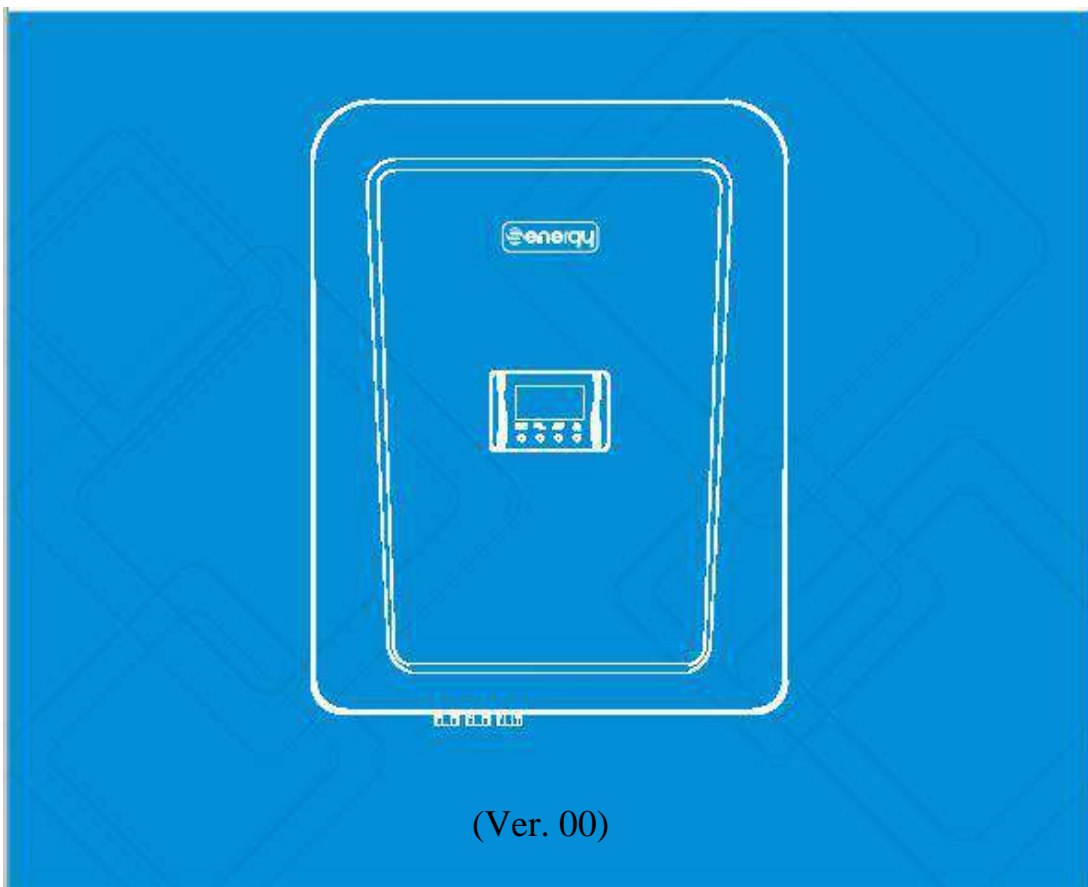




**5K /6K/ 8K/10K/
12K/15K
Installation Manual**



Shenzhen Senergy Technology Co., Ltd.

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Forward

Dear User,

Thank you so much for choosing 5K/6K/8K/10K/12K/15KTL, the latest generation of grid-tied PV Strings inverter (hereinafter referred to as the inverter) designed and developed by Senergy. This user manual describes the inverter in terms of its installation, electrical connections, operation, commissioning, maintenance, and troubleshooting. Please read through the manual carefully before any operation, and keep the manual well for future reference.

Application Model

Grid-tied PV string inverter

- ▶ 5K/6K/8K/10K
- ▶ 12K/15K

Intended Audience

This user manual is intended for photovoltaic (PV) inverter operating personnel and qualified electrical technicians.

Notes:







This user manual is subject to change (specific please in kind prevail) without prior notice. The latest version of user manual and other more information about the product are available from <http://www.Senergytec.com>, and/or by call our service center 400-930-3930.

This inverter must be installed by the " Australia local agent professional person who authorized by manufacturer".

This professional person should familiar with Australia relevant electrical regulations to ensure all installation comply with Electrome chanical regulations.

Symbol Conventions

Safety symbols used in this manual, which highlight potential risks and important safety information, are listed as follows:

Symbol	Description
 DANGER	Indicates an imminently hazardous situation which, if not correctly followed, will result in serious injury or death.
 WARNING	Indicates a potentially hazardous situation which, if not correctly followed, could result in serious injury or death.
 CAUTION	Indicates a potentially hazardous situation which, if not correctly followed, could result in moderate or minor injury.
 NOTICE	Indicates a potentially hazardous situation which, if not correctly followed, could result in equipment failure to run, or property damage.
 Note	Calls attention to important information, best practices and tips: supplement additional safety instructions for your better use of the PV inverter to reduce the waste of your resource.
	Refer to documentation (Remind operators to refer to the documentation shipped with the inverter).


1 Safety Precautions

Please read these safety precautions in *User Manual* carefully to prevent personal injury or death.

1.1 Personnel Safety


- a. The PV inverter must be installed, electronically connected, operated and maintained through qualified/ trained technician;
- b. The qualified technician must be familiar with the safety regulations of electrical system, working process of PV power generation system, and standards of local power grid;
- c. The technician must read through *User Manual* carefully and master it before any installation and operation.

1.2 The PV Inverter Protection

 NOTICE	As soon as receiving the inverter, please check if it is damaged during its transportation. If yes, please contact Senergy or your dealer immediately.
---	--


- a. Do not tamper with any warning signs on the inverter enclosure because these signs contain important information about safe operation.
- b. Do not remove or damage the nameplate on the inverter's enclosure because it contains important product information.
- c. Do not remove the anti-dismantle label on the inverter's enclosure because it is the basis for product warranty.

1.3 Installation Safety

 NOTICE	Please read through <i>User Manual</i> carefully before installing the inverter; warranty or liability will be void from Senenergy if damage is caused by installation faults.
---	--


- a. Ensure there is no electrical connections around ports of the PV inverter before installing;
- b. Adequate ventilation must be provided for inverter installation location. Mount the inverter in vertical direction, and ensure that no object is put on the heat sink affecting the cooling. (For details, refer to Chapter 4 Installation)

1.4 Electrical Connections

 DANGER	Before installing the inverter, check all electrical ports to ensure no damage and no short circuit. Otherwise personal casualty and/or fire will occur.
---	--


- a. Input terminals of the inverter apply only to input terminals of PV String; do not connect any other DC source to the input terminals.
- b. Before connecting PV modules, ensure that its voltage is within the safe range; when exposed to any sunlight, PV modules can generate high voltage.
- c. All electrical connections must meet the electrical standards of the country or region.
- d. Cables used in electrical connections must be well fixed, good insulation, and with proper specification.

1.5 Operating and Commissioning

 DANGER	While the inverter operating, high voltage can lead to an electrical shock hazard, and even cause personal casualties. Therefore, operate the PV inverter strictly according to the safety precautions in user manual.
---	--


- a. Before getting the permission of electrical power sector in the country/ region, the grid-tied PV inverter cannot start generating power.
- b. Follow the commissioning procedures described in user manual when commissioning the inverter.
- c. Do not touch any other parts' surface except the DC switch when the PV inverter is operating; its partial parts will be extremely hot and can cause burns.

1.6 Maintenance

 DANGER	Power OFF all electrical terminals before the inverter maintenance; strictly comply with the safety precautions in this document when operating the inverter.
---	---

- a. For personal safety, maintenance personnel must wear appropriate personal protective equipment (like insulation gloves and protective shoes) for the inverter maintenance.
- b. Place temporary warning signs or erect fences to prevent unauthorized access to the maintenance site.
- c. Follow the procedures of maintenance stipulated in the manual strictly.
- d. Check the relevant safety and performance of the inverter; rectify any faults that may compromise the inverter security performance before restarting the inverter.

1.7 Additional Information

 NOTICE	To avoid any other unforeseeable risk, contact Senergy immediately, if there is any issue found during operation.
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2 Overview of the Inverter

This chapter introduces the inverter and describes its functional model, network application, appearance, dimensions, and working process etc.

2.1 Functional Models

2.1.1 Function

This series (5K/6K/8K/10K/12K/15KTL) is a three-phase grid-tied PV string inverter (transformer less) that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

 WARNING	The inverter is transformerless. Add an isolation transformer before grounding the positive/ negative terminal of PV modules (like Thin Film module) for operation.
 WARNING	Do not connect PV modules in parallel to several PV inverters for operation.

2.1.2 Model Description

Figure 2.1 shows a model number of the inverter, using SE 15KTL as an example.

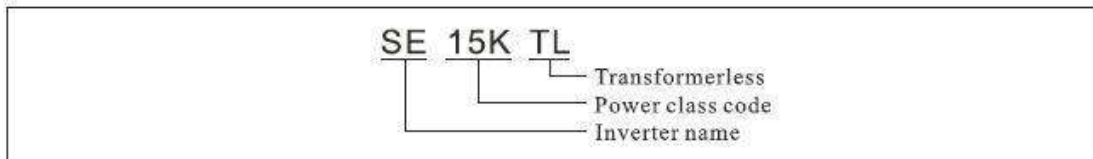


Figure 2.1 Model number descriptions

2.2 Network Application

2.2.1 Grid-tied PV Power Systems

This series inverter applies to grid-tied PV power systems for industrial/commercial rooftops, fishing/farmers light complementary power generation systems, and large ground-based power stations. Generally, these series inverters are used to low-voltage grid-tied PV power system, as shown in Figure 2.2.

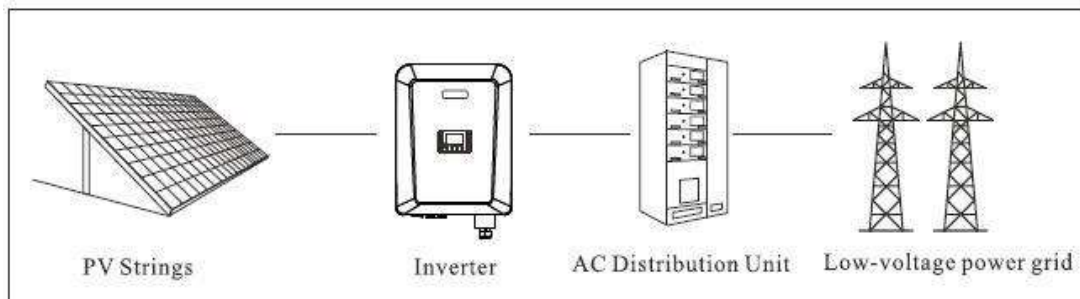


Figure 2.2 a low-voltage grid-tied PV power system

2.2.2 Supported Power grids

These series inverters support TN-S, TN-C, and TT power grids as shown in Figure 2.3.

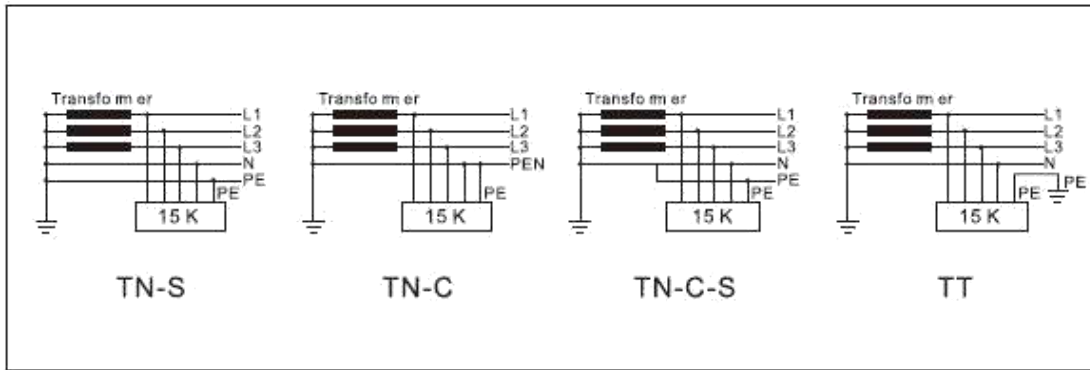


Figure 2.3 Power grids supported by the inverter

2.3 Outline and Dimensions

2.3.1 Dimensions

Figure 2.4 shows the dimensions of the inverter as follows:

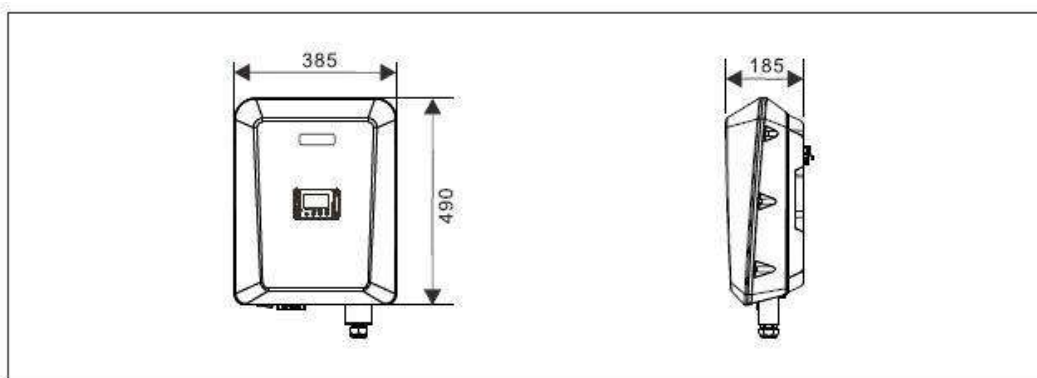


Figure 2.4 The dimensions of the inverter by front & lateral views (unit: mm)

2.3.2 Outline

Figures 2.5 shows the outline of inverter as follows:

