CPS SCA-T Series Grid-tied PV Inverter

CPS SCA6/8/10KTL-T
CPS SCA12/15KTL-T

Installation and Operation Manual

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Shanghai Chint Power Systems CO,.LTD

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Dear User,

Thank you so much for your choosing 6K-15K, the latest generation of grid-tied PV Strings inverter (hereinafter referred to as the inverter) designed and developed by CHINT.

This user manual introduces the inverter in terms of its installation, electrical connections, operation, commissioning, maintenance, and troubleshooting. Please read through the manual carefully before installing and using the inverter, and keep the manual well for future reference.

Application Model

Grid-tied PV string inverter

- CPS SCA6/8/10KTL-T
- CPS SCA12/15KTL-T

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.*chintpower*.com/en, and/or by consulting your dealer.*

Symbol Conventions

The following symbols will be frequently used in this User Manual as well as in the process of actual application.

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, or property damage.
 NOTE	Calls attention to important information, best practices and tips: supplement safety instructions for your better use of the inverter to reduce the waste of resource.
	Mark on the nameplate. Reminds operators to refer to the documentation shipped with the inverter.

1 Safety Precautions

Before beginning your journey, please read these safety precautions in User Manual carefully.

1.1 Personnel Safety

a. The PV inverter must be installed, electronically connected, operated and maintained through specially 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 this User Manual carefully and master it before any operation.

1.2 The PV Inverter Protection

⚠ NOTICE	As soon as receiving the PV inverter, please check if it is damaged during its transportation. If yes, please contact 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 the User Manual carefully before installing the PV inverter; warranty or liability will be void from CHINT if damage is caused by installation faults.

a. Ensure there is no electronical 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 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 PV 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 is 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 appropriate 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 the user manual.

a. Before getting the permission of electrical power sector in the country / region, the grid-tied PV inverter cannot start generate power.
b. Follow the procedures of commissioning described in the user manual when commissioning the PV 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 CHINT immediately, if there is any issue found during operation.

2 Overview of the Inverter

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

2.1 Functional Models

2.1.1 Function

This series of products is a transformerless grid-tied PV inverter with one/two MPP trackers which converts the direct current of the PV strings to grid-compliant three-phase current and feeds it into utility grid.

⚠ WARNING	The inverter is transformerless. Add an isolation transformer before grounding the positive/negative terminal of PV modules (such as thin film module).
⚠ WARNING	Do not connect PV modules in parallel to mutiple PV inverters.

2.1.2 Model Description

Figure 2.1 shows a model number of the inverter, using xK as an example.

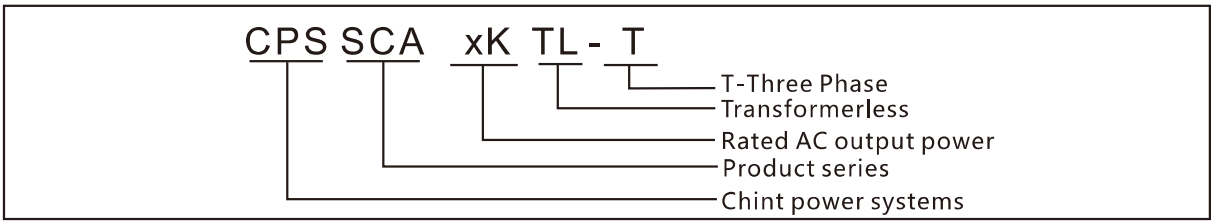


Figure 2.1 Model number descriptions

2.2 Network Application

2.2.1 Grid-tied PV Power Systems

This series of products 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, this series inverters is used to low-voltage grid-tied PV power system, as shown in Figure 2.2.

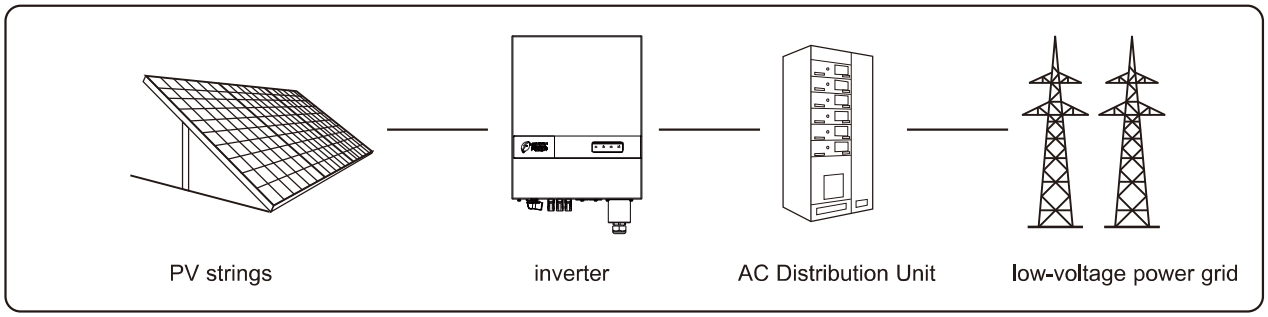


Figure 2.2 a low-voltage grid-tied PV power system

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

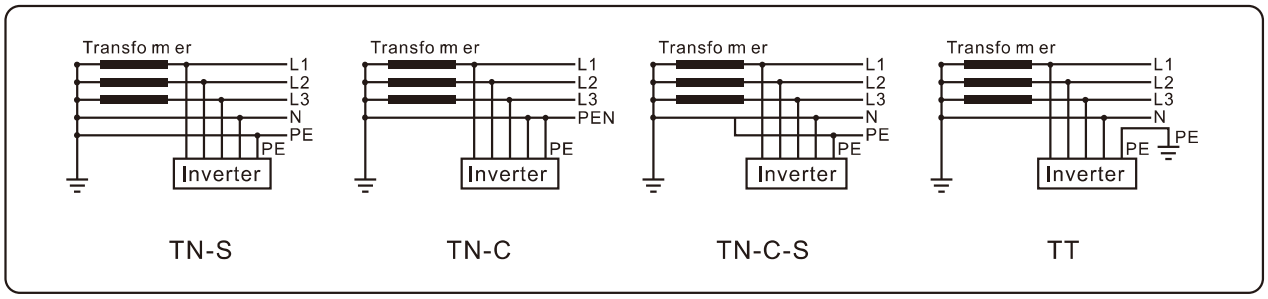


Figure 2.3 Power grids supported by this series inverters

2.3 Outline and Dimensions

2.3.1 Outline

The outline of this series products is shown as Figure 2.4.

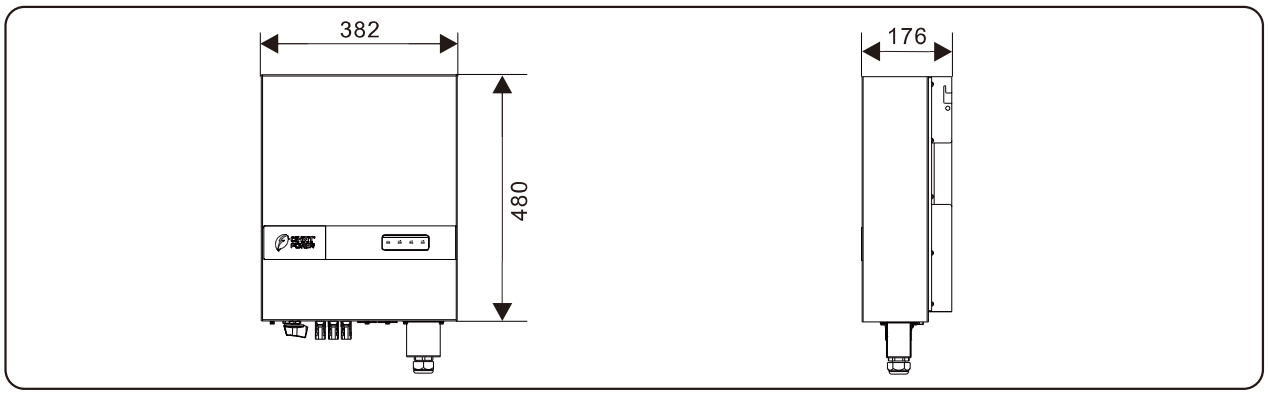


Figure 2.4 The dimensions of the inverter by front & side views (unit: mm)

Figure 2.5 shows the LED indicator area as follows:

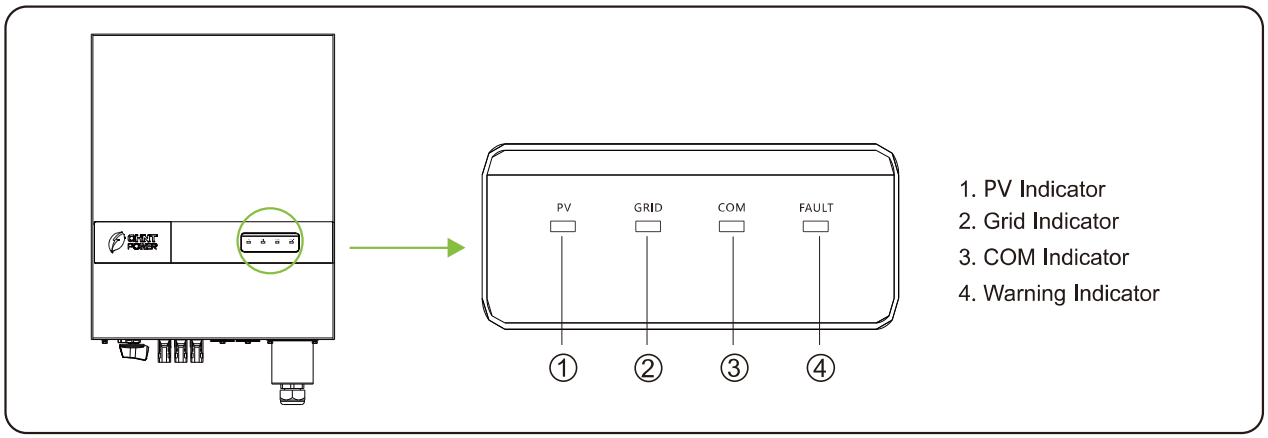


Figure 2.5 The front view of LED indicator area

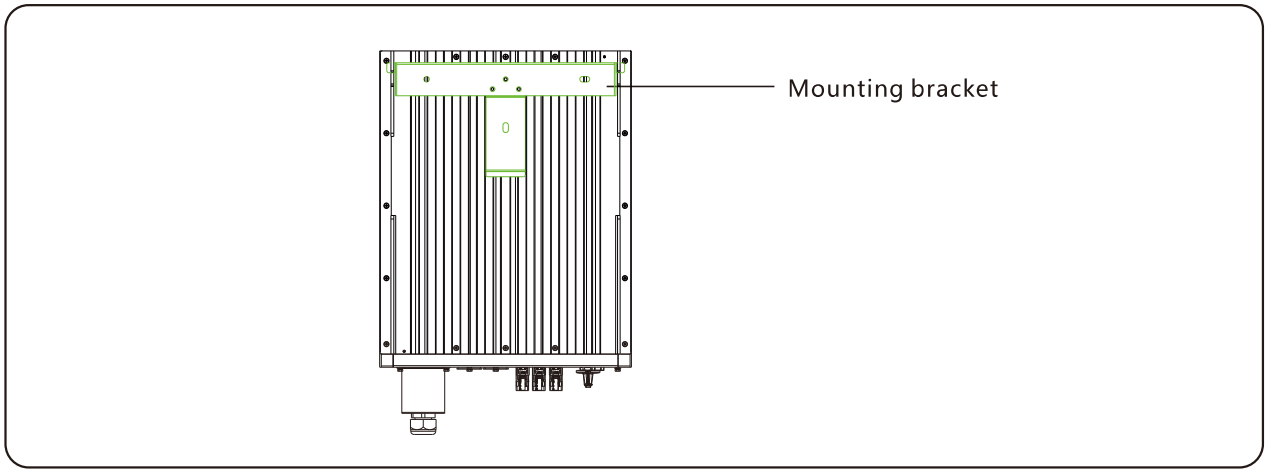


Figure 2.6 The rear view of this series inverters

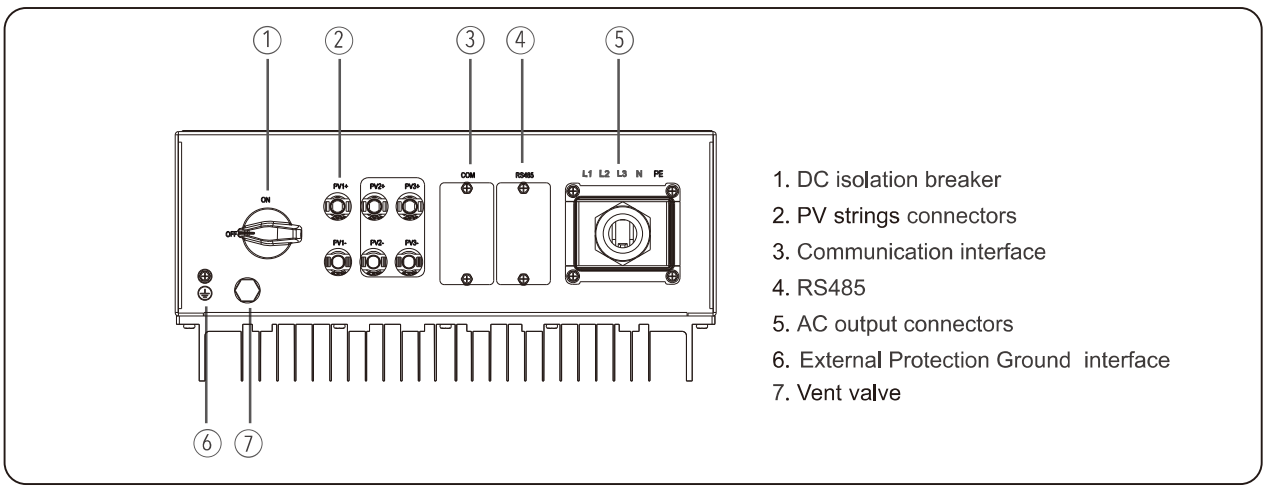


Figure 2.7 The bottom view of this series inverter

2.4 Working Process

2.4.1 Basic Principle Description

This series PV Inverter receives inputs from PV strings through DC switch and surge protection sequentially. There are two groups of PV strings input terminals on DC input terminal of 6K/8K/10K; while there are there groups of PV strings input terminals on 12K/15K with the 2nd and 3rd routes terminals merging into one independent MPPT. Then the inputs are grouped into two independent MPPT routes inside the inverter to track the maximum power point of the PV panels. The two MPPT routes are then converted into DC Bus, and the DC power is converted to AC power through an inverter circuit, which is fed to the power grid finally. Surge protection and EMI filer are supported on both DC and AC sides to reduce the electromagnetic inference.

