User Manual

Hybrid Inverter

KY-EST05KH- KY-EST25KH

V1.1

Trademark Copyright

Software Copyright

Contents

Introduction

Overview

This manual focuses on product information, installation guides, operation, and maintenance. This manual cannot contain complete information about photovoltaic systems. You can get more information about other devices on the webpage of the www.koyoe.com or the manufacturer of the relevant component.

Before using or operating the inverter, please read this manual and other relevant document carefully. Please keep this manual and other relevant document safe for reference. The content in this manual is owned by KOYOE, and may not be copied or published in any form without the prior written permission of our company.

Due to product development needs, the content in this manual may be updated or revised periodically. The information in this manual is subject to change without notice. The latest manuals are available on www.koyoe.com.

Applicable Model

This manual only applies to the following models of hybrid inverters. Do not use as a reference manual for other products.

Model	Nominal Power
KY-EST05KH	5000W
KY-EST06KH	6000W
KY-EST08KH	8000W
KY-EST10KH	10000W
KY-EST12KH	12000W
KY-EST15KH	15000W
KY-EST17KH	17000W
KY-EST20KH	20000W
KY-EST25KH	25000W

Suitable Audience

This document is intended for the following people:

- sales engineer
- systems engineer
- Installation and after-sales engineer

Change History

Change history of each document update is accumulated. The latest document issue contains all updates made in previous issues.

V1.0 this issue is firstly official release（2024. 07）

1. Safety Information

KY-EST inverters strictly comply with the relevant safety regulations of product design and testing. To use the inverter safely and reliably, the following lists the safety information about different types of inverters. During installation, operation, and maintenance, please read and follow the instructions and precautions carefully. Otherwise, personal and property damage may be caused.

KOYOE shall not be liable for any of the following circumstances.

- Do not operate under the conditions of use described in this manual.
- Installation and use of environment outside the relevant international or national standards.
- Disassemble or change the product or modify the software code without authorization.
- Do not follow the operation instructions and safety warnings in the product and documentation.
- Equipment damage caused by abnormal natural environment (such as earthquake, fire, storm, etc.)
- Transportation damage caused by customer's own transportation.
- Damage caused by storage conditions that do not meet product requirements.
- Shall not be used in the area and environment specified in the product contract.
- Beyond the service life of the product.

⚠ CAUTION

- The safety instructions in this manual do not cover all precautions. Perform operations based on site conditions.
- KOYOE shall not be liable for any damage caused by violation of the safety instructions of this manual.

1.1 General Requirement

⚠ DANGER

It is strictly forbidden to operate with electricity during the installation process, and the switch must be turned off when the battery module is not assembled.

- It is strictly prohibited in the thunder, rain, snow, six levels of gales to the bad weather, the installation, use and operation of outdoor equipment, cables. (This includes but is not limited to transporting equipment, operating equipment and cables, plugging and unplugging outdoor signal ports, working at heights, and outdoor installation).

● After installing the device, remove empty packing materials, such as cartons, foams, plastics, and cable ties, from the device area.

● In case of fire, evacuate the building or equipment area and press the fire alarm or call the fire alarm number. Do not re-enter a burning building under any circumstances.

● It is strictly prohibited to alter, damage or block the logo and nameplate on the equipment.

● When installing devices, use professional tools to tighten all screws.

● Fully familiar with the composition and working principle of the whole grid-connected photovoltaic power generation system, as well as relevant standards of the country/region where the project is located.

● Paint scratches in the process of equipment transportation and installation must be repaired in time. Long-term exposure of scratched parts to outdoor environment is strictly prohibited.

● Do not remove the components of the device, including the outer enclosure and the switch display.

● In any case, do not change the structure of equipment, installation sequence, etc., without the permission of the manufacturer.

● You are advised to use the original packing case to pack the goods. Do not lift the goods through battery docking terminals.

● It is not allowed to reverse engineering, decompiling, disassembling, disassembling, adapting, implanting or other derived operations on the device software. It is not allowed to study the internal implementation of the device in any way, obtain the source code of the device software, steal intellectual property rights, and it is not allowed to disclose the performance test results of any device software.

1.2 Photovoltaic Panel

- You must ask professional personnel to install the photovoltaic panel according to the user manual. Pay attention to the following precautions when installing the photovoltaic panel：
- - When photovoltaic panels are exposed to sunlight, they generate electricity and can cause deadly voltages and shocks.
- - This inverter is a multi-power system, the operator must wear appropriate personal protective equipment: safety helmet, insulated wire, gloves, etc.
- - Before touching the output cable of the photovoltaic panel, use the measuring

device to ensure that the cable has no voltage.

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

⚠ WARNING

- The photovoltaic panels used in this inverter must conform to IEC61730 and be class-A photovoltaic panels.

-Do not ground the positive or negative terminals of the PV series.

- If the inverter is damaged due to the installation failure of the photovoltaic panel, it is not covered by the warranty.

1.3 Inverter

⚠ WARNING

Improper operation can lead to the risk of electric shock.

Do not open the case at any time, unauthorized opening of the case will not continue to enjoy the warranty.

⚠ WARNING

The following improper operations are prohibited when the inverter is running：

- When the inverter is running, do not remove the photovoltaic connector, AC connector, and battery connector.

- When shutting down an inverter, you must shut down all power supplies to the inverter, including photovoltaic, power grid, and battery, and wait 10 minutes before operating the inverter.

- Before pulling out any connector, ensure that there is no voltage or current in the connector.

⚠ WARNING

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

- The description must be legible;

- Text should not be removed or overwritten.

⚠ WARNING

The hot parts of the inverter are at risk of burning.

- Do not touch any hot parts (such as the radiator) during inverter operation.

- Only the LCD panel and DC switch knob can be safely touched at any time.

⚠ WARNING

- Only professionals can change the type setting of safety rules.

- The inverter damage caused by unauthorized change of safety regulations is not entitled to warranty service.
- Note that static electricity may damage the inverter.
- Do not disassemble the inverter or touch the internal components.
- Do not directly touch the connectors of the inverters when they are running.

Warning Label

Please strictly comply with all warning labels and contents in this product.

Label	Discription
	Note! Warn! Failure to follow the precautions and warnings in this manual may result in bodily injury.
	Risk of high-voltage electric shock !
	Hazardous hot surfaces !
	Recyclable parts.
	During transportation, handling and storage, it must be placed in this direction.
	The number of packages in a stack must not exceed 6.
	The product should not be disposed of as household waste.
	Please handle this package or product carefully and do not dump or hang.
	Please refer to the operator's manual.
	Keep it dry! Packaging and products must be protected from excessive moisture and should be stored in a moisture-proof environment.
	The inverter can only be touched or operated after turning off all power or disconnecting all connecting wires for 10 minutes to prevent electric shock or personal injury.
	CE Mark.

Warning!

1. When connecting the input and output of the inverter, connect the ground cable of the inverter first, and then connect the DC input terminal and AC output terminal. When disconnecting inverter cables, disconnect the inverter ground cable at the end.
2. Before connecting the inverter to the grid, obtain permission from the local power company and hire a professional to install it.

3. Please read all the documents that come with this product carefully.

4. Inverter maintenance and installation must be carried out by professionals in accordance with the correct procedures.

5. Inverter has no maintenance parts. If there is any problem, it must be maintained by a professional.

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

7. The inverter shall be of non-isolated type and the PV module shall conform to IEC61730 Class A.

8. The inverter may be larger than 18kg. Exercise caution when moving or lifting the inverter. Equipment or parts weighing more than 18 kg should be equipped with lifting and handling tools.

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

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

- Risk of electric shock, do not remove the case. There are no repairable components. If in doubt, contact professional personnel.

- When the photovoltaic array is exposed to light, it may produce a dangerously high voltage. Do not contact the output terminals or cables directly.

- The photovoltaic input voltage must be less than 1000V. If the voltage is too high, the inverter may be damaged.

11. Avoid direct sunlight on the inverter.

12. When the inductive load of the motor is connected to the off-grid port, please note that the instantaneous peak current of the load starting should not be more than twice the rated current of the corresponding model. (6kW-20A,8kW-24A,10kW-30A, 12kW-36A,15kW-44A,17kW-50A,20kW-62A)

1.4 Electric Safety

⚠ CAUTION

- All electrical connections must meet local and national standards.

- The inverter needs permission from the grid to connect to the grid.

Grounding Requirement

- When installing a device that needs to be grounded, install the ground cable first. When removing a device, remove the grounding cable at the end.
- Do not damage the grounding conductor.

- Do not operate the device without a ground conductor installed.
- The equipment shall be permanently connected to the protected area. Before operating the device, check the electrical connections of the device to ensure that the device is properly grounded.

General Requirement

DANGER

Before electrical connection, ensure that the device is not damaged; otherwise, electric shock or fire may occur.

- All electrical connections must meet national/regional electrical standards.
- You must obtain permission from the electricity authority of your country/region before you can connect to the grid.
- Cables prepared by customers must comply with local laws and regulations.
- When performing high voltage operations, use special insulation tools.

DC Operation

DANGER

Do not install or remove power cables when the power is on. Transient contact between the core of a power cable and the conductor generates electric arcs or sparks, which may cause fire or personal injury.

- Before electrical connection of the device, if live parts may be encountered, disconnect the corresponding breaking device at the front of the device.
- Before connecting a power cable, ensure that the label on the power cable is correct.
- If the device has multiple inputs, disconnect all inputs and perform operations on the device only after the device is completely powered off.

Wiring Requirements

- If cables are used in a high temperature environment, the insulation layer may be aged or damaged. Keep at least 30mm away from the heating device or heat source area.
- Cables of the same type are bound together. Cables of different types are routed at least 30mm apart. Do not intertwine or cross each other.
- The cables used in the grid-connected photovoltaic power generation system must be securely connected, well insulated, and of appropriate specifications.

1.5 Battery

The batteries recommended by our company are strongly recommended. Please read the corresponding user manual carefully and strictly follow the user manual before installation.

⚠ WARNING

- short circuit or misinstallation of a battery can release energy and may cause combustion or fire hazards.
- Battery terminals and cables of the inverter may have fatal voltage. Contact with the cables and terminals of the inverter may result in serious injury or death.

⚠ WARNING

The battery system must have adequate ventilation to prevent the explosive gases released by the battery from producing flames and sparks。.

Because of the hazards of hydrogen and battery electrolyte：

- Keep batteries in designated areas and comply with local regulations；
- The battery protection case shall not be damaged；
- Do not disassemble a battery with a deformed bulge；
- When handling batteries, wear appropriate protective equipment, such as rubber gloves, rubber boots, and safety goggles；
- If battery acid spatter meets skin, wash immediately with water for a long time and consult a doctor;
- Improper setting or maintenance may cause permanent damage to the battery；
- Incorrect inverter parameters can cause premature battery aging.

1.6 Personnel Requirement

- The personnel responsible for installation and maintenance of the equipment must be trained to understand all safety precautions, master the correct operation methods, have received the installation, commissioning and hazard handling training of the electrical system, and be familiar with the contents of this manual, other relevant documents and local laws and regulations.
- Only professional or trained personnel can install, operate, and maintain the device.

1.7 Transportation Requirement

- The operation and service life of the energy storage depend on the operating temperature. Install the energy storage at a temperature equal to or better than the

ambient temperature.

- Some functions of the product cannot work at -20 ℃ to 0℃, and the system may run at a load reduction when the temperature exceeds 45℃.
- If stored in a cold environment (e.g., 0°C) prior to installation, the battery modules require additional heating to be recharged. Before installation, you are advised to place the battery module in a relatively warm place to facilitate efficient commissioning.
- Certified by UN38.3 (UN38.3：Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria)（This product belongs to Class 9 dangerous Goods）.
- Products meet the requirements of vehicle, ship and other transportation. The packing cases must be firm and conform to the national standard and should be marked "Handle with care" and "Keep away from moisture". Subject to external environment (such as temperature, transportation, storage, etc.), product specifications are subject to the delivery date.

Avoid it during transportation：

- Direct shower of rain or snow or falling into water
- Fall or mechanical impact

⚠ CAUTION

Do not transport batteries if they leak or bulge. Contact a battery recycling company for handling.

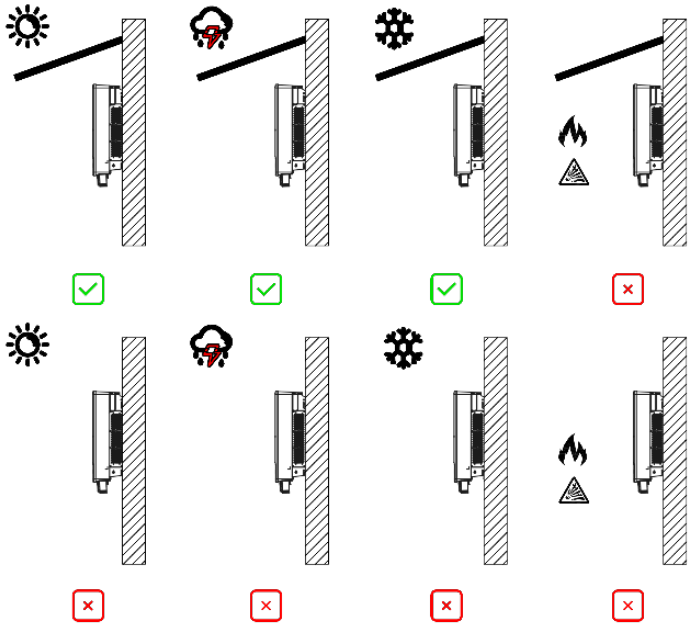
1.8 Installation Environment Requirements

- Install it in a dry and well-ventilated environment to ensure good heat dissipation.
- It is recommended to choose a sheltered installation site, or build an awning.
- Avoid direct sunlight or rain, the surrounding environment is clean, there is no large amount of infrared radiation, organic solvents and corrosive gases.
- Installation position away from fire source.
- The installation position is not accessible to children.
- Installation location away from water sources such as taps, sewer pipes, and sprinklers.
- The cabinet must be fixed to the wall or a fixed object with sufficient bearing capacity to avoid tipping.
- The outdoor unit is recommended to be installed under the eaves or in the garage.

The indoor unit must be kept away from rain.

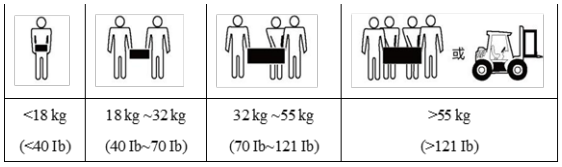
- The device must be on a solid, flat support surface.
- Do not place inflammable and explosive materials around the device.
- When the device is running, do not block the vent or heat dissipation system to prevent high temperature fire.
- Do not place the device in an environment with flammable or explosive gas or smoke, and do not perform any operation on the device.

Figure 1-1 Installation environment requirements



1.9 Installation and Debugging

- When carrying heavy objects, be prepared to bear them to avoid being crushed or sprained.



- Wear protective gloves when handling devices to avoid injury.
- When the device is powered on for the first time, professionals must set the parameters correctly. Incorrect Settings may cause the device to be inconsistent with the certification of the country or region where the device resides, affecting the normal operation of the device.