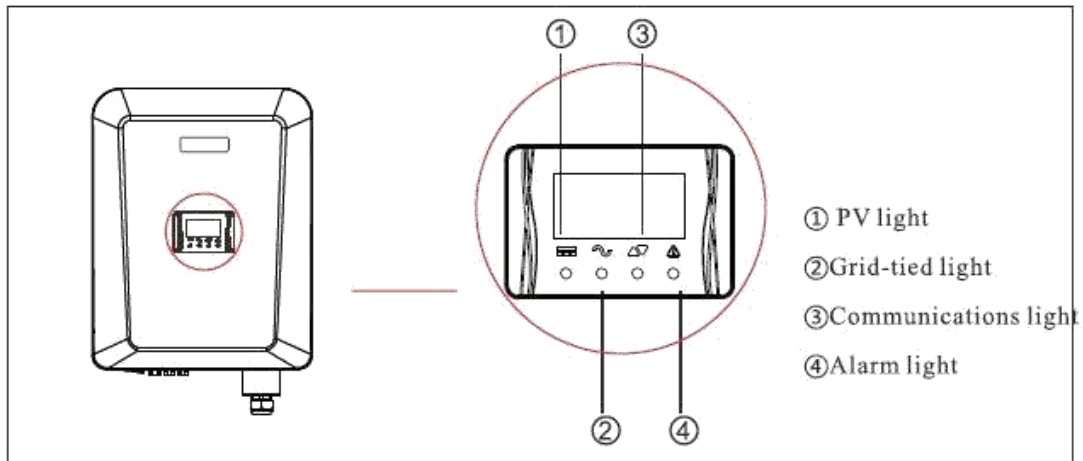


Figure 2.5 The front view and amplification effect of LED indicator area

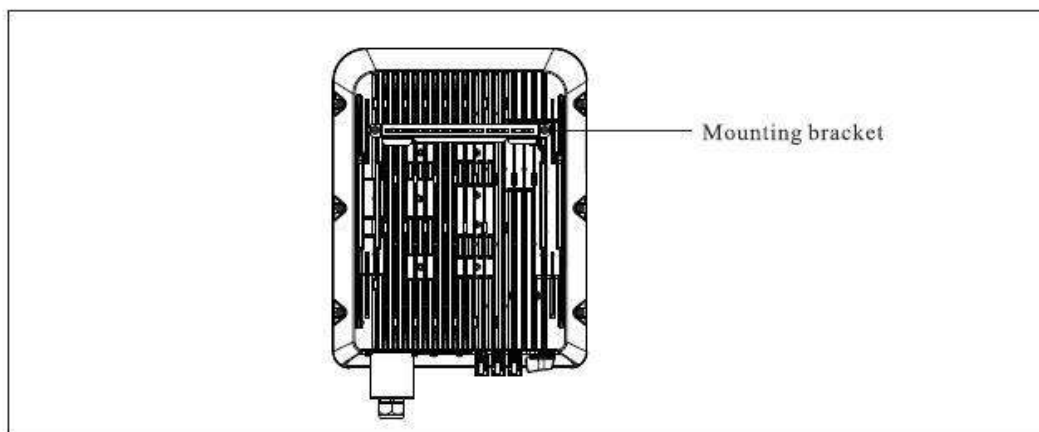


Figure 2.6 The rear view of the inverter

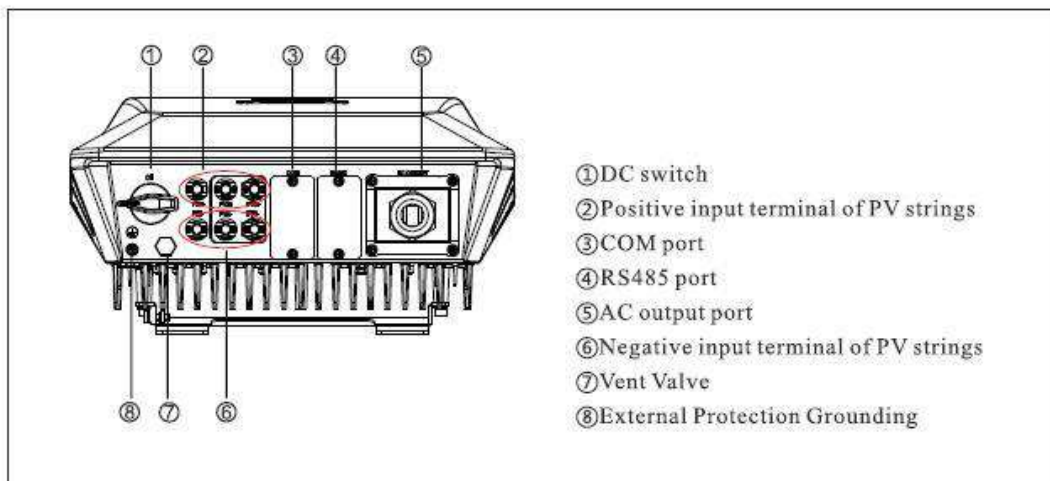


Figure 2.6 The bottom view of the inverter

2.4 Working Process

2.4.1 Basic Principle Description

5K/6K/8K/10K/12K/15KTL receive inputs from PV strings through DC switch and surge protection in order: there are 2 groups of PV strings input terminals on DC input terminal of 5K/6K/8K/10K; there are 3 groups of PV strings input terminals on 12K/15KTL with the 2nd and 3rd routes terminals merging into one independent MPPT. Then the inputs are grouped into two MPPT routes inside the inverter to track the maximum power point of the PV strings. These two MPPT power is then converted into DC Bus which is then converted to AC power through an inverter circuit. Finally the converted AC power is fed to the Power grid through the inverter. Surge protection and EMI filter are supported on both the DC and AC sides to reduce electromagnetic interference.

2.4.2 Circuit Diagrams

Figure 2.7 shows the circuit diagram for 5K/6K/8K/10K.

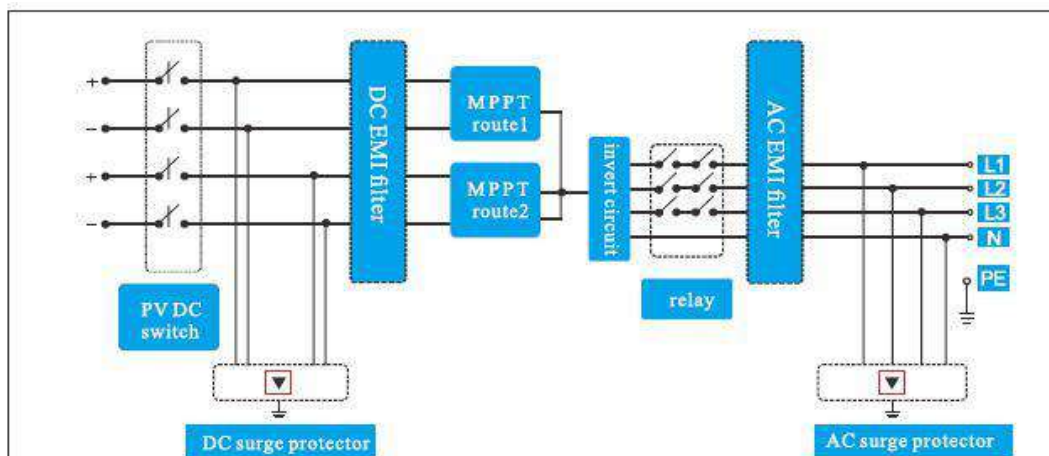


Figure 2.7 The circuit diagram of 5K/6K/8K/10K.

Figure 2.8 shows the circuit diagram for 12K/15KTL.

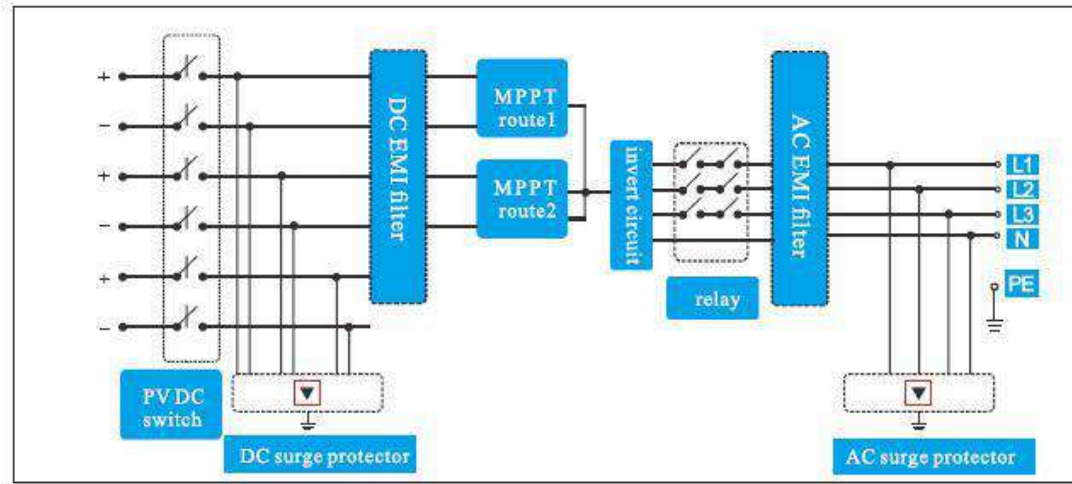


Figure 2.8 The circuit diagram of 12K/15KTL.

2.4.3 Working Modes

Three working modes of the inverter are shown as follows: standby, operating, and shutdown. Table 2.1 shows the conditions for the inverter to switch between working modes.

Table 2.1 Working modes description

Modes	Description
Standby	The PV inverter enters the standby mode when the input voltage of PV Strings can enable auxiliary power supply to run, but cannot meet the inverter operation requirements.
Operating	When the PV inverter is grid-tied and generates electricity, it <ul style="list-style-type: none"> > tracks the maximum power point to maximize the PV String output. > converts DC power from PV strings into AC power and feeds the power to the power grid.

Shutdown	<p>The PV inverter switches from standby or operating mode to shutdown mode if detecting a fault or a shutdown command.</p> <p>The shutdown mode can only be cleared when rebooting DC side or receiving a booting command.</p>
----------	---



3 Storage

This chapter describes the storage requirements for the inverter.

The following storage instructions apply if the PV inverter will not be deployed immediately:

- >Do not unpack the inverter (put desiccant in the original box if the PV inverter is unpacked).
- >Store the PV inverter at a temperature range of -40 °C to +70 °C and with the relative humidity of 0% to 100% (no condensing).
- >The PV inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- > A maximum of four layers of inverters can be stacked.
- > Do not position the inverter at a front tilt, excessive back tilt, or side tilt, or upside down.
- >Conduct periodic inspection during storage. Replace the packing materials immediately if any rodent bites are found.
- > Ensure that qualified personnel inspect and test the inverter before use if it has been stored for a long time.

4 Installation

 DANGER	Do not install the inverter on flammable building materials or in an area that stores flammable or explosive materials.
 CAUTION	Do not install the inverter in a place where personnel are likely to come into contact with its enclosure and heat sinks to avoid electrical shock/ burn.


4.1 Checking the Outer Packing

- When receiving the inverter, check that the packing materials are intact.
- After unpacking, check that the deliverables are complete, intact, and consistent with your order list.
- Examine the PV inverter and its fittings for damage such as scraps and cracks.

Item	Name	Description
①	the inverter*1	
②	rear panel*1	
③	screws reserved for installing rear panel*3	secure a rear panel to the support
④	Output wire protection cover	used to protect output wires
⑤	RS485 protection cover	used to protect RS485
⑥	Inverter retaining screws*1	used to secure the inverter after mounting rear panel
⑦	RS485 terminal block	standard
⑧	Euro type terminal*7	used for crimping wires
⑨	PV Strings input connector*(3*2)	used to connect PV strings input power cable
⑩	metal terminal *(3*2)	port for crimping a PV strings input power cable
⑪	Documentation	includes quick installation guide, CQC certificate, SN label, compliance, and testing reports in paper copies

Figure 4.1 The deliverables of 12K/15KTL, as an example

Note: The deliverable quantity of 5K/ 6K/8K/10KTL for item 9 & 10 in Figure 4.1 is both 2 * 2.

 NOTICE	If any damage mentioned above is found, contact the dealer immediately.
---	---

4.2 Moving the inverter

After checking the outer packing, move the PV inverter to the designated installation position horizontally. Hold the handles on both sides of the inverter, as shown in Figure 4.2.

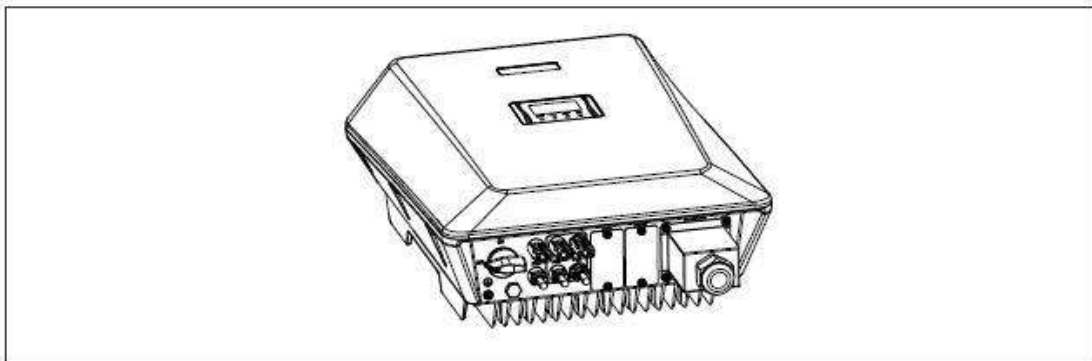




Figure 4.2 Moving the inverter






 CAUTION	The inverter is relatively heavy! To prevent device damage and personal injury, arrange two people to move the inverter and handle with care.
 CAUTION	<ul style="list-style-type: none"> >Do not place the inverter with its wiring terminals contacting the floor because the power ports and signal ports at the bottom of the device are not designed to support the weight of the inverter. >When placing the inverter on the floor horizontally, put foam or paper under to protect its enclosure.

4.3 Identify the Inverter

4.3.1 Nameplate

After moving the PV inverter from packing box, identify it by reading its nameplate labeled on the side. The nameplate contains important product information: the model information, communications/ technical specifications, and compliance.

4.3.2 Compliance and Safety Symbols

Safety symbol	Description
	<p>Electrical shock!</p> <p>There are residual voltages in the PV inverter. It needs 10 minutes to finish discharge.</p>
	<p>The PV inverter must not be touched when in operation. Its enclosure and heat sinks are extremely hot.</p>
	<p>Electrical shock! This part is charged. Only qualified and/or trained electrical technicians are allowed to perform operations on the inverter.</p>
	<p>If the inverter service life has expired, dispose it in accordance with local rules for disposal of electrical equipment waste. Do not dispose the PV inverter with household garbage.</p>
	<p>The PV inverter is compliant with CQC.</p>

4.4 Installation Requirements

According to installation position, one kind of physical installation is described below in detail: wall-mounting.

4.4.1 Determining the Installation Position

Basic Requirements

- a. The inverter is protected to IP65 and can be installed indoors or outdoors.
- b. The installation method and position must be appropriate for the weight and dimensions of the inverter. The weight of 5K/6K/8K/10K is 19.8kg, 12K/15K is 21.8kg, and yet size of 5K/6K/8K/10K/12K/15KTL is 385mm*490mm*185mm.
- c. Do not install the inverter in a place where personnel are likely to come into contact with its enclosure and heat sinks because these parts are extremely hot during operation.
- d. Do not install the inverter in an area that stores flammable or explosive materials.

Installation Environment Requirements

- a. The ambient temperature must be below 50°C which ensures the inverter's optimal operation and extends its service life.
- b. The inverter must be installed in a well ventilated environment to ensure good heat dissipation.
- c. The inverter must be free from direct exposure to sunlight, rain, and snow to extend its service life. It is recommended that the inverter be installed in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4.3.

