KOYOE

KY-3GT series Solar Grid-Connected Inverter

User Manual

Contents

1. Introduction

1.1. Introduction

This manual introduced the grid-tie PV inverters of KY-3GT-20K0/KY-3GT-17K0/KY-3GT-15K0/KY-3GT-12K0/KY-3GT-10K0 which are high-efficient products with state-of-the-art technology and aim at ensuring long-term stable power supply.

KY-3GT grid-connected PV inverter series are three-phase non-isolated inverters without transformer, which converts the direct current generated by photovoltaic cells into alternating current that meets the requirements of the power grid and feeds it into the power grid.

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 10 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.

Permission from the local utility is required before connecting the inverter to the grid and employing qualified personnel.

Before installation：

Check the inverter and package for damage. If in doubt, please contact the supplier before installing the inverter.

Before connecting PV panels to the inverter, please check the voltage of the inverter and ensure it is within the specifications of inverter.

Installation：

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 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 form 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 10 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 950VDC. 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

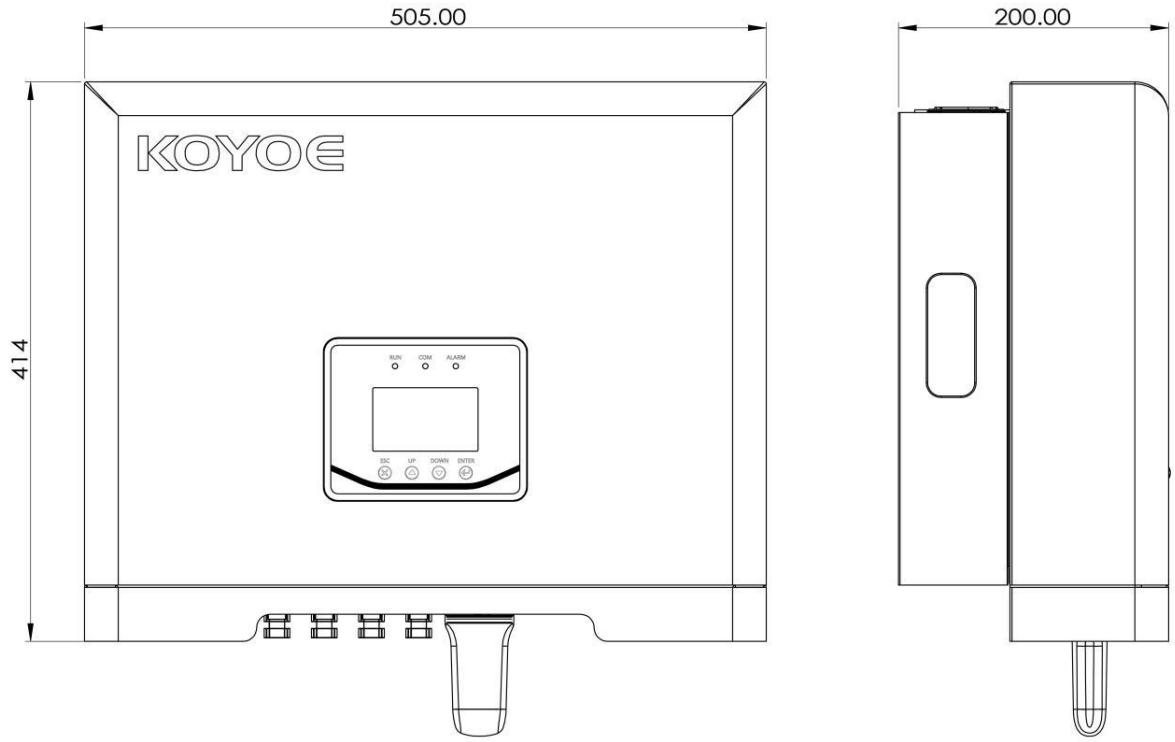

Figure 2-1 KY-3GT series solar Grid-Connected Inverter dimensions （Units mm）

⚠	**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.

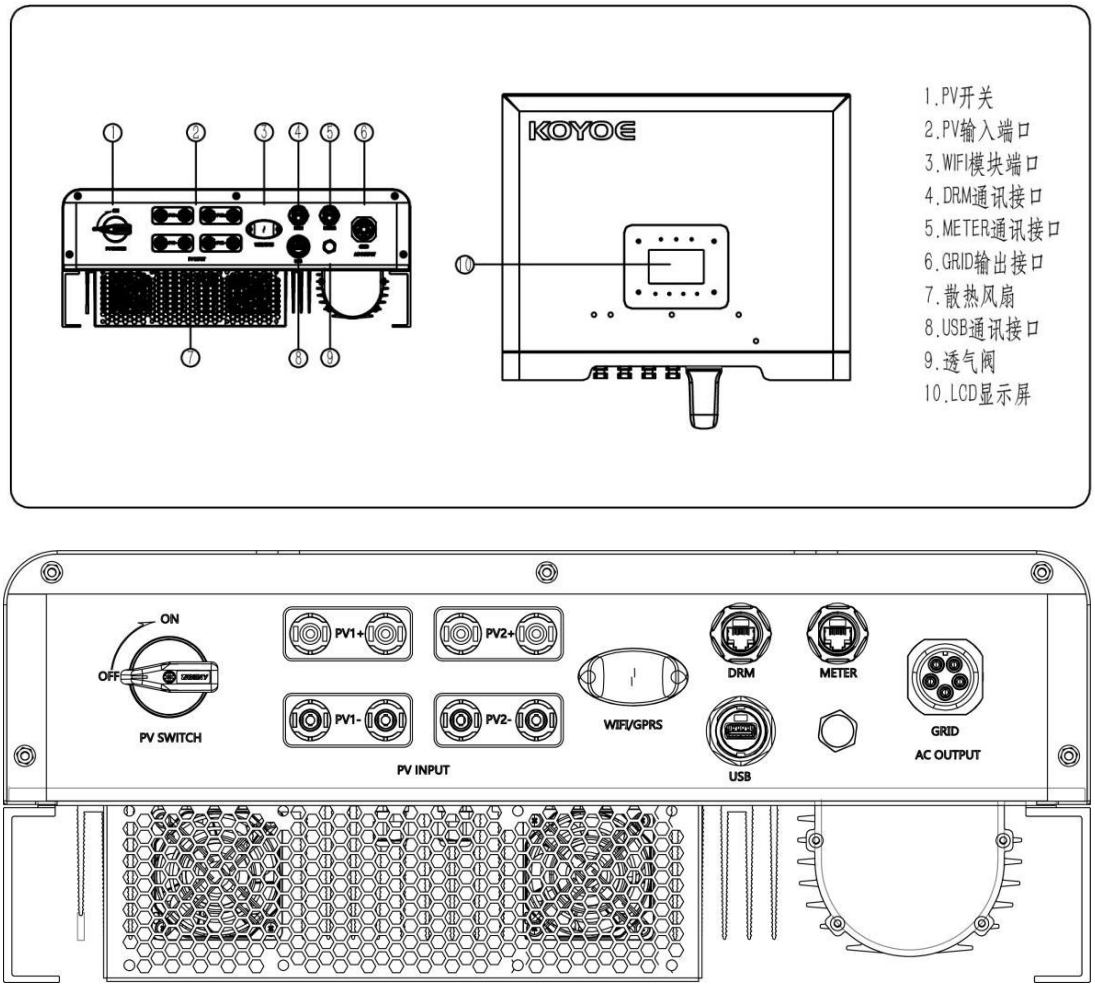

Figure 2-2 KY-3GT series solar Grid-Connected Inverter Electrical Ports

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.

