



R3

Pre Series

User Manual

R3 - 10K - G5

R3 - 15K - G5

R3 - 17K - G5

R3 - 20K - G5

R3 - 25K - G5

RENAC

1. Introduction

1.1 Introduction

This manual describes solar inverters :










R3-10K-G5 / R3-15K-G5 / R3-17K-G5 / R3-20K-G5 / R3-25K-G5.

These inverters are transformerless based inverter.

Please read the safety instructions in this manual first. Throughout the manual it is assumed that the reader is familiar with AC and DC installations and knows the rules and regulations for electrical equipment and for connecting it to the utility AC grid. It is especially important to be familiar with the general safety rules for working with electrical equipment.


1.2 Applied designations

Throughout the manual important information is shown at different levels depending on the character of the information, as shown here:

	Safety information important for human safety. Violation of warnings may result in injury to persons or death.
	Danger of high voltage and electric shock!
	Signals danger due to electrical shock and indicates the time (5 minutes) to allow after the inverter has been turned off and disconnected to ensure safety in any installation operation.
	Danger of hot surface!
	Product should not be disposed as normal household waste.
	CE Mark
	ROHS Mark
	Information important for the protection of property. Violation of this type of information may cause damage and loss of property.
	Useful additional information or "Tips and Tricks" on specific subjects.

1.3 Important safety information

Read this before installing, operating or maintaining the inverter.



Before installation:

Check for damage to inverter and packaging. If you are in doubt, please contact your supplier before installing the inverter. Check the voltages of the solar modules and make sure they are within the limits of the inverter specifications before connecting them to the inverter.

Installation:

Only trained and authorized personnel familiar with local electrical codes may install the inverter. For optimum safety, please follow the steps described in this manual. Keep in mind that the inverter has two voltage carrying sides, the PV input and the AC grid.

Disconnecting the inverter:

Always disconnect the AC line first! Afterwards disconnect the PV lines. Note that the inverter can still be charged with very high voltages at hazardous levels even when it is disconnected from grid and solar modules. Wait at least 5 min. before proceeding, after having disconnected from grid and PV panels.

Operating the inverter:

Before connecting the AC grid to the inverter, make sure that the installation cover is mounted again. The inverter must not be open during operation.


Maintenance and modification:

Only authorized personnel are allowed to repair or modify the inverter. To ensure optimum safety for user and environment, only the original spare parts available from your supplier should be used.

Functional safety parameters:

Unauthorized changes of functional safety parameters may cause injury or accidents to people or inverter. Additionally it will lead to the cancelling of all inverter operating approval certificates.

1.4 System sizing



When dimensioning a photovoltaic system, it must be ensured that the open circuit voltage of the PV string never exceeds the maximum permissible input voltage of 1100V DC. The PV string open circuit voltage during parallel string operation is 1000V. Higher voltages may result in permanent damage to the inverter.

The selection of PV string output should be based on the optimum utilization of the invested capital compared to the expected annual energy yield from the system. This optimization depends on local weather conditions and should be considered in each individual case.

The inverter incorporates an input power limiting device, which automatically keeps the power at levels that are safe for the inverter. The limitation depends mainly on internal and ambient temperatures. The limitation is calculated continuously and always allows the maximum possible amount of energy to be produced.

2. Technical description of inverters

2.1 Mechanical design

Figure 2-1 shows the outline dimensions and electrical terminals of R3-10K-G5 / R3-15K-G5 / R3-17K-G5 / R3-20K-G5 / R3-25K-G5:

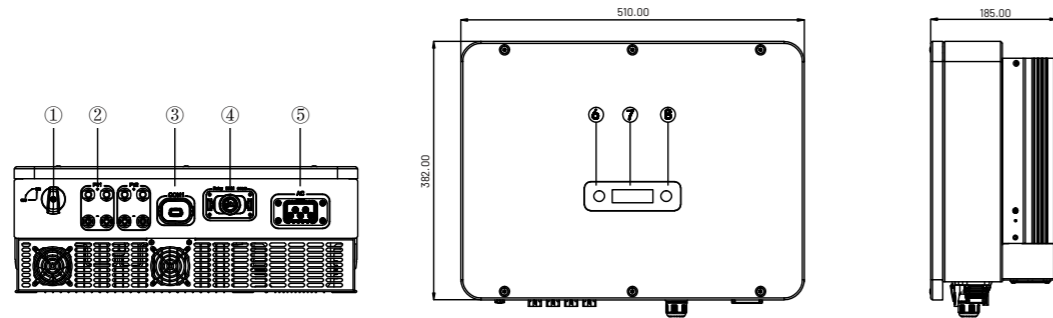


Figure 2-1 Outline dimensions

1	DC Switch	2	DC (PV terminals)
3	Communication port	4	I/O port
5	AC terminal	6	LED (Run/Fault)
7	LCD	8	Key



For safety reasons, the use of a DC switch is recommended. Between the PV modules and the power modules may be mandatory in some countries.

