CPS SCA-T Series Grid-tied PV Inverter
CPS SCA17/20/22KTL-T

Installation and Operation Manual

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Shanghai Chint Power Systems CO,.LTD

Contents

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Dear User,

Thank you so much for your choosing 17K-22K, 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 SCA17/20/22KTL-T

Intended Audience

This document 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 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 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 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.

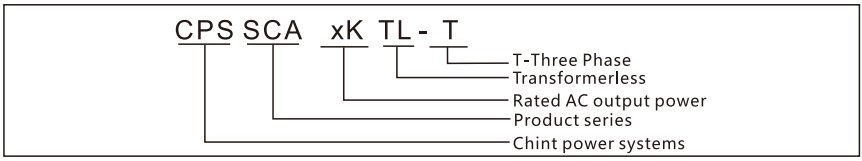


Figure 2.1 Model number descriptions

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 on-grid PV power system, as shown in Figure 2.2.

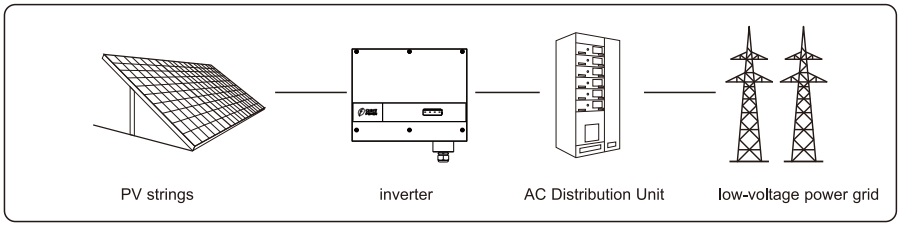


Figure 2.2 a low-voltage grid-tied PV power system

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

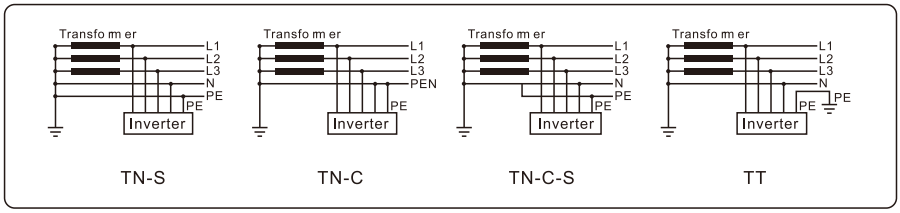


Figure 2.3 Power grids supported by this series inverters

2.3 Outline and Dimensions

2.3.1 Outline

The enclosure dimensions of this series products are shown as Figure 2.4.

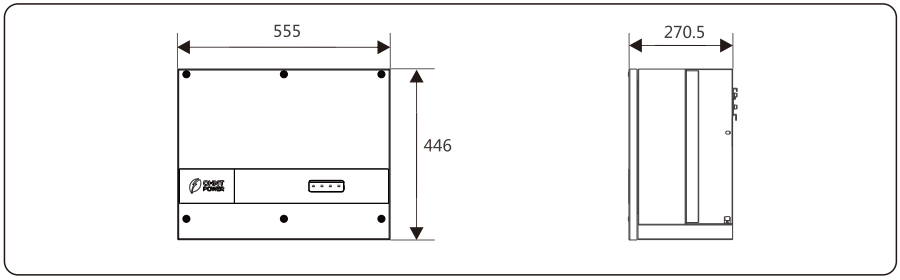


Figure 2.4 The dimensions of the inverter by front & side views (unit: mm)

Figure 2.5 shows the LED indicator area as follows:

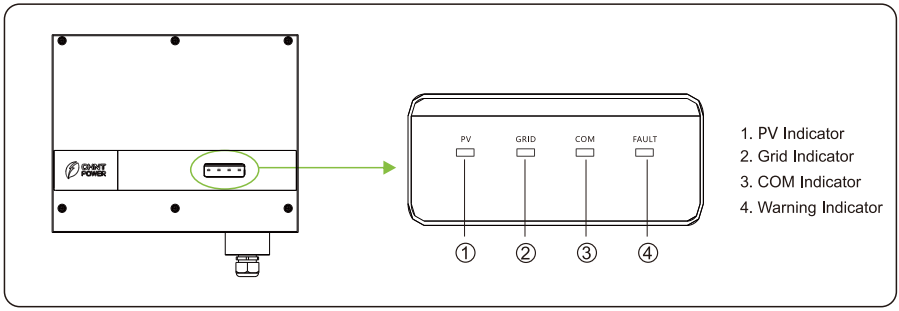


Figure 2.5 The front view of LED indicator area

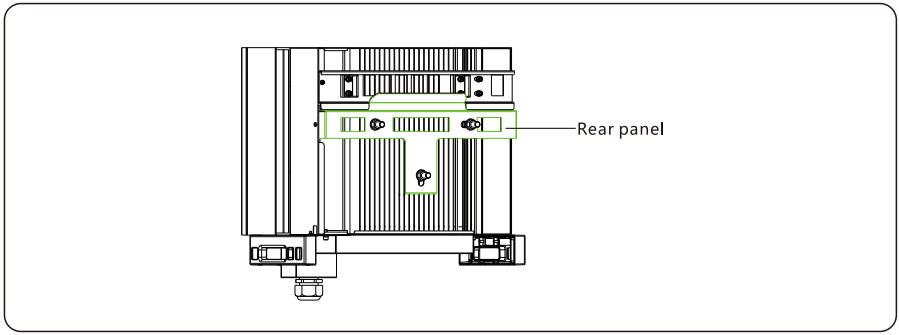


Figure 2.6 The rear view of the inverter

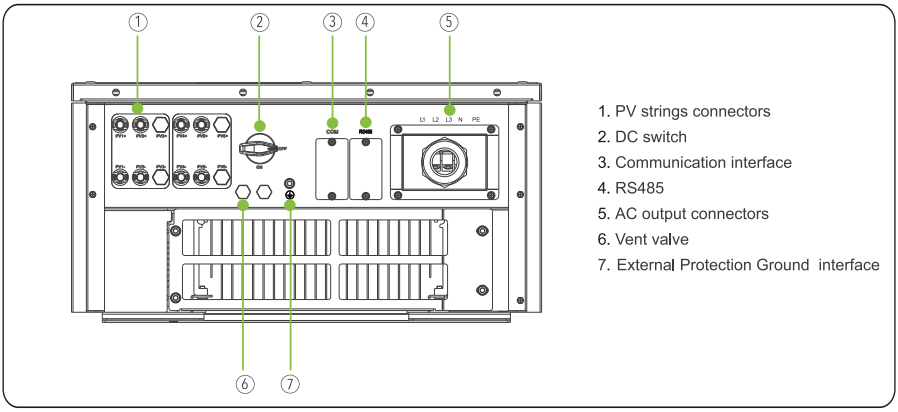


Figure 2.7 The bottom view of the inverter

2.4 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 four 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

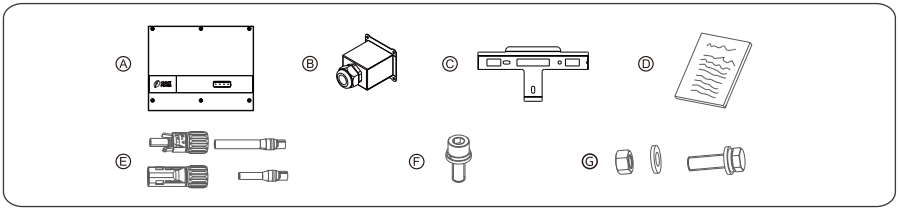
DANGER	Do not mount the inverter in areas containing highly flammable materials or gases.
CAUTION	The mounting location must be inaccessible to unrelated personnel to avoid electrical shock burn.

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	AC output connector
C	Rear panel
D	File package
E	DC terminal connector group
F	M6 screws
G	Bolt group (including screw+washer+nut)*3 (reserved for mounting the 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.

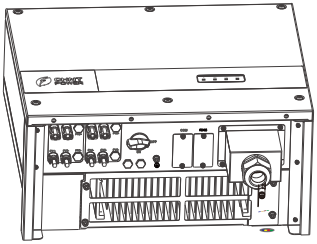


Figure 4.1 Moving the inverter

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 personal 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 support-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.

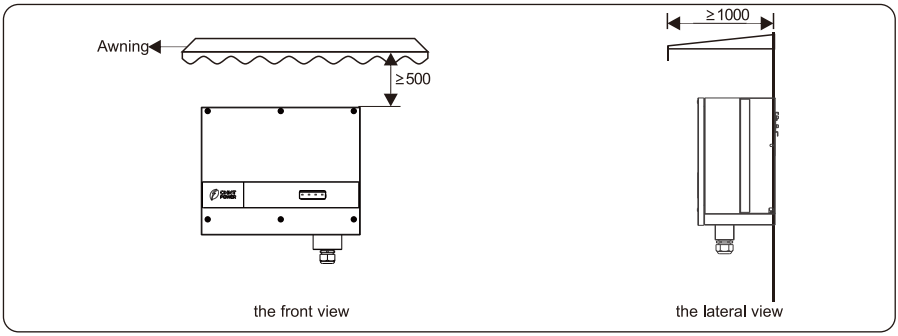


Figure 4.2 Installation environment with awning (unit: mm)

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.

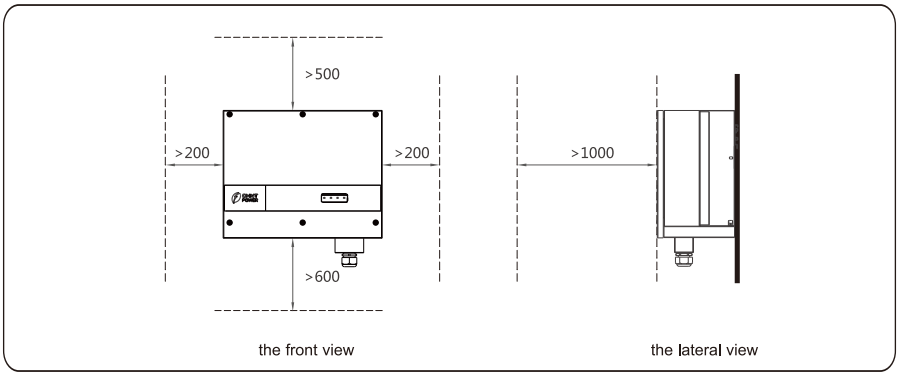


Figure 4.3 Installation space requirements (unit: mm)

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.