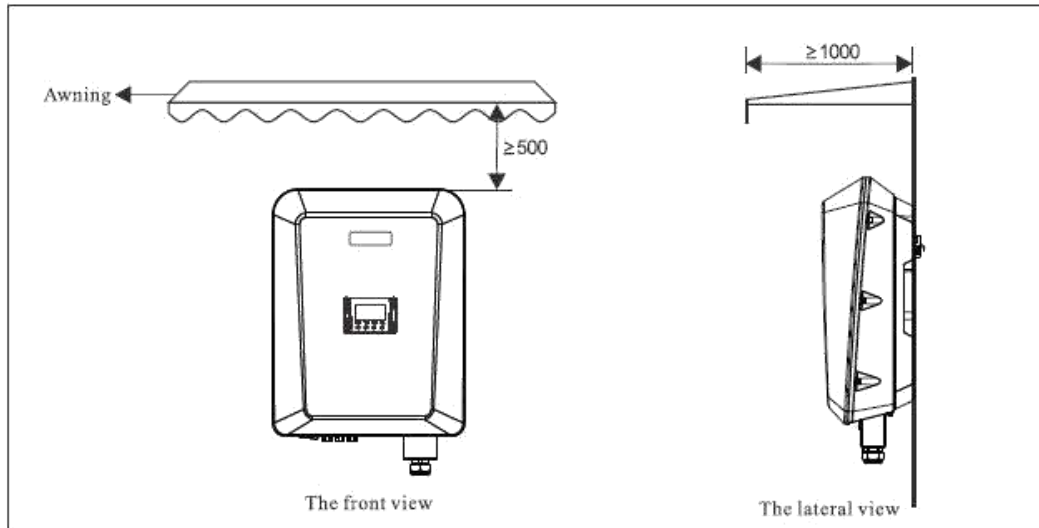


Figure 4.3 Installation environment with awning (unit: mm)

Carrier Requirements

- a. The carrier where the inverter is installed must be fire-proof. Do not install the inverter on flammable building materials.
- b. The wall must be solid enough to bear the weight of the inverter.
- c. Do not install the inverter on a wall made of gypsum boards or similar materials with weak sound insulation to avoid noise disturbance in a residential area.

Installation Space Requirements

- a. It is recommended that the inverter be installed at eye level to facilitate operation and maintenance.
- b. Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation, as shown in Figure 4.4.

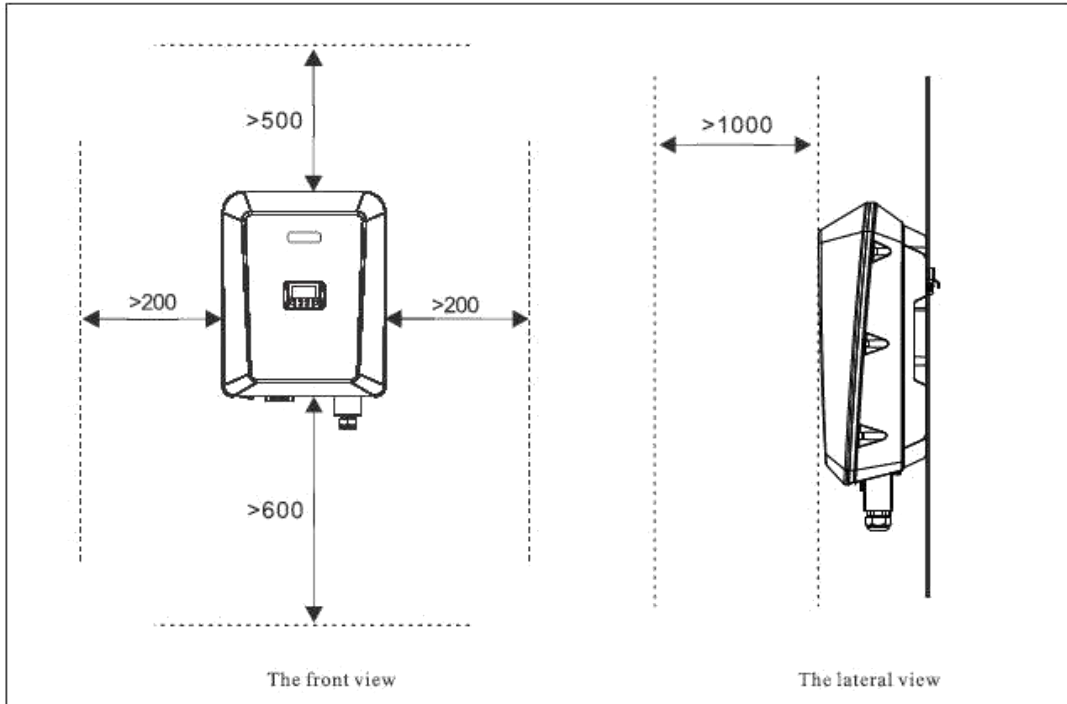


Figure 4.4 Installation Clearance Requirements (unit: mm)

c. When installing multiple inverters, install them along the same line (as shown in Figure 4.5) if sufficient space is available, and install them in triangle mode (as shown in Figure 4.6) or in stacked mode (as shown in Figure 4.7) if no sufficient space is available. The installation modes ensure sufficient space for installation and heat dissipation.

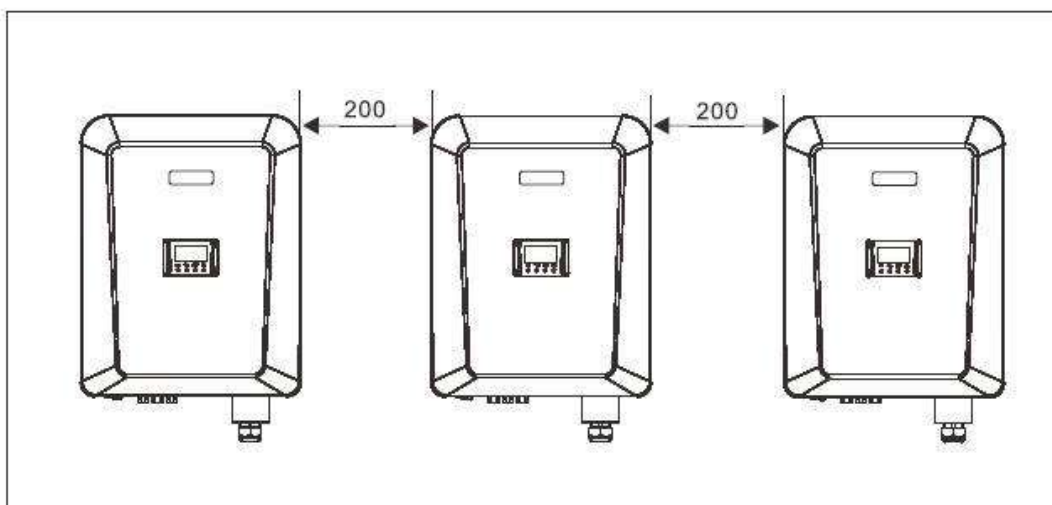


Figure 4.5 Installation along the same line (unit: mm)

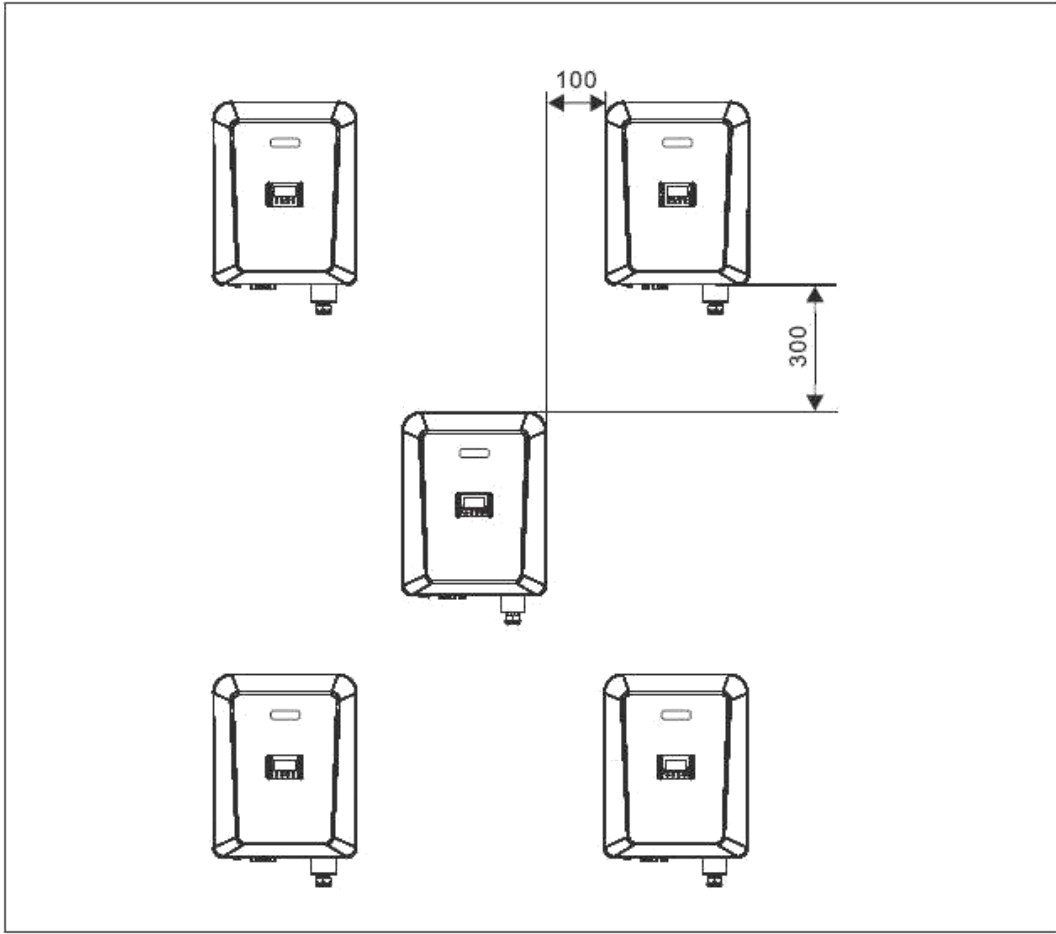


Figure 4.6 Installation in triangle mode (unit: mm)

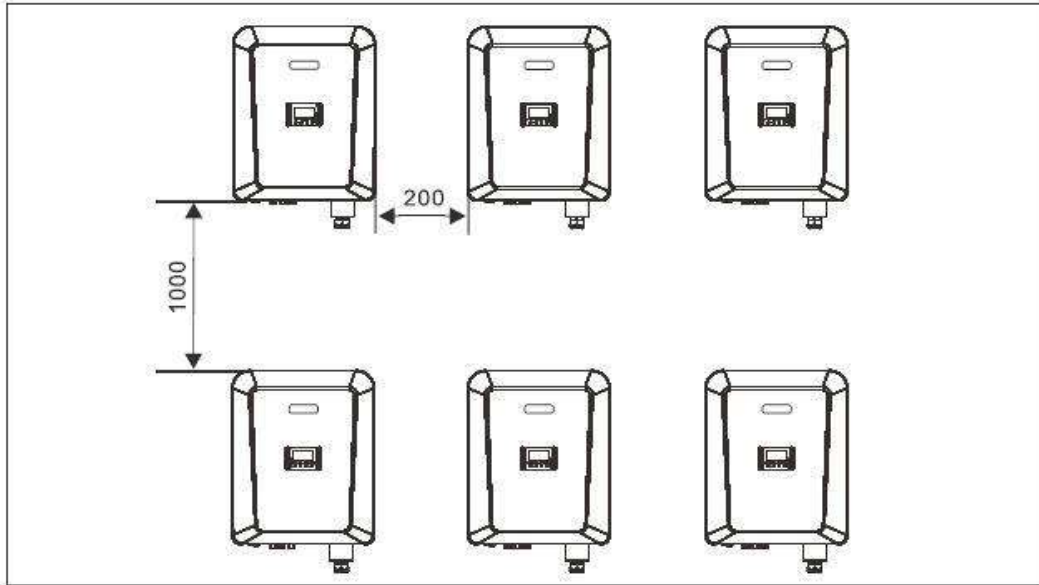



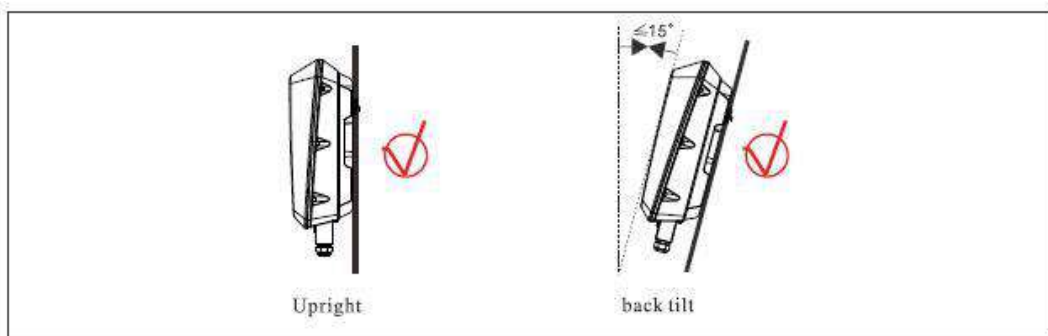
Figure 4.7 Installation in stacked mode

 NOTICE	<p>The clearance between multiple inverters must be increased to ensure proper heat dissipation when they are installed in a hot area.</p>
---	--

4.4.2 Installation Mode Requirements

Install the inverter upright or at a maximum back tilt of 15 degrees to facilitate heat dissipation. Below are some correct/ wrong installation modes, as shown in Figures 4.8 & 4.9.

The right installation mode is shown in Figure 4.8.



Figures 4.8 The correct installation mode

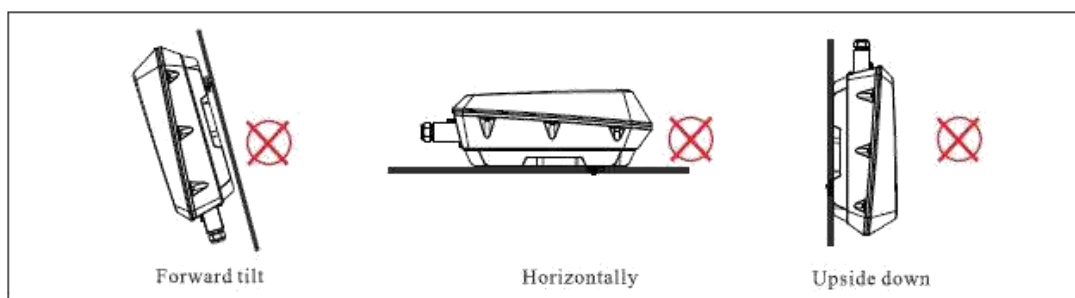



Figure 4.9 The wrong installation modes

	<p>NOTICE The wrong installation will lead to failure of the inverter operation.</p>
---	---

4.5 Wall-mounting the Inverter

Before installing, you have to prepare expansion bolts (specification: M6*60;

Quantity: 3)

Step 1 Move out the rear panel from packing case.