2.2 Electrical system design

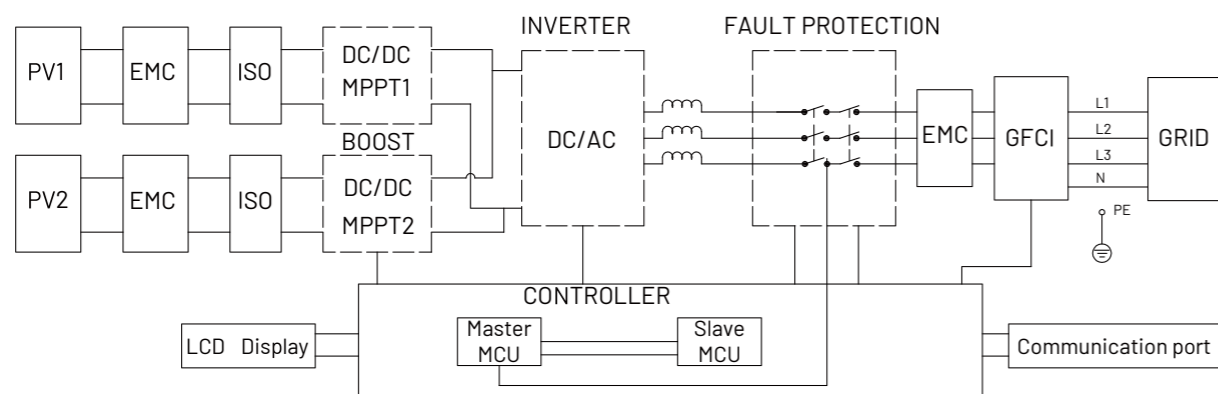


Figure 2-2 wiring diagram of the inverter system

Please refer to chapter 3 for the detail connecting and install methods.

2.3 Technical data

Model	R3-10K-G5	R3-15K-G5	R3-17K-G5	R3-20K-G5	R3-25K-G5
DC Input Data					
Max. Recommended PV Power	15000 W	22500 W	25500 W	30000 W	37500 W
Max. DC Input Voltage	1100 V				
MPPT Voltage Range	150 ~ 1000 V				
MPPT Voltage Range (full load)	300-850V	420-850V	420-850V	420-850V	480-850V
Rated Input Voltage	630V				
Start-up Voltage	165 V				
No. of MPP Trackers	2				
No. of Input Strings per Tracker	1 / 1	2 / 1	2 / 2	2 / 2	2 / 2
Max. DC Input Current	20A/20A	30A/20A	30A/30A	30A/30A	30A"/30A
DC Switch	Integrated				
AC Output Data					
Rated AC Power	10000 W	15000 W	17000 W	20000 W	25000 W
Max. Output Power	11000 VA	16500 VA	18700 VA	22000 VA	27500VA
Max. AC Current	16 A	24 A	27.1 A	31.9 A	40 A
Rated AC Voltage / Range	3/PE 380, 400; +/-20%; 3/N/PE 380, 400; +/-20%				
Grid Frequency / Range	50Hz/60Hz ; ±5Hz				
Adjustable Power Factor [cos φ]	0.8leading ~0.8lagging				
Output THDi (@Rated Output)	< 3%				

Efficiency					
Max. Efficiency	98.30%	98.30%	98.40%	98.50%	98.50%
Euro Efficiency	98.00%	98.00%	98.10%	98.20%	98.20%
MPPT Efficiency	99.90%	99.90%	99.90%	99.90%	99.90%

Protection	
DC Insulation Monitoring	Integrated
Input Reverse Polarity Protection	Integrated
Anti-island Protection	Integrated
Residual Current Monitoring	Integrated
Over-heat Protection	Integrated
AC Overcurrent Protection	Integrated
AC Short-circuit Protection	Integrated



AC Overvoltage Protection	Integrated				
DC Surge Protection	Type III				
AC Surge Protection	Type III (Type II optional)				
General Data					
Size(Width*Height*Depth)	506 x 386 x 185mm				
Weight	23kg				
User Interface	LCD				
Communication	RS485 (Standard), Wifi or GPRS				
Ambient Temperature Range	-25 °C ~ 60 °C				
Relative Humidity	0 - 100%				
Operating Altitude	≤ 4000m				
Standby Self Consumption	< 0.2W				
Topology	Transformerless				
Cooling	Natural	Natural	Fan	Fan	Fan
Protection Grades	IP65				
Noise	< 30dB		< 45dB		
Warranty	5 / 7 / 10 years				
Certifications & Standards					
Grid Regulation	IEC61727, IEC62116, IEC60068, IEC61683				
Safety Regulation	IEC 62109-1, IEC 62109-2				
EMC	EN 61000-3-2, EN 61000-3-3, EN 61000-6-2, EN 61000-6-3, EN 61000-3-11, EN 61000-3-12, IEC61000-4-16, IEC61000-4-18, IEC61000-4-29				

