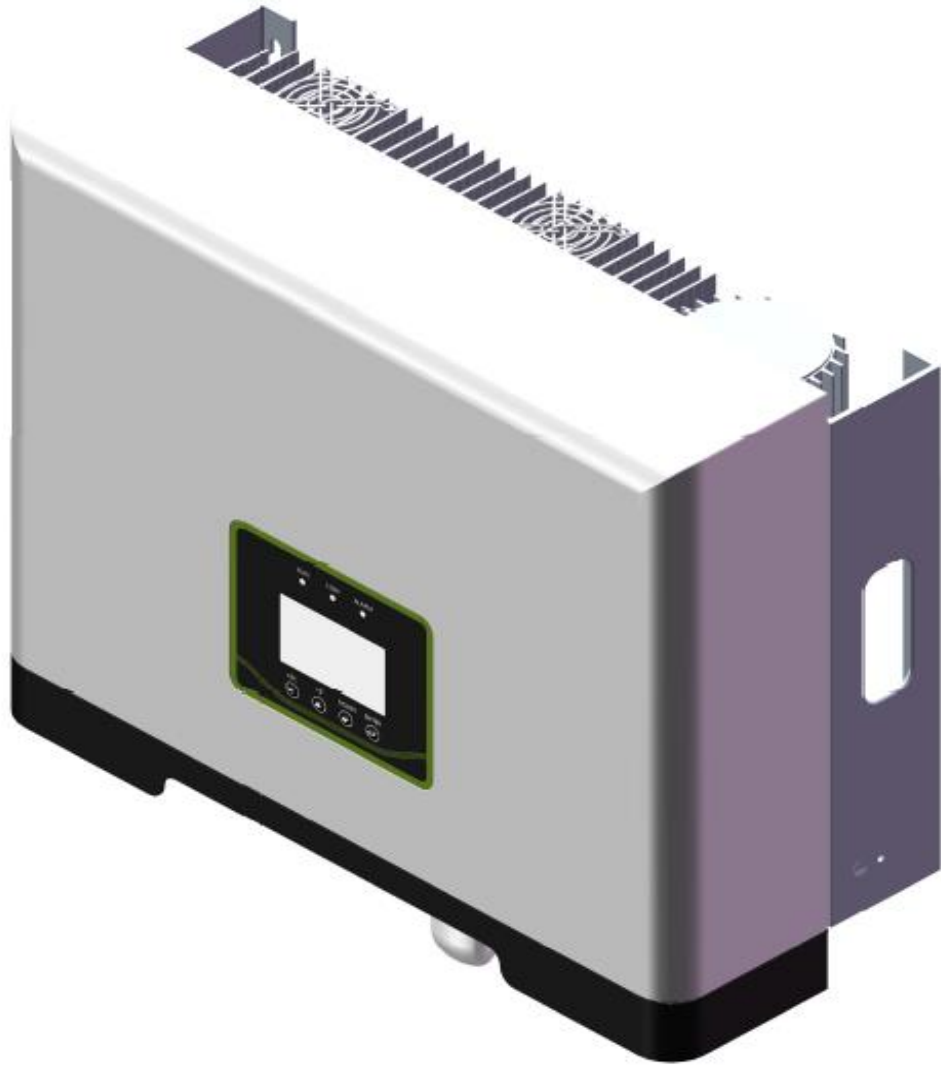


User Manual



KY3GT-20K0/KY3GT-17K0/KY3GT-15K0/KY3GT-12K0/KY3GT-10K0

V1.0

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1. Introduction

1.1. Introduction

This manual introduced the grid-tie PV inverters of KY3GT-20K0 / KY3GT-17K0 / KY3GT-12K0 / KY3GT-10K0 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.



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

Before installation:

Check the installation position to avoid direct exposure of the product to sunlight.

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.

Observe all documentation that accompanies the inverter

The inverter is more 18kg, No handles and grips. Please be carefully to carrying and lifting



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 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

