



## **LONGi Park**

### Installation Manual Book of W-shaped Solar Carport

Xi'an LONGi New Energy Co.,Ltd.

July, 2021

## **Foreword**

In accordance with the demand for green energy and the wide application of new technologies, in the 21<sup>st</sup> century, the solar carport not only meets the daily parking needs, but also allows people to enjoy a comfortable parking experience. At the same time, it adheres to the "Solar for Solar" concept of LONGi Group and the value concept of clean energy power generation to deliver green power. On the basis of the big data of parking, it shall monitor the utilization of parking spaces, parking records and vehicle trajectories and other multi-dimensional data and data statistics collection will also follow the development of the technology era, and the construction of chargers and auxiliary facilities will further lead the market and promote the great combination and development with solar and smart energy.

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# **1 Safety Precautions**

Thank you for choosing our W-type solar carport products. Please refer to this installation manual book before installation, operation, maintenance and inspection. With reference to this manual book and the study of construction drawings, you can finally ensure the perfect realization of the function of the solar carport.

## **1.1 General Precautions**

- The installation is limited to the operators who have professional experience and can carry out the construction according to the regulations.
- Please abide by national and local building regulations and relevant regulations on environmental protection.
- Please follow the labor protection and insurance regulations.
- Please wear labor protection equipment, such as safety helmet, work boots, gloves.
- There must be at least two operators during installation to prevent accidents from occurring in a timely manner.
- Please always prepare at least one installation operation instruction during installation.

## **1.2 Key Precautions**

- Please wear gloves and safety belts and set up scaffolding when working at high places, and then carry out construction after eliminating the danger of falling.
- In order to prevent accidents and failures, please do not arbitrarily modify the style of this product.
- Please pay attention to the section and sharp parts of aluminum alloy profiles,

and be careful not to be injured by collision during construction.

- Please pay attention to tighten the bolts, nuts, self-tapping screws, etc. of each part, and pay attention to whether the fasteners are locked.
- Please be careful not to touch the section of the profile during electrical wiring work, which may damage the wiring.
- Do not use any damaged, faulty or deformed parts of the product to avoid personal injury or safety accidents.

### **1.3 Other Precautions**

- Please use the accessories specified by our company during construction, and please do not arbitrarily modify and change the product.
- Please do not subject the aluminum alloy profile to strong impact to avoid deformation and scratches of the aluminum profile.
- This information is related to the installation of the solar carport. Please consider the characteristics of the carport before proceeding with the construction of foundation, PV modules, inverters and electrical wiring.

## **2 Product Introduction**





W-type solar carport is a brand-new prefabricated ground PV support system. The unique load-bearing beam and guide rail not only meet the overall stability of the system, but also improve the convenience of solar carport installation. This product has the advantages of high-quality component design, less accessories and higher overall integration. It fully saves the user's installation time and cost, which is an efficient solution for large-scale ground solar carport projects.





Please carefully read the manual book before installation!

### 3 Installation Tools and Devices

			
6mm hex wrench	Electric tools	Tape measure	Markers
			
Torque spanner	Strings	Adjustable spanner	Concrete vibrating tube
			
Level gauge	Sleeve spanner	Scaffolding	Hammer

### 4 System Components

Main Components			
			

Fixed clamp for PV module	Fixed clamp for rail	Rail	Rail connector
			
Load-bearing beam	Column	Foundation holder	L-shaped anchor

## 5 Installation Guide

### 5.1 Foundation

Before installation, please prepare the required installation tools and corresponding products; mark the position of each concrete foundation according to the planning of the construction drawing. Pre-embed the L-shaped anchor bolts into the concrete, the distance between the L-shaped anchor bolts should be based on the distance between the two holes at the bottom of the base.

Put the L-shaped anchor bolts into the concrete foundation in sequence according to the design drawings.

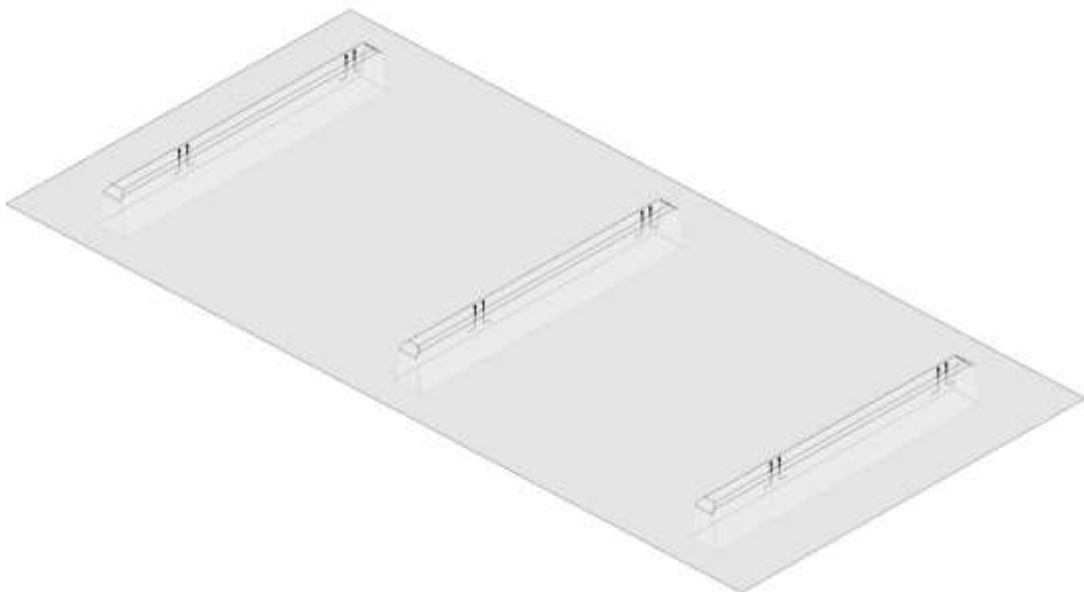


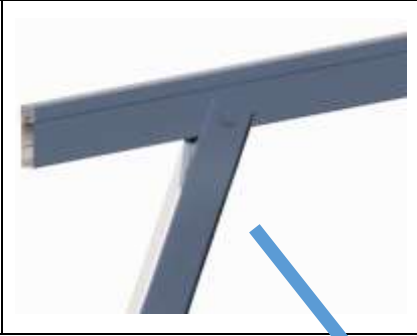
Figure 5.1 Schematic diagram of pre-embedded concrete foundation  
with L-shaped anchor bolts



## 5.2 Support System Installation

### 5.2.1 Assembly of Column and Load-bearing Beam

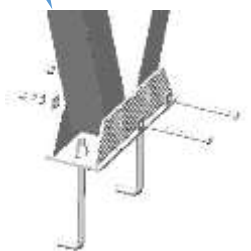
Use 1 set of M20x130 bolt assemblies (2 flat washers, 1 spring washer, 1 nut) to fix between the column and the load-bearing beam



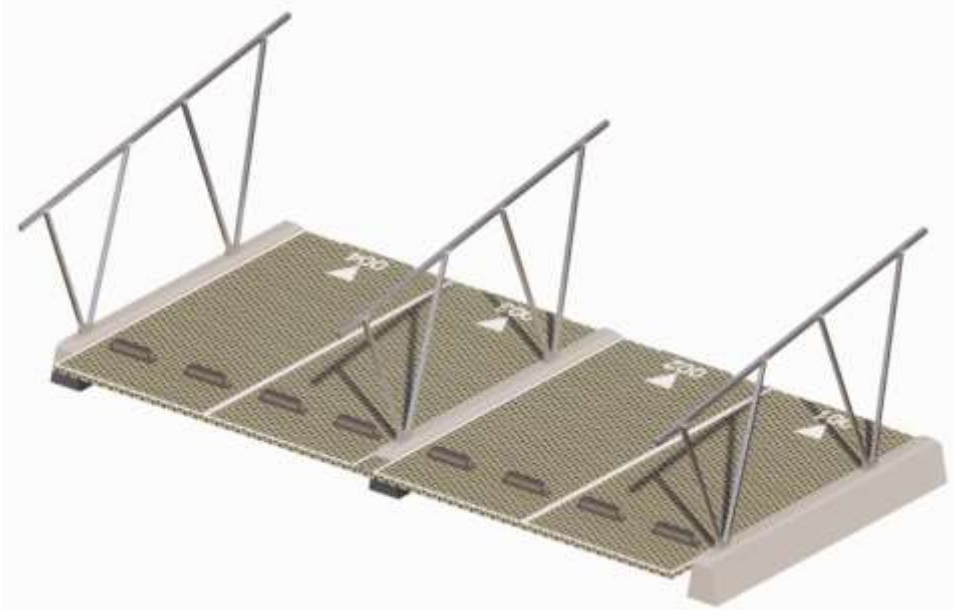
Use L-shaped anchor bolt assemblies (1 flat washer, 1 spring washer, 1 nut) to fix the base and concrete



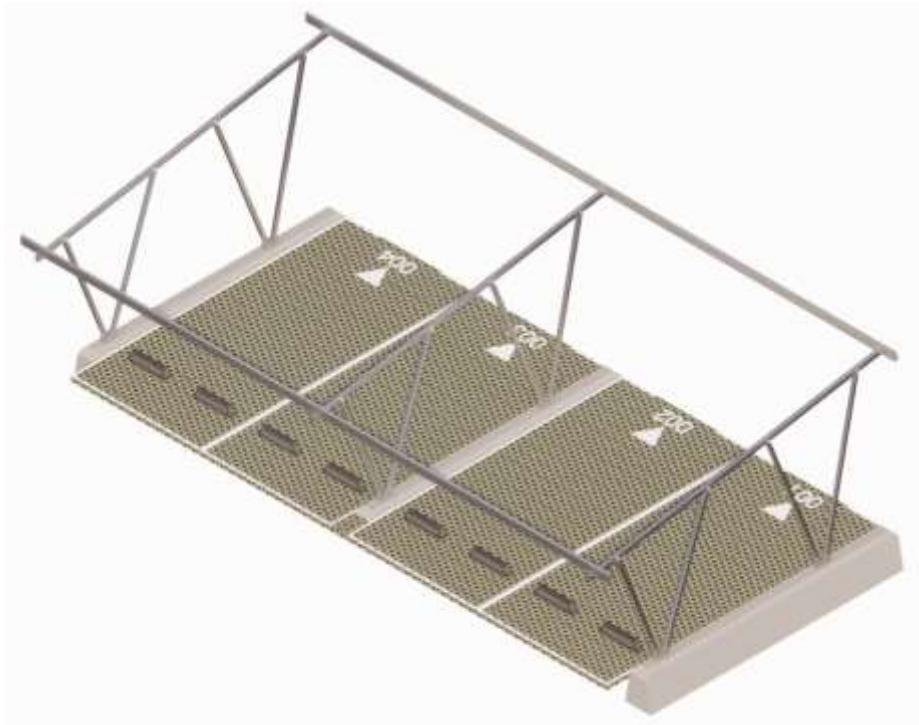
Use 1 set of M20x150 bolt assemblies (1 flat washer, 1 spring washer, 1 nut) and 2 corrugated washers between the base and the column.



5.2.2 Repeat the Previous Step and Install the Support System in Sequence According to the Drawing



5.2.3 At the same time, pay attention to adjusting the size so that the upper surface of the load-bearing beam is on the same plane, ensuring the smooth installation of the



purlin

### 5.3 Purlin Installation

#### 5.3.1 Purlin Splicing

Insert half of the purlin connector into one purlin, and fasten it with 6 self-tapping screws on both sides. Insert the other half of the purlin connector into another purlin, and adjust two purlins to be flush. Finally, use 6 self-tapping screws to lock it on both sides, so that the purlins are connected.

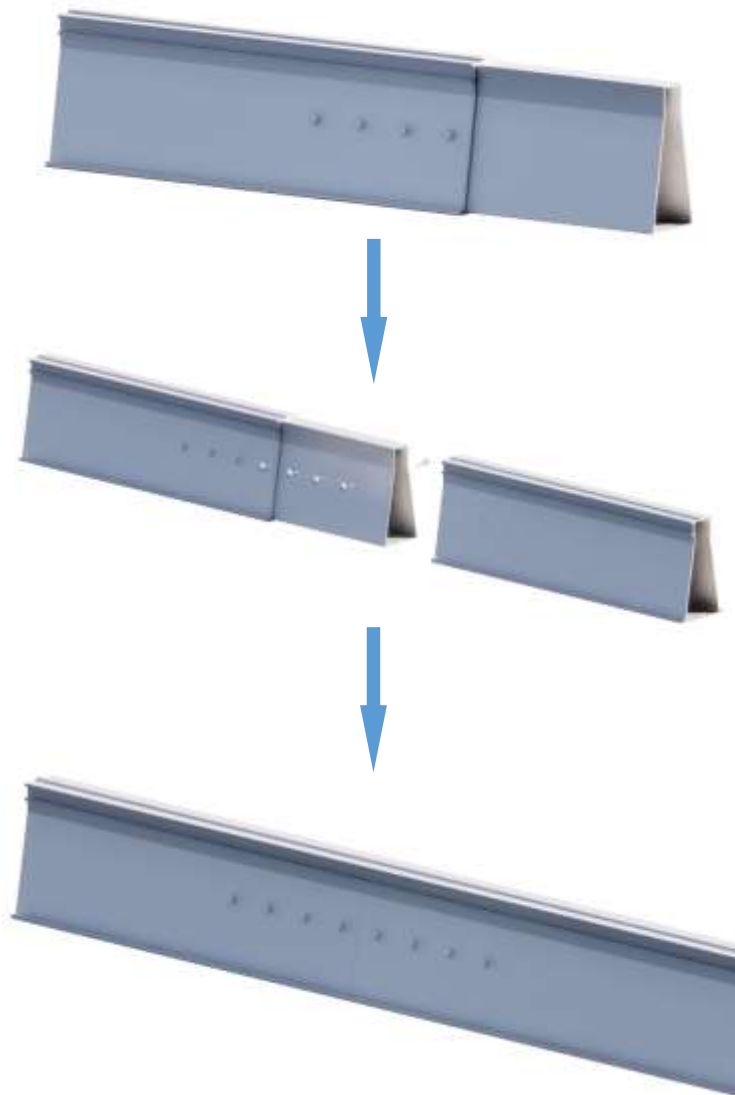




Figure 5.2 Position of Self-tapping Screw

5.3.2 Use two purlin clamp kits on each side to fix purlin on the load-bearing beam as shown in picture below.

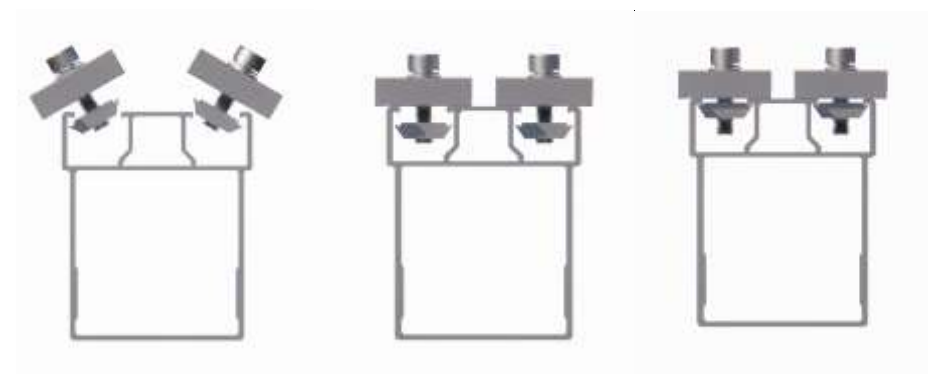


Figure 5.3 Schematic Diagram of Purlin Clamp Installation (pay attention to the direction of the clamp block)

- 5.3.3 Follow the steps above to install the rails in sequence, and ensure that the bolts are fastened tightly

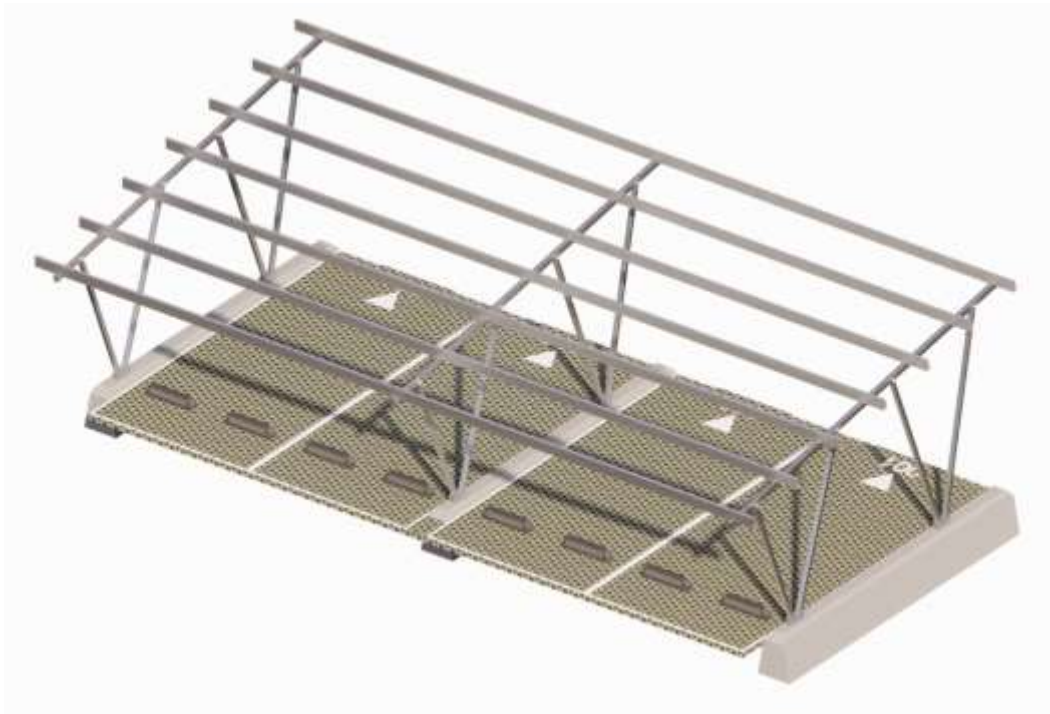
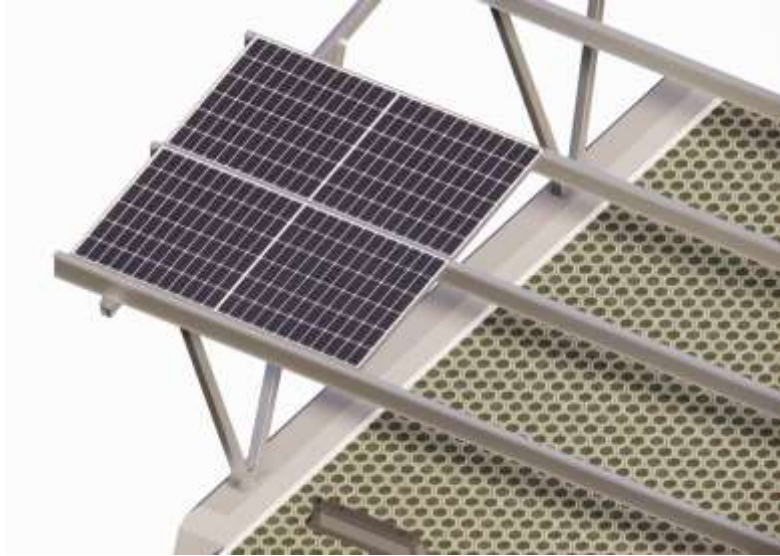


