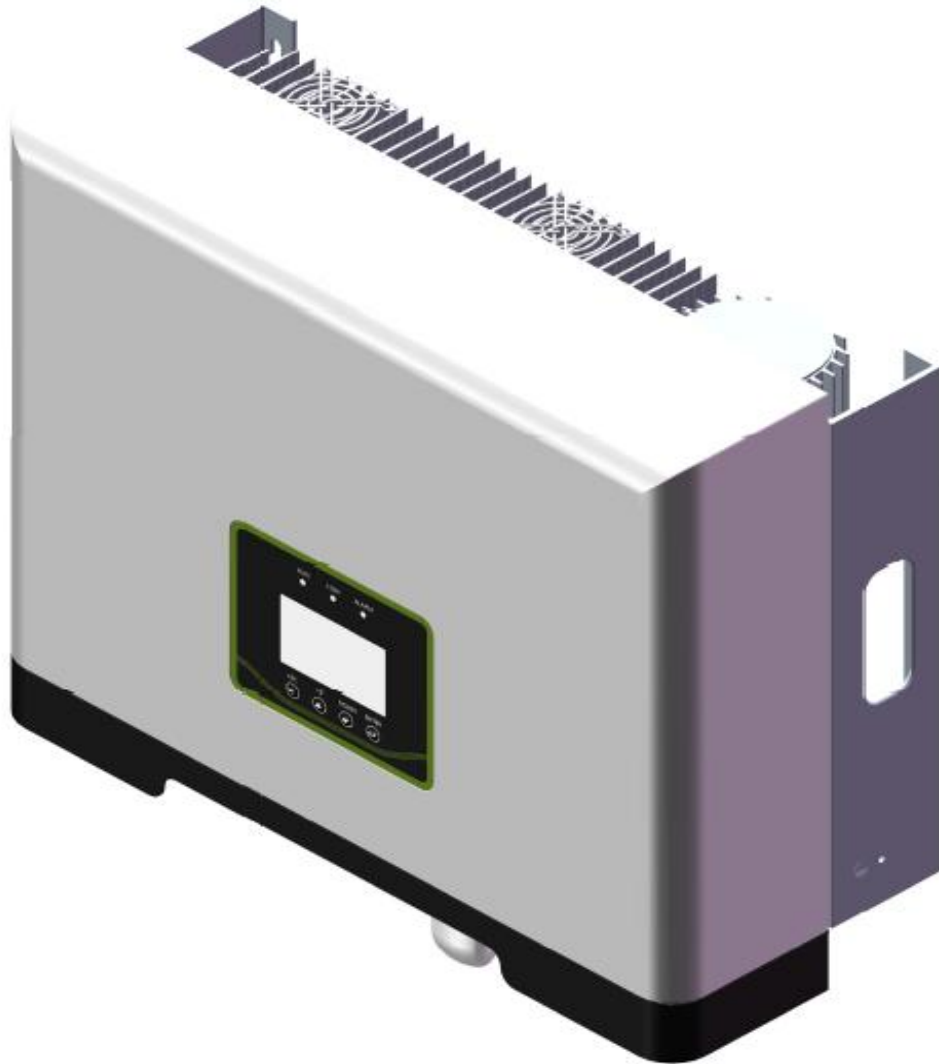


User Manual



KY3GT-20K/KY3GT-17K/KY3GT-15K/KY3GT-12K/KY3GT-10K

V1

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1. Introduction

1.1. Introduction

This manual introduced the grid-tie PV inverters of KY3GT-20K/KY3GT-17K/KY3GT-12K/KY3GT-10K which are high-efficient products with state-of-the-art technology and aim at ensuring long-term stable power supply.





As these grid-connected PV inverter series are inverters without transformer non-isolated between DC input and AC output, the adaptive PV model must have IEC61730 Grade A.



1.2. How to Use the Manual



Before using this inverter, please read the manual carefully. For this manual, it is assumed that the user is familiar with AC and DC systems and knows the rules and regulations regarding electrical equipment and its connection to grid of utility company. It is particularly important to be familiar with the general safety regulations related to the use of electrical equipment.

1.3. Applicable (warnings, precautions, notices)

Some of the important information shown below runs through different parts of this manual (where this important information is at this manual depends on the nature of the information):



	Failure to comply with the warnings in this manual may result in personal injury.
	Danger to life due to high voltages! Danger of electric shock!
	Burn danger due to hot surface!
	Do not touch live parts for at least 20 minutes after disconnection from the power sources to prevent electric shock or injury.

	Products should not be disposed as household waste, but should be recycled through special ways.
	CE Mark

	Other useful information, or tips and techniques related to a specific topic,
	Please refer to the operating instructions!

1.4. Important Safety Information

Please read the manual before installation, operation and maintenance.

	<p>Permission from the local utility is required before connecting the inverter to the grid and employing qualified personnel.</p> <p><i>Before installation:</i></p> <p>Check the installation position to avoid direct exposure of the product to sunlight.</p> <p>Check the inverter and package for damage. If in doubt, please contact the supplier before installing the inverter.</p> <p>Before connecting PV panels to the inverter, please check the voltage of the inverter and ensure it is within the specifications of inverter.</p> <p>Observe all documentation that accompanies the inverter</p> <p>The inverter is more 18kg, No handles and grips. Please be carefully to carrying and lifting</p>
	<p><i>Installation:</i></p> <p>All electrical installation must be carried out in accordance with national standard wiring rules and local specifications. Only the personnel who has been trained, authorized and familiar with local electrical regulations can install inverter. To ensure safety, follow the steps described in this manual. Please note that the</p>

inverter has two live terminals, PV input and grid.

The earth line must be connected before connecting the DC input and AC output. The product identification must be clearly visible after installation.



Disconnect the inverter:

Always disconnect the AC circuit first, then the PV circuit, and finally the ground wire. Please note that even if the inverter has been disconnected from the grid/main power supply and solar module, its voltage may still be very high and still dangerous at this time. After disconnecting from the grid and PV panels, please wait at least 20 minutes.



Operation/Maintenance:

Maintenance and installation of equipment should be carried out by qualified personnel with adequate skills and training who use safe working practices.

Before connecting the inverter to the grid, make sure that the mounting cover is refitted. Do not open it while the inverter is working. Risk of electric shock.

When the PV array is exposed to sun, it will supply DC voltage to this device.

There are no repairable parts inside the inverter, if there is any problem you must contact a professional for maintenance.

Performance safety parameters:

Unauthorized modification of performance safety parameters may cause injury or accident to personal or the inverter. In addition, this will result in the invalidation of all inverter operation certification

If non original spare parts are used, there will be no guarantee of CE compliance in terms of electrical safety, EMC and equipment safety.

1.5. General Safety Regulations for Working on Electrical Equipment

All personnel responsible for inverter installation, maintenance and service shall be trained and familiar with the general safety regulations to be observed when working on electrical equipment.

Personnel responsible for equipment installation and service must also be familiar with local requirements, rules and regulations and safety requirements.

To provide general guidance on safety, here are five well-known and widely accepted provisions. These provisions should in no way be regarded as exhaustive.



Personnel working on electrical equipment shall be responsible for personnel and property safety!

Cut off

Before starting any work, disconnect all cables that supply power to the workplace. Note that no voltage does not mean that the cable is disconnected.

Prevent reconnection

Prevent the system from being reconnected by labeling or closing / blocking the work area. If it is accidentally reconnected, it may cause serious accidents.

Check that there is no voltage in the system

With the voltage tester, make sure there is no voltage in the system. Check all terminals to ensure that there is no voltage on each conductor of the system.

Cover neighboring live components and prevent others from approaching

Cover all live system components that may cause injury during operation. Make sure the danger area is clearly marked.

1.6. System selection



Maximum PV voltage

When selecting the specifications of photovoltaic system, it must be ensured that the open circuit voltage of PV string will not exceed the maximum input voltage 1000VDC of the inverter. The maximum open circuit voltage of PV series during parallel or series operation is 950 v. Voltage above this level may cause permanent damage to the inverter.

Maximum current of each DC terminal

The maximum current of each PV input terminal of inverter is 12A, which may cause permanent damage to the inverter.

The selection output of PV string should be based on the principle that investment capital can be used optimally, rather than on the expected energy output of the system each year. This optimization depends on local climate conditions and should be considered in all cases.

The inverter is equipped with input and output power limiting devices, which can automatically maintain the power at a safe level for the inverter. The limit range mainly depends on the internal and ambient temperature. The system constantly calculates the limits, which always allows the system to produce as much energy as possible.

Please use the tools provided by KOYOE to calculate the configuration of PV system.

2. Technical Description of Inverter

2.1. Mechanical Design

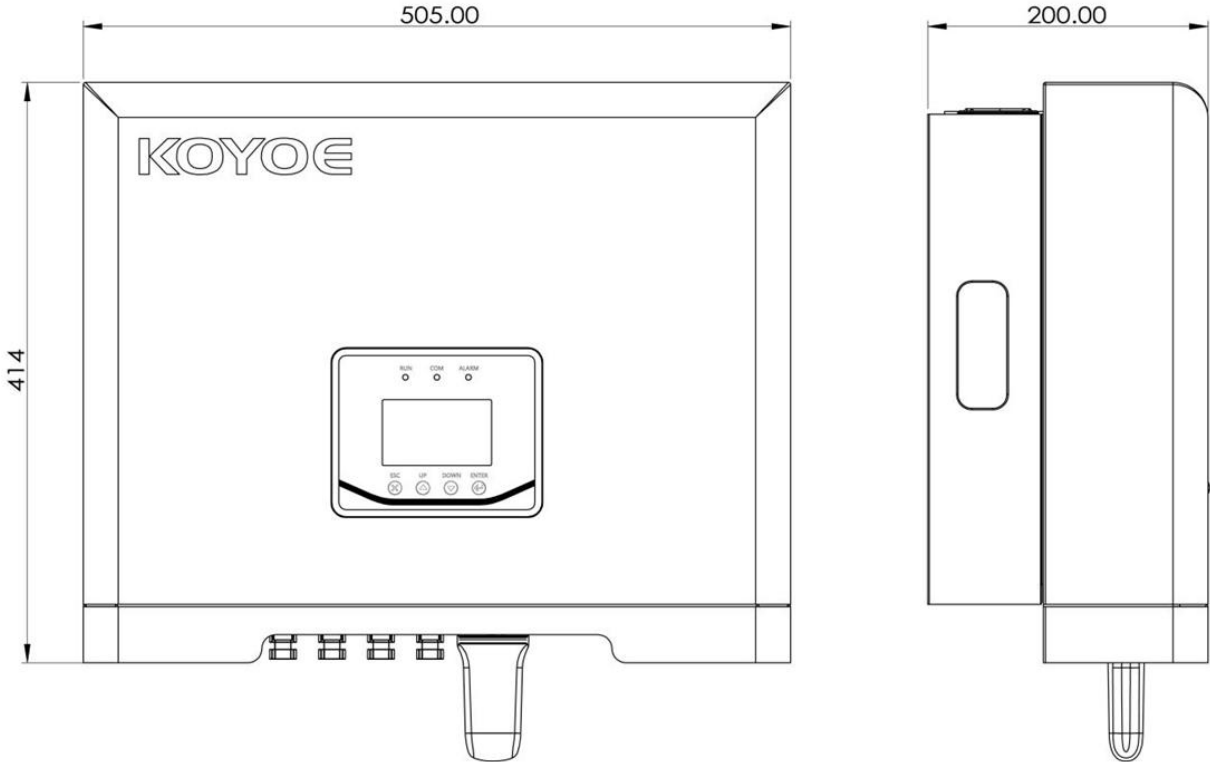



Figure 2-1 KY3GT-20K/KY3GT-17K/KY3GT-15K/KY3GT-12K/KY3GT-10K Dimensions



Be careful!

The input DC switch is located on the left side of the inverter. When moving the inverter, pay attention to keep a distance to avoid damage.

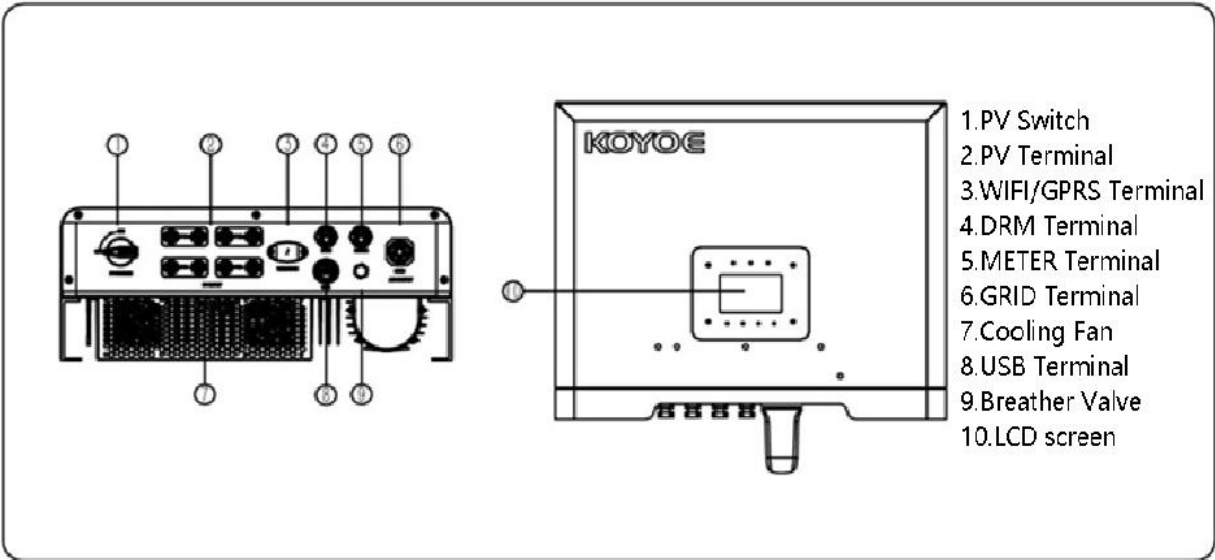


Figure 2-2 KY-3GT-20K /17K /15K /12K /10K Electrical Ports



Be careful!

For safety reasons, it is recommended to use DC switch between PV arrays and power modules (this measure is mandatory in some countries).

2.2. Electrical Design

The power of PV string is transmitted to the DC bus of inverter through boost circuit, and the inverter circuit converts DC into AC and feeds it into power grid.

Two DC inputs of inverter are equipped with MPPT to ensure maximum output power even under different PV input voltage conditions.

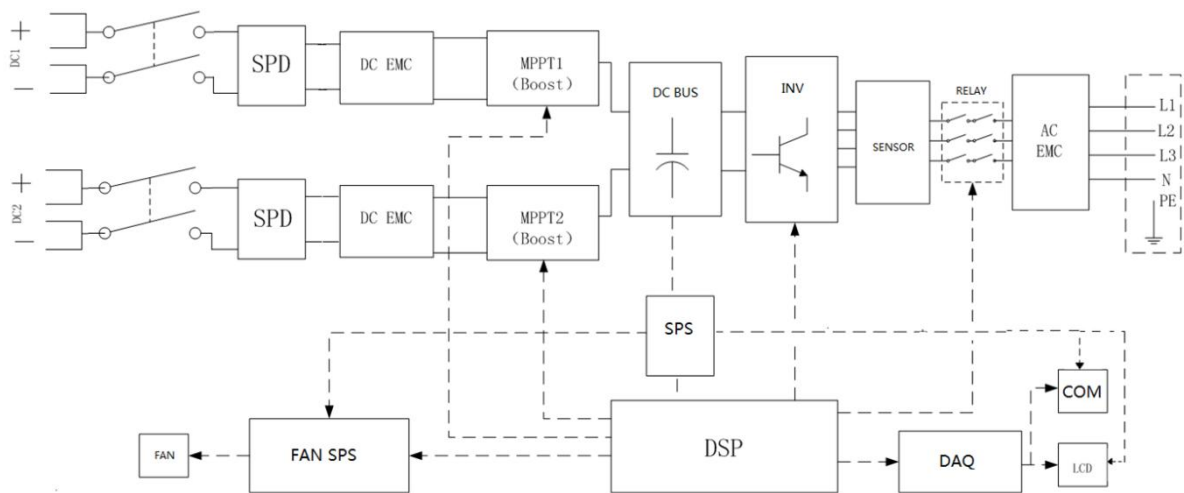


Figure 2-3 KY-3GT-20K /17K /15K /12K /10K electrical diagram

Refer to Chapter 4 for details on connection and installation.