*1: The maximum DC input current for R3-25K-P is 37.5A

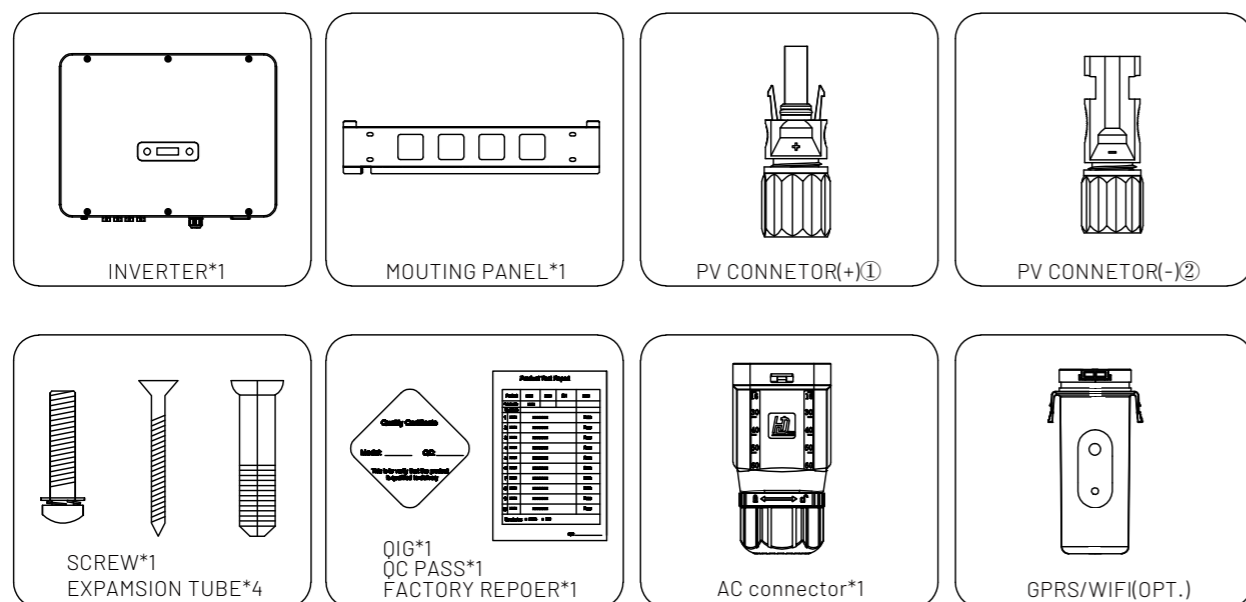
2.4 Grid codes

No.	National / Regional Grid Code	Description
1	VDE4105-DE	Germany power Grid, meet Grid standards "VDE-AR-N-4105".
2	CEI0-21	Italy power Grid.
3	AS4777	Australia power Grid.
4	RD1699	Spain power Grid.
5	EN50549-TR	Turkey power Grid.
6	EN50549-DK	Denmark power Grid.
7	Greece	Greece power Grid.
8	EN50549-NL	Netherland power Grid, meet Grid standards "EN50438".
9	C10/11	Belgium power Grid.
10	G59	UK power Grid.
11	China	China power Grid, meet Grid standards "CN-NBT".
12	VDE0126-FR	France power Grid, meet Grid standards "VDE 0126".
13	EN50549-PL	Poland power Grid.
14	BDEW-DE	Germany power Grid, meet Grid standards "BDEW-MV".
15	VDE0126-DE	Germany power Grid, meet Grid standards "VDE 0126".
16	CEI0-16	Italy power Grid, meet Grid standards "CEI 0-16".
17	G83	UK power Grid.
18	Greece Island	Greece Island power Grid.
19	EN50549-CZ	Czech Republic power Grid, meet Grid standards "EN50438Y2007-CZ".
20	IEC61727	India power Grid.
21	Korea	Korea power Grid.
22	EN50549-SW	Sweden power Grid.
23	China-W	China power Grid, Grid voltage range: 160-290V. Grid frequency range: 47-53HZ.
24	China-H	China power Grid, meet standards "CQC".
25	IEC61727-IN	India power Grid, meet Grid standards "IEC61727".
26	Brazil	Brazil power Grid, meet Grid standards "NBT 16150".
27	IEC61727-SL	Sri Lanka power Grid, meet Grid standards "IEC61727".
28	Mexico	Mexico power Grid, meet Grid standards "IEC61727 60HZ".
29	NZ4777	New Zealand power Grid.
30	Philippines	Philippines power Grid, meet Grid standards "IEC61727 60HZ spec".
31	IEC61727-SL-W	Sri Lanka power Grid, Grid voltage range: 160-290V, Grid frequency range: 47-53HZ.
32	PEA	Thailand power Grid.
33	PEA-W	Thailand power Grid, Grid voltage range: 160-290V, Grid frequency range: 47-53HZ.
34	IEC61627-VN	Vietnam power Grid.
35	IEC61627-VN-W	Vietnam power Grid, Grid voltage range: 160-290V, Grid frequency range: 47-53HZ.
36	MEA	Thailand power Grid.
37	MEA-W	Thailand power Grid, Grid voltage range: 160-290V, Grid frequency range: 47-53HZ.
38	Tunisia	Tunisia power Grid.
39	Tunisia-W	Tunisia power Grid, Grid voltage range: 160-290V, Grid frequency range: 47-53HZ.

3. Installation and startup

	<p>Warning!</p> <p>Before installation and maintenance, AC and DC side doesn't carry electricity, but if DC side is just disconnected, capacitance still contains electricity, so please wait for at least 5 minutes to ensure the capacitors completely release the energy and inverter is not electrified.</p>
	<p>Note!</p> <p>Inverters must be installed by qualified person.</p>

3.1 Package information



- ① There are 2 PV+ connectors for R3-10K-G5, 3 PV+ connectors for R3-15K-G5 and 4 PV+ connectors for R3-17/20/25K-G5
- ② There are 2 PV- connectors for R3-10K-G5, 3 PV- connectors for R3-15K-G5 and 4 PV- connectors for R3-17/20/25K-G5

Figure 3-1 package information

3.2 Installation environment

- 1) In order to achieve optimal performance, the ambient temperature should be kept lower than 45 °C.
- 2) For the convenience of checking the LCD display and possible maintenance activities, please install the inverter at eye level.
- 3) Inverters should not be installed near inflammable or explosive items. Any strong electro-magnetic equipment should be kept away from installation site.
- 4) Product label and warning symbol shall be clear to read after installation.
- 5) Please do not install inverter under direct sunlight, rain and snow.