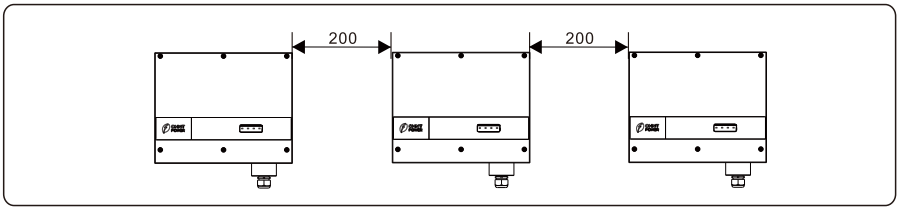


Figure 4.4 Mounting along the same line (unit: mm)

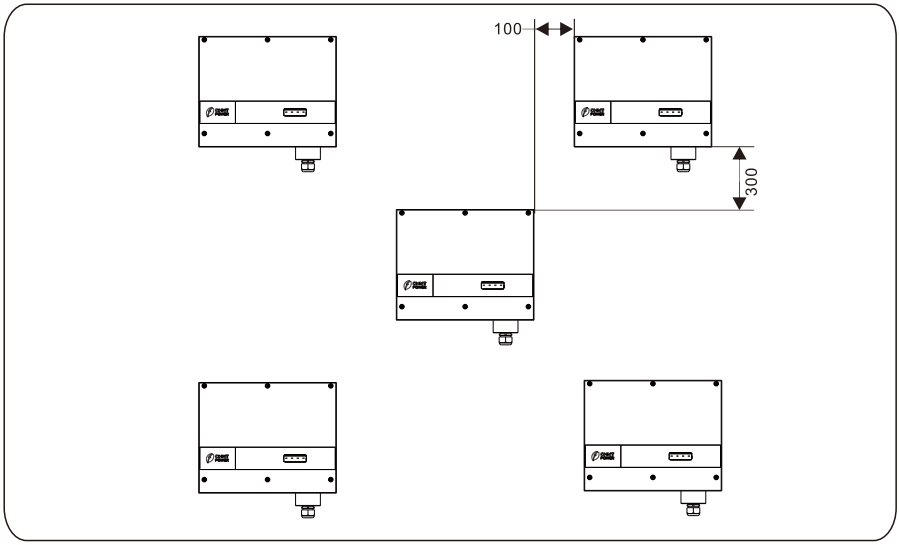


Figure 4.5 Mounting in triangle mode (unit: mm)

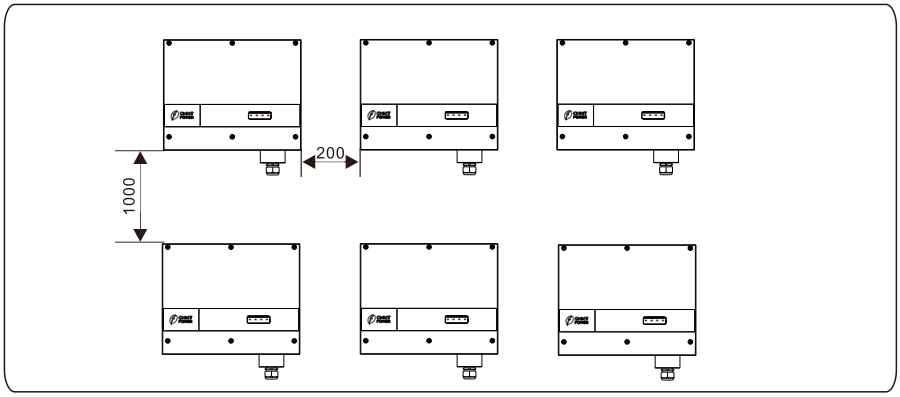
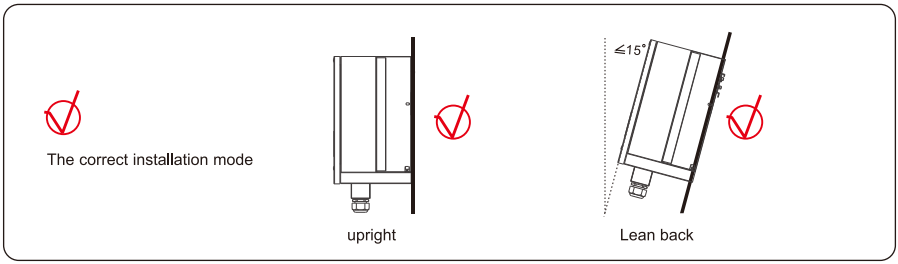


Figure 4.6 Mounting in stacked mode (unit: mm)

⚠ 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

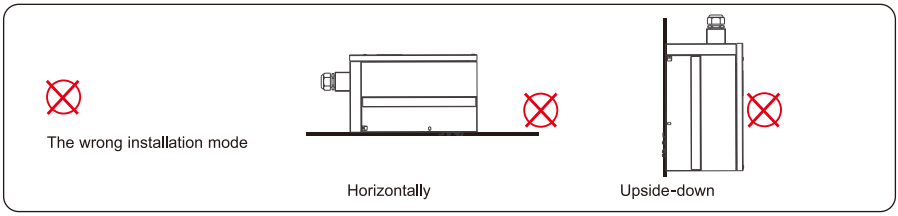


Figure 4.8 The wrong mounting modes

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

4.5 Support-mounting the Inverter

Step 1 Support-mounting the inverter is recommended as shown in Figure 4.9. Mount the rear panel to the supporting frame using the M12 bolts with a torque of 45N.m.

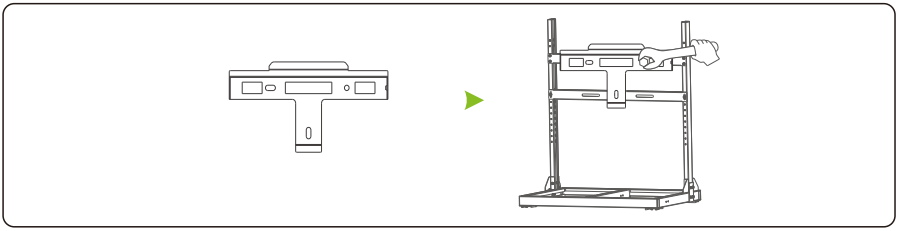


Figure 4.9 Mounting the rear panel

Step 2 Mount the inverter on the rear panel and keep them aligned with each other, as shown in Figure 4.10.