2.4.2 Circuit Diagrams

Figure 2.8 shows the circuit diagram for the 6K/8K/10K model:

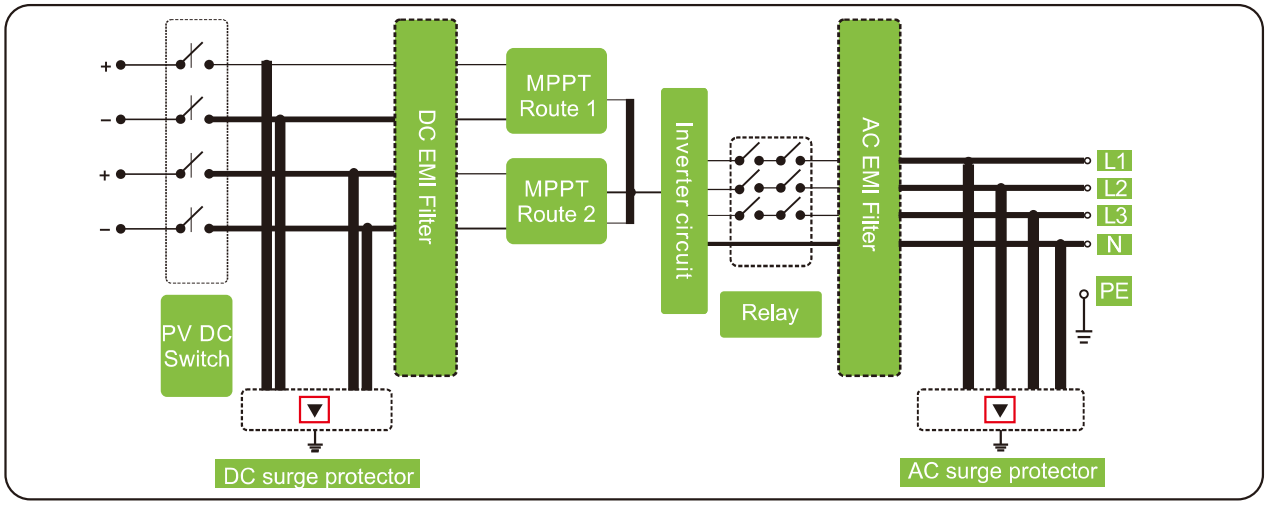


Figure 2.8 circuit diagram

Figure 2.9 shows the circuit diagram for the 12K/15K model:

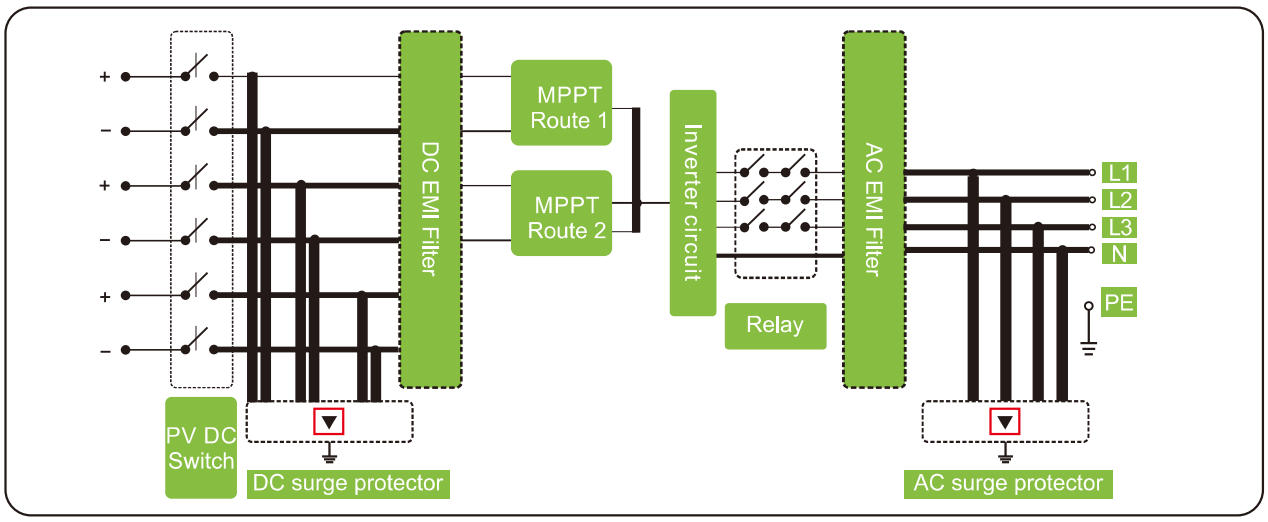


Figure 2.9 circuit diagram

2.5 Working Modes

There are three working modes of the inverter shown as follows: standby, operating, and shutdown. Table 2.1 shows the conditions of the inverter switching between working modes.

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 on-grid and generates electricity, it tracks the maximum power point to maximize the PV String output and converts DC power from PV strings into AC power and feeds the power to the power grid.
Shutdown	The PV inverter switches from standby or operating mode to shutdown mode if detecting a shutdown command. And the shutdown command can only be cleared when the DC side is powered off and restarted or the boot command is received.

Table 2.1 Working modes description

3 Storage

If you do not use the inverter immidiately, please follow the requirements below to keep the inverter for proper performance in futher use.

- Do not unpack the inverter (put desiccant in the original packing box if the PV inverter is unpacked).
- Store the PV inverter at a temperature range of -40℃ to +70℃ with the relative humidity of 0% to 100% (no condensation).
- A maximum of six layers of cartons can be stacked.
- Carton should not be left in a lop-sided position or turned upside down.
- Ensure that the inverter be inspected and tested by qualified personnel before use if it has been stored for a long time.

4 Installation

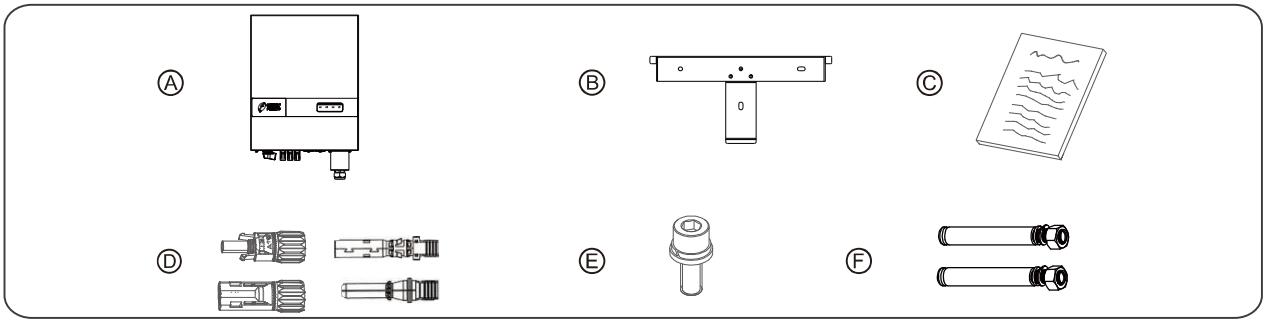
DANGER	Do not mount the inverter in areas containing highly flammable materials or gases.
CAUTION	The mounting location must be inaccessible to unrelated personnel to avoid electrical shock burn.

4.1 Checking the Outer Packing

a. When receiving the inverter, check that the packing materials are intact.

b. After unpacking, check that the deliverables are complete, intact, and consistent with your order list.

c. Examine the PV inverter and its fittings for damage such as scraps and cracks.



Items	Deliverables
A	The inverter
B	Rear panel
C	File package
D	DC terminal connector group
E	Screw
F	Bolt group (reserved for tightening the bracket and rear panel)

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, as shown in Figure 4.1.

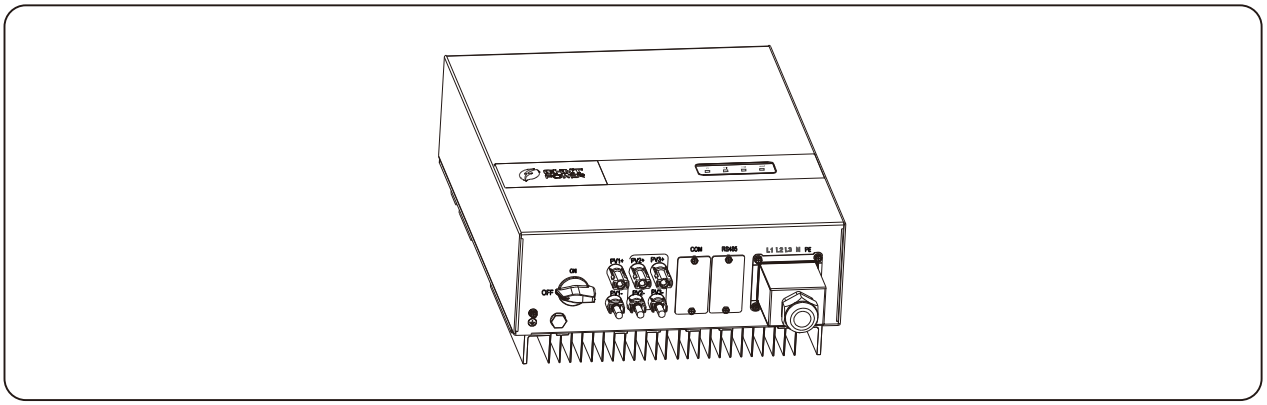


Figure 4.1 Moving the inverter

⚠ CAUTION	To avoid damage or scratches of the inverter, please place the inverter horizontally on a piece of foam or cardboard, and make sure all ports bear no heavy pressure.
⚠ CAUTION	Please handle the device with care to prevent slipping and personnel injury during transportation.

4.3 Identifying the PV Inverter

4.3.1 Nameplate

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

4.3.2 Compliance and Safety Symbols

Safety symbol	Description
	Electrical shock! There are residual voltages in the PV inverter. It needs 5 minutes to finish discharge.
	The PV inverter must not be touched when in operation. Its enclosure and heat sinks are extremely hot.
	Electrical shock! This part is charged. Only qualified and / or trained electrical technicians are allowed to perform operations on the inverter.
	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.
	The PV inverter is compliant with CQC.

4.4 Installation Requirements

Applies to wall-mounting installation, as described below in detail.

4.4.1 Determining the Installation Position

Basic Requirements

a. The inverter protection class is IP65 and can be mounted indoors or outdoors.
b. The mounting method and location must be suitable for the weight and dimensions of the inverter (refer to 12 Technical Specifications).
c. The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.
d. Do not install the inverter in areas containing highly flammable materials or gases.

Installation Environment Requirements

a. To ensure optimum operation and long service life, the ambient temperature must be below 50℃.

b. The inverter must be mounted in a well ventilated environment to ensure good heat dissipation.

c. To ensure long service life, the inverter must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the inverter be mounted in a sheltered place. If no shelter is available, build an awning, as shown in Figure 4.2.

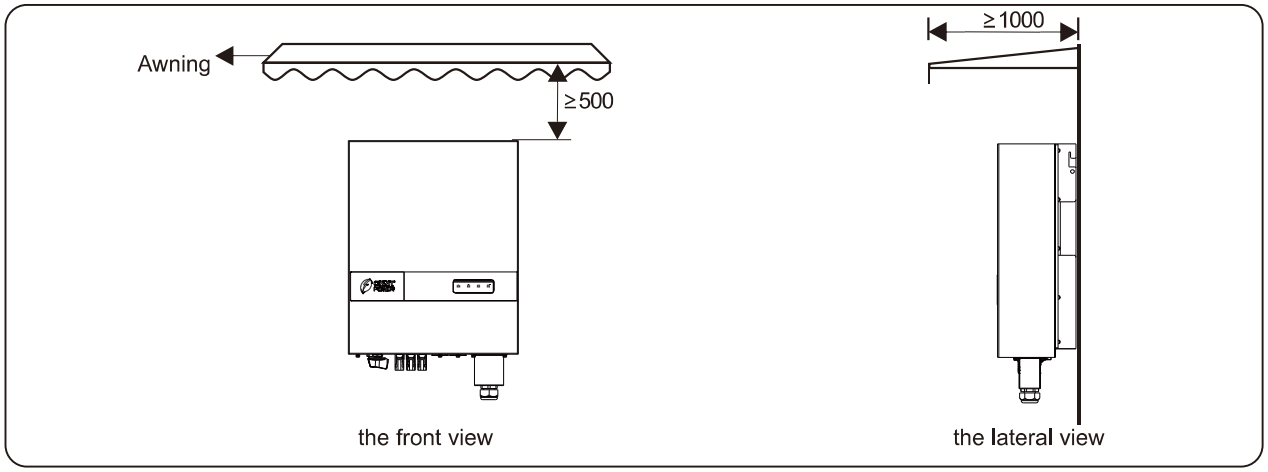


Figure 4.2 Installation environment with awning (unit: mm)

Carrier Requirements

a. The carrier where the inverter is mounted must be fire-proof. Do not mount 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 in a residential area since it will cause noise during operation.