2.3 Reducing and Limiting Output Power

The operation of inverter derating is a method to avoid overload or restrain potential fault. In addition, the derating function can be activated under specific grid conditions according to the requirements of grid company. The series inverters have the following derating conditions:

- When the ambient temperature exceeds 73 °C or the temperature of power device exceeds 85 °C, stop outputting power.
- When the ambient temperature is between 65-73 °C or the temperature of power device is between 81-85 °C, the output power is reduced linearly.
- External power level adjustment.

1. Volt response mode

1.1) Volt-watt response mode:

Open by default from the factory. The response curve range is set according to the

default value. If necessary, the range can be modified by the upper computer.

1.2) Volt-var response mode:

Close by default from the factory. The response curve range is set according to the default value, if necessary, the range can be modified by the upper computer.

1.3) Voltage balance modes:

This inverter does not have this function.

2. Fixed power factor or reactive power mode:

Close by default from the factory. It can be modified by the upper computer.

3. Power response mode ($\cos \phi$ (P):

Close by default from the factory. It can be modified by the upper computer.

4. Power rate limit:

Close by default from the factory. It can be modified by the upper computer.



Only authorized personnel can make external power level adjustments

2.4 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: SDM630MCT, The meter manufacture is Zhejiang EASTRON Electronic Co.,Ltd.. Current transformer is: EASTRONESCT-TA16, the manufacture is Zhejiang EASTRON Electronic Co.,Ltd..

2.4.1 Instrument installation and wiring

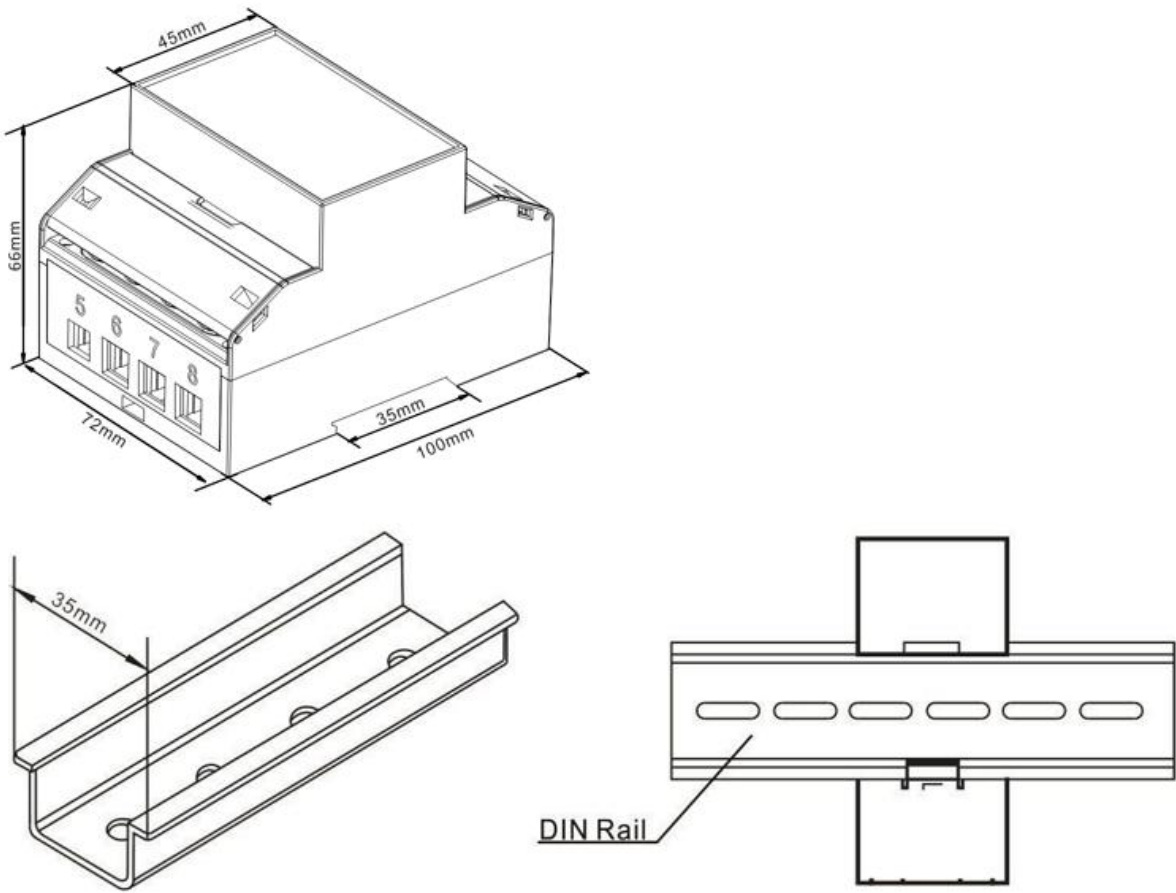
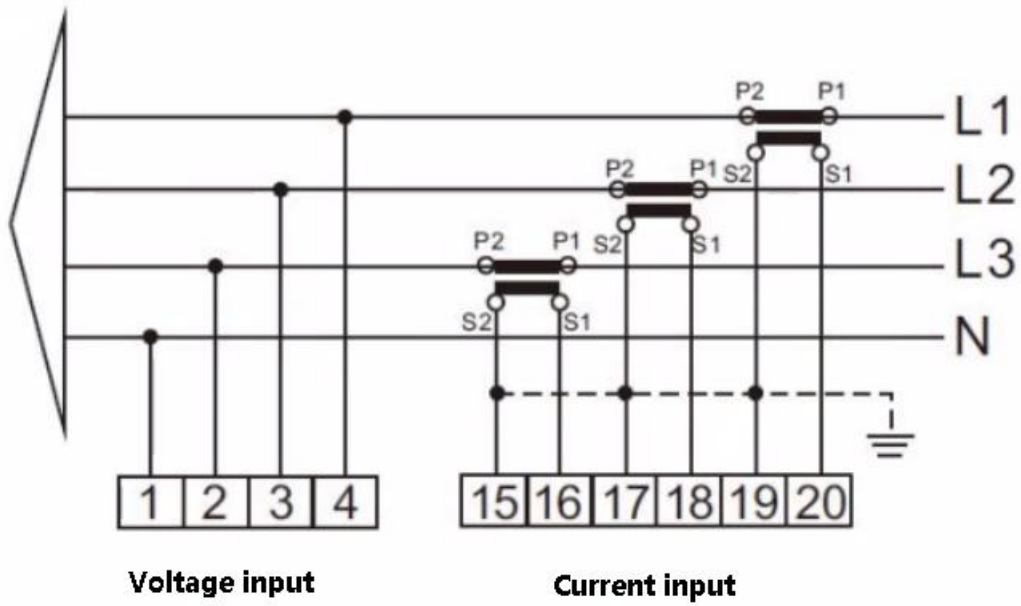


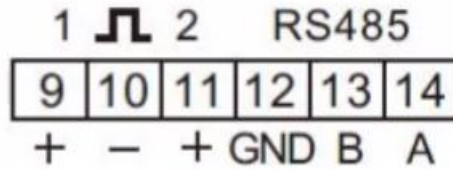
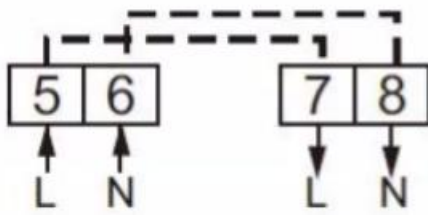
Fig2-4.Three-phase Meter Dimension (unit: mm)

3P4W 3CT

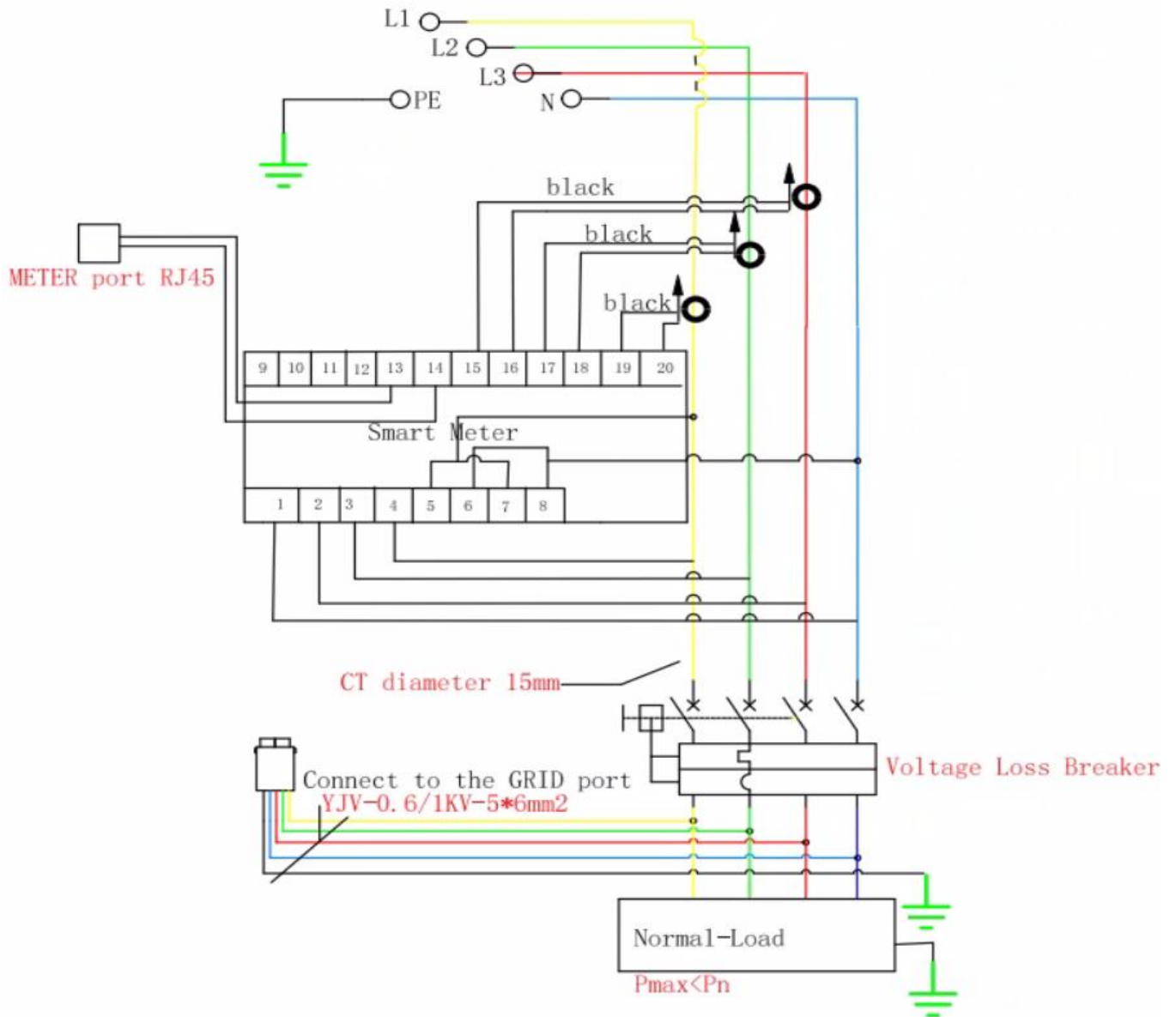


power supply

voltage input

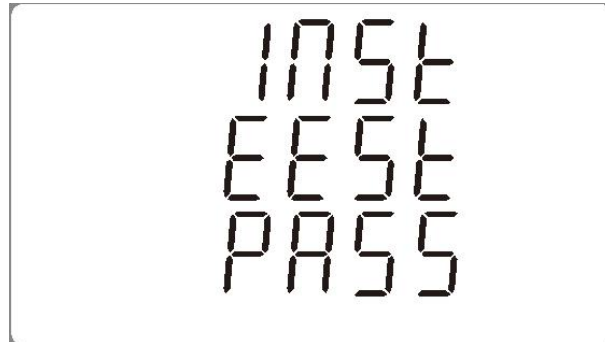


The following is the electrical connection diagram of the electricity meter. For detailed operation of the electricity meter, please refer to the operation manual of the electricity meter in the accessories. If you have any questions, please contact our customer service.







2.4.2 Operating manual of Meter

If the wiring is OK, the instrument will display the following results on the screen after automatic power on self-test.



The functions of the keys on the right side of the instrument are shown in the figure below.

	Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" or "Back" button. 1 will be used in the next following.
	Select the Frequency and Power factor display screens. In Set-up Mode, this is the "Up" button. 2 will be used in the next following.
	Select the Power display screens. In Set-up Mode, this is the "Down" button. 3 will be used in the next following.
	Select the Energy display screens. In Set-up mode, this is the "Enter" or "Right" button. 4 will be used in the next following.

Each successive press of the button  selects a new parameter:

	Phase to neutral voltages.
	Current on each phase.
	Phase to neutral voltage THD% of 2nd to 19th.
	Each phase Current THD% of 2nd to 19th.

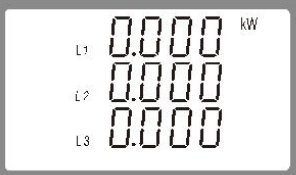
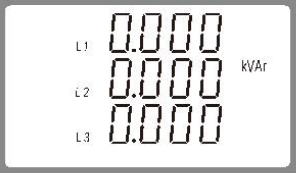
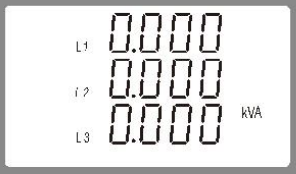
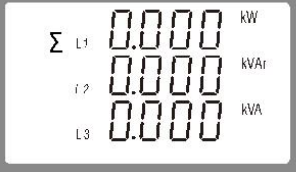


Each successive press of the button  selects a new parameter:

	Frequency and Power Factor (total).
	Power Factor of each phase.
	Maximum Current Demand.
	Maximum Power Demand.



Each successive press of the button selects a new parameter:

	Instantaneous Active Power in kW.
	Instantaneous Reactive Power in kVar.
	Instantaneous Volt-Amps in KVA.
	Total kW, kVarh, kVA.



Each successive press of the button selects a new parameter:

Σ 0000 kWh 0000	Total active energy in kWh.
Σ 0000 kWh 0000	Total reactive energy
Imp 0000 kWh 0000	Import active energy in kWh.
Exp 0000 kWh 0000	Export active energy in kWh.
Imp 0000 kWh 0000	Import reactive energy
Exp 0000 kWh 0000	Export reactive energy

3. Inverter Working Mode

The photovoltaic grid connected inverter can be divided into five working modes in the whole working process: standby mode, check mode, normal mode, fault mode and programming mode.