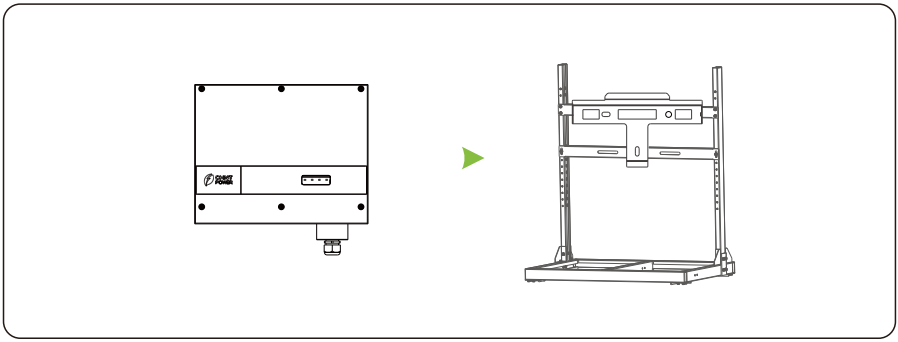


Figure 4.10 Mounting the inverter

Step 3 Tighten the screws to secure the inverter on the rear panel , as shown in Figure 4.11.

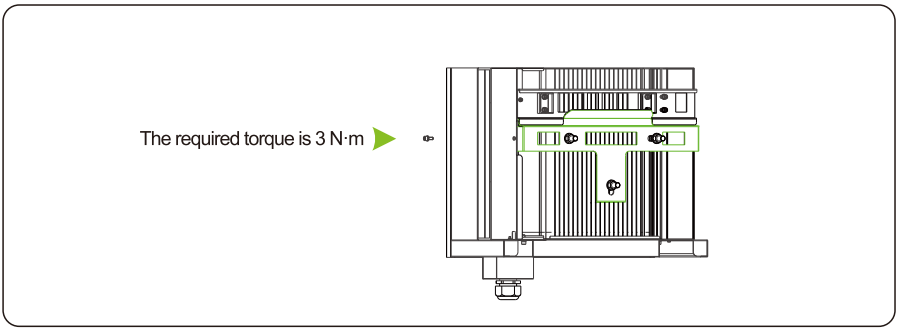


Figure 4.11 Securing the inverter

Check the following items when installation is completed:

Step1: Ensure the supporting points (on the back of the inverter) align with the holes of the supporting frame;

Step2: Ensure the inverter is secured firmly;

Step3: Ensure all screws are tightened.

5 Electrical Connections

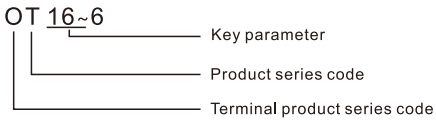
DANGER	Before performing any electrical connections, ensure that both DC and AC Switches are OFF. Otherwise, fatal injury can occur due to the high voltage caused from AC and DC cables.
CAUTION	Grounding the PV Strings requires below prerequisites:
1. An isolation transformer must be installed on the 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 16 mm^2 or above are recommended.
- OT terminal: OT16~6.



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.

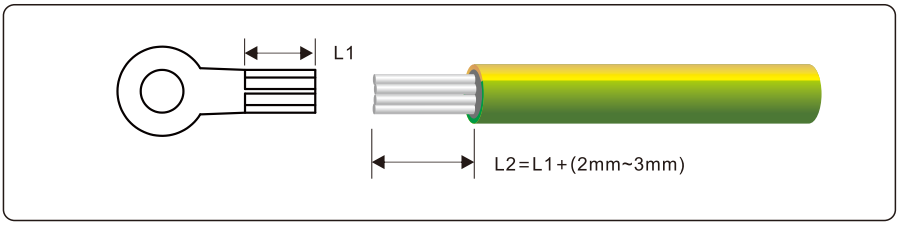


Figure 5.1 Stripped length (unit: mm)

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

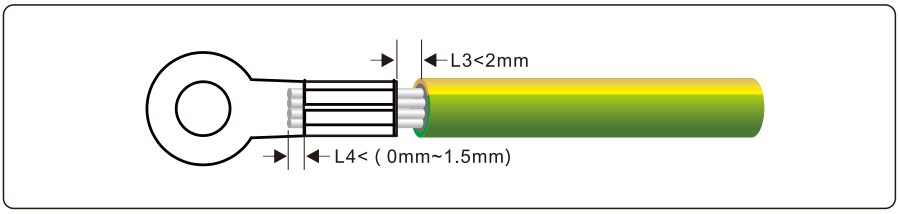


Figure 5.2 Crimping a cable (unit: mm)

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.

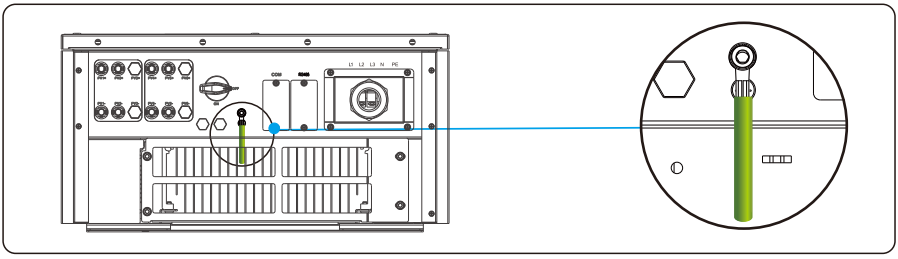


Figure 5.3 Securing the PGND cable

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 cable: Multi-core outdoor cables are recommended. Please refer to Table 5.1 for the specifications.