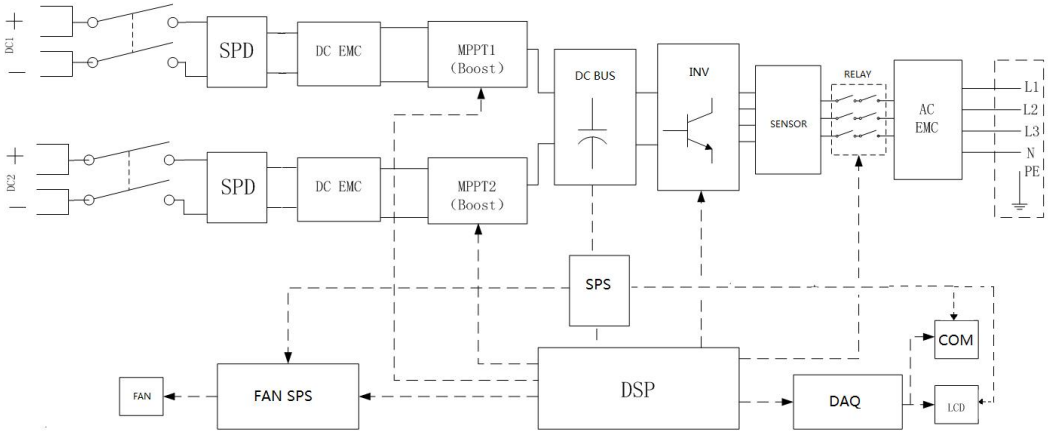

Figure 2-3 KY-3GT series solar Grid-connected inverter electrical diagram

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. When the inverter detects that the ambient temperature is too high, it starts to reduce the output power protection. In addition, the derating function can be activated under specific grid conditions according to the requirements of grid company.

⚠	Only authorized personnel can make external power level adjustments

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.

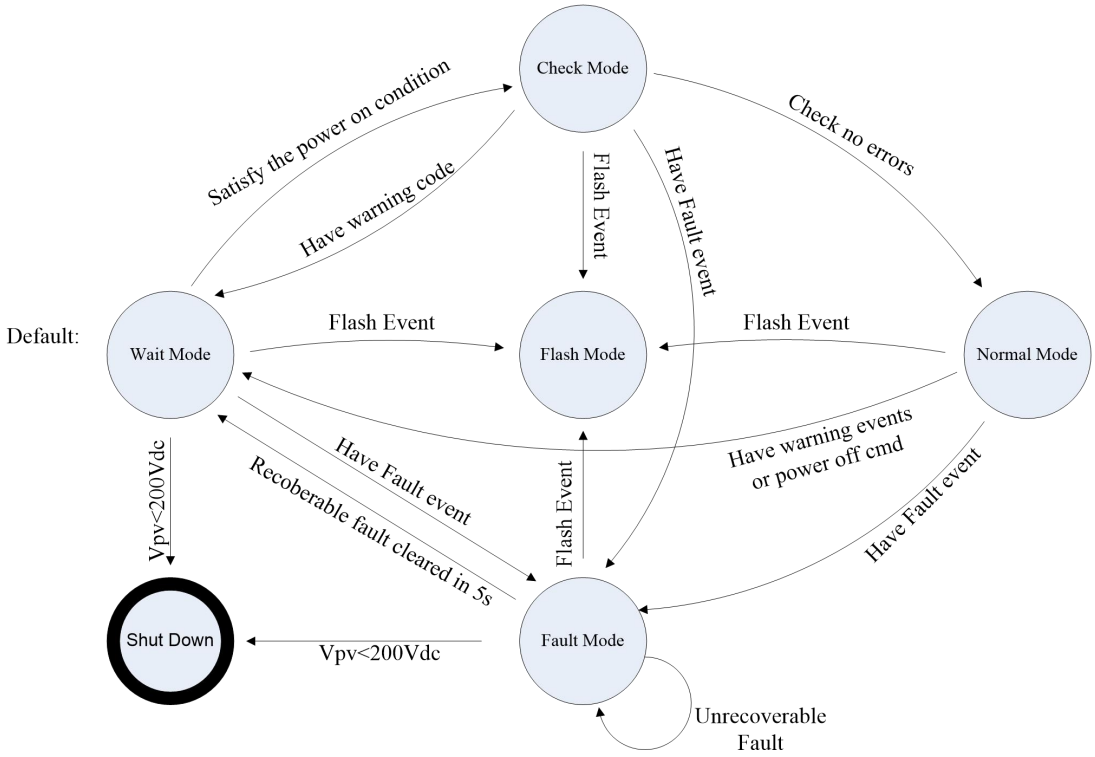

Figure 3-1 inverter working mode state machine

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 260V, 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 150V, 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.

4. Installation and Start-up

4.1. Preparation for Installation

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 10 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.