Our inverter does not support multi-machine parallel mode temporarily

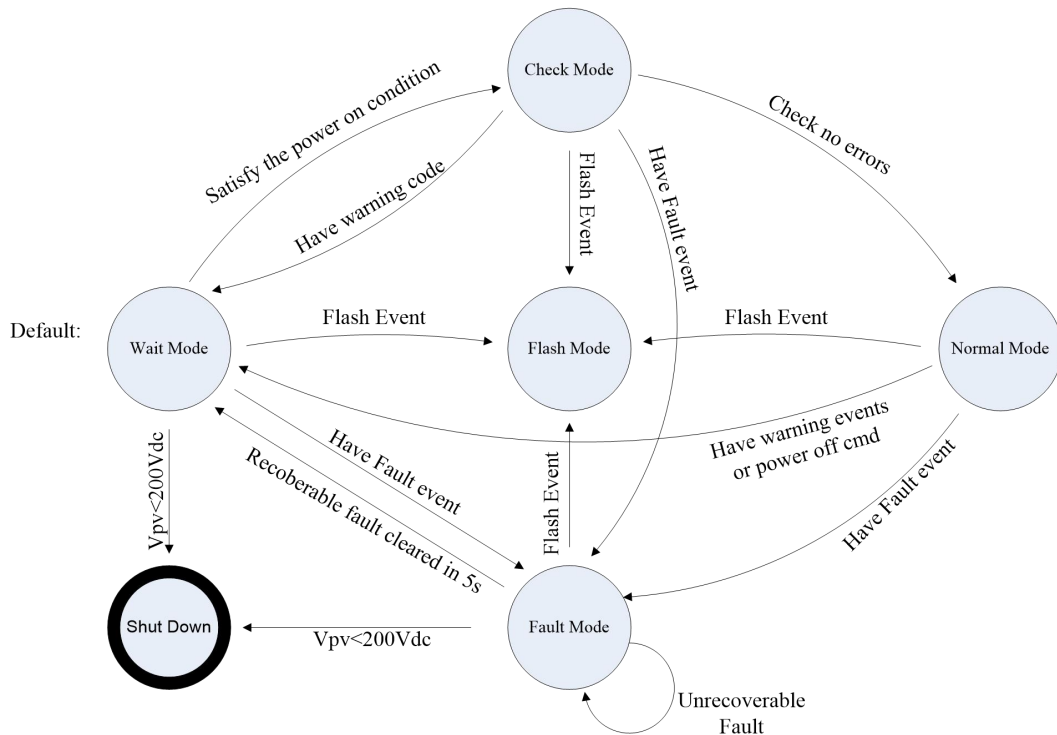


Figure 3-1 inverter working mode state machine

3.1. Standby Mode

When the output power of photovoltaic cell is not enough to make its power module work, the inverter will be in standby mode. When the DC input voltage is higher than 300V, the inverter will enter the check mode.

3.2. Check Mode

When the inverter is powered on, it will automatically detect the insulation, current sensor, leakage protector, relay and other components according to the sequence, and soft start. In this way, the inverter can work normally and enter the normal operation mode smoothly.

3.3. Normal Mode

When the above conditions are met, the inverter will drive BOOST circuit and inverter module and enter normal power generation mode. After that, the inverter tracks the maximum output power of PV array through maximum power tracking technology, and converts it into electric energy to feed into the grid. At the same time, the inverter will automatically calculate the daily / monthly / annual electricity generated, and save the data to EEPROM for human-computer interface to read the data.

3.4. Fault Mode

When there is a fault in the operation, the inverter will stop the output power and enter the fault mode, and the fault information will be displayed on the LCD. Before entering the fault mode, the inverter will automatically store the output power into EEPROM. The general fault will be automatically removed within 5 seconds, and the inverter will resume operation. When a serious fault occurs, the inverter will stop in the failure mode until the relevant technical personnel remove the fault.

3.5. Programming Mode

No matter what working mode the inverter is in, when the system needs programming, the inverter will enter the programming mode and rewrite the firmware in DSP flash memory.

3.6. Shut Down

When the output DC voltage of photovoltaic array is lower than 200V, it is not enough to provide the energy required for the normal operation of the inverter. At this time, the inverter will automatically shut down. If there is no fault and the light intensity increases gradually, the inverter will start smoothly the next day.

3.7. Inverter demand response modes (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	description
DRM0	Inverter is in the "disconnect output" state.
DRM5	The power output from the DRM5 inverter to the grid is 0.
DRM6	The power output of the DRM6 inverter to the grid does not exceed 50% of the rated power.
DRM7	The power output of the DRM7 inverter to the grid does not exceed 75% of the rated power.
DRM8	The DRM8 inverter outputs 100% of its rated power to the grid, but is subject to other DRM limitations.

DRED could declare more than one DRM at a time, and the inverter responded according to the priority of the instruction, in order of priority as shown below.

DRM5 > DRM6 > DRM7 > DRM8

The DRED device is RJ45 connected to the DRM port of the inverter, DRM port as shown in figure 3-2, See Figure 3-3 for RJ45 wiring and DERD device connection

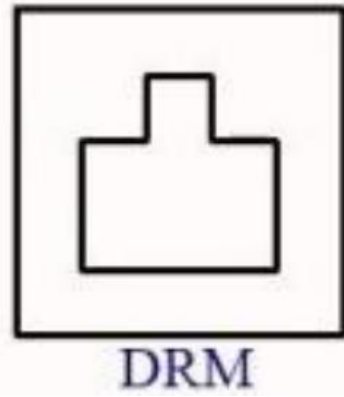


figure 3-2

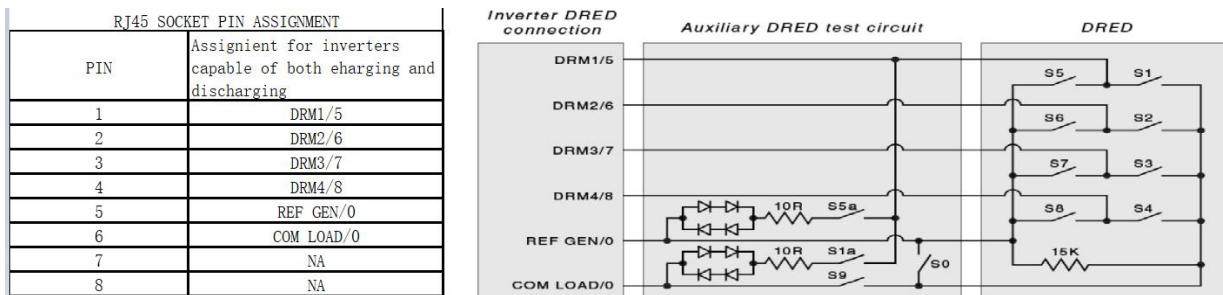


figure 3-3

3.8. 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 figure3-4(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 figure 3-5 correspond to Australia respectively_ A、Australia_ B、Australia_ C、Newzealand

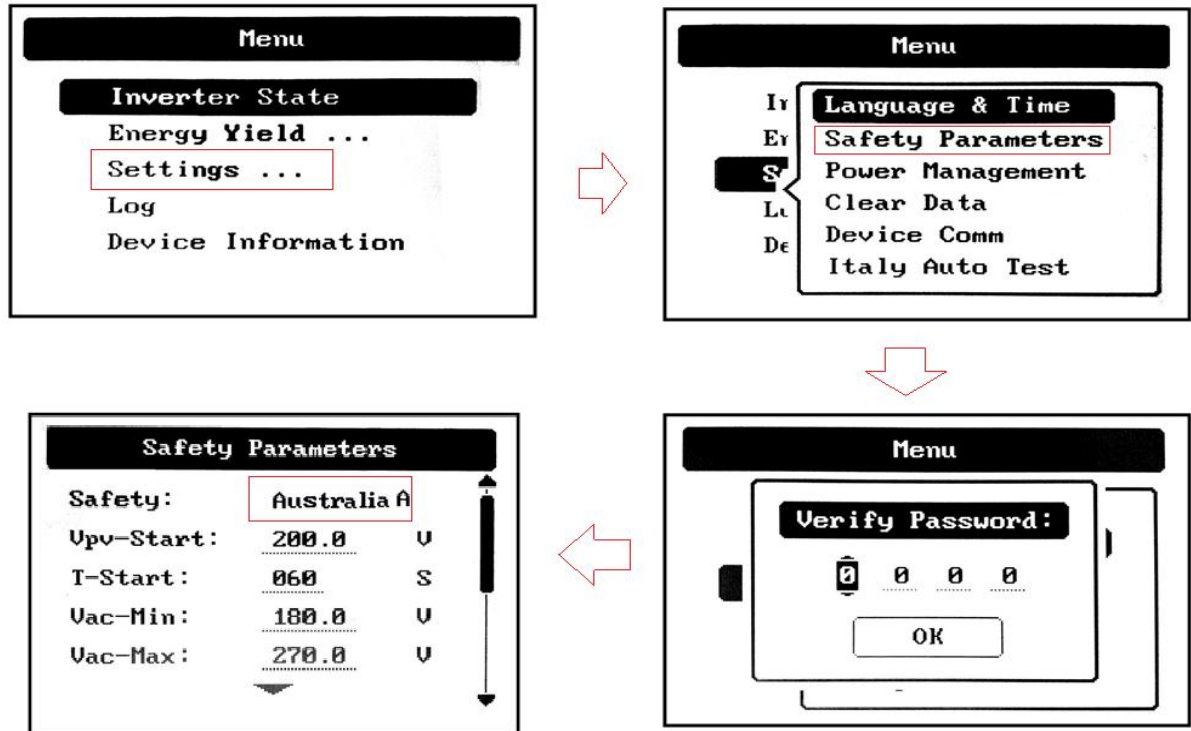


Figure 3-4 Safety Setting

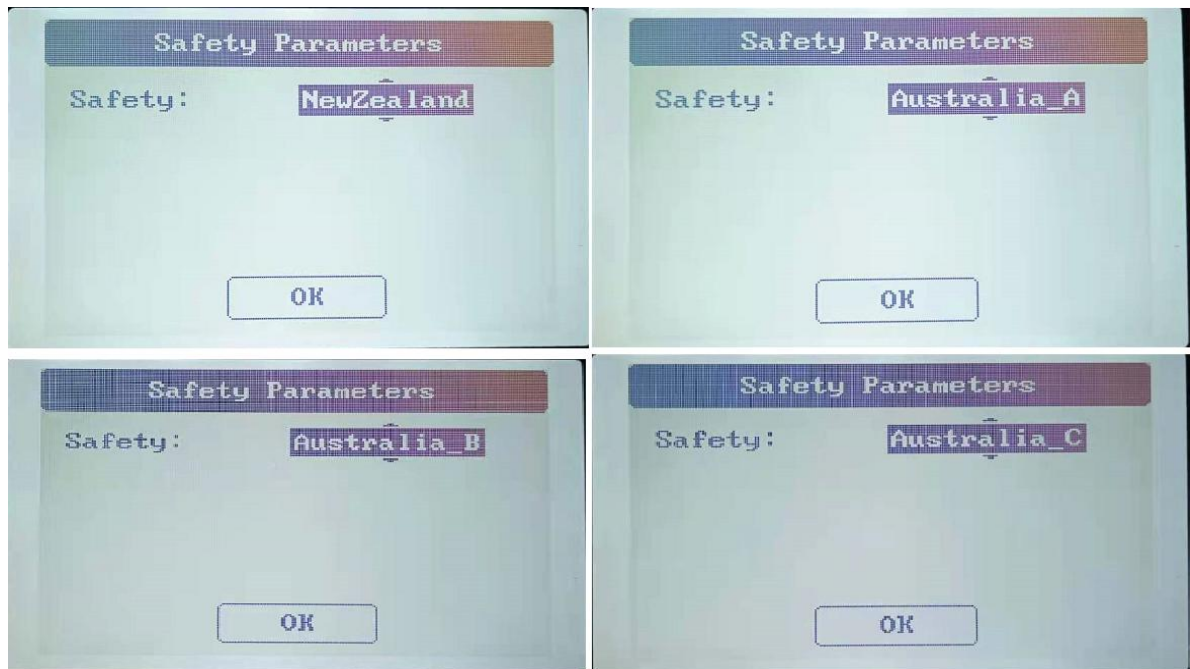


Figure 3-5

3.9. 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 Management" 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 the password is entered correctly, the user can Enter the following menu. The user can select the power quality mode that need to be set through the "up" and "down" keys(four modes are provided,as shown in figure 3-5), 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 Figure3-4

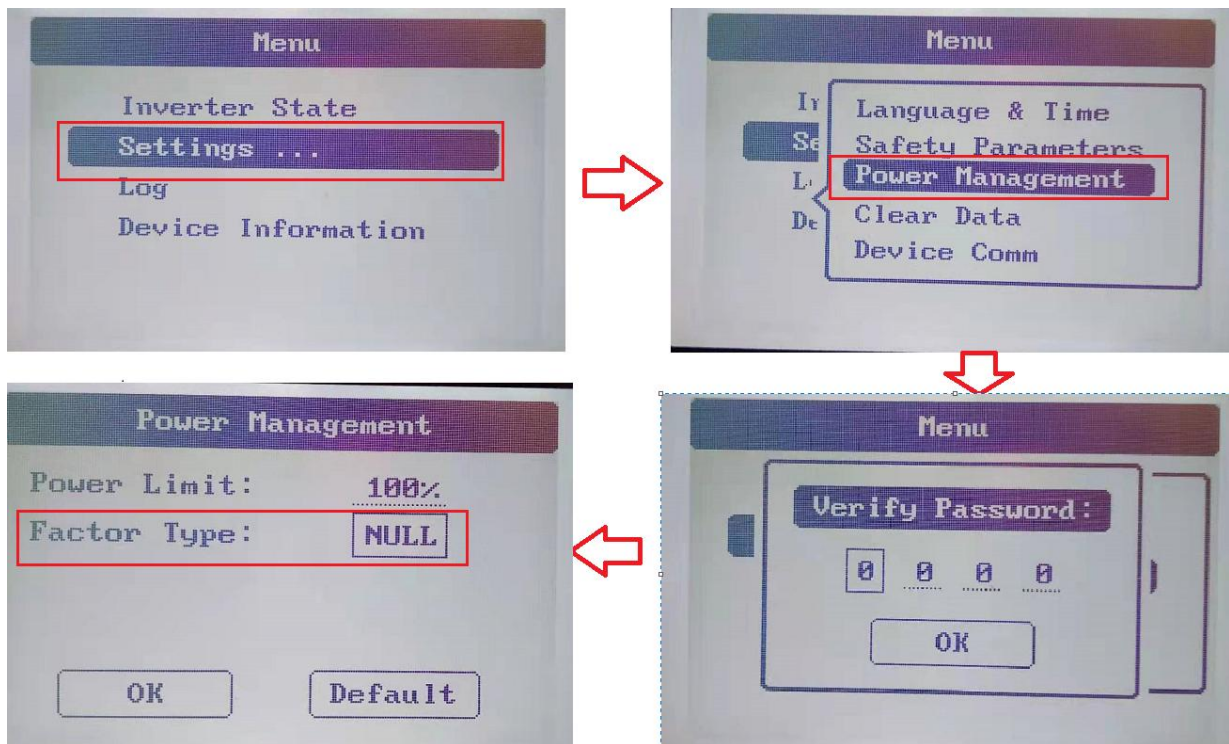


Figure 3-4

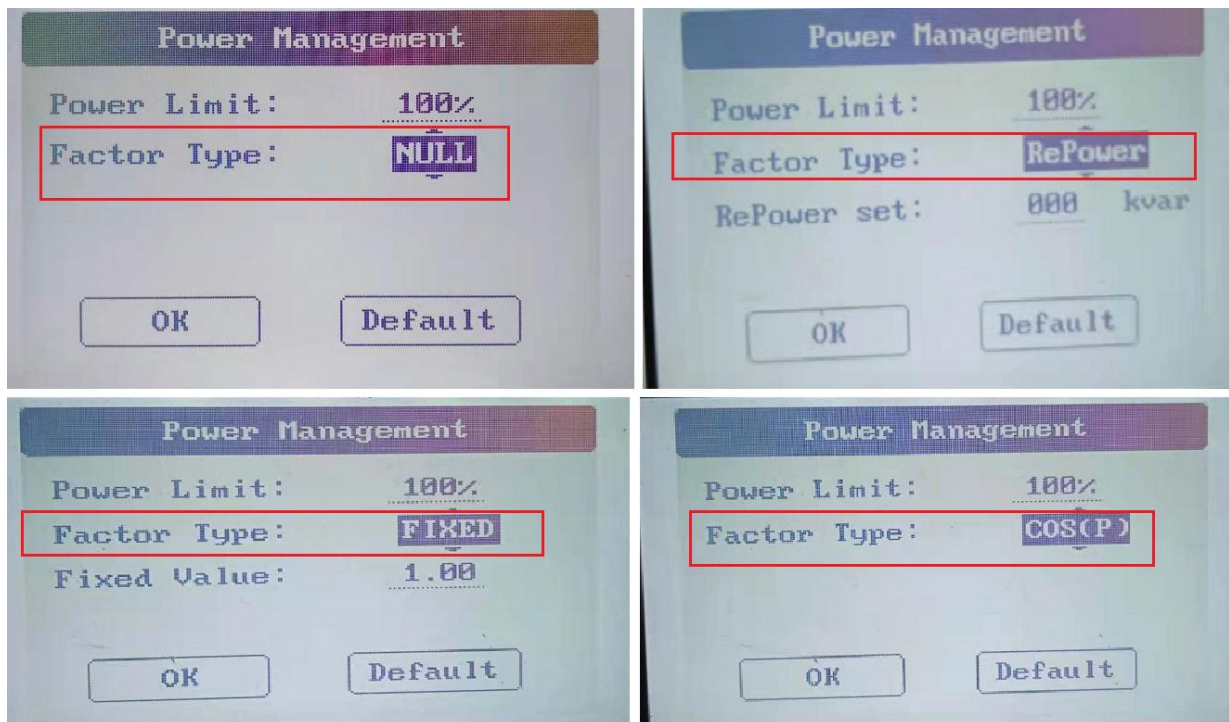


Figure 3-5

4. Installation and Start-up

4.1. Installation notice



Warning!