Figure 5.4 Schematic diagram of rail installation completed

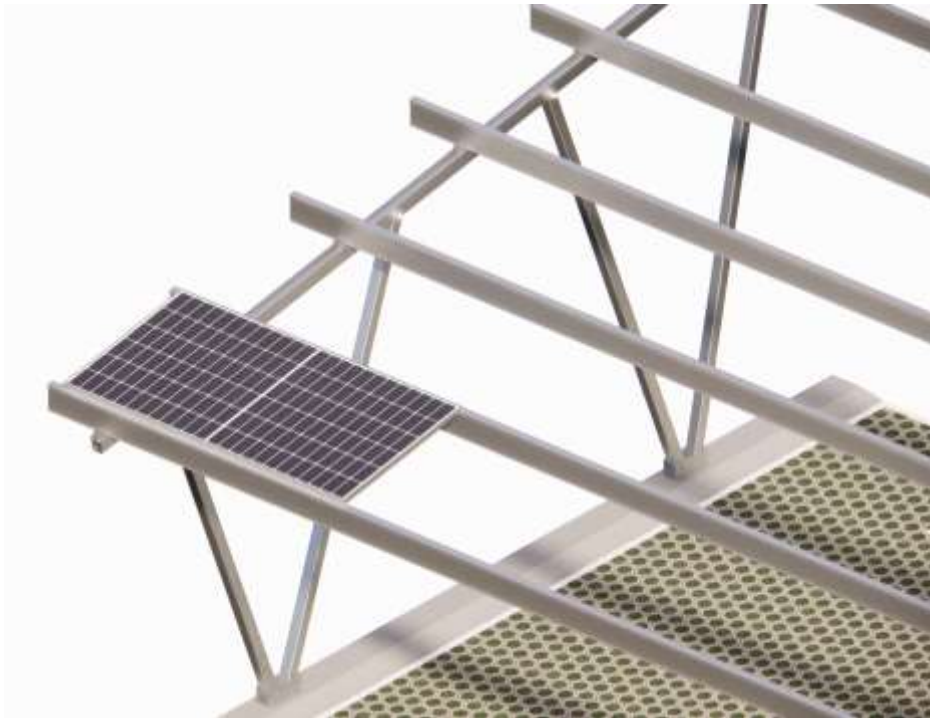
## 5.4 PV Module Installation

- 5.4.1 Place PV module on purlin as shown in figure below, it is recommended to installation from lower edge to upper edge, reserve 100mm long at the end of purlin.



#### 5.4.2 Use the PV module clamp kit to fix PV module on purlin

A Put PV module on purlin as shown below



B Unfasten PV module clamp kit, stuck the lower part into the groove on the side of purlin and use the upper part to clamp the PV module frame.



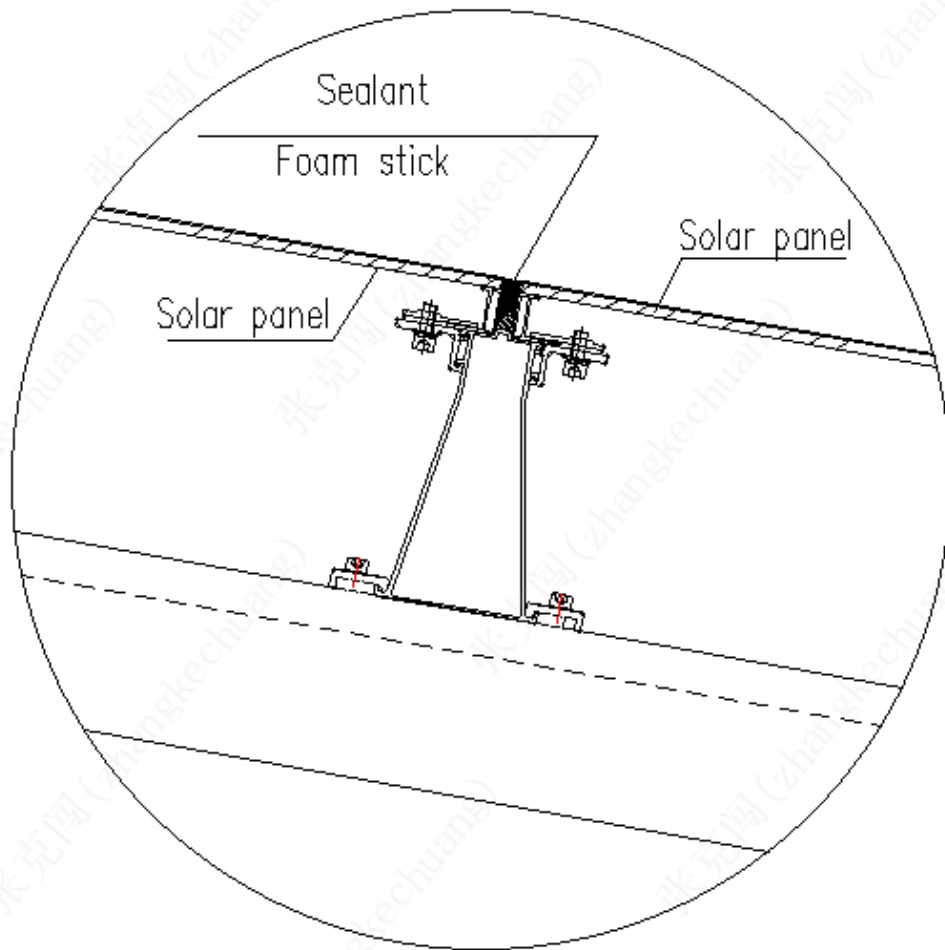


C Move the PV module clamp kit to the right position for pre-tightening, and install two sets of PV module clamp kit on one side of PV module, totally four sets



Figure 5.5 Schematic diagram of component installation completed

D. Use T shape sealing strip to fill the gap between PV module in vertical direction from the top, for the gap in horizontal direction, put foam stick in first and then use sealant on the top as shown below.



## 5.5 Inverter Installation

### 5.5.1 Inverter Installation Precautions



#### **WARNING: FIRE HAZARD**

Despite safe production and assembly, electrical equipment can still cause fires:

1. Do not install the inverter in a place full of highly flammable substances or gases;
2. Do not install the inverter in a potentially explosive environment

- 1) Consider the visibility of the status indicator and LCD screen.
- 2) Please install the inverter on the bracket or a solid surface (such as a concrete wall).



- 3) The inverter is suitable for vertical or backward tilt installation, but the backward tilt angle cannot exceed  $15^\circ$  (the horizontal angle is  $75^\circ$ ).
- 4) The inverter cannot be tilted forward or installed horizontally.

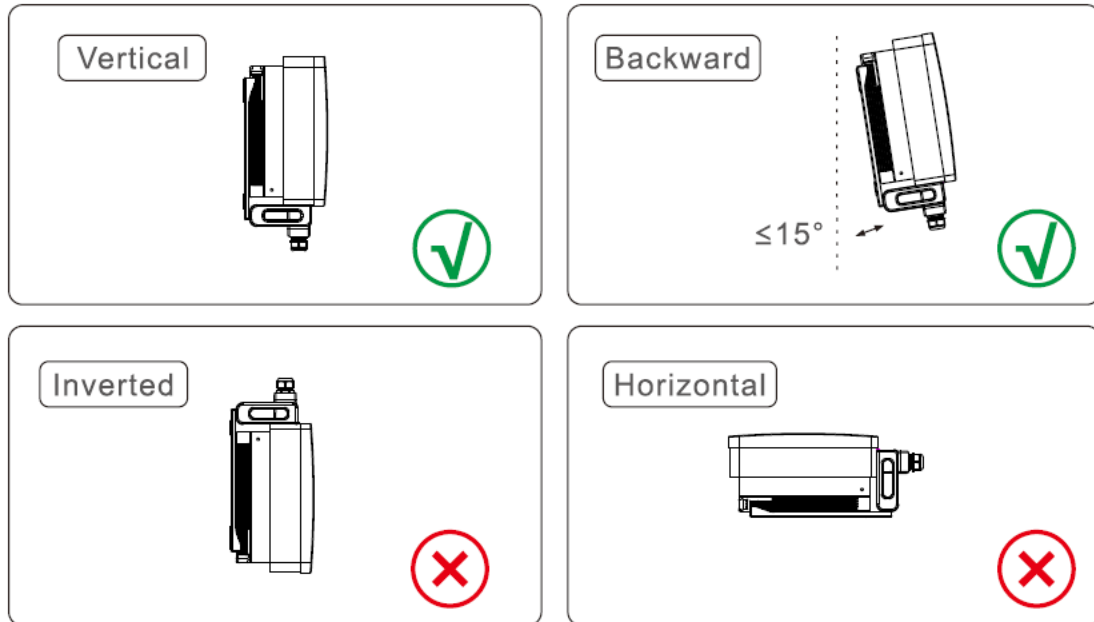


图 5.6 逆变器正确安装方式

## 5.5.2 Inverter Installation

### 5.5.2.1 Backboard Dimensions

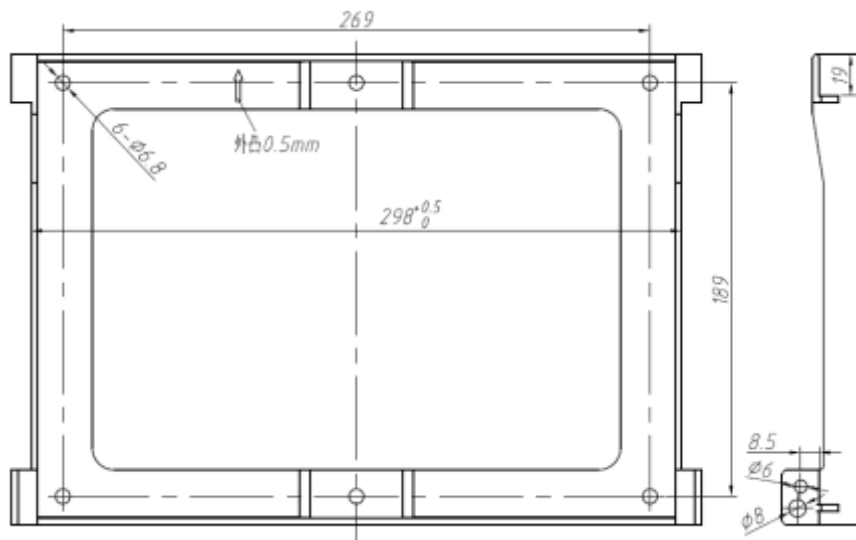


Figure 5.7 Dimensions of 5~20kW Inverter Back Mounting Plate

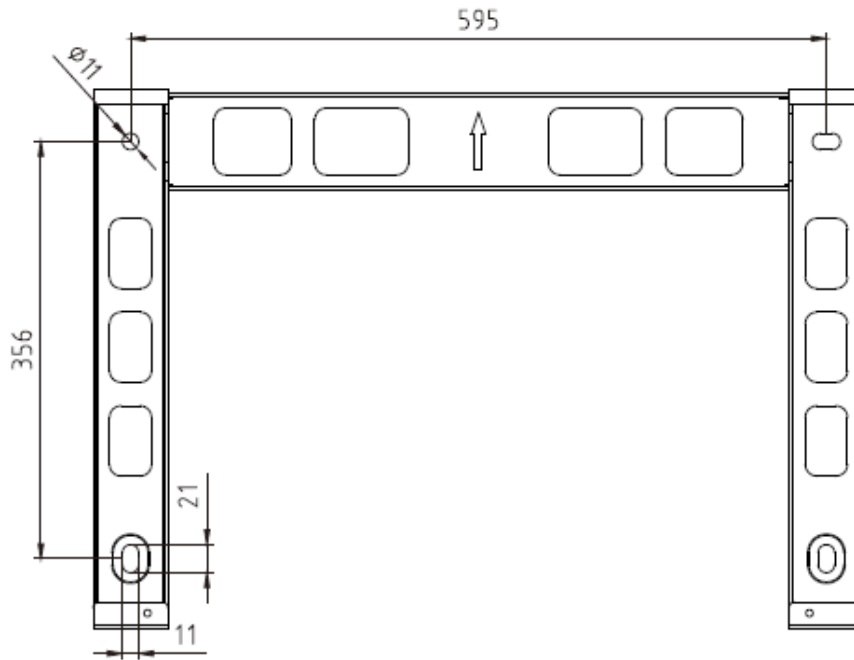


Figure 5.8 Dimensions of 25~50kW Inverter Back Mounting Plate

### 5.5.2.2 Inverter Installation

- 1) Mark the installation position of the inverter support column according to the construction drawing plan, then use expansion bolts to fix the square tube column on the concrete foundation and install the beam, then vertically fix the inverter back plate on the support beam.



Figure 5.9 Inverter bracket location diagram

- 2) Lift the inverter and hang it on the backplane, and use the fastening

screws in the accessories to fix the two sides (lower ends) of the inverter on the backplane.

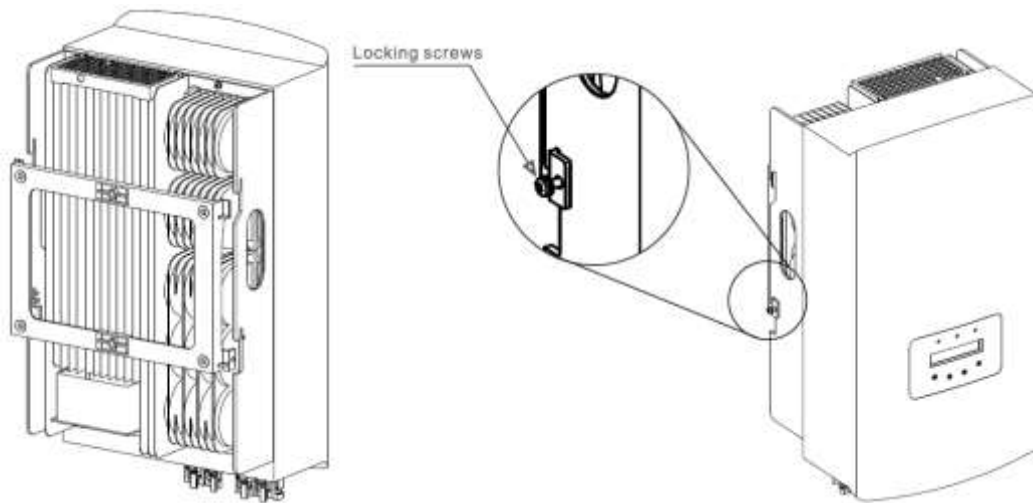


Figure 5.10 Installing and fixing the inverter (5~20kW)

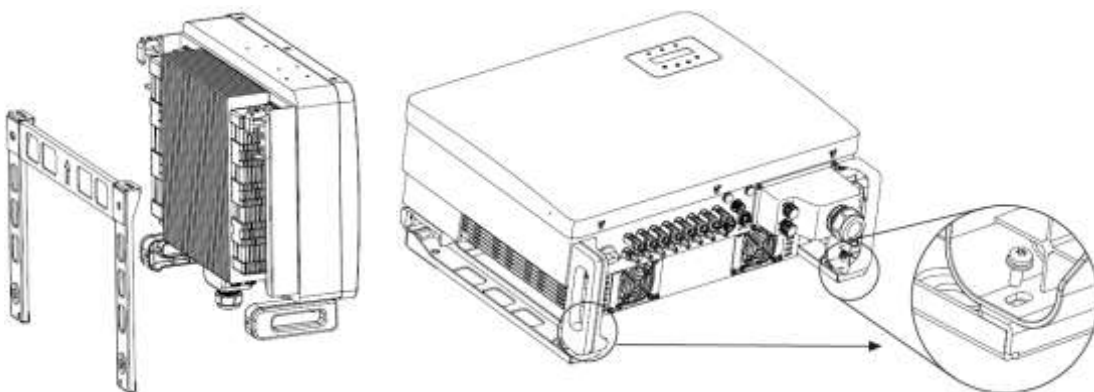


Figure 5.11 Installing and fixing the inverter (25~50kW)



Figure 5.12 Inverter installation completed

**5.6 Cable Tray Installation**

The aluminum alloy cable tray is laid horizontally along the outermost purlins on both sides, the longitudinal cable tray is laid along the outermost inclined beam on the installation side of the inverter, and is laid along the outer surface of the side column to the connection between the foundation and the embedded pipeline. All cable trays are fixed with self-tapping screws at the interval of 500mm as shown in Figure 5.13 and Figure 5.14.