2. System

KY-EST series inverter also known as hybrid inverter, is suitable for energy management systems such as photovoltaic, battery, load, power grid, etc. Electricity from photovoltaic panels is used for residential consumption, and excess electricity can be stored in batteries. When the battery is fully charged, users can feed excess power to the public grid.

When the amount of electricity generated by the photovoltaic is not enough to meet the load demand of the user, the battery will discharge to the load. If there is not enough energy stored in the battery, the grid will power the load through the system.

The KY-EST series is an inverter with a transformerless topology, there is no isolation between DC input and AC output, and the adaptive PV model must meet IEC61730 Class A. The energy management system is shown in Figure 2-1.

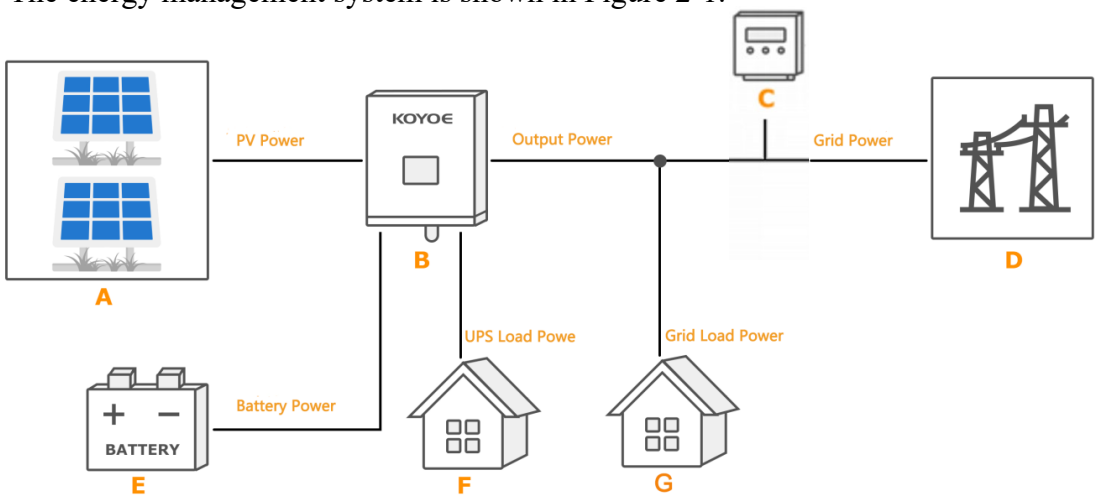


Figure 2-1. Photovoltaic energy storage energy management system

NO.	Description	Remarks
A	PV modules	PV Type
B	Inverter	Type KY-EST
C	Energy meter(three-phase)	RS485 communication with inverter
D	Utility grid	Grid type： TT,TN
E	Battery system	Lead-acid or lithium batteries
F	UPS load	User load connected to the inverter EPS port.
G	Grid load	User loads connected to the grid.

⚠ WARNING

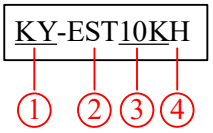
For the grid type of TT system, the voltage of the N phase and the direct earth must be below 30V.

2.1 Product Introduction

2.1.1 Inverter Introduction

Model description

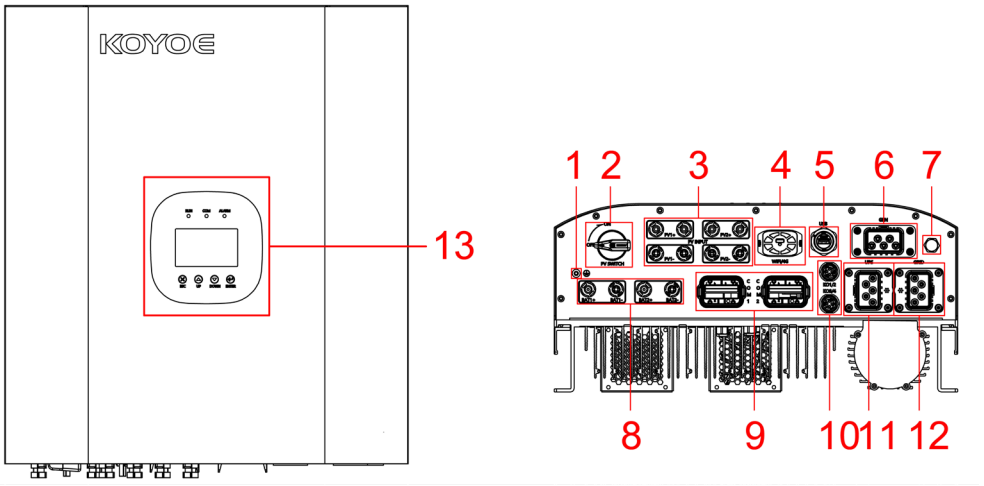
The inverter model description is as follows (Take KY-EST10KH as an example):



1	Abbreviation of a company	KY: KOYOE
2	Type	EST： Three-phase energy storage inverter
3	Nominal power	10K：Nominal power 10kW
4	Battery	H：High-voltage battery

Appearance

The following figure shows the inverter (KY-EST05KH- EST25KH) appearance, which is for reference only. The actual product that you receive may differ.



Introduction			
NO.	Description	NO.	Description
1	Ground	2	PV Switch
3	PV Terminal	4	WIFI
5	USB Terminal	6	GEN Terminal
7	Breather Valve	8	BAT Terminal
9	COM Terminal	10	KO Terminal
11	UPS Terminal	12	GRID Terminal
13	LCD		

Figure 2-2. Product appearance (KY-EST05KH- EST25KH)

⚠ CAUTION

This inverter contains PV switch, for safety reasons, it is recommended to configure a DC switch between the PV array and the PV input terminal of the inverter (mandatory in some countries).

3. LCD

The description of the LCD panel is shown in Figure 2-4 and the table below

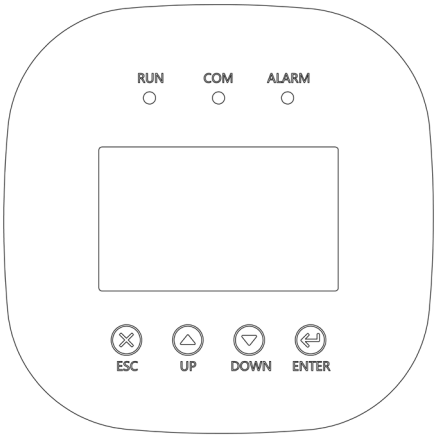


Figure 3-1. LCD panel schematic

SN	NAME	DESCRIPTION
1	RUN	After the inverter is powered on, the LED indicator blinks. When the inverter is in normal mode, the LED will remain on. (Green)
2	COM	When the inverter communicates with the upper computer through WIFI and GPRS, the LED flashes. (Yellow)
3	ALARM	When an alarm occurs, the LED flashes. When a fault occurs, the LED is solid on. (Red)
4	/	Screen
5	ESC	Exit
6	UP	Page up or move the cursor
7	DOWN	Page down or move the cursor
8	ENTER	Confirm

This chapter introduces the display content of the screen interface and the method of setting parameters through the screen.

3.1 Position of display screen

The display screen is located in the energy storage converter system, basically flush with the line of sight, which is convenient for users to view data and carry out relevant operations.

The user can view and set the relevant data information through the four keys below the screen.

ESC	Escape

UP	Up key (page turning, modifying parameters)
DOWN	Down key (page turning, modifying parameters)
ENTER	Enter key

3.2 Backlight function

If the user does not perform any click operation on the LCD within a certain period of time:

- If the non-operation time reaches 2 minutes, the LCD will automatically return to the main page.
- If the operation time reaches 1 minute, the LCD backlight goes out.

> In order to facilitate the user to operate the display, this chapter has configured a large number of interface pictures. The parameter values and other specific details in the picture are for illustrative purposes only. Users should refer to the product display of the received product.

When the user performs any click operation, the LCD backlight is on, and the main page is displayed.

3.3 Start Page

When the system is powered on, the display screen will start itself and display the startup page, as shown in the figure below。

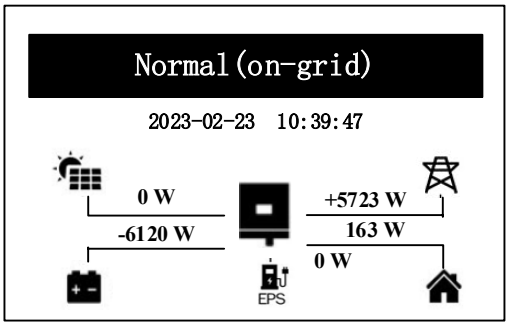
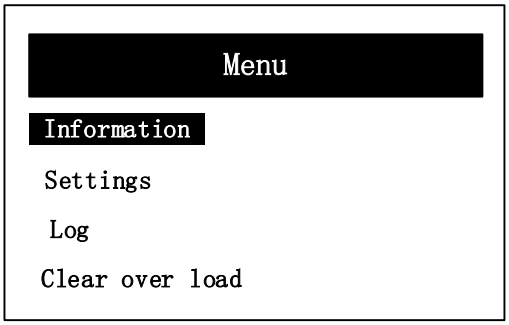


Fig 3-2 Startup

This page will be displayed each time the power on, after the boot process to enter the home page. (Note: There will be SOC display for lithium batteries, but no SOC display for lead-acid batteries)

Start screen
Start screen and the main page, click "ENTER" to enter

Start screen description



Menu	Function Declaration
Information	Detailed parameters and real-time data display (PV information, power grid information, battery information, etc.)
Settings	Common function setting and management
Log	Alarm log during work
Clear over load	Clear the overload flag

For detailed information, click to enter the Settings interface to set up.

3.4 Settings interface

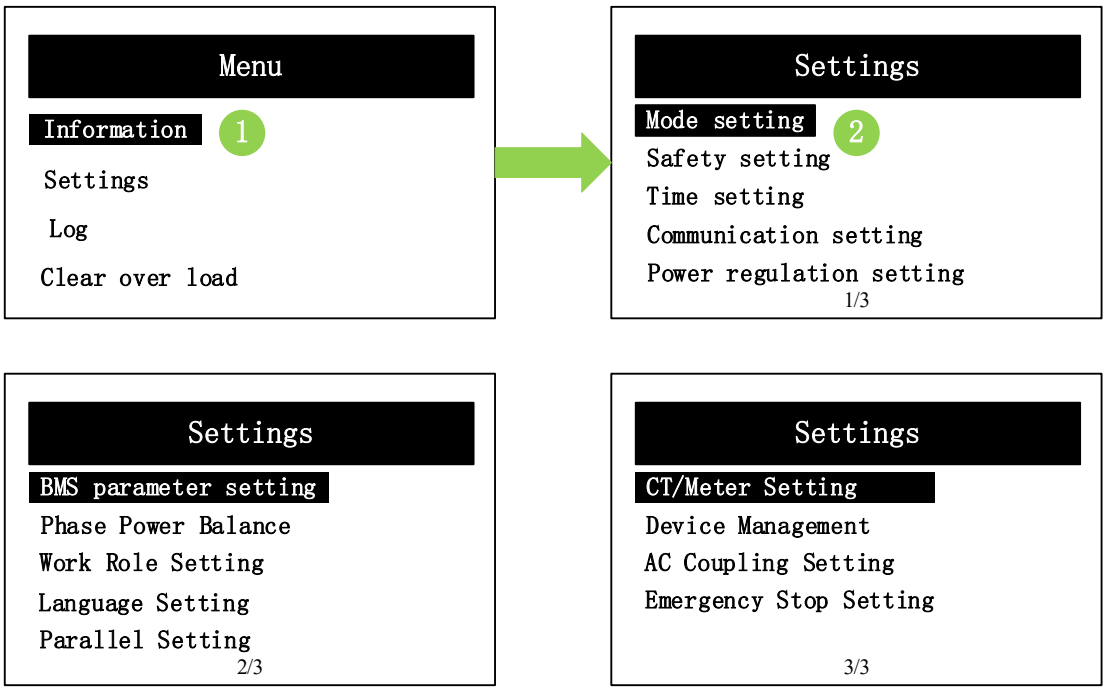


Fig. 3-3 Settings interface

Setting interface function (When setting the interface, you need to enter the password, the password is 1001, the password is valid within five minutes, if more than five minutes, please enter again) :

Mode setting, safety setting, time setting, communication setting, power regulation setting, BMS parameter setting, phase power balance, work role setting, language setting, parallel setting, CT/ meter setting, device management , AC coupling setting and can emergency stop setting be carried out according to the setting interface.

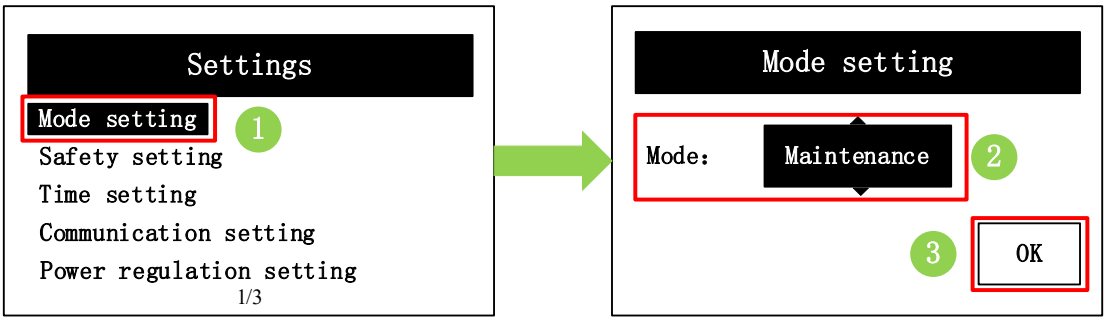
3.4.1 Mode setting

It is used to set the operating mode of the inverter. The steps for mode setting are as follows:：

Step 1： Select "Mode Setting" and click "ENTER" button to enter the mode setting interface

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3： Locate the cursor at "OK" and click "ENTER" button to complete the setting



Operating Mode	Descriptions
Reserved	Initial value
Self use	The energy generated by the photovoltaic system is preferred to meet its own load consumption, followed by excess energy used to charge the battery, and the final remaining energy can be limited by setting the power size of the node to limit the power fed into the grid.
Forced Discharging	This mode must be connected to the power grid to take effect. In the strong discharge mode, the inverter selects the appropriate power to feed into the power grid according to the allowable discharge current of the BMS, SOC and energy management calculation value. When the BMS stop discharge command is received or the working mode is changed, the strong release mode is exited.
Forced Charging	This mode must be connected to the power grid to take effect. In the strong charge mode, the inverter selects the appropriate power to charge the battery according to the allowable charging current of the BMS and the calculated value of energy management. When the SOC is charged to the upper limit or the working mode is changed, the SOC exits the power charging mode.
Peak Shaving	This mode must be connected to the power grid to take effect. In the mode of peak clipping and valley filling, the inverter can set up to 10 groups of discontinuous charge and discharge periods within 24 hours. In this mode, the power supplied to the load is preferred, and the power charged or discharged is adjusted according to the allowable value of the BMS and the current energy management
Maintenance	This mode takes effect only after being connected to the power grid. In maintenance mode, the inverter charges the battery until the SOC reaches 100% or is set to another mode. The power of the charge adjusts

	itself according to the allowable value of BMS and the current energy management.
Emergency Charging	This mode must be connected to the power grid to take effect. In emergency charging mode, the inverter will charge the battery according to the start or stop charging instruction of the BMS, until the SOC charge limit or other mode is set to automatically exit the mode. The power of the charge adjusts itself according to the allowable value of BMS and the current energy management.
Electricity Sales	This mode is similar to peak clipping and valley filling, and supports discharge without load.