Before installation and maintenance, both AC and DC terminals are dead. However, if the DC input has just been cut off, the capacitor inside the device will still store electricity. So please wait for at least 20 minutes to ensure that the capacitor will release the electricity and the equipment is not electrified.



Be careful!

The inverter must be installed by professionals.

Our company will provide warranty service for your purchased PV grid connected inverter within 5 years after purchase. If you do not install the inverter according to the requirements of this manual, the warranty will become invalid. The content of warranty is limited to the cost of product repair or replacement.

4.2. Installation instructions

- When the ambient temperature is not higher than 45°C, the inverter can achieve the best working state.
- The installation height should be parallel to the line of sight for easy operation and maintenance.
- The inverter shall be installed away from inflammables and explosives and ensure that there is no strong electromagnetic interference equipment around.
- After the inverter is installed, the parameter labels and warning signs must be clearly visible.
- Avoid sunshine, rain and snow when installing the inverter.



The selection of installation location must consider the following factors:

- The installation method and location must be suitable for the weight and size of the inverter.
- Install on a solid surface and the installation position is well ventilated.
- Refer to Figure 4-1 to confirm the correct installation angle

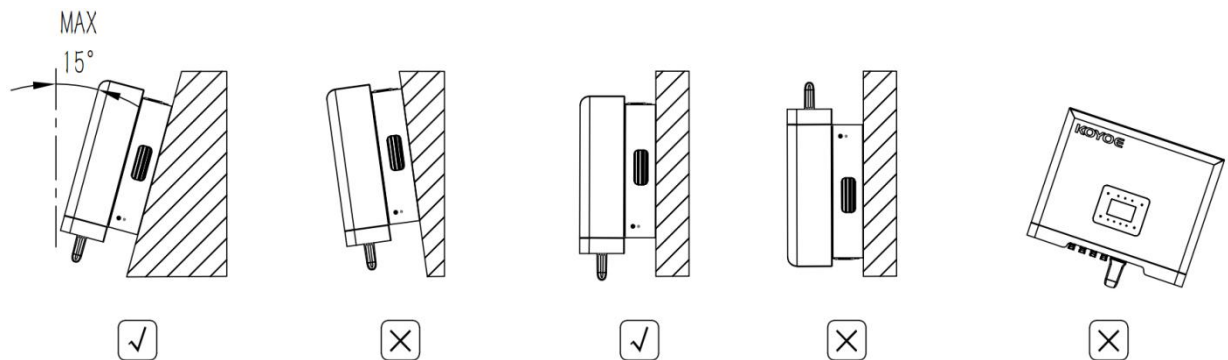


Figure 4-1

Ventilation is very important for heat cooling of inverter. To ensure good heat dissipation and easy disassembly, the minimum clearance around the inverter shall not be less than the following values, as shown in Fig. 4-2

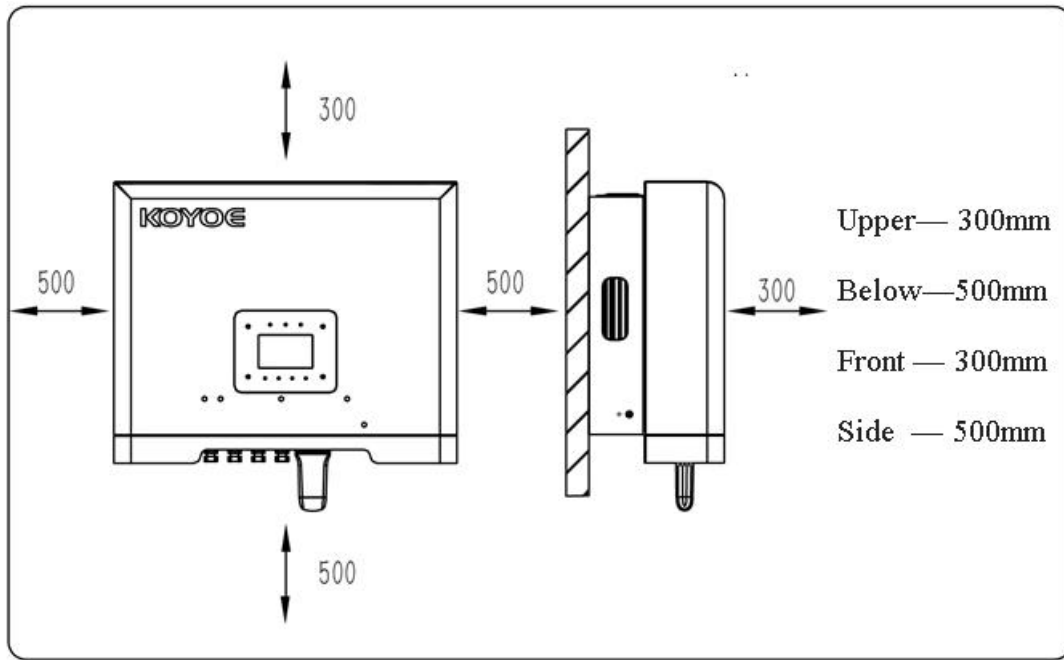


Figure 4-2

4.3. Installation Steps

Step 1: Mark the screw hole position, refer to Figure 4-3

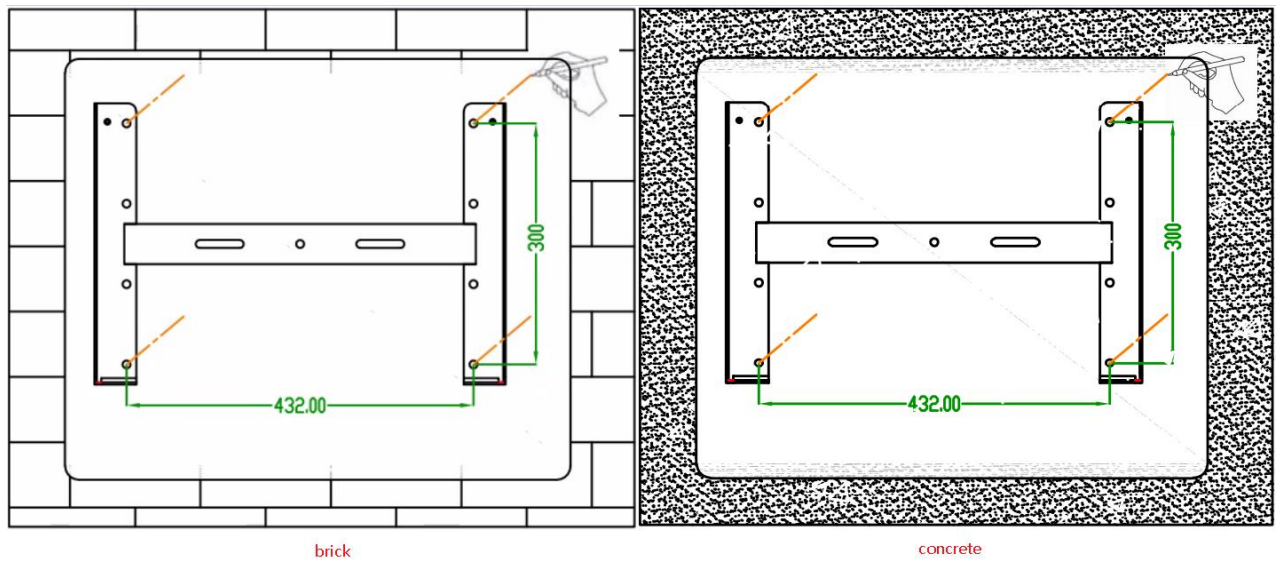


Figure 4-3

Step 2: Use $\Phi 8$ drill bit, drilling depth 55mm, install expansion threaded pipe ,refer to Figure 4-4

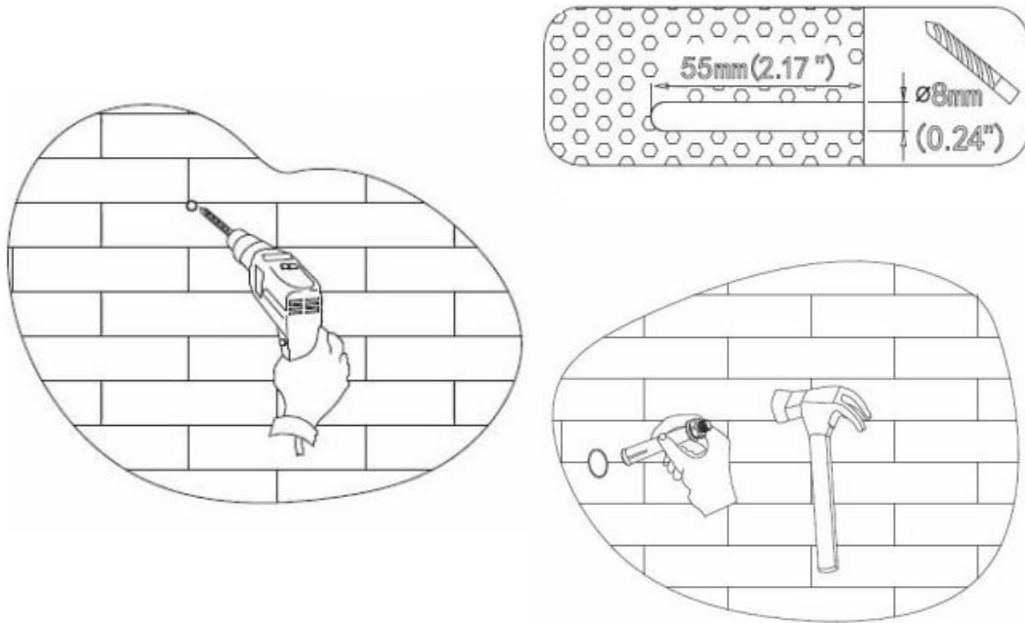


Figure 4-4

Step 3: Correctly install the wall mounting bracket on the wall, refer to Figure 4-5

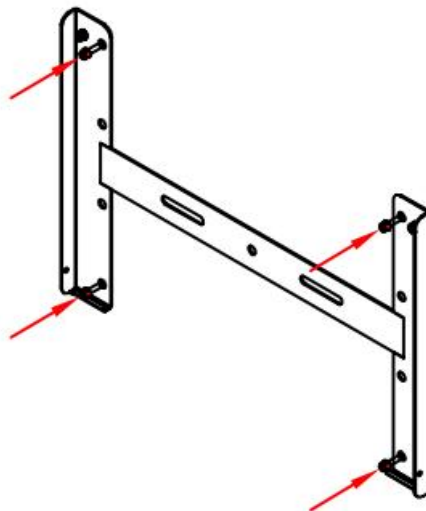


Figure 4-5



Be careful!

Keep the borehole perpendicular to the wall, otherwise the wall may be damaged. If the hole position deviation is too large, you need to reposition.

Step 4: Hang the inverter correctly on the wall hanging bracket and install the fixing screws, refer to Figure 4-6

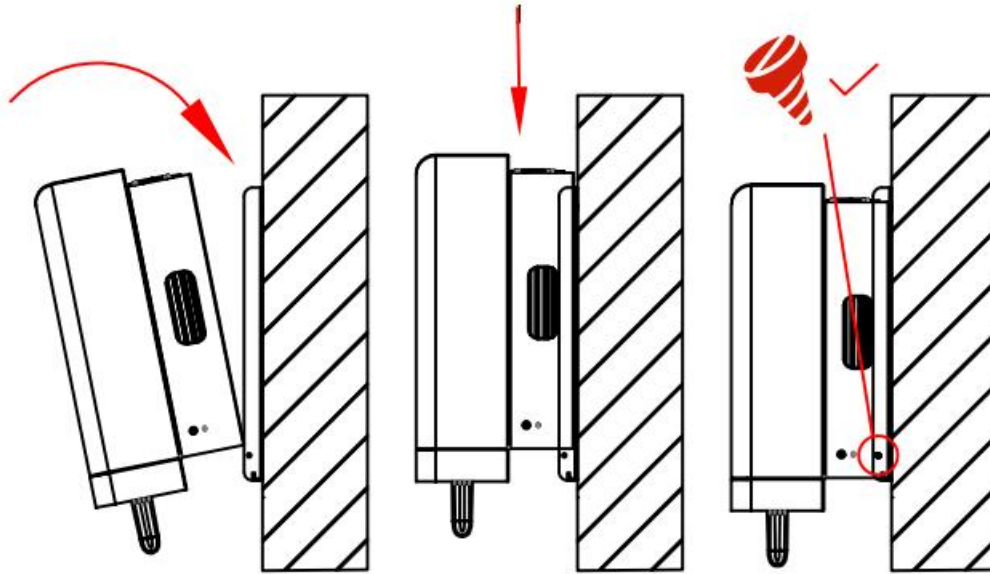


Figure 4-6



Be careful!

The machine can also be fixed on other surfaces, such as stable and flat metal support. The installation process is basically the same as that of the wall. It is to punch holes to fix the wall hanging, and then fix the inverter on the wall hanging. However, the installation surface must be solid, flame-retardant and not deformed at high temperature. Refer to Figure 4-1 for installation angle.

4.3. Electrical Connection

4.3.1. Connection to The Grid (AC output)

**Be careful!**

During installation and maintenance, please use a separate manual circuit breaker to completely disconnect the inverter from the grid.

Before connecting to the grid, it is necessary to ensure that the grid voltage and frequency meet the requirements of the inverter. The recommended AC side circuit breakers and leakage current protectors are as follows:

AC side circuit breaker

The AC side of each inverter is equipped with independent three-stage or four-stage circuit breaker to ensure the safe disconnection of inverter and grid.

Model	KY-3GT-20K	KY-3GT-17K	KY-3GT-15K	KY-3GT-12K	KY-3GT-10K
Recommended parameters of AC circuit breaker	45A	40A	35A	30A	25A

**Be careful!**

No load can be connected between inverter and circuit breaker!

**Be careful!**

The inverter has integrated RCD detection module, will exclude possibility of DC residual current to 10mA, thus in the system an external RCD (type A) can be used($\geq 30\text{mA}$).

