PV Module Installation Instructions

Lianyungang Shenzhou New Energy Co.,Ltd.

1 Introduction

Thanks for purchasing PV modules of Lianyungang Shenzhou New energy Co., Ltd.(Shenzhou) This manual refers to PV modules manufactured and sold by Shenzhou.

This manual contains the installation and safe handling information of Shenzhou's PV module (module).

All instructions shall be carefully read before installation. Please contact marketing department for further information if have any question.

The installation staff shall be familiar with the mechanical and electrical requirement of PV system and shall comply with safety precautions listed in this manual and local law regulations when installing the modules.

The company does not take the responsibility of the loss, damage, or expense arising which caused by any violation of this manual.

This manual shall be properly kept for future reference such as maintenance, re-sale and disposal of the module at the end of its useful life.

The company reserves the right of final interpretation of this installation manual.

2 Product Identification

1) Each module has a label on the back containing following information:
   Product type, weight, size, fuse current, the system max voltage, rated power measured under standard test conditions, rated current, rated voltage, open circuit voltage, short circuit current.
2) Bar code (serial number): each module is registered with a unique serial number. It is permanently fixed inside the module, which can be seen from the front of module.

Explanation： Under standard test conditions (1000W / m² irradiance, AM=1.5, 25 ° C (77 ° F) ambient temperature), the electrical performance parameters of modules, such as Isc, Voc, and Pmax, will have ± 10% deviation compared to nominal value.

3 Tools & Materials for Installation

1) Screwdriver, Wrench
2) Mounting rack, stainless steel screws, nuts, washers, clamps and other accessories

4 Warnings

1) It requires specialized skills and knowledge for installation of solar photovoltaic systems and performed by qualified licensed professional installation staff.

2) PV modules generate DC electrical energy when exposed to sunlight or other light sources. Active parts of module such as terminals can result in burns, sparks, and lethal shock.
3) Apply modules to such as ground, roofs etc. outdoor environment. Appropriate rack structure shall be designed by system designer or installation staff.
4) Do not disconnect the cables of modules when modules are on operation.
5) Do not disassemble modules or move nameplate or any adhesion parts of modules.
6) Do not place the modules where it is easy to produce or gather combustible gases.
7) Artificially concentrated sunlight shall not be directed on the module.
8) Any dropping or covering on modules is not allowed. Do not tread, stand or walk on modules.

9) Do not pull or drag the modules by cables or connectors.
10) Keep children away from modules during transportation and installation,
11) Do not touch live terminals with bare hands. Use insulated tools for electrical connections.

12) Do not wear metal rings, bracelet, earrings, nose rings, lip rings or other metal accessories during transportation and installation,.
13) Do not destroy the structure of the module such as drill on the glass surface and frame which will void its warranty.
14) Do not destroy the modules edge seal which will void its warranty.
15) Any shading on the cells by fixture will downgrade the modules performance which will void its warranty.
16) Make sure the connection between the rack and PV module is firmly and without loosen.

5 System design

Please use the the equipments, connectors, wires and rack which match with solar power system. In a particular system, be sure to apply the same type of modules. Please refer to the short-circuit current (Isc) and open circuit voltage (Voc) showing on modules' label as proper value to install and design when determining settling parameters such as rated voltage, the wire capacity, fuse, the controller capacity and module output power of relevant parts of PV system.

It need to take 1.25 times of Isc, Voc when design and installation modules.

Make sure the array of modules should be installed within the Maximum permitted system voltage. And it need taken into the influence of environment temperature.

5.1 Appropriate install environment selection

To ensure the system output power reach to maximum value, make sure there is no shading on the modules when choose the installation location at any circumstance.

5.2 Appropriate inverter selection

It need take the output power, open-circuit voltage, short-circuit current of PV modules array into consideration when choose inverter type. And the minimum voltage of the module array should be higher than the threshold voltage of inverters to guarantee the inverters proper functioning.

Below table 1 is the example of choosing inverters: the internal structure of inverters is showing in the following Figure 1, this inverter can be accessed into two module arrays.