Installation Space Requirements

a. The mounting location should be freely and safely accessible at all times without the need for any auxiliary equipment (such as scaffolding or lifting platforms). Non-fulfillment of these criteria may restrict servicing.

b. Reserve enough clearance around the inverter to ensure sufficient space for installation and heat dissipation, as shown in Figure 4.3.

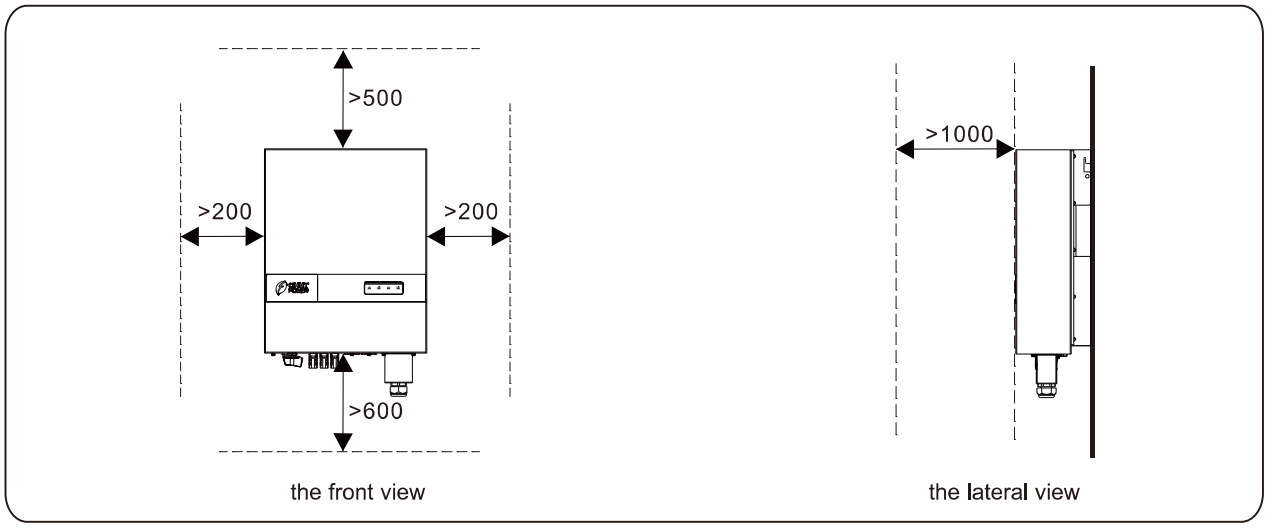


Figure 4.3 Installation Space Requirements (unit: mm)

c. When installing multiple inverters, there are three suggested installation methods as follows in considering the installation space and heat dissipation.
Please install them along the same line (as shown in Figure 4.4) if sufficient space is available;
Please install them in triangle mode (as shown in Figure 4.5) or stacked mode (as shown in Figure 4.6) if there is no sufficient space.

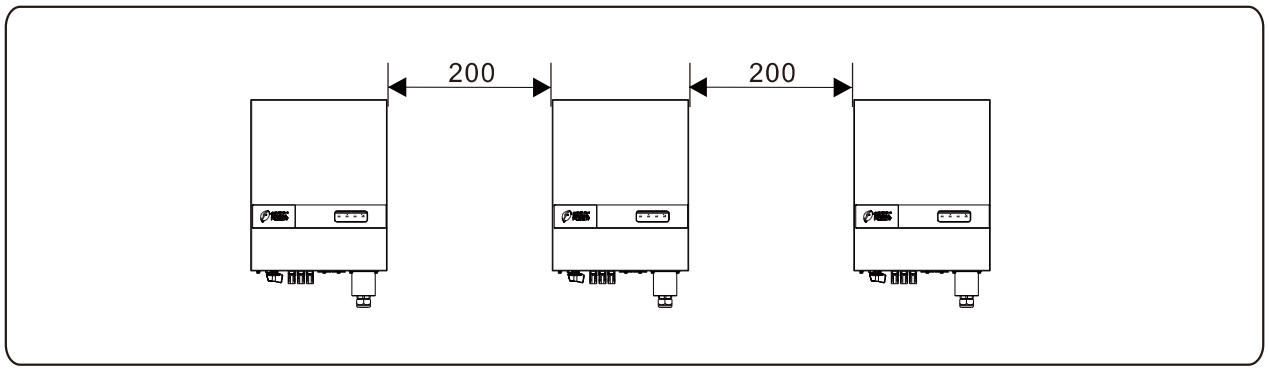


Figure 4.4 Mounting along the same line (unit: mm)

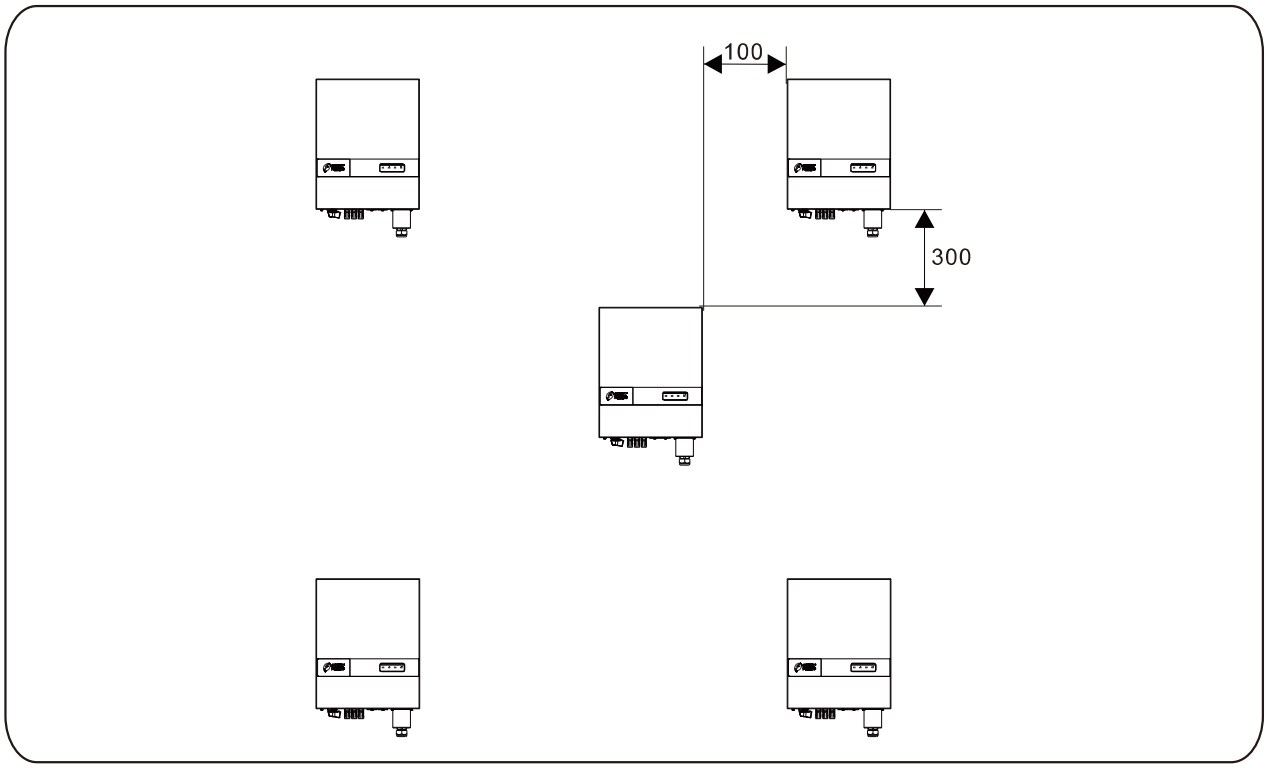


Figure 4.5 Mounting in triangle mode (unit: mm)

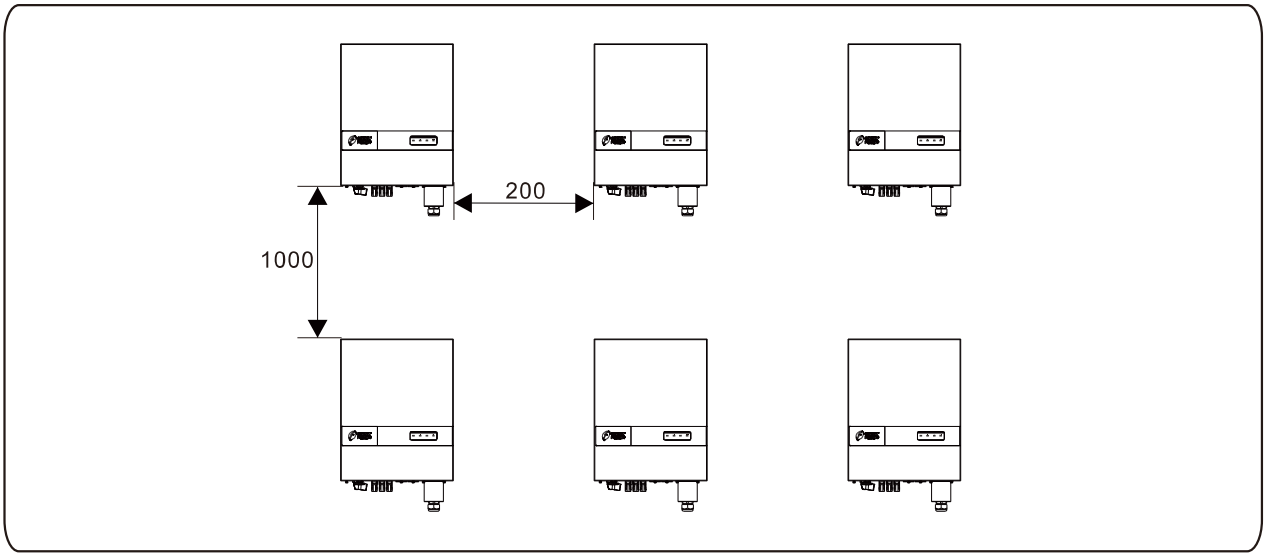
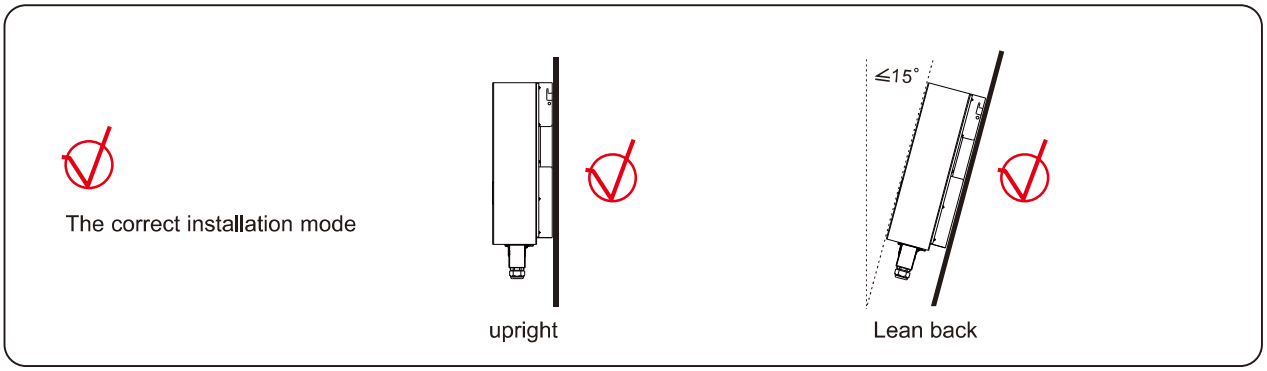


Figure 4.6 Mounting in stacked mode (unit: mm)

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

4.4.2 Installation Mode Requirements

Mount the inverter upright or at a maximum back tilt of 15 degrees to facilitate heat dissipation. Some correct/wrong mounting modes, as shown in Figure 4.7 & 4.8.



Figures 4.7 The correct mounting modes

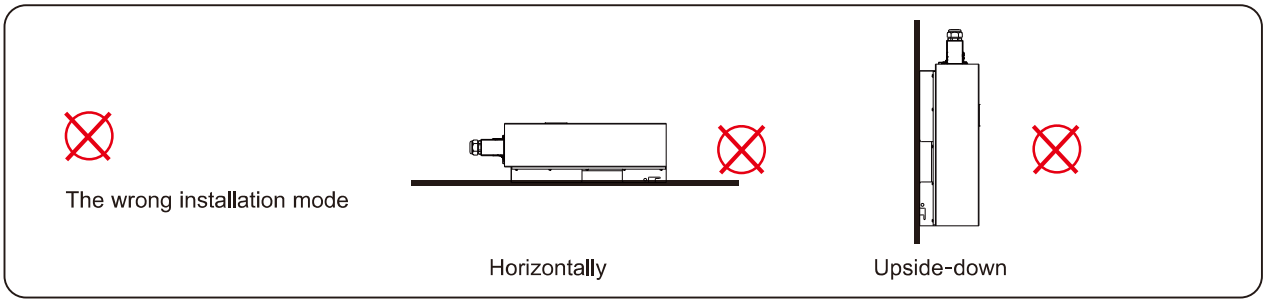


Figure 4.8 The wrong mounting modes

NOTICE	Incorrect installation will result in the inverter not working properly.

4.5 Installing a Rear Panel

Before installing the inverter, prepare expansion bolts (specification: M6*60; quantity: 3) and secure the shipped rear panel to a wall.

Step 1 Move out the rear panel from the packing case.

Step 2 Determine the positions for drilling holes (as shown in Figure 4.9) using the rear panel.