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. 4-1

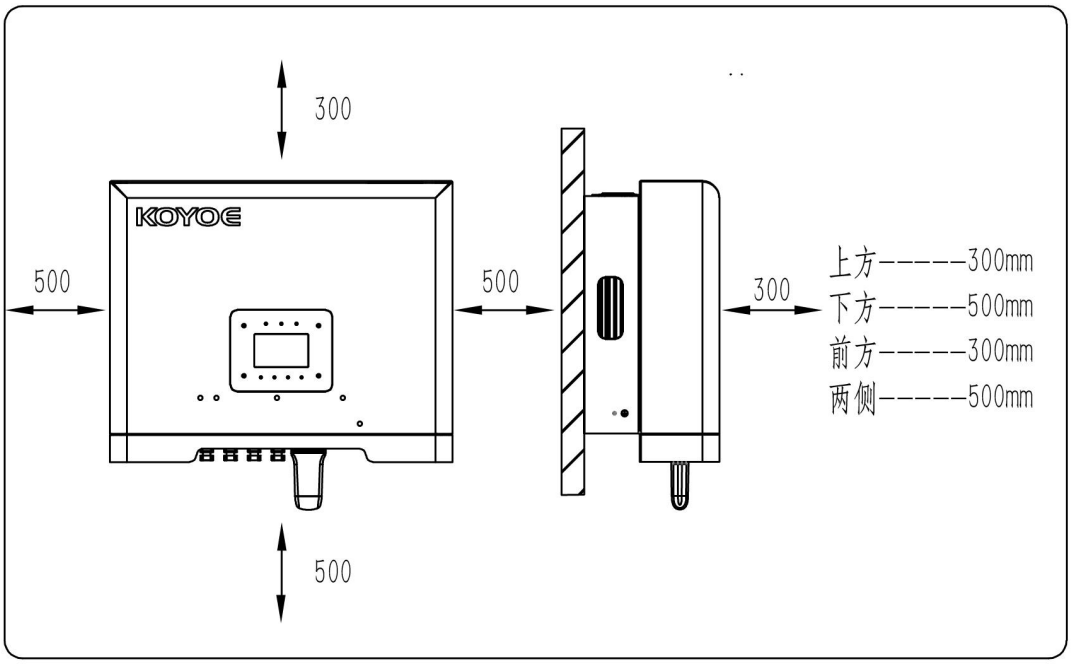

Figure 4-1

4.2. Installation Steps

4.2.1. Concrete Wall Installation Steps

Refer to Figure 4-2 below for installation of inverter

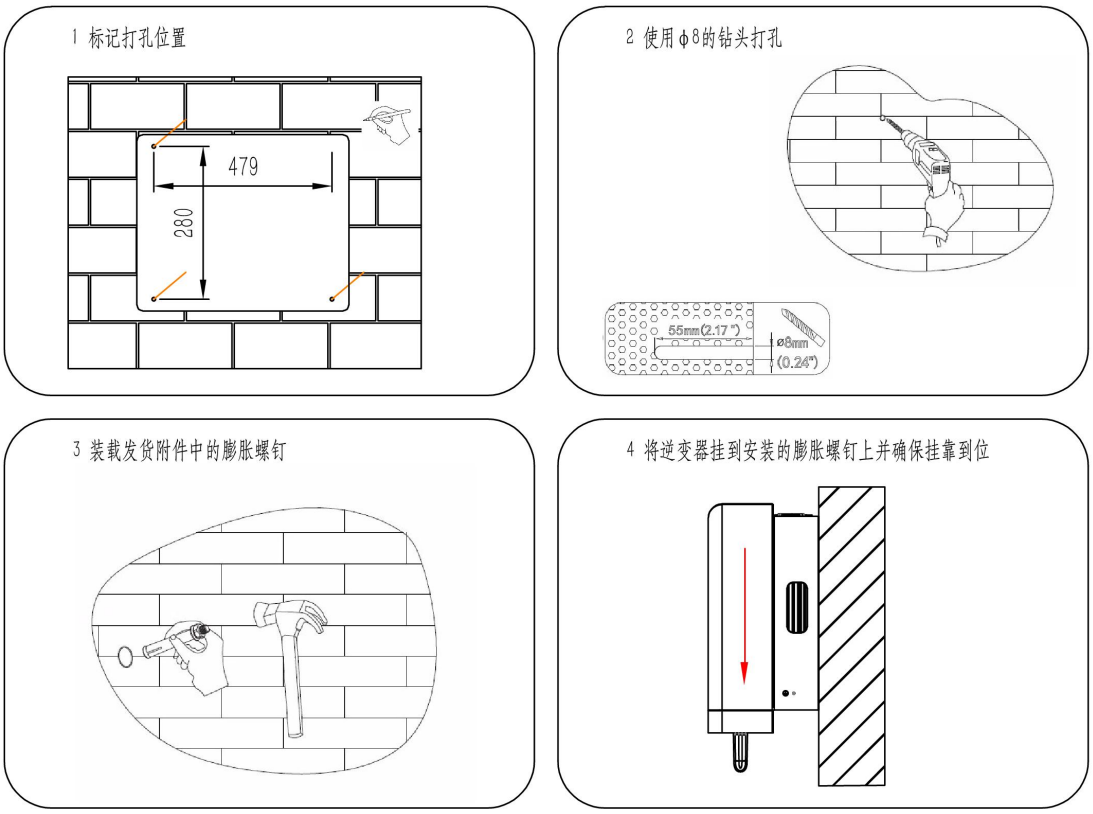

Figure 4-2

Step 1: drill 4 holes with diameter of 8mm on the wall according to the size indicated

Step 2: insert the expansion pipe vertically into the hole, and knock the expansion pipe into the wall thoroughly with a hammer.

Step 3: screw the self-tapping screw into the expansion pipe, and leave a 4-6mm gap between the screw flange and the wall.

Step 4: hold the grooves on both sides to hang the inverter on the self-tapping screw.

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-20K0	KY-3GT-17K0	KY-3GT-15K0	KY-3GT-12K0	KY-3GT-10K0
Recommended parameters of AC circuit breaker	40A	40A	30A	25A	25A

Be careful!

Multiple inverters cannot share one circuit breaker!

No load can be connected between inverter and circuit breaker!

Leakage current protector

The inverter is equipped with an integrated leakage current detection unit. When the leakage current is greater than the allowable value, the inverter will quickly disconnect from the power grid.

Be careful!

If an external leakage current switch is installed, the action current value of the switch must be 300mA or greater

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. 4-3;

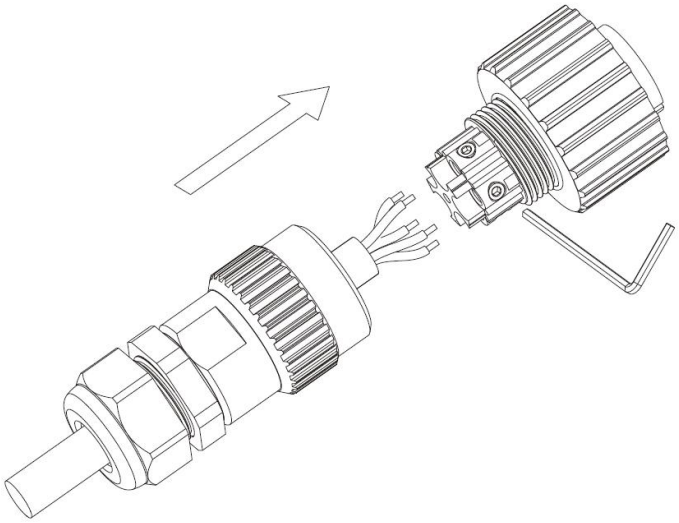

Figure 4-3 loosening connector screws

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

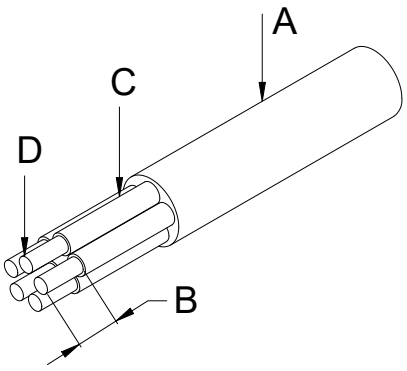

Figure 4-4 tripping diagram

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	4-8mm² Recommended value 6mm²