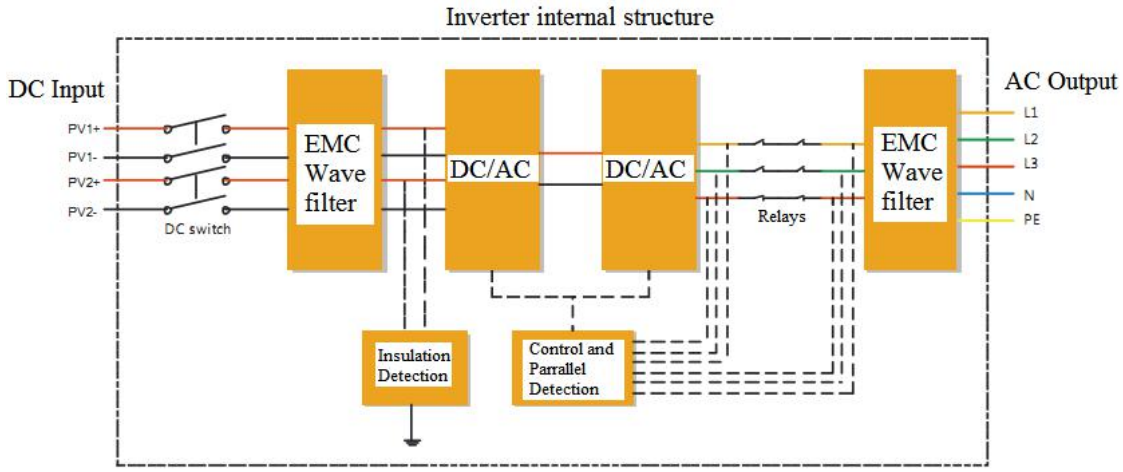


Figure 1 Inverter internal structure

Table 1 Example of choosing inverters

Module performance parameters		Reference in choosing inverters		Notes	Requirements in inverters parameters	
Module power	260W	Array output power	260*21= 5460W		Maximum output power	≥5460 W
Open-circuit voltage	37.6V	Maximum system voltage	21*45.9= 963.9V	45.9V is calculated based on T=-40 ℃ , voltage temperature coefficient is -0.34%/K	Maximum input voltage	1000V
Short-circuit current	8.97A	System current of array	10.76A	Maxim irradiance 1200W/m^2	MPPT short-circuit current	≥15A
Maximum quantity in Series connection of array	21 Pcs				Starting voltage	<Array input voltage

The above suggestion about the choice of inverters is just for reference. The specific choice of inverters should contact with professional system design company.

5.3 Installation Location Selection

1) In most applications, modules should be installed in a location where they will receive maximum sunlight throughout the year should guarantee no shading
2) It is suggest that the modules should facing south in northern hemisphere, and modules should facing north in southern hemisphere.
3) The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (as shows in Figure 2). The PV module generates maximum output power when it faces the sun vertical. If you want the specific information of best install tilt angle, please consult the local authoritative solar system construction company.