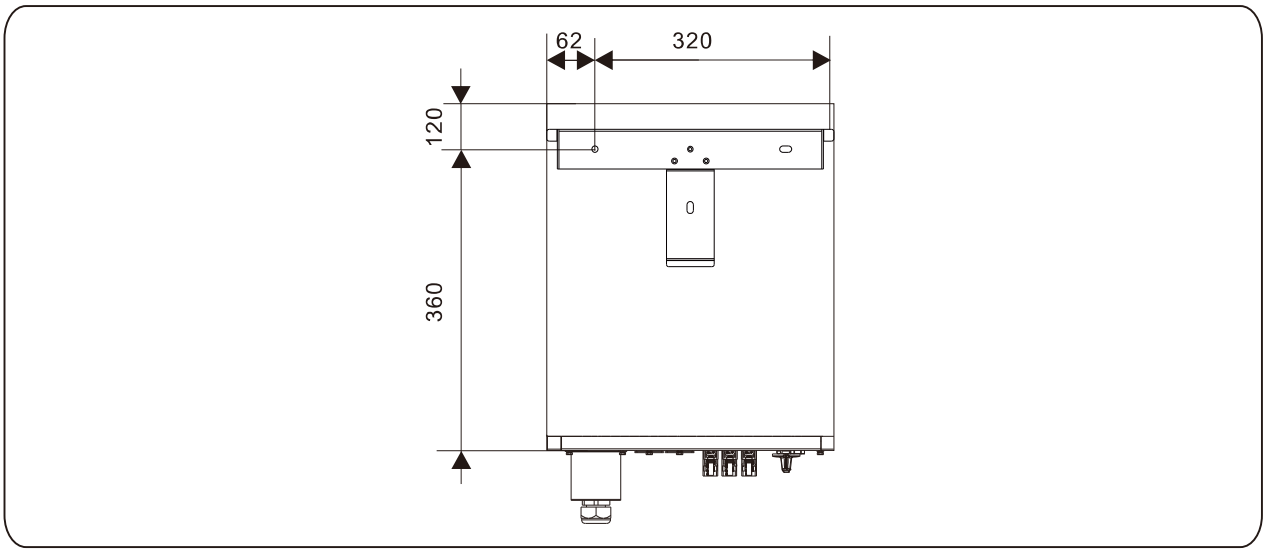


Figure 4.9 Determine the positions for drilling holes (unit: mm)

Step 3 Level the hole positions using a level ruler, and mark the hole positions using a marker (as shown in Figure 4.10).

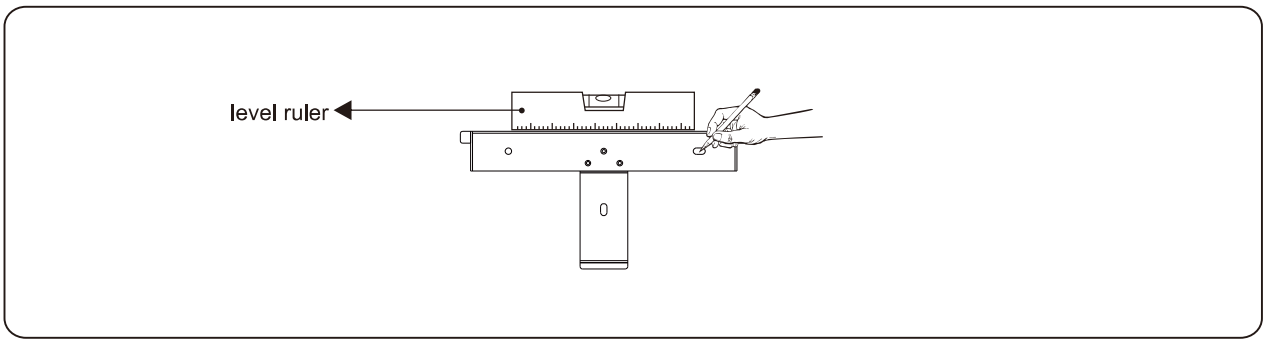


Figure 4.10 mark the hole positions using a marker

DANGER	Before 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, insert the threaded bolts (with nuts and sleeves removed) through the holes of the rear panel (install the nuts and sleeves then), secure the rear panel partially on the wall by knocking the bolts completely into the holes using a rubber mallet, as shown in Figure 4.11.

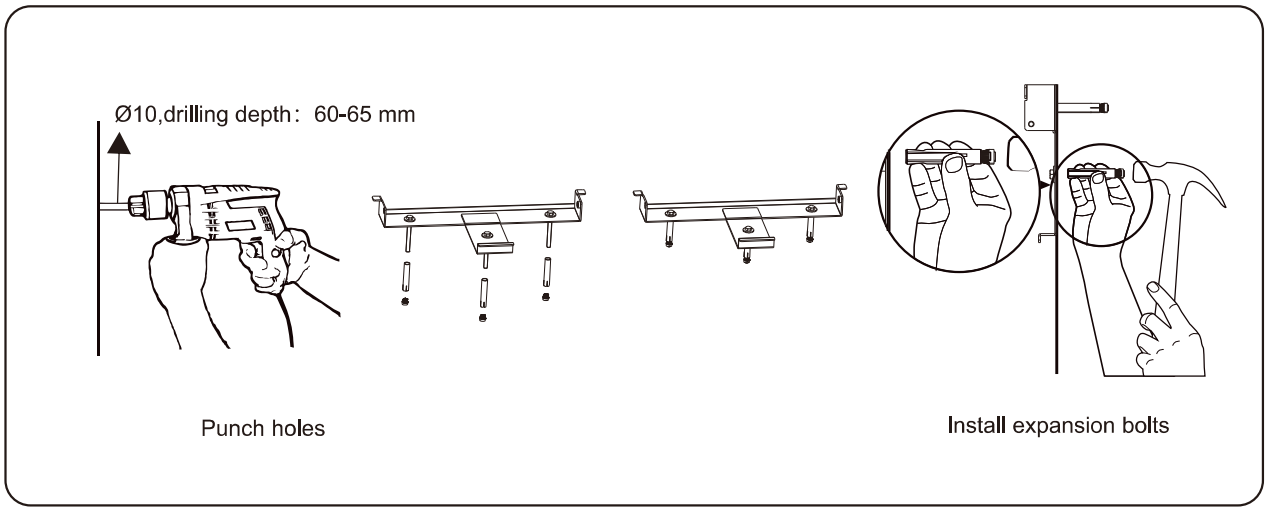


Figure 4.11 Punch holes and install expansion bolts (unit: mm)

Step 5 Tighten the expansion bolts with a torque of 3 N.m using a torque wrench to completely secure the rear panel on the wall, as shown in Figure 4.12.

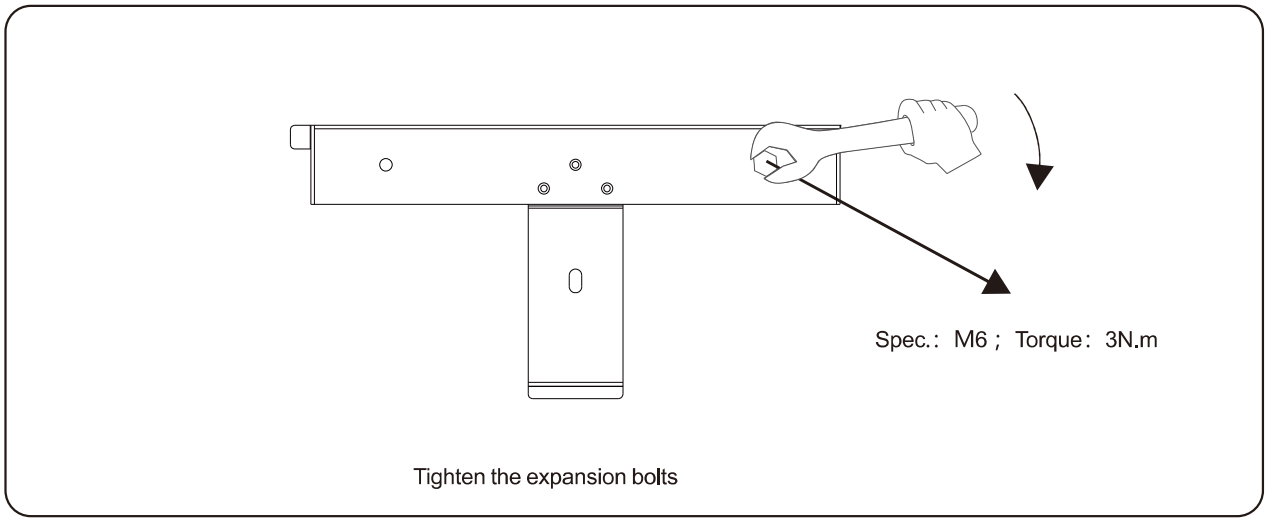


Figure 4.12 Completely secure the real panel

4.6 Installing the inverter

Follow below procedures:

Step 1 Firmly hang the inverter on the rear panel, as shown in Figure 4.13.

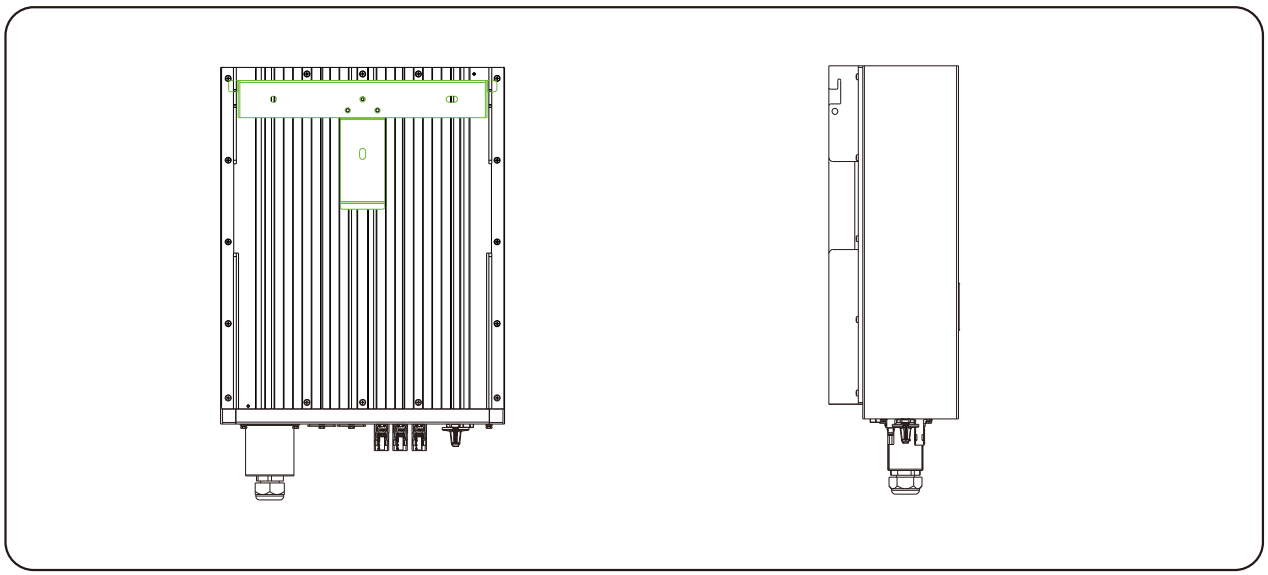


Figure 4.13 Hanging the inverter

Step 2 Tighten the screws to lock the inverter with the rear panel and ensure that the inverter i is secured, as shown in Figure 4.14.

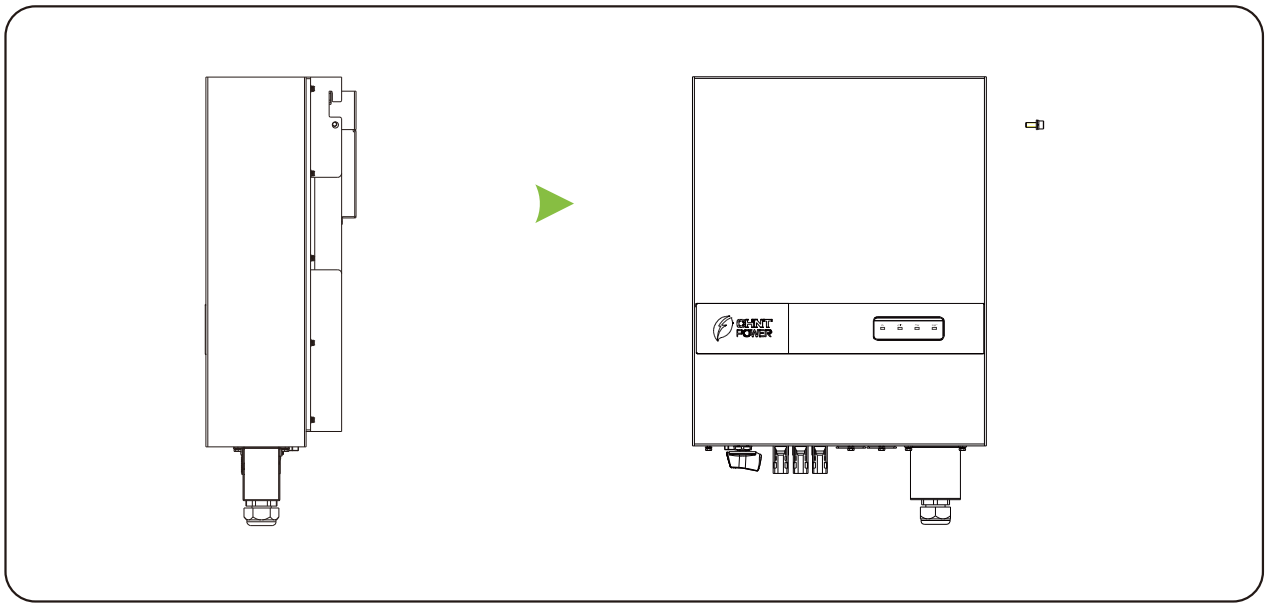


Figure 4.14 Securing the inverter

5 Electrical Connections

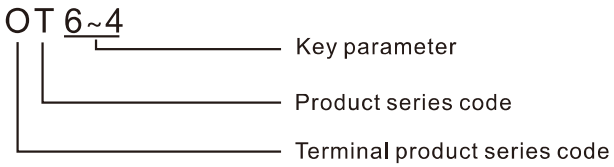
DANGER	Before performing any electrical connections, ensure that both DC and AC Switches are OFF. Otherwise, fatal injury can occur due to the high voltage caused from AC and DC cables.
CAUTION	Grounding the PV Strings requires below prerequisites:
1. An isolation transformer must be installed on the AC side of each inverter. Ensure that the neutral wire of the isolation transformer must be disconnected from the PGND cable.	
2. One isolation transformer should be connected to only one PV inverter. Do not connect one isolation transformer to multiple inverters, otherwise, circulating current generated by the inverters will lead to operation failure.	
3. Select “Isolation SET” on the ChintHome APP, and set “Input Grounded, With TF”.	