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	4mm²	6mm²
Maximum length of conductor	20m	40m

Step 4: Push the threaded sleeve onto the connection terminal until both are locked. As shown in Figure 4-5

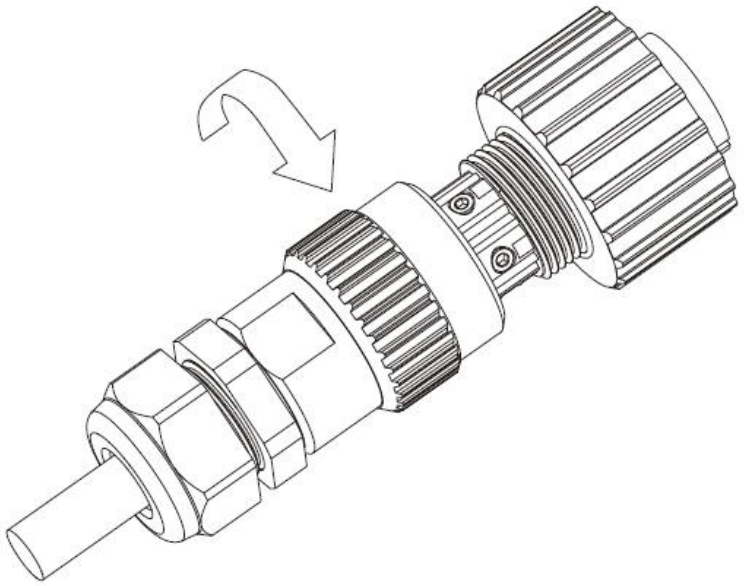

Figure 4-5 connector locking

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

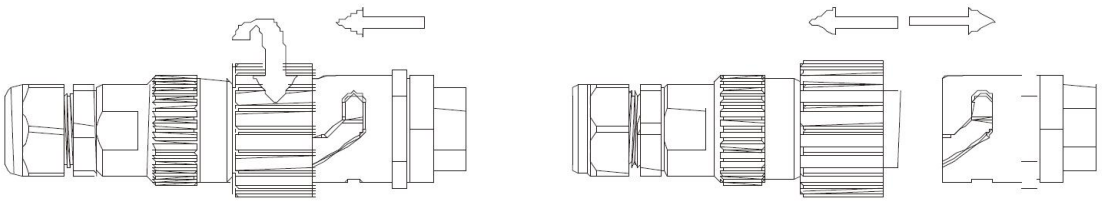

Figure 4-6

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.

KY-3GT series solar Grid-connected inverter 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 high performance photovoltaic connector

Be careful!

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

There are DC plugs in the accessory box. The specific connection mode is as follows

Step 1: Prepare photovoltaic cables and DC plugs

The dc plug provided by our company is used, and the cable is 2.5-4 mm²

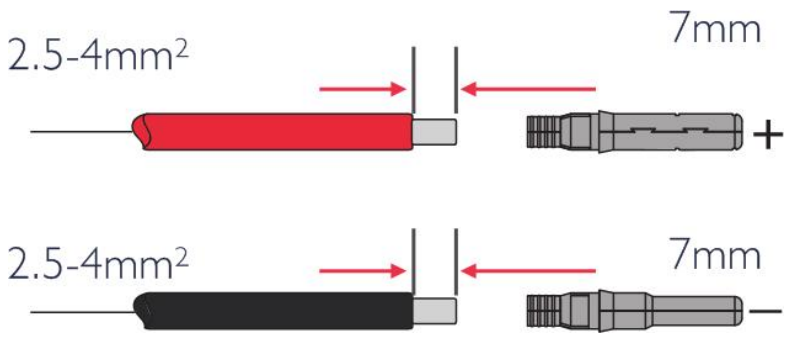

Figure 4-7

Step 2: The metal part that connects the cable to the DC plug

The photovoltaic cable must be pressed tightly into the connector. The limit card on the DC connector cannot be pressed down. If connected correctly, insert the DC plug and it will make a click sound.

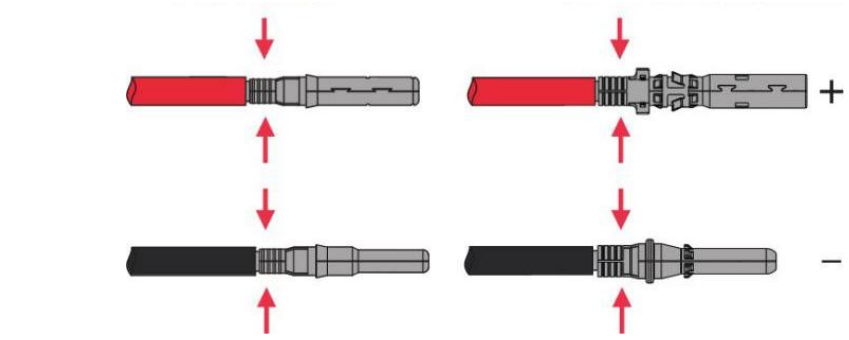

Figure 4-8

Step3: Tighten the cap clockwise , make sure the polarity is correct and plug into the inverter.

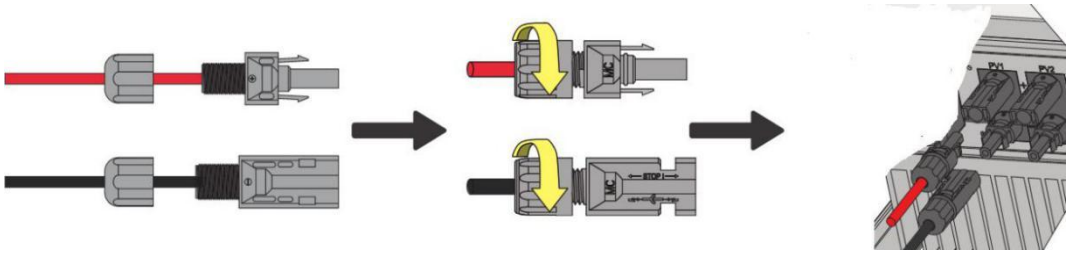

Figure 4-9

	**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, the positive and negative poles of the PV string should not be earthed, otherwise the inverter will be damaged.

a) System grounding

A single inverter system needs to ground the "PE" cable;

Multiple inverter systems need to connect all inverter "PE" cables and the metal frame of photovoltaic array to the same grounding copper bar to realize equipotential connection.

b) Protective earthing

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. 4-10

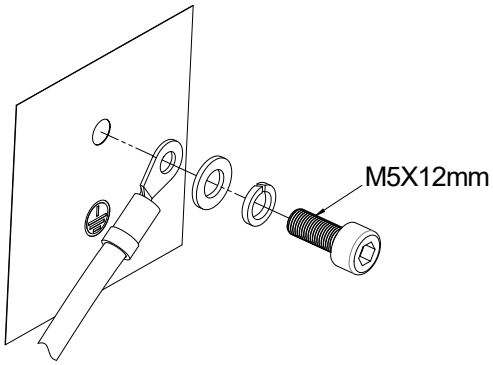

Figure 4-10 connecting grounding protection wire

4.4. 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:

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 generated energy.