Step 2 Determine the positions for drilling holes (as shown in Figure 4.10) using the rear panel.

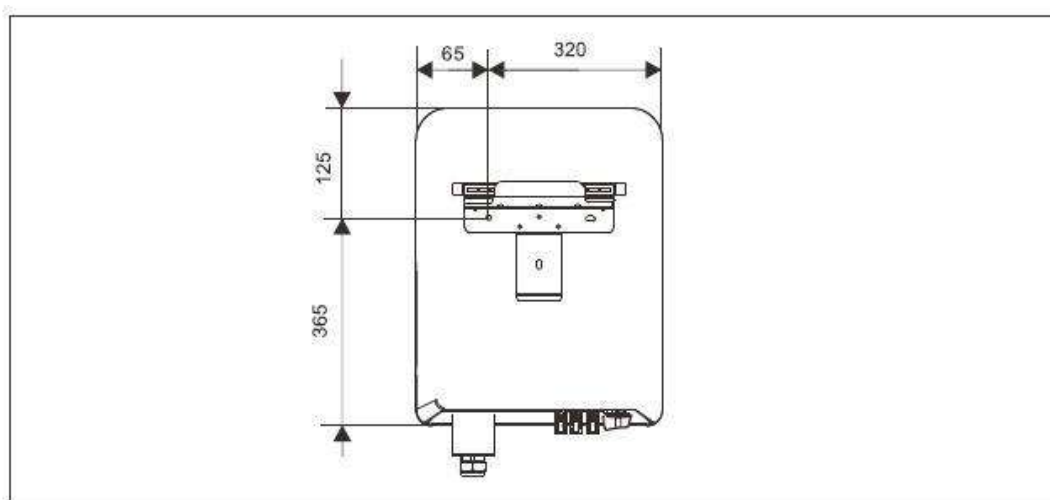


Figure 4.10 Positions determining (unit: mm)

Step 3 Level the hole position using a level, and mark the hole positions using a marker, as shown in Figure 4.11.

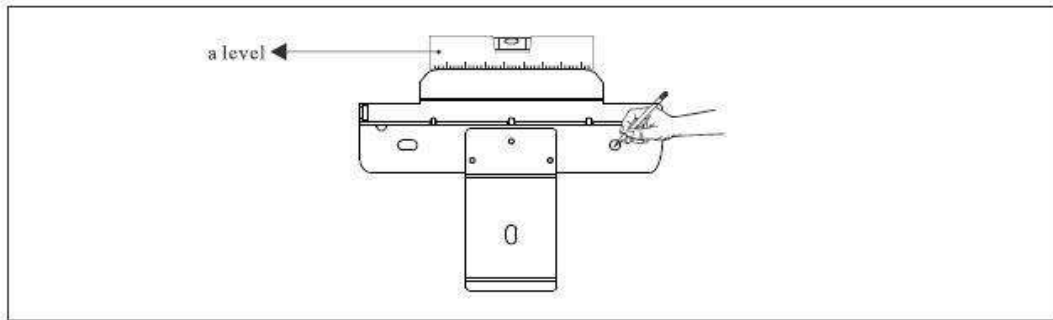


Figure 4.11 marking the hole positions



DANGER

While drilling the hole on the wall, ensure no damage on the electric wire and /or water pipe inside the wall.

Step 4 Drill holes using a hammer drill and install expansion bolts, as shown in Figure 4.12.

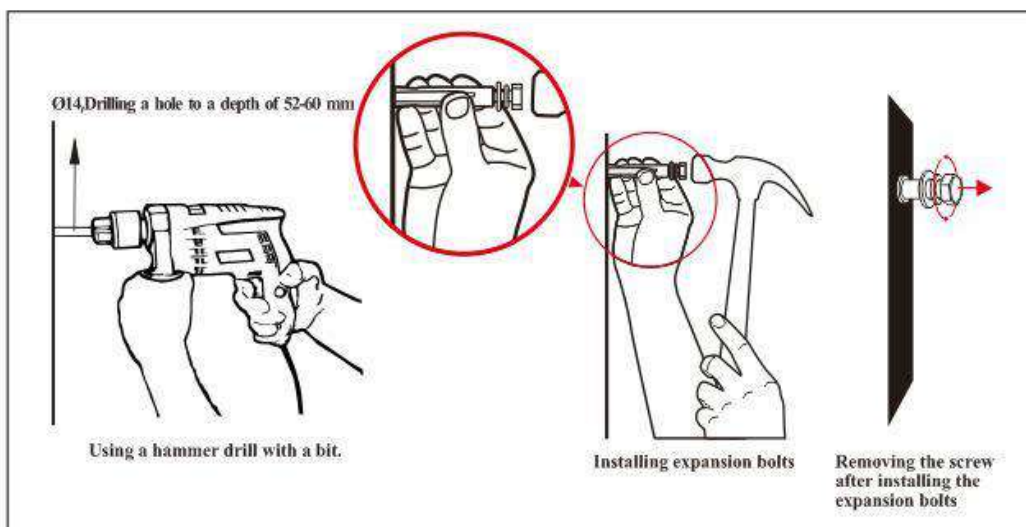


Figure 4.12 Drilling a hole and installing expansion bolts (unit: mm)

Step 5 Align the rear panel with the holes, insert expansion bolts into the holes through the rear panel, and tighten the expansion bolts to a torque of 3 N·m using a torque wrench, as shown in Figure 4.13.

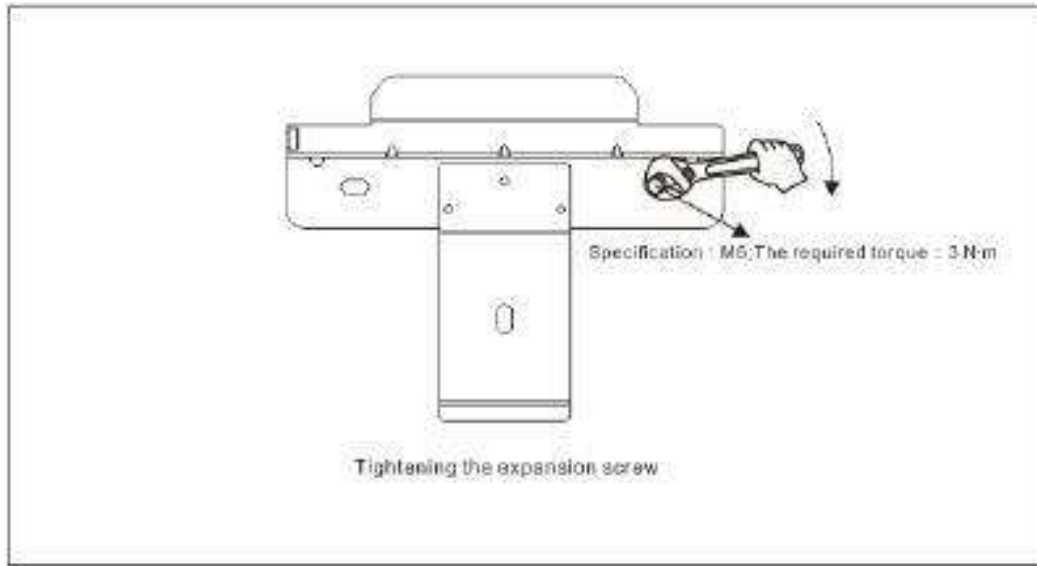




Figure 4.13 Securing a rear panel

5 Electrical Connections

 <p>DANGER</p>	<p>Before performing any electrical connections, ensure that both DC and AC Switches are OFF. Otherwise, the high voltage can result in fatal injury.</p>
 <p>CAUTION</p>	<p>Prerequisites of grounding PV Strings are listed as follows</p> <p>An isolation transformer must be installed on the AC side of each inverter;</p> <p>Ensure that the neutral wire of the isolation transformer must be disconnected with the PGND cable.</p>

One isolation transformer is with one PV inverter: do not install a single isolation transformer for multiple inverters; otherwise, circulating current generated by the inverters will lead to operation failure.

Set **Isolation** to **Input Grounded, With TF** on the SE Touch.

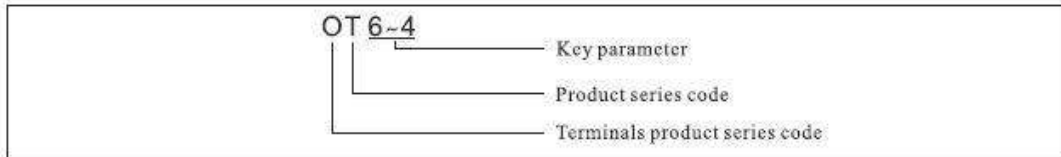
5.1 Connecting Protection Ground (PGND) Cables



5.1.1 Preparation

The ground cable and OT terminals have been prepared with below requirements.

2 a.

Ground cable: Outdoor copper-core cables with a cross sectional area of 6 mm or more are recommended.



 <p>NOTE</p>	<p>Good grounding for the inverter helps resist the impact of surge voltage and improve the EMI performance. Connect the PGND cable before connecting the AC power cables, DC power cables, and communications cables.</p>
 <p>NOTE</p>	<p>It is recommended that the ground cable be connected to a nearby ground position. For a system with multiple inverters connected in parallel, connect the ground points of all inverters to ensure equipotential connections.</p>

5.1.2 Wiring Procedures

Step 1 Remove an appropriate length of the insulation layer from the PGND cable using a wire Stripper; the length is a little bit longer than that of OT terminal's crimping end by 2mm~3mm, as shown in Figure 5.1.

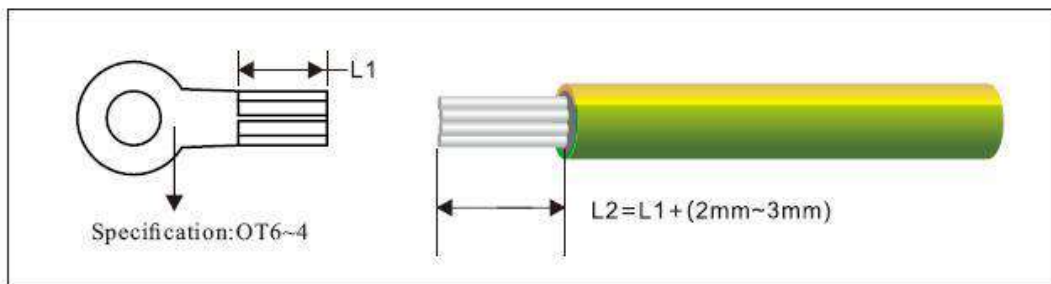


Figure 5.1 Stripped length (unit: mm)

Step 2 Insert the exposed core wires into the crimping area of the OT terminal and crimp them using hydraulic pliers, as shown in Figure 5.2.

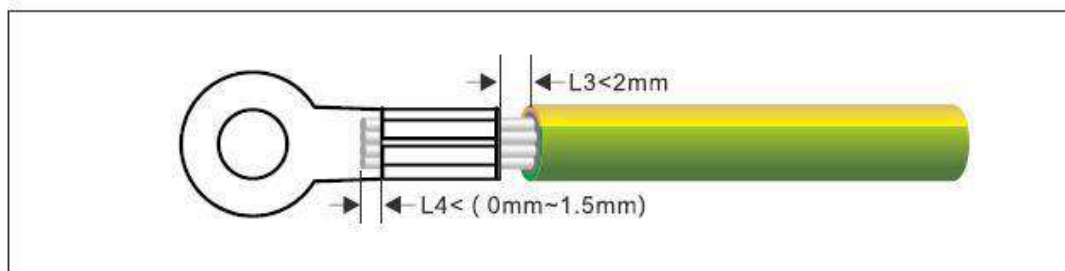


Figure 5.2 Crimping a cable (unit: mm)

Step 3 Secure the PGND cable (done by step 1 & 2) using the ground bolts and tighten the bolts to a torque of 5 N m using a socket wrench. Ensure that the PE wire is grounding well and impedance between earth wire and neutral wire is no more than 10 Ω , as shown in Figure 5.3.

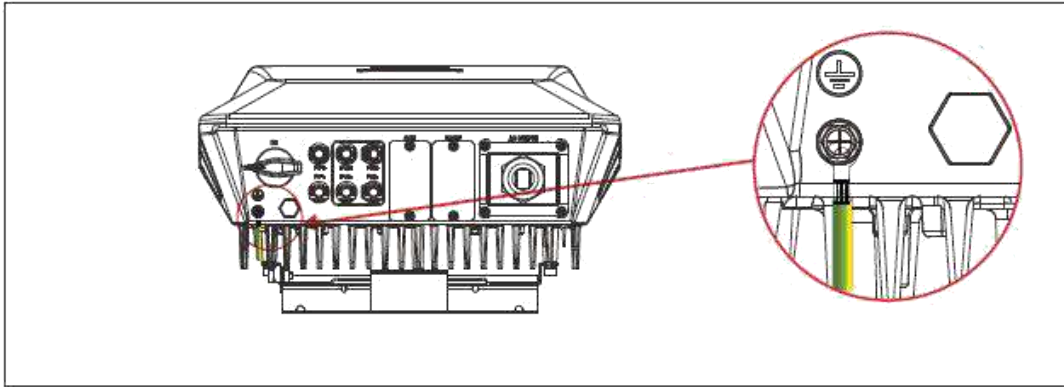


Figure 5.3 Securing the PGND cable

5.2 Connecting AC Power Cables

5.2.1 Preparation

The AC power cable and AC terminals have been prepared with below requirements.

a. AC power cable: Outdoor multi-strand copper-core cables are recommended. Single strand cables or aluminum cable is forbidden for inverter output terminal. Table 5.1 describes the specifications.

Table 5.1 AC output cable specifications (recommended)

Cable	Cable type	Inverter Model	Conductor Cross-sectional Area(mm ²)		Cable Outer Diameter (mm)
			Range	Recommended Value	Range
AC terminal	multi-core	5K/6K/8K/10K	4~6	4	11~18
	outdoor cable	12K/15K	4~6	6	11~18



DC terminal	PV special multi-core outdoor cable (PV1-F)	5K/6K/8K/10K	2.5~4	4	4~5
		12K/15K			
Connecting External Protection Ground Cables	multi-core outdoor cable	5K/6K/8K/10K	4~6	6	NA
		12K/15K			

Table 5.2 Cable Max length at AC terminal

Model Cross-sectional Area	5k/6k	8k	10k	12k	15k
4mm ²	53m	40m	30m	25m	20m
6mm ²	80m	58m	47m	39m	30m

b. AC wiring terminals:

Leak-protective switch is not recommended in this system; if there is a must, please install a model B switch with no less than 300mA current leakage. Neutral wire sharing is forbidden for multi leak-protective switches in system, or tripping operation will be resulted.

