 (there is no difference in appearance between WiFi module and GPRS module)

Figure 11-2

11.5 Monitoring

1. Local monitoring system

The local monitoring software is connected to the inverter through USB to RS-485 converter, and up to 32 inverters can be connected at the same time (it need to buy additional communication lines by youself, and the settings are complex, which is not recommended for customers)

2. Remote monitoring system

1).Insert the WiFi module in Figure 11-1 into the WiFi terminal of the inverter turn on the mobile wifi, select the WiFi module hotspot, and enter the password: 12345678(starts with EAFI module).Open the mobile browser and enter 10.10.10.1 to enter the WiFi module configuration page.The method is shown in Fig 11-2.

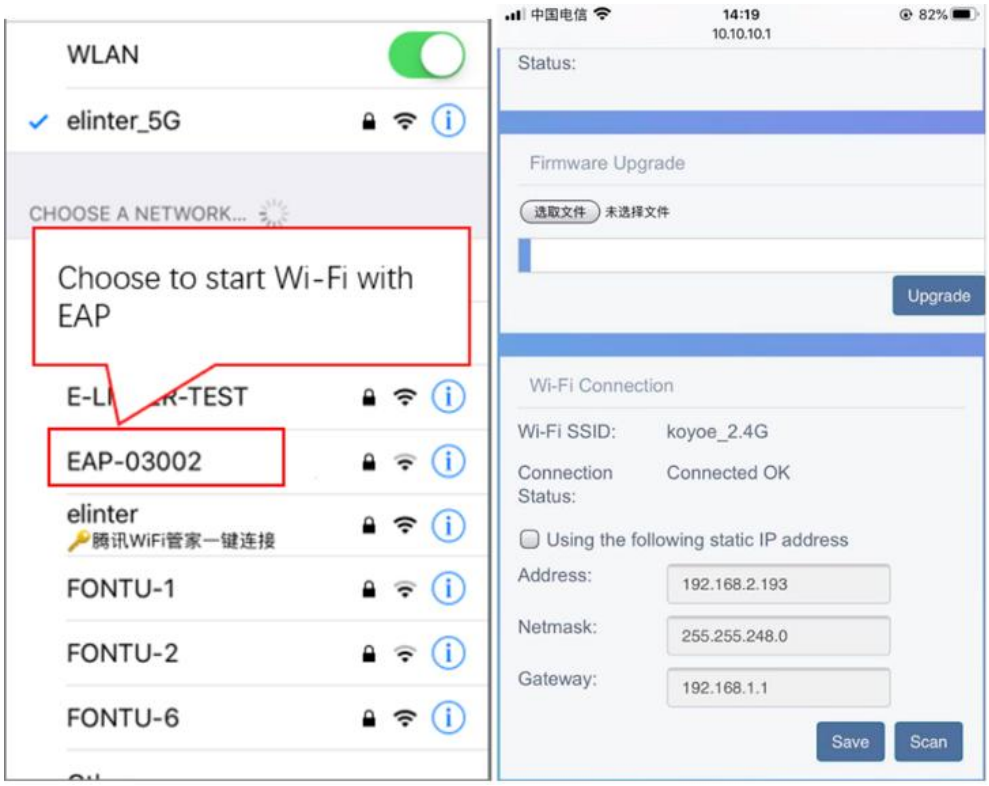


Figure 11-2

2).Click the "scan" button, and the router WiFi hotspot list will appear.Then select the WiFi hotspot, enter the password and click "connect".The method is shown in Fig11-3.