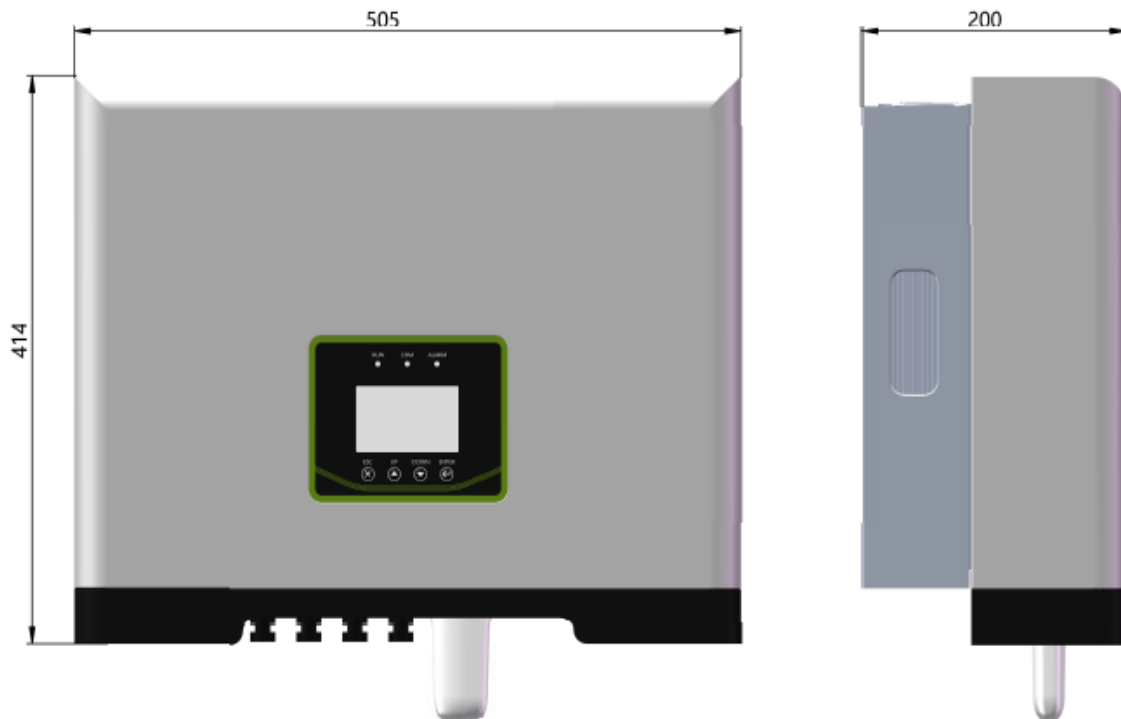


Figure 2-1 KY3GT-20K0/KY3GT-17K0/KY3GT-15K0/KY3GT-12K0/KY3GT-10K0 Dimensions



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.

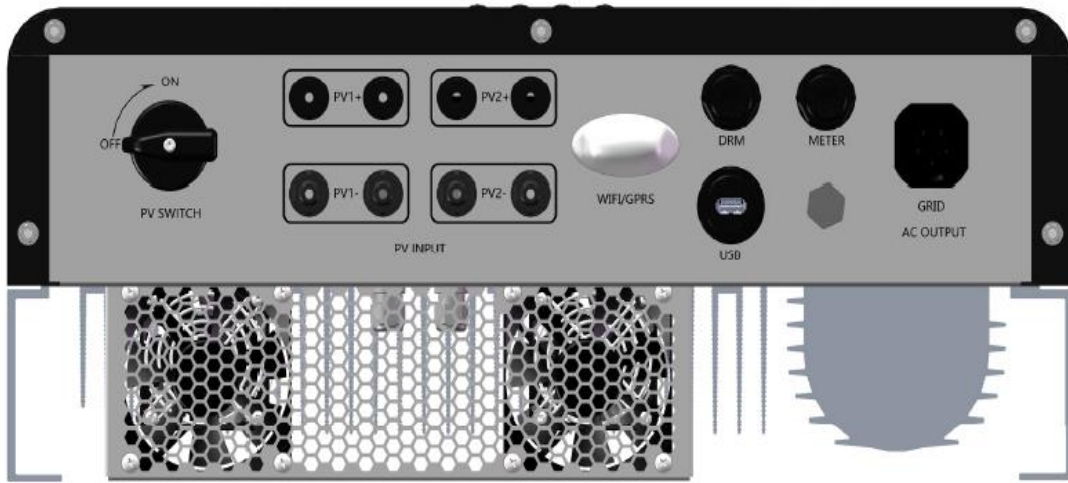



Figure 2-2 KY-3GT-20K0 /17K0 /15K0 /12K0 /10K0 Electrical Ports



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.

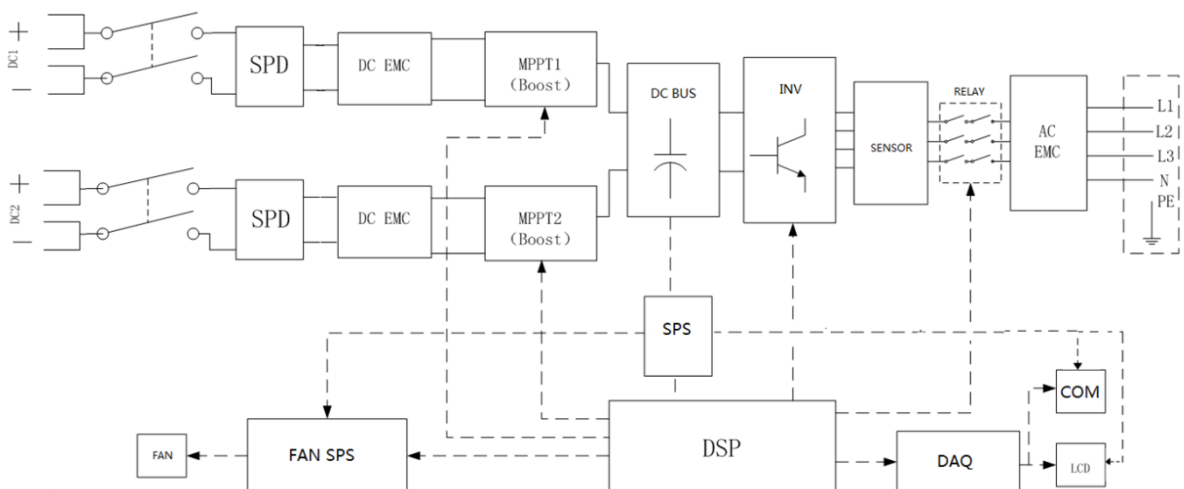


Figure 2-3 KY-3GT-20K 0/17K0 /15K 0/12K0 /10K0 electrical diagram

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

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.