 WARNING	An independent three-phase circuit breaker must be installed on the AC side of each inverter to ensure that the inverter can be safely disconnected from the power grid.
 WARNING	Do not connect loads between the AC output terminals of the inverter and circuit breaker.

5.2.2 Procedure of Connecting AC Cables

Step 1 Remove an appropriate length of the jacket and insulation layer from the AC output cable using a wire stripper, as shown in Figure 5.4.

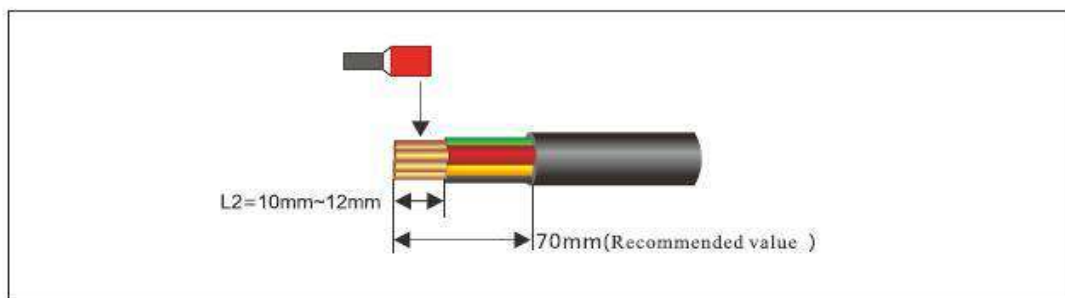


Figure 5.4 Stripped length (unit: mm)

Step 2 Crimp Euro type terminals using special crimping tool, shown in Figure 5.5.

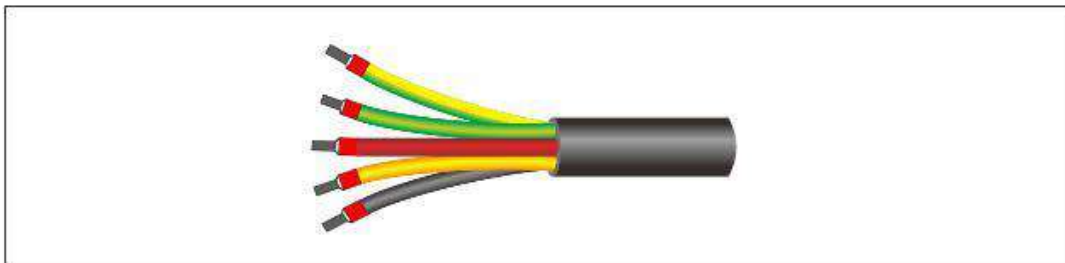


Figure 5.5 Crimping Euro type terminals

Step 3 Insert AC output wire through waterproof terminal block to AC connector reserving appreciate wiring length.

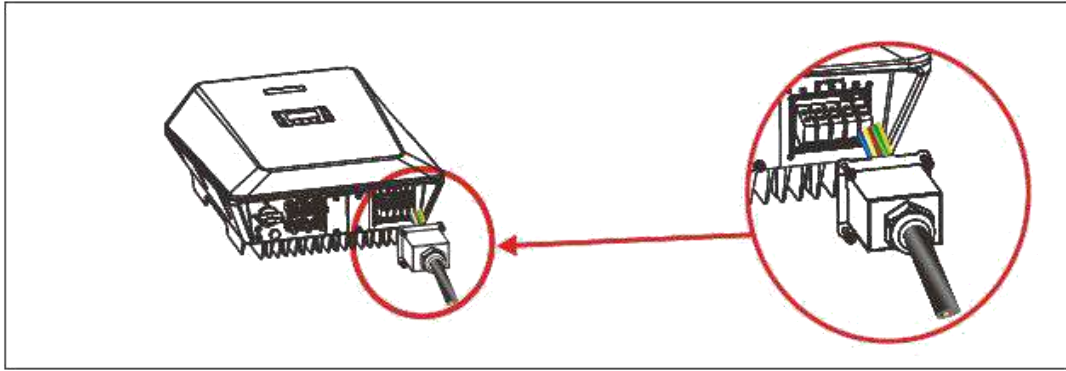


Figure 5.6 Dealing AC output cable

Step 4 Connect the AC output cable to L1, L2, L3, N, and E on the AC terminal block, tighten them using screw driver and the required torque is 1.5 N m, shown as in Figure 5.7.

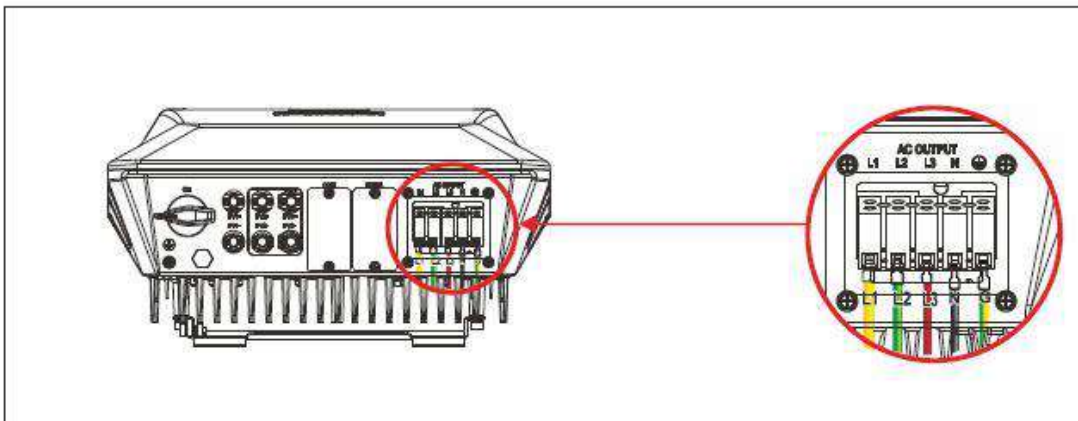


Figure 5.7 Tightening AC cable

Step 5 Aligning with the hole position on the AC terminal cover, use a torque wrench to tighten the locking cap to a torque of 1.2 N m, as shown in Figure 5.8.

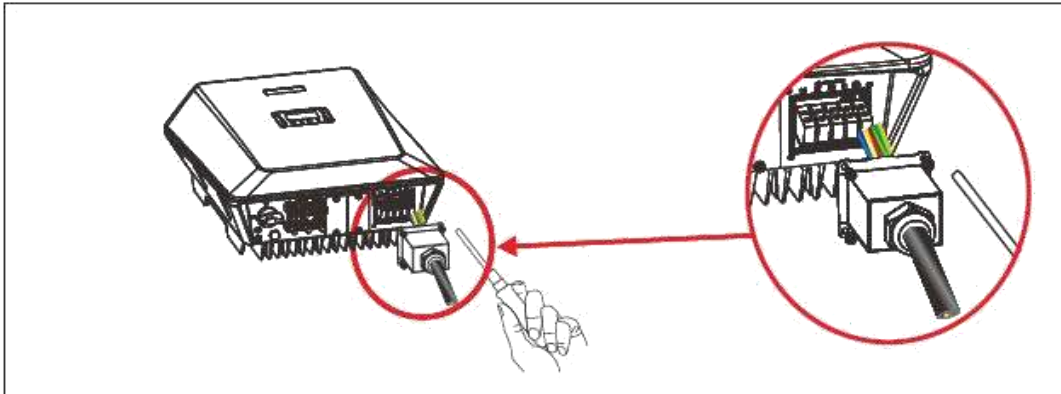




Figure 5.8 Tightening AC wiring cover

Step 6 Use a torque wrench to tighten the locking cap on the AC cable to a torque of 5 N m, as shown in Figure 5.8.

5.3 Connecting the PV Strings

 <p>DANGER</p>	<p>The following items are prerequisites for PV Strings connection; otherwise, an electrical shock can occur.</p>
<p>PV modules generate electric energy when exposed to sunlight and can create an electrical shock hazard. Therefore, when connecting the PV modules, shield them with opaque cloth.</p>	
<p>Before connecting DC input power cables, ensure that the voltage on the DC side is within its safe range and that the DC SWITCH on the inverter is OFF. Otherwise, high voltage may result in electric shock.</p>	
<p>When the inverter is grid-tied, it is not allowed to maintain DC input power cables, such as to connect or disconnect a string or a module in a string. Only after the inverter enters in shutdown mode, it is allowable for preceding DC input power cables maintenance.</p>	

 <p>WARNING</p>	<p>The following items are prerequisites for PV Strings connection; otherwise, a fire can occur.</p>
---	--

PV modules connected in series in each PV string must be of the same specification.
The maximum open-circuit voltage of each PV string must be always lower than or equal to 1000 V DC.
The maximum short-circuit current of each PV string must be always lower than or equal to 13 A.
The positive and negative terminals of PV modules must be connected to the positive and negative DC input terminals of the inverter respectively.
During the installation of PV strings and the inverter, the positive or negative terminals of PV strings cannot be connected with short-circuit.
The total output power of PV strings must be always lower than or equal to maximum input power of inverter.

5.3.1 Preparation

PV Strings DC input cable and PV Strings connectors have been prepared with below requirements:

a. Route connecting for the installation of PV strings and the inverter is shown in Table 5.3

Table 5.3 Route connecting for the installation of PV strings and the inverter

5K/6K/8K/10K	
Input Route	Number of Input Route
1	Connected to any route
2	Connected to routes 1 & 2
12K/15K	
Input Route	Number of Input Route
1	Connected to any route
2	Connected to routes 1 & 2
3	Connected to routes 1,2 & 3

b. DC input cables of PV Strings: Table 5.4 lists the recommended outdoor copper-core DC input cable specifications.

Table 5.4 Recommended DC input cable recommended specifications

Inverter model	Cable Type	Cross-sectional Area (mm ²)		Cable Outer Diameter (mm)
		Range	Recommended Value	Range
5K/6K/8K/10K/ 12K/15K	Common PV cables in the industry (model: PV1-F)	2.5~4	4	4~5

c. Connectors of PV Strings: Positive and negative DC input connectors are used, as shown in Figure 5.9 and Figure 5.10.

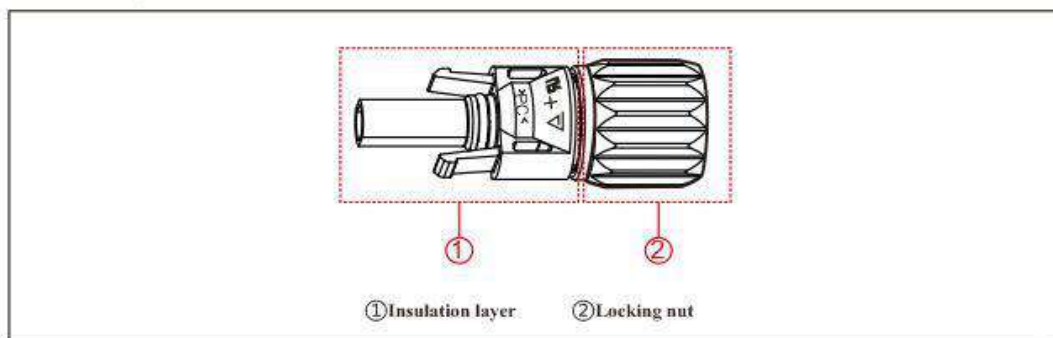


Figure 5.9 Positive connector compositions

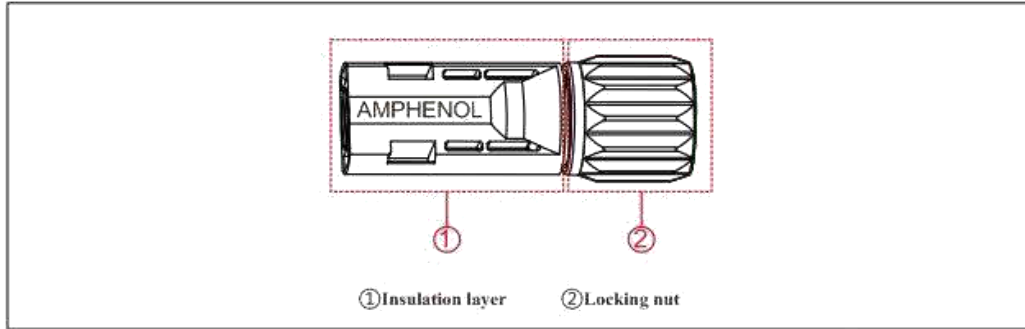


Figure 5.10 Negative connector

	<p>Positive and negative metal terminals are packed with positive and negative connectors respectively when they are shipped out. After unpacking, keep the positive and negative ones separate to avoid confusion. NOTE</p>
--	---

5.3.2 Connecting DC Power Cables

Step 1 Remove an appropriate length of the insulation layer from the positive and negative power cables using a wire stripper, as shown in Figure 5.11.

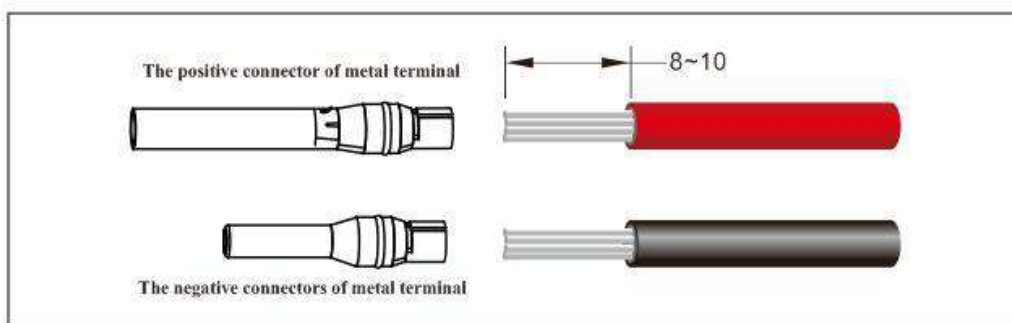


Figure 5.11 Stripping the insulation layer from DC power cables (unit: mm)

Step 2 Insert the exposed area of the positive and negative power cables into the metal terminals of the positive and negative connectors respectively and crimp them using a

crimping tool, as shown in Figure 5.12.