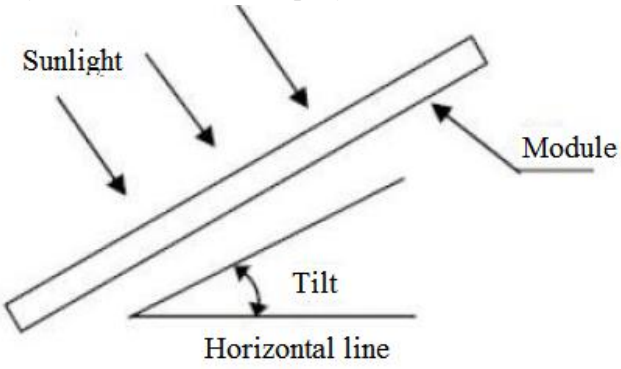


Figure 2 PV module tilt angle

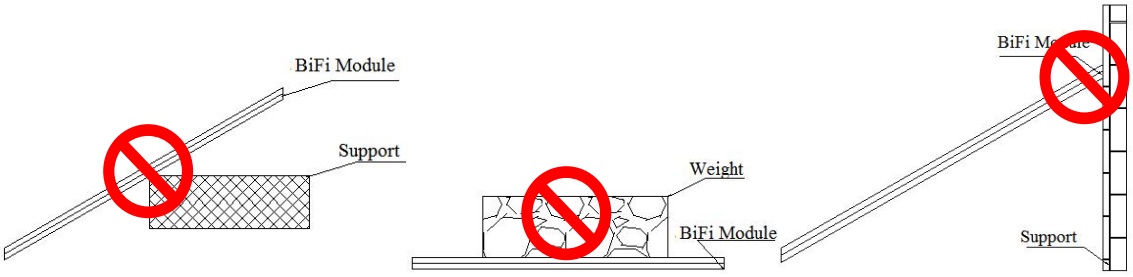
5.4 Appropriate mounting rack selection

The load calculation should be charged by system designers and installers to make sure all modules could bear predetermined load conditions. The choosing rack should pass all the inspection and test by third party test institution which possessing static mechanics analysis ability.

6 Modules Installation

6.1 Modules unpacking

1) Do not unpack modules in rainy weather.
2) The modules shall be placed horizontally after unpacking. Do not incline, stack or .lean modules.



No inclining No stacking No Leaning

3) Modules should not be piled up together directly without any protection. In order to prevent the frame and glass from scratch, it need to apply specialized plastic or paper angle to separate the modules as showing in following Figure 3. The quantities of one pallet modules should not exceed 20.

Figure 3 Modules stack illustration

4) Unpacking the package should refer to the following instructions as Figure 4:

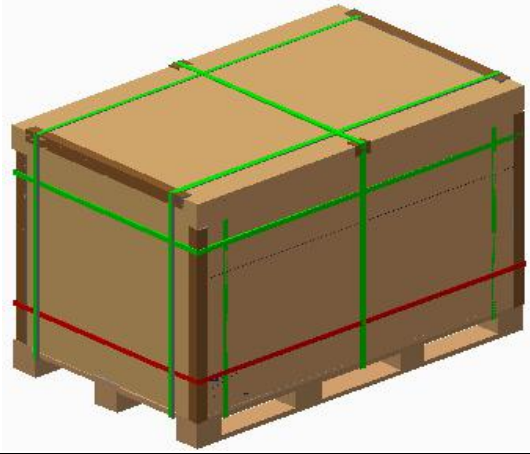
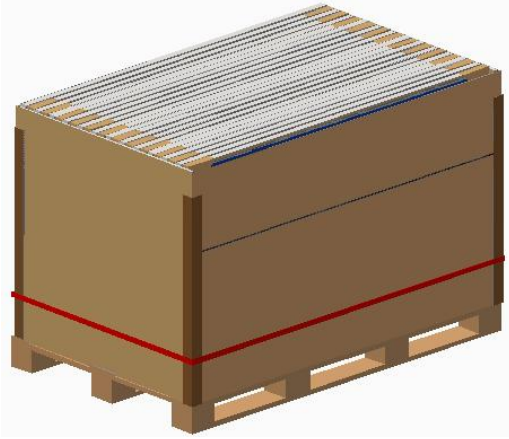
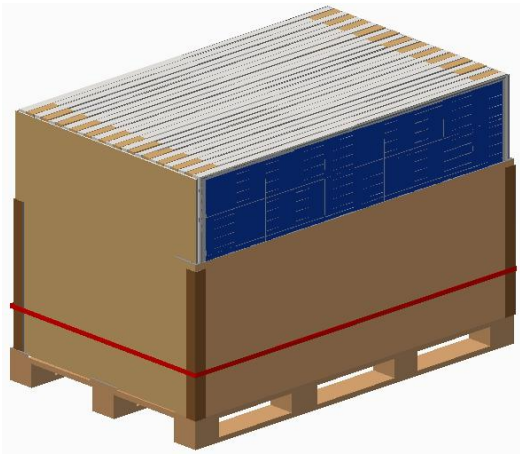
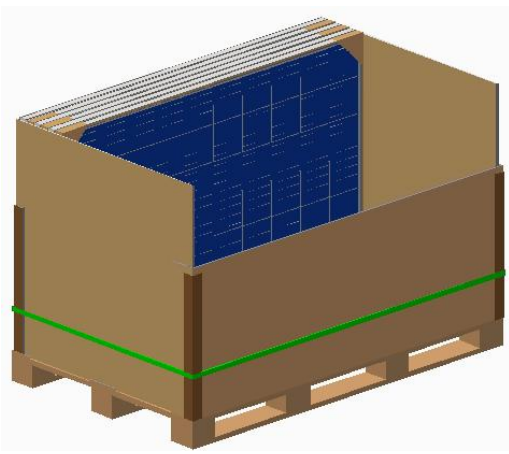
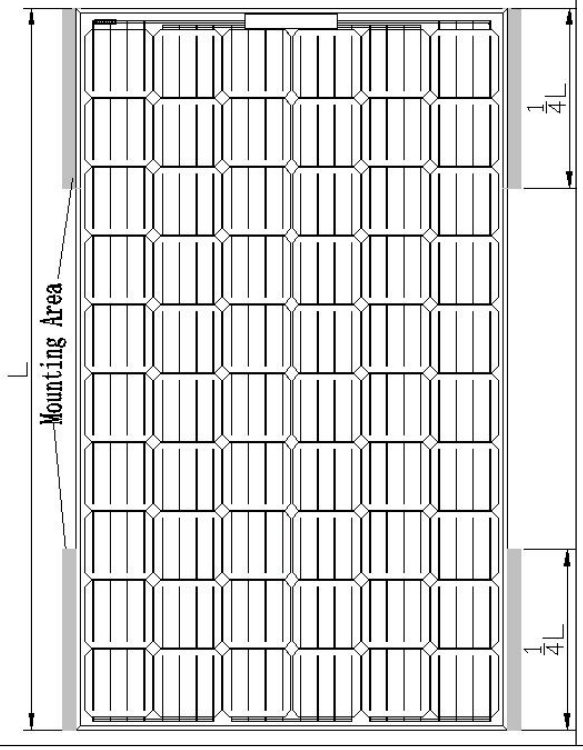
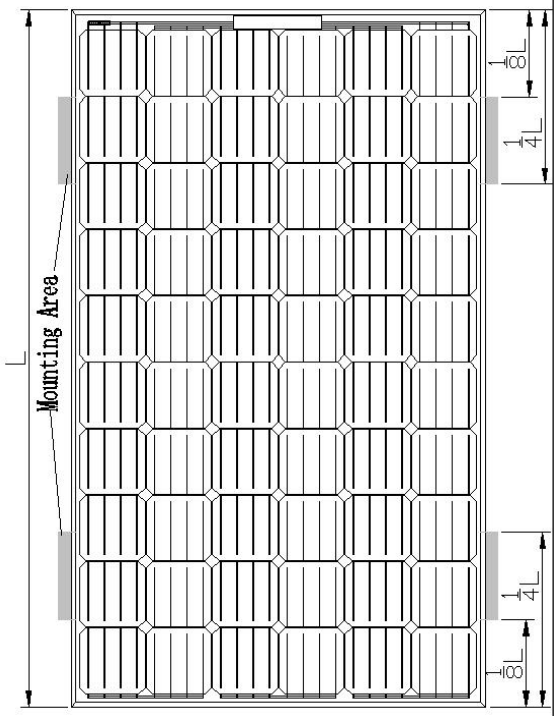
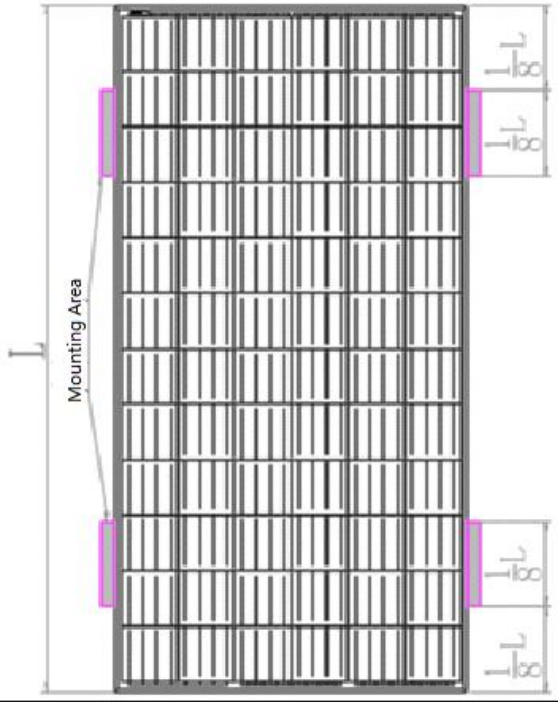
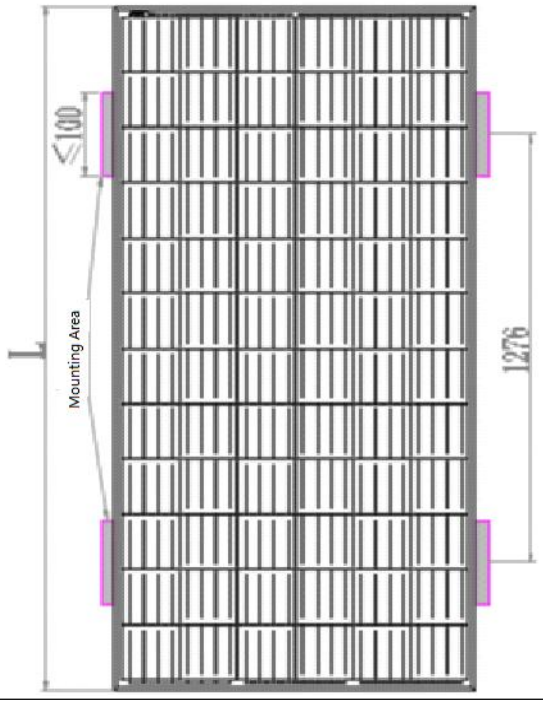
Export packing boxes unpacking process:	
	