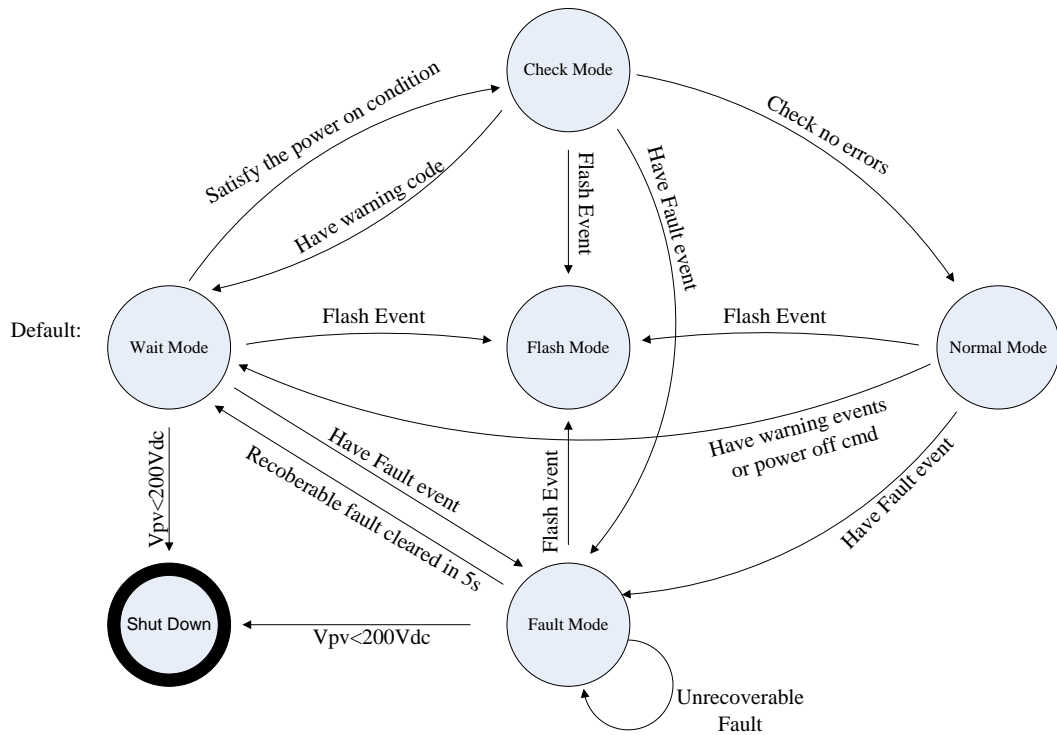


Figure 3-1 inverter working mode state machine

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 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 (DRED). 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 "off" 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

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 figure below:

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.

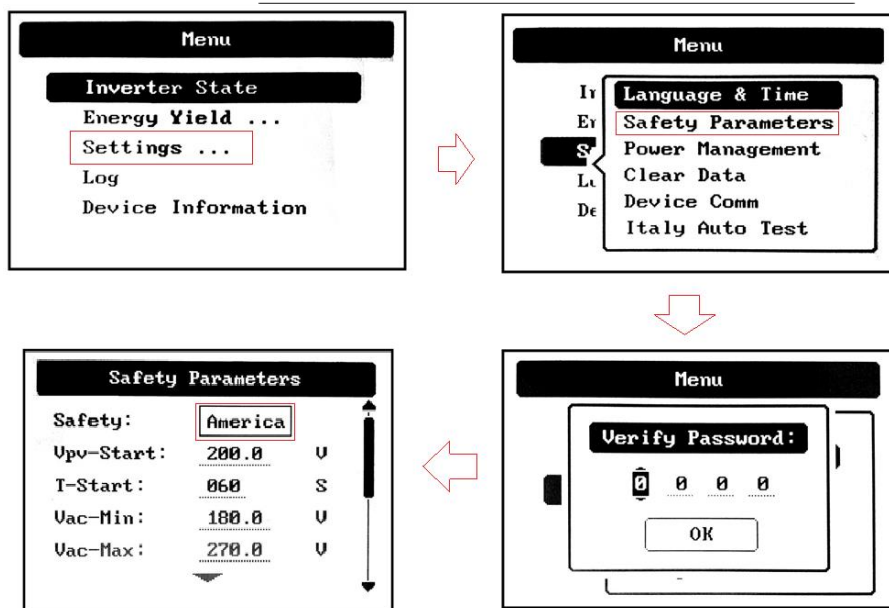


Figure 3-2 Safety Setting

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 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.
Don't expose the product to direct sunlight.

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. Under outdoor conditions, the inverter needs operating room at least 200 mm left and right and at least 300 mm up and down.



4.2. Installation Steps

4.2.1. Concrete Wall Installation Steps

Step 1: drill 4 holes with diameter of 12mm on the wall according to the size indicated in Fig. 4-2