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.

5. Human Machine Interface

5.1. Control and Display Panel

The information provided here mainly includes LED display, LCD display, function keys, display fault, etc.

This interface can realize the functions of parameter viewing, setting, fault information and so on.See Figure 5-1.

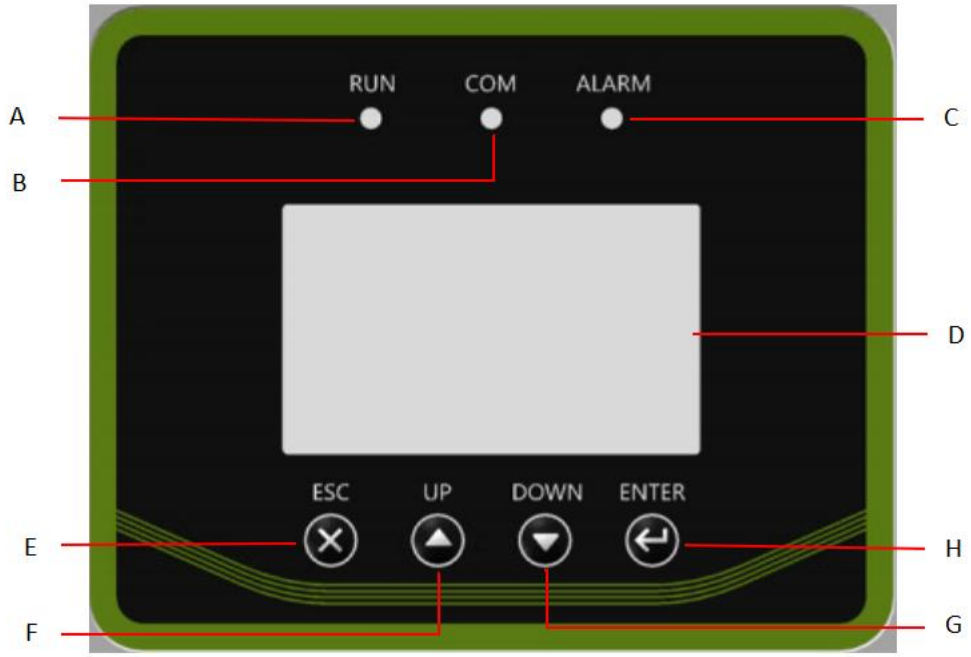

Figure 5-1

Tab	Description
A	Normal Operation (Green light)
B	Communication Instructions (Yellow light)
C	Trouble Warning (Red light)
D	LCD Display Area
E	Return/Cancel (Function keys)
F	Up (Function button)
G	Down (Function button)
H	Confirm (Function button)

5.2. LED Indicate

The grid-connected photovoltaic inverter has three LED indicators, including "green", "yellow" and "red", providing information on various working conditions.

1.Green

(1)Green LED lighting indicates normal operation and operation of the inverter.Otherwise, the inverter is closed or fails.

(2)The green LED flashes when the inverter is in self-check mode.

2.Yellow

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

3.Red

The red LED lighting indicates that the inverter has stopped supplying power to the grid due to a fault, while the LCD displays the corresponding fault information.

5.3. Interface Operation and Display

Interface operation and switch are shown in Figure 5-2:

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).