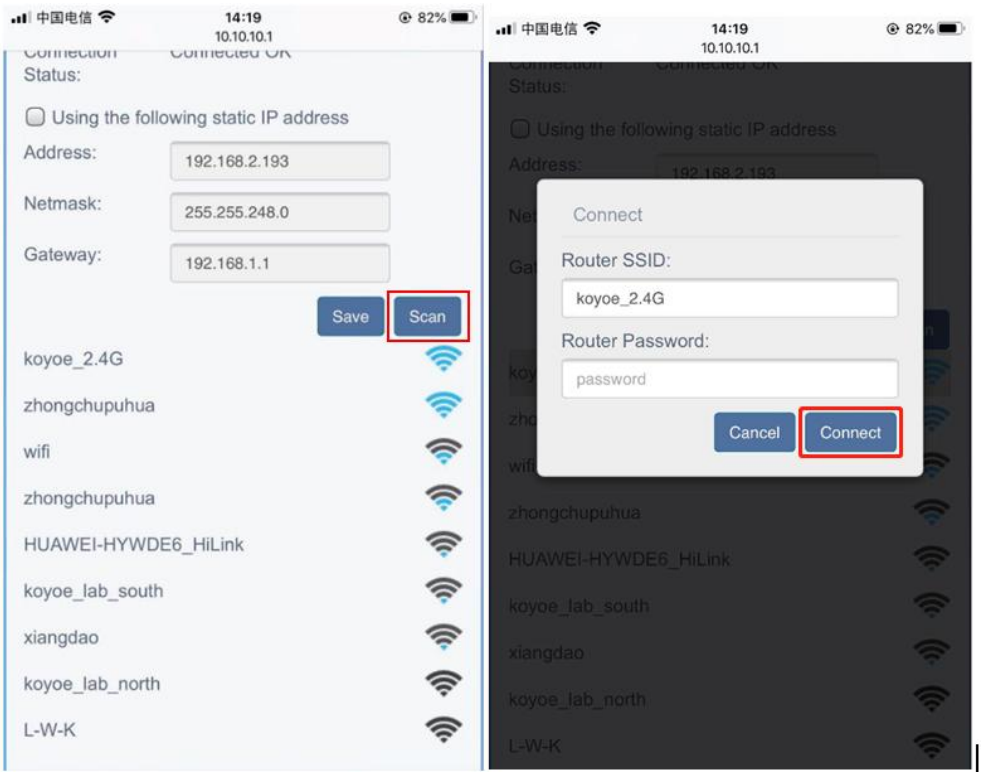


Figure 11-3

3).In apple and android app stores, enter the KOYOE-log keyword, and users can download apps to your mobile device. After installation and registering an account,The method is shown in Fig11-4.

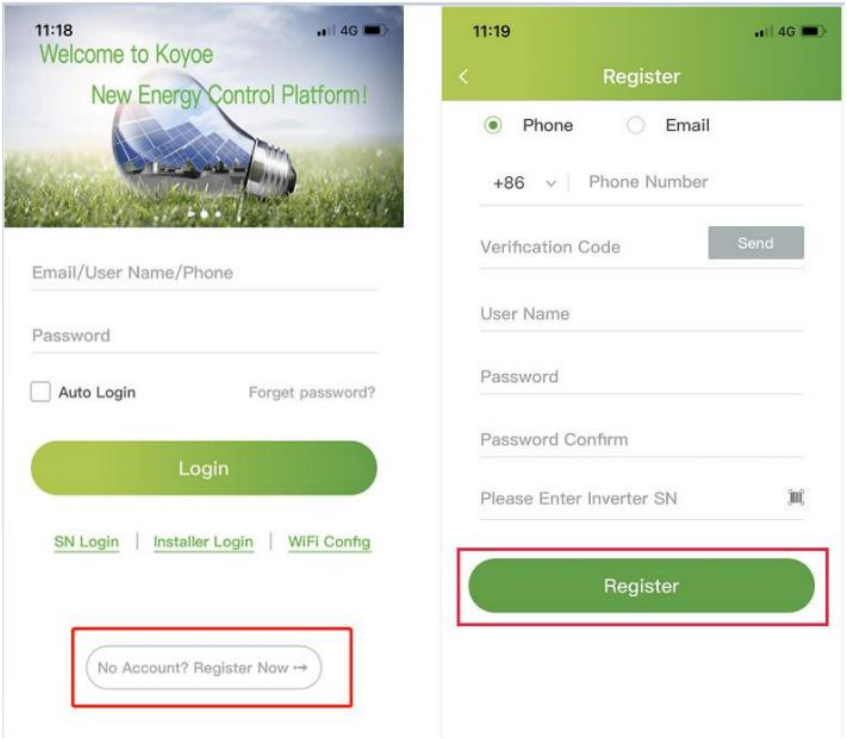


Figure 11-4

4).Enter the user name and password to log in, and the user can monitor the voltage, current and power of the inverter. (GPRS module only needs to fill in the SN code in Figure 11-4, and then click Register to monitor the data without the previous steps)

12. Maintenance and Repair

12.1. Precautions during Maintenance

When the inverter fails, the inverter will automatically disconnect from the grid and send fault or warning information. For solutions to simple faults, please refer to the common in Appendix I.