5.1 Connecting Protection Ground (PGND) Cables

5.1.1 Preparation

The requirements of ground cables and OT terminals prepared are as follows:

- Ground cables: Outdoor copper-core cables with a cross sectional area of 6 mm^2 or above are recommended.
- OT terminal: OT6~4.



NOTE	Good grounding of the inverter helps resist the impact of surge voltage and improve the EMI performance. Therefore, connect the PGND cable before connecting the AC power cables, DC power cables, and communications cables.

NOTE	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.

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 should be 2mm~3mm longer than OT terminal's crimping end, as shown in Figure 5.1.

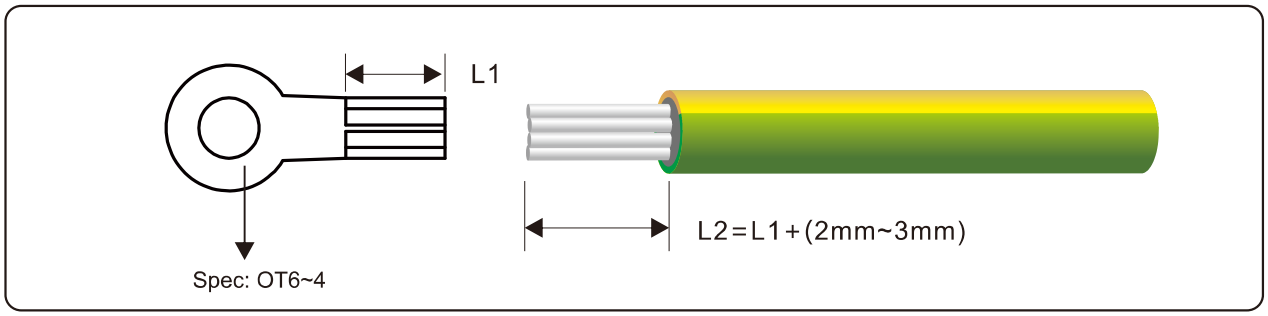


Figure 5.1 Stripped length (unit: mm)

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

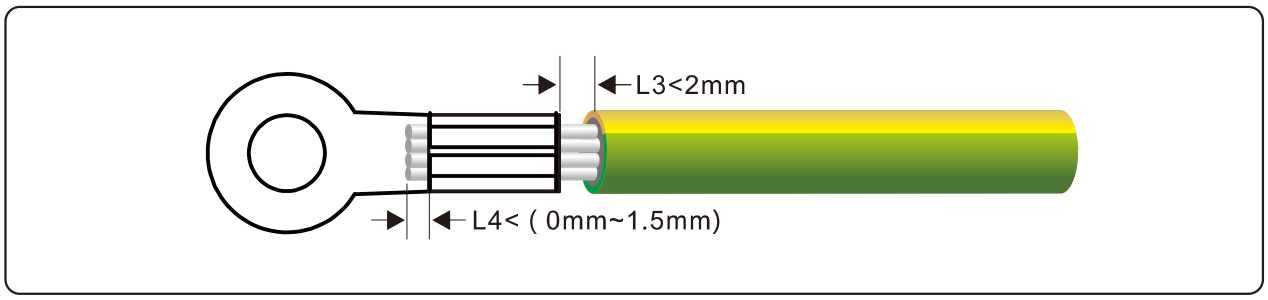


Figure 5.2 Crimping a cable (unit: mm)

Step 3 Secure the PGND cable (done by step1 & 2) using the ground bolts and tighten the bolts with a torque of 1.2 N.m using a socket wrench, as shown in Figure 5.3.

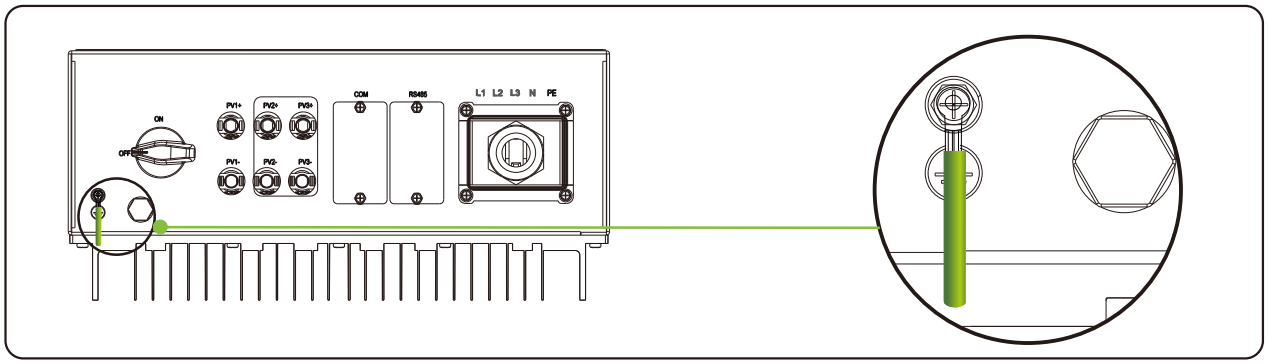


Figure 5.3 Securing the PGND cable

5.2 Connecting AC Output Cables

5.2.1 Preparation

Prepare the AC power cables and take out the AC terminals from the package.

AC power cables: Outdoor multi-strand copper-core cables are recommended. Single strand cables or aluminum cables for inverter output terminal please contact and confirm with our company. Please refer to Table 5.1 for the specifications.

Cable	Cable Type	Cross-sectional Area (mm^2)		Cable Outer Diameter (mm)
		Range	Recommended Value	Range
AC Cable	Multi-core outdoor cable	4~6	4	11~18
DC Cable	Common PV cables (model: PV1-F)	2.5~4	4	4~5
External PGND Cable	Multi-core outdoor cable	4~6	6	NA

Table 5.1 Recommended AC output cable specifications

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

Table 5.2 Max cable length at AC terminal

AC wiring terminals: an independent 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.

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	The circuit breaker on the AC side should be connected to only one inverter independently. Do not connect one circuit breaker to two or more inverters.
⚠ 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 by using a wire stripper, as shown in Figure 5.4.

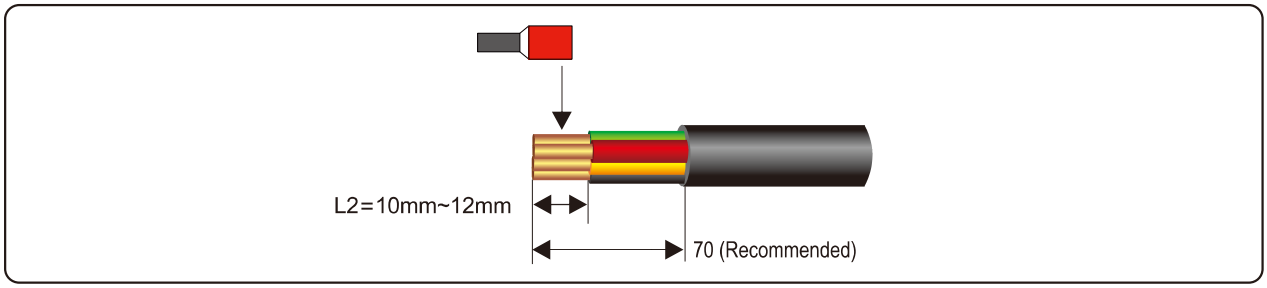


Figure 5.4 Stripped length (unit: mm)

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

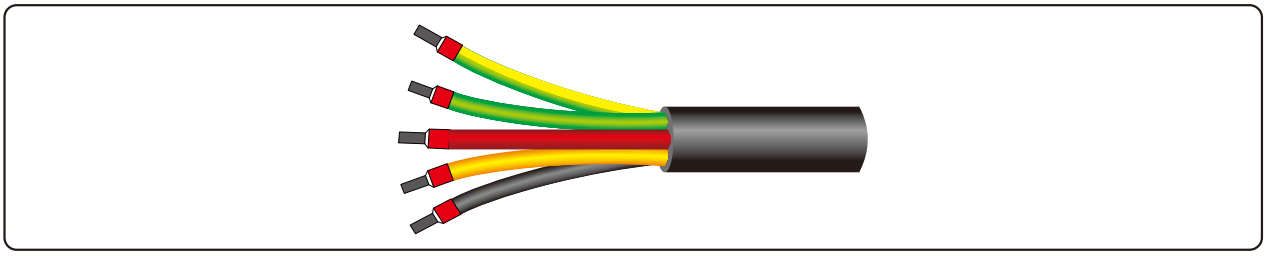


Figure 5.5 Crimping Euro type terminals

Step 3 Insert AC output wire through waterproof terminal block to AC connector with appreciate wiring length reserved, as shown in Figure 5.6.

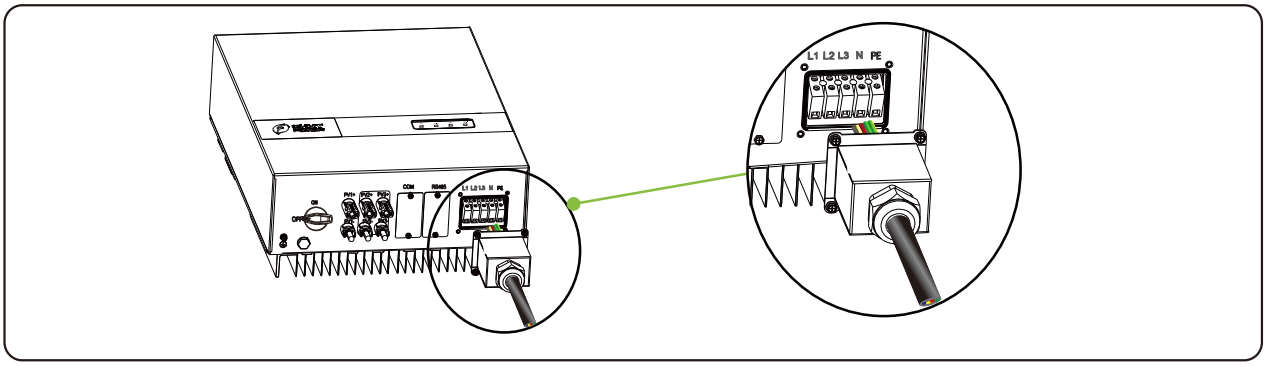


Figure 5.6 Dealing AC output cable

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

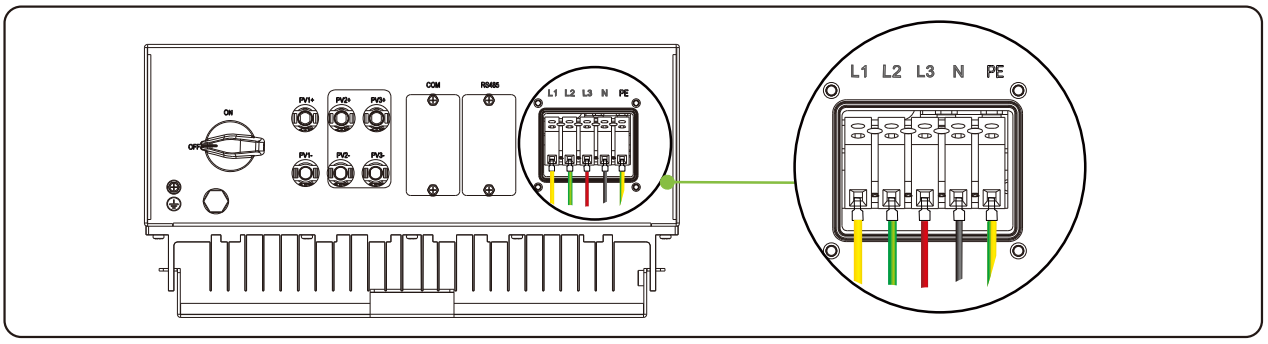


Figure 5.7 Tightening AC cable

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

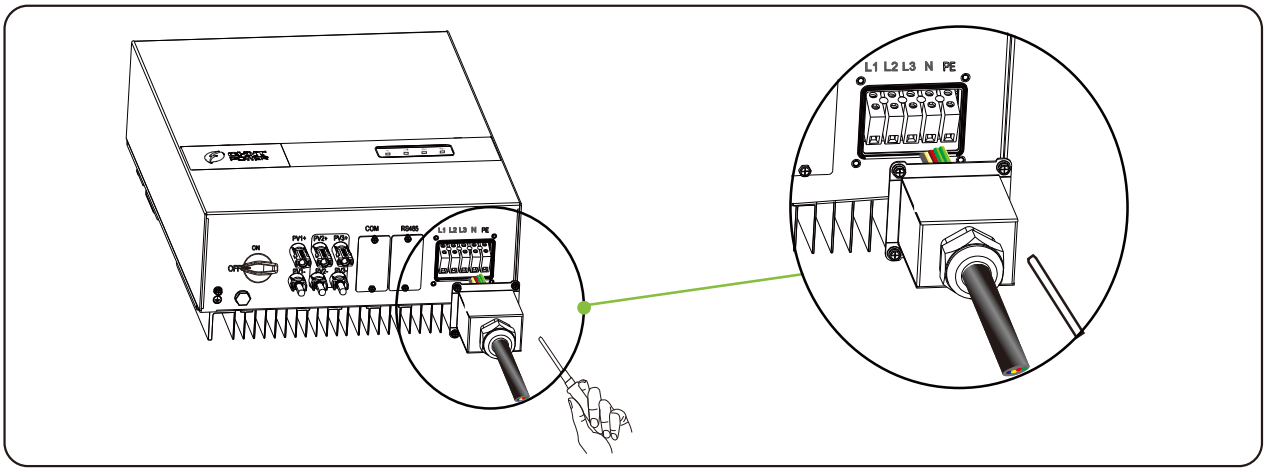


Figure 5.8 Tightening AC wiring cover

Step 6 Tighten the locking cap on the AC cable using a torque wrench with a torque of 5 N.m, as shown in Figure 5.8.