Model	Cable Type	Cross-sectional Area (mm^2)		Cable Outer Diameter (mm)
		Range	Recommended Value	Range
17-22K	Multi-core outdoor cable	6~16	10	24~32

Table 5.1 Recommended AC output cable specifications

- OT terminals: The inverter requires M5 OT terminals and a cable with the maximum cross-sectional area of 25 mm^2.

NOTE	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	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, as shown in Figure 5.4.

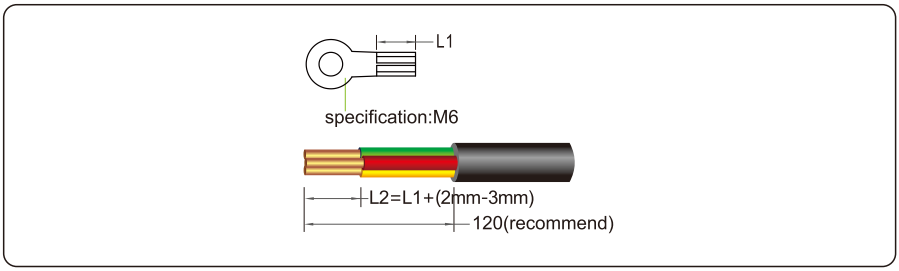


Figure 5.4 Stripped length

Step 2 Insert the exposed core wires into the crimp area of the OT terminal and crimp them using hydraulic pliers. Wrap the wire crimp area with heat shrink tube or PVC insulation tape, as shown in Figure 5.5.

NOTICE	If heat shrink tube is used, put it through the power cable and then crimp the OT terminal.

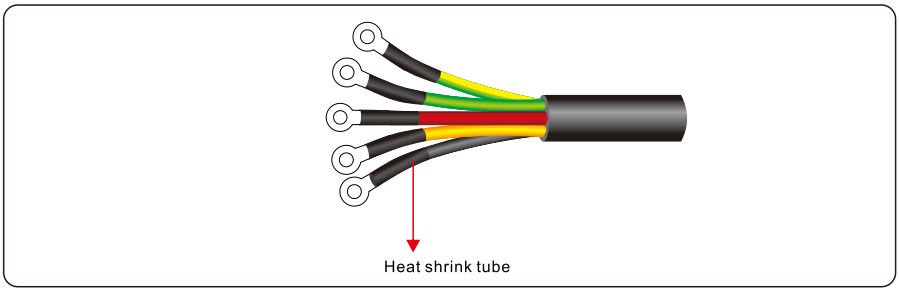


Figure 5.5 Crimping the OT terminal

Step 3 Remove the four screws on the AC OUTPUT terminal cover, and connect L1, L2, L3, N and PE through AC OUTPUT connector to the terminal block, use a screw driver to tighten screws with a torque of 3N·m, as shown in Figure 5.6.

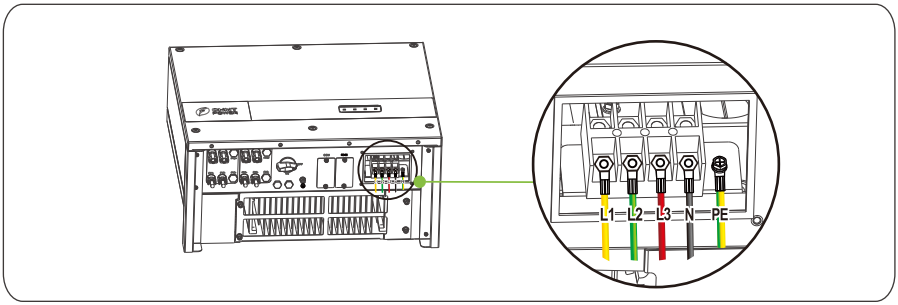


Figure 5.6 Connecting AC OUTPUT wires

Step 4 Lock the AC OUTPUT terminal cover back to the original position, straighten all the wires and then tighten the plug of the AC connector, as shown in Figure 5.7.

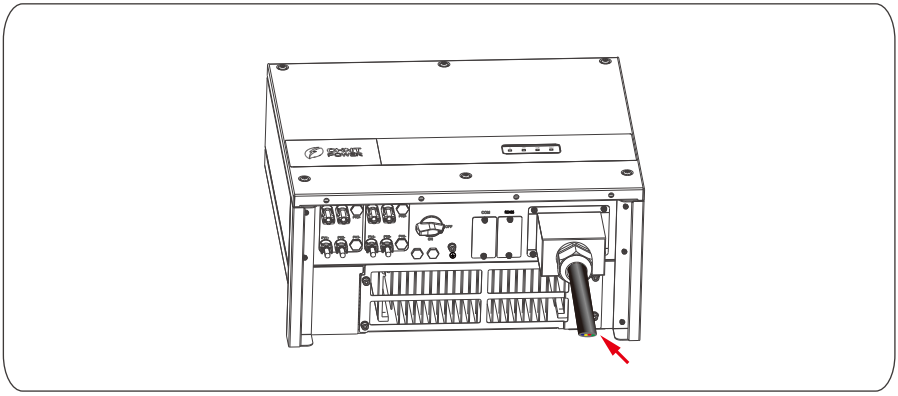


Figure 5.7 Locking the terminal cover

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. Figure 5.8 shows the DC input terminal numbers at the bottom of the inverter. There are four input routes totally, and refer to Table 5.2 for cable connecting if the quantity of PV strings is less than four.