12.2 .Safety Requirements during Maintenance

	For the operation running and after operation, the shell temperature is high due to the heat generated by power circuit, which is at risk of scalding. Contact operation shall be carried out after cooling.
	Before removing the fault, it is necessary to ensure that the circuit breaker of DC or AC circuit is disconnected, and professional personnel are contacted to deal with it. Other people are not allowed to close the circuit breaker without authorization.
	There is no repairable part in the inverter. If there is any problem, it must be maintained by professionals. Even if the inverter has been disconnected from PV and battery and power grid, it may still have dangerous voltage. Before starting work related to electronic system in the cabinet, the voltage of DC bus should be measured first. This voltage must be below 48V.

12.3. Daily Maintenance

Usually, the inverter does not need regular maintenance and calibration. Due to natural heat dissipation, the radiator must not be covered by dust and other dirt.

In order to ensure good ventilation of the inverter, it is necessary to check the radiator and make sure that it is unobstructed.

If necessary, clean the inlet and outlet of the inverter with a soft brush. Do not use water, corrosive chemicals or strong detergents to clean the inverter.

13. Technical data

13.1 .Technical Parameters And Certificates

Specifications	
Model	KY-1Hybrid-5k0-H
PV input	
Vmax PV	550V d.c.
Isc PV (absolute Max.)	15A/15A
Max PV input power	7000W
Number of MPP trackers	2
Number of input strings	1/1
Max. PV input current / string	12A/12A
MPPT voltage range	120-500Vdc
Vdc range @ full power	250-500Vdc
Battery (input and output)	
Max Input/Output Voltage	450V
Operating Voltage Range	85V ~450V (self-adapt)
Max charge/discharge Current	25A/25A
Max Input/Output Power	5000W/5000W
Battery Type	Li-ion（LFP）/ Lead-Acid
AC Grid (input and output)	
Normal Voltage	230VAC, 1φ (L/N/PE)
Frequency	50Hz
Max. continuous input/output current	21.7A
Max. continuous output Power	5000W
Max. continuous output Power	5000VA
Power factor and PF range	>0.99 (-0.8～+0.8)
Off-Grid AC Output (Backup AC output)	Maybe work at stand-alone mode
Normal Voltage	230VAC, 1φ (L/N/PE) (N not connect PE inside)
Frequency	50Hz
Nominal Output Current	21.7A
Nominal Output Power	5000W
Nominal Output Power	5000VA
others	
Protective class	Class I
Ingress protection	IP 65
Working temperature	-25℃ to 60℃ (derating 45℃)
Overvoltage category	OVC II(PV)（Battery）, OVCIII(AC main Grid)
Humidity	4% ~ 95 % no condensation
Isolation	Transformerless
Condition	Outdoor unconditioned
Dimensions	390*500*185mm
Weight	18kg
Country of origin	Made in China

Safety and Protection	YES/ON
Over/under voltage protection	YES
DC isolation protection	YES
Monitoring ground fault protection	YES
Grid protection	YES
DC injection monitoring	YES
Back feed current monitoring	YES
Residual current detection	YES
Anti-islanding protection	YES
Over load protection	YES
Over heat protection	YES

14. Warranty commitment

In order to provide you with high-quality service and better protect your rights and interests, please read this regulation carefully and keep your quality assurance card and purchase invoice.

We will provide you with standard warranty service for 5/10years（The warranty is 5 years and can be extended warranty to 10 years at most）. From the date of purchase, during the warranty period, we will provide you with free warranty and maintenance services. The faulty inverter needs to be returned to the factory for repair, so please keep the original package properly. If the customer uses the new packing box, the packing cost and transportation cost will be borne by the customer. During the warranty period, the customer needs to provide the original invoice and quality card, and the label of the inverter body is clearly visible. If these requirements cannot be met, we will not be able to provide you with perfect service.