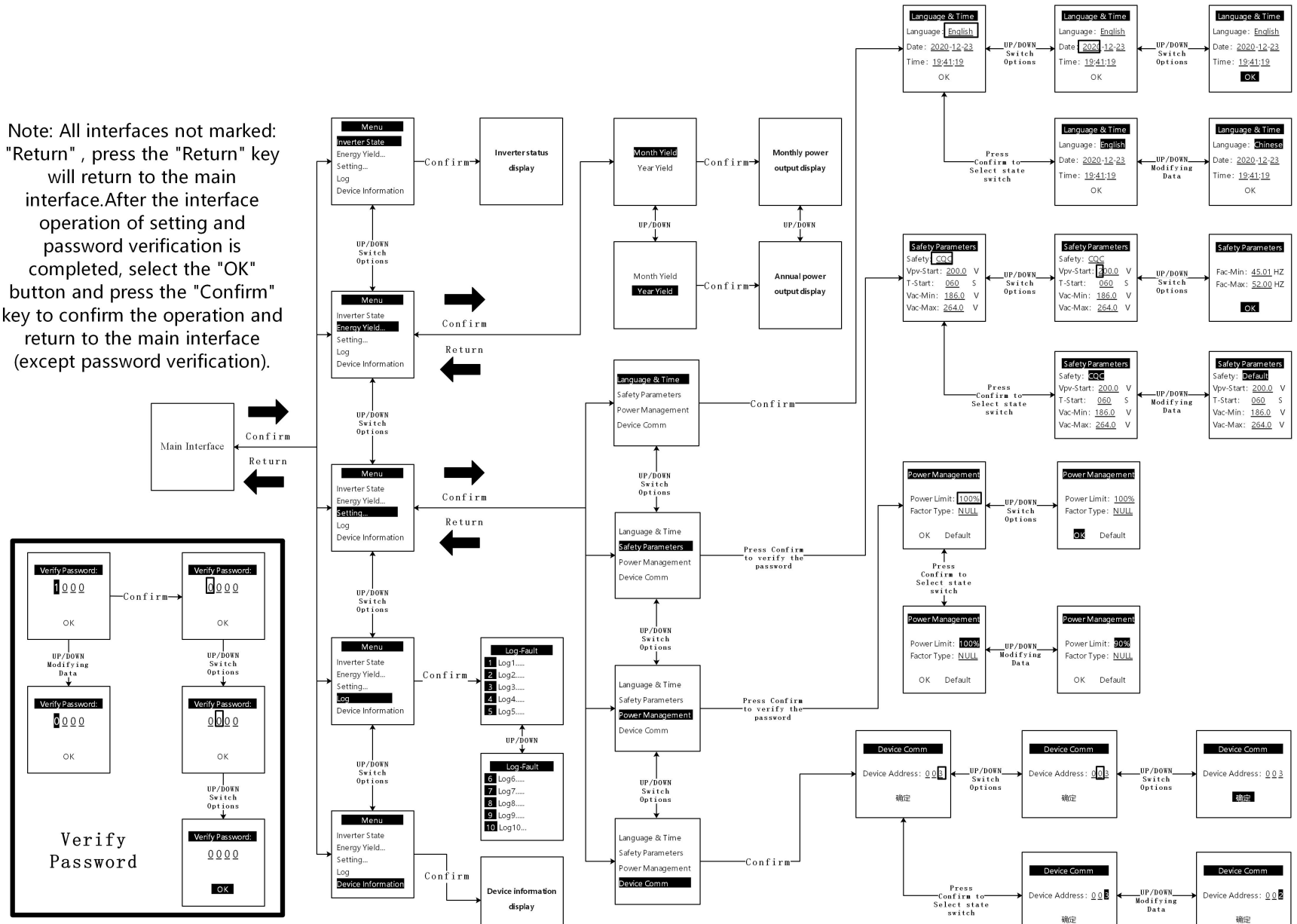

Figure 5-2

5.3.1. Main Interface Display

The top displays the working status and the left displays the parameter information.On the right, it always shows current power, current generation, total generation.The time and date will be displayed at the bottom of the LCD display (Figure 5-3 Main interface)

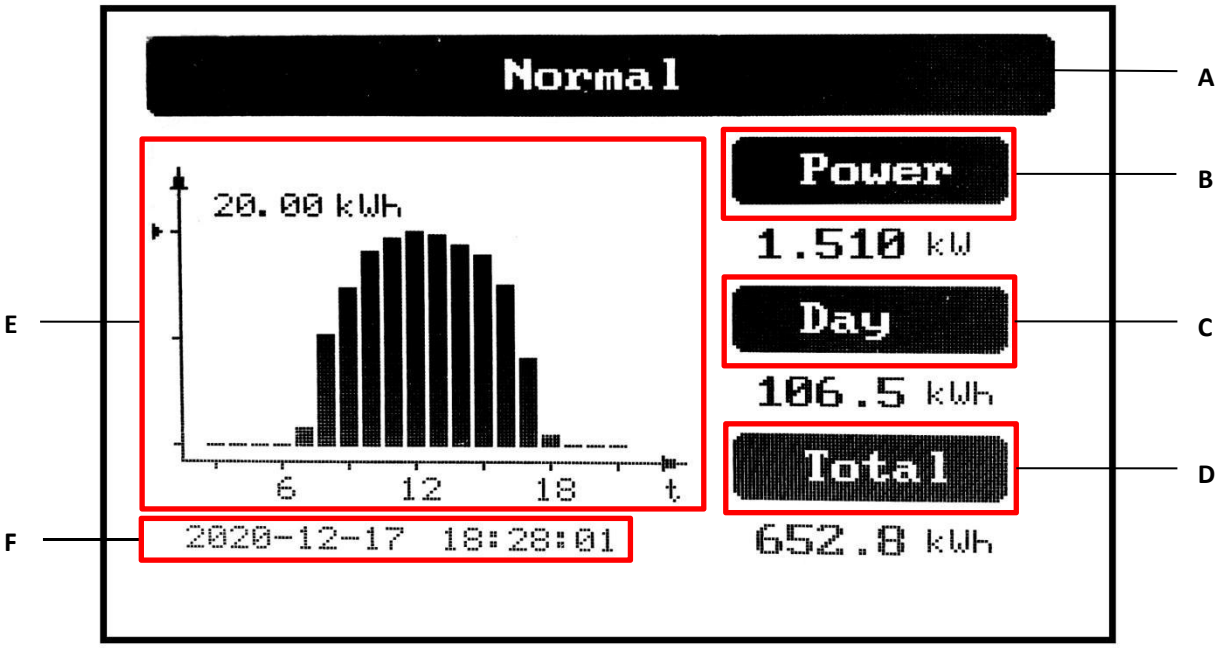

Figure 5-3 main interface

Tab	Description
A	Display the working status of the inverter
B	Inverter current power display
C	Daily output of inverter display
D	Total output of inverter displayed
E	Chart of daily generating capacity (3-21 hours)
F	Inverter working date, time display bar

5.3.2. Inverter Status

This interface mainly displays PV input voltage, current, inverter current power, temperature, output three AC voltage, current and frequency.(Figure 5-4 Inverter Status)

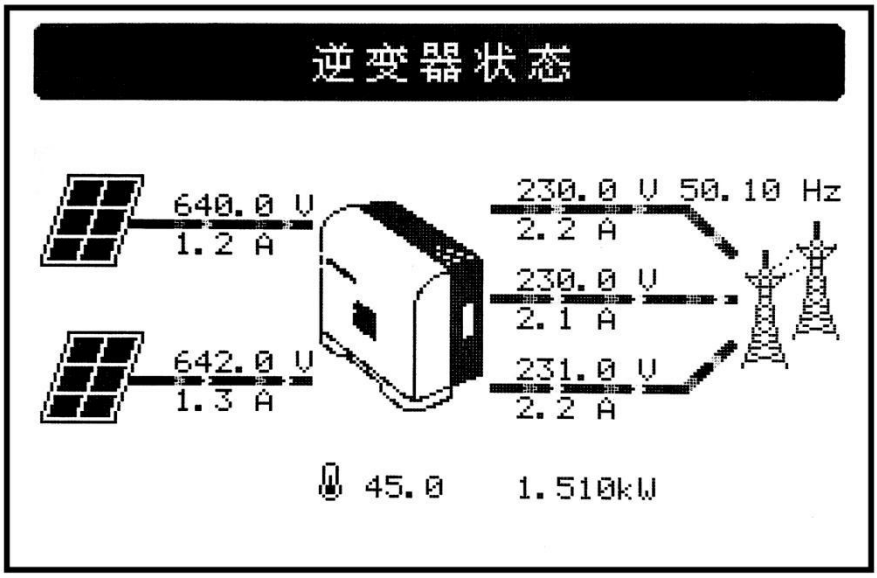

Figure 5-4 Inverter Status

5.3.3. Device Information

Device Information mainly displays: INV Module name, product serial number, currently selected safety regulation type and software version number (Figure 5-5 Device information)