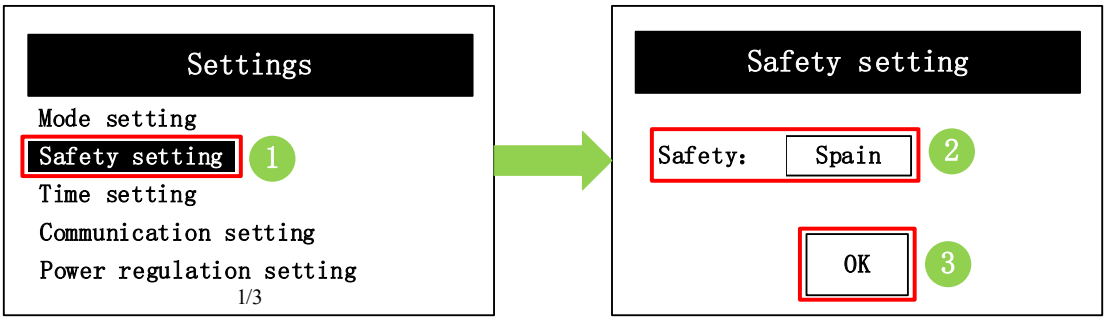
3.4.2 Safety setting

It is used to set the safety regulation of the inverter. The steps for setting the safety regulation are as follows:

Step 1：Select "Safety Setting" and click "ENTER" button to enter the safety regulation setting interface;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3： Locate the cursor at "OK" and click "ENTER" button to complete the setting



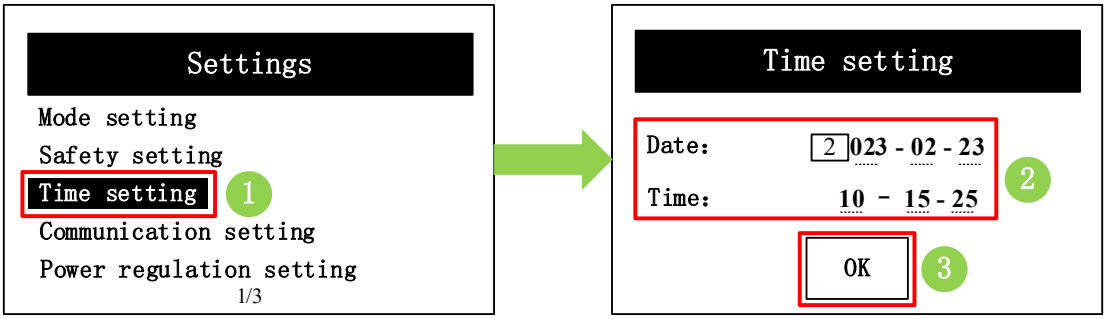
3.4.3 Time setting

It is used to set the inverter time. The steps to set the time are as follows:

Step 1：Select "Time Setting" and click "ENTER" button to enter the time setting interface;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



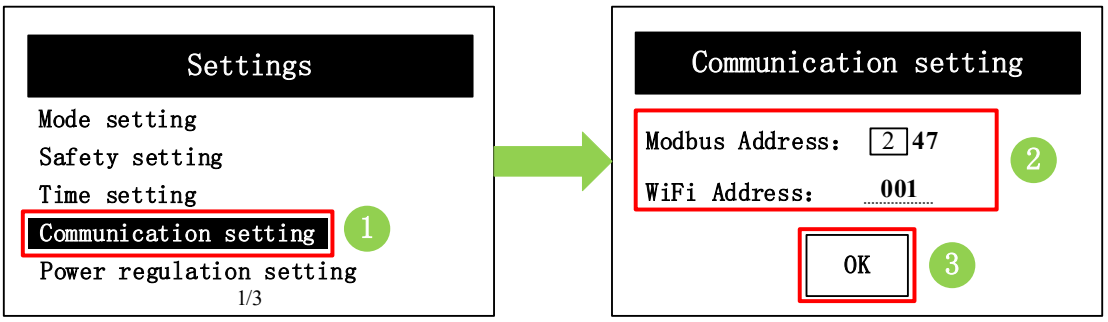
3.4.4 Commnication setting

It is used to set modbus address of Para port and modbus address of wifi port. The steps for communication setting are as follows:

Step 1：Select "Communication Settings" and click "ENTER" to enter the interface of communication Settings;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



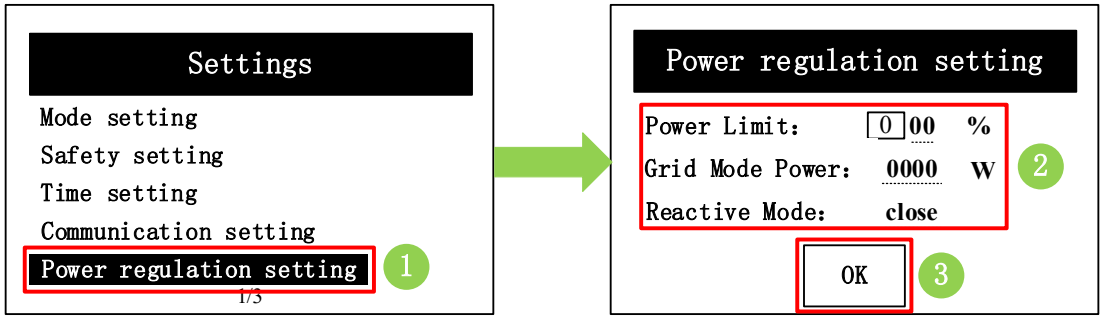
3.4.5 Power regulation setting

It is used to set inverter power limit, allowed grid-connected power, reactive power, etc. The steps for power setting are as follows:

Step 1： Select "Power Regulation Setting" and click "ENTER" button to enter the power setting interface;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



3.4.6 BMS parameter setting

It is used to match batteries from different manufacturers and set the upper and lower limits of battery SOC. The steps for setting battery parameters are as follows:

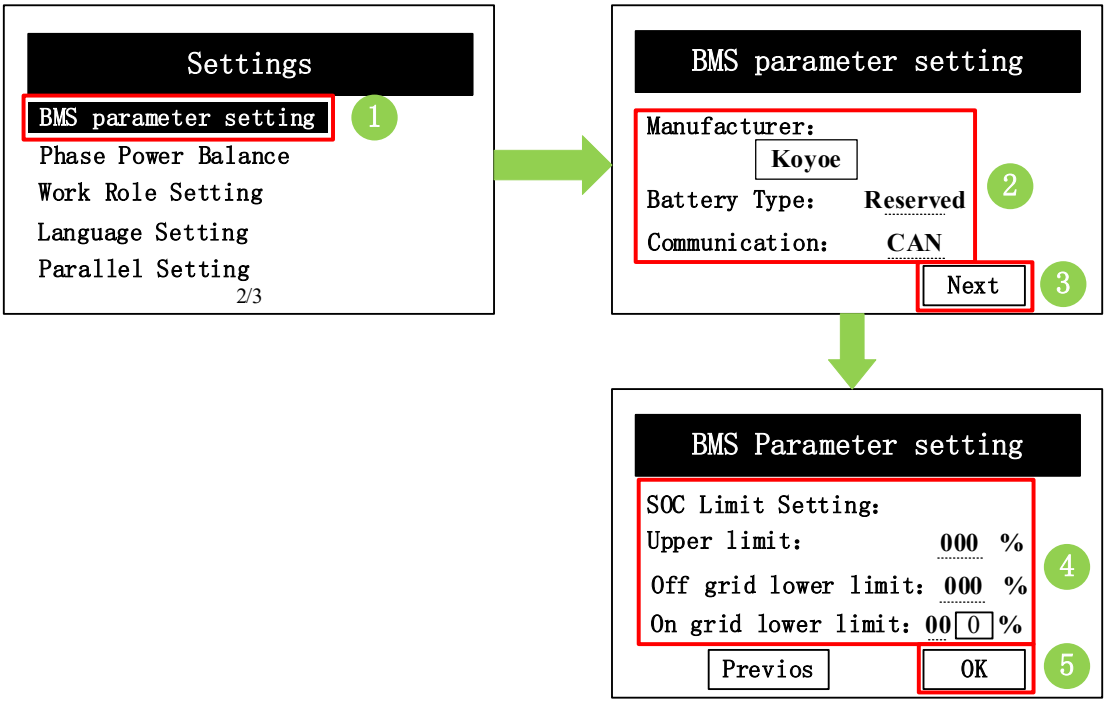
Step 1： Select "Battery Parameter Setting" and click "ENTER" button to enter the interface of battery parameter setting;

Step 2：Position the cursor at the desired setting and set it by clicking the "UP"/" DOWN "/" ENTER "button;

Step 3：Locate the cursor in "Next" and press "ENTER" to set the remaining content;

Step 4：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 5：Locate the cursor at "OK" and click "ENTER" button to complete the setting



3.4.7 Phase Power Balance

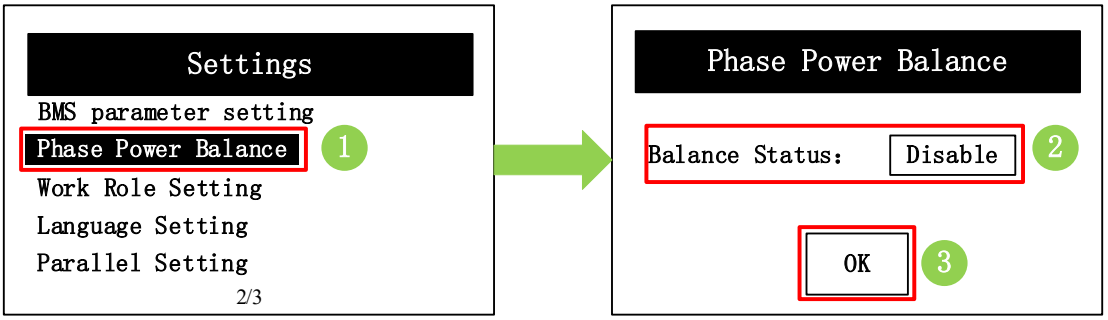
It is used to set unbalanced output. By default, unbalanced output is off. The steps to set

phase power balance are as follows:

Step 1： Select "Phase Power Balance" and press "ENTER" to enter the phase power balance setting interface.

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



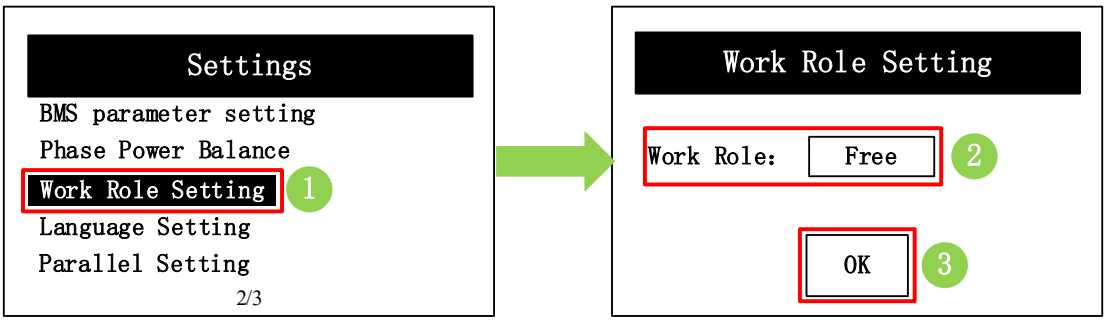
3.4.8 Work Role Setting

It is used to set the host and slave when multiple machines are combined. The steps to set the work role are as follows:

Step 1：Select "Work Role Setting" and press "ENTER" to enter the job role setting interface;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



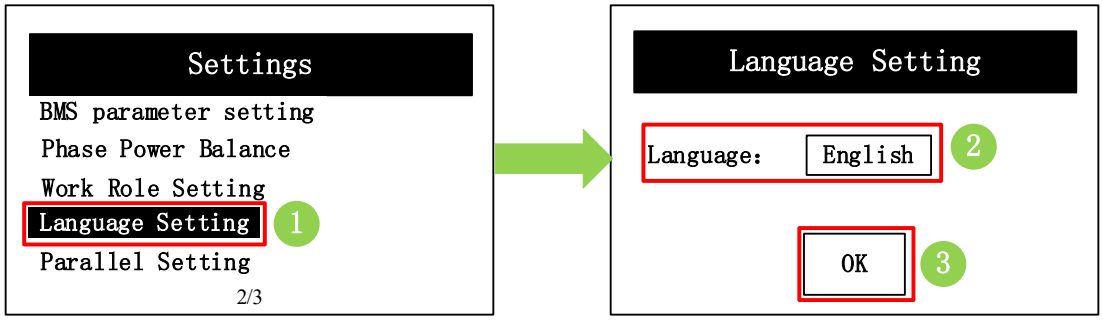
3.4.9 Language setting

It is used to set the LCD screen display language. The procedure for setting the language is as follows:

Step 1：Select "Language Setting" and press "ENTER" to enter the language setting interface.

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



3.4.10 Parallel setting

It is used for parallel operation without parallel collector. The procedure for parallel setting is as follows:

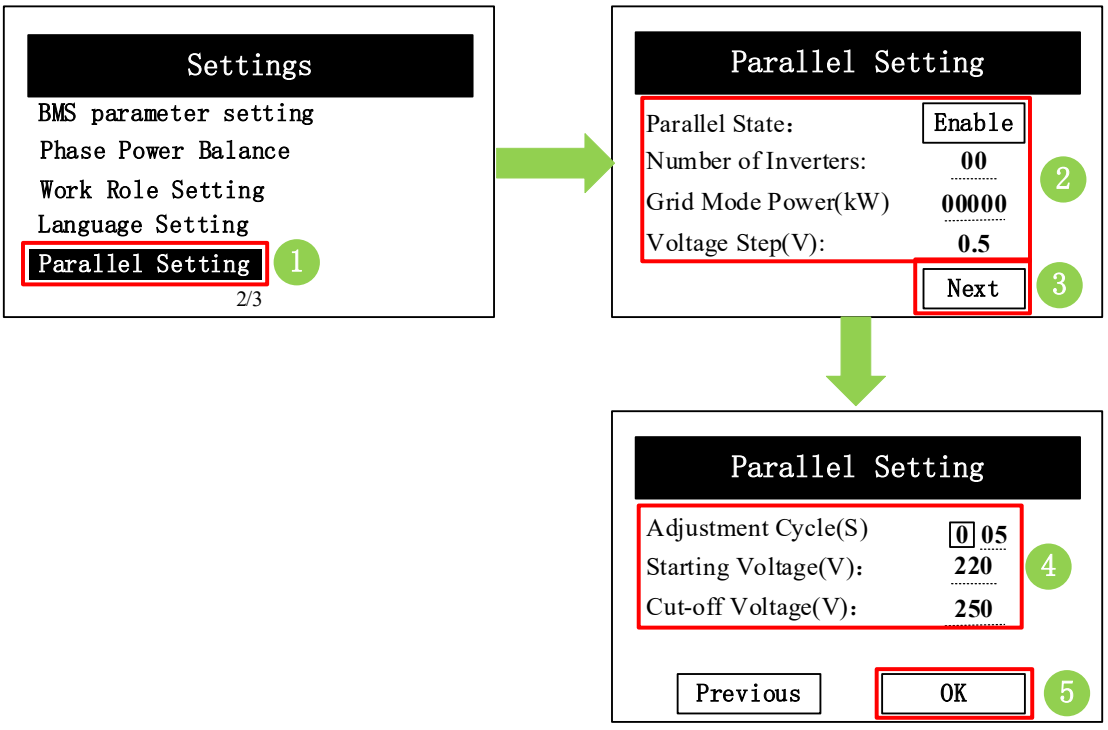
Step 1：Select "Parallel Setting" and press "ENTER" to enter the parallel setting interface.