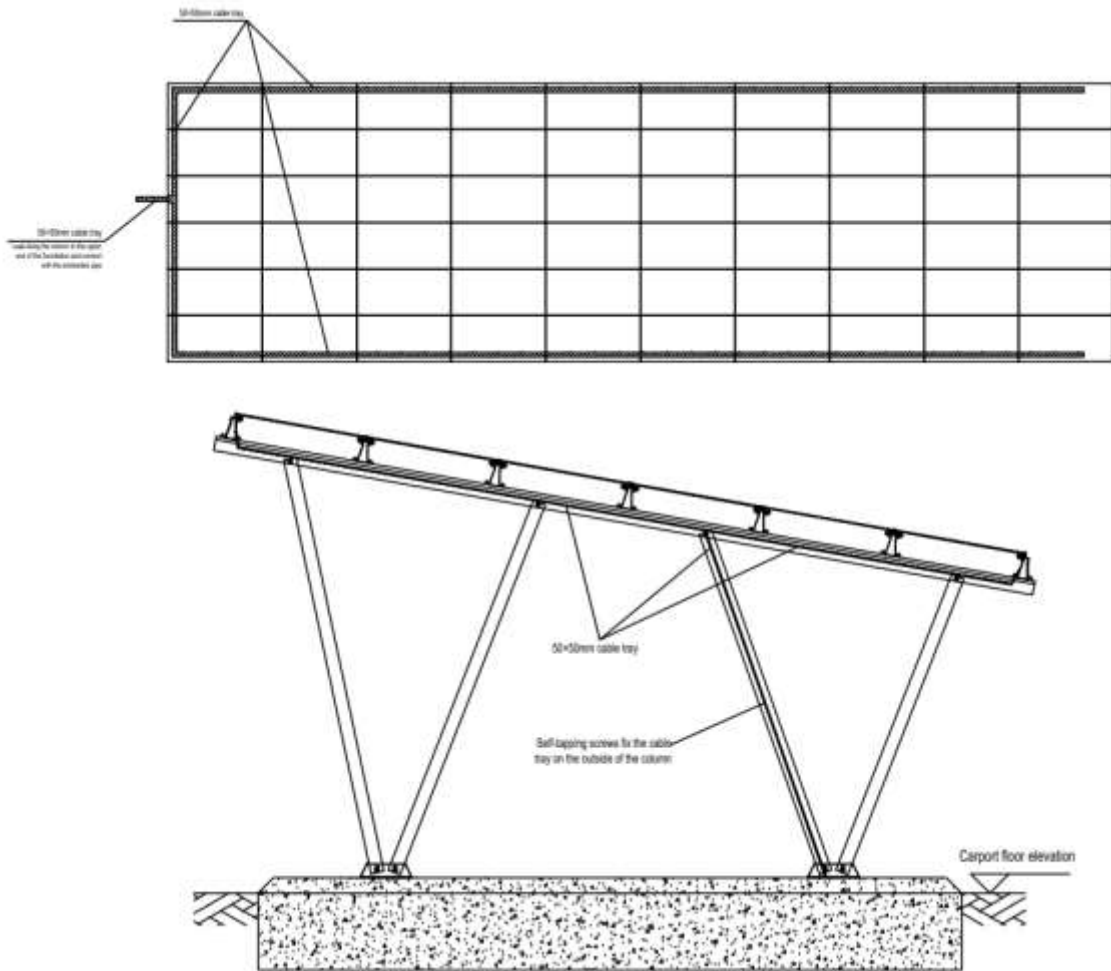


Figure 5.13 Cable tray layout

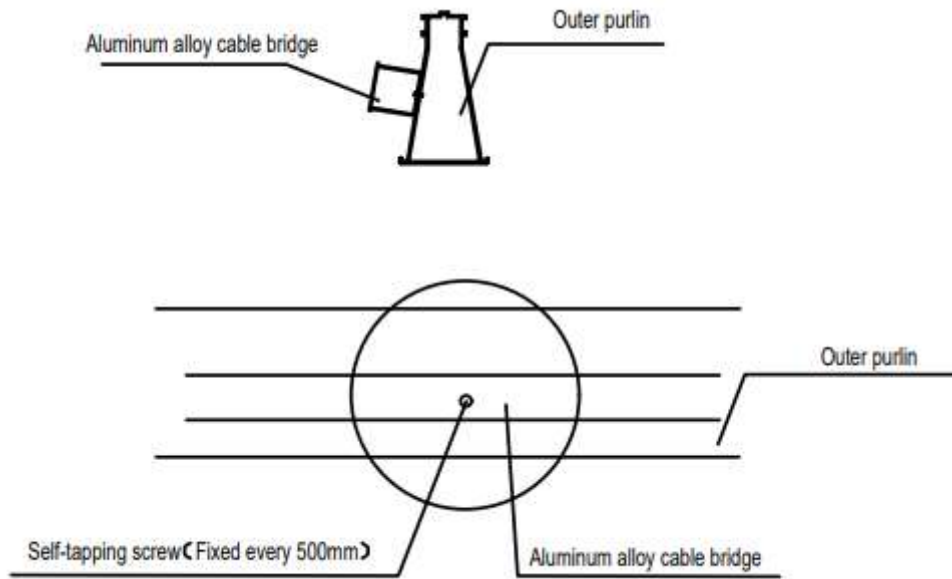


Figure 5.14 Schematic diagram of cable tray installation

## 5.7 Grounding Device Installation

### 5.7.1 Vertical grounding body and horizontal grounding body installation

1) The vertical grounding body of hot-dip galvanized angle steel with a length of 2.5 meters is vertically buried underground, and the burial depth of the vertical grounding body should not be less than 800mm from the top of the ground plane, as shown in Figure 5.15.

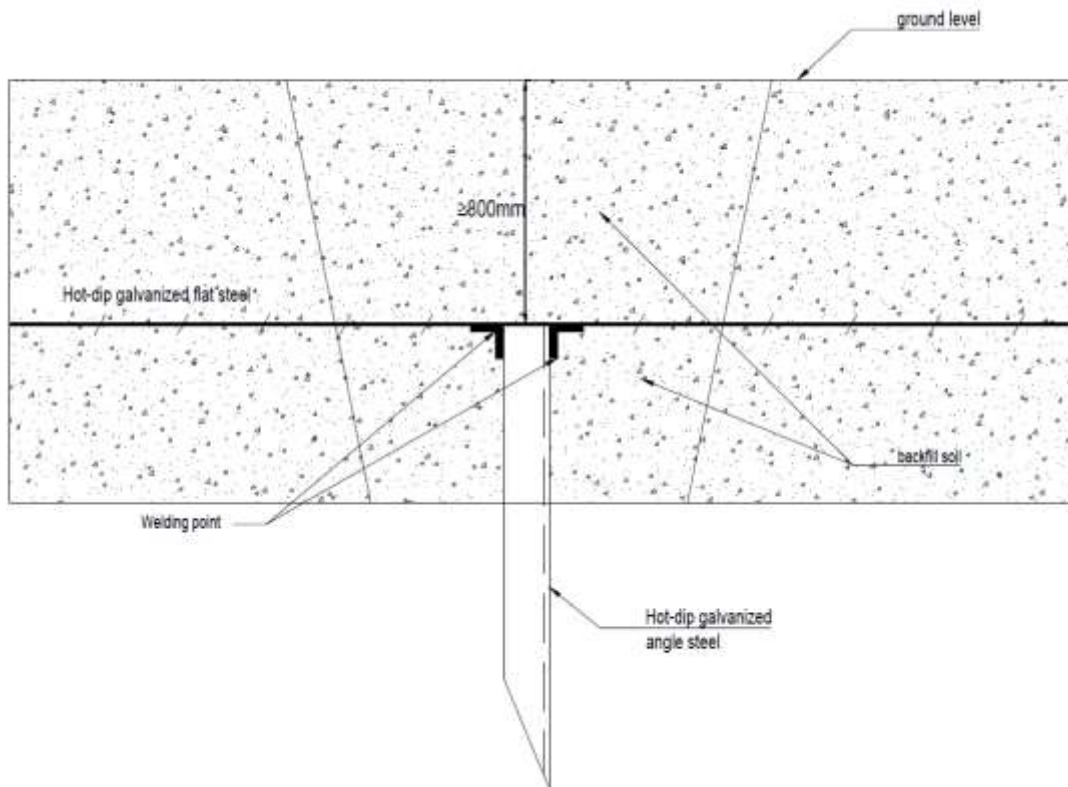


Figure 5.15 Grounding body installation

2) Solar carports generally use at least 2 vertical grounding bodies, and more than 2 vertical grounding bodies are required for more than 10 parking spaces. The number of vertical grounding bodies is mainly based on the construction drawings, as shown in Figure 5.16.

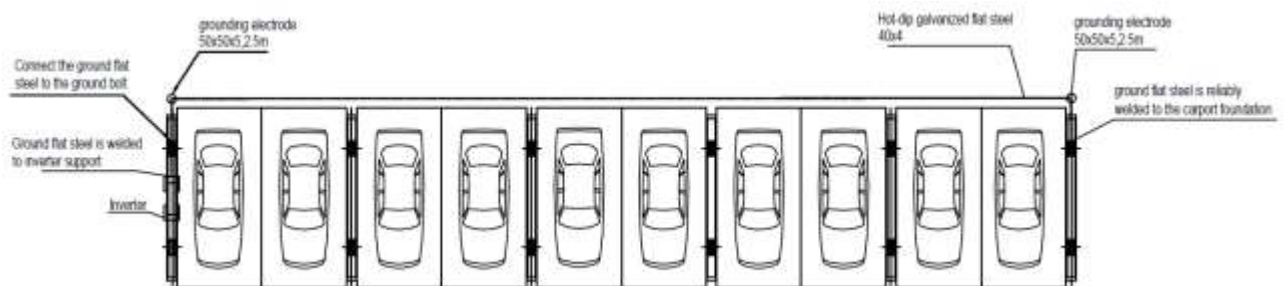


Figure 5.16 Layout of the grounding device

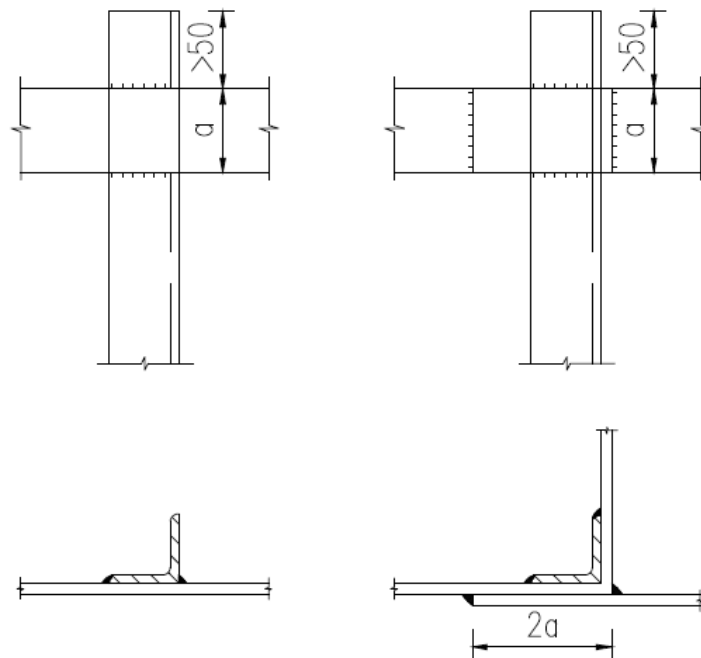
3) If multiple vertical grounding bodies are used, the spacing between vertical grounding bodies should generally not be less than 5 meters.

4) The burial position of the vertical grounding body should not be less than 1.5m from the building; when the grounding body is buried in garbage, ash,

etc., the soil should be replaced and compacted in layers.

5) The horizontal grounding body (hot-dip galvanized flat steel) is laid underground (below the frozen soil layer), and the laying should be straight and the distance from the ground should be at least 800mm, as shown in Figure 5.16.

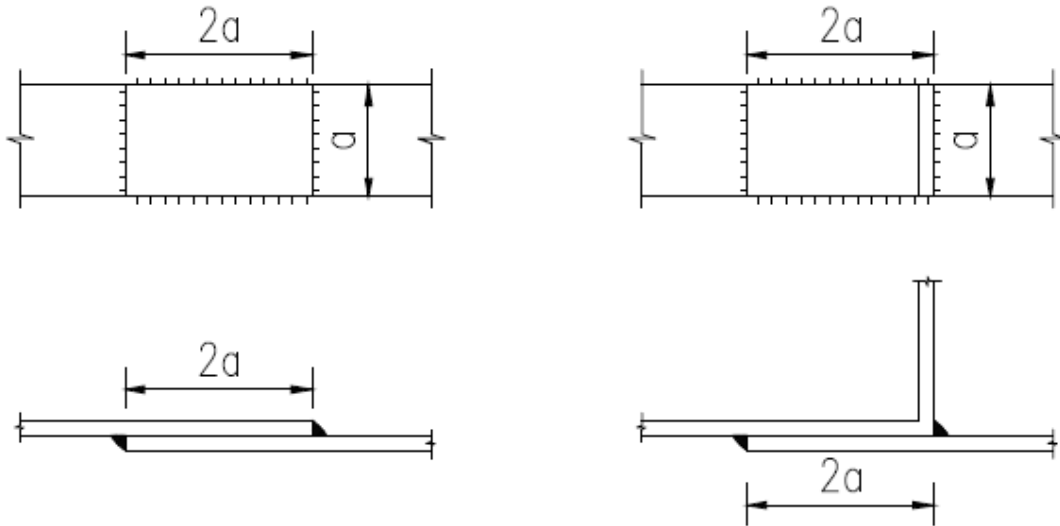
6) The horizontal grounding body and the vertical grounding body shall be welded by lap joint, and the length of the lap joint shall not be less than twice the width of the flat steel, and shall be welded on no less than three sides, as shown in Figure 5.17.



a: Width of hot-dip galvanized flat steel

Figure 5.17 Welding of flat steel and ground electrode

7) The welding of hot-dip galvanized flat steel and flat steel for the horizontal grounding body is shown in Figure 5.18.



a: Width of hot-dip galvanized flat steel

Flat bar horizontal lap

Flat bar horizontal tap

Figure 5.18 Welding of flat steel to flat steel

8) Before welding of galvanized flat steel, the welding surface should be carefully ground to remove the galvanized layer, the surface of the welding head should also be smooth and firm, and the surface should be treated with anti-corrosion material after welding.

9) The horizontal grounding body in the inverter side should be laid along the cable tray and reliably connected to the inclined beam and inverter bracket through bolts. The horizontal grounding body in the other side should be reliably welded to the carport foundation, as shown in Figure 5.16 and Figure 5.19.



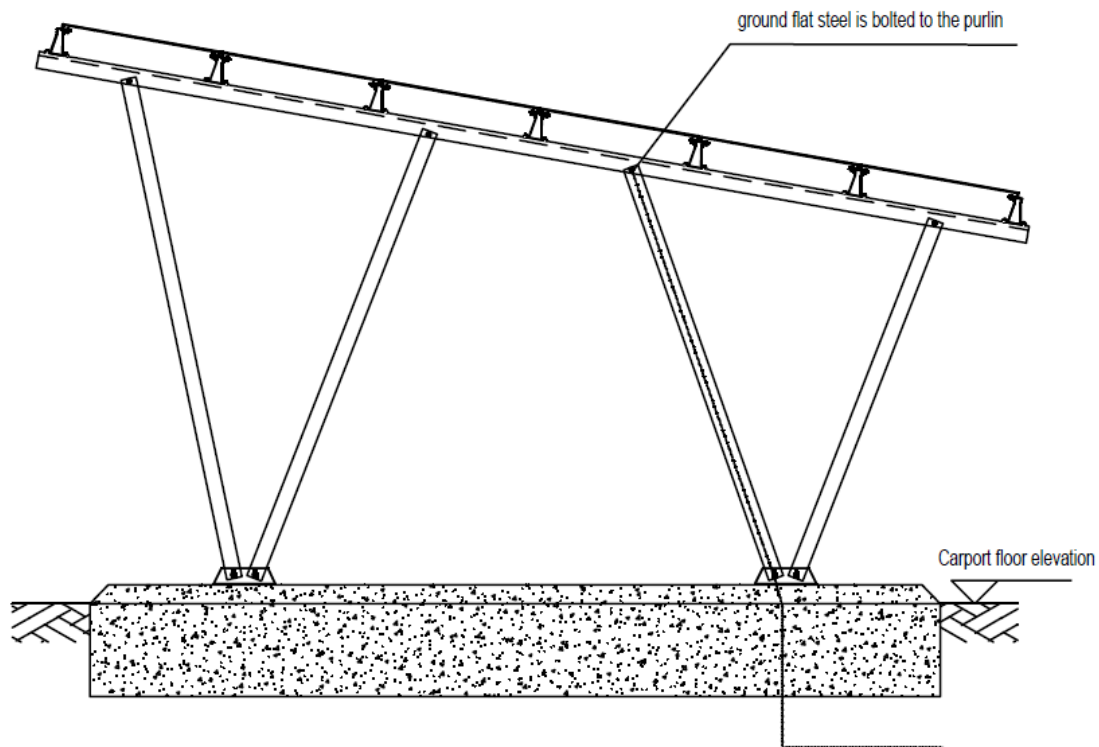


Figure 5.19 Carport grounding

10) Grounding resistance should be measured after the grounding grid is completed. The measured value of grounding resistance for main grid should be not greater than  $4\Omega$ , otherwise, the area of the grounding grid should be increased or the burial depth of the vertical grounding body should be increased.

11) After the grounding resistance test is passed, the trenches or pits of the grounding grid should be backfilled and compacted in layers.

12) The exposed grounding flat steel shall be coated with 30mm width of green and yellow strips for all sides.