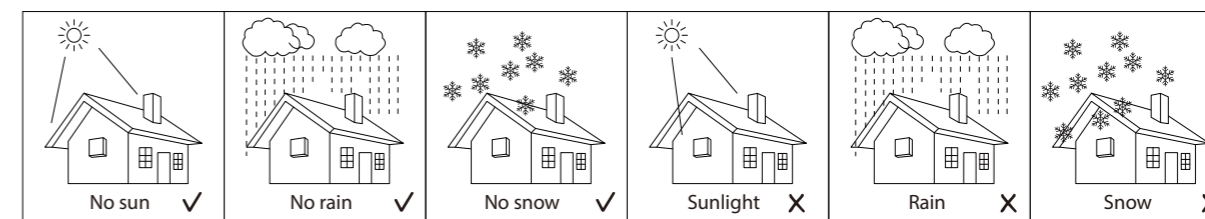


Figure 3-2 installation environment

3.3 Installation position

- ! 1) The installation method and mounting location must be suitable for the inverter's weight and dimensions.
- 2) Mount on a solid surface.
- 3) Select a well-ventilated place sheltered from direct sun radiation.

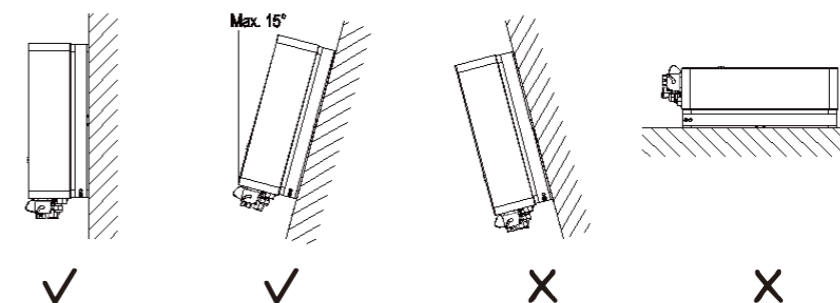


Figure 3-2 installation position

In consideration of heat dissipation and convenient dismantlement, the minimum clearances around the inverter should be no less than the following value.

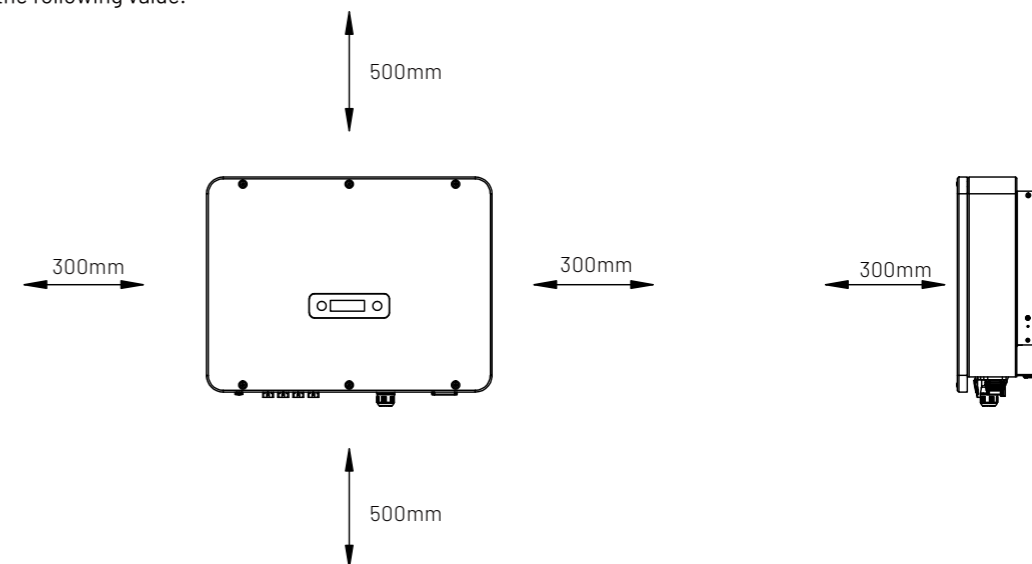


Figure 3-3 Distance required of Invertors

3.4 Mounting procedure

Step1: Drill 4 Fix Ø11 holes in the wall according to the dimensions.

Step2: Fix the wall mounting bracket on the wall with 4 expansion bolts in accessory bag.

Step3: Place the inverter on the wall-mounted bracket and install the fix screw.