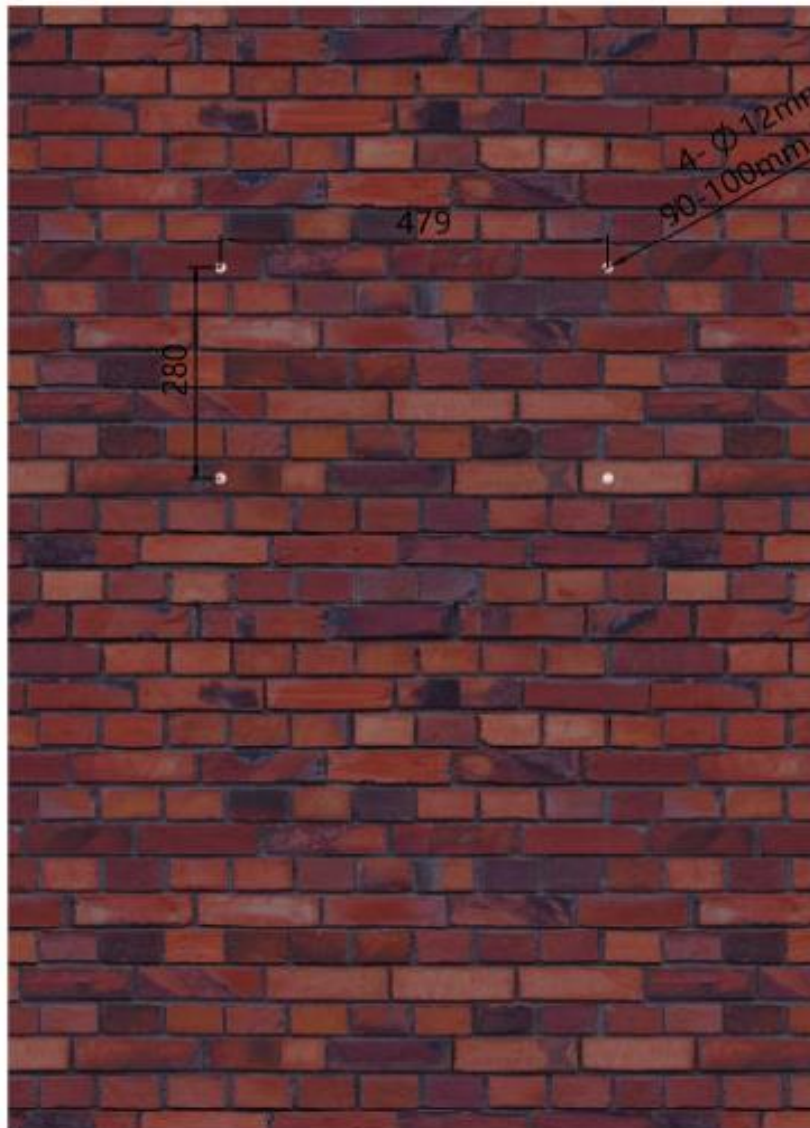


Figure 4-2 borehole size



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 2: insert the expansion pipe shown in Fig. 4-3 vertically into the hole, and knock the expansion pipe into the wall thoroughly with a hammer.

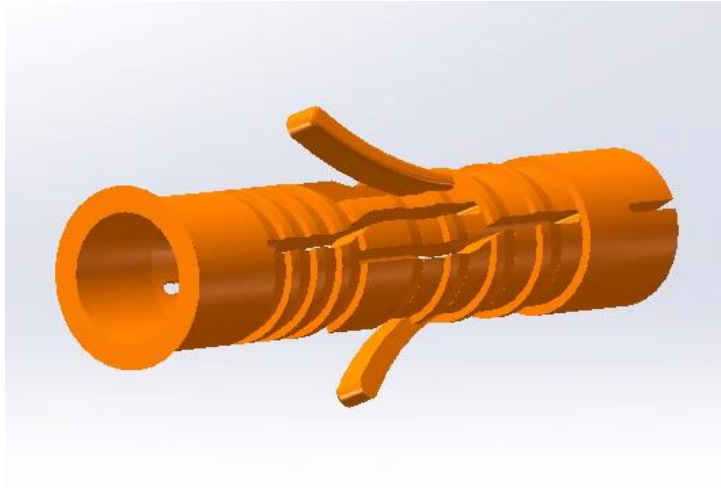


Figure 4-3 expansion pipe

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

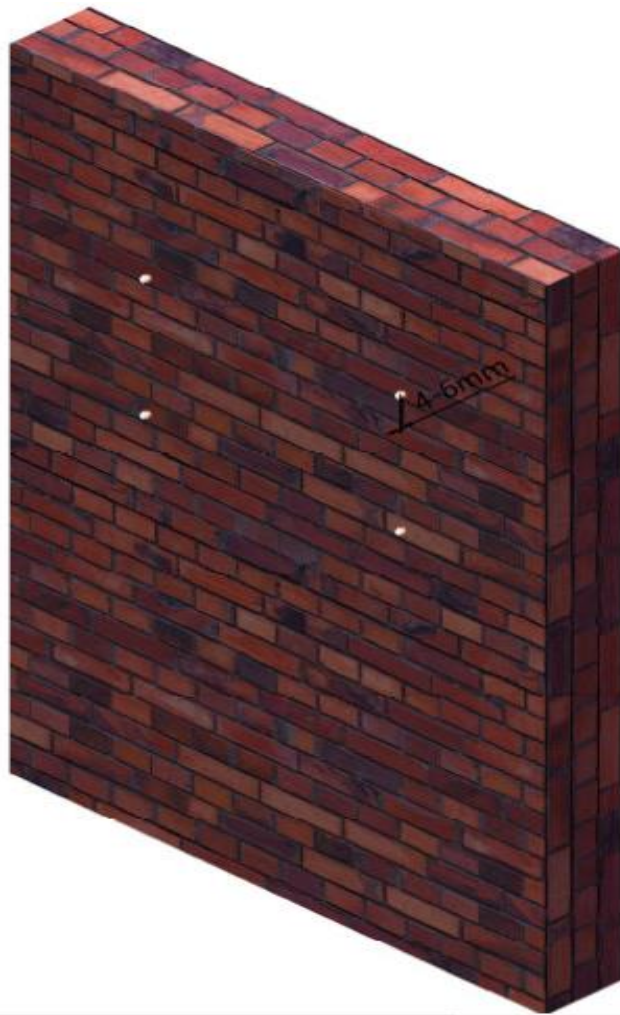


Figure 4-4 screw the screw into the expansion tube



Step 4: hold the grooves on both sides to hang the inverter on the self-tapping screw, as shown in Figure. 4-5.