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor in "Next" and press "ENTER" to set the remaining content;

Step 4：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 5：Locate the cursor at "OK" and click "ENTER" button to complete the setting



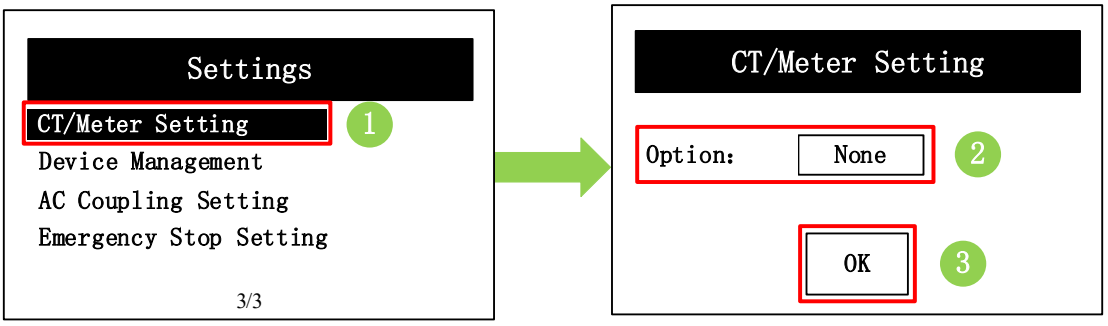
3.4.11 CT/Meter setting

Used to set the inverter to collect power grid information, CT/ meter Settings enter the steps as follows:

Step 1： Select "CT/ Meter Setting" and press "ENTER" to enter the CT/ meter setting interface;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



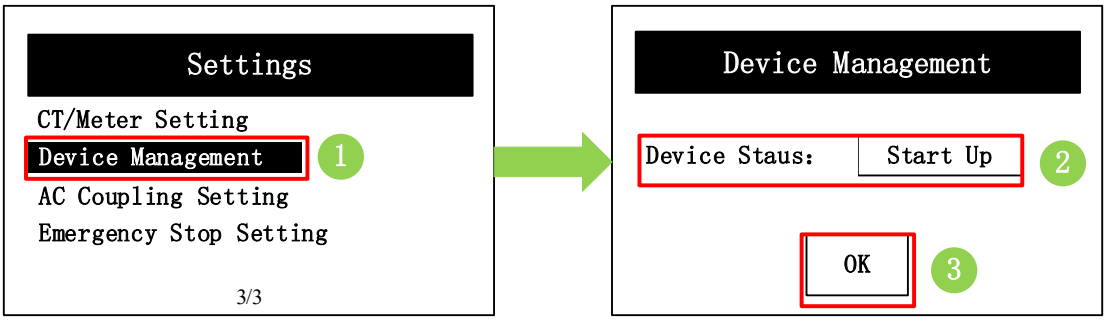
3.4.12 Device management

To start, shut down, and restart the inverter, perform the following steps:

Step 1：Select “Device Management” and press "ENTER". The device management page is displayed;

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



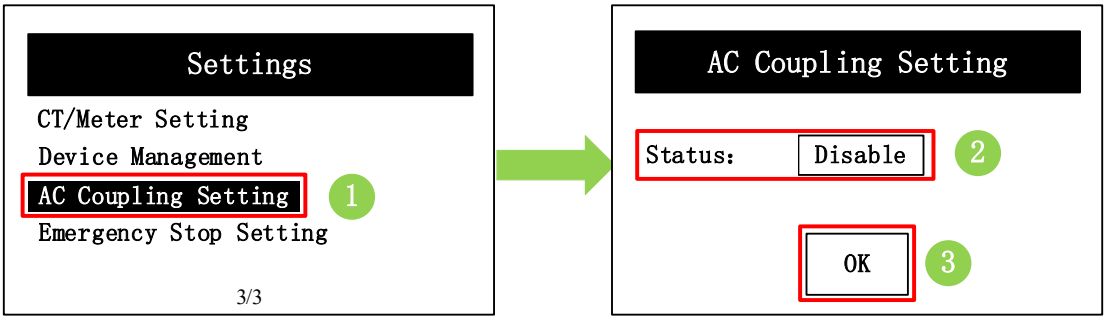
3.4.13 AC coupling setting

Enter the AC coupling setting step

Step 1：Select "AC Coupling Setting" and press "ENTER" to enter the setting interface.

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



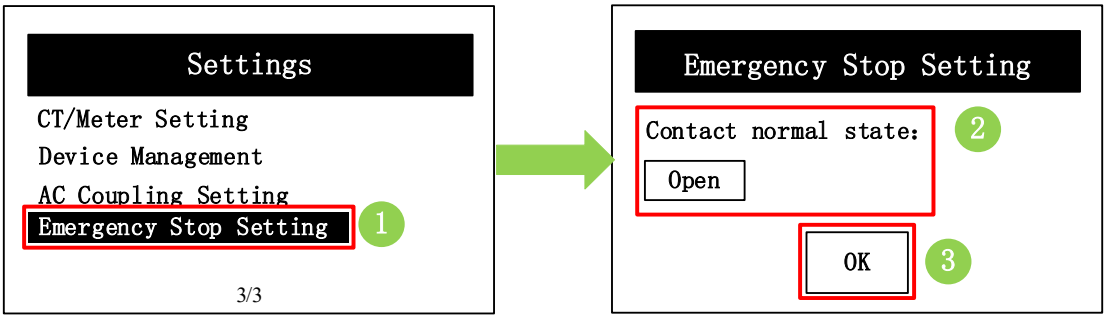
3.4.14 Emergency stop setting

To set the normal status of the external dry contact, perform the following steps to set the emergency stop:

Step 1：Select "Emergency Stop Setting" and press "ENTER" to enter the setting interface.

Step 2：Locate the cursor at the desired setting, and click "UP"/" DOWN "/" ENTER "button to set;

Step 3：Locate the cursor at "OK" and click "ENTER" button to complete the setting



4. Working Status

4.1 Standby Status

When the inverter is only connected to the grid or only connected to photovoltaics, the inverter enters the standby state, at this time the LCD shows "waiting", the inverter will always detect the current working state, and when the conditions are met, the inverter will automatically resume normal operation.

4.2 Self-test Status

After the inverter is powered on or restarted from a recoverability fault, a check self-test will be performed, at which time the LCD will display "checking ", and if the self-test is faulty or warning, the inverter will prompt.

4.3 Normal Status

After the inverter self-test is successful, the inverter will enter the normal working state, and the running light of the LCD will be on continuously. Users can view relevant information through the LCD

4.4 Failed Status

When the inverter fails, the inverter will automatically stop the output, enter the fault mode, and the fault information will be displayed on the LCD. Before entering the failure mode, the inverter automatically saves the relevant information. If the fault is recoverable, the inverter will automatically resume operation. When an unrecoverable fault occurs, the inverter stops in failure mode until the relevant technician handles the fault.

⚠ WARNING

- When the inverter failed, it must be repaired by a professional.
- The error code displayed on the LCD can be viewed in the appendix.

4.5 Upgrade Status

Regardless of the operating mode of the inverter, when the system meets the conditions for updating the software, the inverter enters an upgraded state and the firmware is rewritten. Users can download the latest upgrade operation guide from the website of KOYOE.

5. Feature Description

5.1 Protection Features

The inverter integrates protection functions such as short-circuit protection, grounding insulation resistance monitoring, residual current protection, anti-islanding protection, and DC overvoltage/overcurrent protection.

5.2 Energy Conversion and Management

The inverter converts the DC power supply of photovoltaic panels or batteries into AC power that meets the requirements of the grid. It also transfers the energy of photovoltaics to the cell. The inverter integrates a bidirectional converter, and the inverter can charge or discharge the battery.

The inverter uses two PV MPPT trackers, which can be used to maximize the power of PV clusters with different orientations, different tilt angles, or different module structures.

5.3 Power Derating

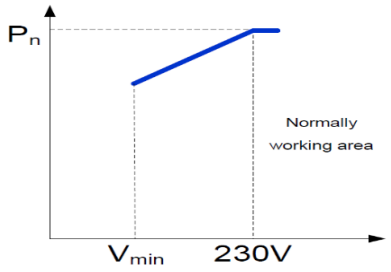
Power derating is a way to prevent overload or potential failure of the inverter. In addition, the derating function can be activated according to the requirements of the power grid. Inverter power derating is required in the following situations:

- Grid dispatching;
- The internal power module of the inverter or the internal environment of the inverter is over-temperature;
- Limit setting of output power;
- Power response mode;

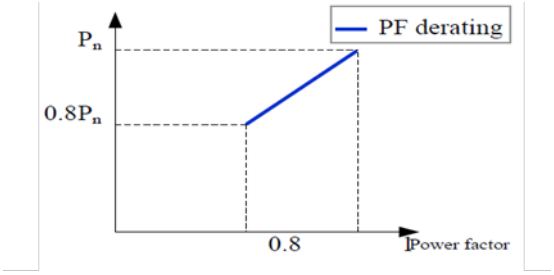
Grid dispatch derating： The output power is adjusted according to the remote dispatching command, and the inverter is derated to operate.

Ultra-high temperature derating： Excessive ambient temperature or poor ventilation can cause inverter derating. When the internal temperature or module temperature exceeds the upper limit, the inverter reduces the output power until the temperature drops to the allowable range.

Grid undervoltage drop： When the grid voltage is too low, the inverter will reduce the output power to ensure that the output current is within the allowable range. The undervoltage derating curve is shown in the figure below.



Power factor derating： When the power factor PF<1.0, the inverter reduces the output power to the specified range. The figure below shows the power factor derating curve.



5.4 DRM function

The inverter provides terminal blocks for connection to demand response enabling devices (DRED). DRED Demand Response Models (DRMs) are available in Australia. 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	Instruction
DRM0	The inverter is in the "off" state.
DRM1	The grid input power is 0.
DRM2	Grid input power does not exceed 50% of rated power.
DRM3	Grid input power does not exceed 75% of rated power.
DRM4	The grid input power is 100% of the rated power, but it is limited by other DRMs.
DRM5	The power output of the inverter to the grid is 0.
DRM6	The power output of the inverter to the grid does not exceed 50% of the rated power.
DRM7	The power output of the inverter to the grid does not exceed 75% of the rated power.
DRM8	The power output of the inverter to the grid is 100% of the rated power, but is limited by other DRMs.

DRED can declare multiple DRMs at once, and the inverter responds according to the priority of the instruction, the following is the priority order.

Multiple modes	Order of precedence
DRM1…DRM4	DRM1 > DRM2 > DRM3 > DRM4
DRM5…DRM8	DRM5 > DRM6 > DRM7 > DRM8

6. Unpacking and Storage

6.1 Unpacking and Inspection

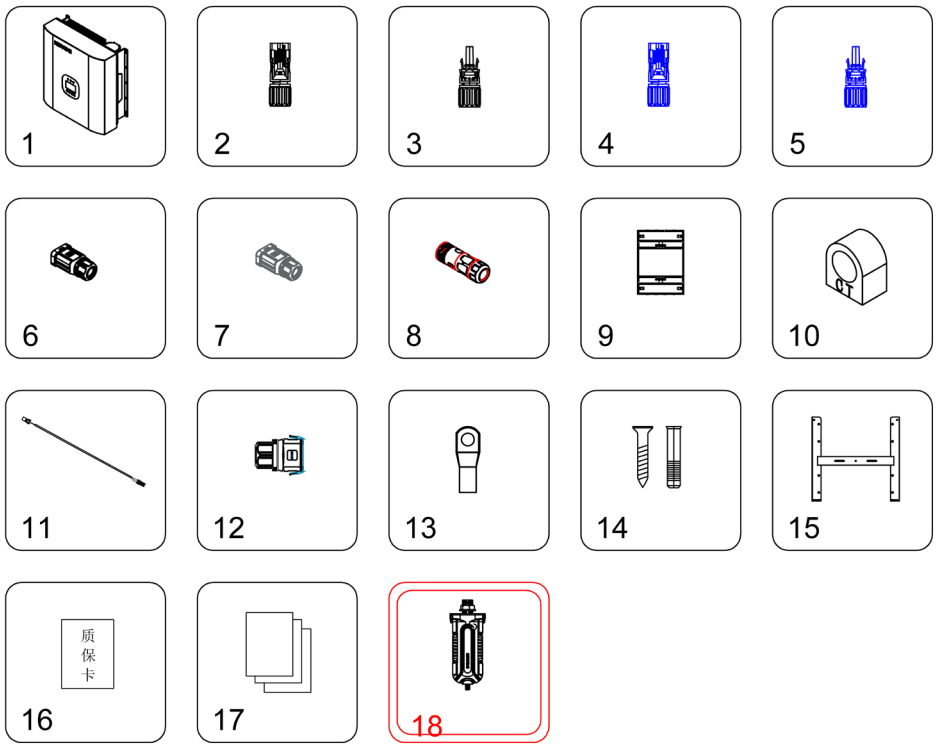
The inverter is fully tested and strictly inspected before leaving the factory. Damage can still occur during transport. Therefore, once you receive your device, the first thing is to do a thorough inspection.

1. Check the package for obvious damage.
2. Check whether the shipping content is complete according to the packing list.
3. Check the inside for visible damage.

If there is any damage or incompleteness, please contact the company or supplier. Do not discard the original box. It is recommended to store the inverter in it.

6.2 Packing List

After receiving the inverter, please check if all the following parts are missing or damaged. Among them, the WIFI or 4G module is configured according to the user's choice when placing an order.



1. Inverter *1
2. PV negative connector*4
3. PV positive connector*4
4. BAT negative connector *2
5. BAT positive connector *2
6. AC connector（black）*2
7. AC connector（grey）*1
8. KO dry contact connector*2
9. Meter*1
10. CT *3
11. Meter communication line *1
12.COM connector *2
13. M4 crimping terminal *1
14. Expansion bolt *4
15. Wall backboard *1
16. Warranty card *1
17. Installation instructions *1
18.WIFI/4G (Optional) *1

6.3 Inverter Storage

If the inverter is not installed immediately, proper storage is required.

- Keep the inverter in the original box, which has desiccant inside.

-The storage temperature should always be kept between -30 °C ~ +85 °C, and the storage relative humidity should always be kept between 0 ~100%.

- When stacking and storing, the number of stacking layers must not exceed the label on the outer packaging of the box (KY-EST stacking layers is 6 layers).