This regulation is applicable to series photovoltaic grid connected inverter produced by KOYOE. All products purchased through regular channels shall enjoy the full range of quality assurance services provided by the company, except for the following situations:

1. Beyond the warranty period;
2. No valid quality assurance card and product serial number;
3. Transportation damage;
4. Improper use, operation and modification;
5. Operating in an environment beyond the specified in this manual;
6. Any installation and use beyond the scope specified in relevant international standards;
7. Damage caused by abnormal natural disasters (earthquake, fire, flood, etc.).

15. Contact Information

If you have any questions about the PV grid connected inverter or technical issues, please contact us:

Jiangsu KEYOE Energy Technology Co., Ltd

Address: NO. 40, Wangwu Road, Wuzhong District, Suzhou Province, China

Tel: +86 512 6513 9208

Email: sales_Int@koyoe.com

Web: www.koyoe.com

Appendix I: Common Problems

In case the inverter will not work normally at times, solutions to common problems are listed below. This will help technicians understand problems and take effective measures.

Item	LCD display	Possible Causes and Solutions
1	GFCI Fault	1. The grounding current is too high. 2. After disconnecting the AC side circuit, pull out the photovoltaic cell at the input end and detect the peripheral equipment of the AC system. 3. After removing the fault, reconnect the PV panel and AC side circuit to detect the inverter status.
2	BMS Communication Fault	1. Communication between the battery pack and the inverter failed. 2. Check whether the communication cable is connected correctly and reliably. 3. Restart the inverter after replacing the connecting cable.
3	SPI Communication Fault	1. Master-slave DSP communication failure, please restart the inverter. 2. If it cannot work properly after reboot, please contact customer service
4	PV Overvoltage Fault	1. PV overvoltage fault, please check the PV input voltage, voltage value must be less than 550V.
5	Isolation Fault	1. Check whether the inverter is effectively earthed and whether the impedance between the positive and negative poles of the photovoltaic cell is greater than 1M Ω; 2. Check whether the AC side is connected to the earth.
6	Grid Voltage Fault	1. Please check whether the network voltage is too low or too high. 2. Restart the inverter after the power grid is normal
7	Grid Frequency Fault	1. Please check whether the grid frequency is too low or too high. 2. Restart the inverter after the power grid is normal
8	Bus Voltage High	1. Bus voltage is high, please check whether the PV input voltage is less than 550V.2. If the fault cannot be cleared after restarting the inverter, please contact customer service.
9	Off Grid Over Voltage Fault	1. High off-grid output voltage. 2. Please check whether the off-grid port is connected correctly and whether the off-grid load is working normally.
10	Battery Over Temperature Fault	1. Battery temperature is too high.2. Please confirm whether the battery is placed in a high temperature area.3. Please restart the inverter after the battery cools down.

11	Inverter Module Over Temperature Fault	1. High temperature of inverter module.2. Please confirm whether the heat sink of the inverter is blocked.3. Please confirm whether the working environment temperature of the inverter is normal.4. Restore the inverter after the surface temperature of the inverter cools.
12	Battery Voltage Low Fault	1. Low voltage battery failure. Please check the connection of the battery is correct.3. Please check whether the battery can work properly and restart the inverter.
13	Low ambient Temperature Warn	1. Low ambient temperature fault.2. Please confirm whether the ambient temperature of the inverter and battery is lower than the normal value, and restart the inverter after the ambient temperature rises.

In addition to the above common problems, if you encounter other unsolvable problems, please contact us, we will try our best to provide you with quality service.

Appendix II: Abbreviations of Terms

AC	Alternating Current
DC	Direct Current
DSP	Digital Signal Processor
EEPROM	Electrically Erasable Programmable Read Only Memory
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
GFCI	Grounding fault current leakage protector
HCT	Hall Current Transducer
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MPPT	Maximum Power Point Tracking
PC	Personal Computer
PV	Photovoltaic
PVCS	Photovoltaic Control System
SCI	Serial Communication Interface