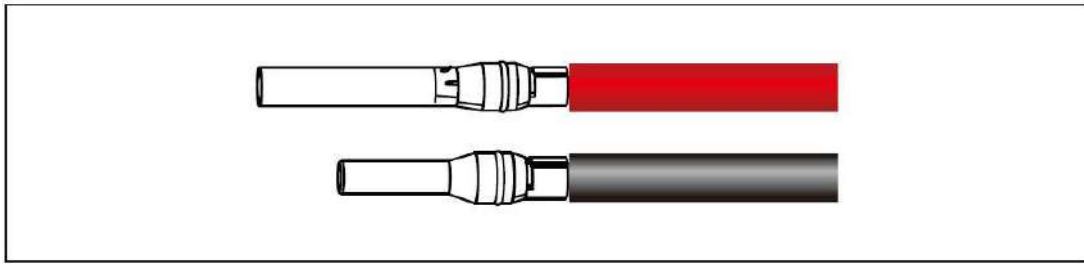


Figure 5.12 Crimping a metal terminal

Step 3 Insert the crimped positive and negative power cables into the corresponding positive and negative connectors until a "click" sound is heard, as shown in Figure 5.13.

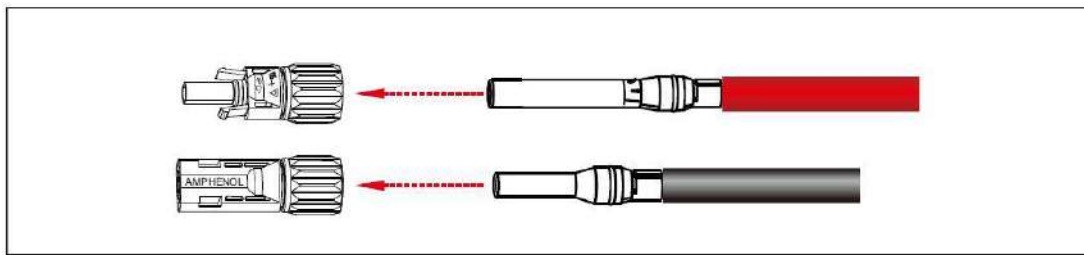


Figure 5.13 Connecting positive and negative connectors

Step 4 Tighten the locking nuts on the positive and negative connectors using a removal wrench, as shown in Figure 5.14.

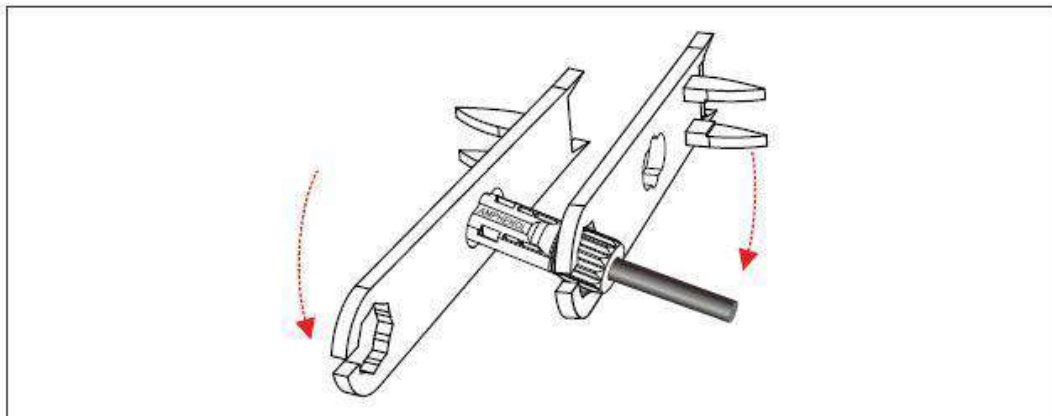


Figure 5.14 Locking a nut

Step 5 Measure the voltage of every route Strings using a multimeter. Ensure that the polarities of the DC input power cables are correct, as shown in Figure 5.15.

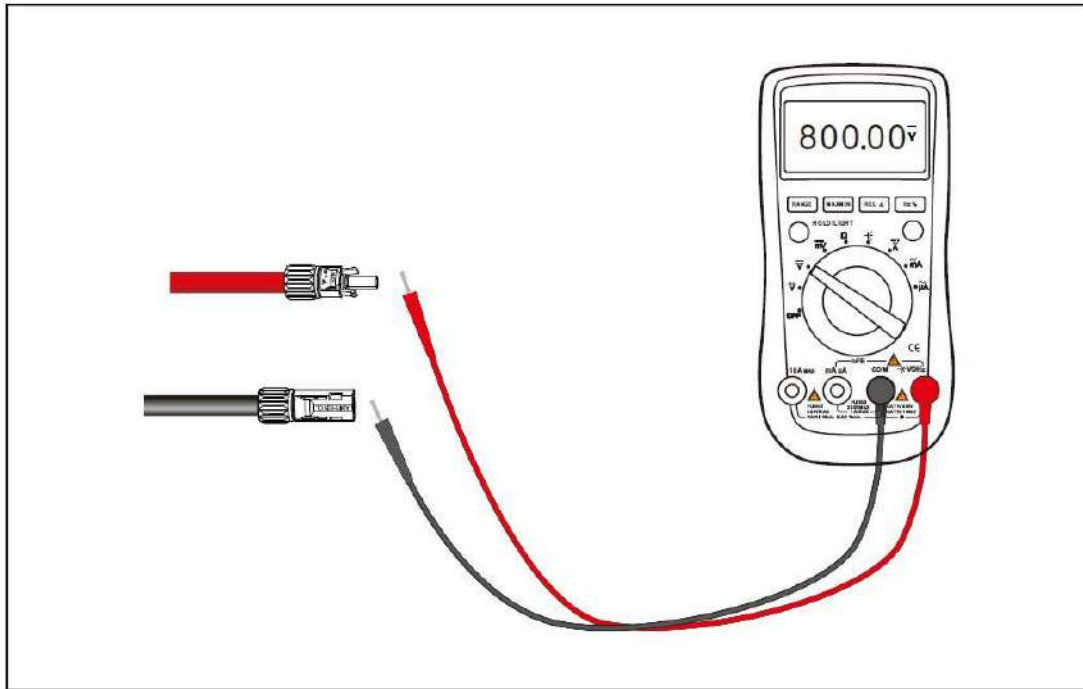


Figure 5.15 Checking the voltage of every route Strings

Step 6 Insert the positive and negative connectors into the corresponding connector terminals of the inverter until a "click" sound is heard, as shown in Figure 5.16.

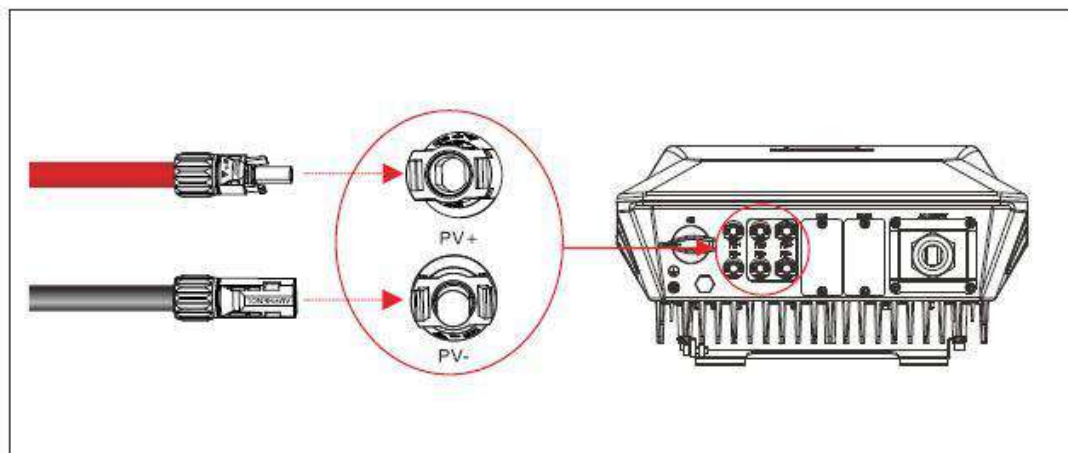


Figure 5.16 Connecting to the inverter

Step 7 After connecting the PV strings, ensure that all connectors are in position by checking for resistance when a slight pull is applied.

5.4 Connecting Communications Cables

5.4.1 5K/6K/8K/10K/12K/15K Communications Mode Description

You can use the following communications modes to implement communications: Bluetooth, DB9 and RS485.

Bluetooth

Bluetooth can be applied with your smart phone to implement local communications. You can set inverter parameter and monitor running data of the inverter through SE Touch APP in mobile phone, for details referring to *Accessory Modules Installation Guide*.

DB9

DB9 communications mode can be applied to query inverter information, and devices (which can be connected to DB9 terminal to implement communications) and communications functions are listed in Table 5.5. Table 5.5 Communications Module

Module	Function
SE WIFI	WIFI module, Ethernet and Cloud service can be connected to implement communications and monitor inverter, referring to <i>Product User Manual</i> .
SE GPRS_R	GPRS_R module, mobile base station network and Cloud service can

	be connected to implement communications and monitor inverter, referring to <i>Product User Manual</i> .
Notes	SE WIFI and SE GPRS_R modules are optional; SE WIFI, SE GPRS_R, and SE Touch are introduced in <i>Product User Manual</i> which is available from http://www.sernergytec.com .

RS485 (for single inverter)

You can connect RS485 communications module to inverter for monitoring in two ways: connecting to single inverter and to multiple inverters. Figure 5.17 demonstrates connection to single inverter to implement RS485 communications.

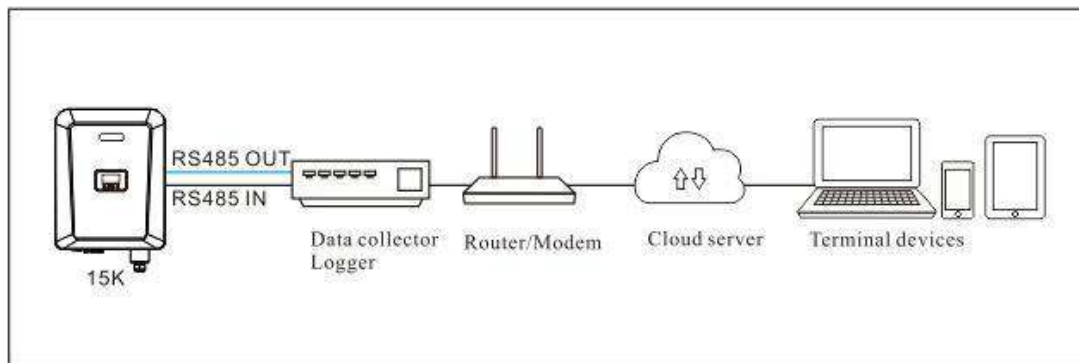


Figure 5.17 RS485 communications mode for a single inverter

RS485 communications mode (for multiple inverters, shown in Figure 5.18)

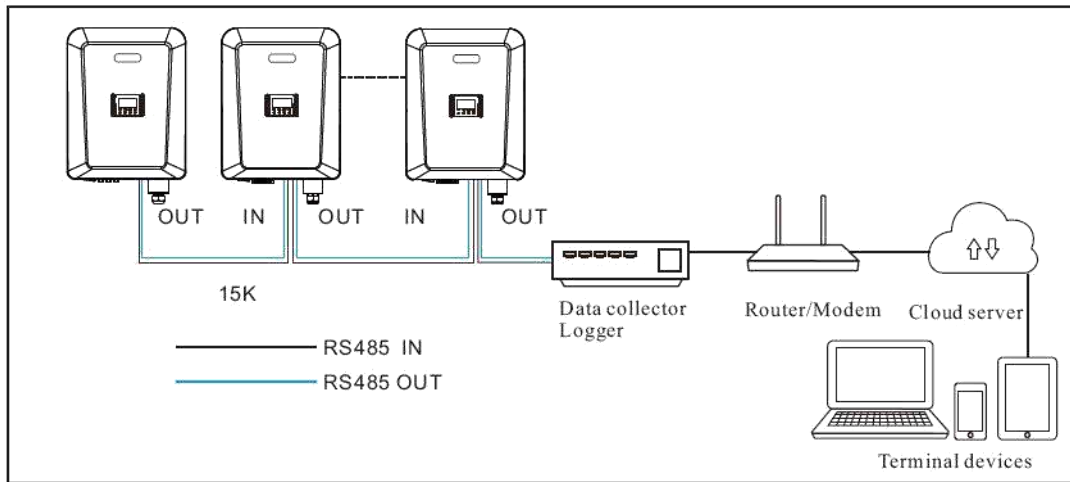


Figure 5.18 RS485 communications for multiple inverters

	<p>V1000 data collector logger made by Senergy is recommended when NOTE multiple inverters are connected; Modbus address configuration can be generated automatically in Senergy logger. Otherwise, if with other brand logger, you need set Modbus address manually through SE Touch APP in mobile phone, for details referring to <i>Accessory Modules Installation Guide</i>.</p>
	<p>If multiple inverters are connected, turn RS485 Resistance to ON from the dial switch of the inverters on the end of the chain.</p>
	<p>Ensure that the appropriate length of communications cable between every two inverters is less than 200 m when RS485 communications mode is implemented for multiple inverters.</p>

5.4.2 Connecting RS485 Communications Cables

Figure 5.19 shows the standard RS485 wiring diagram:

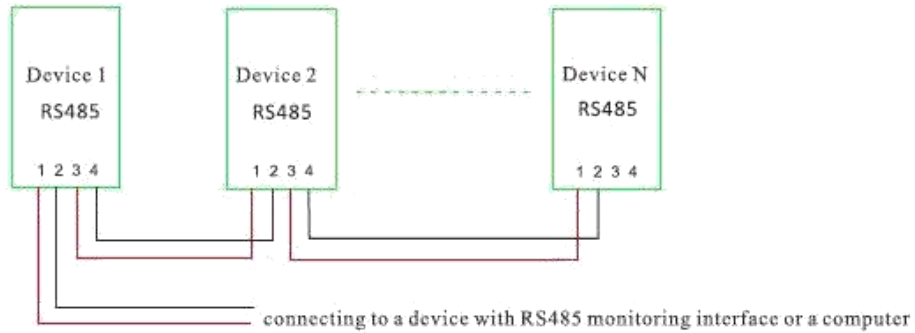


Figure 5.19 RS485 wiring diagram

Step 1 Remove an appropriate length of the insulation layer from the cable using a wire stripper, as shown in Figure 5.20.

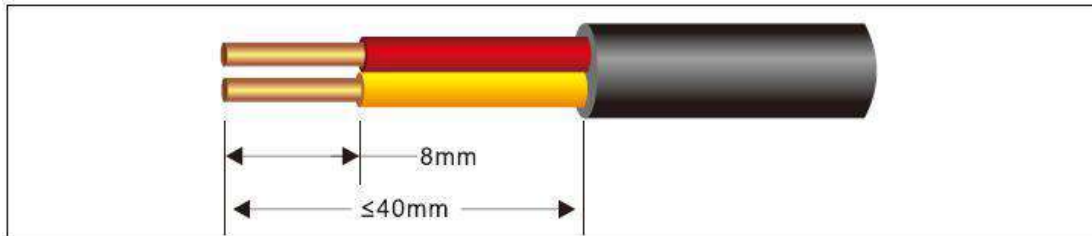


Figure 5.20 Stripping an RS485 communications cable (unit: mm)

Step 2 Remove the screws at the inverter bottom to remove the metal plate, shown in Figure 5.21.