-The package must stand upright.

- If the inverter has been stored for more than a year, it must be thoroughly inspected and tested by a professional before installation.

7. Mechanical Installation

7.1 Safety Precautions at the Time of Installation

⚠ WARNING

Make sure there are no electrical connections before installation.

To avoid electric shock or other injury, it is important to confirm that there are no energized pipes or other devices before drilling.

⚠ WARNING

The following improper actions may cause personal injury.

- When moving and positioning the inverter, it is necessary to follow the instructions.

-System performance degradation may occur due to poor ventilation.

- For safety reasons, it is forbidden to open the upper cover.

⚠ WARNING

-Please wear gloves when installing the inverter to avoid scratches.

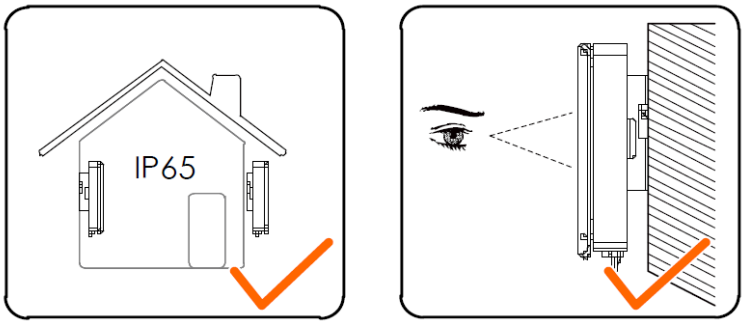
- The inverter must be installed by a professional.

7.2 Installation location

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

This inverter is an IP65 rated inverter, which can be installed indoors and outdoors.

Install the inverter in a place that is convenient for electrical connection, operation, and maintenance.



7.3 Installation Environment Requirements

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

-The installation environment must be away from flammable and explosive dangerous goods.

- The inverter must be installed in an environment out of reach of children.

-Ambient temperature (-25°C~+ 60°C) and relative humidity (0% ~100% non-condensing).

-Do not expose the inverter directly to sunlight, rain and snow.

-The inverter should be well ventilated to ensure air circulation of the radiator.

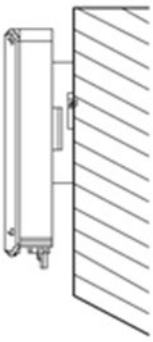
-Do not install the inverter in the living area, otherwise the inverter will generate noise during operation, which will affect daily life.

7.4 Installation Carrier Requirements

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

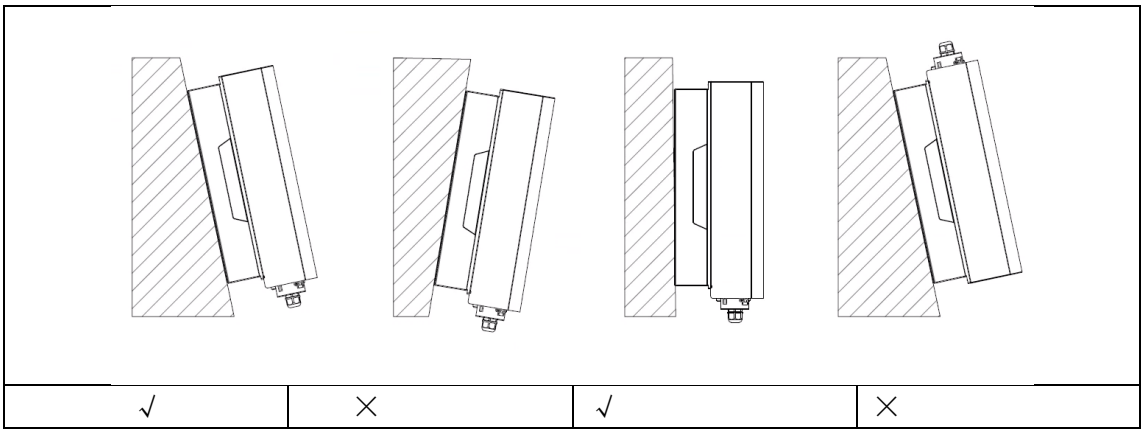
Must be non-combustible material

Must be able to withstand more than 4 times the weight of the inverter



7.5 Installation Angle requirement

Never install inverters horizontally, or tilt them forward or backward, or even upside-down. Otherwise, the inverter will be damaged

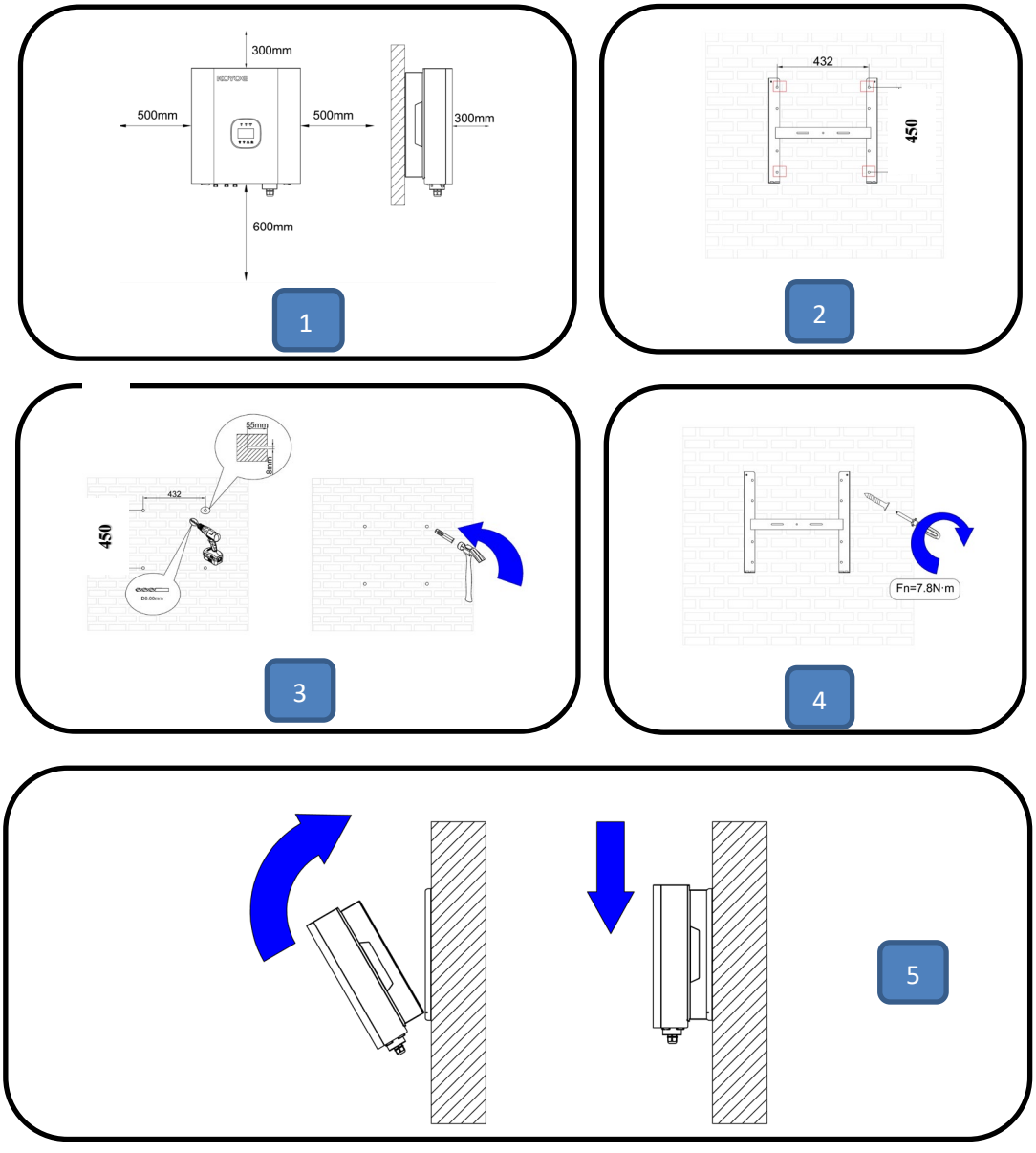


7.6 Installation Clearance Requirements

Please reserve enough space around the inverter to ensure that there is enough space to dissipate heat from the inverter.

7.7 Install the Inverter

Be careful when taking it out of the package. Install the inverter as follows



8. Electrical Connection

8.1 Safety Caution

Before any electrical connection, keep in mind that this inverter is a multi-power supply. Electrical connections must be made by a professional and personal protective equipment must be worn when connecting.

⚠ WARNING

There is a deadly high voltage inside the inverter, please pay attention to safety when operating.

- PV panels will produce deadly high voltage in sunlight, do not touch PV output cables or interfaces.

- Before starting the electrical connection, it is necessary to confirm that the DC and AC circuit breakers are disconnected and prevent them from being inadvertently reconnected.

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

⚠ WARNING

When connecting cables, personal injury or equipment damage may occur due to improper operation.

Only professional personnel can make cable connections.

All cables must be intact, securely connected, properly insulated and appropriately sized.

⚠ WARNING

Follow the safety instructions related to photovoltaic panels and the regulations related to the power grid.

All electrical connections must comply with local and national standards.

Inverters need to be licensed by the grid to be connected to the grid.

8.2 Terminal Description

All electrical terminals are located at bottom of the inverter. For details, see Chapter 2.

8.3 Additional Grounding Connection

WARNING

• Since the inverter is transformerless, neither the negative pole nor the positive pole of the PV string must not be grounded. Otherwise, the inverter will not operate normally.

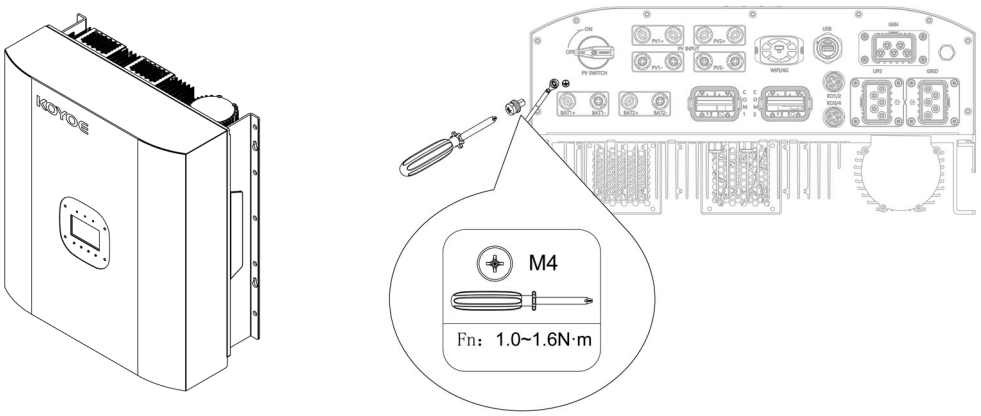
• Connect the additional grounding terminal to the protective grounding point before AC cable connection, PV cable connection, and communication cable connection.

• The ground connection of this additional grounding terminal cannot replace the connection of the PE terminal of the AC cable. Make sure the two terminals are both grounded reliably.

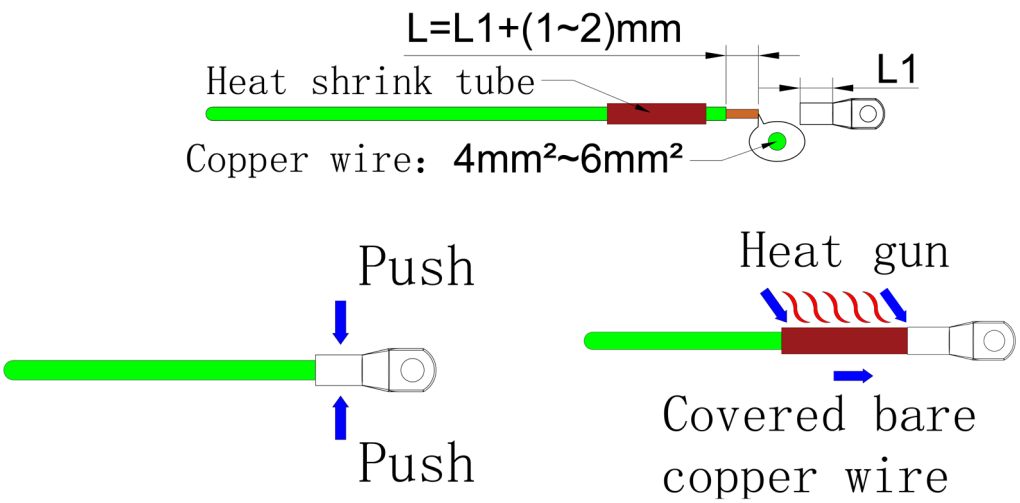
Additional Grounding Connection

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. When there is only one inverter in the system, connect the additional grounding cable to a nearby grounding point.

Installation position



Wiring Harness Making



8.4 PV Connection

WARNING

The PV array will generate lethal high voltage once exposed to sunlight

Make sure the PV array is well insulated to ground before connecting it to the inverter

Before connecting the PV array to the inverter, ensure that the impedances between the positive terminals of the PV string and earth, and between the negative terminals of the PV string and earth are larger than 1 MOhm.

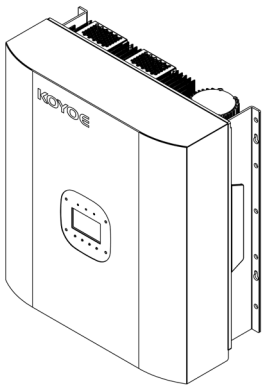
WARNING

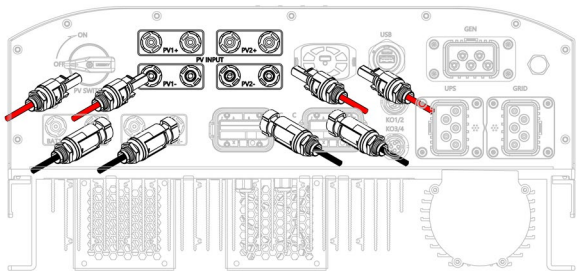
Risk of inverter damage! Observe the following requirements. Failure to do so will avoid guarantee and warranty claims.

- Make sure the maximum voltage of each string is always less than 1,000 V.