### 5.7.2 PV module Grounding

A  $4\text{mm}^2$  yellow-green grounding wire is used for equipotential connection between the PV module frames in landscape direction, as shown in Figure 6. The PV module at the both ends and the carport bracket are reliably connected by bolts or self-tapping screws, as shown in Figure 7.

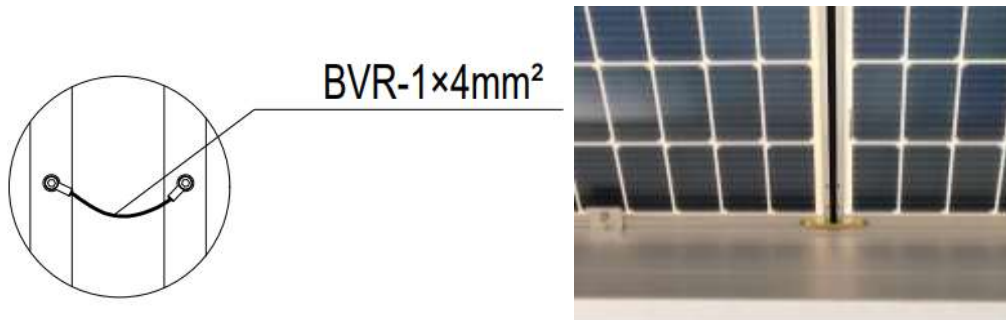


Figure 5.20 Schematic diagram of wiring between each PV module

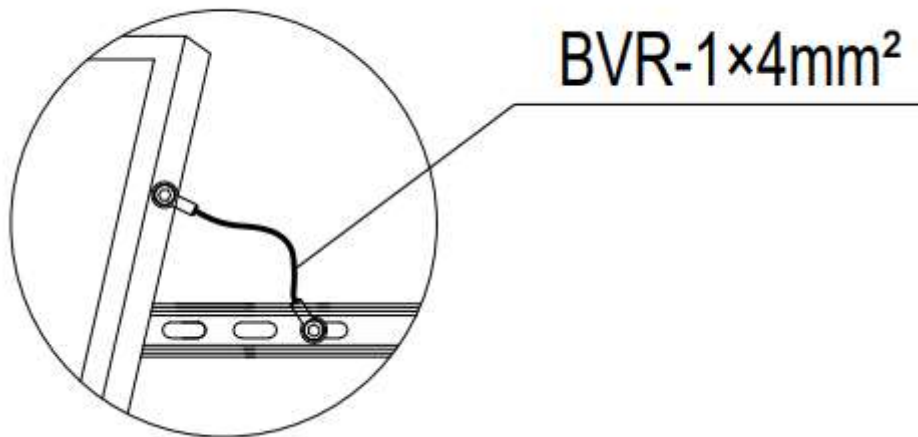


Figure 5.21 Schematic diagram of the ground connection between the panel and the carport bracket

### 5.7.3 Inverter Grounding

The inverter bracket is reliably welded to the main grounding grid. The inverter itself is grounded to main grounding grid through 16mm<sup>2</sup> green-yellow wires as shown in figure 5.22.

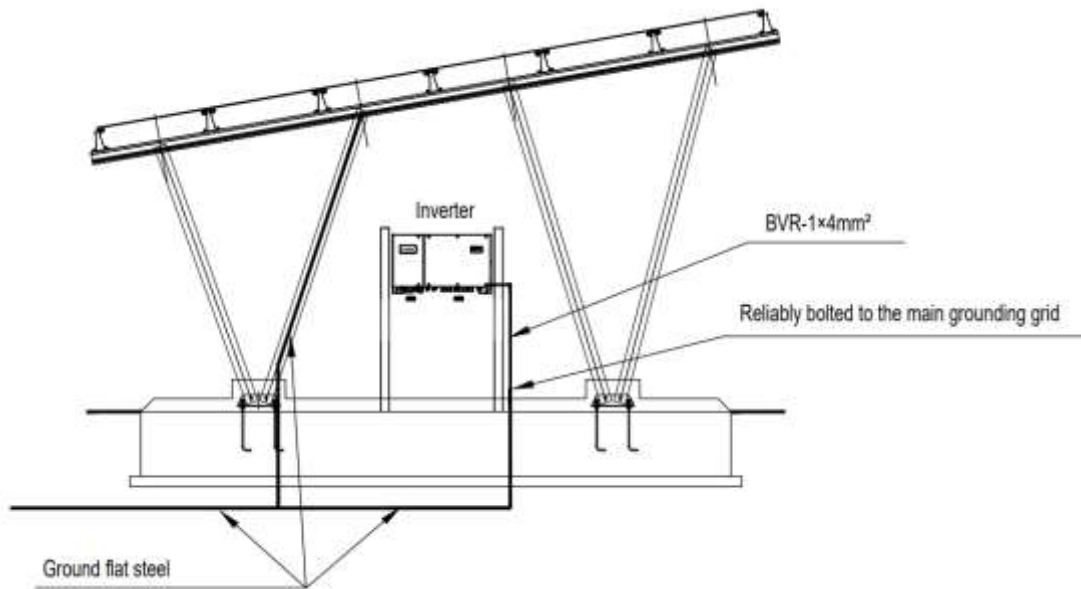


Figure 5.22 Inverter Grounding Diagram

## 5.8 Views After Installation



Figure 5.23 Front View



Figure 5.24 Rear View

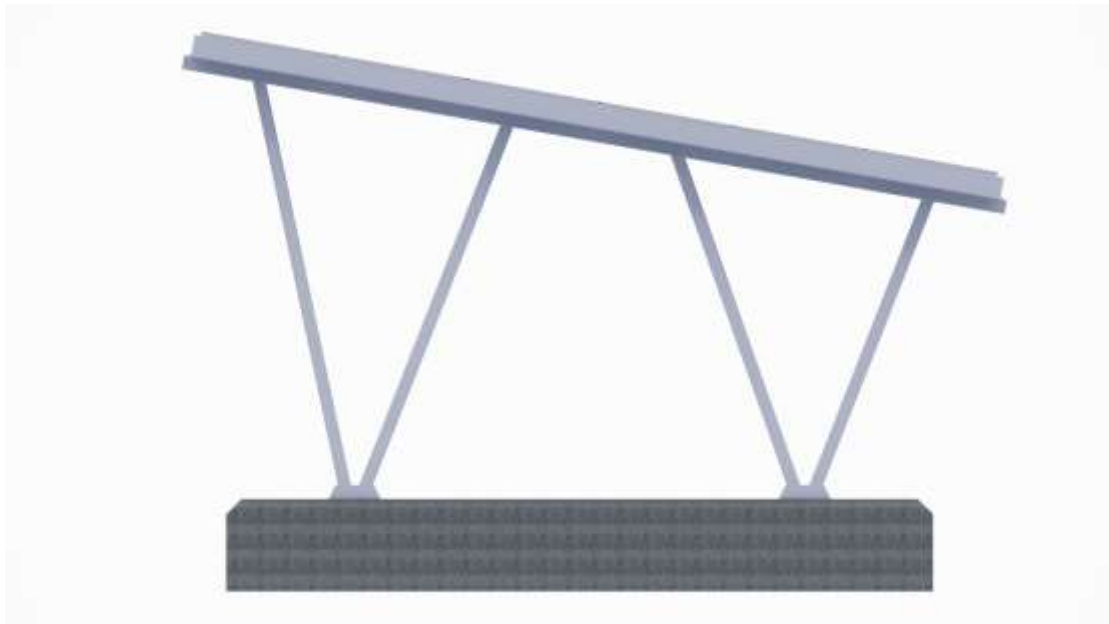


Figure 5.25 Side View



Figure 5.26 Rendering 1



Figure 5.27 Rendering 2

## **6 Installation Precautions of Solar Carport**

### **6.1 Installation Dimension**

The specific dimensions of the engineering installation are subject to the engineering construction drawings. This installation instruction is only used for the description of the installation method of the W-type solar carport product.

### **6.2 Stainless Steel Fixed Components**

As the stainless steel has good ductility, it is essentially different from carbon steel; improper use will cause the bolt and nut to be unscrewed after being matched. The prevention of lockup mainly includes the following aspects:

1. Reduce friction coefficient:

A. The bolt threads should be clean and tidy, free of dust, sand and foreign matters, etc.

B. It is recommended to use yellow wax or lubricating oil (such as butter, 40# engine oil) during installation.

2. Correct operation method:

A. It must be screwed perpendicular to the axis of the thread, and do not tighten it at an angle.

B. During the process of tightening bolts and nuts, the force must be applied uniformly.

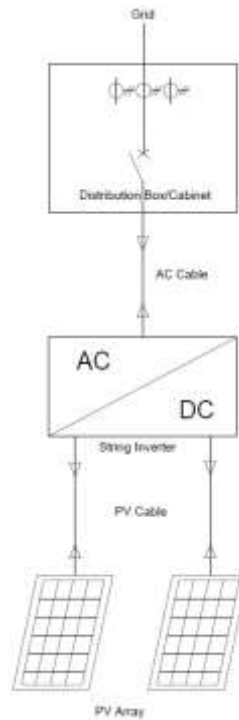
C. Use torque spanner or socket spanner as much as possible, avoid using adjustable spanner or electric spanner.

D. Avoid tightening at high temperature, and use an electric spanner to reduce the speed as much as possible to avoid locking due to a rapid rise in temperature.

## 7 Electrical Connections

### 7.1 Electrical system diagram

The electrical system diagram of the photovoltaic carport is as follows:



### 7.2 Electrical connections of PV modules

#### 7.2.1 Electrical installation of PV modules

##### 7.2.1.1 Electrical Performance

The reported performance measurements are subject to +/-3% uncertainty at STC (1000 W/m<sup>2</sup> Irradiance, a cell temperature of 25°C and an AM1.5 spectrum) for voltage, current and power..

When modules are in series connection, the string voltage is sum of every individual module in one string. When modules are in parallel connection, the current is sum of the individual module as shown in below figure 7.1. Modules with different electric performance models can not be connected in one string.

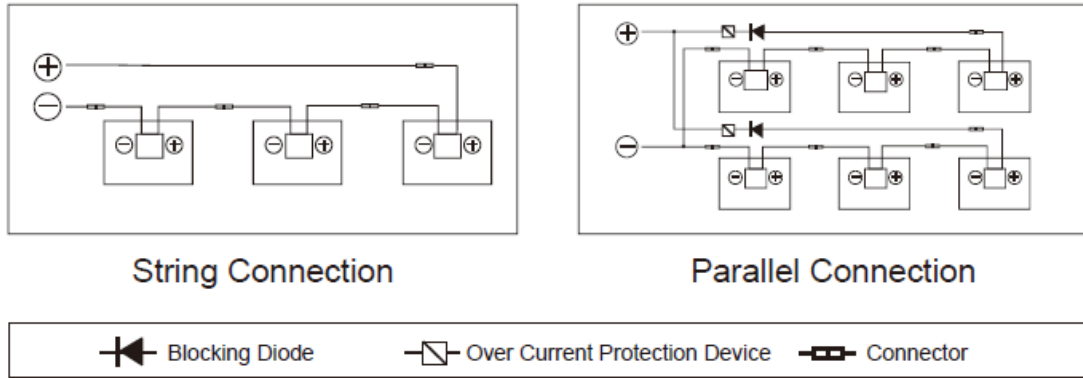


figure 7.1 Series Connection and Parallel Connection Circuit Diagram

The maximum allowed quantity of modules in string connection shall be calculated according to relative regulations. The open circuit voltage value under the expected lowest temperature shall not exceed the maximum system voltage value allowed by modules and other values required by DC electric parts. (LONGi modules maximum system voltage is DC1000V/DC1500V--- actually system voltage is designed based on the selected module and inverter model.)

The number of PV modules in series in this system is 12 modules in series and 18 modules in series.

The VOC factor can be calculated by the following formula.

$$CV_{oc} = 1 - \beta V_{oc} \times (25 - T)$$

T: The expected lowest temperature of the installation site.

$\beta$ : VOC temperature coefficient (% / °C) (Refer to modules data sheet for further detail)

### 7.2.1.2 Cables and wiring

In module design, adopt junction boxes with the protective level of IP67 for on-site connection to provide environmental protection for wires and connections and contacting protection for non-insulating electric parts. The junction box perform the protective level of IP67 with well connected cables and connectors. These designs facilitate parallel connection of modules. Each module has two individual wires connecting the junction box, one is negative pole and the other is positive pole. Two modules can be in series connection



by inserting the positive pole at one end of wire of one module into the negative pole of the adjoining module.

According to local fire protection, building and electrical regulation, apply proper cable and connector; ensure the electrical and mechanical property of the cables (the cables should be put in a catheter with anti-UV aging properties, and if exposed to air, the cable itself should have anti-UV aging capability).

The installer can only use single-wire cable, 2.5-16mm<sup>2</sup>(5-14 AWG), 90 °C , with proper insulation capability to withstand the maximum open circuit voltage (such as EN50618 approval). Need to select appropriate wire specifications to reduce voltage drop.

LONGi requires that all wiring and electrical connections comply with the appropriate 'National Electrical Code'.

When cables are fixed on the bracket, avoid mechanical damaging cables or modules. Do not press cables by force. Adopt UV resistant cable ties and clamps to fix cables on the bracket. Though cables are UV resistant and water proof, it is still necessary to prevent cables from direct sun light and water immersion.

The minimum bending radius of cables should be 43mm. (1.69in)

#### 7.2.1.3 Connector

Please keep connectors clean and dry. Make sure connector caps are fastened before connection. Do not connect connectors under improper conditions of damp, dirty or other exceptional situations ). Avoid connectors from direct sun light and water immersion or falling onto ground or roof.

Incorrect connection may lead to electric arc and electric shock. Please make sure that all electric connection is reliable.

Make sure all connectors are fully locked. Only compatible connectors can be mated, i.e. from the same vendor and model, shall be used; (If you need to use different types of connectors, please consult customer service of LONGi );.

#### 7.2.1.4 Bypass diode

LONGi solar module junction box contains bypass diode which is in parallel connection with the cell string. If hot spot occurred, the diode will come into operation to stop the main current from flowing through the hot spot cells in order to prevent module over-heated and performance loss. Notice, bypass diode is not the overcurrent protection device.

If the diode is definite or suspected to be defective, the installer or system maintenance supplier shall contact LONGi. Please do not try to open the module junction box on your own.

#### 7.2.1.5 PID Protection and Inverter Compatibility

1) PV modules may appear Potential Induced Degradation (PID) under high humidity, high temperature and high voltage condition. Modules may appear Potential Induced Degradation (PID) under the conditions below:

- PV modules install under hot and humid weather condition.
- PV modules installation site is under long term humid condition such as floating PV system.

2) To reduce the risk of PID, on the modules DC connection site, it is recommended to connect the negative to ground. The PID protection measures on system level are recommended as follow:

- For isolated PV inverter, the negative of the PV modules DC connection side can be directly grounded.
- For non-isolated PV inverter, isolated transformer is needed to be installed before applying virtual grounding (grounding method guidance from the inverter manufactures are usually needed).

### 7.2.2 PV string connection method

There are 2 kinds of photovoltaic strings in the photovoltaic carport, one is a string of 18 modules, and the other is a string of 12 modules. After the PV string connection is completed, the PV cable is led along the cable tray to the

string inverter, Please refer to Figure 7.2 and Figure 7.3 for the wiring method of the string:

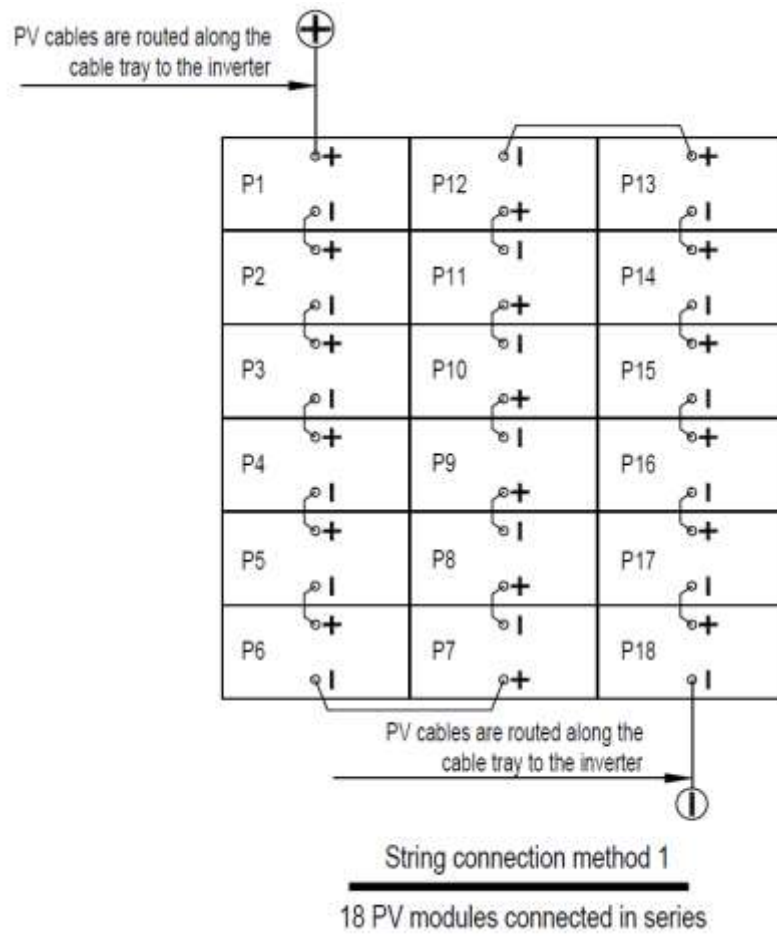


Figure 7.2 PV string connection method 1

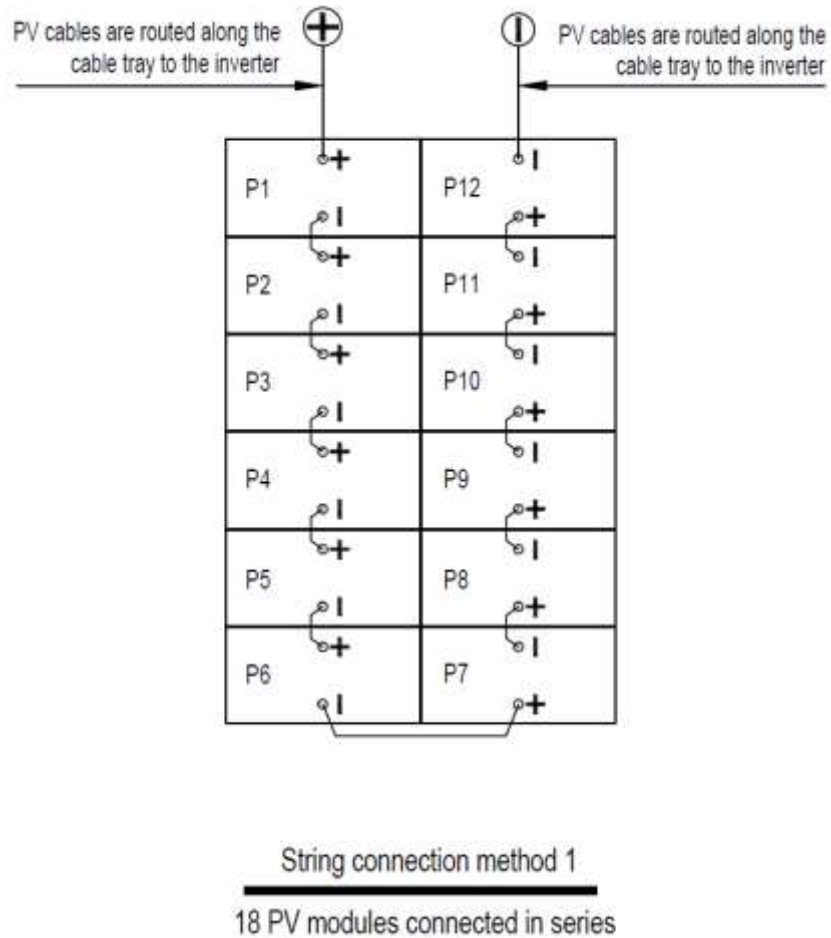


Figure 7.3 PV string connection method 2

The PV string connection adopts the PV special cable of model H1Z2Z2-K 1×4mm<sup>2</sup>. The positive and negative poles of the photovoltaic module junction box have their own cables and plugs. When connecting the modules, please confirm the positive and negative poles of the modules. When the length of the PV module's own cable is not enough, use the PV special cable to connect, The connection between PV modules Please refer to Figure 7.4;

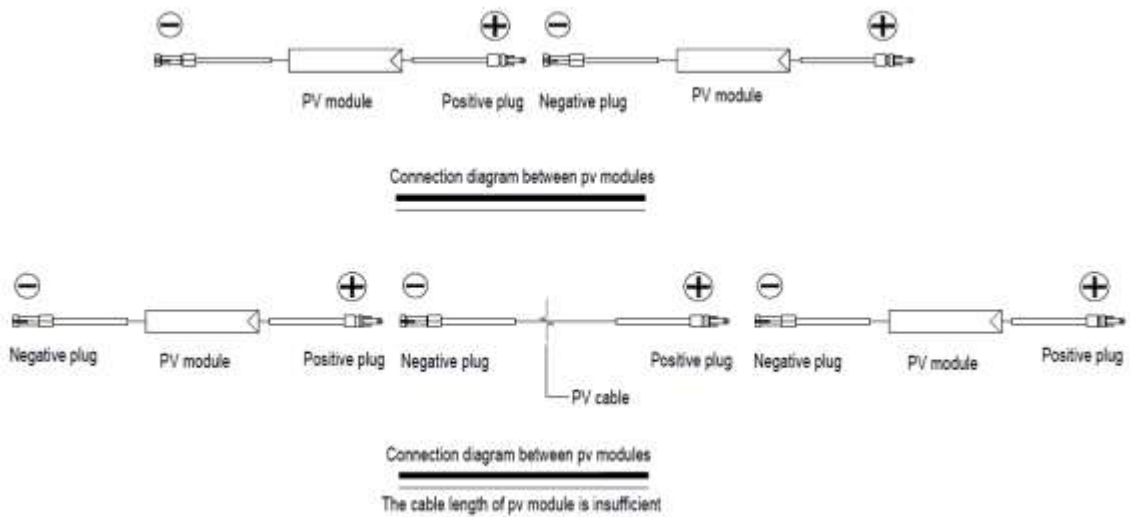


Figure 7.4 PV module connection

### 7.3 Inverter Electrical Connections

#### 7.3.1 Inverter Introduction

The solar carport with 1~5 bays adopts a string inverter with the capacity of 5~20kW, The solar carport with more than 6 bays adopts a string inverter with the capacity of more than 20kW.

##### 7.3.1.1 Product Description

String inverters can convert DC power generated by photovoltaic modules into AC power and connect it to the grid. 3-phase inverters integrated DRM and backflow power control function that could suitable for smart grid requirement.

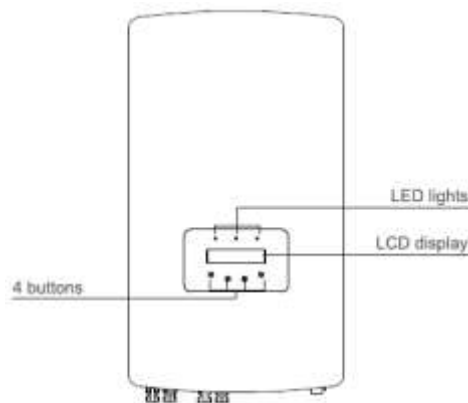


Figure 7.5 5~20kW front view

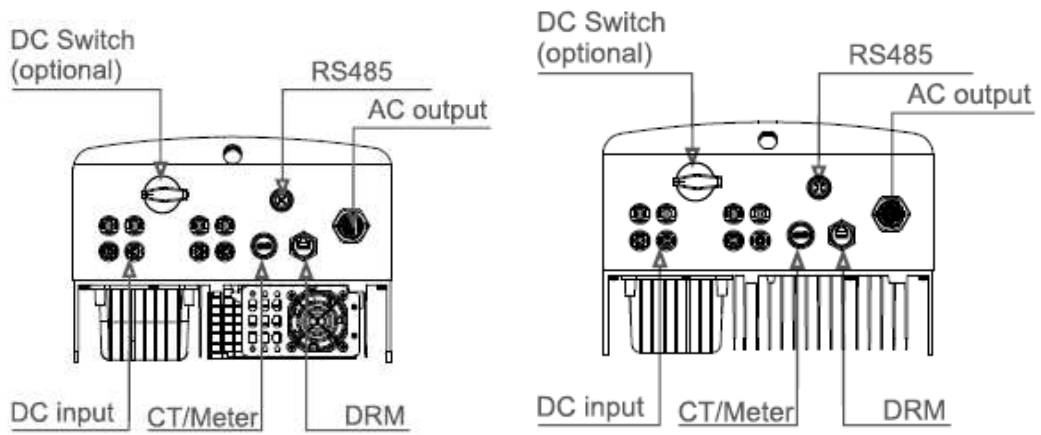


Figure 7.6 5~10 kW inverter (left) and 12~20 kW (right) inverter bottom view

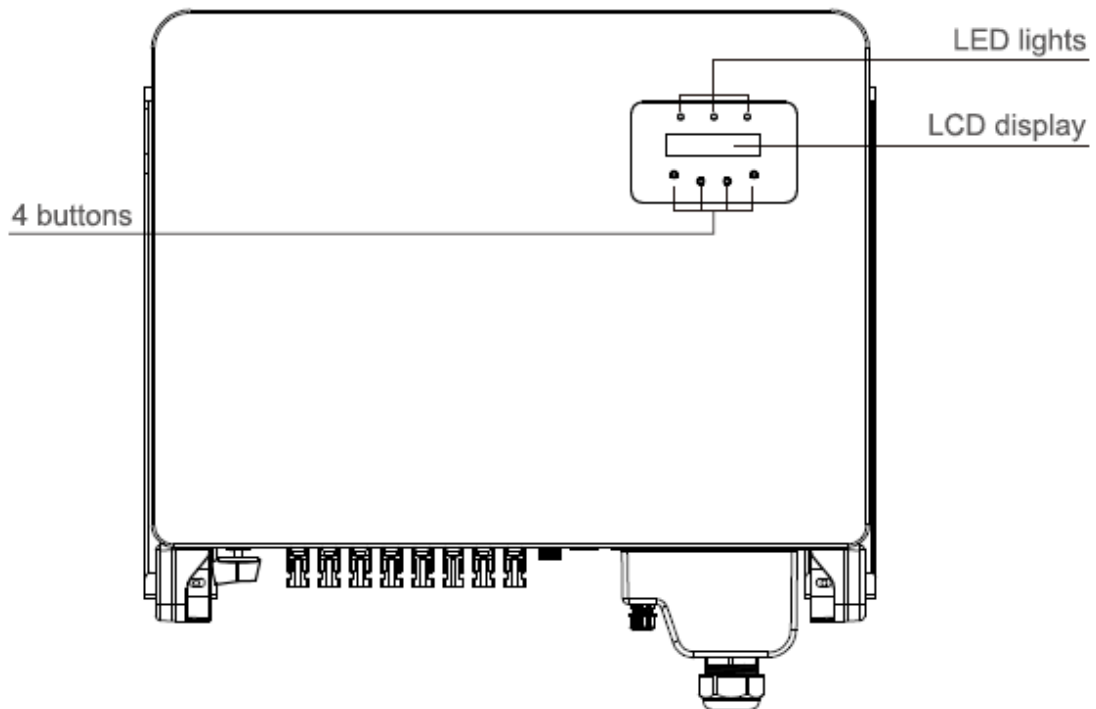


Figure 7.7 25~50kW inverter front view

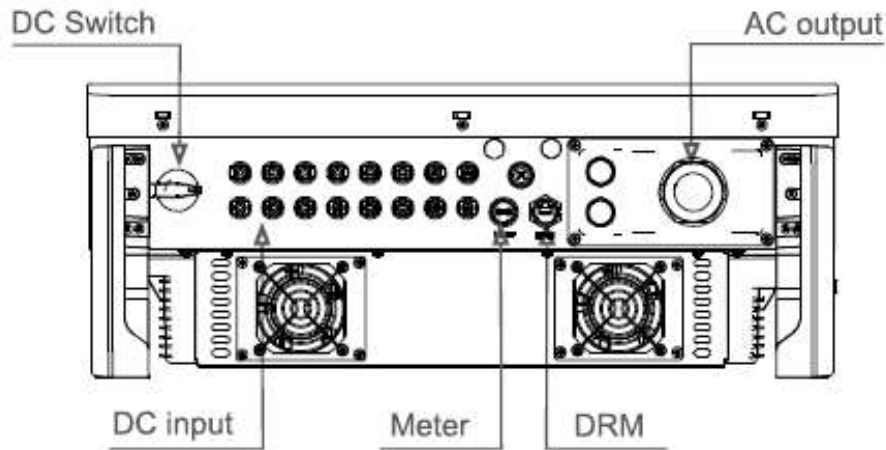


Figure 7.8 25~50kW inverter bottom view

### 7.3.2 Electrical Connections

Inverter designs quick—connect terminal, so top cover need not open during electrical connection. The sign meaning located the bottom of inverter, as shown below in table 1(5~20kW inverter)、table 2(25~50kW inverter). All electrical connections are suit for the local or national standard.

+	Positive DC input terminal
-	Negative DC input terminal
DC 1	DC input terminal
DC 2	DC input terminal
DC SWITCH	Switch of DC input terminals
COM	RJ45 and terminal block for RS485 communication port
GRID	Connecting terminal of the Grid

table 1 5~20K Inverter electrical connection symbols

DC1~DC8	DC input terminal
ON	Switch on the DC switch
OFF	Switch off the DC switch
COM1	Com port for monitoring
METER	Com port for meter
DRM	Com port for DRM

Table 2 25~50K Inverter electrical connection symbol

The electrical connection of the inverter must follow the steps listed below:

- 1) Switch the Grid Supply Main Switch (AC) OFF;
- 2) Switch the DC Isolator OFF.;
- 3) Assemble PV input connector to the Inverter.

### 7.3.3 Grounding

- 1) Remove the screw at the grounding point of the inverter;
- 2) Connect the grounding cable to the grounding point on the heat sink, and tighten the grounding screw, Torque is 2Nm/5~20kW inverter(see figure 7.9), and torque is 3~4Nm /25~50kW inverter(see figure 7.10);

Important: For improving anti—corrosion performance, after ground cable installed, apply silicone or paint is preferred to protect.

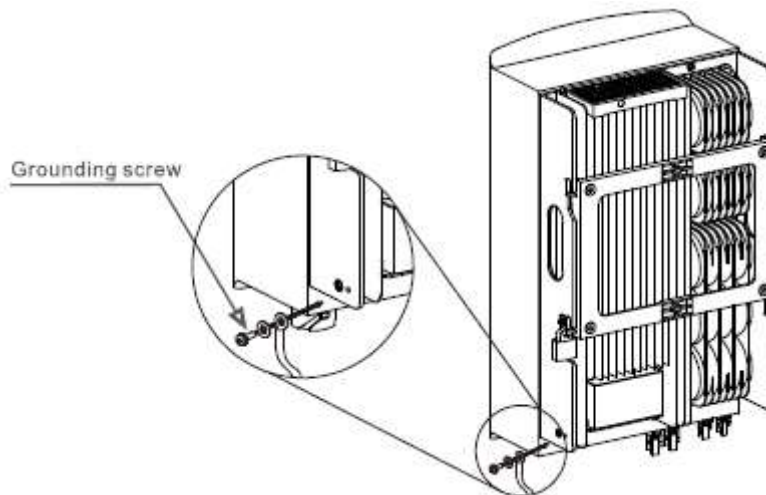


figure 7.9 Fixed cable (5~20kW inverter)

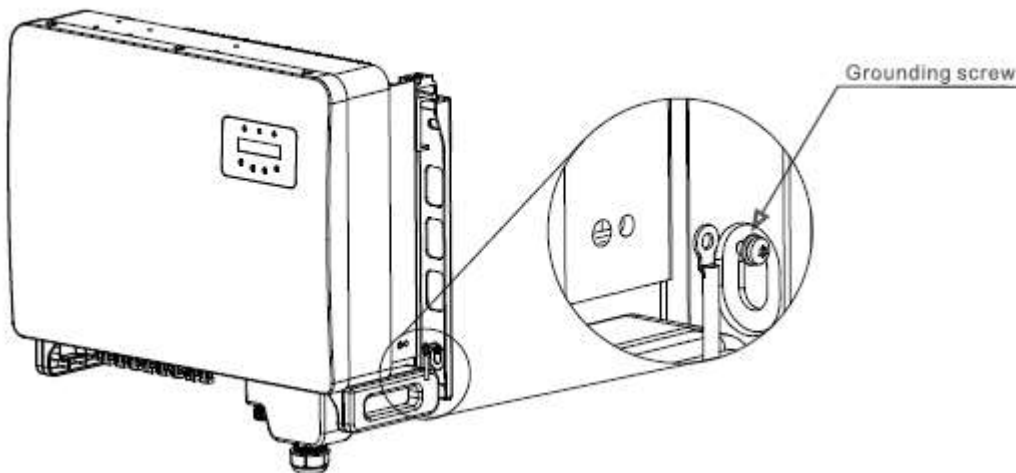




figure 7.10 Fixed cable(25~50kW inverter)

### 7.3.4 Connect PV Side of inverter



Before connecting inverter, please make sure the PV array open circuit voltage is within the limit of the inverter.



Before connection, please make sure the polarity of the output voltage of PV array matches the "DC+" and "DC-" symbols.