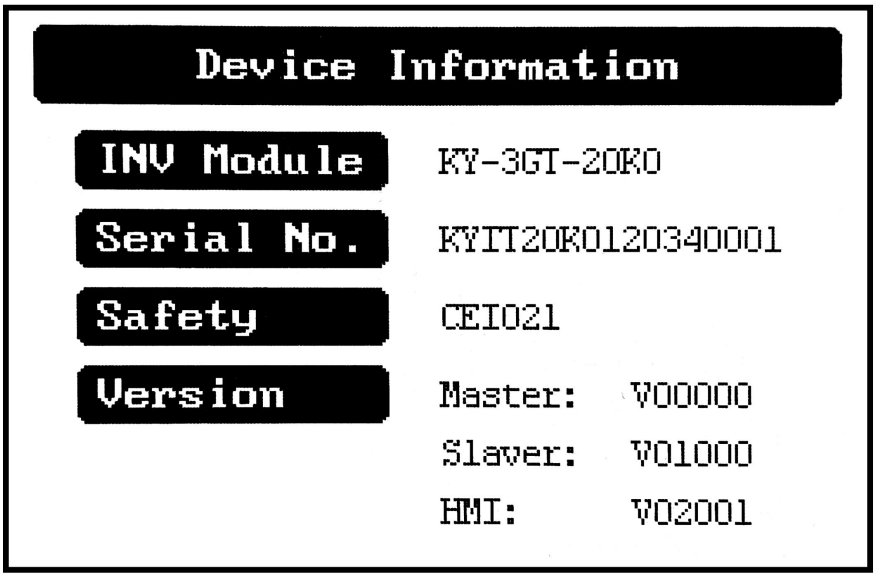

Figure 5-5 Device Information

6. Communication and Monitoring

6.1. Summery

KY-3GT series PV grid-connected inverter provides an RS485 communication interface for external WiFi/GPRS module.After configuring the monitoring system, the output voltage, current, grid frequency, fault and other information can be viewed remotely.

6.2. Communication

The user can browse the inverter's data remotely through the RS485 communication interface, which is usually used for local monitoring or connecting to a third-party data collector: When connected to the local monitoring, the inverter's RS485 interface can connect to the COMPUTER's USB interface through the USB to the RS485 converter, and the RS485 line should not exceed 1200 m at most.When networking communication, One WiFi/GPRS communication module can be configured to achieve communication networking.

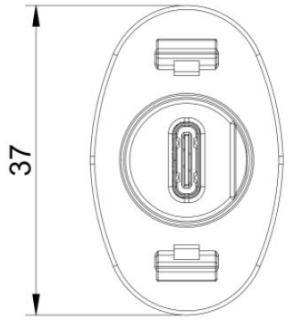

Figure 6-1 RS485 communication interface definition on the panel (unit：mm)

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

Be careful:

1. The wiring sequence of 2 terminals of 1 RS485 cable shall be consistent.

2. If the customer needs RS485 to communicate with inverter, they need to purchase USB to RS485 converter.

6.3. Monitoring

When the WiFi/GPRS communication module is inserted into the inverter and successfully connected to the network, the customer can monitor the inverter information through the monitoring website of Keyao.The user opens a web browser and inputs the website address: http://solar.koyoe.com/. After registering the account, the user can choose the user name to log in or serial number to log in. After logging in, the user can monitor the voltage, current power and other information of the inverter.

In the Apple and Android APP stores, type in the Koyoe-log keyword and users can download the APP to your mobile device.After installation, enter your user name and password, you can access your power station to view the inverter information.

Note: For detailed instructions of WiFi/GPRS communication module, please refer to the corresponding communication module user manual.

7. Maintenance and Repair

7.1 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.

7.2 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.**
	Before maintenance, because the DC input and AC output have just been cut off, the capacitor inside the device will still store electricity. So please wait for at least 10 minutes to ensure that the capacitor will release the electricity and the equipment is not electrified.
	There is no repairable part in the inverter. If there is any problem, it must be maintained by professionals.

7.3 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, KY-3GT-20k0 /KY-3GT-17K0/KY-3GT-15K0 Inverter adopts intelligent air cooling method.

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 dust on the bottom radiator of the inverter with a soft brush. Do not use water, corrosive chemicals or strong detergents to clean the inverter.

7.4 Fan Maintenance

This item is only applicable to models with fans. The preset fan at the bottom of the 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 PV panel with opaque materials, and turn the DC switch to the "off" position.

Step 3: Wait at least 10 minutes.

Step 4: Disconnect all electrical connections.