5.3 Connecting the PV Strings

DANGER	PV Strings connection needs below prerequisites; otherwise, an electrical shock may occur.
PV modules can generate electric energy when exposed to sunlight, which may create an electrical shock hazard. Therefore, make sure to shield them with opaque cloth before connecting the PV modules,	
Before connecting DC input power cables, ensure that the DC SWITCH on the inverter is OFF.	
When the inverter is on-grid, it is not allowed to maintain DC input power cables, such as connect or disconnect a string or a module in a string. Only after the inverter enters shutdown mode, it is allowable for preceding DC input power cables maintenance.	

WARNING	Grounding the PV Strings needs below prerequisites; otherwise, a fire can occur.
All PV modules connected in series in each PV string must be of the same type.	
The maximum open-circuit voltage of each PV string must be always lower than or equal to its permitted range.	
The maximum short circuit current of each PV string must be always lower than or equal to its permitted range.	
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 all PV strings should be lower than or equal to the maximum input power of the inverter.	

5.3.1 Preparation

Prepare DC input cables and PV Strings connectors required as bellows:

- Input routes of PV strings: 2 routes for 6-10K models, 3 routes for 12-15K, refer to Table 5.3.

Input Route	Connecting Method	Inverter model
1	Connected to any route	6K/8K/10K/12K/15K
2	Connected to routes 1 & 2	
3	Connected to routes 1,2 & 3	Not applicable for 6K/8K/10K

Table 5.3 Route connecting of PV strings and the inverter

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

Inverter model	Cable Type	Cross-sectional Area(mm²)		Cable Outer Diameter (mm)
		Range	Recommended Value	Range
6K/8K/10K 12K/15K	Common PV cables (model: PV1-F)	2.5~4	4	4~5

Table 5.4 Recommended DC input cable specifications

Connectors of PV Strings:

There are positive and negative DC input connectors used, as shown in Figure 5.9 and Figure 5.10.

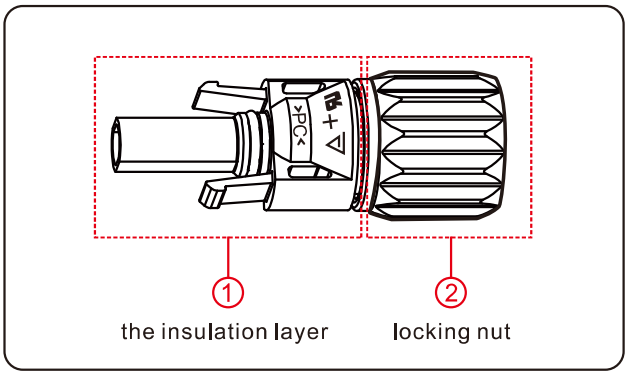


Figure 5.9 Positive connector compositions

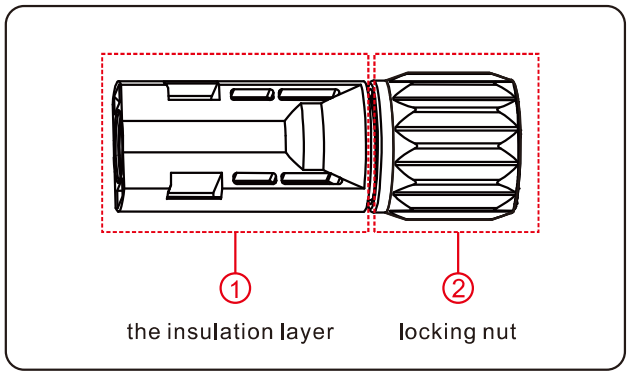


Figure 5.10 Negative connector compositions

NOTE	Positive and negative metal connectors are packed with positive and negative connectors respectively when shipped out. After unpacking, keep the positive and negative ones separate to avoid confusion.

5.3.2 Procedures of Connecting the PV Strings

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

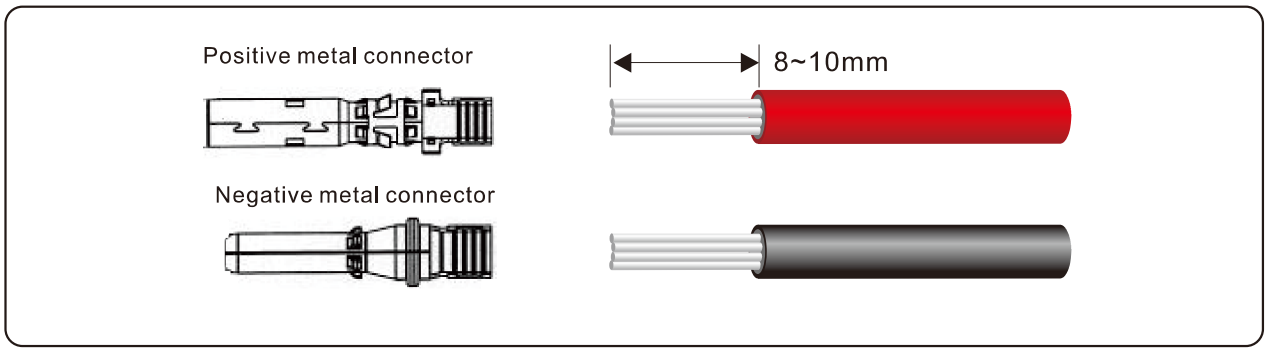


Figure 5.11 Removing insulation layer for DC cable (unit: mm)

Step 2 Insert the exposed areas 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.

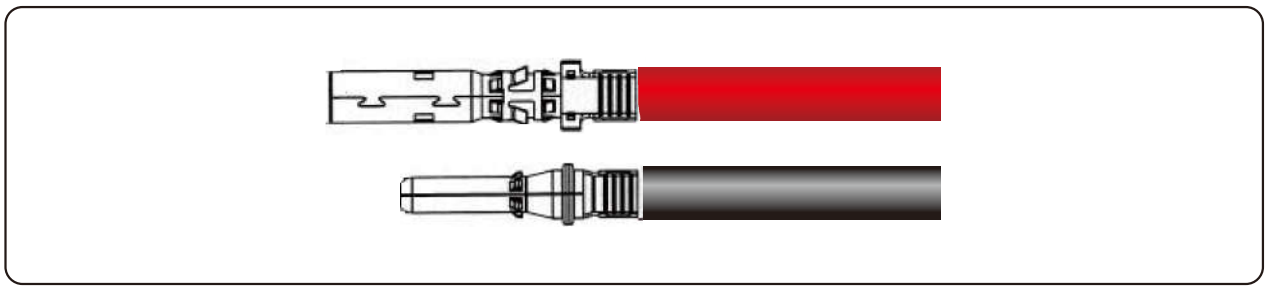


Figure 5.12 Crimping a metal connector

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.

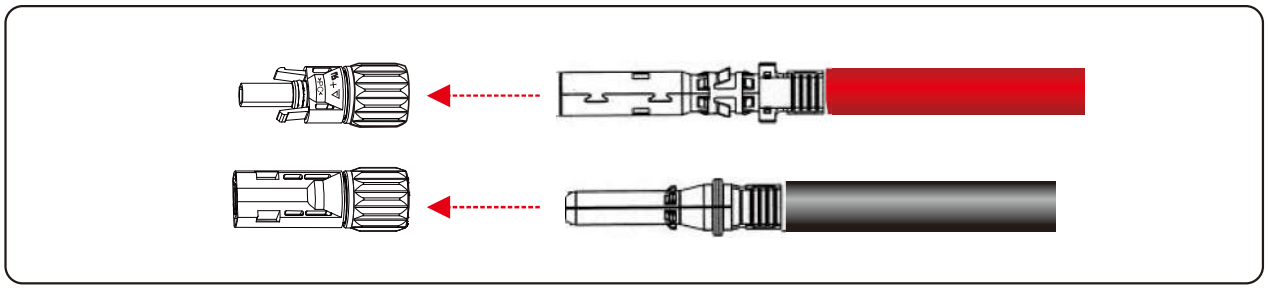


Figure 5.13 Connecting positive and negative connectors

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

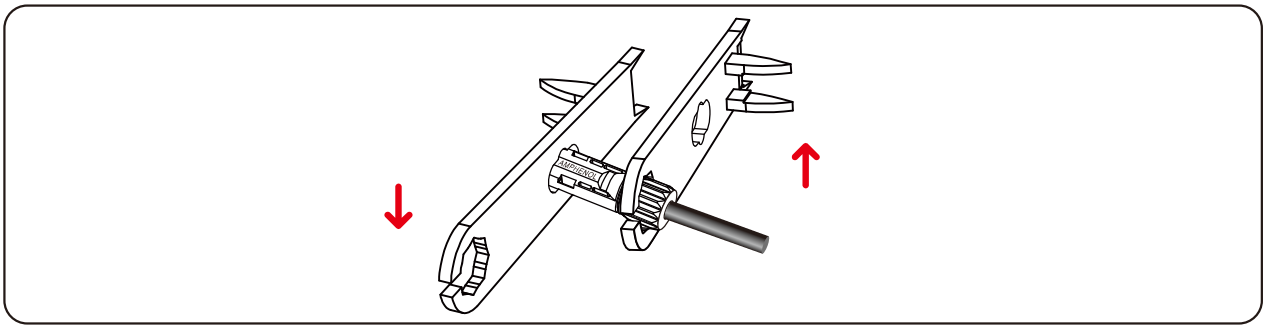


Figure 5.14 Locking connectors

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

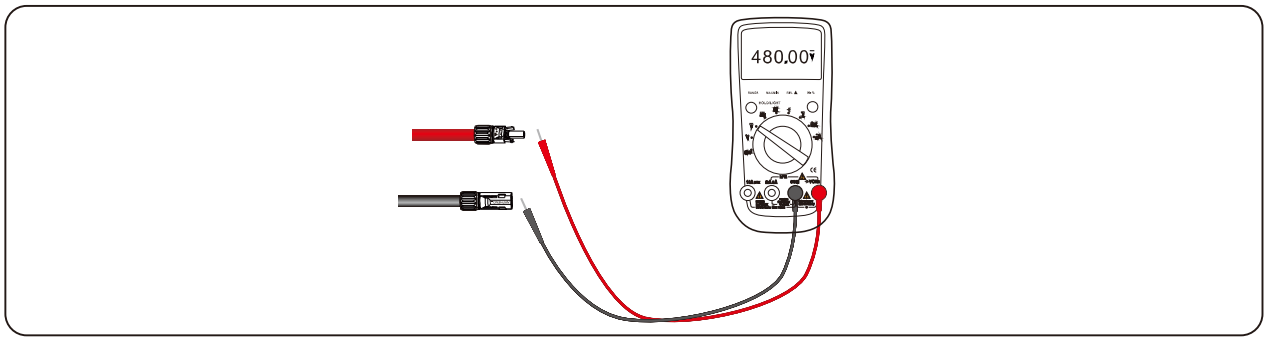


Figure 5.15 Checking the voltage of every route Strings

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

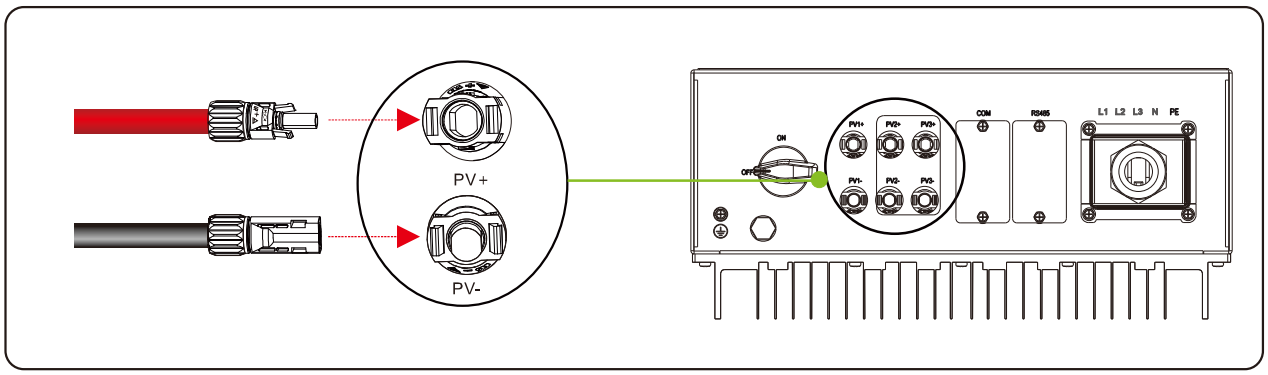


Figure 5.16 Connecting to the inverter

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 Communication Cables

5.4.1 Communication Mode Description

There are multiple standard communication modes to implement communicating with the inverter: Bluetooth, WIFI, GPRS and RS485, which are introduced as follows.

Bluetooth Module

You can turn on the Bluetooth function of the mobile phone, and set parameters and monitor data of the inverter through the mobile APP ChintHome.
Please refer to the APP user manual for operation details, which is available from www.chintpower.com/en.

WIFI & GPRS & RS485 Modules

Connect the inverter to other communication modules by using DB9 Communication adaptor, and refer to Table 5.5 below for details.