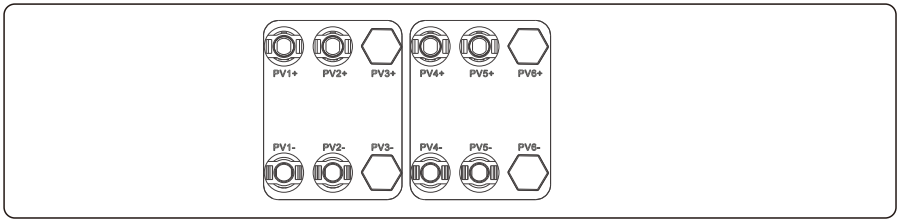


Figure 5.8 DC input terminal numbers at the bottom of the inverter

Input Route	Connecting Method
1	Connected to any route
2	Connected to routes 1 & 4
3	Connected to routes 1 & 2 & 4
4	Connected to routes 1 & 2 & 4 & 5

Table 5.2 DC input Routes connecting method

• DC input cables of PV strings: Table 5.3 lists the recommended outdoor copper-core DC input cable specifications.

Cable type	Cross-sectional Area (mm²)		Cable Outer Diameter (mm)
	Range	Recommended Value	Range
Common PV cables in the industry (model: PV1-F)	4~6	4	5~8

Table 5.3 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.

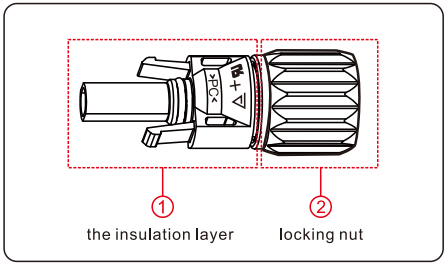


Figure 5.9 Positive connector compositions

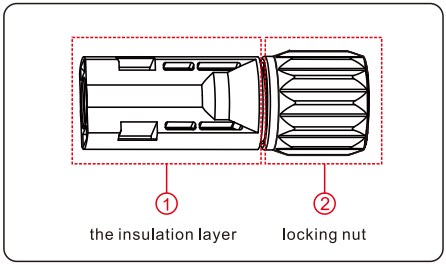


Figure 5.10 Negative connector compositions

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.

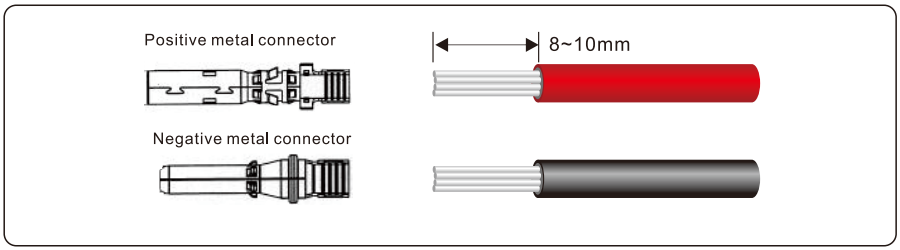


Figure 5.11 Removing insulation layer for DC cable (unit: mm)

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.

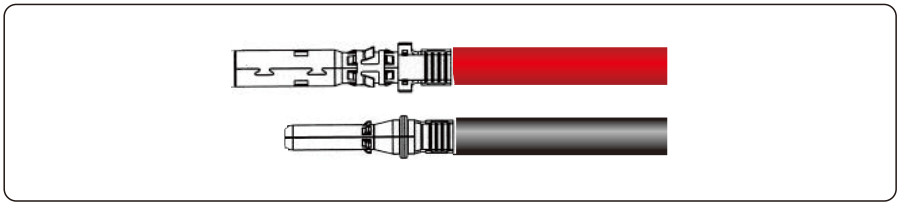


Figure 5.12 Crimping a metal connector

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.

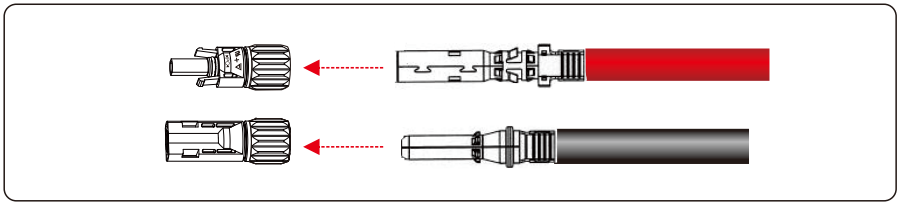


Figure 5.13 Connecting positive and negative connectors

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

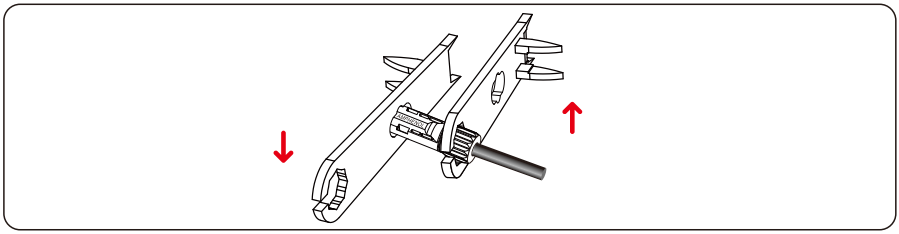


Figure 5.14 Locking connectors

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.