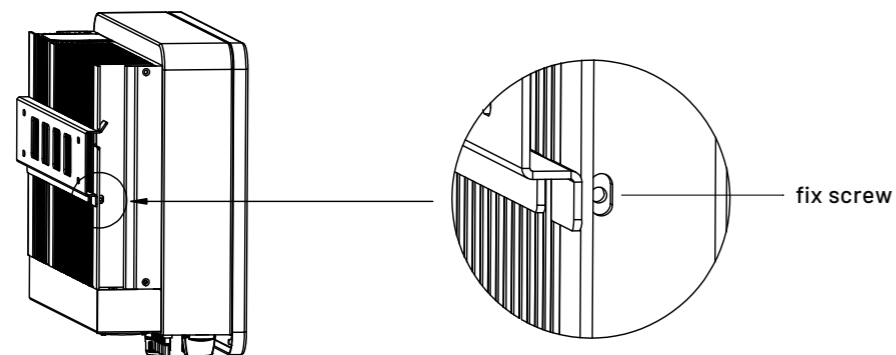
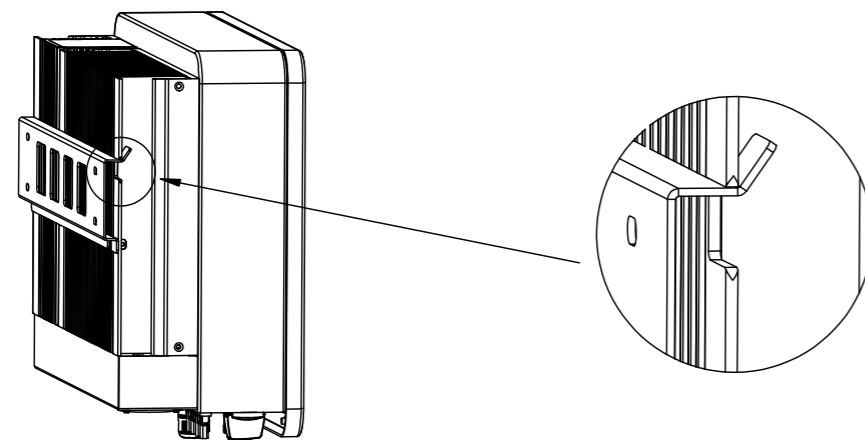
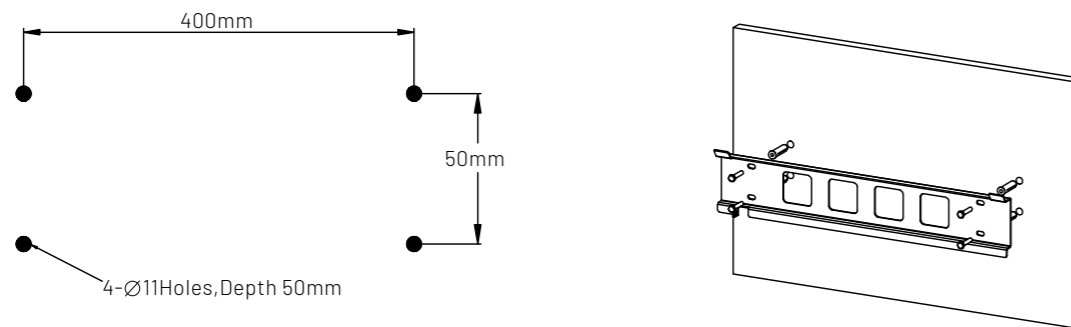


Figure 3-4 mounting the inverter

3.5 Electrical connection

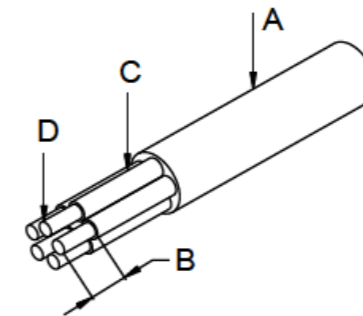
3.5.1 Connection to the grid (AC output)



- 1) Add breaker or fuse to AC side, the specification should be more than 1.25 times of rated AC output current.
- 2) The PE line of inverter should be connected to the earth, make sure the impedance of neutral wire and earth wire less than 10 ohm.
- 3) Disconnect the breaker or fuse between the inverter and the utility.
- 4) All inverters incorporate a certified internal Residual Current Device(RCD) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter. There are 2 trip thresholds for the RCD as required for certification (IEC 62109-2:2011). The default value for electrocution protection is 30mA, and for slow rising current is 300mA.

Connect the inverter to the grid :

1) Strip off PE/N/L1/L2/L3 cables as figure below:



No.	Description	Remark
A	Protective layer diameter	15-25mm
B	Length of stripped off	16mm
C	Length of insulate layer	50mm
D	Cross section of ac cables	6-15mm ²

2) Crimp pin contact by using a crimping pliers.

3) Separate the AC connector.

4) Pass the crimped AC wire into the AC connector

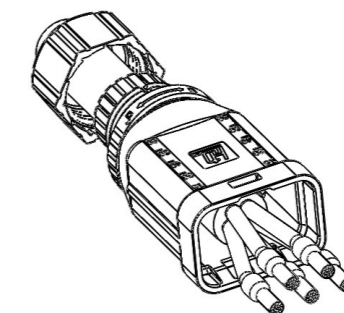


Figure 3-6

5) The cables are inserted into the terminal according to the wire sequence (L1/L2/L3/N/PE), so that the insulating terminal is flush with the surface of the terminal, and the crimping screw torque is $2.0 \pm 0.1 \text{ N}\cdot\text{m}$.

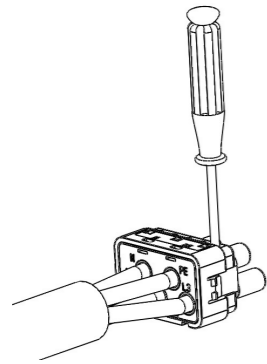


Figure 3-7

6) Insert the main part of AC connector into the terminal and hear a "click" sound.

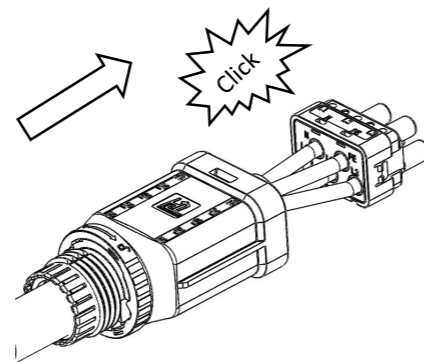


Figure 3-8

7) Use a wrench to tighten the nut, and there is a "click" sound.