Module	Function description
WIFI	WIFI module implements communication with Cloud server through wireless network to monitor PV inverter's data status. For more details, refer to WIFI Product Application Manual.
GPRS	GPRS module implements communication with Cloud server through cellular to monitor PV inverter's data status. For more details, refer to GPRS Product Application Manual.
RS485	RS485 switching module monitors PV inverter's data status through collecting and uploading data to Cloud server. For more details, refer to RS485 Product Application Manual.
NOTE	You can purchase the WIFI/GPRS/RS485 communication modules from CHINT. WIFI/GPRS/CHINT HOME User Manual is available from http://www.chintpower.com/en.

Table 5.5 WIFI & GPRS & RS485 Modules Description

- **RS485 communication mode (for single inverter)**

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

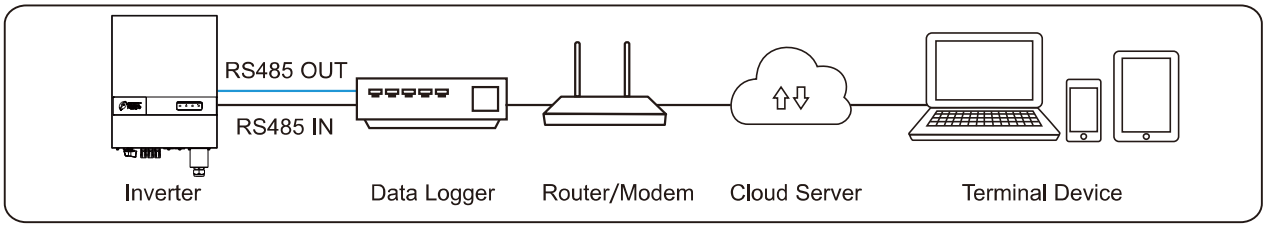


Figure 5.17 RS485 communication mode for a single inverter

- **RS485 communication mode (for multiple inverters)**

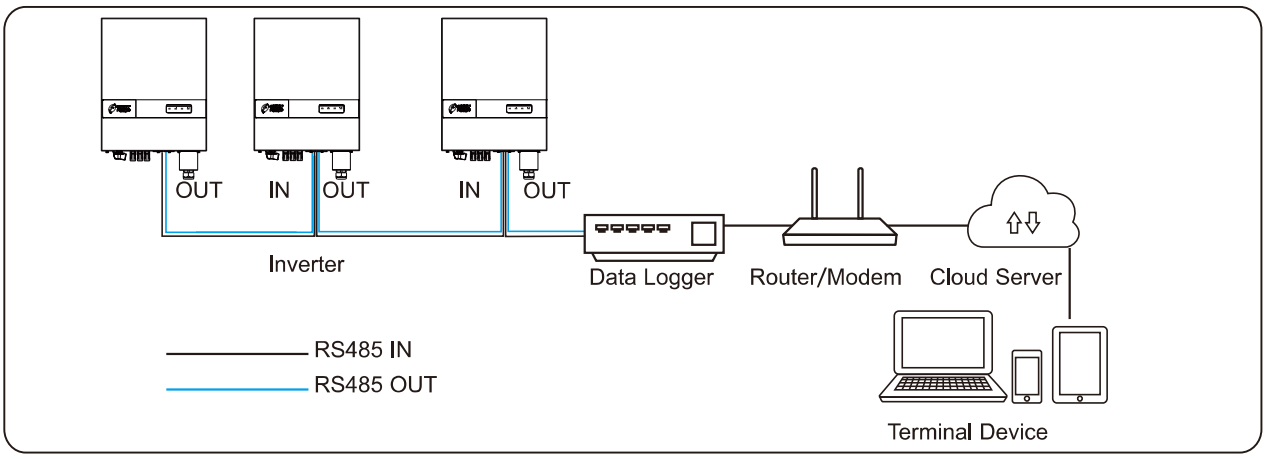


Figure 5.18 RS485 communication for multiple inverters

NOTE	If multiple inverters are connected, note the following: 1. No need for re-setting Modbus address and the address can be allocated automatically if V1000 data logger is used. Otherwise, you need to re-set Modbus address manually through the APP if other brand data logger is used. For details, refer to the APP User Manual. 2. Turn RS485 Resistance of the inverter at the end of the chain to ON through *ChintHome* APP. 3. Ensure that the appropriate length of communication cable between every two inverters is less than 200m and communication cable must be separated from other power cables to avoid communication interference.

5.4.2 Connecting RS485 Communication Cables

Step 1 Remove an appropriate length of the insulation layer from the cable using a wire stripper, as shown in Figure 5.19.

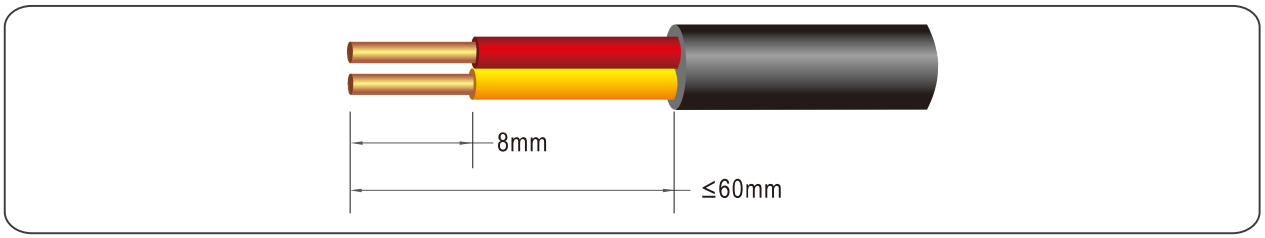


Figure 5.19 Stripping an RS485 communications cable (unit: mm)

Step 2 Remove the RS485 screws at the inverter bottom to remove 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.

Step 4 Connect RS485 differential positive and negative signal of data logger to terminal 1A and 1B of the inverter, and connect terminal 2A and 2B of the inverter to terminal 1A and 1B of another inverter, as shown in Figure 5.20.

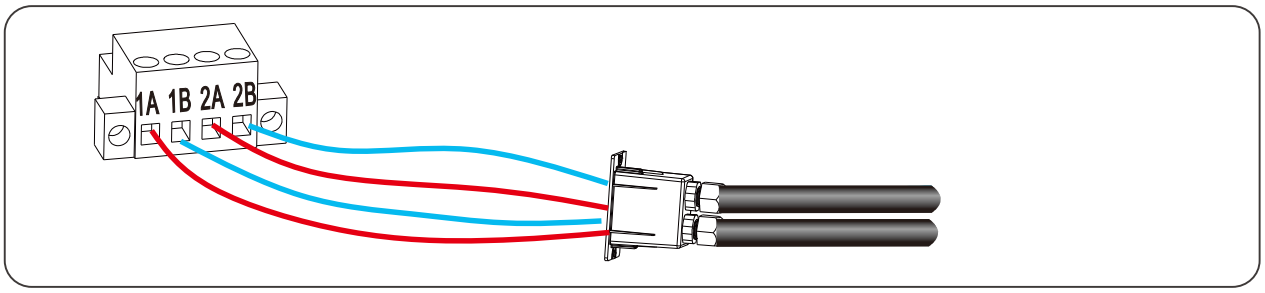


Figure 5.20 RS485 Terminal block connection

Step 5 Connect RS485 male terminal with its female terminal, tighten the locking caps with a torque of 8 N·m, and tighten the waterproof cable connectors.

⚠ NOTICE	To prevent corrosion, apply silica gel or fireproof mud to the terminal or interface after connecting external PGND cables, AC cables, RS485 port, and Ethernet port.

5.4.3 Setting RS485 Communication Address

Step 1 Input the official website of our company in your mobile phone browser and click APP to Download *ChintHome*, which is also available by scanning below QR code. And then login ChintHome and register an account for your inverter.

Figure 5.21 QR Code for downloading APP ChintHome

Step 2 Click the Extension Key, and select Setting in the prompt manual, as shown in Figure 5.22.

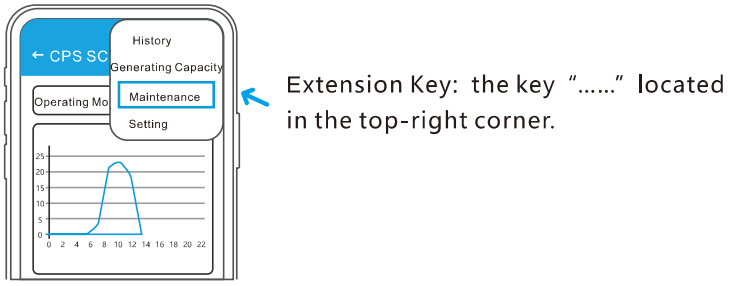


Figure 5.22 APP homepage setting

Step 3 Check the Modbus address in Figure 5.23, the default address is 1, click to revise the address and save it, as shown in Figure 5.23.

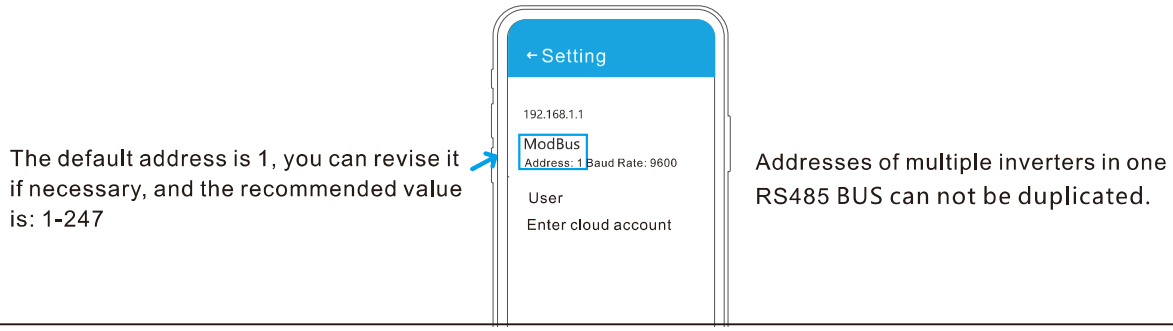


Figure 5.23 Revise the Modbus address and save

Step 4 You can set Mach Resistance of the end of multi-RS485 connection chain, as shown in Figure 5.24.

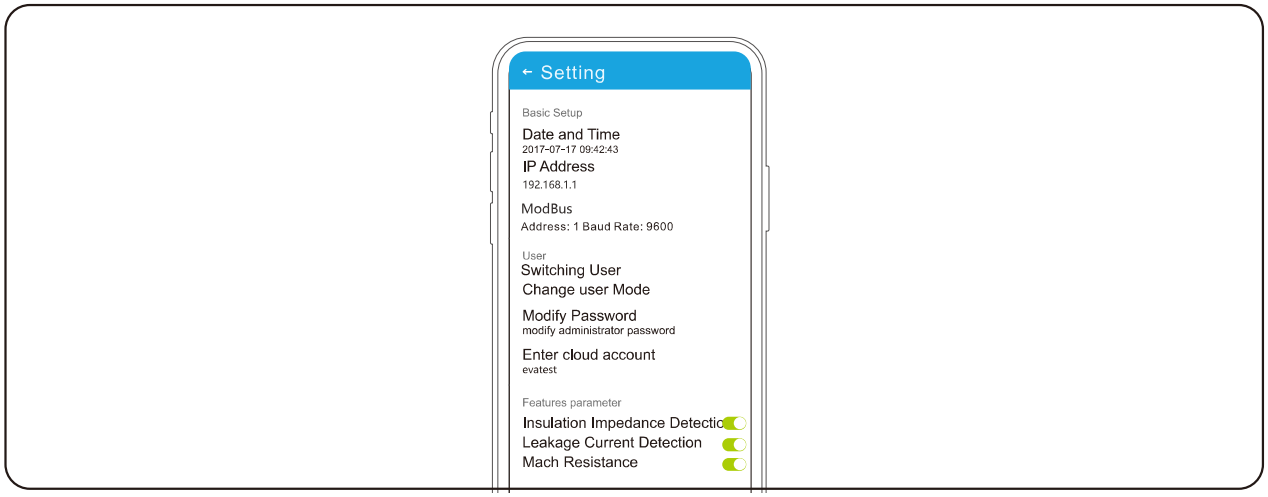


Figure 5.24 Setting Mach Resistances

5.5 Installation Verification

When the installation is completed, please check the inverter as Table 5.6 shown.

1. No other objects left on the PV inverter.
2. All screws are tightened.
3. The PV inverter is installed correctly and securely.
4. PGND, AC, DC, and Communication cables are connected tightly/correctly and securely.
5. Ground cables are connected correctly and securely.
6. There is no open circuit or short-circuit at AC and DC terminals by using multimeter.
7. Waterproof connectors at AC terminals and RS485 ports are plugged with waterproof plugs tightly.
8. Covers at AC terminals are tightened.
9. Idle terminals are sealed.
10. All safety warning symbols are intact and complete on the inverter.

Table 5.6 Self-check items after installation

6 System Operation

6.1 Powering ON the Inverter

Step 1: Switch ON the AC circuit breaker.

Step 2: Shield the PV panels, then turn ON the DC circuit switch on the inverter, and take off the shielding object.

Step 3: Observe status of LED indicator lights on the inverter according to Table 7.2.

NOTE	When LED status lights display grid-connecting status, it means the inverter is operating well. Any query please contact your dealer.

6.2 Powering OFF the Inverter

Step 1: Switch off the AC circuit breaker.

Step 2: Turn off the DC circuit switch on the inverter.

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 the power-off.

7 User Interface

7.1 LED Indicator

LED indicators include PV indicator, grid indicator, COM indicator and warning indicator, as shown in Figure 7.1.