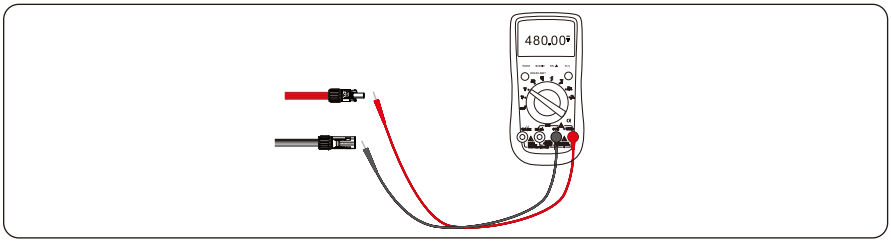


Figure 5.15 Checking the voltage of every route Strings

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.

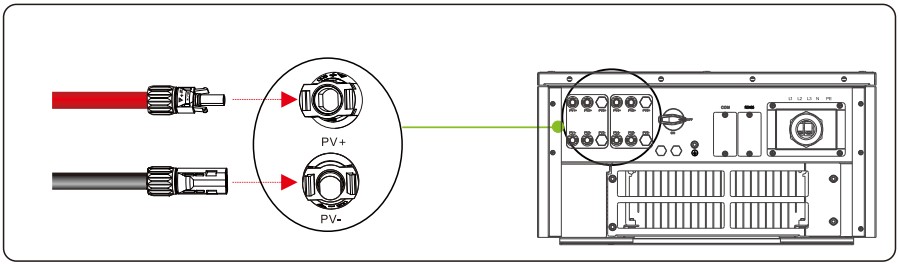


Figure 5.16 Connecting to the inverter

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 5.4 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 5.4 WIFI & GPRS & RS485 Modules Description

- **RS485 communication mode (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 shows connection to single inverter to implement RS485 communications.

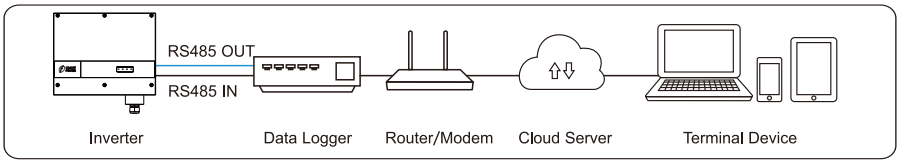


Figure 5.17 RS485 communications mode for a single inverter

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

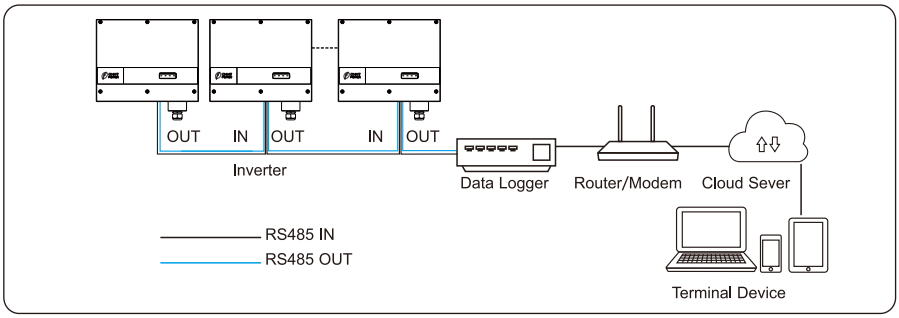


Figure 5.18 RS485 communications for multiple inverters

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 APP ChintHome. 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

RS485 connectors are located in the wiring cavity at the bottom of the inverter. To ensure equipment and personal safety, always adhere to the prescribed sequence.

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

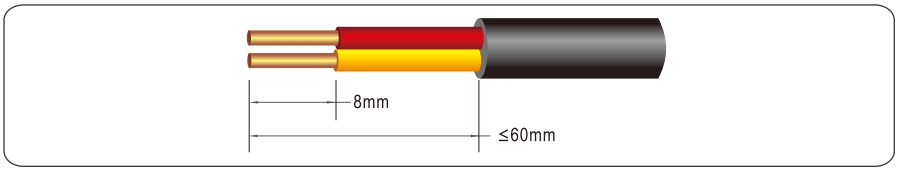


Figure 5.19 Stripping an RS485 communication cable (unit: mm)

Step 2 Remove the screws of the RS485 terminal cover at the bottom of the inverter and remove the cover.

Step 3 Loosen the two waterproof plugs on the protective assembly, and insert the communication cables through the waterproof plugs.

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.

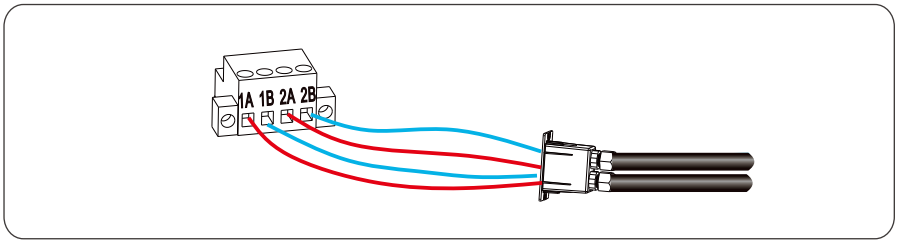


Figure 5.20 RS485 Terminal block connection

Step 5 Connect RS485 male terminal with its female terminal, assemble the protective assembly and tighten the locking caps with a torque of 8 N·m, then fasten 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, and RS485 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.