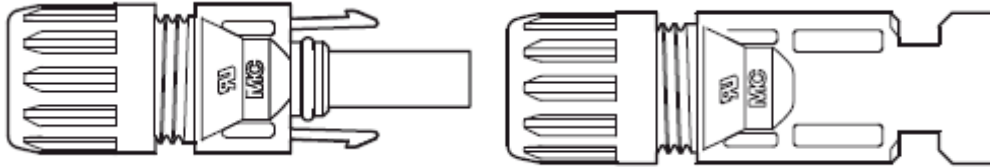


figure 7.11.1 DC+ Connector



figure 7.11.2 DC- Connector

Cable type	Cross section (mm <sup>2</sup> )
PV cable H1Z2Z2-K 1×4mm <sup>2</sup>	4.0 (12AWG)

#### 7.3.4.1 The steps to assemble the DC connectors are listed as follows:

- 1) Strip off the DC wire for about 7mm, disassemble the connector cap nut. (see Figure 7.12.1)
- 2) Insert the wire into the connector cap nut and contact pin. (see Figure 7.12.2)
- 3) Crimp the contact pin to the wire using a proper wire crimper. (see Figure 7.12.3)
- 4) Insert metal connector into top of connector, and tighten nut with torque 3—4 Nm (see figure 7.12.4).
- 5) Measure PV voltage of DC input with multimeter, verify DC input cable polar Before connecting inverter, please make sure the PV array open circuit (see figure 7.12.5), and ensure each string of PV voltage in range

of inverter operation. Connect DC connector with inverter until hearing a slight clicking sound indicates connection succeed. (see figure 7.12.6)

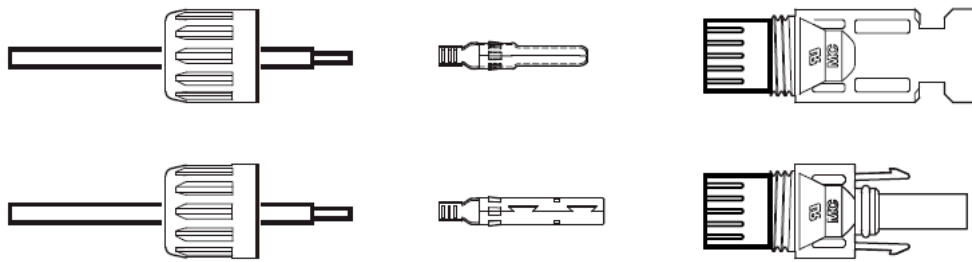


Figure 7.12.1 Disassemble the Connector Cap nut

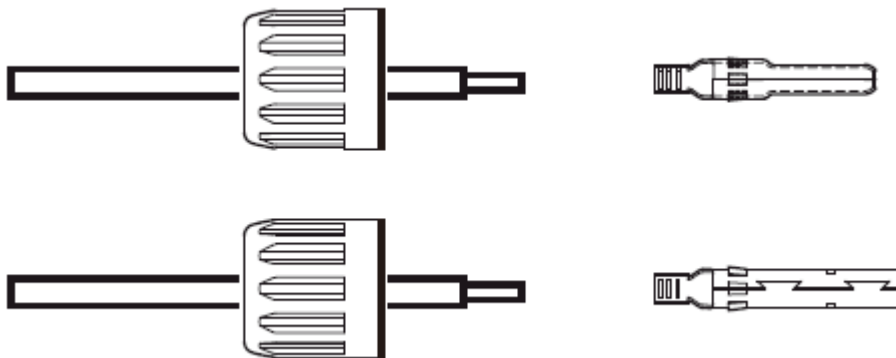


Figure 7.12.2 Insert the Wire into the Connector Cap nut and contact pin

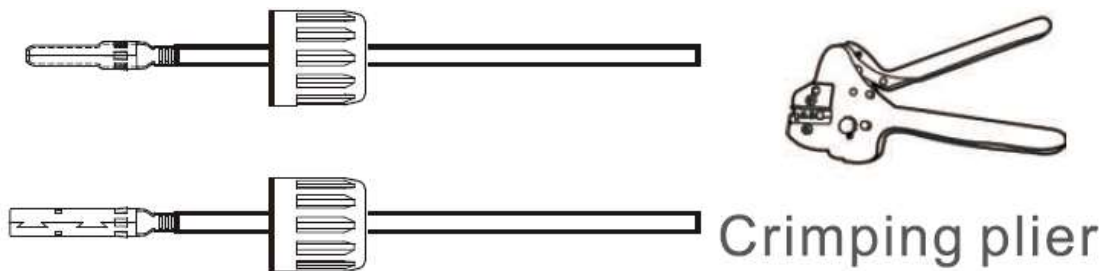


Figure 7.12.3 Crimp the contact pin to the wire

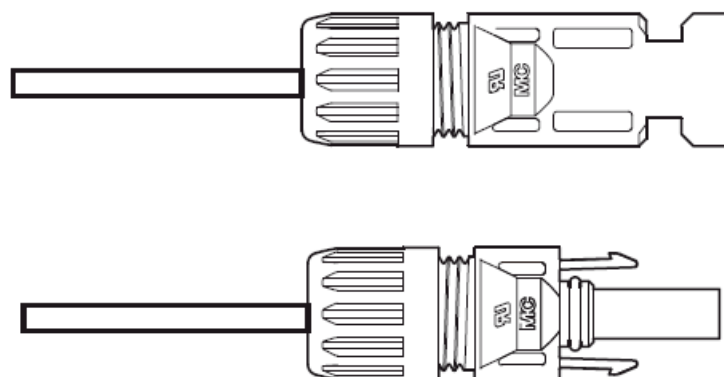


Figure 7.12.4 Connector with Cap nut Screwed on

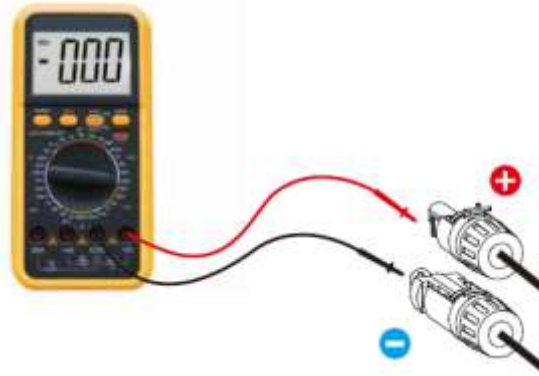


Figure 7.12.5 Multimeter measurement

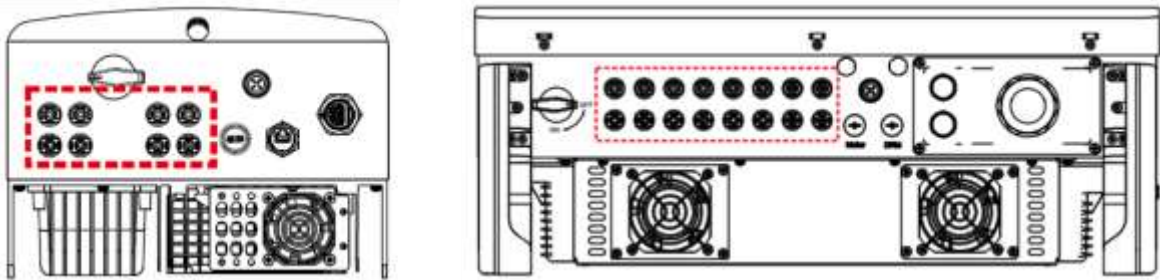


Figure 7.12.6 Connect the DC connectors to the Inverter

**⚠ CAUTION:**

If DC inputs are accidentally reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch as it will damage the inverter and even leads to a fire disaster.

The correct actions are:

- Use a clip—on ammeter to measure the DC string current.
- If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
- Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.

Please note that any damages due to wrong operations are not covered in the device warranty.

### 7.3.5 Connect Grid Side of inverter

Three-phase string inverter connected to the AC grid.

➤ **Connect grid side of inverter(3~13kW inverter)**

For the AC connection of 3~13kW inverter, 6mm<sup>2</sup> AC cable is required to be used. Please make sure the resistance of cable is lower than 1.50hm.

 **NOTE**

Internal of AC connector signs "L1","L2","L3", "N" and "PE" five connection ports (see Figure 7.13.1). Three phase lines shall be connected to the "L1", "L2" and "L3" terminals respectively, Earth wire shall be connected to "PE" and Neutral wires shall be connected to "N" terminal.

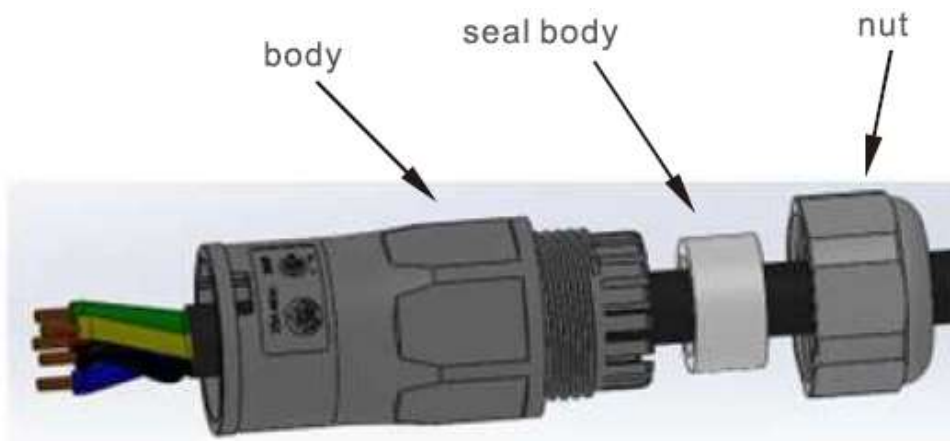


Figure 7.13.1 AC connector

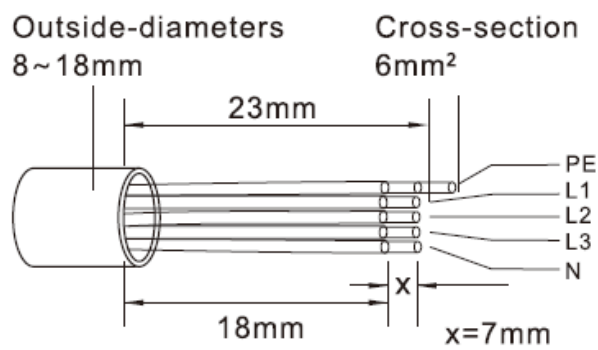
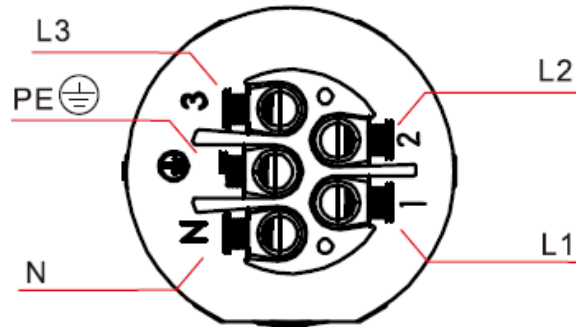


Figure 7.13.2 Stripped and bared wire



7.13.3 Internal structure of AC connector

The steps of AC grid terminal connector for installation are as follows:

1) Fix the wires into the correct position and the torque is 0.8N.m.

Please try to pull out the wire slightly to make sure that the wires are well connected.

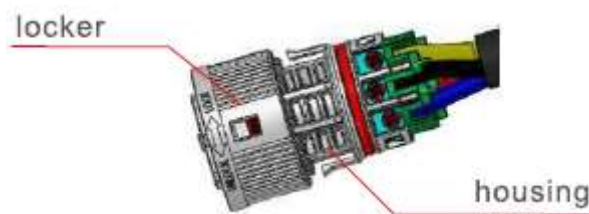


Figure 7.13.4 Connect Wires to the Terminal

2) Insert the seal and clamp finger into body, then tighten the nut and the torque is 2.5N.m.



Figure 7.13.5 Tighten up the Cap on the Terminal

3) Connect the AC grid connector to the inverter, until hearing a slight click sound that indicates the connection succeed.

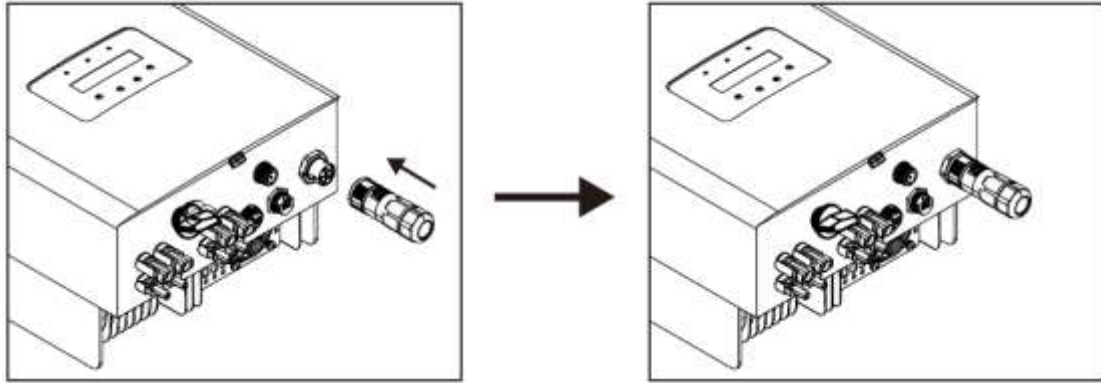


Figure 7.13.6 Connect AC connector to inverter

➤ **Connect grid side of inverter(15~20kW inverter)**

For the AC connection of 25~50kW inverter, 10~35mm<sup>2</sup> AC cable is required to be used. Please make sure the resistance of cable is lower than 1.50hm. If the wire is longer than 20m, preferred to 10~16mm<sup>2</sup> cable.

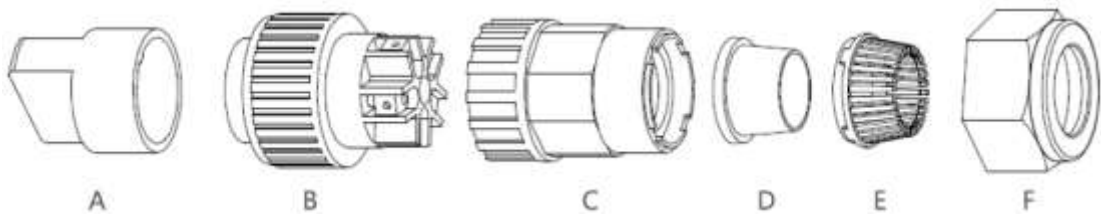


Figure 7.14.1 AC connector

	Number	Description	
Accessory	A	Plastic Fixture (Auxiliary installation)	
AC Connectors	B	Socket element	
	C	Adapter	
	D*	Seal realing	Seal Realing(thick)suit for 12-18mm cable
			Seal Realing(thin)suit for 16-21mm cable
	E	Fastening case	
F	Swivel nut		

\* The combination of AC connectors has two seal rings, please refer to different diameters of cable select corresponding seal ring.

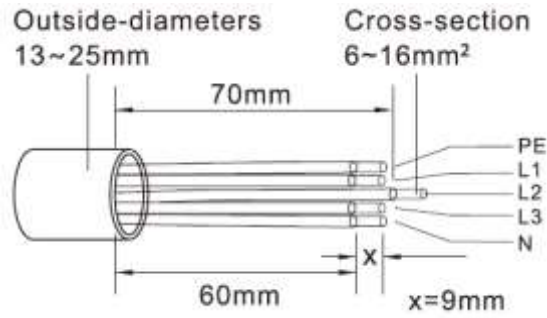


Figure 7.14.2 Stripped and bared wire



Figure 7.14.3 Internal structure of AC connector

The steps of AC gird terminal connector for install as follows:

- 1) Stripped the insulation sleeve of cable for 70mm, so that bared copper—cored connector reaches for 9mm. Cable through nut and sleeve of socket element, insert corresponding terminals and tighten with allen wrench (see figure 7.14.4). Torque is 1.8-2.0Nm.

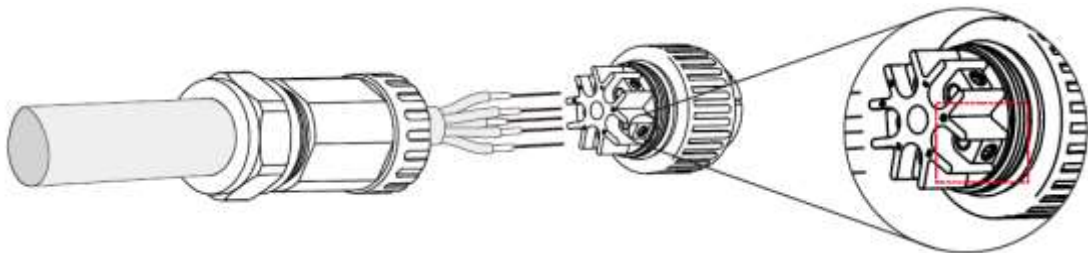


Figure 7.14.4 Connected cable

**NOTE**

Tighten cable with 3.0 mm allen wrench( focus in dotted box, see figure 7.14.4). Allen

screw is at easy to drop off, don't screw out completely.



- 2) Clip plastic fixture (Auxiliary tighten) in socket element , tighten adapter

in socket element, then tighten swivel nut with 3~4Nm torque (see figure 7.14.5).

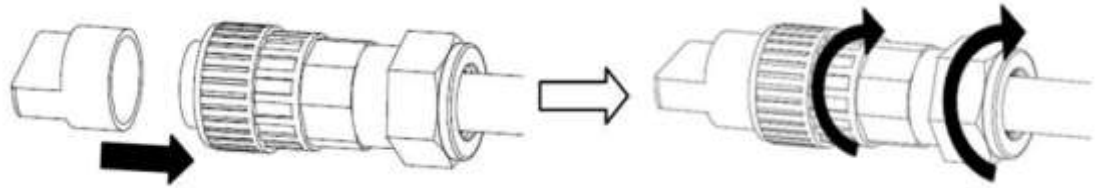


Figure 7.14.5 Assembly AC terminal

3) Connect AC connector with inverter, then tighten AC connector for clockwise (see figure 7.14.6), until hearing a slight clicking sound indicates connection succeed.

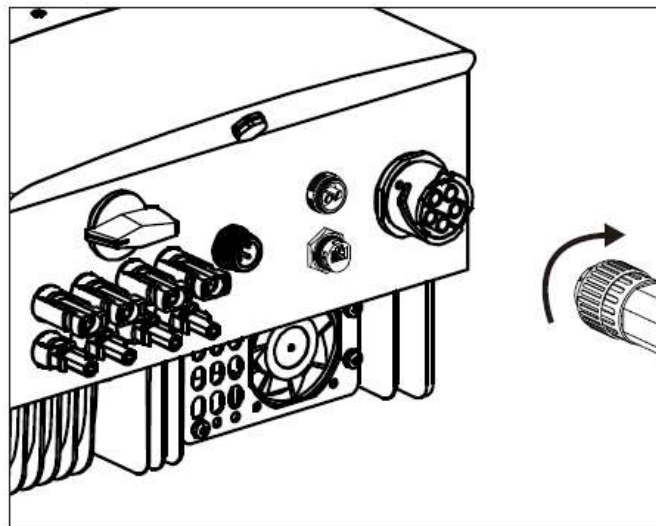


Figure 7.14.6 AC connector to inverter

➤ **Connect grid side of inverter(25~50kW inverter)**

For the AC connection of 25~50kW inverter, 10~35mm<sup>2</sup> AC cable is required to be used. Please make sure the resistance of cable is lower than 1.50hm.

Cable specification		Copper—cored cable
Traverse crosssectional area (mm <sup>2</sup> )	Rangge	10-35
	recommend	25
Cable outer diameter (mm)	Rangge	22-32
	recommend	27



**NOTE**

For reliable connection, recommend customer select corresponding Euro type connectors based on wiring specification to connect the terminal.