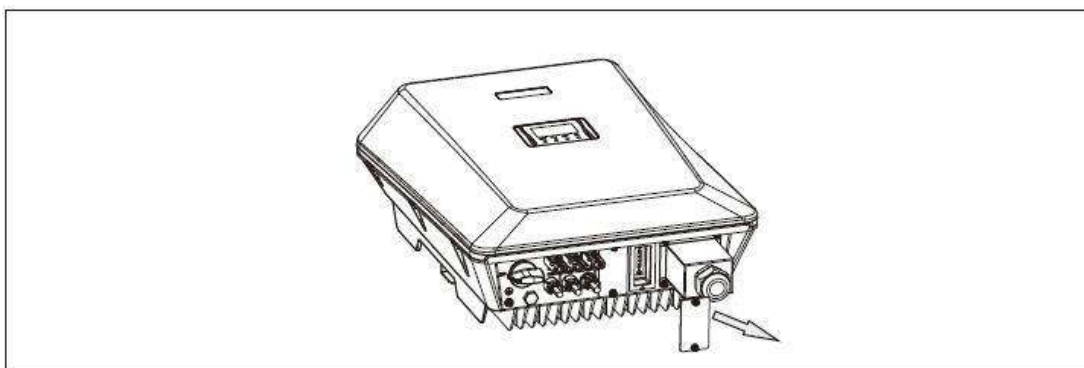


Figure 5.21 Removing the metal plate

Step 3 Take RS485 cable out of accessory kit, and remove the locking caps from the **485 IN** and **485 OUT** waterproof cable connectors. Route RS485 cables through

waterproof cable connectors and reserve appreciate wire length for wiring to the inverter.

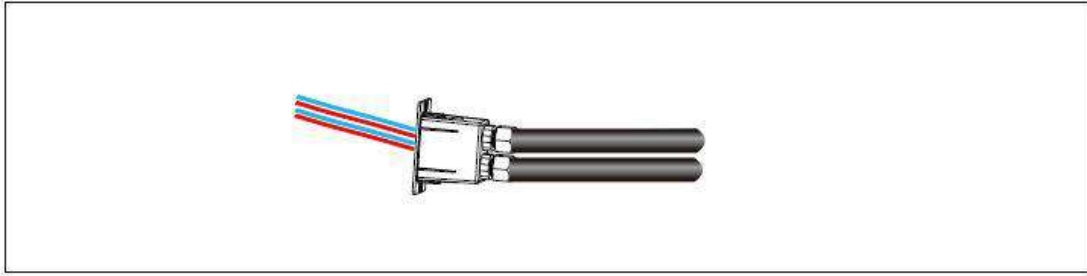


Figure 5.22 Processing RS485 cable

Step 4 Take out RS485 terminal block from accessory kit, remove the 4 screws from its male terminal, and connect with RS485 cable, as shown in Figure 3.19

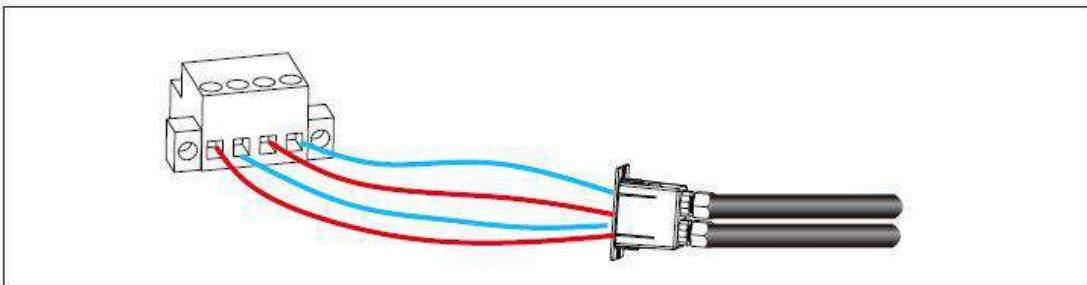


Figure 5.23 RS485 Terminal block connection

Step 5 Connect RS485 male terminal with its female terminal, shown as Figure 5.24.

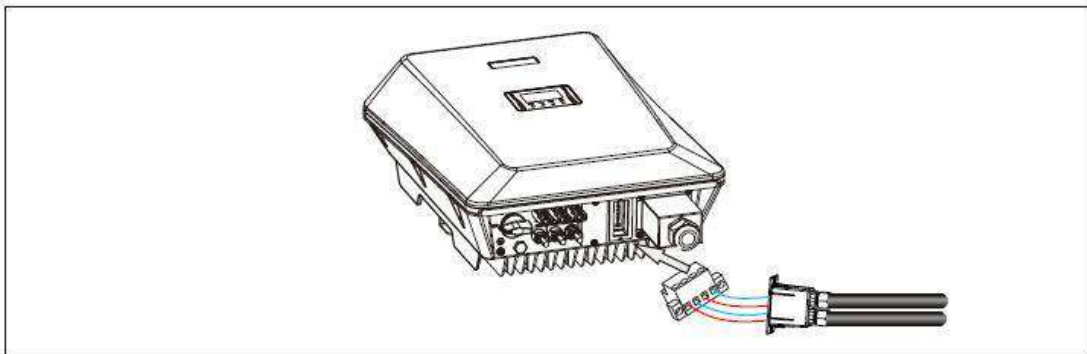


Figure 5.24 RS485 cable connections

Step Tighten the locking caps to a torque of 8 N m as well as waterproof cable connectors, as shown in 5.24.

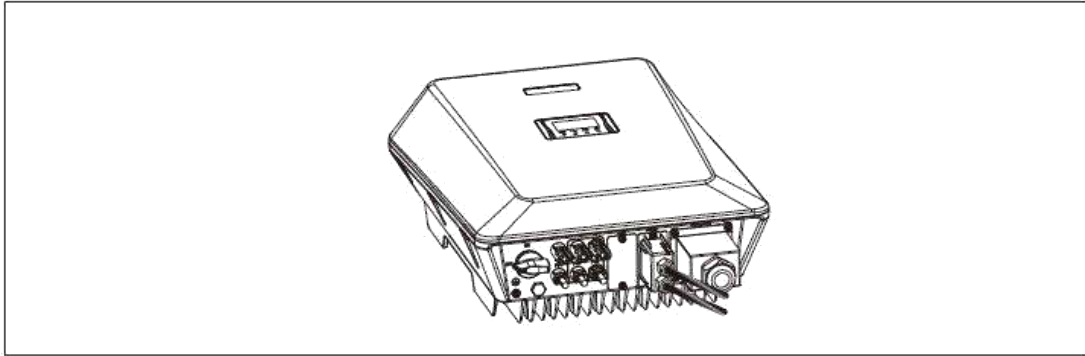


Figure 5.25 Tighten locking caps and waterproof cable connectors

	<p>To prevent corrosion, apply silica gel or fireproof mud to the terminal or NOTE interface after connecting external PGND cables, AC cables, RS485 port, and Ethernet port.</p>
--	---

5.4.3 Setting RS485 Communications Address

Step 1 Input <http://www.Senergy.com> in your mobile browser and click to download SE Touch APP which can also be available by scanning below QR code (shown in Figure 5.26). Then register an account and log in.



Figure 5.26 QR code for SE Touch APP downloading

Step 2 Click the extended-key in the homepage of SE Touch APP, and select **setting** in the pop-up menu, as shown in Figure 5.27.

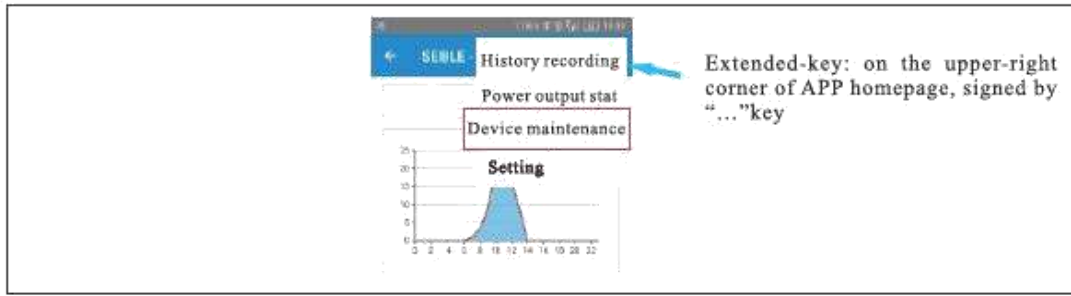


Figure 5.27 SE Touch APP homepage setting

Step 2 Check the Modbus address (in Figure 5.28) and its defaulted value is 1. You can also modify it if any need, and then save it.



Figure 5.28 Modifying and saving Modbus address

6 Installation Verification

Check the following items after the inverter is installed according to Table 6.1.

Table 5.4 Self-check items after installation

1. No other objects put on the PV inverter.
2. All screws, especially the screws used for electrical connections, are tightened
3. The PV inverter is installed correctly and securely.
4. Ground, AC, DC, and Communications cables are connected tightly/correctly and securely.
5. Check there is no open circuit or short-circuit at AC and DC terminals using multimeter.
6. Waterproof connectors at AC terminals and RS485 ports are plugged with waterproof plugs


tightly.

7. Covers at AC terminals are tightened.

8. Idle terminals are sealed.

9. All safety warning symbols are intact and complete on the inverter.

7 System Operation


 DANGER	Electrical shock! Only qualified and/or trained electrical technicians are allowed to perform operations on the inverter.
---	---

7.1 Powering ON the Inverter

Step 1 Switch ON the AC circuit breaker.

Step 2 Set the DC SWITCH of the inverter to ON.

Step 3 Observe statuses of LED indicator lights on the inverter according to Table 8.2.

 NOTE	When LED status lights display the inverter has entered grid-connecting, it means the inverter is operating well. Any query during operation, call your dealer.
---	---

7.2 Powering OFF the Inverter

Step 1 Switch OFF the circuit breaker at AC terminal.

Step 2 Set the DC SWITCH to OFF.



WARNING

After the inverter powers off, the remaining electricity and heat may still cause electrical shock and body burns. Please only begin servicing the inverter ten minutes after power-off.

8 User Interface

8.1 Querying inverter operation status

The inverter operation status can be obtained from observing LED indicator status, for more details, refer to Table 8.1.

Table 8.1 LED indicator status

Communications status indicator priority: when the communications with higher priority is ON, the communications with lower priority will be OFF; DB9 is with the top priority, and RS485t is secondary.	
Bluetooth/WIFI/GPRS	ON 0.5s/ OFF 0.5s
RS485 communications	ON 2s/ OFF 1s
No communications connecting or communications abnormal	OFF
When grid-on, the blink of Grid-tied light means loading amounts	
less than 20% rated power	Blink one time at an interval of 30s;
20%~40%% rated power	blink twice every 30s
40%~60% rated power	blink three times every 30s
60%~80% rated power	blink four times every 30s
80%~100%% rated power	blink five times every 30s

8.2 Downloading and setting SE Touch APP

Inverter running data can be obtained through AE Touch APP which can be downloaded in mobile phone through Bluetooth communications, for details referring to *Accessory Module Installation Guide*.


	You can view & set data through the inverter APP, SE Touch. For NOTE details about operation, refer to <i>Accessory Module Installation Guide</i> which is available for free from http://www.Senergytec.com .
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Table 8.2 LED indicator status for common inverter fault

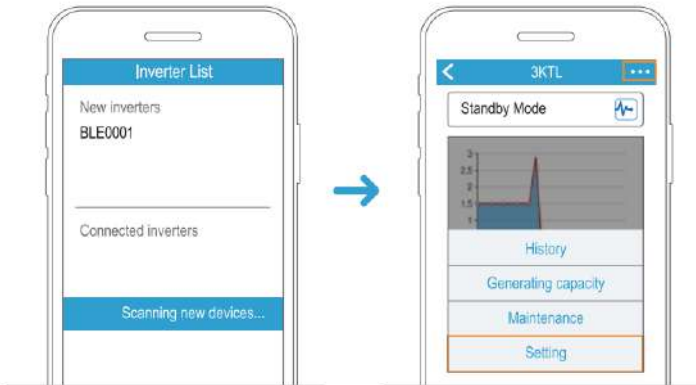
	PV light	Grid-tied light	Communications light	Warning light
Grid-tied	●	●/		○
ON	●	○		○
Grid Abnormal			○	○
PV normal	●			○
PV Abnormal			○	○
WLAN/WIFI/RS485 communications	●	●/○		○
Strings Reverse	○	○	●	●
Leakage current abnormal	○	●	○	●
Inverter relay abnormal	○	●	●	●
Insulation Resistance abnormal	●	○	○	●
Grounding current abnormal	●	○	●	●
Leakage current HCT abnormal	●	●	○	●

Invert circuit abnormal	●	●	●	●
Internal communications fault	○	○		●
Control power abnormal	○		○	●
Boost circuit abnormal		○	○	●
EEPROM fault		○	●	●
Software version incompatibility		●	○	●
System fault				●

Note: ● means light ON, ○ off, blink, keeping original status.

8.3 Setting Standard Parameters

Step 1 Open APP and choose “Bluetooth”, click BLExxxx to login, then click the function list and choose Setting.



Step 2 Click switch user, enter password “admin” to login with administrator account,

Step 3 Then you can see the inverter current running standard code on the settings page, if it is not, We can change the settings to AS4777.2 for Australia.

← Setting

Standard Code

AU (AS/NZS 4777.2/.3)

Reactive Power (%)

0

Derated Power(%)

100

Power Factor

1.00

Protection parameter

Insulation impedance(kΩ)

250


Reconnected time(s)

60

MovingAvgVoltLimit(V)

299

9 Maintenance

	<p>Before maintaining and commissioning the PV inverter and its peripheral distribution, switch off all the charged terminals of the inverter and wait at least</p> <p>WARNING</p> <p>10 minutes after the inverter is powered off.</p>
---	--

9.1 Routine Maintenance

Table 9.1 Maintenance checklist and interval

Check Item	Check Content	Maintain content	Maintenance Interval
inverter output status	Statistically maintain the status of electrical yield, and monitor its abnormal status.	NA	Weekly
inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	yearly
inverter running status	Check that the inverter is not damaged or deformed. Check for normal sound emitted during inverter operation. Check and ensure that all inverter communications is running well.	If there is any abnormal phenomenon, replace the relevant parts.	monthly
inverter electrical	Check that AC, DC, and communications cables are securely connected;	If there is any abnormal	Semiannually

connections	Check that PGND cables are securely connected; Check that cables are intact and there are not wire aging;	phenomenon, replace the cable or re-connect it.	
-------------	--	--	--

9.2 The Inverter Troubleshooting

When inverter enters in shutdown mode, the alarm light is illuminated. Table 9.2 describes the troubleshooting measures for common fault alarms in the inverter.