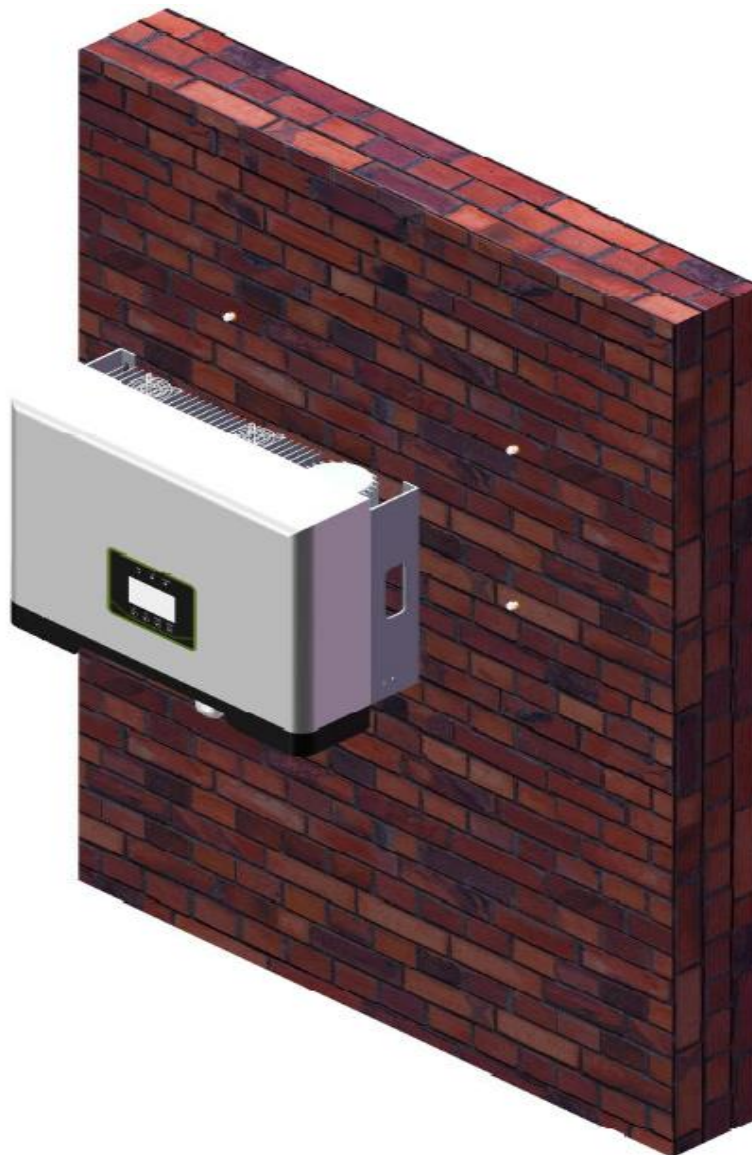


Figure 4-5 hanging inverter

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 | 45A | 40A | 35A | 30A | 25A |



Be careful!

Multiple inverters cannot share one circuit breaker!

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;

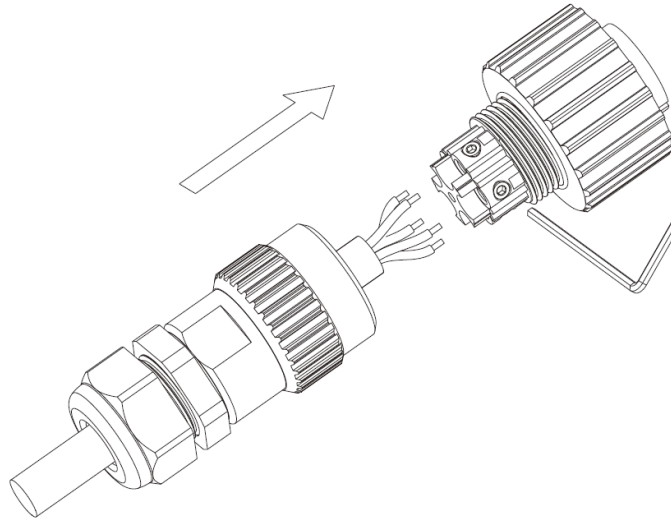


Figure 4-9 loosening connector screws

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

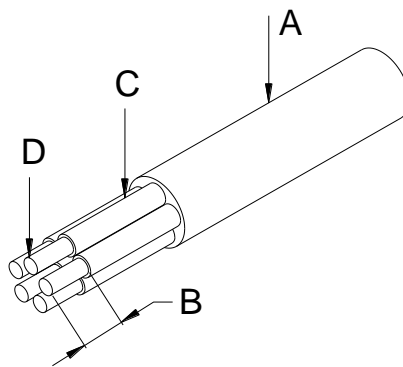



Figure 4-10 stripping diagram

| 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

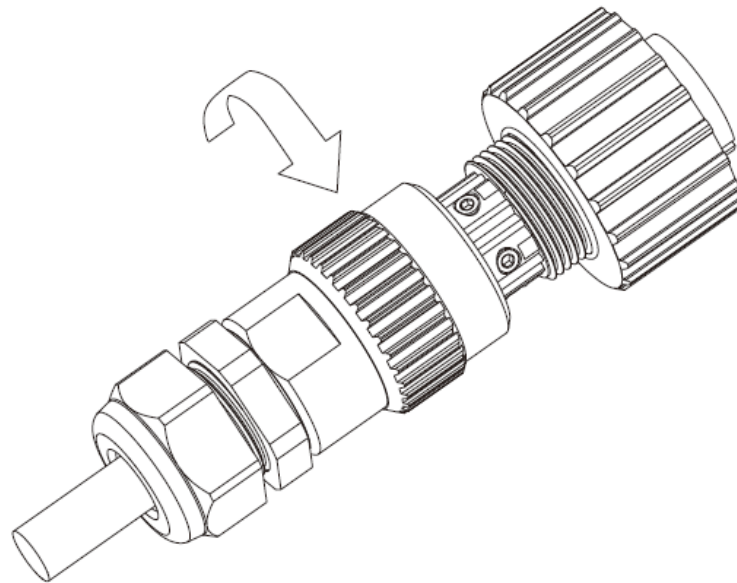
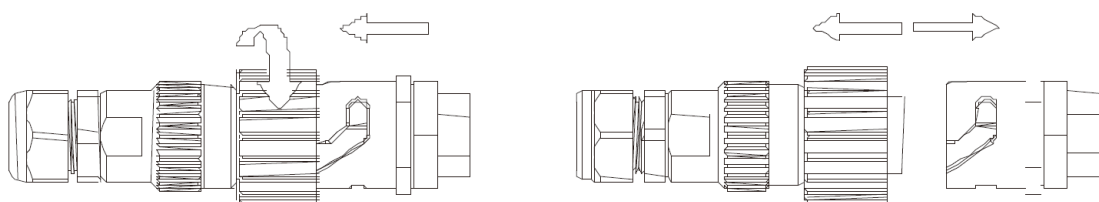