The steps to assemble the AC grid terminals are listed as follows:

- 1) Strip the end of AC cable insulating jacket about 80mm then strip the end of each wire. (as shown in figure 7.15.1)

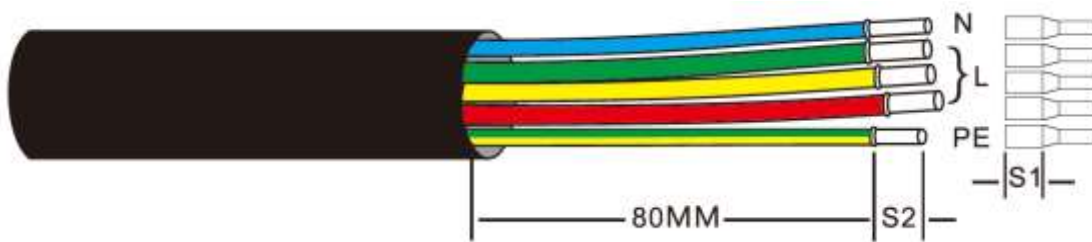


Figure 7.15.1 Strip AC cable

**NOTE**

S2 (insulation stripping length) should be as long as S1(AC terminal cable compression area).

- 2) Strip the insulation of the wire past the cable crimping area of the OT terminal, Then use a hydraulic crimp tool to crimp the terminal. The crimped portion of the terminal must be insulated with heat shrinkable tube or insulating tape.

- 3) Leave the AC breaker disconnected to ensure it does not close unexpectedly.

Remove the 4 screws on the inverter junction box and remove the junction box cover .

- 4) Insert the cable through the nut, sheath, and AC terminal cover. Connect the cable to the AC terminal block in turn, using a socket wrench. Tighten the screws on the terminal block. The torque is 3~4Nm (as shown in Figure 7.15.2).

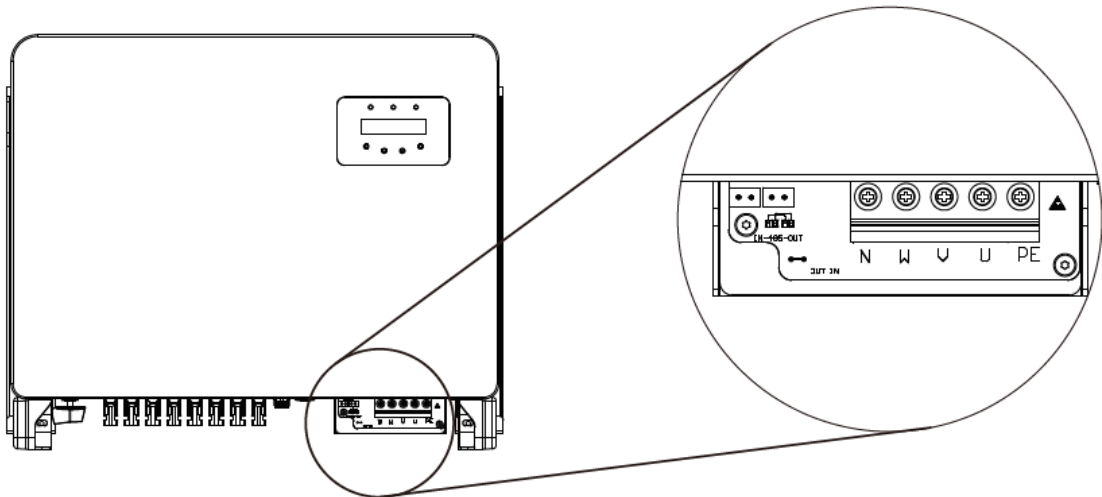


Figure 7.15.2 Wiring

### 7.3.6 Max. Over Current Protection Device (OCPD)

To protect the inverter's AC grid connection conductors, Solis recommends installing breakers that will protect against overcurrent. The following table defines OCPD ratings for the Solis Three phase inverters.

Inverter power (kW)	Rated voltage (V)	Rated output Current (A)	Current for protection device (A)
5	220/380,230/400	7.6/7.2	20
6	220/380,230/400	9.1/8.7	20
8	220/380,230/400	12.2/11.5	20
10	220/380,230/400	15.2/14.4	32
12	220/380,230/400	18.2/17.3	32
13	220/380,230/400	19.8/18.8	32
15	220/380,230/400	22.8/21.7	32
17	220/380,230/400	25.8/24.6	40
20	220/380,230/400	30.4/28.9	40
25	220/380,230/400	38.0/36.1	50
30	220/380,230/400	45.6/43.3	63
33	220/380,230/400	50.1/47.6	63
36	220/380,230/400	54.7/52	80

40	220/380,230/400	60.8/57.7	80
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### 7.3.7 Inverter Monitoring Connection

In Europe, The inverter is monitored by WiFi, please refer to Appendix A for details: WIFI Stick Datalogger Quick Installation Manual.

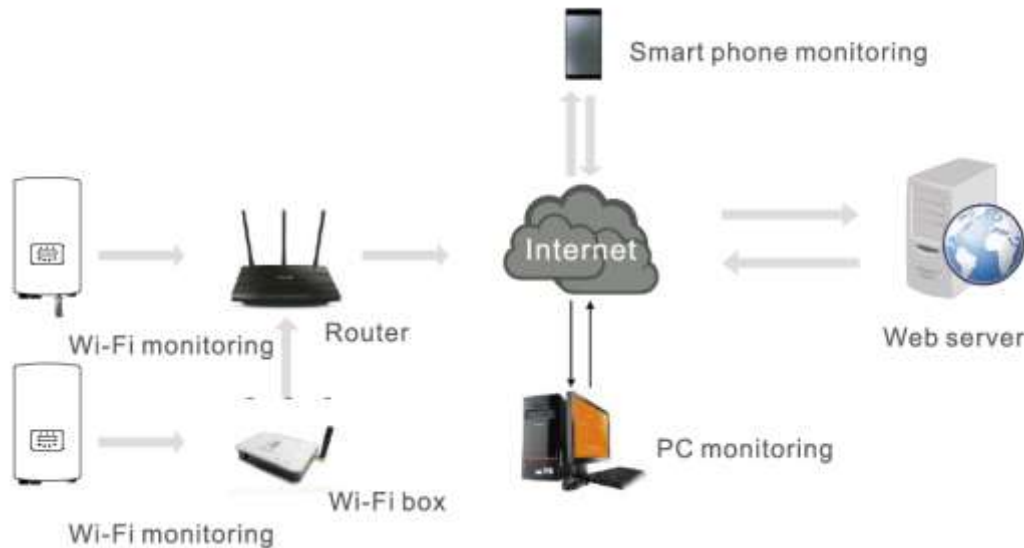


Figure 7.16 Wireless communication function

### 7.3.8 Meter Connection(optional)

The inverter can work with a three phase smart meter to achieve Export Power Management function and/or 24hour consumption monitoring function.

#### NOTE

To achieve Export Power Management function, the smart meter can be installed on either grid side or load side.

To achieve 24hour consumption monitoring function, the smart meter can only be installed on grid side.

Two types of meters are supported:

Direct Insert Type Meter — Max input current 80A(DTSD1352—Direct Insert Type).

External CT Type Meter — 150A/5A CTs are supplied(DTSD1352—External CT Type).

Customer can place the order for a suitable meter from Sales Reps.

Below are the connection diagrams of different meters connecting to different locations.

Detailed settings please refer to Appendix B: Three Phase Inverter Installation and Operation Manual.

➤ **Meter Connection(5~20kW inverter)**

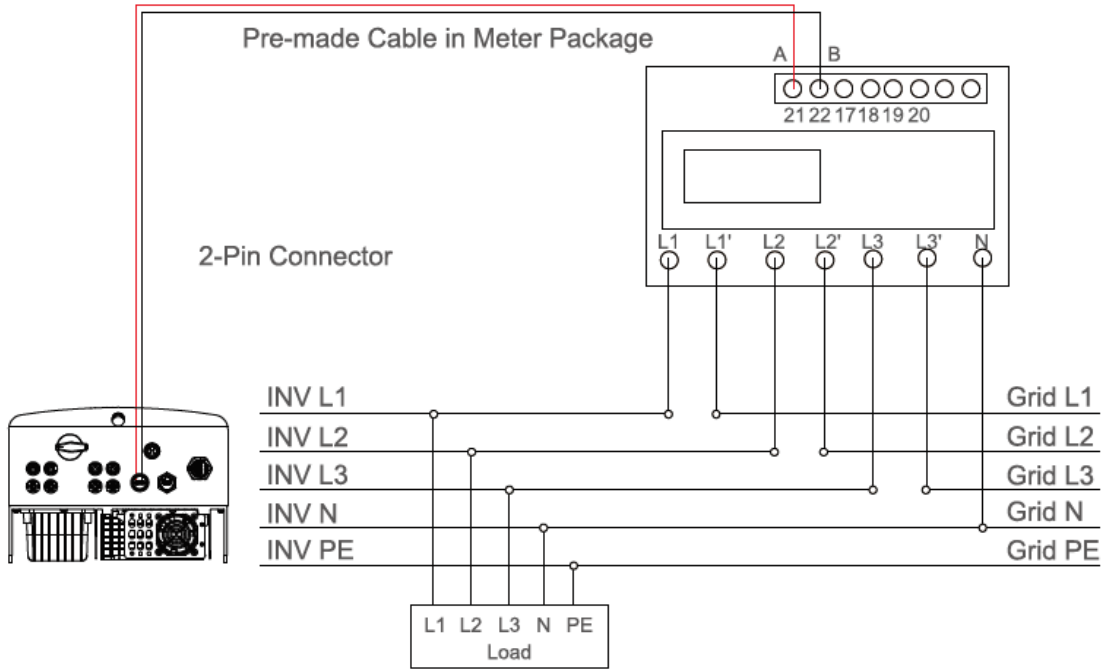


Figure 7.17.1 Direct Insert Type Meter — "Meter in Grid"

Pre-made Cable in Meter Package

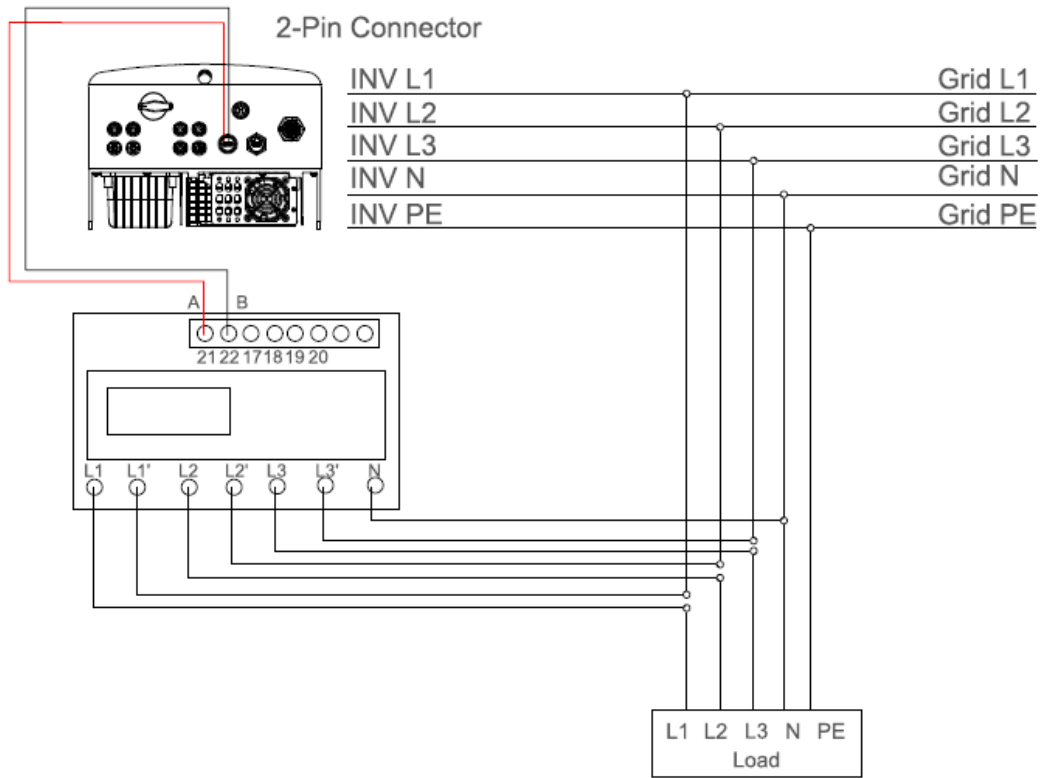


Figure 7.17.2 Direct Insert Type Meter — "Meter in Load"

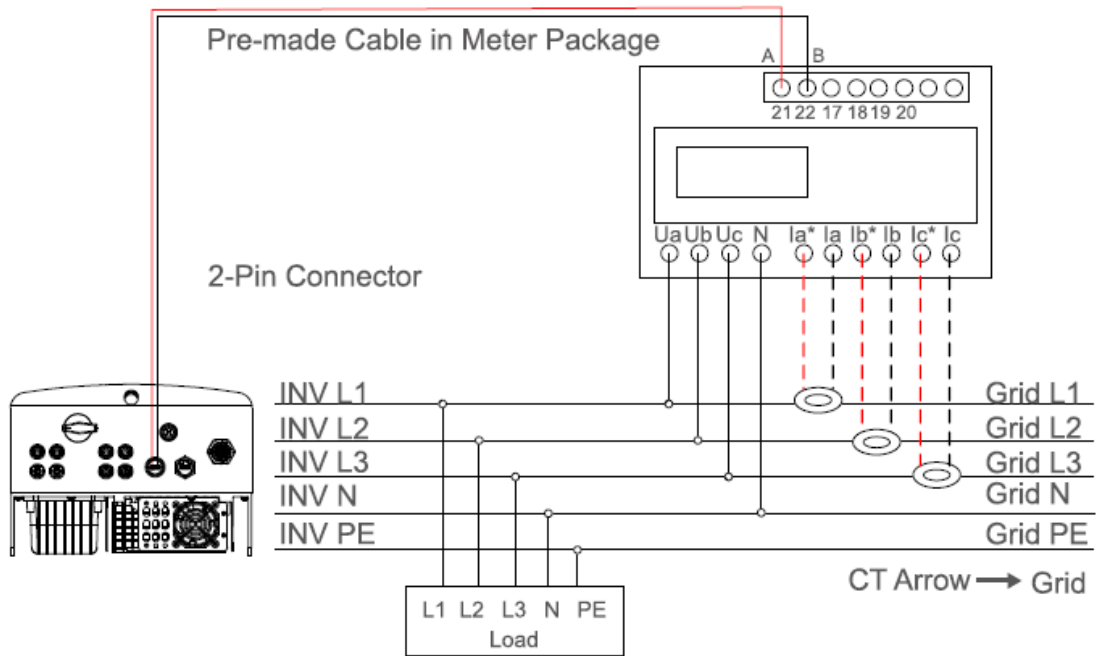


Figure 7.17.3 External CT Type Meter — "Meter in Grid"

Pre-made Cable in Meter Package

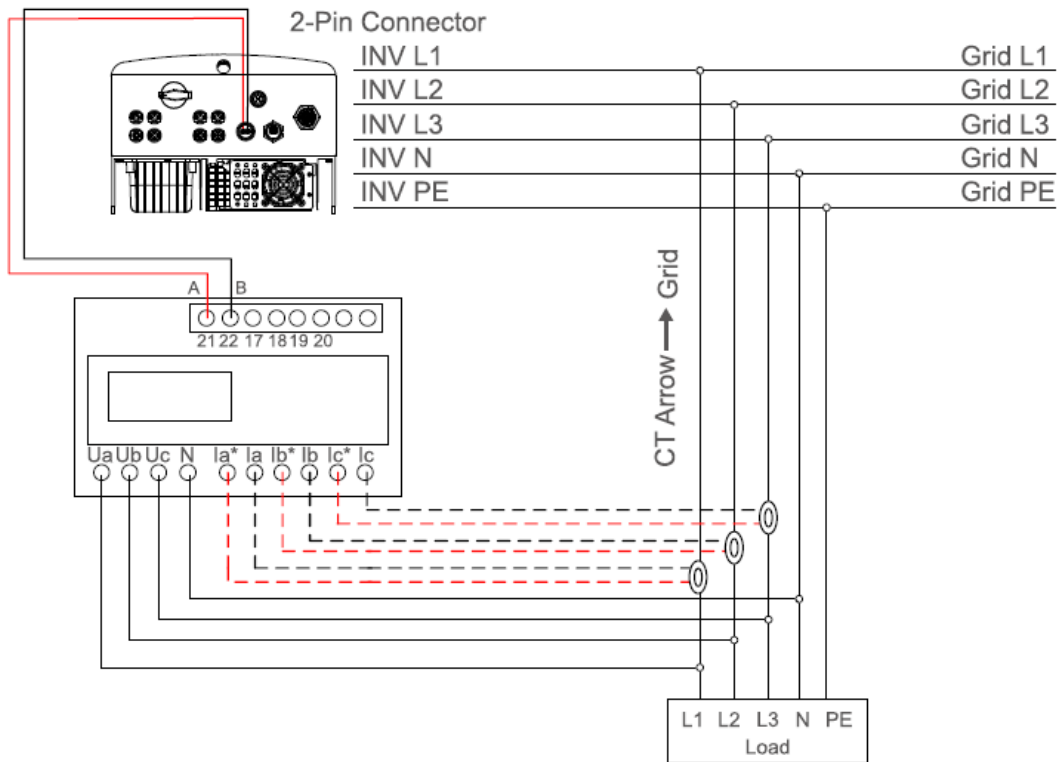


Figure 7.17.4 External CT Type Meter — "Meter in Load"