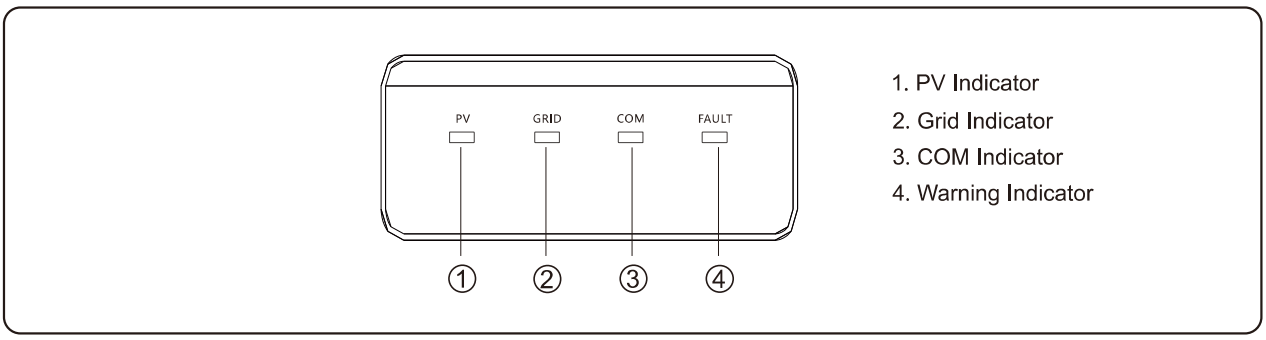


Figure 7.1 LED indicators

LED indicator	Status	Instruction
PV Indicator	on	Voltage of PV strings meet the conditions for feed-in operation.
	blink	Voltage of PV strings does not meet the conditions for feed-in operation.
Grid Indicator	blink	Power grid abnormal. The conditions for feed-in operation are not yet met.
	on	Feed-in operation. The blink times (every cycle lasts 30s) of the grid indicator present power size, and after that the indicator keeps ON. When less than 20% rated power, blink one time; 20%~40% rated power, blink twice; 40%~60% rated power, blink three times; 60%~80% rated power, blink four times; 80%~100% rated power, blink five times.
COM Indicator	blink	Communication data transmission is underway.
	off	No external communication is connected or no communication data transmission.
Warning Indicator	on/blink	An error has occurred.
	off	No error.

Table 7.1 LED Indicator status

	PV indicator	Grid indicator	COM indicator	Warning indicator
Normal status	●	●/★	◎	○
Starting up	●	○	◎	○
WLAN/Wi-Fi/RS485 communication	◎	◎	★	○
PV normal	●	◎	◎	○
Grid overvoltage	◎	★	◎	○
Grid undervoltage				
Grid absent				
Grid over-frequency				
Grid under-frequency				
Grid unbalance				
PV overvoltage	★	◎	◎	○
PV undervoltage				
Weak solar irradiation				
PV strings abnormal	◎	◎	◎	★
Inverter over-temperature				
Fan abnormal				
Insulation resistance abnormal	●	○	○	●
Leakage current abnormal	○	●	○	●
Strings reverse	○	○	●	●
Control power abnormal	○	★	○	●
DC bias current abnormal	★	●	★	●
Inverter relay abnormal	○	●	●	●
Leakage current HCT abnormal	●	●	○	●
System fault	★	★	★	●
Fan abnormal	★	○	★	●
BUS voltage unbalance	●	○	●	●
BUS overvoltage	○	★	★	●
Internal communication fault	○	○	★	●
Software version incompatibility	★	●	○	●

EEPROM fault	★	○	●	●
Sampling inconsistency	★	●	●	●
Invert circuit abnormal	●	●	●	●
Boost circuit abnormal	★	○	○	●

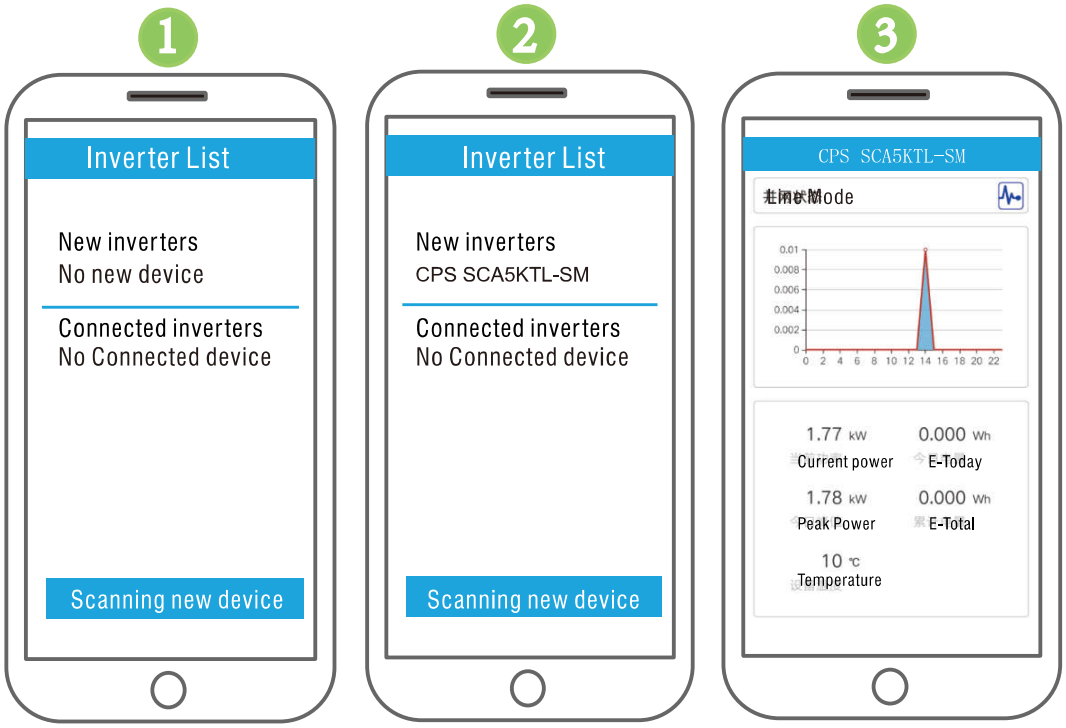
Table 7.2 The LEDs indicate the operating state of the inverter

Remark: ● LED ON ○ LED OFF ★ LED Blinking ◎ Keep Original Status

NOTE	Users can view & set parameters of the inverter through inverter APP. For details about operation, please refer to APP User Manual, which is available for free from our official website.

7.2 App ChintHome

Inverter parameters can be configured with APP throught bluetooth connection
iPhone users can go to APP Store to search ChintHome to download APP.
Android phone users can scan below QR code to download APP.



1.Open APP ChintHome, click “Scanning new devices…” button.
2.Click new device for connection.
3. APP display inverter status after connection.

4.Scroll screen to see DC & AC meters.

5. Click top right button for parameter setting.

6.Click “Setting”, setup date & time.(Note: If you want to configure inverter internal parameter, click “Switching user” button to switch to administration mode. Contact service engineer to get administration password. Non-dedicated users do not arbitrarily change related parameters)

8 Maintenance

⚠ WARNING	Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 10 minutes after the inverter is powered off.

8.1 Routine Maintenance

Check Item	Check Content	Maintain content	Maintenance Interval
Inverter output status	Statistically maintain the status of electrical yield, and remotely monitor its abnormal status.	NA	Weekly
PV inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Periodically clean the heat sink.	yearly
PV inverter running status	a. The inverter is not damaged or deformed. b. Normal sound emitted during inverter operation. c. Inverter communication is running well.	If there is any abnormal phenomenon, replace the relevant parts.	monthly
PV inverter Electrical Connections	a. AC, DC, and communication cables are securely connected; b. PGND cables are securely connected; c. Cables are intact and there are not wire aging;	If there is any abnormal phenomenon, replace the cable or re-connect it.	Semiannually

Table 8.1 Maintenance checklist and interval

8.2 The Inverter Troubleshooting

The LED is solid on in case of inverter fault, refer to Table 8.2 for details.

Alarm Name	Causes	Measures Recommended
Grid Over Voltage	The grid voltage exceeds the permissible range.	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 on the inverter through *ChintHome* 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	PV modules input voltage exceeds the permissible range.	Check the number of PV modules and adjust it if needed.
PV Under Voltage	PV modules input voltage is under the inverter's defaulted protection value.	1. When sunlight intensity weakens, PV modules voltage decreases. No extra action is needed. 2. If such phenomena occurs when sunlight intensity does not weaken, check if there is short circuit, open circuit etc. in the PV strings.
Insulation Resistance Abnormal	A short circuit exists between PV strings and protection ground. PV strings are installed in a long-term moist environment.	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 default value in a rainy environment, set "Insulation Resistance Protection" parameter on *ChintHome*

Residual Current Abnormal	The insulation resistance against the ground at the input side decreases during the inverter operation, which causes excessively high residual current.	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 PC strings is too low.
PV Strings Abnormal	PV strings have been shielded for a long time. PV strings are deteriorating.	1. Check whether the PV strings are shielded. 2. If the PV strings are 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 installation.	Check whether the cables of PV strings are correctly connected. If they are connected reversely, reconnect the cables.
BUS Under Voltage	Abnormal internal energy control imbalance has been triggered by the PV Strings/grid sharp change of working conditions	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		
Invert Module Fault		
BOOST Fault		
EEPROM Fault	EEPROM Component damaged	Replace the monitoring board.
Remote monitor displays zero power generation and yellow LED is lit	Communications outage	If modem or other data logger is used, please reboot it; if it still does not work after rebooting, contact your dealer.

Remote monitor displays zero power generation	Communications outage	If modem or other data logger is used, please reboot it; if it still does not work after rebooting, contact your dealer.
Remote monitor displays no output voltage	Output switch tripping	Check if DC switch is damaged, and if not, switch it to ON. If it still doesn't work, contact your dealer.
Inverter off grid	1. Power grid fault; 2. DC switch tripping	1. Wait till power is restored; 2. Turn DC switch to ON, and if DC switch trips a lot, contact your dealer.

Table 8.2 Common troubleshooting measures

NOTE	If you cannot clear the preceding alarm through the measures recommended, contact your dealer timely.

8.3 Removing the Inverter

Perform the following procedures to remove the inverter. Always adhere to the prescribed sequence.

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 8.1.

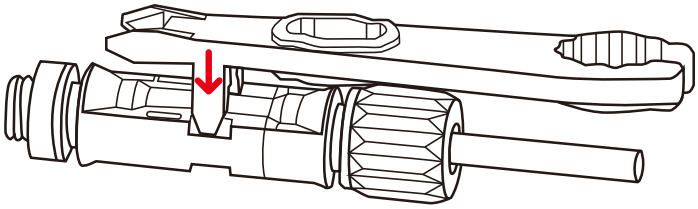


Figure 8.1 Removing DC input connector

Notes:

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.

9 Quality Guarantee

9.1 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, CHINT shall repair or replace it for free.
3) The defective / damaged PV inverter replaced must be returned.

9.2 Liability Waiver

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

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

10 Disposal of the Inverter

The PV inverter and its packing case are made from environment-friendly materials. If the inverter service life has expired, do NOT discard it with household garbage; dispose the inverter in accordance with local environmental laws and regulations.

11 Technical Specifications

Inverter Model	6K	8K	10K	12K	15K
Efficiency					
Max. Efficiency	98.00%	98.20%	98.30%	98.40%	98.40%
European efficiency	97.50%	97.60%	97.60%	98.00%	98.00%
MPPT dynamic efficiency	99.50%	99.50%	99.50%	99.50%	99.50%
Input					
Max. input power	7,200W	9,600W	12,000W	14,400W	18,000W
Max. input voltage	1000V				
Max. input current	22A (1*11A+1*11A)			33A (1*11A+2*11A)	
Starting voltage	180V				
MPPT operation voltage range	160V-850V				
Full load MPPT voltage range	300V-800V	380V-800V	470V-800V	380V-800V	470V-800V
Max. number of inputs	2(1/1)			2(1/2)	
Max. short circuit current	26A(1*13A+1*13A)			39A(1*13A+2*13A)	
Max. back feed current	0A				
Over voltage class	II				
Output					
Rated output power	6,000W	8,000W	10,000W	12,000W	15,000W
Max. apparent power	6,600VA	8,800VA	11,000VA	13,200VA	16,500VA
Max. active power (PF=1)	6,600W	8,800W	11,000W	13,200W	16,500W
Max. output current	3*10A	3*13A	3*16A	3*19A	3*23A
Max. Inrush current	3*10A				
Max. output fault current	3*14A	3*18A	3*23A	3*27A	3*32A
Rated grid voltage	380V/400V/415V				
Grid voltage range*	277V-510V				
Rated grid frequency	50/60Hz				
THDi	<5%				
DC off-sets current	<50mA				
Power factor range	0.8 lead----0.8 lag				
Over voltage class	III				

Common specs		
Topology	Transformerless	
Protective class	I	
Protection level	IP65	
Pollution degree	PD3	
Operating temperature range	-25 degree~60 degree	
Relative humidity	0 - 100% (no condensation)	
Warranty	5 year	
Cooling	Natural convection	
Max. operating altitude	4000m (derating when>2000m)	
Noise	<25dB	
Dimensions	382*480*176mm	
Weight	18.5 Kg	20.8 Kg
Protection	Input DC switch, Over/under voltage protection, DC component protection, Insulation resistance detection, GFCI protection, AC surge protection, Anti-islanding, Over-heat protection, Output short circuit protection, Input reverse-connection protection	
Standards Compliance		
On-grid	NB/T 32004	
Safety certification	IEC 62109-1 IEC 62109-2 NB/T 32004	
Note	To avoid potential risk, you are recommended to configure following devices: a 15A/100VDC PV fuse on the input terminal of every PV string, and an over-current protection device with specifications more than 20A/400VAC for 6K/8K/10K, and 32A/400VAC for 12K/15K on the output terminal.	

The preceding technical specifications are subject to change without prior notice.

Remark:

** Grid power voltage range can be set according to national voltage standards;*

*** Power grid frequency range can be set according to national grid standards.*

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