Connection steps:

Step 1: Close the fuse of the manual AC circuit breaker to prevent the circuit breaker from being opened unintentionally;

Step 2: Put the cable through the nut, sealing ring and threaded sleeve in sequence, insert the cable into the terminal according to the polarity shown on it, and tighten the screw. As shown in Fig. 4-9;

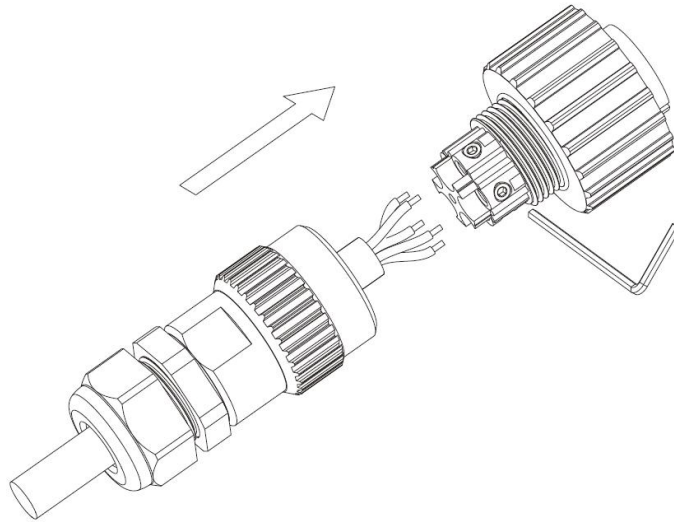


Figure 4-9 loosening connector screws

Step 3: Strip the cable as shown in the figure below:

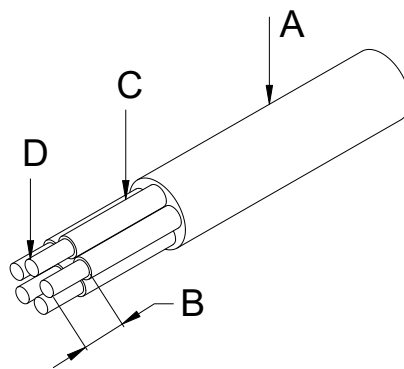



Figure 4-10 stripping diagram

Number	Description	Remarks
A	Protective layer	Cable outer diameter range: 7-13mm
B	Insulation stripping length	10mm
C	Insulating layer	-
D	Cross section area of AC cable	Maximum: 6 mm

Figure 4-10 stripping diagram



Be careful!
The power loss on the cable should be controlled within 1% of the rated power.

The relationship between the cross-sectional area of AC cable conductor and its corresponding maximum length is as follows:

Cross section area of AC cable	4mm ²	6mm ²
Maximum length of conductor	20m	40m

Step 4: Push the threaded sleeve onto the connection terminal until both are locked. As shown in Figure 4-11

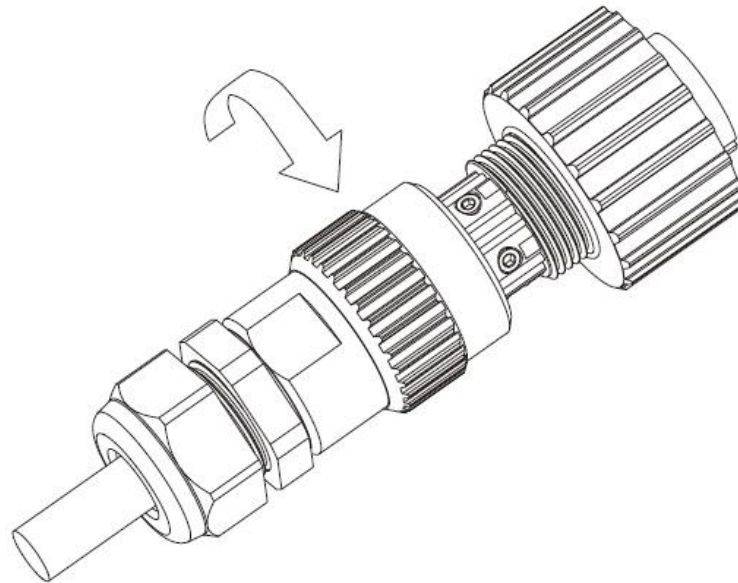
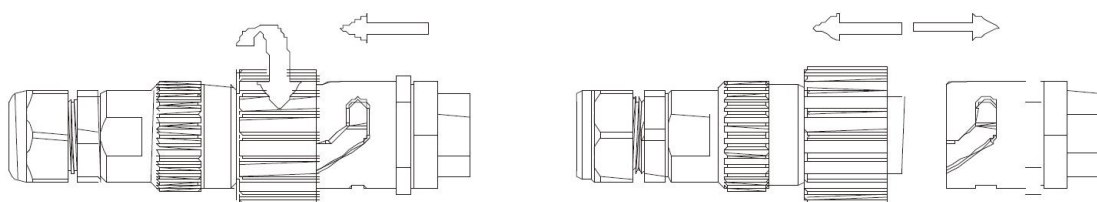


Figure 4-11 connector locking

Step 5: Insert the socket into the AC output terminal, screw the socket clockwise, and loosen the socket anticlockwise.



Be careful!

Please make sure that the wiring sequence of each cable is correct!

4.3.2. Connection of Solar Panel (DC input)



Be careful!

In the process of installation and maintenance, each inverter needs to be protected by a separate manual DC circuit breaker to ensure the safe disconnection of inverter and components. Please ensure that the circuit breaker has sufficient over-voltage and over-current capacity. In addition, please cut off the AC output before switching off the DC input.

KY3GT-20K/KY3GT-17K/KY3GT-15K/KY3GT-12K/KY3GT-10K provides two sets of MPPT tracking circuits, and each group of circuits provides four DC input terminals.

Before connecting the inverter and components, make sure that the sequence of DC terminals is correct.



Be careful!

The maximum configuration current of each DC terminal should not exceed 10A, otherwise the fuse inside the inverter will blow!

Assembly guide for Amphenol H4 high performance photovoltaic connector



Be careful!

The connector must be unloaded to perform the connection and disconnection operations!

**Helios H4 components come pre-assembled and the caps are loose.
And the whole connector will include the male side and female side.**



Figure 4-13 Amphenol H4 high performance photovoltaic connector

Step 1: Assembly guide for male and female connectors:

Strip the wire about 7mm as shown in figure 4-14. Be careful not to damage the conductor

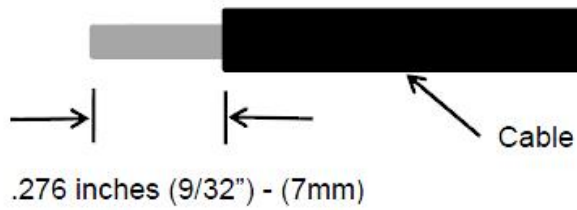


Figure 4-14 stripping size

- This procedure requires the use of an Amphenol certified wire stripping tool. Adjust the wire stripping positioning plate to a suitable position, put the cable into the incision, stripping about 7mm. Refer to figure 4-15



Figure 4-15 stripping method

- Insert the stripped wire into the cylinder at the back of the connector pin to ensure that all the cable ends enter the cylinder behind the pin and the cable can be seen in the observation window of the pin. Refer to the following figure:

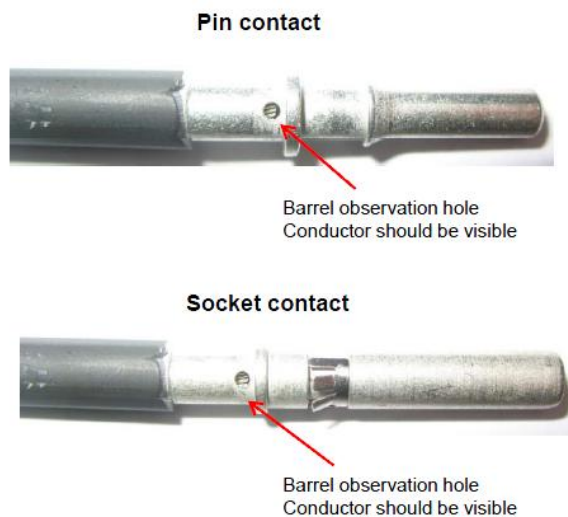


Figure 4-16 terminal installation

- This step requires the use of a special thread pressing tool certified by Amphenol. Put the pin and wire together into the hexagonal clamp of the crimping pliers, and

press the handle to flatten the cylinder. See Figure 4-17 and Figure 4-18

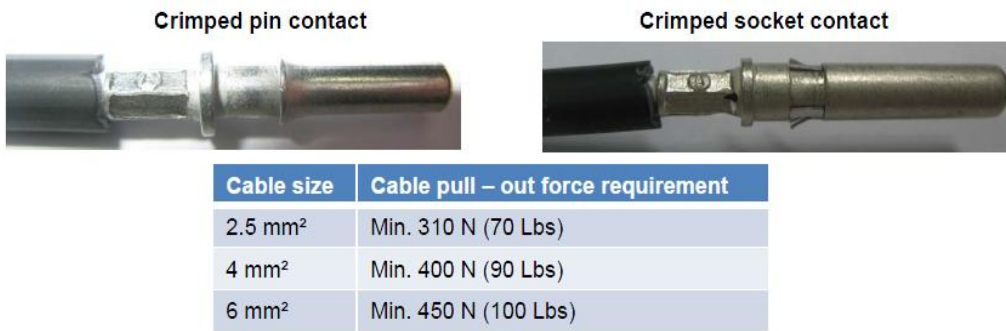


Figure 4-17 wire end crimping



Figure 4-18 wire end crimping method

- Insert the pressed wire into the back of the plastic plug and you will hear a click. Please refer to the following figure for the fitting of the plug: (note that the matching between the pin and the plastic plug should not be wrong, otherwise the pin and the plastic plug will be invalid.)



PV-090508-F – Female side Connector



PV-090508-M – Male side Connector

Figure 4-19 wiring installation

- Tighten the cover at the back of the plastic plug with an Amphenol wrench (optional), with a torque of 2.6 ~ 2.9 NM;



Amphenol specified wrench tool can be used in this step. Here 2 wrench tools are used, one is by hand for holding the connector, another is also by hand to wrest the cap down until the tool starts to snap over. See below figures.

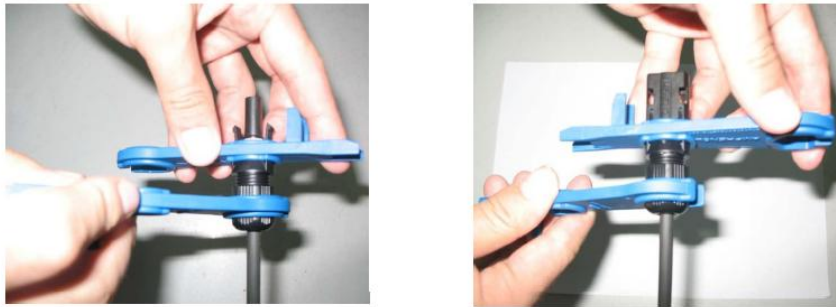


Figure 4-20 wire end fastening method

Step 2: Match the Amphenol DC connector:

- After the plug is fastened, align the two plugs and press them gently. You will hear a "click" sound, and the two plugs will match.

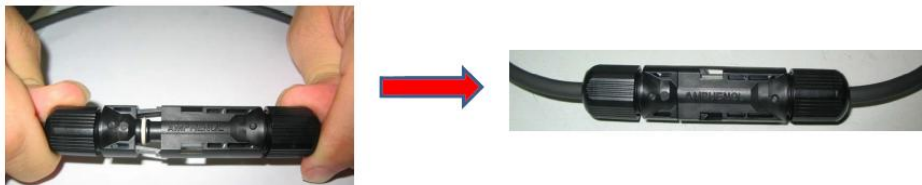


Figure 4-21 connector connection

- When you need to separate the two plugs, you need to use the Amphenol special unlocking tool provided by our company. Please note: when using the ring unlocking tool or wrench unlocking tool, the bevel side should face the side of the female plug. Separate the two plugs by hand. See the attached figure for details:



Separated by Ring tool



Separated by Wrench tool

Figure 4-22 connector separation



Danger!

Potential fire and electrical hazards can be life-threatening!
Never connect or unlock the DC plug with load!

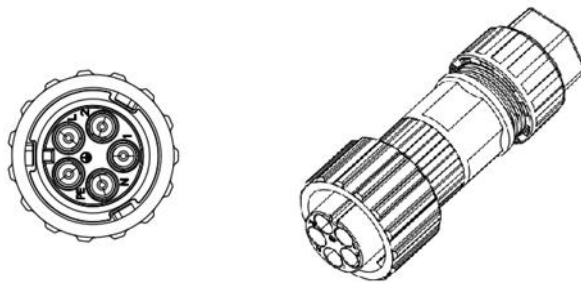
4.3.2. Ground Connection



Be careful!

As the photovoltaic grid connected inverter is transformer-less, functional grounding is not supported, the positive and negative poles of the PV string should not be earthed, otherwise the inverter will be damaged.

- a) System grounding (First PE at AC connector L, N, PE)
A single inverter system needs to ground the "PE" cable;



- 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. 4-23

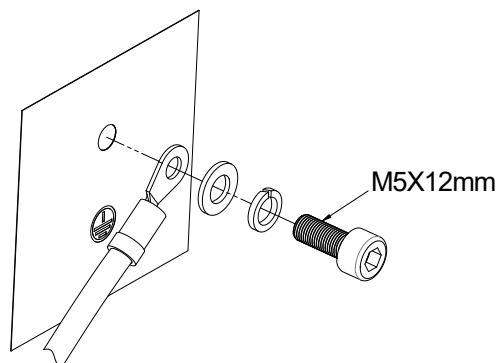


Figure 4-23 connecting grounding protection wire

- 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. When the grounding fault is triggered, the screen displays "isolation fault", and the red indicator light is on. Figure 4-24 (left)
2. After the inverter triggers the ground fault, an audio signal (buzzer) will appear and the alarm will continue until the fault is eliminated ;
3. Phone APP remote monitoring error notification; As shown in Figure4-24 (Right)

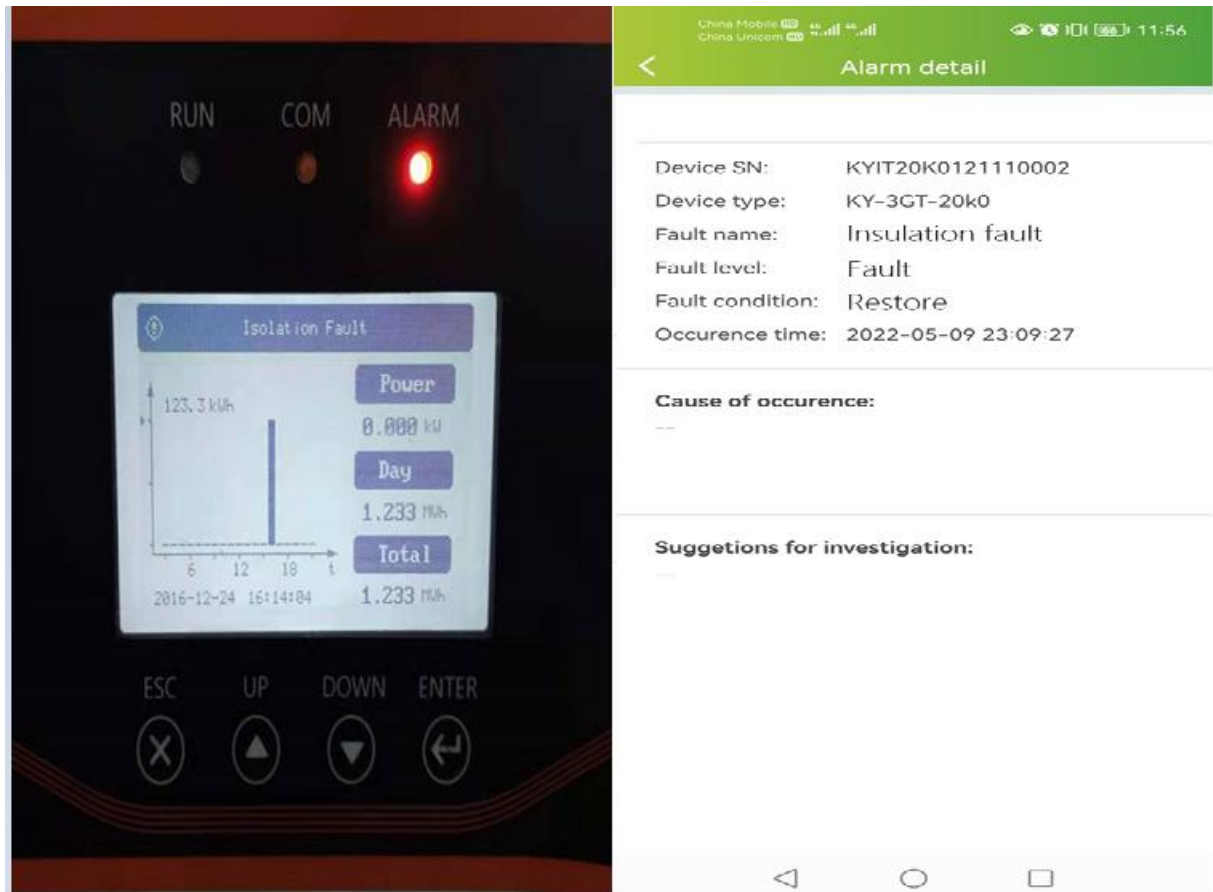



Figure 4-24

4.4. 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 be properly connected
---	---