➤ **Meter Connection(25~50kW inverter)**

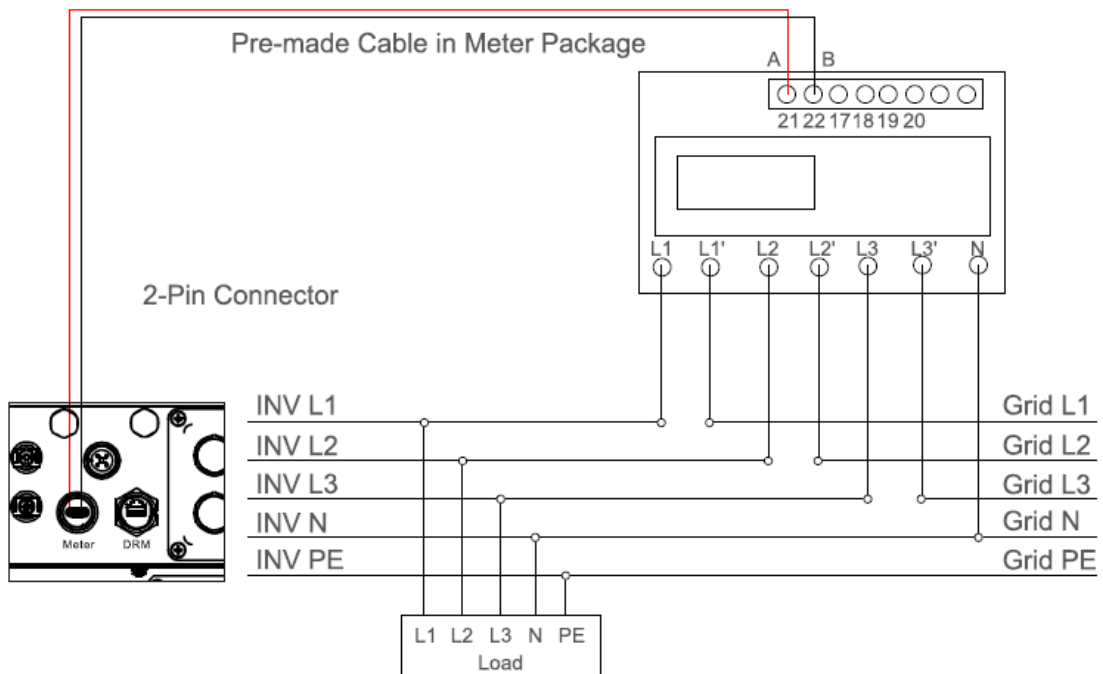


Figure 7.18.1 Direct Insert Type Meter — "Meter in Grid"

Pre-made Cable in Meter Package

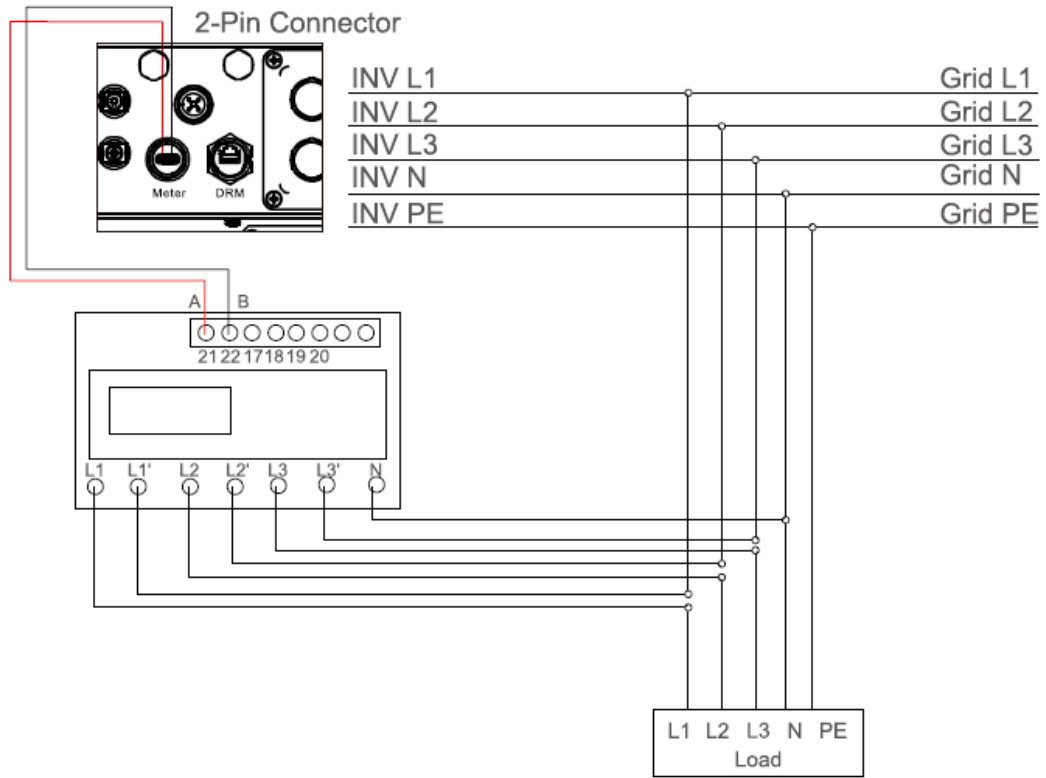


Figure 7.18.2 Direct Insert Type Meter — "Meter in Load"

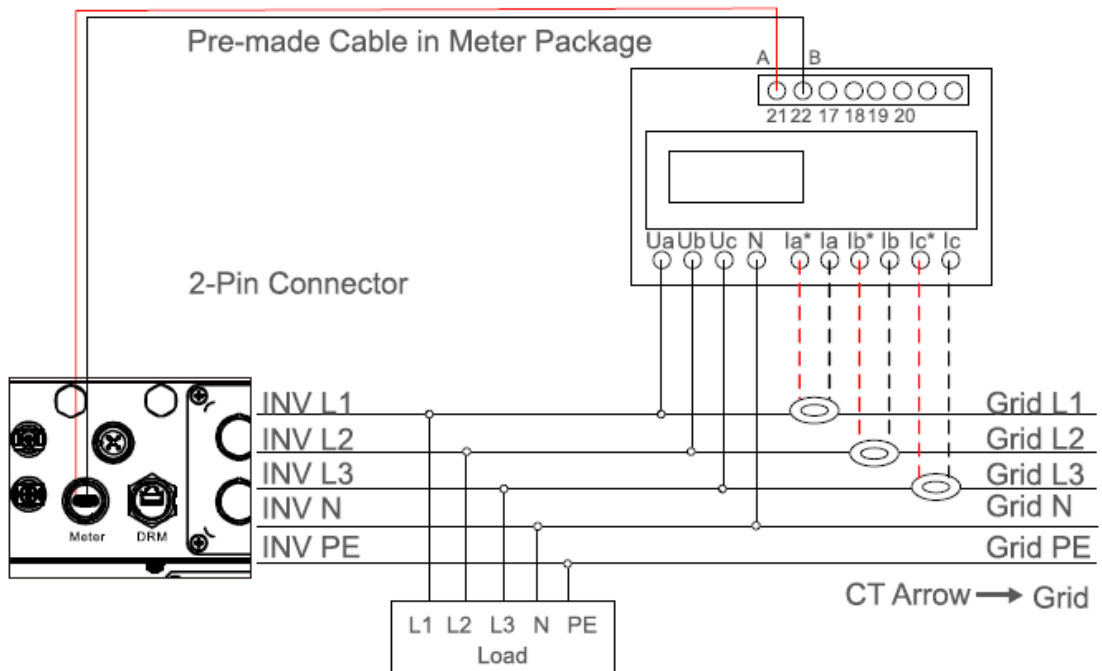


Figure 7.18.3 External CT Type Meter — "Meter in Grid"

Pre-made Cable in Meter Package

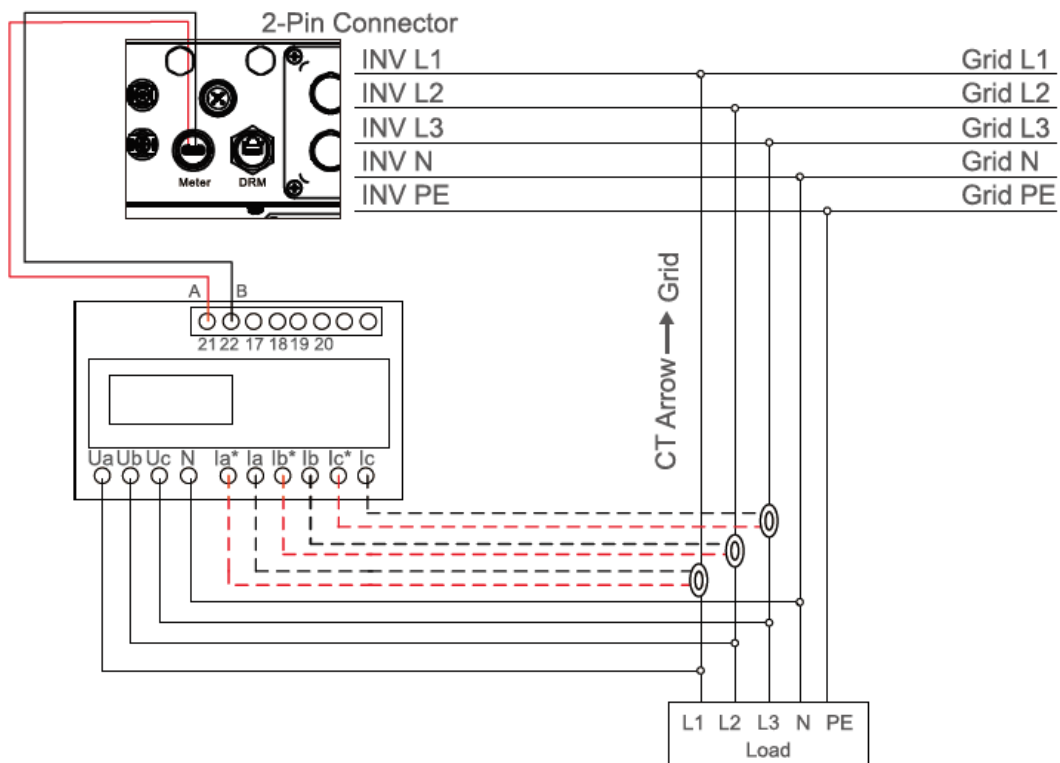


Figure 7.18.4 External CT Type Meter — "Meter in Load"

## 8 Inverter Startup & Stop

### 8.1 Inverter Startup

To start up the Inverter, it is important that the following steps are strictly followed:

- 1) Switch the grid supply main Switch (AC) ON first.
- 2) Switch the DC switch ON. If the voltage of PV arrays are higher than start up voltage, the inverter will initialize. The red LED power will light.
- 3) When both the DC and the AC sides supply to the inverter, it will be ready to generate power. Initially, the inverter will check both its internal parameters and the parameters of the AC grid, to ensure that they are within the acceptable limits. At the same time, the green LED will flash and the LCD displays the information of INITIALIZING.
- 4) After 30—300 seconds (depending on local requirement), the inverter will



start to generate power. The green LED will be on continually and the LCD displays GENERATING.

 **WARNING**

Do not touch the surface when the inverter is operating. It may be hot and cause burns.

## 8.2 Inverter Stop

To stop the inverter, it is mandatory that the steps below are followed in the exact order outlined.

- 1) Select “Grid Off” in the Advanced Setting of Inverter LCD.
- 2) Turn off the AC Switch between Solis inverter and Grid.
- 3) Wait approximately 30 seconds (during this time, the AC side capacitors are dissipating energy). If the inverter has DC voltage above the start—up threshold, the red POWER LED will be lit. Switch the DC switch OFF.
- 4) Confirm all LED’s switch OFF (~one (1) minute).

 **CAUTION**

Although the inverter DC disconnect switch is in the OFF position and all the LED’s are OFF, operators must wait five (5) minutes after the DC power source has been disconnected before opening the inverter cabinet. DC side capacitors can take up to five (5) minutes to dissipate all stored energy.

## 9 Inspection and Maintenance

During the warranty period, the PV modules and solar carport must be inspected and maintained regularly. If the fasteners of solar carport are found to be loose, they must be tightened in time. At the same time, if the PV modules are damaged, the supplier must be notified within two weeks.

## **9.1 Cleaning**

Dust buildup on the glass surface of a PV module shall reduce its power output and can cause hot spots in areas such as industrial wastewater and bird droppings. The degree of impact depends on the transparency of the waste, a small amount of dust on the glass can affect the intensity and uniformity of absorbed sunlight, but it is not dangerous, and the power is usually not significantly reduced.

When the PV modules are in work condition, there should be no environmental factors that cast shadows on the PV modules and block some or all of the PV modules, such as: other PV modules, mounting structure system, birds staying, a lot of dust, mud or plants, etc., which will cause the output power is significantly reduced. It is recommended that the surface of the PV modules should not be blocked at any time.

As for the frequency of cleaning, it depends on how quickly the dirt accumulates. Under normal circumstances, rain will clean the surface of the PV modules, which can reduce the frequency of cleaning. It is recommended to use a damp sponge with water or a soft cloth to wipe the glass surface. It is strictly forbidden to use detergents containing alkalis and acids to clean the PV modules. Under any circumstances the PV modules cannot be cleaned with rough-surfaced materials.

In order to reduce potential electric shock or burns, it is recommended to clean PV modules in the early morning or evening when the sunlight is not strong and the PV module temperature is low, especially for areas with high temperature.

Do not attempt to clean PV modules with features such as broken glass or exposed wires, as there is a risk of electric shock.

## **9.2 PV module Appearance Inspection**

1. Check whether the glass of the PV module is broken or not.

2. Corrosion at the welding of the battery busbar: During installation or during transportation, the surface encapsulation material is damaged, which causes moisture to enter the PV modules.

3. Check whether PV modules have the signs of aging, including the possible rodent damage, weathering, and whether all connectors are tight and corroded. Check whether the grounding of PV modules is in good condition.

5. Check whether there is a sharp object touching the surface of the PV modules.

6. Check whether the fixing screws of the fixed clamps are loose or damaged, and apply for adjustment or repairing in time.

### **9.3 Inverter Maintenance**

3-phase string inverter does not require regular maintenance by the user. However, cleaning the dust on the radiator can help the inverter to dissipate heat and increase the service life of the inverter. It can be cleaned with a soft brush.



Do not touch the inverter when the equipment is running as the temperature of some parts of the casing is too high, which may cause burns. After shutdown for a period and surface temperature of inverter reduces, it is just allowed to maintain and clean.

If the LCD and LED status indicators are too dirty to read, please clean it with a damp cloth.



#### **NOTE**

Do not use any solvents, abrasives or corrosive materials for cleaning.

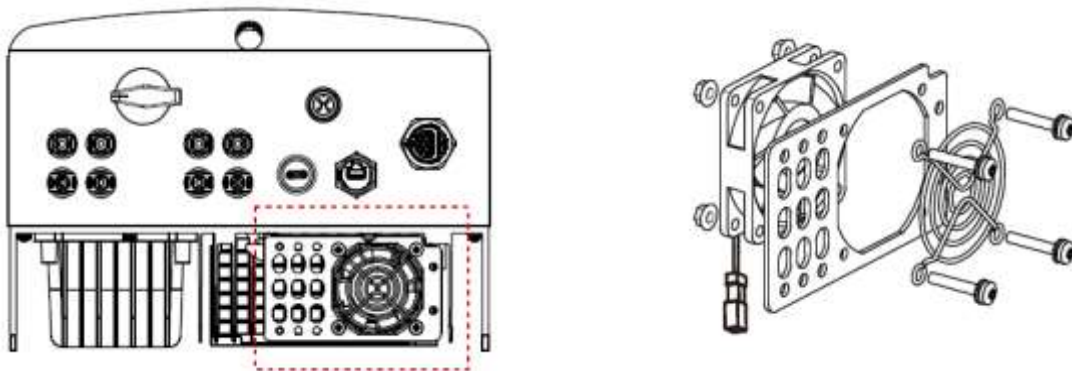
#### **9.3.1 Fans Maintenance**

If the fans are not in proper work condition, the inverters will not be able to cool effectively.

It may affect the efficient operation of the inverters.

Therefore, it is necessary to clean or replace the damaged fans as follows:

- 1) Disconnect the AC power supply.
- 2) Turn the DC switch to the "OFF" mode.
- 3) Wait at least 10 minutes.
- 4) Disconnect all electrical connections.
- 5) Place the inverter on the platform.
- 6) Remove the 4 screws of the fan board, then slowly pull out the fan assembly.
- 7) Carefully disconnect the fan connector and take out the fan.
- 8) Clean or replace the fan and install the fan on the rack.
- 9) Connect the fan and reinstall the fan assembly, then restart the inverter.



□ Figure 9.1 5~20kW Inverter Fans Replacement

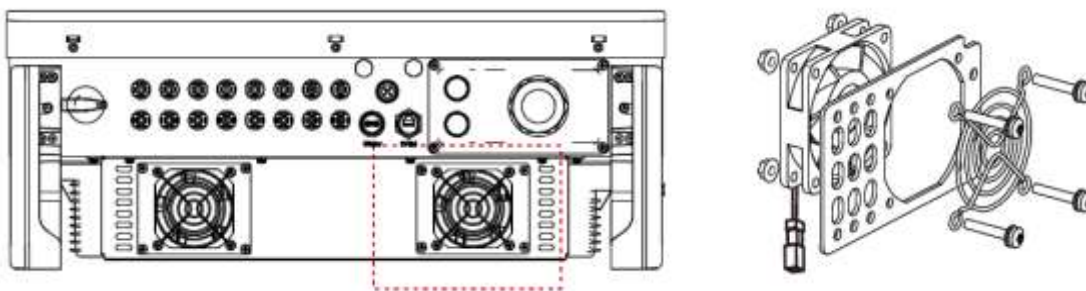


Figure 9.2 25~50kW Inverter Fans Replacement

## 9.4 Inspection of PV Module Connector and Cables

It is suggested to do a preventive inspection once per 6 months in the

following:

1. Check the tightness of the PV module connector and the cable connection.
2. Check whether the sealant at the junction box is cracked with gaps.



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