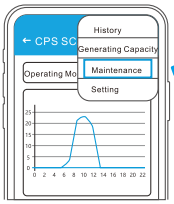


Figure 5.22 APP homepage setting

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

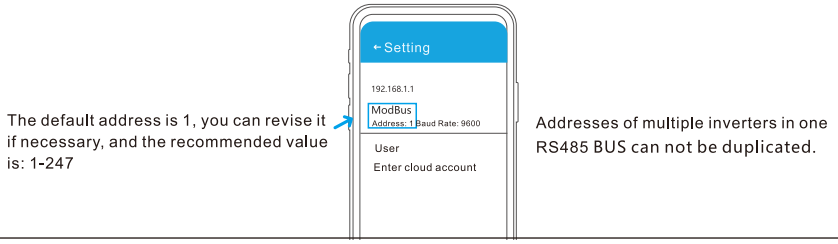


Figure 5.23 Revise the Modbus address and save

5.5 Installation Verification

When the installation is completed, please check the inverter as Table 5.5 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 5.5 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.

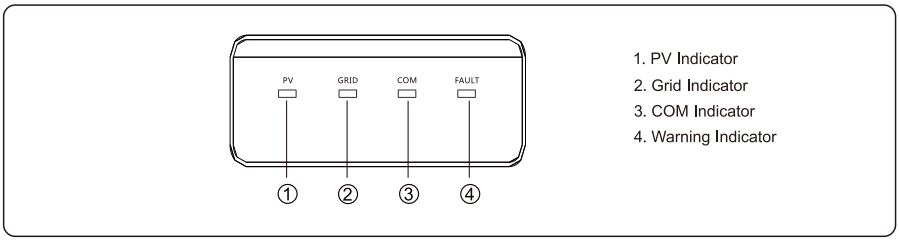


Figure 7.1 LED indicators

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. Refer to LED display reference table.
	off	No error.

Table 7.1 LED Indicator status

	PV Indicator	Grid Indicator	COM Indicator	Warning Indicator
Grid over voltage	◎	★	◎	○
Grid under voltage				
Grid absent				
Grid over frequency				
Grid under frequency				
Grid unbalance				
PV over voltage	★	◎	◎	○
PV under voltage				
PV irradiation weak				
PV string abnormal	◎	◎	◎	★
Inverter over temperature				
PV insulation abnormal	●	○	○	●
Leakage current abnormal	○	●	○	●
PV string reverse	○	○	●	●
Control power low	○	★	○	●
DCI too high	★	●	★	●
Inverter relay abnormal	○	●	●	●
Leakage current HCT abnormal	●	●	○	●
System type error	★	★	★	●
Fan lock	★	○	★	●
Bus voltage unbalanced	●	○	●	●
Bus over voltage	○	★	★	●
Internal communication abormal	○	○	★	●
Software incompatibility	★	●	○	●

EEPROM error	★	○	●	●
Consistent warning	★	●	●	●
Inverter abnormal	●	●	●	●
Boost abnormal	★	○	○	●

Table 7.2 The LEDs indicate the operating state of the inverter

Remark: ● LED ON ○ LED OFF ★ LED Blinking ◎ Keep the 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 Grid Under Voltage Over Frequency Under Frequency	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.
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 BUS Over Voltage Invert Module Fault BOOST Fault	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.
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.

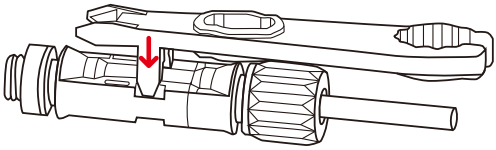


Figure 8.1 Removing DC input connector

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	17K	20K	22K
Efficiency			
Max. efficiency	98.30%		
European efficiency	98.00%		
Input			
Max. input power	28,000W		
Max. input voltage	1000V		
Max. input current	50A (2*25A)		
Max. short-circuit current*	2*30A		
Max. reverse current in the system for max. 1 ms	0A		
Starting voltage	250V		
MPPT operation voltage range	180V-960V		
Full load MPPT voltage range	480V-800V		
Max. number of inputs	4（2/2）		
Number of MPPT routes	2		
Overvoltage grade (in accordance with IEC 62109-1)	II		
Output			
Rated output power	17,000W	20,000W	22,000W
Max. apparent power	18,700VA	22,000VA	24,200VA
Max. active power (PF=1)	18,700W	22,000W	24,200W
Max. output current	28.3A	33.5A	35A
Current (Inrush)	20A		
Max. output current under fault conditions*	50A		
Rated power grid voltage	380V/400/415V,3W+N+PE		
Power grid voltage range*	340V-440V		
Rated power grid frequency	50Hz/60Hz		
Power grid frequency range**	45Hz-55Hz/55Hz-65Hz		
THDi	<3%		
DC off-sets	<0.5%In		
Power factor	0.8 lead-0.8 lag		
Overvoltage grade in accordance with IEC 62109-1	III		
Common specs			
Topology	Transformerless		
Pollution degree	PD3		
Protection level	IP65		
Cooling	Natural convection		
Operating temperature range	-25 ℃-60 ℃		
Relative humidity	0-100%		
Max. operating altitude	4000m		
Noise	30dB		
Dimensions (W x H x D)	555*446*270.5mm		
Weight	33KG		

Display & Communication	
Display	LED indicators
Communication	RS485, Bluetooth, WIFI(optional), GPRS(optional)
Standards compliance	
Safety certification	IEC62109-1, IEC62109-2,NB/T32004
On-grid	IEC61727, NB/T32004
Protection	
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.	

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

It is recommended to add following devices: a 15A/1000VDC PV FUSE on the input terminal of every PV string, and an overcurrent protection device with specification more than 50A/400VAC on the output terminal.

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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