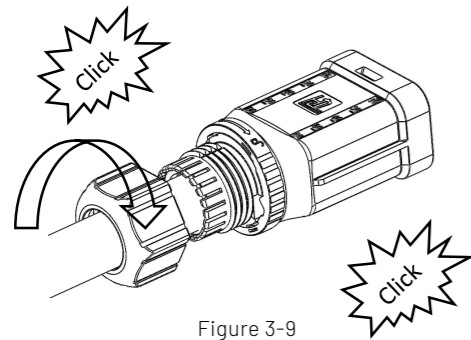


Figure 3-9

8) Insert the female end of the wire into the male end of the inverter and hear a "click".

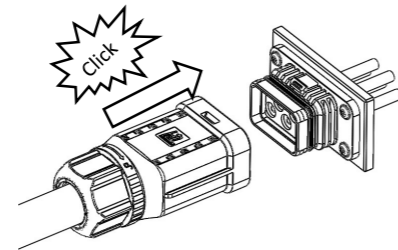


Figure 3-10

9) Complete the installation.

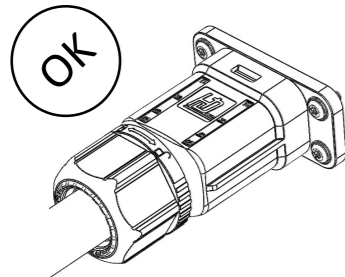


Figure 3-11

Disassembly the inverter from the Grid:

1) Use a screwdriver to press against the unlocked position and hold the wire nut and pull it back to complete the separation of the male and female ends.

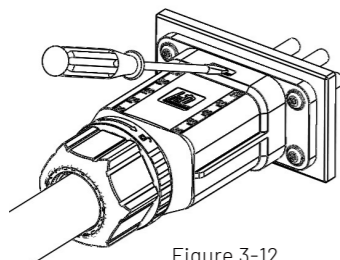


Figure 3-12

2) The female end connector is separated from the inverter end connector.

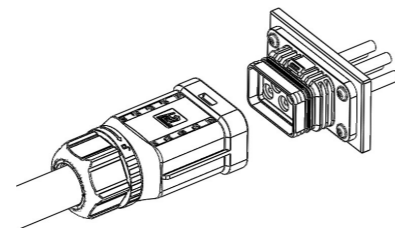


Figure 3-13

3) Hold the unlocking buckle with one hand and rotate it in the direction of the mark, and turn the nut in the opposite direction.

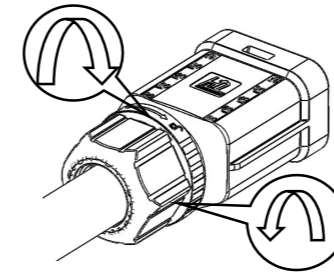


Figure 3-14

4) Use a screwdriver to peel off the positions (both sides) indicated by the red circle to complete the disassembly.

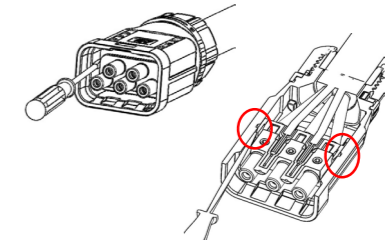


Figure 3-15

3.5.2 Connection to PV string (DC input)

- 1) Before connecting PV string, make sure DC switch is turned off .
- 2) Make sure PV string polarity confirms with DC connector, otherwise, it will cause damage to inverter.
- 3) Make sure the maximum open circuit voltage (Voc) of each PV string does not exceed the inverter input voltage V_{max} under any condition.
- 4) Do not connect positive or negative pole of PV string to earth wire. Otherwise, it will cause damage to inverter.