4.4.1. Soft export Limit Control

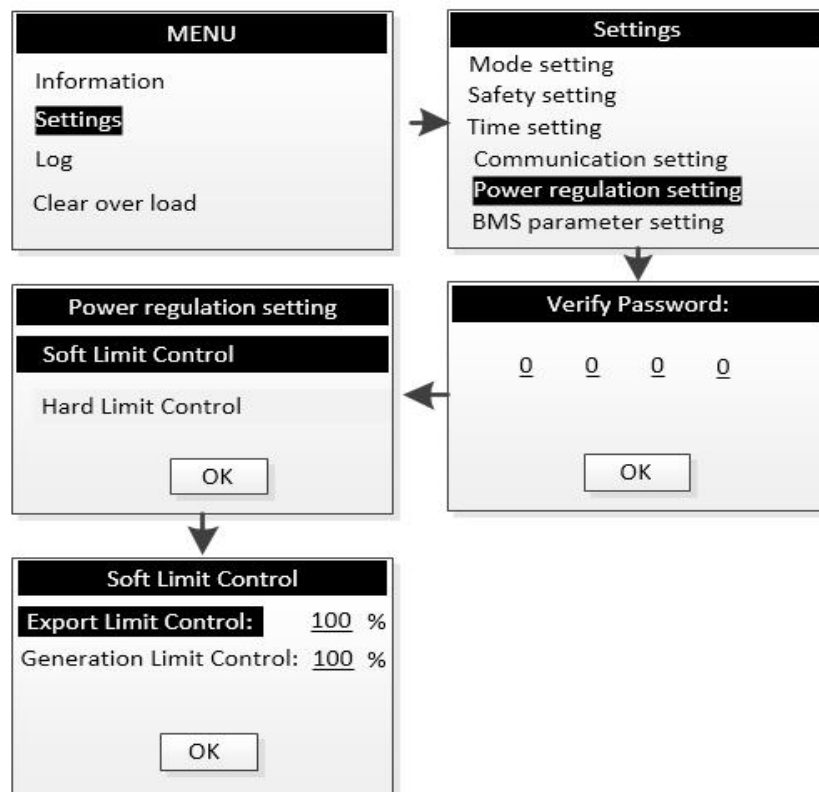
Users can set the output power of the inverter through the LCD (Soft export Limit Control); The operation steps are as follows:

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:



4.4.2 Hard export Limit Control

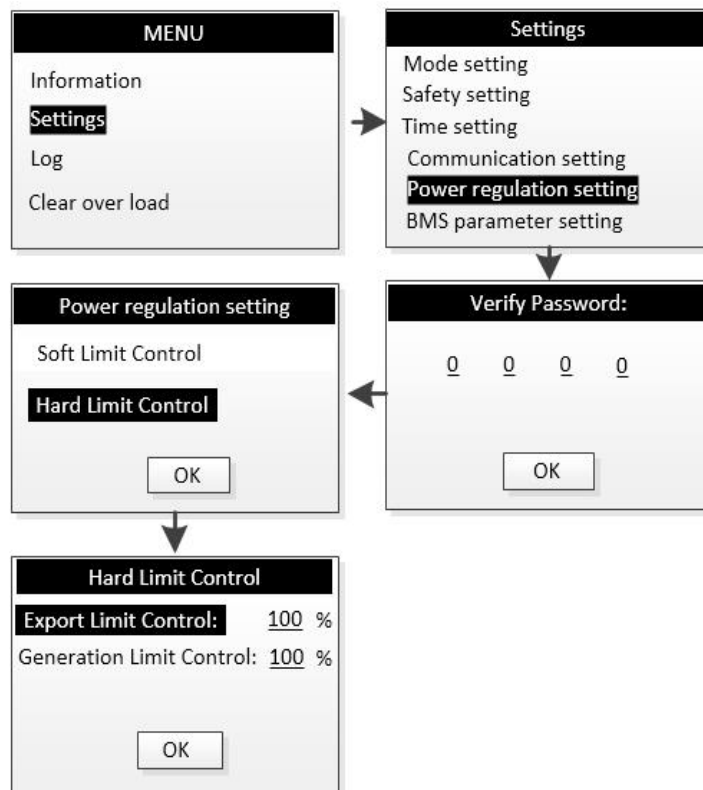
Users can set the output power of the inverter through THE LCD (Hard export Limit Control);
The operation steps are as follows:

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:



4.4.3 Soft generation limit control

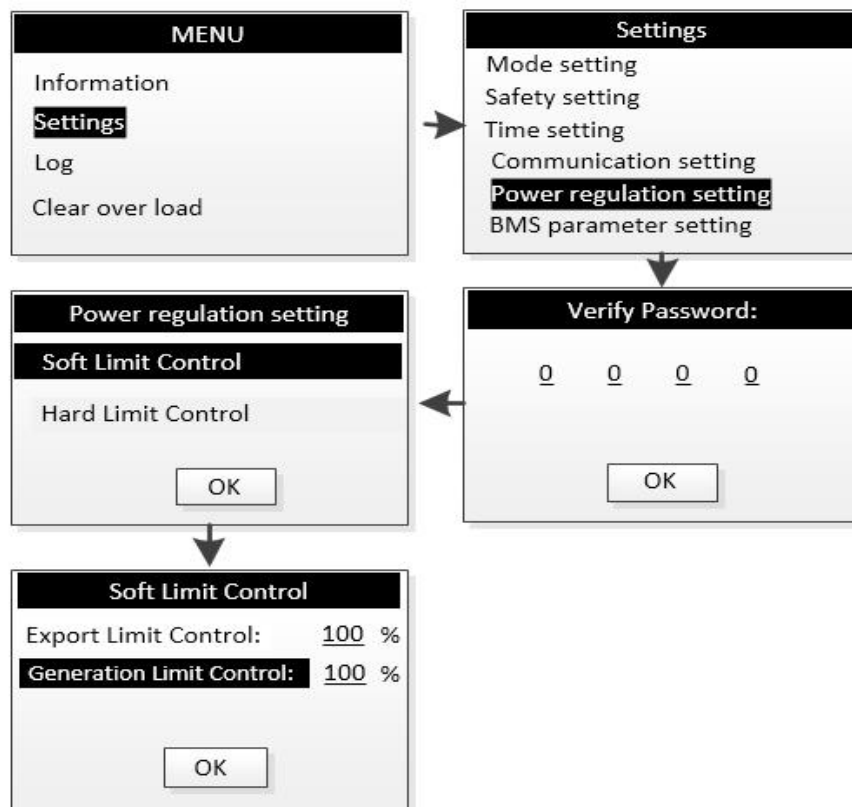
Users can set the output power of the inverter through THE LCD (Soft generation limit control);
The operation steps are as follows:

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:



4.4.4 Hard generation limit control

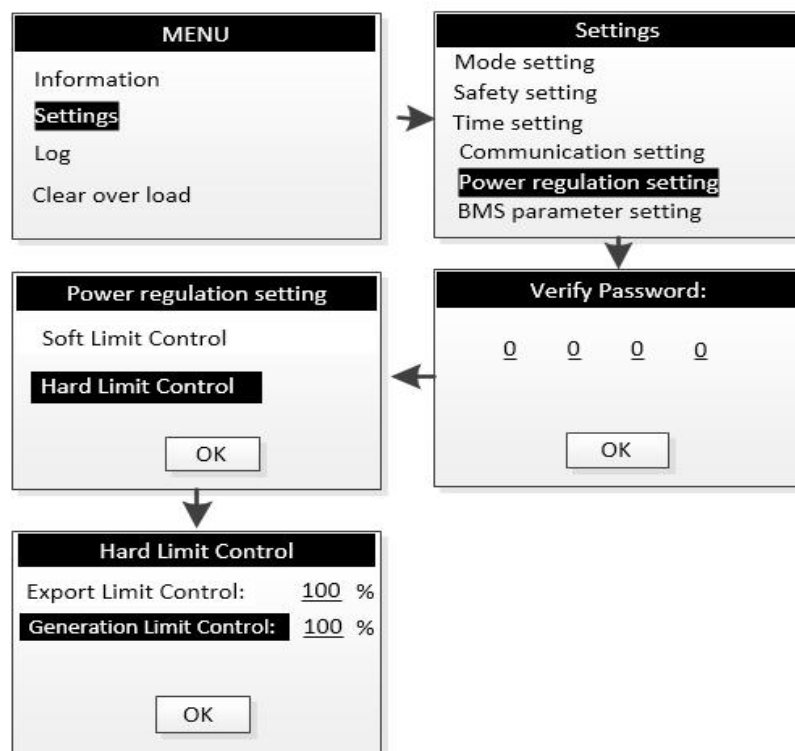
Users can set the output power of the inverter through THE LCD (Hard generation limit control);
The operation steps are as follows:

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:



4.5. Commissioning

Before starting the equipment, please confirm that:

- a) The three-phase five wire (R/S/T/N/PE) cable is correctly connected to the AC side terminal of inverter through AC circuit breaker;
- b) The DC cable is correctly connected to the DC side terminal of the inverter through the DC circuit breaker. Please note: the cable is correctly connected to the two branches and the correct polarity connection is ensured;
- c) Unused terminals shall be sealed with end caps.

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 °C

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.

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.

4.5. HMI

4.5.1. Control and display panel

The information provided here mainly includes LED display, LCD display, function keys, display faults, etc. This interface can realize the functions of parameter viewing, setting, fault information and so on. As shown in Figure 4-25.

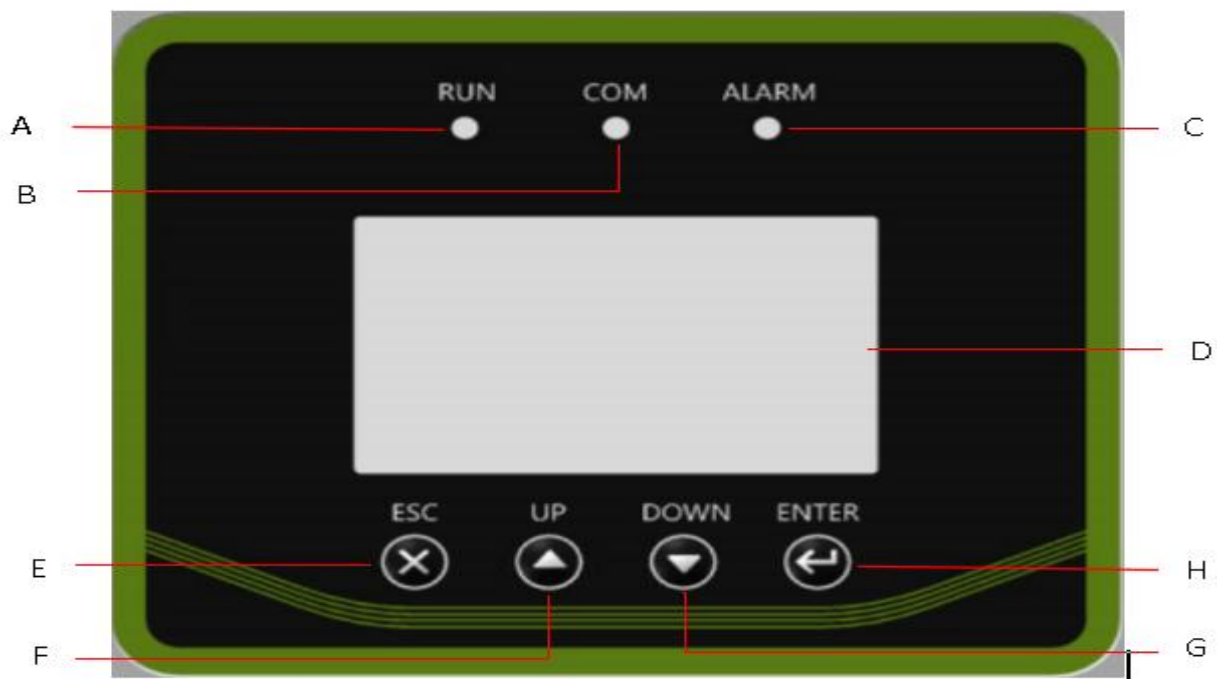


Figure 4-25

Tag	Description
A	Normal (green light)
B	Communication indicator(yellow light)
C	Fault(red light)
D	Screen
E	ESC (Function key)
F	UP (Function key)
G	DOWN(Function key)
H	ENTER (Function key)

4.5.2. LED depiction

The photovoltaic grid connected inverter has three LED indicators, including "green", "yellow" and "red", which provide information on various working states.

1. Green light

(1) The green LED is on, indicating that the inverter is normally active and working. Otherwise, it indicates that the inverter is off or faulty.

(2) When the inverter is in self inspection mode, the green LED flashes.

2. Yellow light

When the inverter communicates with PC through RS485 interface, the yellow LED will flash and go out after communication.

3. Red light

When the red LED is on, it indicates that the inverter has stopped supplying power to the power grid due to fault, and the LCD displays the corresponding fault information.

4.5.3. Interface operation and display

4.5.3.1. Interface operation

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. 4-26.

The screen can view country grid code and protection settings, power quality response modes, and firmware version etc.

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.

Note: All interfaces not marked: "Return", press the "Return" key will return to the main interface. After the interface operation of setting and password verification is completed, select the "OK" button and press the "Confirm" key to confirm the operation and return to the main interface (except password verification).