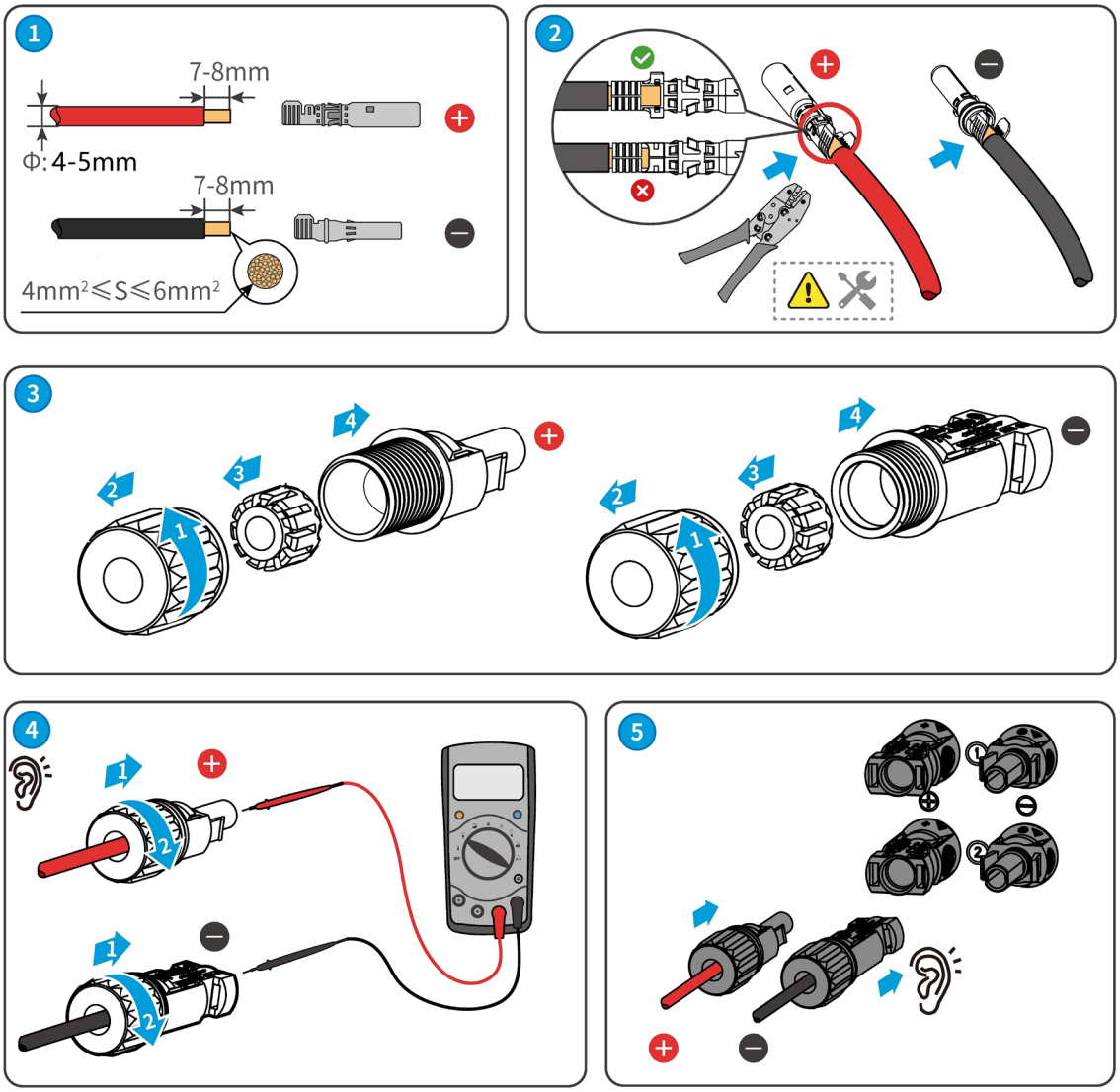
- Make sure the maximum short circuit current on the DC side is within the permissible range.

Installation position





Wiring Harness Making



8.5 Battery Interface Connection

⚠ CAUTION

- Before inserting the battery port, turn off the battery switch to ensure that there is no voltage on the cable.

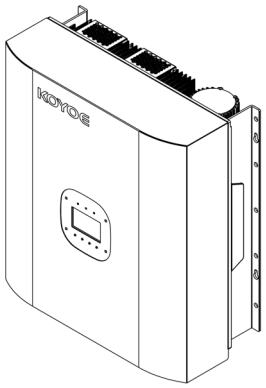
- Please confirm that the battery voltage is within the input rating range of the inverter before inserting the battery interface.

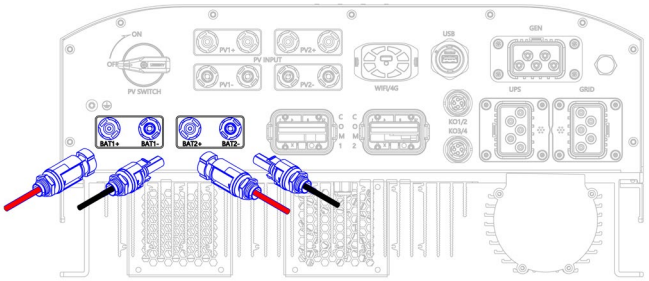
- Please use appropriate insulation tools to prevent contact with electric shock or short circuit. If no insulating tool is available, use triple insulating tape to cover the entire bare metal surface of the tool used.

- Plug connectors must be connected by a professional electrician.

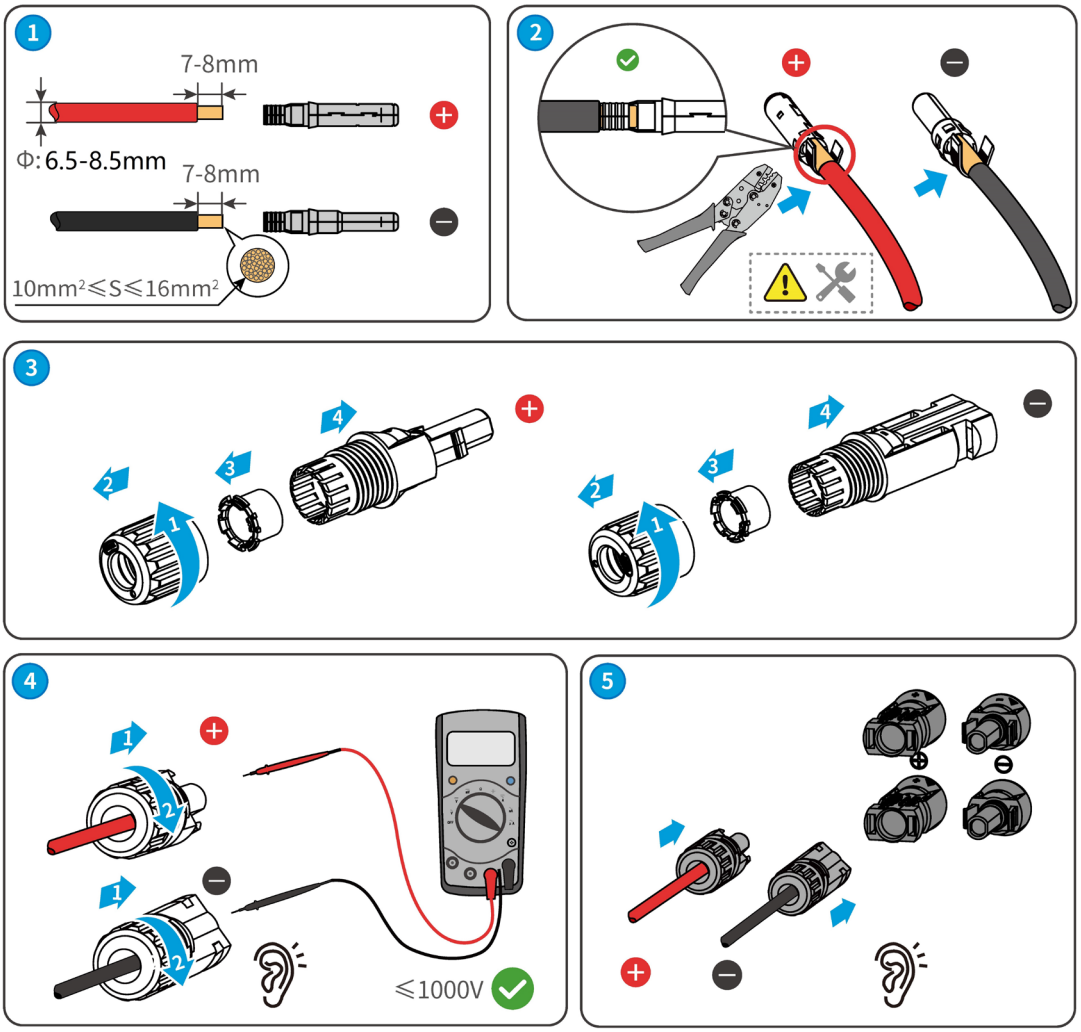
- Bipolar DC circuit breaker with over-voltage protection (voltage level not less than 600V and current not less than 40A) shall be installed between inverter and battery.

Installation position





Wiring Harness Making



8.6 AC Cable Connection

Grid Side Requirements

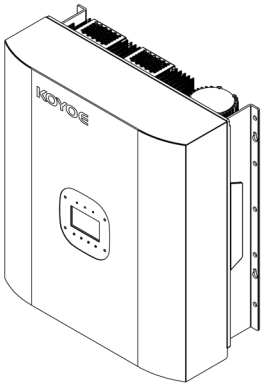
An independent three or four-pole circuit breaker must be installed on the output side of the inverter to ensure safe disconnection from the grid.

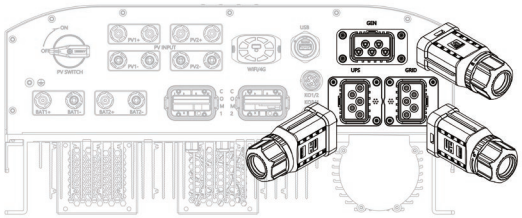
CAUTION

-Multiple inverters cannot share one circuit breaker.

-Never connect a load between the inverter and the circuit breaker.

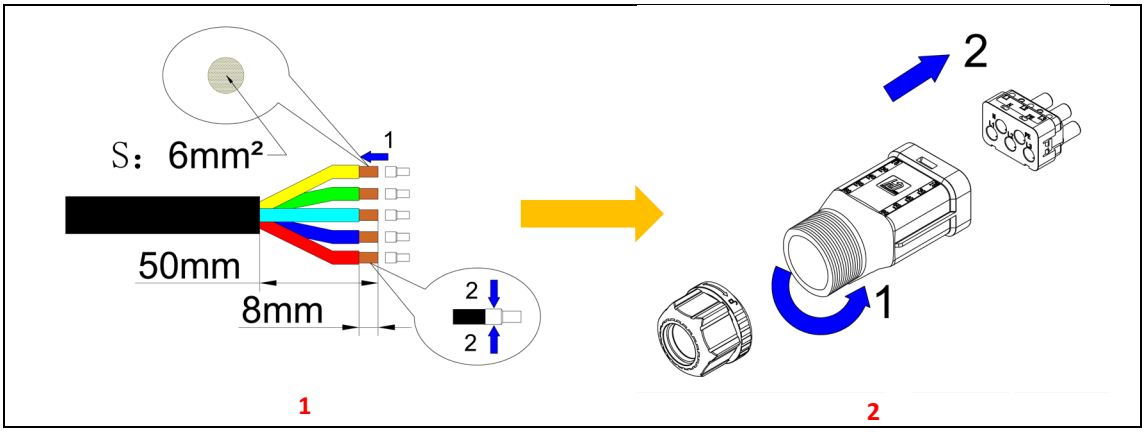
Installation position

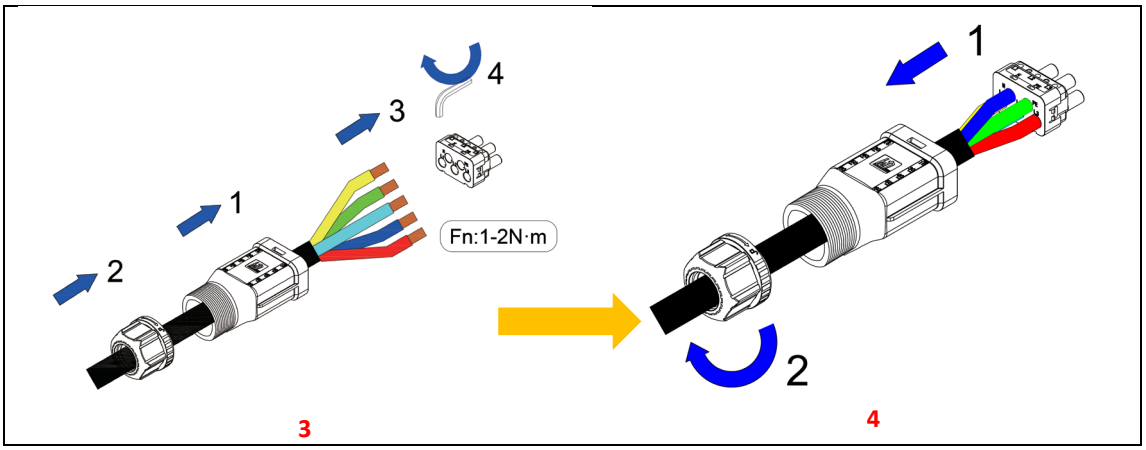




Wiring Harness Making

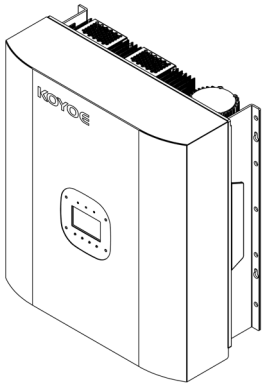
The AC terminal connects to the socket terminal	Corresponds to the load phase sequence of the power grid	Harness color in the image below
1	L1	Yellow
2	L2	Green
L	L3	Red
N	N	Blue
PE	PE ground connection	Yellow Green