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

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

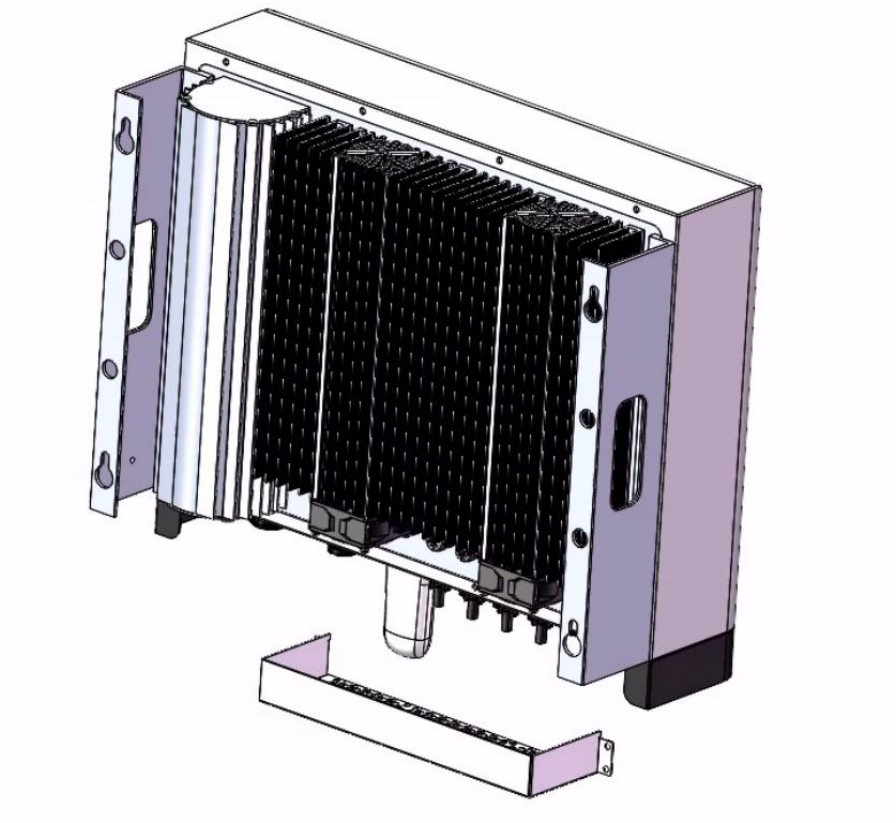

Figure 7-1 Remove the screws from the fan shield

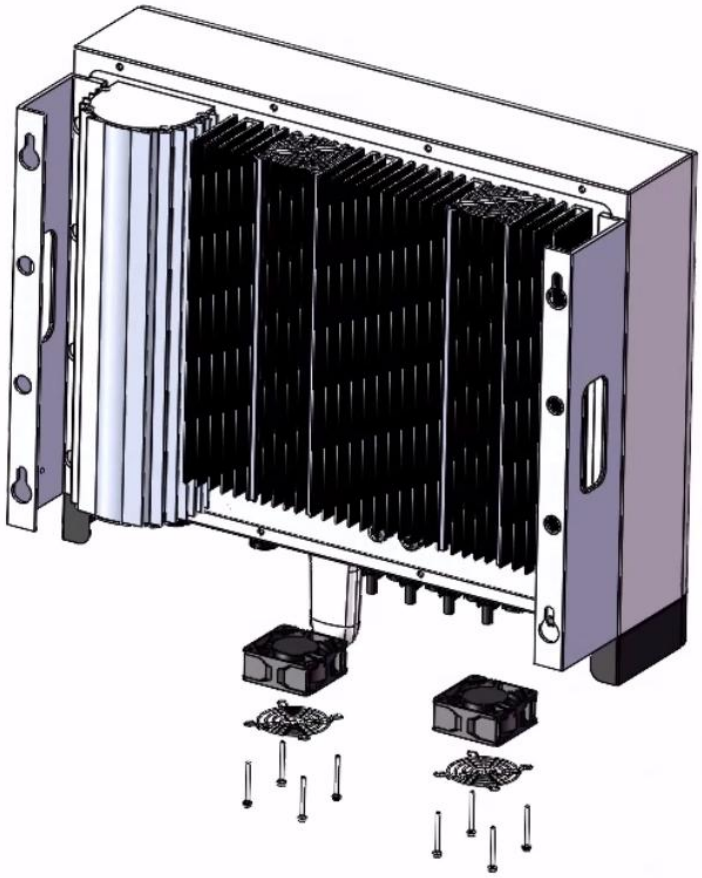

Figure 7-2 Remove the screws fixing the fan

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.

8. Technical data

Model	KY-3GT-20K0	KY-3GT-17K0	KY-3GT-15K0	KY-3GT-12K0	KY-3GT-10K0
Efficiency					
Maximum efficiency	98.50%	98.43%	98.30%	98.20%	97.80%
European efficiency	98.10%	98%	97.90%	97.80%	98.20%
MPPT efficiency	99.90%	99.90%	99.90%	99.90%	99.90%
DC side					
①Maximum allowable PV array power (W)	26000	22100	19500	15600	13000
Rated input power (W)	20520	17500	15400	12350	10300
Maximum DC voltage (V)	1000	1000	1000	1000	1000
Start voltage (V)	180	180	180	180	180
Voltage range of MPPT (V)	200 - 950	200 - 950	200 - 950	200 - 950	200 - 950
Input number of strings (pcs)	2+2	2+2	2+1	1+1	1+1
Maximum input current (A)	23/23	23/23	23/12	12/12	12/12
Maximum DC short-circuit current (A)	28/28	28/28	28/15	15/15	15/15
AC side					
Rated output power (W)	20000	17000	15000	12000	10000
Maximum output power (VA)	20000	17000	15000	12000	10000
Rated grid voltage / grid voltage range	400 Vac / 270 - 480Vac				
Type of power grid	3L/N/PE				
Frequency / range	50/60Hz 45-55 Hz / 55-65 Hz				
Total harmonic of output current	< 1.5%				
DC component	< 0.5% * In				
Power factor / range	> 0.99 / 0.8 lead - 0.8 lag (adjustable)				
Protect					
DC switch	Integrate（Optional）				
Over current protection	Integrate				
Island protection	Integrate				
Surge protection	DC class II / AC class III				
DC reverse connection protection	Integrate				
Leakage current protection	Integrate				
Insulation protection	Integrate				
Over/undervoltage protection	Integrate				
Basic parameter information					
Dimensions (mm)	505 x 414 x 200				
Weight (Kg)	18	18	17	16	16
Protection level	IP65				
Installation mode	Wall hanging				
Cooling mode	Intelligent fan cooling		Natural Convection		
Topological structure	No transformer				

night consumption (W)	<0.5
Working temperature	-25 ℃ - 60 ℃ (> 45 ℃ derating)
Relative humidity	0~95%
Altitude	< 3500 m, over 2000 m derating
Display mode	LCD
Communication	RS485 /WIFI/GPRS （Optional）
AC/DC connection	Quick plug type
Warranty	5/10years
Standard	
Safety standards	IEC62109-1/-2
EMC standards	EN61000-6-1/-2/-3, IEC61000-2-2
Grid standards	AS/NZS 4777.2, NRS 097-2-1:2017, NBT 32004-2018

① When configuring photovoltaic modules according to this parameter, it is necessary to pay attention that the voltage of photovoltaic array should not exceed the maximum DC voltage 1000V.

9. Warranty commitment

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

We will provide you with standard warranty service for 60 months. 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 photovoltaic grid connected inverter produced by KOYOE. All products purchased through regular channels shall enjoy the full range of quality assurance services provided by the company, except for the following situations:

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

10. 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
Website: www.koyoe.com
Address: No. 40, Wangwu Road, Wuzhong District, Suzhou
Telephone: + 86 512 65139208
Email: koyoesales@szzcph.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
System Error	Isolation Fault	1.Check whether the inverter is effectively earthed 2. Check whether the impedance between the positive/negative poles of the photovoltaic cell and the earth is greater than 120 KΩ.
	GFCI Out of Range	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 Voltage Out of Range	1. Check the AC output line connection is correct and reliable. 2. Wait for 5 minutes. If the power grid returns to normal, the inverter will restart automatically. 3. Ensure that the grid voltage and frequency meet the local specifications.
	Grid Frequecy Out of Range	1. Check the AC output line connection is correct and reliable. 2. Wait for 5 minutes. If the power grid returns to normal, the inverter will restart automatically. 3. Ensure that the grid voltage and frequency meet the local specifications.
	No Utility	1. Not connected to the power grid. 2. Check the cables connected to the power grid. 3. Check the availability of power grid.
	PhotoVoltaic Over Voltage Fault	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.
Inverter Failure	Temperate Overrange Fault	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.
	Relay Check Failure	1. Disconnect the positive and negative electrodes of photovoltaic cells from the inverter. 2. Wait for a while. 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.
	HCT Check Failure	
	DCI Out of Range	
	SPI Communication Fault	
	Fan Lock Fault	
	EEPROM Operation Error	
	Bus Voltage Out of Range	
	GFCI Device 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