Figure 4-11 connector locking

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-20K0/KY3GT-17K0/KY3GT-15K0/KY3GT-12K0/KY3GT-10K0 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

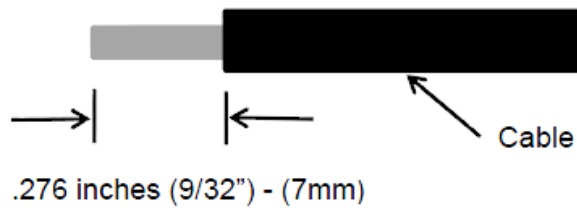


Figure 4-14 stripping size

- 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:

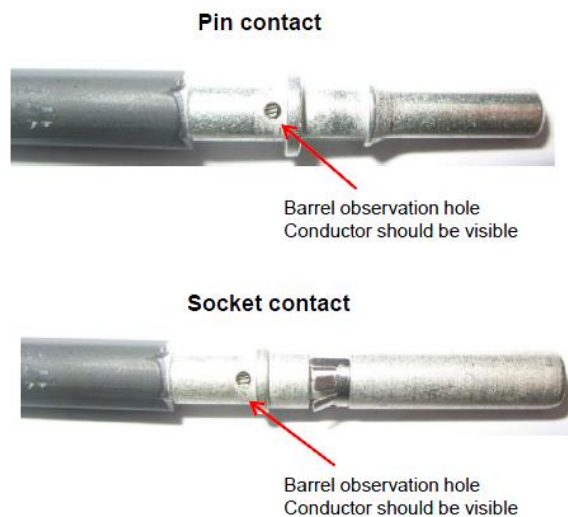


Figure 4-16 terminal installation

- 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

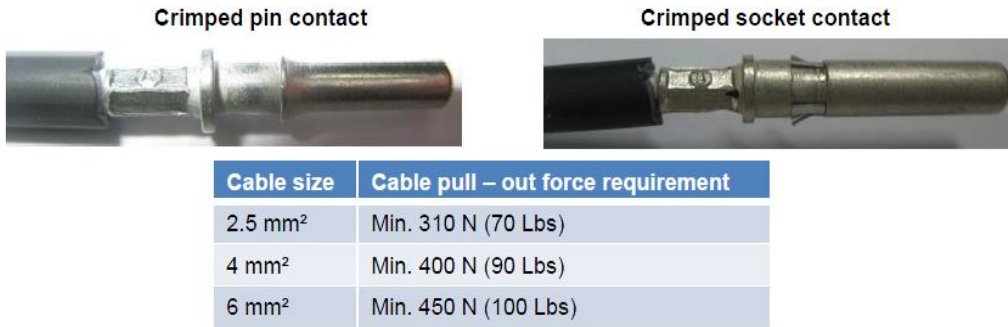


Figure 4-17 wire end crimping



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.

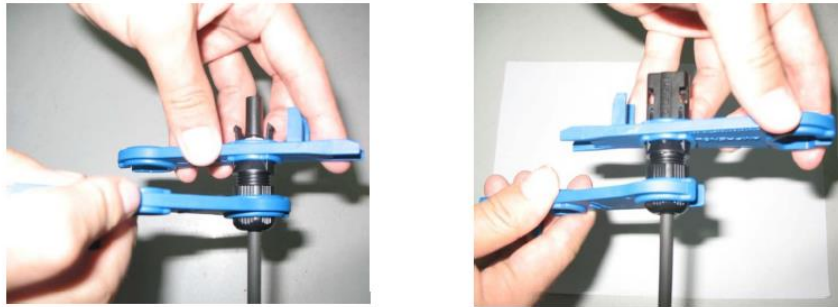


Figure 4-20 wire end fastening method

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.

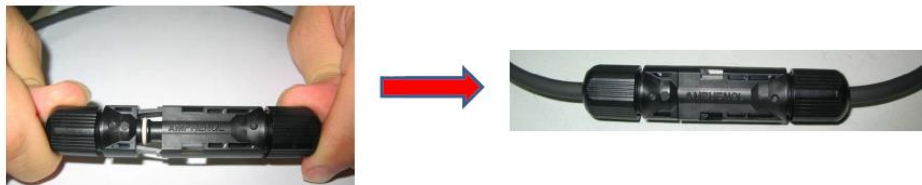


Figure 4-21 connector connection

- 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



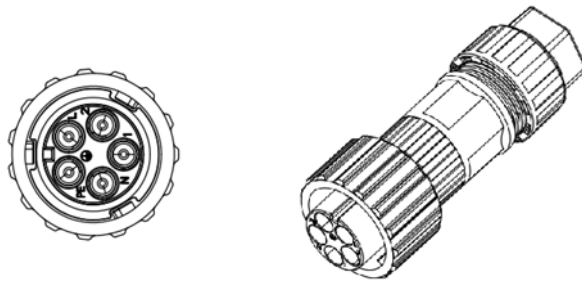
Be careful!