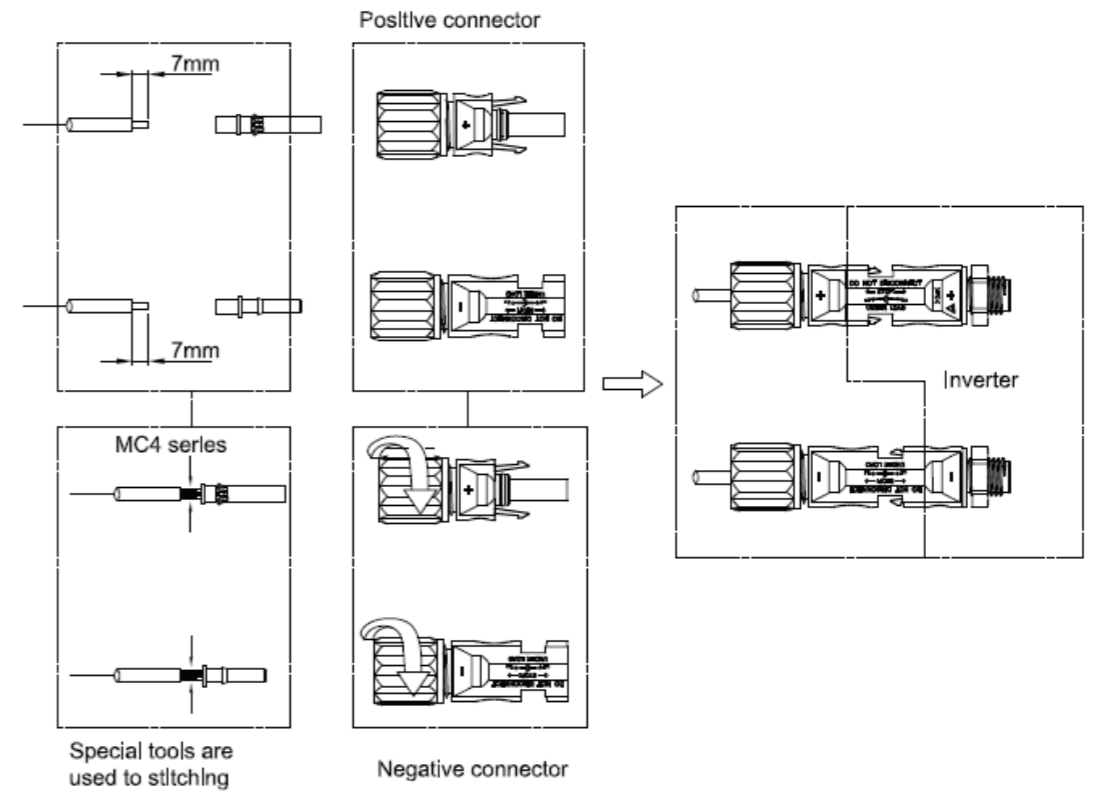


Figure 3-16 Connect the PV string

3.5.3 Communication

Overview of communication ports:

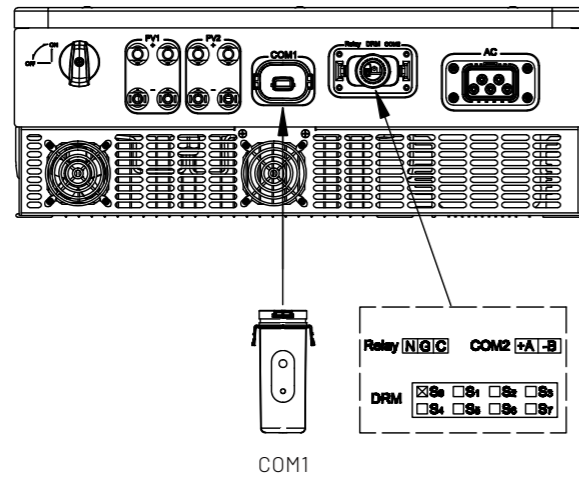


Figure 3-17

3.5.3.1 WIFI/GPRS Communication (optional)

Connect the WIFI/GPRS module produced by Renac to the COM1 port of inverter. After successful connection, information such as power generation and running state of the inverter can be viewed via the App on the phone. The details please refer to the module user manual. The block diagram of the WIFI/GPRS communication system is as follows:

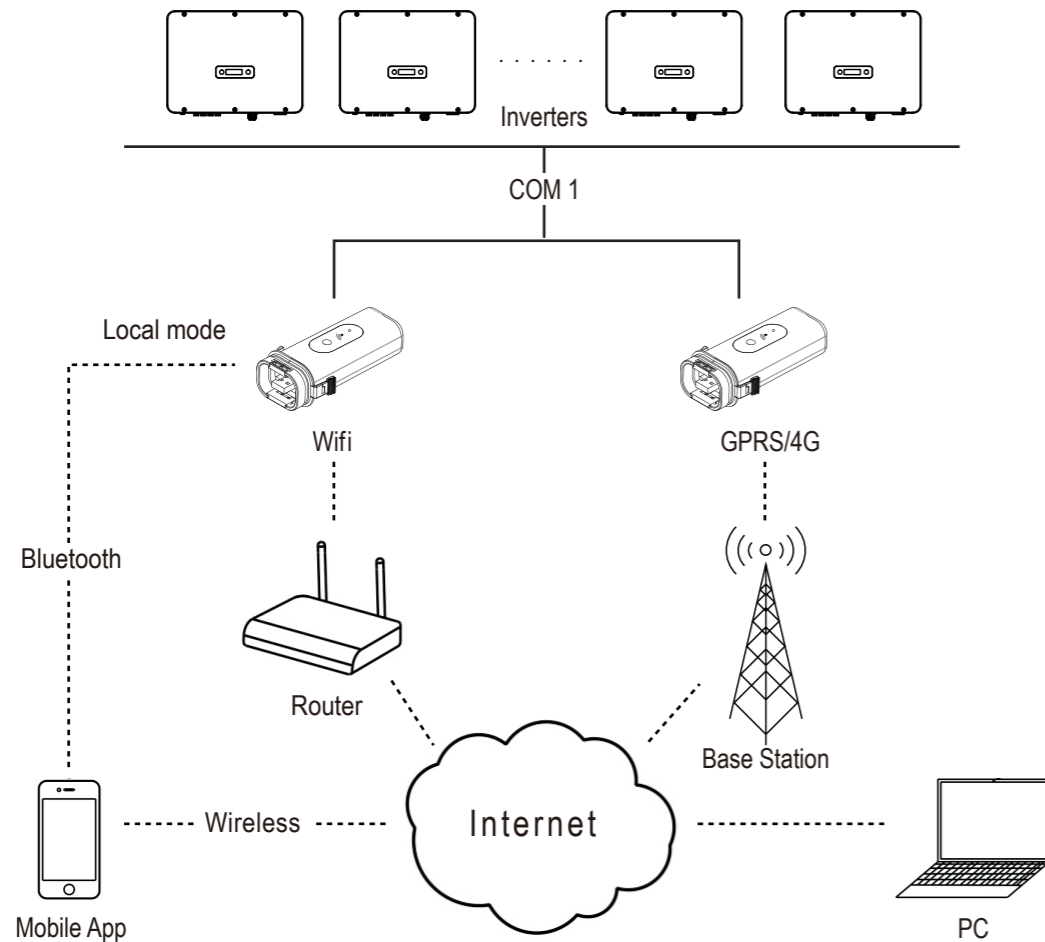


Figure 3-18

3.5.3.2 Smart Energy Meter Connection (Optional)

The inverter is equipped with the feed-in power limit function, and the communication port for smart energy meter is COM2, below is the method of connecting the smart meter in system.