1. Dismantle packing belt of outer box(except red belt)	2. Dismantle the cover
	
3. Dismantle the protector paper.	4. Dismantle the module

Figure 4 Unpacking instruction

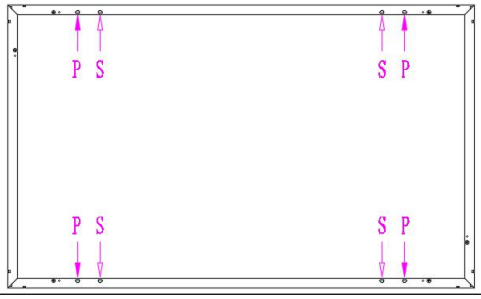
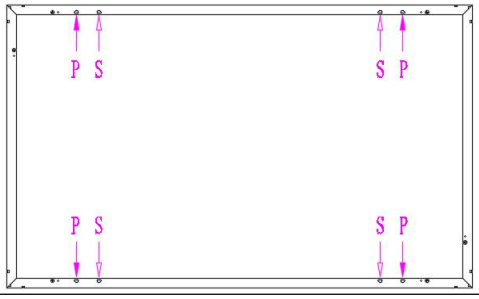
6.2 Modules installing Method

It is suggest using the following two installation methods and the materials could be decided by local requirement.

6.2.1 Clamping Method:

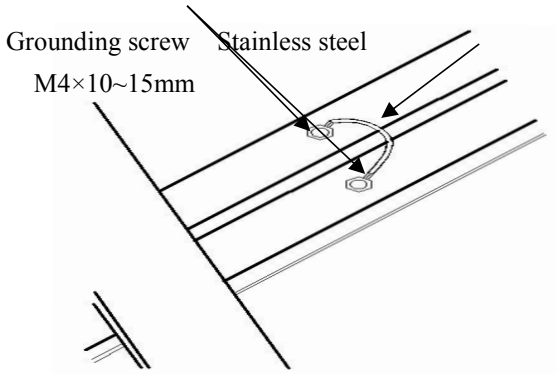
Load≤2400Pa(Using 4 clamps)	Load≤5400Pa(Using 4 clamps)
	
Notes: L is the length of PV module, L ≤1640mm. Length of clamp≥150mm.	
Load≤2400Pa(Using 4 clamps)	Load≤5400Pa(Using 4 clamps)
	
Notes: L is the length of PV module, 1640mm≤L≤1956mm. Length of clamp≥150mm.	