As the photovoltaic grid connected inverter is transformer-less, 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;

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



b) Protective earthing (second PE at external enclosure)

The inverter is required to add protective earthing connection port. Users can choose to connect the grounding protection line according to their needs. The grounding port is located next to the AC output port at the bottom of the inverter. The installation method is shown in Fig. 4-23

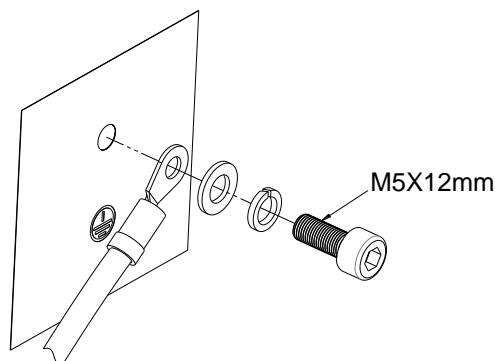


Figure 4-23 connecting grounding protection wire

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 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.

5. Communication and Monitoring

5.1. Summary

KY-3GT-20K0/KY-3GT-17K0/KY-3GT-15K0/KY-3GT-12K0/KY-3GT-10K0 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.

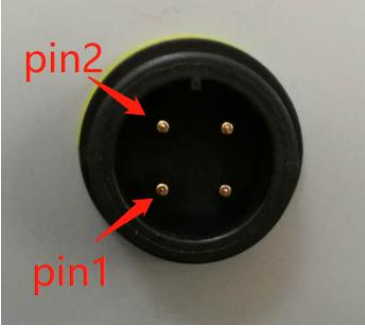
5.2. Communication

Users can browse the data of the inverter remotely through the communication interface, and the inverter provides two kinds of communication interfaces.

5.2.1. RS-485 Communication

RS-485 is usually used for local monitoring or connecting to the third-party data collector:

when connecting to the local monitoring, the RS-485 interface of the inverter can be connected to the USB interface of the computer through the USB to RS-485 converter, and the maximum length of the RS-485 cable should not exceed 1200m. Users can view and record the current power generation, working status and error information of the photovoltaic power station through the PVCs software installed on the computer.

| | | |
|------|----------|--|
| PIN1 | VCC |  |
| PIN2 | GND | |
| PIN3 | RS-485_A | |
| PIN4 | RS-485_B | |



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.

5.2.3. WiFi / GPRS Communication

KY-3GT-20K0/KY-3GT-17K0/KY-3GT-15K0/KY-3GT-12K0/KY-3GT-10K0 can be configured with a WiFi / GPRS communication module to realize communication networking.

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.

2. Remote monitoring system

When the WiFi/GPRS communication module is inserted into the inverter, the customer can monitor the inverter information through the monitoring website of KOYOE. The user opens the web browser and enters the web address: <http://www.koyoe.com/>. After registering an account, enter the user name and password to log in, and the user can monitor the voltage, current and power of the inverter.

In apple and android app stores, enter the KOYOE-log keyword, and users can download apps 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 details of WiFi/GPRS communication module, please refer to the

corresponding communication module manual.

3. Read the software version number

The local monitoring software is connected to the inverter through USB to RS-485 converter, and the software version number can be read. For example, the software version number of the main DSP is v0.0.0.00, that of the secondary DSP is v0.1.0.00, and that of the communication ARM is v0.2.0.00.