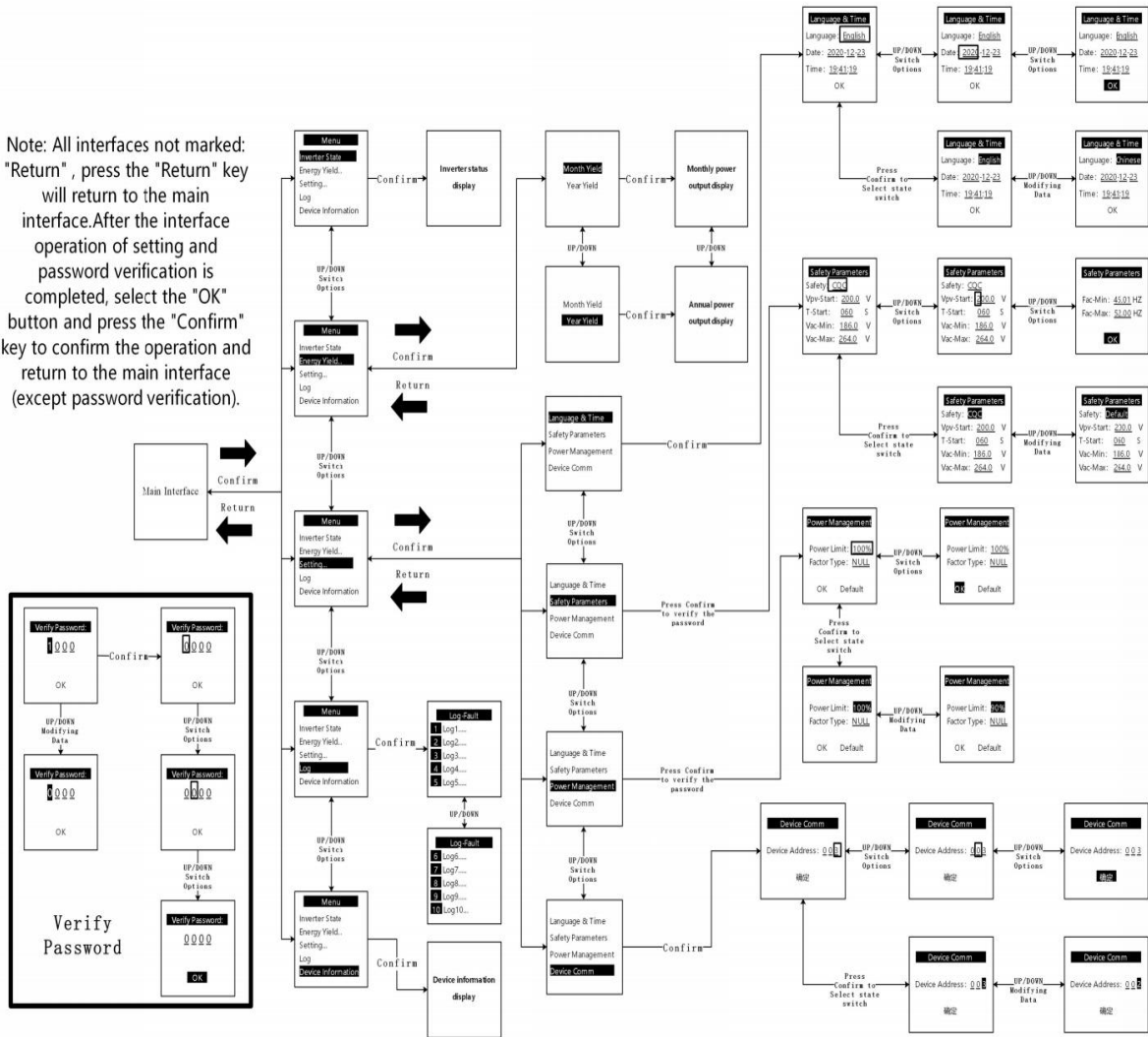
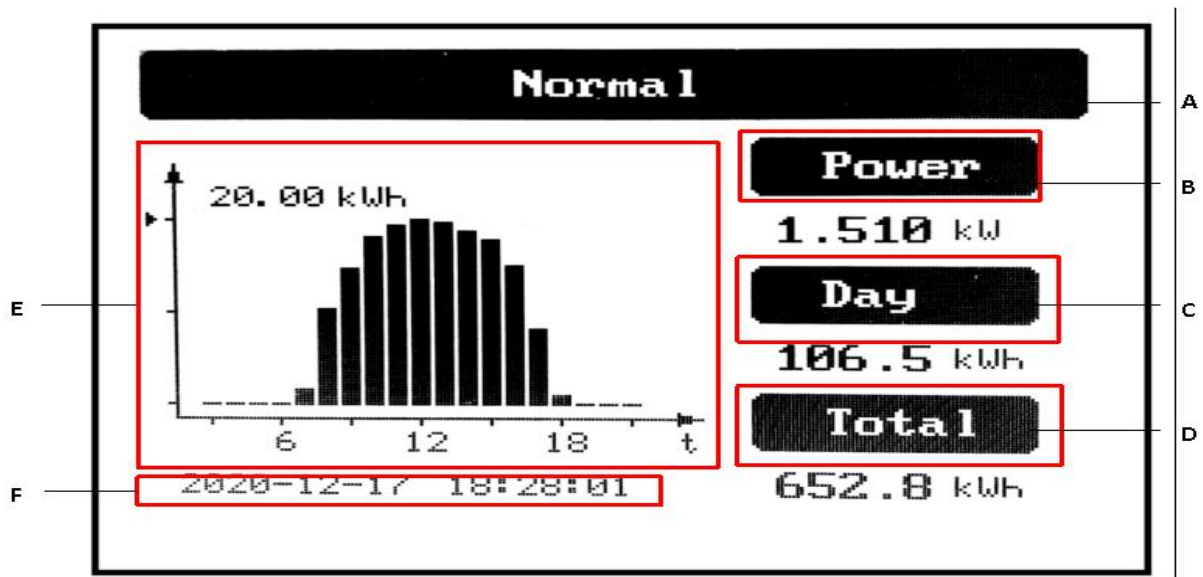


Figure 4-26

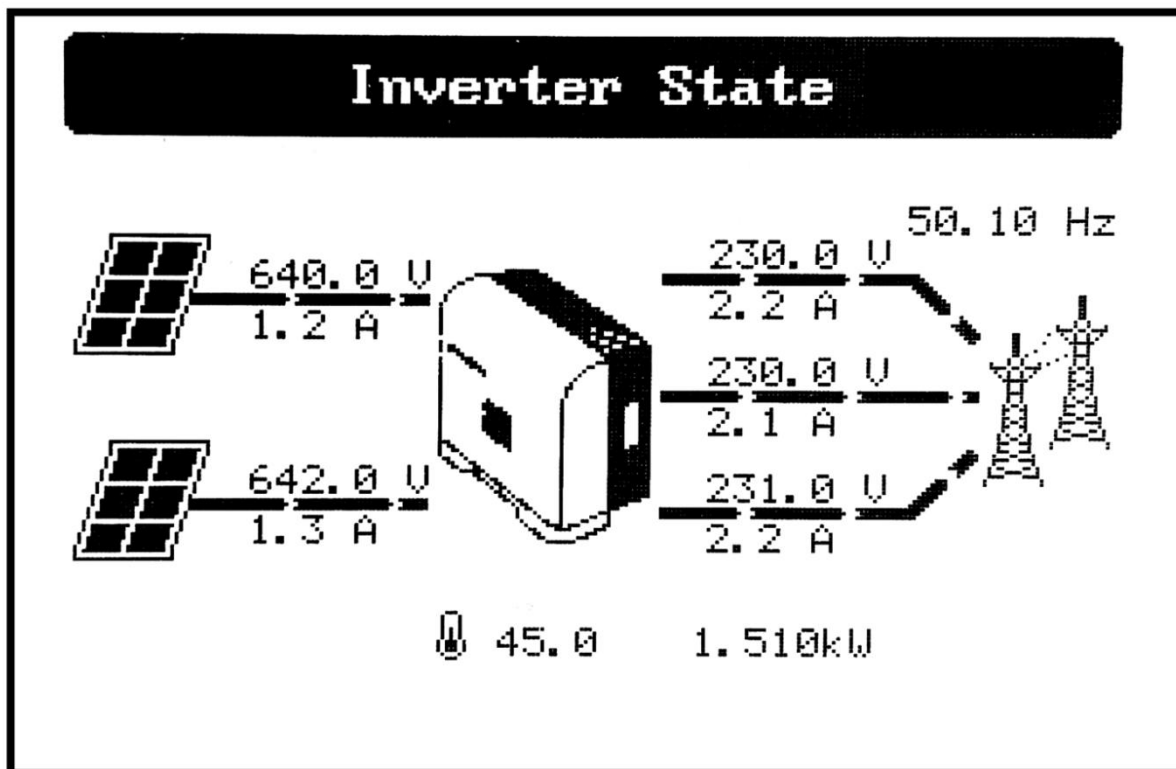
4.5.3.2. Main interface display



Tag	Description
A	Display of working state of inverter
B	Current power display of inverter
C	Display of current day power generation of inverter
D	Display of total power generation of inverter
E	Daily power generation display chart
F	Display column of working date and time of inverter

4.5.3.3. Inverter status display

This interface mainly displays the PV input voltage and current, the current power, temperature and output AC voltage, current and frequency of the inverter.



4.5.3.4. Inverter status display

Equipment information mainly displays: module name, product serial number, currently selected safety regulation type and software version number

Device Information	
INU Module	KY-3GT-20K0
Serial No.	E470A20A36512345
Safety	NewZealand
Version	Master: V00000
	Slaver: V01000
	HMI: V02000

5. Communication and Monitoring

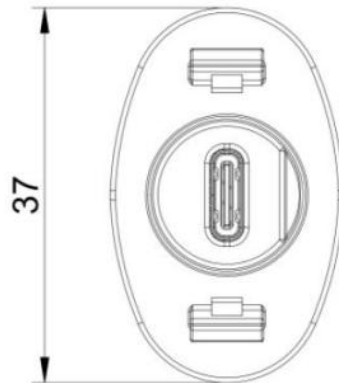
5.1. Summery

KY-3GT-20K/KY-3GT-17K/KY-3GT-15K/KY-3GT-12K/KY-3GT-10K inverter provides RS-485, WIFI, GPRS and other communication interfaces, and is equipped with a monitoring system, which can remotely browse the output voltage, current, grid frequency, fault and other information. At the same time, these parameters are stored in the local PC to facilitate the query of historical records.

Port	Tpye	Contain
WIFI/GPRS	Tpye-c	YES
USB	USB-A	YES
DRM	RJ45	YES
METER	RJ45	YES

5.2. Communication

The user can obtain the data of the inverter through RS485. During local monitoring, RS485 is connected to the local computer through 485 to USB or directly connected to the third-party data collector. The longest line of RS485 shall not exceed 1200 meters. During networking and communication, WIF / GPRS communication module can be configured to realize communication networking more conveniently and quickly.



47

RS485 interface of inverter(unitmm)

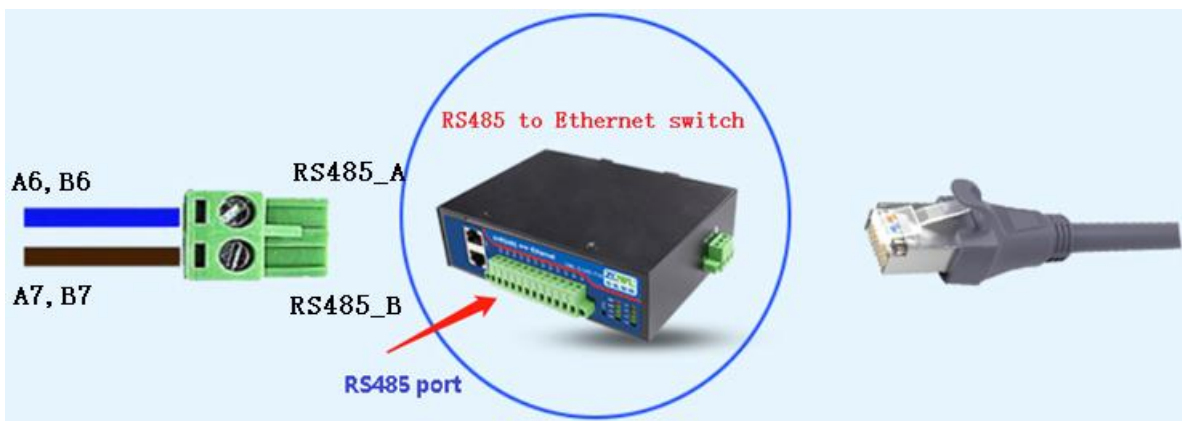
Pin	Name	Type	Describe	define	max value
A4,A9,B4,B9	VCC	Power Supply	DC 5V~12V	DC5V-12V	DC-0.3V~16V
A1,A12,B1,B1 2	GND	Ground	DC 0V	DC 0V	DC -0.3V
A6,B6	RS485-A	RS485 Aline	-	-	-7V ≤ VCM ≤ +12V
A7,B7	RS485-B	RS485 B line	-	-	

5.2.1. 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.

5.2.2. WiFi / GPRS Communication

KY3GT-20K/KY3GT-17K/KY3GT-15K/KY3GT-12K/KY3GT-10K can be configured with a WiFi / GPRS communication module to realize communication networking. The module is shown in the figure 5-1 (there is no difference in appearance between WiFi module and GPRS module)



figure 5-1

5.3. 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

a. Insert the WiFi module in Figure 5-1 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. 5-2



Figure 5-2

b. 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 Fig. 5-3

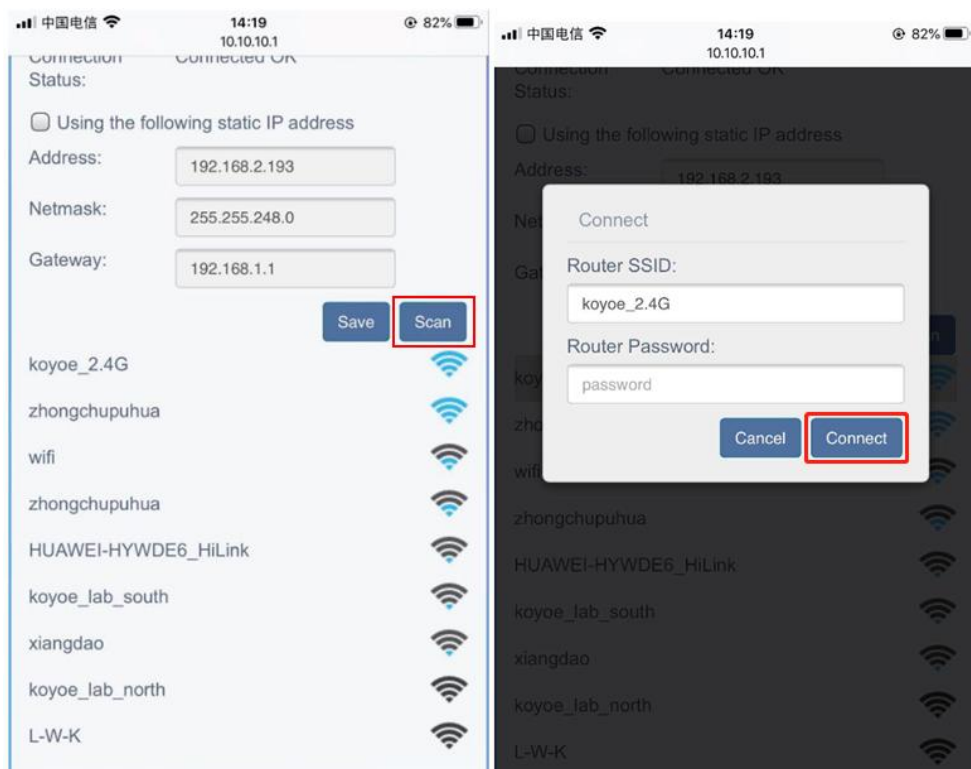


Figure 5-3

c. 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 Fig. 5-4

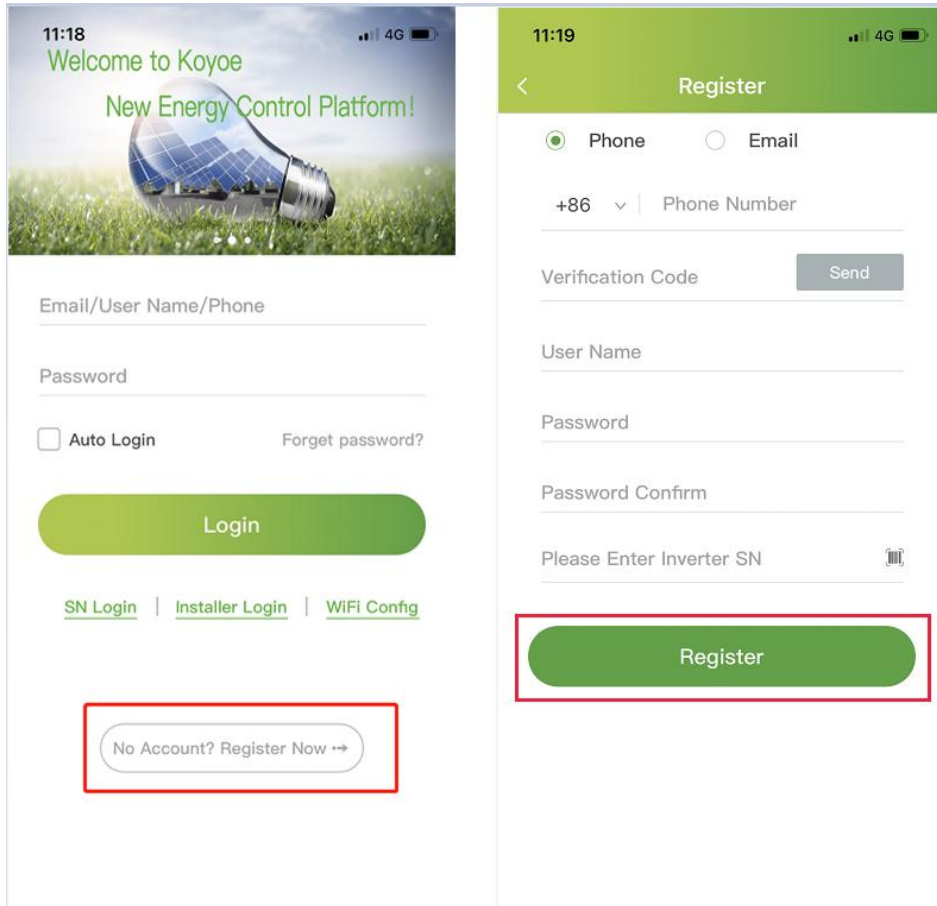


Figure 5-4

d. 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 5-4, and then click Register to monitor the data without the previous steps)

6. Maintenance and Repair

6.1 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.