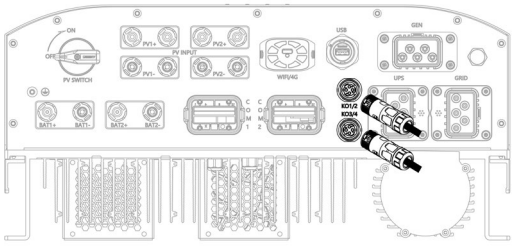




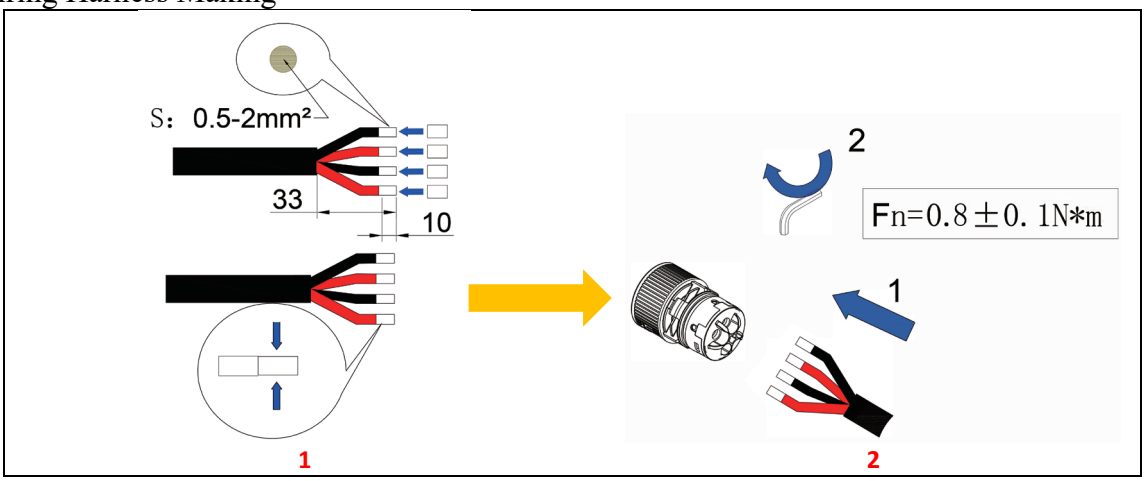
8.7 KO Side

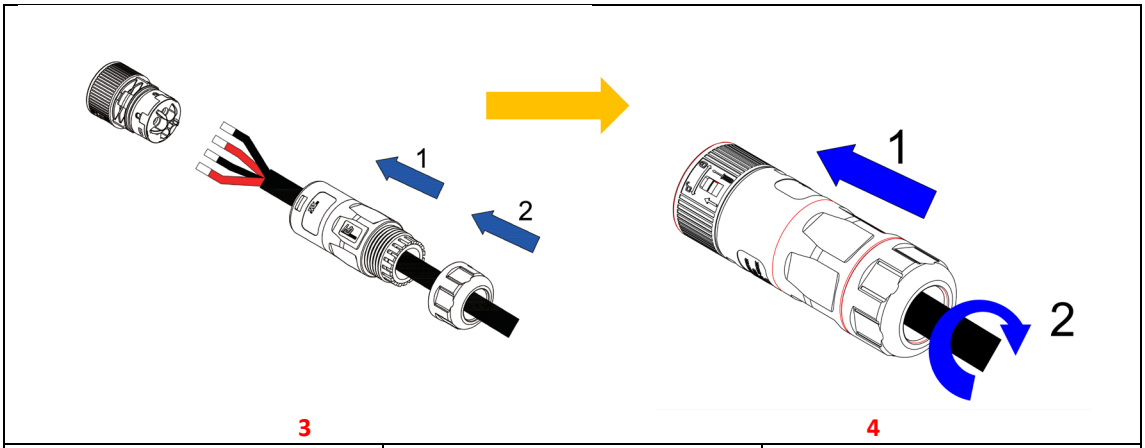
Installation position





Wiring Harness Making

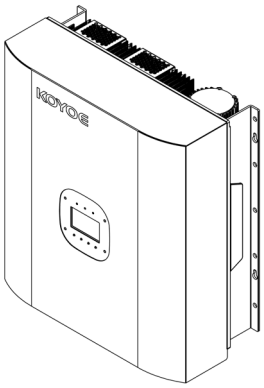


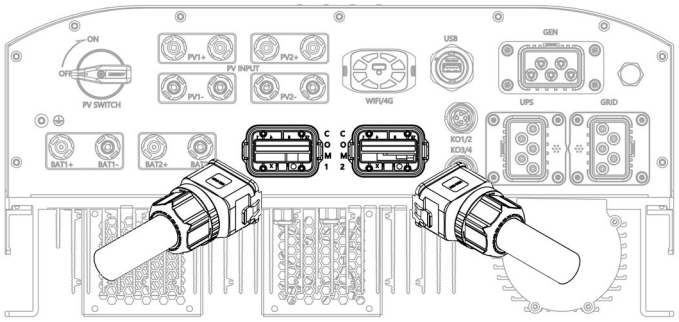


KO Terminal	Harness Color	Harness Port Definition
1	Red	KO1+
2	Black	KO1-
3	Red	KO2+
4	Black	KO2-

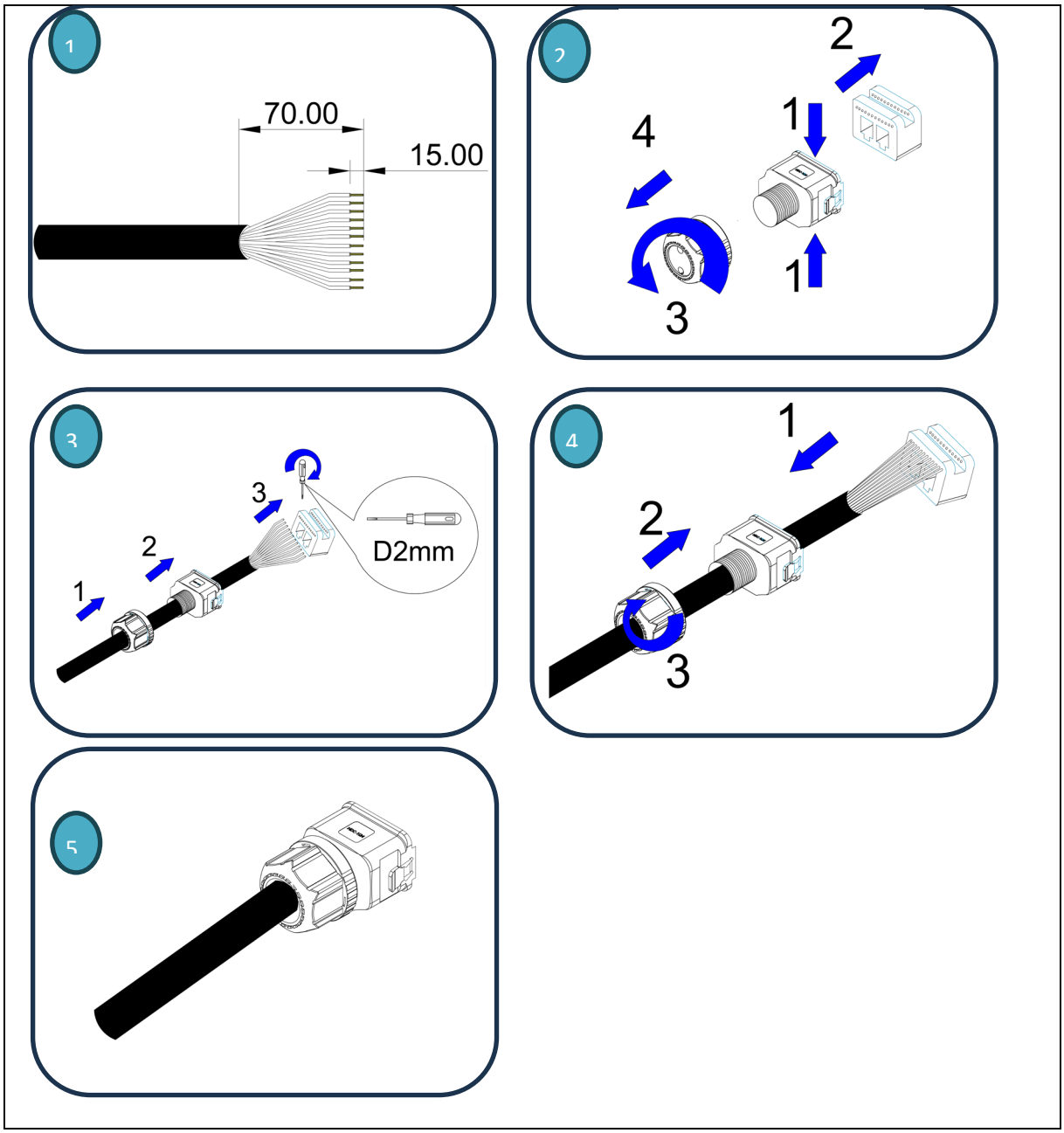
8.8 Communication Connection

Installation position

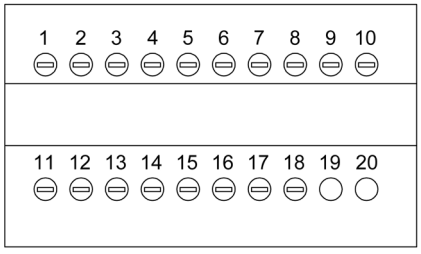
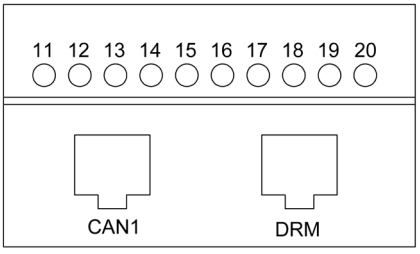




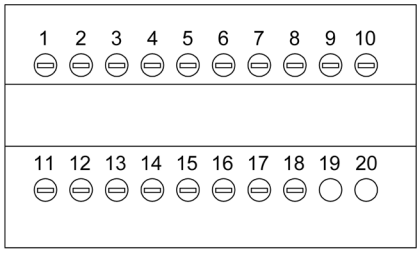
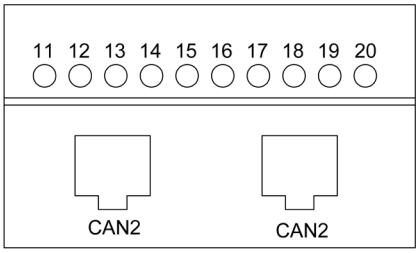
Wiring Harness Making



Communication interface definition and location

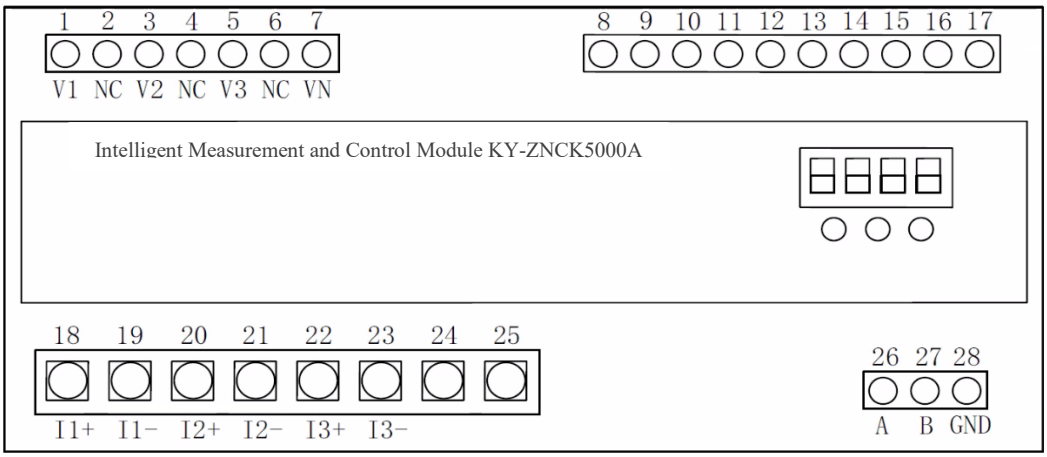
Communication interface：COM1							
							
NO	Description	NO	Description	NO	Description	NO	Description
1	Meter1 A	2	Meter1 B	3	GND	4	Para A
5	Para B	6	GND	7	Para A	8	Para B
9	GND	10	GND	11	KIN1+	12	KIN1-
13	KIN2+	14	KIN2-	15	KIN3+	16	KIN3-
17	NTC+	18	NTC-	19	NC	20	NC

Network interface-left：CAN1				Network interface-right：DRM			
PIN interface：Left—Right（PIN1—PIN2）				PIN interface：Left—Right（PIN1—PIN2）			
PIN1	NC	PIN2	NC	PIN1	DRM1/5	PIN2	DRM2/6
PIN3	NC	PIN4	CAN1_H	PIN3	DRM3/7	PIN4	DRM4/8
PIN5	CAN1_L	PIN6	NC	PIN5	GEN	PIN6	COM
PIN7	NC	PIN8	NC	PIN7	NC	PIN8	NC

Communication interface：COM2							
							
NO	Description	NO	Description	NO	Description	NO	Description
1	CT1+	2	CT1-	3	CT2+	4	CT2-
5	CT3+	6	CT3-	7	SYNC IN	8	SYNC OUT
9	SYNCS	10	SYNCS	11	Meter2_A	12	Meter2_B
13	GND	14	LCD12V	15	LCD12V GND	16	LCD485A
17	LCD485B	18	SYNC GND	19	SYNC GND	20	SYNC POWER
Network interface-left：CAN2				Network interface-right：CAN2			
PIN interface：Left—Right（PIN1—PIN2）				PIN interface：Left—Right（PIN1—PIN2）			
PIN1	NC	PIN2	NC	PIN1	NC	PIN2	NC
PIN3	NC	PIN4	CAN2_H	PIN3	NC	PIN4	CAN2_H
PIN5	CAN2_L	PIN6	NC	PIN5	CAN2_L	PIN6	NC
PIN7	NC	PIN8	NC	PIN7	NC	PIN8	NC

8.9 Smart Meter Connection

The inverter is packaged with a smart meter, model: KY5000A, additional CT model: AKH-0.66. The electricity meter is installed at the outlet of the main switch of the grid to detect the electricity information value of the connection point. It communicates with the inverter via RS485. Meter length, width, and height: 124*75*55mm. Meter wiring instructions are provided in the corresponding installation guide.



Front View

Bottom View

No	ID	Describtion
1	V1	Voltage sense, connect to Grid-L1
3	V2	Voltage sense, connect to Grid-L2
5	V3	Voltage sense, connect to Grid-L3
7	VN	Voltage sense, connect to Grid-N
18	I1+	Current sense, connect to S1 of CT which connected to the L1
19	I1-	Current sense, connect to S2 of CT which connected to the L1
20	I2+	Current sense, connect to S1 of CT which connected to the L2
21	I2-	Current sense, connect to S2 of CT which connected to the L2
22	I3+	Current sense, connect to S1 of CT which connected to the L3
23	I3-	Current sense, connect to S2 of CT which connected to the L3
26	A	RS485-A, connect to inverter
27	B	RS485-B, connect to inverter
28	GND	RS485-GND, connect to inverter
29	N	Power input for Meter, connect to Gird-L1
31	L	Power input for Meter, connect to Gird-N

The meter of this inverter has been set with communication baud rate, CT rate, etc. at the factory. Users can use it without specific settings. Please refer to the ammeter manual or consult technicians for detailed operations.

1) Panel key operation instructions

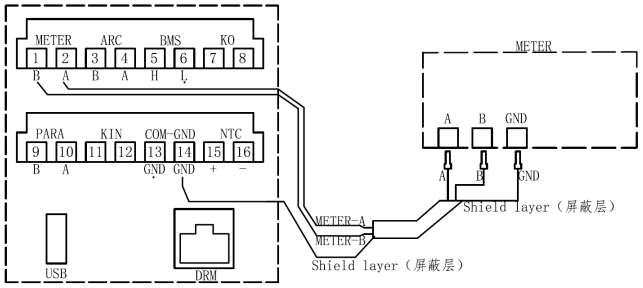
After the correct connection, it will enter the normal measurement state after the power is turned on.

2) Key definition

There are 3 keys on the panel, and the key operations are shown in the table below

UP KEY	Parameter addition, subtraction
DOWN KEY	Parameter addition, subtraction
SET KEY	Parameter setting and subtraction

When the inverter is connected to the grid, it must be connected to the supporting electricity meter. Refer to section 1.1.2 for L/N connections. The inverter relates to the electricity meter through RS485 communication mode. The wiring of the electricity meter is shown in the figure below：



9. Debugging

9.1 Pre-commissioning Inspection

Before the system starts, you need to check the following:

1. Inverter DC switch and external air-open disconnection.
2. The inverter should be easy to operate, maintain and repair.
3. There is no debris on the top of the inverter or battery.
4. The inverter is properly connected to external devices, and the cable routing is safe or without mechanical damage.
5. The selection of AC circuit breakers should follow this manual and all applicable local standards.
6. The unused terminals at the bottom of the inverter need to be sealed.
7. Warning signs and labels fit properly and are durable.
8. When .EPS applying, check the inverter wiring, if the power grid power cord is wrongly connected to the EPS load terminal, there is a risk of damaging the inverter.