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

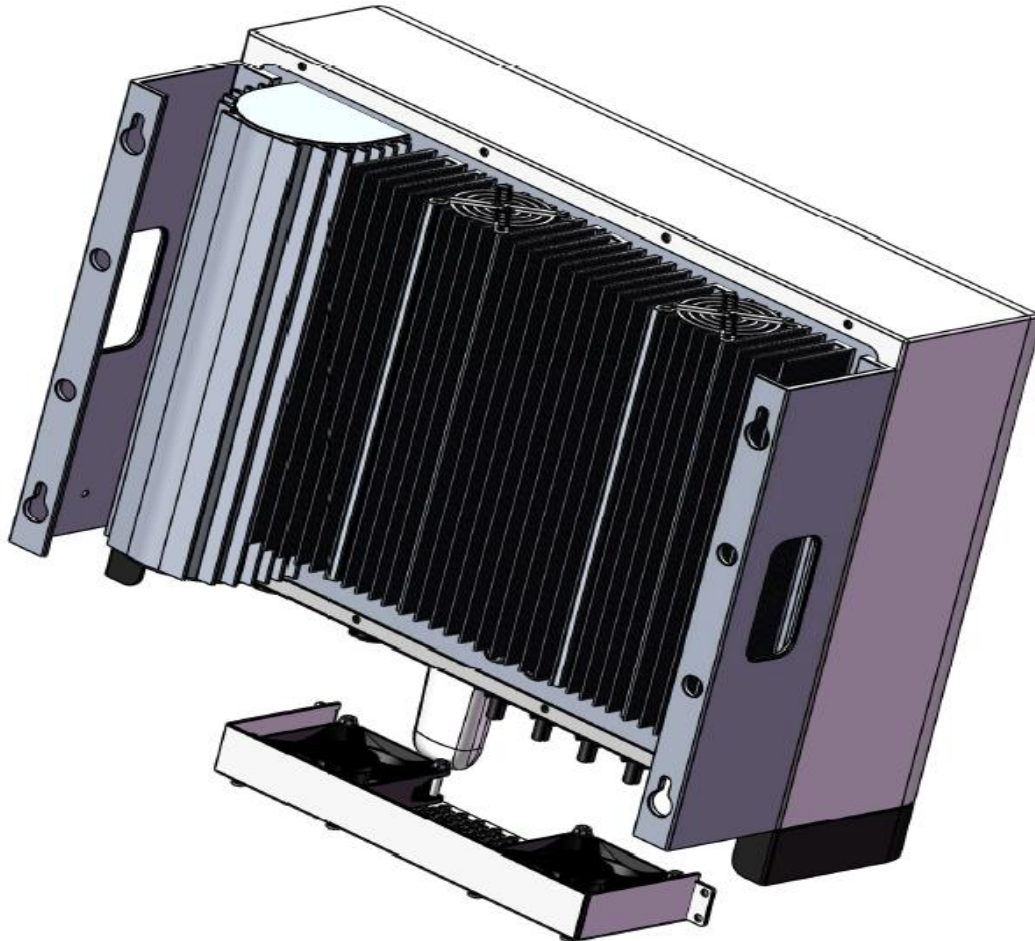


Figure 7-1 Remove the screws from the fan assembly

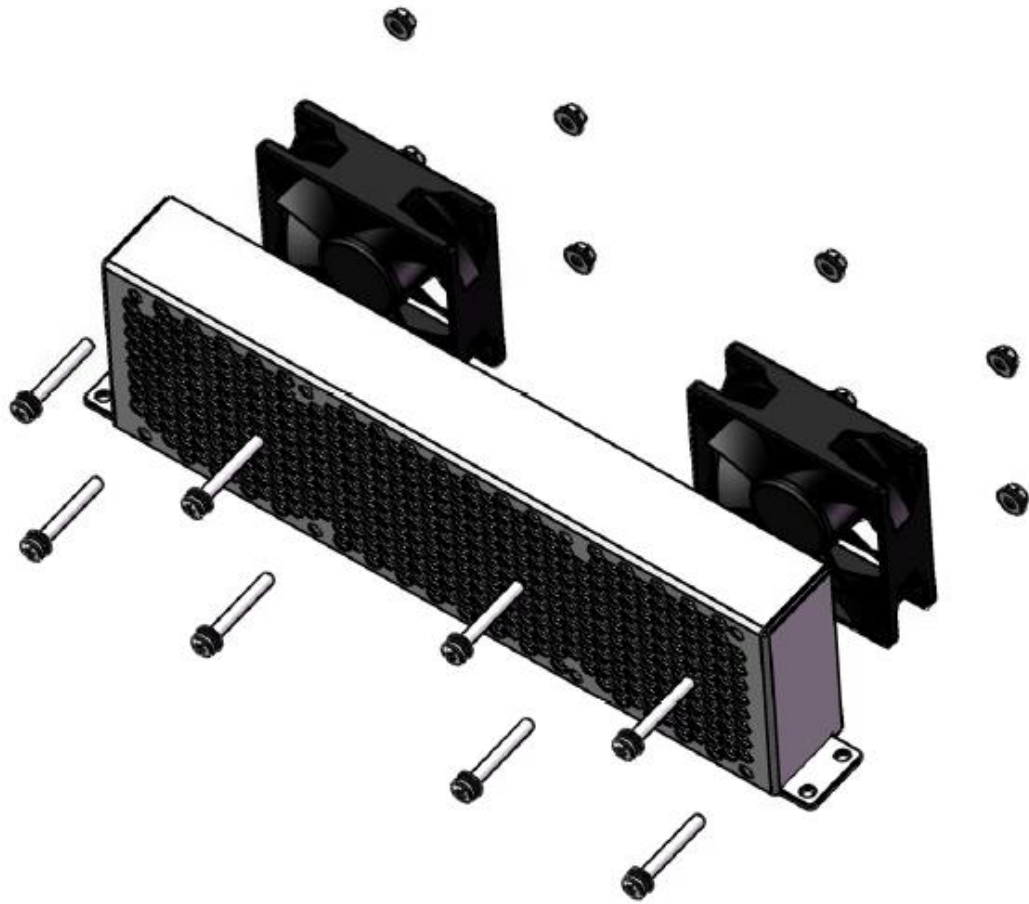


Figure 7-2 Remove the screws fixing the fan

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-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 | | | | | |
| 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 | 450 V-800 V | 450 V-800 V | 450 V-800 V | 500 V-800 V | 450 V-800 V |
| Maximum voltage range of MPPT | 200V-950 V | 200V-950 V | 200V-950 V | 200V-950 V | 200V-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 | 20A | 23A | 12A | 12A |
| Maximum input current (PV2) | 23A | 20A | 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 |
| 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 | Optional | Optional |
| 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 | 5/10years | | | | |
| Standard | | | | | |
| Safety standards | IEC62109-1/-2 | | | | |
| EMC standards | IEC 61000-6-2, IEC 61000-6-3 | | | | |
| Grid standards | AS/NZS 4777.2 NB / T 32004-2018 | | | | |

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 60 months, including KY-1Hybrid-5k0-H. 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-20K0/KY3GT-17K0/ KY3GT-15K0/ KY3GT-12K0/ KY3GT-10K0 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:

Manufacturer: 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

Australian Importer: Australian New Energy Technology Pty Ltd

Website: aus-ne.com

Address: 17 Killarra Avenue, Camberwell VIC 3124

Telephone: + 61 488 586 666

Email: info@australiannewenergytechnology.com.au

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 | <ol style="list-style-type: none"> 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. |
| | High DC current injection | |
| | 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 |