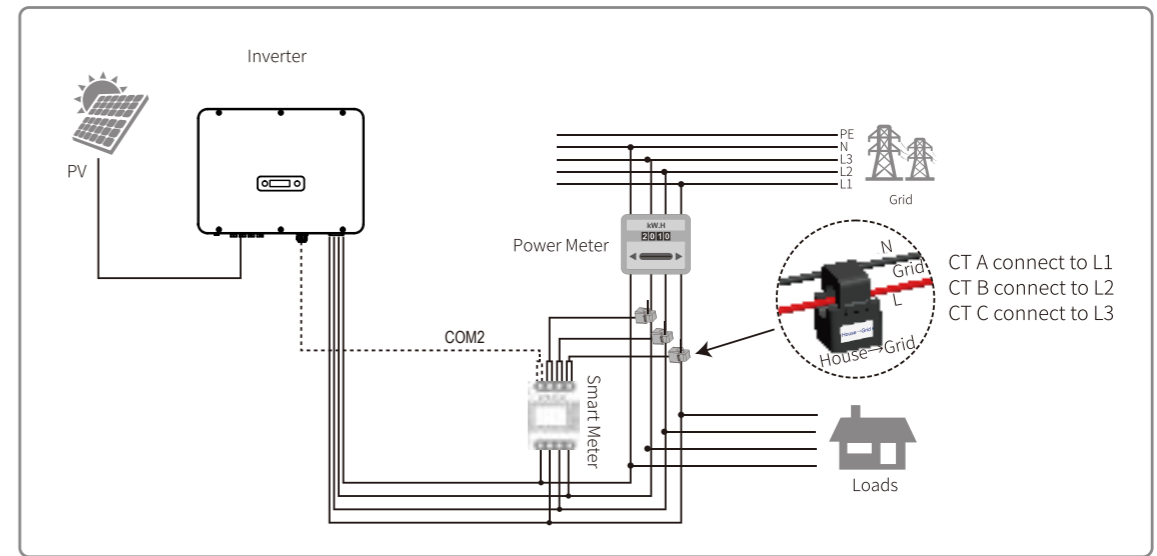


Figure 3-19

3.5.3.3 DRM connection

The inverter supports the demand response modes as specified in the standard AS/NZS4777. The inverter has integrated a terminal for connecting to a DRED. The details please refer to figure 3-17, and for CEI standard, DRM S0 is the DI port .

3.5.3.4 Relay connection

The relay can be set to fault alarm output, and user can configure it to be a normal open contact (COM & NO) or a normal close contact (COM & NC). The relay is initially at the NC terminal, and it will trip to another contact when a fault occurs. Use LED indicators or other equipment to indicate whether the inverter is in the faulty state. The following figures show the typical applications of normal open contact and normal close contact:

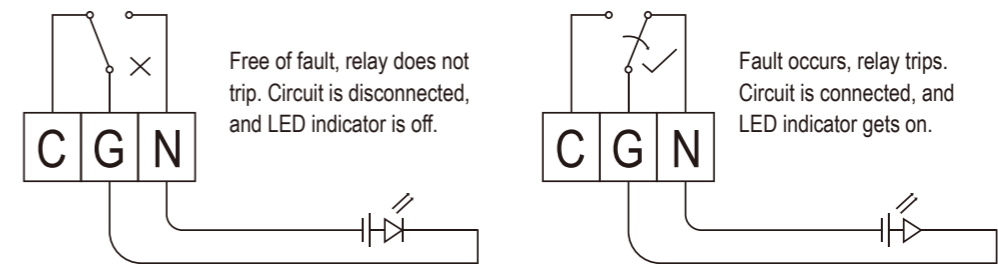


Figure 3-20 Normal open contact

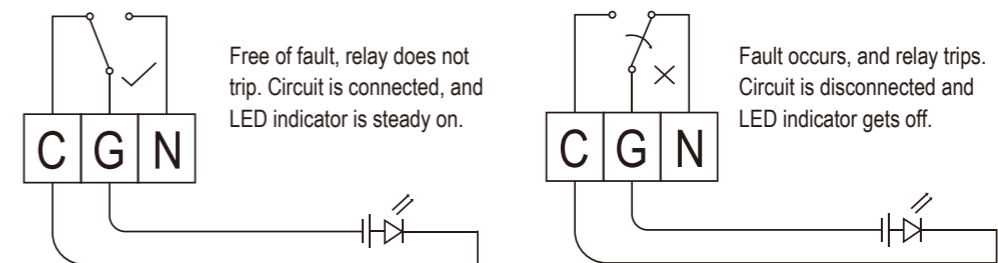


Figure 3-21 Normal close contact