6.2 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 module 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.

6.3 Daily Maintenance

Usually, the inverter does not need regular maintenance and calibration, but its radiator must not be covered by dust and other dirt.

The inverter will produce a lot of heat when it is running, so the forced air cooling is adopted in the inverter.

In order to ensure good ventilation of the inverter, it is necessary to check the air inlet and outlet regularly 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.

6.4 Fan Maintenance

The built-in fan of inverter is used for cooling during operation. If the fan cannot work normally, the inverter cannot be cooled effectively, which will affect the efficiency of the inverter or cause derating operation.

Therefore, it is necessary to keep the fan clean and replace the damaged fan in time. The cleaning and replacement steps of the fan are as follows:

Step 1: Disconnect the AC circuit breaker.

Step 2: Disconnect the front DC side circuit breaker or cover the battery panel with opaque materials, and turn the DC switch to the "off" position.

Step 3: Wait at least 20 minutes.

Step 4: Disconnect all electrical connections.

Step 5: Loosen the screw fixing the fan assembly, as shown in Figure 7-1

Step 6: Remove the fan assembly, as shown in Figure 7-1

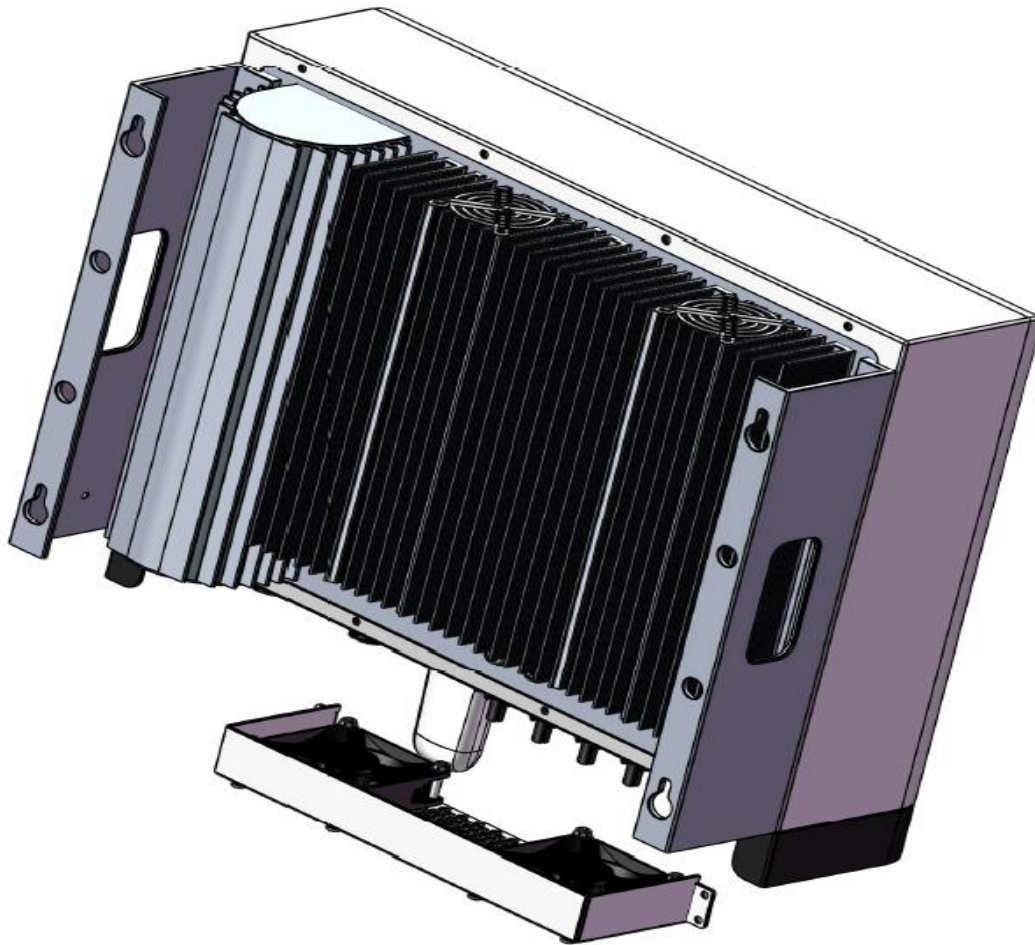


Figure 7-1 Remove the screws from the fan assembly

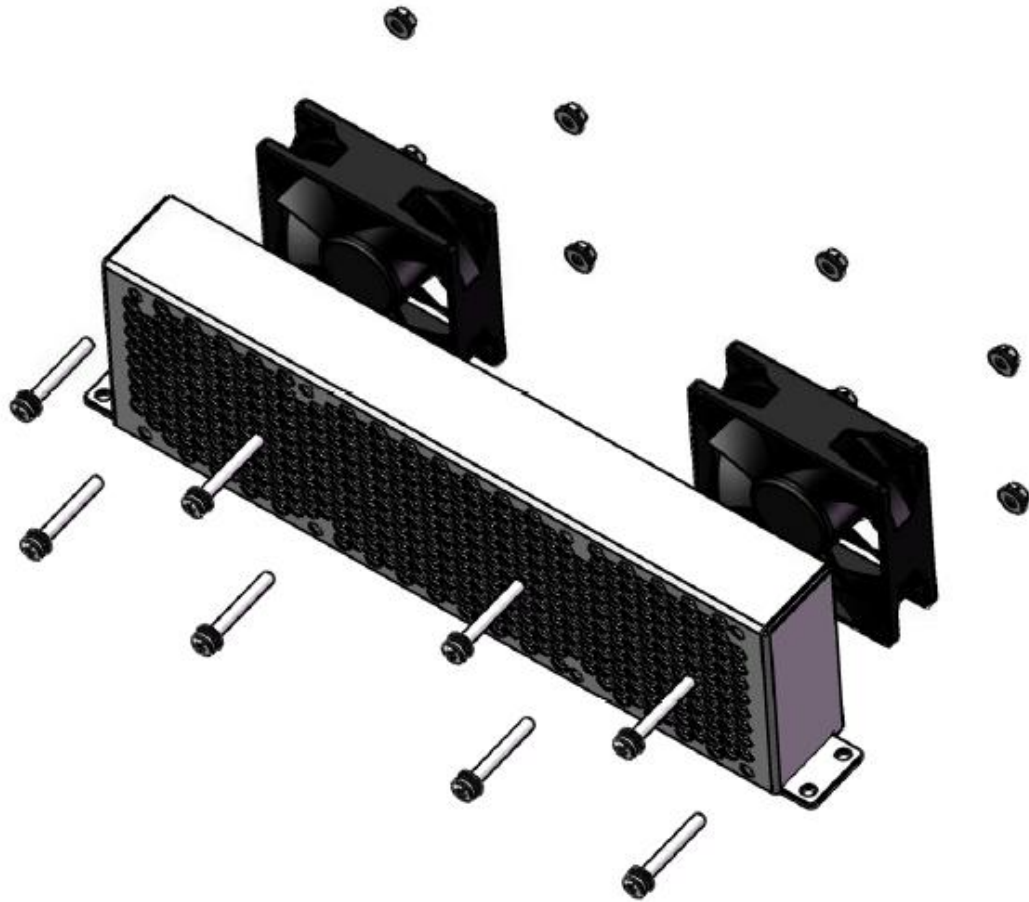


Figure 7-2 Remove the screws fixing the fan

Step 7: Pull out the fan harness connector and loosen the screw fixing the fan

Step 8: Take out the fan, clean the fan or replace the damaged fan, as shown in Fig. 7-2

Step 9: Install the fan on the inverter in reverse order and restart the inverter.

7. Technical data

Model	KY-3GT-20K	KY-3GT-17K	KY-3GT-15K	KY-3GT-12K	KY-3GT-10K
Efficiency					
Maximum efficiency	98.50%	98.43%	98.30%	98.20%	97.80%
DC side					
Maximum input voltage	1000 V	1000 V	1000 V	1000 V	1000 V
Start voltage	180V	180V	180V	180V	180V
Rated input voltage	630 V	630 V	630 V	630 V	630 V
MPPT voltage range / rated input voltage	200 V-950 V	200 V-950 V	200 V-950 V	200 V-950 V	200 V-950 V
Number of MPPT / number of strings	2PCS/(2+2)PCS	2PCS/(2+2)PCS	2PCS/(2+1)PCS	2PCS/(1+1)PCS	2PCS/(1+1)PCS
Maximum input current (PV1)	23A	23A	23A	12A	12A
Maximum input current (PV2)	23A	23A	12A	12A	12A
Maximum DC short-circuit current of each circuit	28A/28A	28A/28A	28A/15A	15A	15A
Max Inverter Backfeed Current to Array	0A	0A	0A	0A	0A
AC side					
Rated output power	20000 W	17000 W	15000 W	12000 W	10000 W
Maximum output power	20000 VA	17000 VA	15000 VA	12000 VA	10000 VA
Rated grid voltage / grid voltage range	400 V (230 V) /270 V-480V				
Type of power grid	3L/N/PE	3L/N/PE	3L/N/PE	3L/N/PE	3L/N/PE
Rated output current	29A	24.6A	21.7 A	17.4A	14.5A
Maximum output current	31A	25A	23 A	17.5A	15.2A
Frequency / range	500HZ / 60HZ 45HZ-55HZ / 55HZ-65HZ				
Total harmonic of output current	< 3%	< 3%	< 3%	< 3%	< 3%
DC component	< 0.5% * In	< 0.5% * In	< 0.5% * In	< 0.5% * In	< 0.5% * In
Power factor / range	> 0.99 / 0.8 lead - 0.8 lag (adjustable)				
Max Output Over Current Protection	33A				
Inrush Current(peak and duration)	91A peak@25us				
Protect					
DC switch	integrate	integrate	integrate	integrate	integrate
Over current protection	integrate	integrate	integrate	integrate	integrate
Island protection	integrate	integrate	integrate	integrate	integrate
Surge protection	DC class II / AC class III				
over voltage category	PV OVC II / AC main OVC III				
DC reverse connection protection	integrate	integrate	integrate	integrate	integrate

Leakage current protection	integrate	integrate	integrate	integrate	integrate
Insulation protection	integrate	integrate	integrate	integrate	integrate
Over/undervoltage protection	integrate	integrate	integrate	integrate	integrate
Basic parameter information					
Dimensions (mm)	505 x 414 x 200				
Weight	18Kg	18Kg	17Kg	16Kg	16Kg
Protection level	IP65	IP65	IP65	IP65	IP65
Installation mode	Wall hanging	Wall hanging	Wall hanging	Wall hanging	Wall hanging
Cooling mode	Wind cooling	Wind cooling	Wind cooling	Wind cooling	Wind cooling
Topological structure-	No transformer				
Anti-islanding protection	Frequency shift				
Standby consumption	<15 W	<15 W	<12 W	<10 W	<10 W
Condition	Outdoor unconditioned				
Protective class	Class I				
Isolation	Transformerless				
Working temperature	-25 °C - 60 °C (45 °C derating)				
Relative humidity	0~100%				
Altitude	< 3500 m, over 2000 m derating				
Display mode	LCD				
Communication	WIFI / GPRS				
AC/DC connection	Quick plug type				
Warranty	10 years				
Standard					
Safety standards	IEC62109-1/-2, IEC62116, IEC61727				
EMC standards	IEC 61000-6-2, IEC 61000-6-3				
Grid standards	AS/NZS 4777.2 NB / T 32004-2018				
Others					
Country of origin	Made in China				

8. 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.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Jiangsu Koyoe Energy Technology Co., Ltd. will provide you with standard warranty service for 10 years. 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 KY3GT-20K/KY3GT-17K/KY3GT-15K/KY3GT-12K/KY3GT-10K 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.).

9. Contact Information

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

Jiangsu KOYOE Energy Technology Co., LTD

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

Tel: +86 512 6513 9208

Email: koyoesales@szzcph.com, sales_Int@koyoe.com

Web: en.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.

	LCD display	Possible Causes and Solutions
Fault can be cleared	Insulation fault	<ol style="list-style-type: none"> 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.
	Earth current fault	<ol style="list-style-type: none"> 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, re connect the PV panel and AC side circuit to detect the inverter status.
	Grid failure; Frequency overrun; AC voltage overrun;	<ol style="list-style-type: none"> 1. Wait for 5 minutes. If the power grid returns to normal, the inverter will restart automatically. 2. Ensure that the grid voltage and frequency meet the local specifications.
	Loss of power grid	<ol style="list-style-type: none"> 1. Not connected to the power grid. 2. Check the cables connected to the power grid. 3. Check the availability of power grid. 4. If the power grid is OK and the fault still exists, it may be because the fuse is disconnected. Please contact the after-sales service department.
	High temperature	<ol style="list-style-type: none"> 1. The internal temperature of the inverter is higher than the normal value. 2. Keep the ambient temperature as low as possible. 3. Or put the inverter in a low temperature environment.
	Photovoltaic cell overvoltage	<ol style="list-style-type: none"> 1. Check whether the DC open circuit voltage of photovoltaic cell is greater than 950v. 2. If the DC open circuit voltage of photovoltaic cell is less than 950v and the problem still exists, please contact the local after-sales service department.
Fault can't be cleared	Consistency failure	Disconnect the positive and negative poles of the photovoltaic cell from the input end of the inverter, and restart the inverter.
	Relay self-check failed	1. Disconnect the positive and negative electrodes of photovoltaic cells from the inverter.
	High DC current	2. Wait for a while.

	injection	3. After the LCD is turned off, re connect and re test. 4. If the problem still exists, please contact the local after-sales service department.
	Serial communication failure	
	AC current sensor failure	
	Earth current fault	

If the DC output voltage of photovoltaic cell is higher than 250V and the inverter still can't work normally, please contact the after-sales service department.

In the case of weak light intensity, the inverter may turn on and off continuously. This is due to the photovoltaic cells can't provide enough power caused by the normal phenomenon. If the problem still exists when there is enough sunlight or enough energy, please contact the after-sales service department.

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
DLU	Data recorder
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
HMI	Human Machine Interaction
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