Table 9.2 Common troubleshooting measures

Alarm Name	Causes	Measures Recommended
Grid Over Voltage	The grid voltage exceeds the allowable range.	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, possibly the power grid is abnormal accidentally. No extra action is needed. 2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameters setting of inverter through SE Touch, APP. 3. If the alarm persists for a long time, check whether the AC circuit breaker/ AC terminals is disconnected or not, or if the grid has a power outage.
Grid Under Voltage		
Over Frequency		
Under Frequency		
PV Over Voltage	Input voltage of PV modules exceeds the	Check the number of PV modules and adjust it.

	inverter's allowable range.	
PV Under Voltage	PV modules input voltage is under the inverter's defaulted protection value.	<ol style="list-style-type: none"> 1. When the sun light intensity weakens, PV modules voltage decreases. No action is needed. 2. If such phenomena occur when the sun light intensity does not weaken, check if there is short circuit, and open circuit etc. in the PV strings.
Insulation Resistance Abnormal	<p>A short circuit exists between PV strings and protection ground.</p> <p>PV strings are installed in a permanently moist environment.</p>	<ol style="list-style-type: none"> 1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. 2. If the insulation resistance against the ground is less than the defaulted value in a rainy environment, set Insulation resistance protection on SE Touch.
Residual Current Abnormal	The insulation resistance against the ground at the input side decreases during the inverter operation, which causes excessively high residual current.	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly or lasts a long time, check whether the insulation resistance against the ground of PV strings is too low.
PV Strings Abnormal	<p>PV strings have been shielded for a long time.</p> <p>PV strings are deteriorating.</p>	<ol style="list-style-type: none"> 1. Check whether the PV string is shielded. 2. If the PV string is clean and not shielded, check whether the PV modules are aging or deteriorated.
PV Strings Reverse	The cables of PV strings are connected reversely during the inverter	Check whether the cables of PV strings are correctly connected. If they are connected reversely, reconnect the cables.

	installation.	
BUS Under Voltage	Abnormal internal energy control imbalance has been triggered by the PV	1. If the alarm occurs occasionally, the inverter can automatically recover to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly, contact your dealer for technical support.
BUS Over Voltage	Strings/ grid sharp change of working conditions.	
Invert Module Fault		
BOOST Fault		
EEPROM Fault	EEPROM Component damaged	Replace the monitoring board.
Remote monitoring displays zero electrical yields with yellow light on	Communications breakdown	Reboot router or other data collector logger, if fail again, please contact Senergy customer service center.
Remote monitoring displays no power generating.	Communications breakdown	Reboot router or other data collector logger, if failure again, please contact Senergy customer service center.
Remote monitoring	Output switch tripping	If the output switch is damaged, replace it, or re-close the switch, if failure again, please contact

displays no output voltage in the inverter.		Senergy customer service center.
Inverter off grid	1.Power grid fault; 2.Output switch tripping	1.Wait for power restoration; 2. Re-close the output switch, if failure always occurs, please contact Senergy customer service center.

	<p>NOTE If you cannot clear the preceding alarm according the measures recommended, contact Senergy customer service center timely.</p>
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9.3 Removing the Inverter

Perform the following procedures to remove the inverter:

Step 1 Disconnect all cables from the inverter, including communications cables, DC input power cables, AC output power cables, and PGND cables, as shown in Figure 9.1.

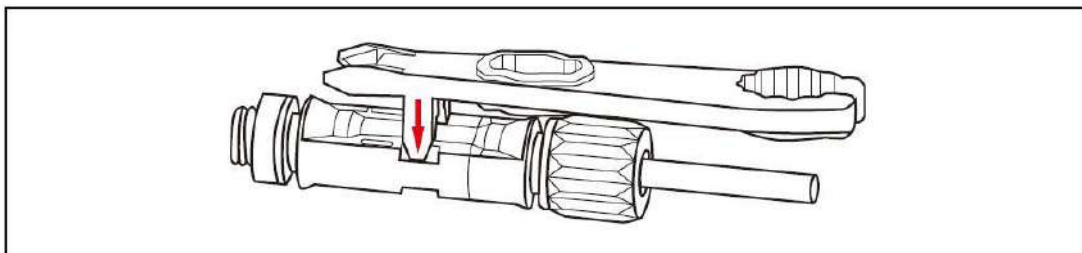



Figure 9.1 Removing DC input connector

Note: When removing DC input connector, insert the removal wrench to the bayonet,

press the wrench down, and take out the connector carefully.

Step 2 Remove the inverter from the rear panel.

Step 3 Remove the rear panel.

 WARNING	Before removing DC input connector, double check DC input switch is turned to OFF to avoid inverter damage and personal injury.
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10 Quality Guarantee

10.1 Quality Terms

- 1) Where otherwise agreed to in a contract, quality warranty period of the inverter is 60 months.
- 2) As for the PV inverter which is defective or damaged within its quality warranty period, Senergy shall repair or replace it for free.
- 3) The defective/damaged PV inverter replaced must be returned.

10.2 Liability Waiver

Warranty or liability will be void if damage is caused from below operations/situations. If customer asks for maintenance service, Senergy can, at its discretions, provide paid service.

- 1) The warranty period expired;
- 2) The damage caused during transit;

- 3) The damage caused by man;
- 4) The damage caused by force majeure including, but not restricted to the following: earthquake, flood, fire, explosion, debris flow etc.
- 5) Operation in adverse environments beyond that described in the User Manual;
- 6) Any installation and operation environment beyond the relevant national standards;
- 7) Any installing, reconfiguring, or using faulty;
- 8) Any revising the product or modifying its software code without authorization;
- 9) Maintenance faulty caused by the technician personnel unauthorized by Sernegy;
- 10) Any operation ignoring the safety precautions stipulated in the User Manual.

11 Disposal of the Inverter

The PV inverter and its packing case are made from environmentally friendly material. If the inverter service life has expired, do NOT cut it away with household garbage; dispose the inverter in accordance with local rules for disposal of electrical equipment waste.

12 Technical Specifications

Table 12 Technical specifications

Inverter Model	5K	6K	8K	10K	12K	15K
Efficiency						
Max. efficiency	98.00%	98.00%	98.20%	98.30%	98.40%	98.40%
European efficiency	97.50%	97.50%	97.60%	97.60%	98.00%	98.00%
MPPT dynamic efficiency(10%-50%)	99.50%	99.50%	99.50%	99.50%	99.50%	99.50%
MPPT dynamic efficiency(30%-100%)	99.80%	99.80%	99.80%	99.80%	99.80%	99.80%
Input						
Max. input power	7,200W	7,200W	9,600W	12,000W	14,400W	18,000W
Max. input voltage	1000V	1000V	1000V	1000V	1000V	1000V
Max. input current	22A (1*11A+1*11A)	22A (1*11A+1*11A)	22A (1*11A+1*11A)	22A (1*11A+1*11A)	33A (2*11A+1*11A)	33A (2*11A+1*11A)
Maximum short-circuit current*	26A (1*13A+1*13A)	26A (1*13A+1*13A)	26A (1*13A+1*13A)	26A (1*13A+1*13A)	39A (2*13A+1*13A)	39A (2*13A+1*13A)
Maximum reverse current	0A	0A	0A	0A	0A	0A
Starting voltage	180V	180V	180V	180V	180V	180V
MPPT operation voltage range	160V-850V	160V-850V	160V-850V	160V-850V	160V-850V	160V-850V
Full load MPPT	300V-800V	300V-800V	380V-800V	470V-800V	380V-800V	470V-800V

voltage range						
Max. number of inputs	2(1/1)	2(1/1)	2(1/1)	2(1/1)	2(2/1)	2(2/1)
Number of MPPT routes	2	2	2	2	2	2
Overvoltage protection level	II	II	II	II	II	II
Output						
Rated output power	5,000W	6,000W	8,000W	10,000W	12,000W	15,000W
Max. apparent power	5,000VA	6,000VA	8,000VA	10,000VA	12,000VA	15,000VA
Max. active power (PF=1)	5,000W	6,000W	8,000W	10,000W	12,000W	15,000W
Rated output current	3*7.58/7.25/6.94A	3*9.09/8.70/8.33A	3*12.12/11.59/11.11A	3*15.15/14.49/13.89A	3*18.18/17.39/16.67A	3*22.73/21.7/20.83A
Max. output current	3*8.3A	3*10A	3*13A	3*16A	3*19A	3*23A
Current (Inrush)	3*10A	3*10A	3*10A	3*10A	3*10A	3*10A
Max output current under fault conditions*	3*14A	3*14A	3*18A	3*23A	3*27A	3*32A
Rated voltage	380V/400V/415V	380V/400V/415V	380V/400V/415V	380V/400V/415V	380V/400V/415V	380V/400V/415V
Power grid voltage range*	277V-510V	277V-510V	277V-510V	277V-510V	277V-510V	277V-510V
Rated frequency	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz	50/60Hz
THDi	<5%	<5%	<5%	<5%	<5%	<5%
DC off-sets	<50mA	<50mA	<50mA	<50mA	<50mA	<50mA
Power factor range	0.8lead~0.8lag	0.8lead~0.8lag	0.8lead~0.8lag	0.8lead~0.8lag	0.8lead~0.8lag	0.8lead~0.8lag
Overvoltage	III	III	III	III	III	III

protection level						
Common specs						
Warranty period	5 years	5 years	5 years	5 years	5 years	5 years
Cooling	Natural convection	Natural convection	Natural convection	Natural convection	Natural convection	Natural convection
Max. operating altitude	4000m(>2000 derate)	4000m(>2000 derate)	4000m(>2000 derate)	4000m(>2000 derate)	4000m(>2000 derate)	4000m(>2000 derate)
Noise	<25dB	<25dB	<25dB	<25dB	<25dB	<25dB
AC&DC wiring	Terminal block	Terminal block	Terminal block	Terminal block	Terminal block	Terminal block
Dimensions (W x H x D)	385mm*490mm*185mm	385mm*490mm*185mm	385mm*490mm*185mm	385mm*490mm*185mm	385mm*490mm*185mm	385mm*490mm*185mm
Weight	19.8Kg	19.8Kg	19.8Kg	19.8Kg	21.8Kg	21.8Kg
Protective class	I	I	I	I	I	I
Protection level	IP65	IP65	IP65	IP65	IP65	IP65
Pollution degree	PD3	PD3	PD3	PD3	PD3	PD3
Operating temperature	-25°C -60°C	-25°C -60°C	-25°C -60°C	-25°C -60°C	-25°C -60°C	-25°C -60°C
Display & Communications						
Display	LED indicator light+ Bluetooth, LCD display (optional)					
Communications	RS485 Ethernet(optional), GPRS (optional), WIFI(optional)					
Protection						
Supported: Input DC switch, Anti-islanding protection, low voltage ride-through, Output over current Protection, Output short circuit protection, Input reverse-connection protection, PV string fault detection, DC surge protection, AC surge protection, Insulation resistance detection, RCD detection.						
Standards Compliance						
Grid-tied	NB/T 32004					
Safety certification	IEC 62109-1 IEC 62109-2 NB/T 32004					

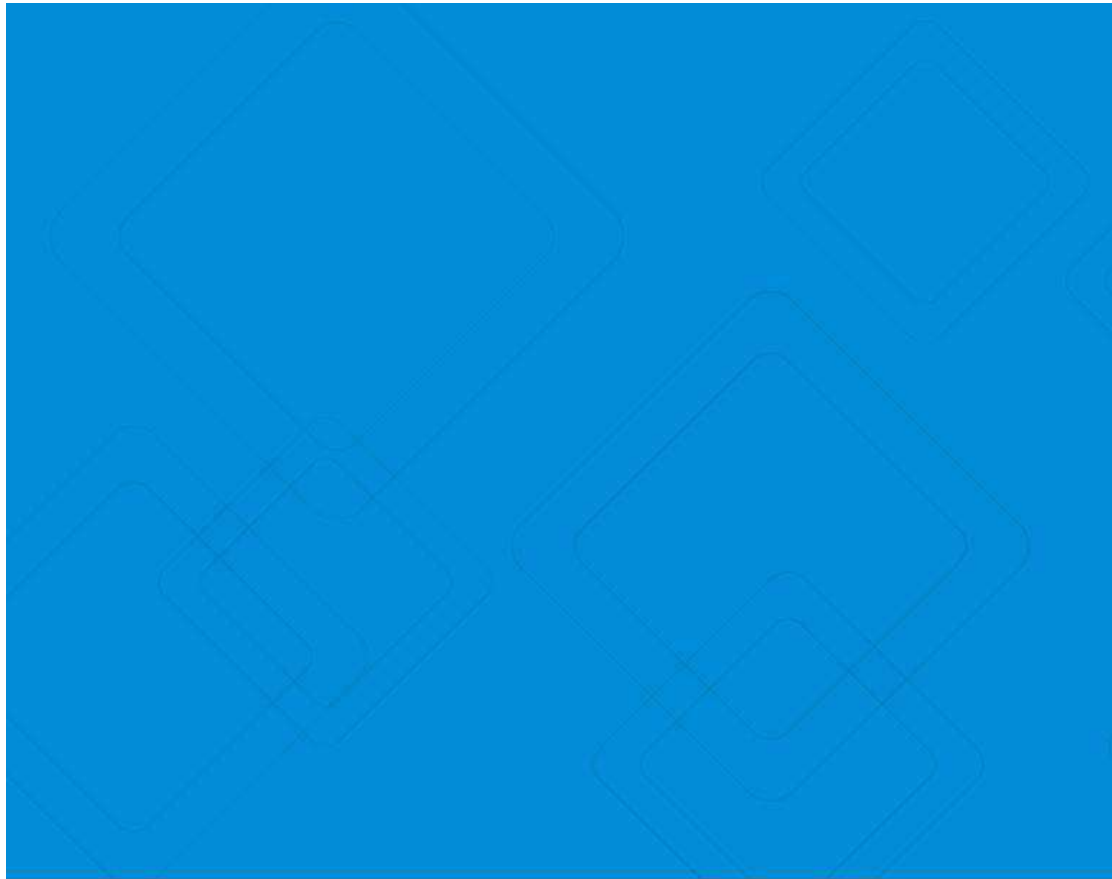
Remark for sign *:

To avoid potential risk, you are recommended to add following devices: a 15A/1000VDC PV FUSE on the input terminal of every PV String, and an overcurrent protection device with specifications more than 20A/400VAC for

5K/6K/8K/10K, and 32A/400VAC for 12K/15K on the output terminal.

Note:

- 1) Grid power voltage range can be set according to national voltage standards;
 - 2) Power grid frequency range can be set according to national grid standards
 - 3) The preceding technical specifications are subject to change without prior notice.
- The listed specifications are for your reference only.



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