9.2 Power up the System

If all the items in Chapter 7 meet the requirements, start the inverter for the first time according to the following steps.

1. Rotate the DC switch on the inverter panel to the "ON" position.
2. Turn on the AC switch between the inverter and the grid.
3. Turn on the switch between the inverter and the battery, and if it is supplied to our company, turn on the switch of the battery main control box.
4. After the LCD screen is on, the inverter will automatically start to detect, the top of the LCD screen will display the current status, if Normal is displayed, it means that the inverter is working normally.

9.3 LCD Introduction

See Chapter 3 for details.

10. Deactivate

10.1 Deactivate the Inverter

The inverter must be turned off while maintenance or repair work is being carried out. Follow the steps below to disconnect the inverter from AC and DC power sources. Failure to do so will result in fatal voltage or inverter damage.

10.1.1 Disconnect the Inverter

1. Disconnect the AC circuit breaker to prevent reconnection.
2. Rotate the DC switch to the "OFF" position and disconnect all PV string input connectors.
3. Disconnect the EPS device.
4. Disconnect the circuit between the battery and the inverter (turn off the BMS or DC switch in the main circuit).
5. Wait at least 10 minutes until the capacitor inside the inverter is completely discharged.
6. Remove the DC connector (PV and battery).
7. Remove the AC connector and EPS connector.
8. Install the MC4 waterproof plug and AC waterproof cover.

10.1.2 Remove the Inverter

⚠ CAUTION

Risk of burns and electric shock!

Do not touch the internal live parts within 10 minutes of disconnecting the inverter from the grid and the PV input.

1. All cables connected to the inverter are disconnected in reverse, see "8 Electrical Connections". 2. Please disassemble the inverter according to the steps of 7.2 to install the inverter. 3. If necessary, remove the wall bracket from the wall. 4. If you want to reinstall the inverter in the future, please refer to "6.3 Inverter Storage" for appropriate protection.

10.1.3 Handle the Inverter

The disposal of this inverter is the responsibility of the user.

NOTICE

Some components and devices of the inverter, such as LCD displays, batteries, capacitors, etc., may cause environmental pollution.

Do not dispose of the product with household waste, and should dispose of it in accordance with the electronic waste disposal regulations applicable at the installation site.

11. Communication and Monitoring

11.1 Overview

KY-EST series inverter provides RS485 communication interface, which can be connected to WIFI/GPRS module. After configuring the monitoring system, you can remotely view information such as output voltage, current, grid frequency, faults, and so on.

11.2 Communication

Users can remotely view inverter data over the RS485 communication port. The RS485 port is usually used for local monitoring or connecting to a third-party data collector. When connecting to the local monitoring device, the RS485 port on the inverter can be connected to the USB port on the computer through the USB-RS485 converter. The longest RS485 line is not more than 1200 meters. When networking communication, WIFI/GPRS communication module can be configured to achieve communication networking.

11.3 Monitor

When the WIFI/GPRS communication module is plugged into the inverter and successfully connected to the network, customers can monitor the inverter information through monitoring website. The user opens a browser and enters the website: http://solar.koyoe.com. After registering an account, users can choose a username or serial number to log in. After the user logs in, he can monitor the voltage, current power and other information of the inverter.

In the Apple and Android app stores, enter the KOYOE keyword and users can download the app on your mobile device. After the installation is complete, register an account, create a new power station, add device serial numbers to the new power station, and view inverter information

12. Maintenance and Repair

12.1 Breakdown Maintenance

When the inverter fails, the inverter will automatically disconnect from the grid and send a fault or alarm message. For details about how to deal with simple faults, see "Common Faults" in Appendix 1.

12.2 Security Requirements in Maintenance

	In operation and operation after operation, the temperature of the housing is high due to the heat generated by the power circuit, and there is a risk of burns. Contact operations should be carried out after cooling.
	Before troubleshooting, it is necessary to ensure that the circuit breakers of DC and AC circuits are disconnected and contact a professional for handling. Other personnel shall not close the gate without authorization.
	The inverter has no serviceable parts. If there are any problems, maintenance must be carried out by professionals. Even if the inverter has been disconnected from photovoltaics, batteries and the grid, dangerous voltages may still exist. Before starting the operation of the electronic system related to the cabinet, the DC bus voltage should be measured. The voltage must be below 48V.

12.3 Routine Maintenance

In general, inverters do not require regular maintenance and calibration. Due to natural heat dissipation, the radiator must not be covered with dust and other dirt.

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

If necessary, clean the inlet and outlet of the inverter with a soft brush. It is forbidden to clean the inverter with water, corrosive chemicals, or strong detergents.

13. Technical Parameters

Model	KY-EST05KH	KY-EST06KH	KY-EST08KH	KY-EST10KH	KY-EST12KH
PV Input Data					
Max. Input Power[W]	7500	9000	12000	15000	18000
Max. Input Voltage[V]	1000				
MPPT Operating Voltage Range/Nominal Input Voltage[V]	180~900/610				
Max. Input Current[A]	18/18				
Max. Short Circuit Current[A]	20/20				
Number of MPPT Trackers	2				
Number of Strings per MPPT	1/1				
Battery Input Data					
Battery Voltage Range[V]	180~700				
Input Number	2				
Max.Charge/Discharge Current[A]	Simplex Max. 25/25				
Max.Charge/Discharge Power[W]	5000/5000	6000/6000	8000/8000	10000/10000	12000/12000
Battery Type	Li-ion/Lead-acid				
AC Output Data(GRID)					
Nominal Output Power[W]	5000	6000	8000	10000	12000
Max. Apparent Power [VA]	5500	6600	8800	11000	13200
Max Input Power[W]	9000	12000	16000	18000	18000
Nominal Output Voltage[Vac]	380/400V,3L/N/PE				
Nominal Output Frequency[Hz]	50/60				
Max. Output Current[A]	8	9.5	12.7	16	19
Max. Three-phase Unbalanced Output Current[A]	11	13	17.5	22	26
Grid Bypass Current[A]	35				
Power Factor	~1 (0.8 lead to 0.8 lag can be set)				
Total Harmonic Distortion[%]	<3				
AC Output Data(EPS)					
Nominal Output Power[W]	5000	6000	8000	10000	12000
Max. Apparent Power [VA]	5500	6600	8800	11000	13200
Nominal Output Voltage[Vac]	380/400V,3L/N/PE				
Nominal Output Frequency[Hz]	50/60				
Max. Three-phase Unbalanced Output Current[A]	11	13	17.5	22	26

Max. Output Single-phase Apparent Power[A]	2500	3000	4000	5000	6000
Peak Output Apparent Power[VA](60s)	6000	7200	9600	12000	14400
Peak Output Apparent Power[VA](10s)	7500	9000	12000	15000	18000
On/off Grid switching time [ms]	<10				
AC Output Data(GEN)					
Nominal Voltage[Vac]	380/400V,3L/N/PE				
Nominal Frequency[Hz]	50/60				
Nominal Input Apparent Power[VA]	5000	6000	8000	10000	12000
Efficiency					
Max. Efficiency[%]	98.2				
European Efficiency[%]	97.1				
Protection					
PV Reverse Polarity Protection	Integrated				
Overcurrent Protection	Integrated				
Anti-islanding Protection	Integrated				
Short Circuit Protection	Integrated				
Leakage Current Protection	Integrated				
Insulation Protection	Integrated				
Surge Protection	DC TypeⅡ/AC TypeⅢ				
General Data					
Operating Temperature Range [℃]	-25℃~60℃（>45 derating）				
Altitude[m]	<4000				
Noise Emission [dB]	<40				
Topology	Transformerless isolation				
Cooling Method	Natural convection				
Ingress Protection Rating	IP65				
Relative Humidity[%]	0-95, No condensation				
DC Connector	MC/Amphenol/Phoenix				
AC Connector	Plug in Connector				
Interaction	LCD,RS485				
Cloud Communication	RS485(WIFI/4G optional)				
BMS Communication	CAN				
Meter Communication	RS485				
Installation	Wall-mounted				
Dimension(W*H*D)[mm]	505*597*220				
Weight[kg]	35				
Certification					
Safety Standards	IEC62109-1/-2				
EMC Standards	EN61000-6-1/-2/-3,IEC61000				

On-grid Standard	AS4777.2:2020,NRS097-2-1:2017,EN 50549-1 for Czech,VDE-AR-N 4105:2018,EN50549-1:2019+AC:2,G98 G99,OVE-R25,EN50549-1:2019 for Poland A&B

Model	**KY-EST15KH**	**KY-EST17KH**	**KY-EST20KH**	**KY-EST25KH**
PV Input Data				
Max. Input Power[W]	22500	25500	30000	37500
Max. Input Voltage[V]	1000			
MPPT Operating Voltage Range/Nominal Input Voltage[V]	180~900/610			
Max. Input Current[A]	36/36			
Max. Short Circuit Current[A]	40/40			
Number of MPPT Trackers	2			
Number of Strings per MPPT	2/2			
Battery Input Data				
Battery Voltage Range[V]	180~700			
Input Number	2			
Max.Charge/Discharge Current[A]	Simplex Max. 25/25			
Max.Charge/Discharge Power[W]	15000/15000	17000/17000	20000/20000	25000/25000
Battery Type	Li-ion/Lead-acid			
AC Output Data(GRID)				
Nominal Output Power[W]	15000	17000	20000	25000
Max. Apparent Power [VA]	16500	18700	22000	27500
Max Input Power[W]	30000			
Nominal Output Voltage[Vac]	380/400V,3L/N/PE			
Nominal Output Frequency[Hz]	50/60			
Max. Output Current[A]	24	27	32	40
Max. Three-phase Unbalanced Output Current[A]	33	37	43	43
Grid Bypass Current[A]	50			
Power Factor	~1 (0.8 lead to 0.8 lag can be set)			
Total Harmonic Distortion[%]	<3			
AC Output Data(EPS)				
Nominal Output Power[W]	15000	17000	20000	25000
Max. Apparent Power [VA]	16500	18700	22000	27500
Nominal Output Voltage[Vac]	380/400V,3L/N/PE			
Nominal Output Frequency[Hz]	50/60			
Max. Three-phase Unbalanced Output Current[A]	33	37	43	43
Max. Output Single-phase Apparent Power[A]	7500	8500	10000	10000
Peak Output Apparent Power[VA](60s)	18000	20400	24000	/

Peak Output Apparent Power[VA](10s)	22500	25500	30000	30000
On/off Grid switching time [ms]	<10			
AC Output Data(GEN)				
Nominal Voltage[Vac]	380/400V,3L/N/PE			
Nominal Frequency[Hz]	50/60			
Nominal Input Apparent Power[VA]	15000	17000	20000	25000
Efficiency				
Max. Efficiency[%]	98.2			
European Efficiency[%]	97.1			
Protection				
PV Reverse Polarity Protection	Integrated			
Overcurrent Protection	Integrated			
Anti-islanding Protection	Integrated			
Short Circuit Protection	Integrated			
Leakage Current Protection	Integrated			
Insulation Protection	Integrated			
Surge Protection	DC TypeⅡ/AC TypeⅢ			
General Data				
Operating Temperature Range [℃]	-25℃~60℃（>45 derating）			
Altitude[m]	<4000			
Noise Emission [dB]	<40			
Topology	Transformerless isolation			
Cooling Method	Natural convection			
Ingress Protection Rating	IP65			
Relative Humidity[%]	0-95, No condensation			
DC Connector	MC/Amphenol/Phoenix			
AC Connector	Plug in Connector			
Interaction	LCD,RS485			
Cloud Communication	RS485(WIFI/4G optional)			
BMS Communication	CAN			
Meter Communication	RS485			
Installation	Wall-mounted			
Dimension(W*H*D)[mm]	505*597*220			
Weight[kg]	40			
Certification				
Safety Standards	IEC62109-1/-2			
EMC Standards	EN61000-6-1/-2/-3,IEC61000			
On-grid Standard	AS4777.2:2020,NRS097-2-1:2017,EN 50549-1 for Czech,VDE-AR-N 4105:2018,EN50549-1:2019+AC:2,G98 G99,OVE-R25,EN50549-1:2019 for Poland A&B			

14. Contact

If you have any questions or technical problems with this inverter, please contact us:

Jiangsu Koyoe Energy Technology Co.,Ltd

Add: Building 3, Industrial Zone C, No.588 Wutaishan Road, New District, Suzhou, Jiangsu P.R. China

Business Cooperation: info@koyoe.com

After Sales Service：service@koyoe.com

Web：www.koyoe.com

Global Support Hotline: +86 400-900-9536

Appendix I: Frequently Asked Questions

If the inverter sometimes does not work properly, the solutions to common problems are listed below. This helps technicians understand the problem and take effective action.

SN	LCD display	Possible causes and solutions
1	GFCI Fault	1. The ground current is too large. 2. After disconnecting the AC side circuit, unplug the photovoltaic terminal at the input end to detect the peripheral equipment of the AC system. 3. After troubleshooting, reconnect the PV terminal and the AC side circuit to detect the inverter status.
2	BMS Communication Fault	1. The communication between the battery pack and the inverter fails. 2. Check whether the communication cable is connected correctly and reliably. 3. Restart the inverter after replacing the connecting cable.
3	ARM DSP Communication Fault	1. Master-slave DSP communication fails, please restart the inverter. 2. If it does not work normally after restarting, please contact customer service
4	PV Overvoltage Fault	1. PV overvoltage fault, please check the PV input voltage, the voltage value must be lower than 550V
5	Isolation Fault	1. Check whether the inverter is effectively grounded and whether the impedance between the positive and negative electrodes of the photovoltaic cell is greater than 1MΩ; 2. Check that the AC side is grounded.
6	Grid Voltage Fault	1. Please check if the grid 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. The bus voltage is high, please check whether the PV input voltage is less than 550V. 2. After restarting the inverter, if the fault cannot be cleared, please contact customer service
9	Off Grid Over Voltage Fault	1. High off-grid output voltage. 2. Please check whether the off-grid port connection is correct, and confirm whether the off-grid load is working normally.
10	Battery Over Temperature Fault	1. The battery temperature is too high. 2. Please confirm whether the battery is placed in a high temperature area. 3. Please wait for the battery to cool down before restarting the inverter.
11	Inverter Module Over Temperature Fault	1. The inverter module temperature is high. 2. Please confirm whether the inverter heat sink is occluded. 3. Please confirm whether the working environment temperature of the inverter is normal. 4. Restart the inverter after the surface temperature of the inverter cools.
12	Battery Voltage Low Fault	1. Battery voltage low failure. 2. Please check whether the wiring of the battery is correct. 3. Please check whether the battery can work normally and restart the inverter.
13	Low ambient Temperature Warn	1. Low ambient temperature failure. 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.

Note: When the phase sequence of the power grid access is inconsistent with that of the power source, the machine will display alarm information, and the switch will stop during the switchover, which cannot ensure the uninterrupted power supply to the EPS port.

In addition to the above common problems, if you encounter other problems that cannot be solved, 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	Leakage current
HCT	Hall current sensor
LCD	LCD
LED	LED
MPPT	Maximum power point tracking
PCS	Power conversion system
PV	Photovoltaic
PVCS	PV Control System
SCI	Serial communication