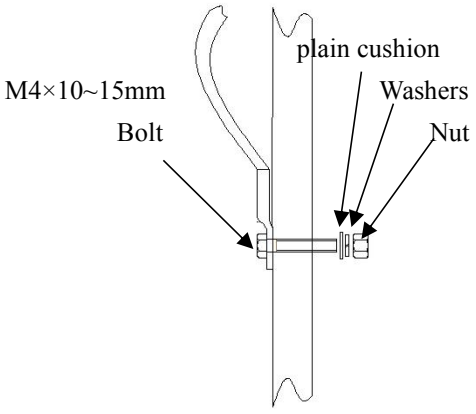
6.2.2 Installed through mounting holes, match with M8×20mm nuts and bolts.

L≤1640mm		1640mm≤L≤1956mm	
Load≤2400Pa	Load≤5400Pa	Load≤2400Pa	Load≤5400Pa
Using four mounting holes, position S or P is optional		Using four mounting holes, position S or P optional	Using four mounting holes, position S.
			

7 Electrical Connections

1) Please read the electrical wiring drawings carefully before connecting. For the IEC standard module, the maximum system voltage is 1000V DC. And the UL standard module, the maximum system voltage is 600V DC.
2) Connection of modules and junction box: the modules series and junction boxes shall be connected by DC cable. Cross-sectional area and connector capacity of the cable shall meet the maximum system short-circuit current (it is recommended 4mm2 for the cable cross-sectional area of an individual module. The diameter of cable is 4mm^2, and the application temperature range is -40~90℃. Connector rated current greater than 15A), otherwise the cable and connector would be overheating because of strong circuit. Please note that the maximum temperature of cables is 90 ℃ , and the maximum temperature of connector is 125℃.
3) The modules and support could be grounded to Earth by grounding holes, to enhance the insulation effect. Detailed could find in following Figure 5.





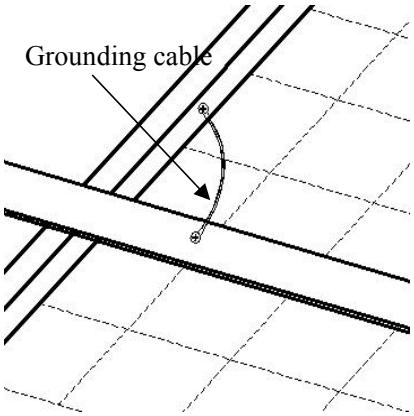


Figure 5 Illustration of grounding

4) Electrical connection should conform with local electrical laws regulations.
5) Modules are equipped with bypass diodes, improper installation may damage diodes, cables or junction box.
6) Please wrap the connectors after taking out the modules without immediate installation to prevent damage caused by wind or rain. Use of lubricant on connectors is prohibited due to it will make the connector failure
7) Do not remove the waterproof rubber rings out of the junction box or connectors.
8) Use of diesel oil for heating is strictly prohibited at installation site. The gas produced by combustion of diesel and other petroleum products may cause the wiring boxes get cracking.

8 Maintenance

8.1 Check all electrical connections to ensure that there is no open circuit and well connected.

1) Check the open circuit voltage of each module:
2) Covered the modules completely by non-transparent material.
3) Disconnect the wire terminals
4) Remove the non-transparent material off the modules; check and measure the terminal open circuit voltage.
5) If the measured voltage is reduced by 1/4, it supposed to be bypass diode damaged. Please test the bypass diode performance.

8.2. It's recommend that adopt the following maintenance to ensure the modules maintain the best performance:

1) If necessary, Please clean the glass surface of modules by soft sponge or wiping cloth with water. A mild without abrasive cleaning agent can be used to remove stubborn dirt.
2) Mechanical and electrical checks are required every six months to ensure the modules' connectors clean and reliable connected.
3) It need consult qualified person to check the modules if have any doubt on the modules.