PV Module Installation Manual

Applicable Module Type	Certification Status	Module Structure
ZTT-NE66HD-XXX	double glass	IEC、TÜV SÜD
ZTT-NE48HD-XXX	double glass	IEC、TÜV SÜD
ZTT-ND78HD-XXX	double glass	IEC、TÜV SÜD
ZTT-ND72HD-XXX	double glass	IEC、TÜV SÜD
ZTT-ND60HD-XXX	double glass	IEC、TÜV SÜD
ZTT-ND54HD-XXX	double glass	IEC、TÜV SÜD

Safety Note

- This manual elaborates on installation and safety use information for PV power generating modules (hereinafter referred to as module) of Jiangsu Jiangdong solar Technology Co., Ltd. (here in after referred to as JDGN). Please abide by all safety precautions in this guide and local regulations.
- Installation of modules requires professional skills and knowledge and is to be carried out by qualified personnel. Please read this manual carefully before installing and using this module. Installation personnel shall get familiar with mechanical and electrical requirements of this system. Please keep this manual properly as reference for future maintenance or upkeep or for sales and treatment of modules.
- If you have any doubts, please contact JDGN quality and customer service department for further interpretation.

Contents

1. Introduction

First of all, thank you for choosing ZTT solar photovoltaic(PV) modules. (hereafter reffered to as "module"). To ensure correct installation and stable power output, it is necessary to read and understand all installation instructions before proceeding. As PV modules are power generation products, professional technicians must perform the installation and adopt appropriate safety measures to avoid accidents.

The protection Class of the module : Class II (IEC61730:2023); (IEC61730:2016);

Application class of the modules: Class A (IEC61730:2004);

Fireproof rating: Class C, in line with IEC61730-2 standard.

1.1 Manual use

✧ The technical content of this guidelines for the installation, maintenance,and use of the modules. JDGN Solar disclaims any liability for any following kinds of injuries and losses, including but not limited to any physical injuries or property losses resulted from Module misoperation , system installation failure, and violation of the instructions set out in this manual.

Information for installers

✧ The installer must read and understand this manual before installation.

✧ Please ensure that the installation, operation and maintenance of the photovoltaic system described in the manual is performed by qualified personnel, such as system planning, installation and maintenance personnel, who must comply with all safety precautions in this manual and applicable local regulations; Unqualified personnel can only carry out cleaning work.

This manual is part of the product and should be retained for the life of the PV system.

Information for operators

✧ keep this manual during the service life of the photovoltaic system.

✧ Contact your equipment supplier for installation information concerning the photovoltaic systems. Be sure to learn about the guidelines and understand the needs of the persons who are in charge of local authorities, as well as the energy suppliers prior to the installation of photovoltaic power station.

✧ Make sure your PV system can withstand natural disasters (e.g. electricity , lightning strikes)

1.2 Responsibility statement

- ✧ This manual is valid for the module of JDGN solar.
- ✧ The information in this manual is based on JDGN solar’s knowledge and experience and is considered to be reliable; but such information, including product specifications (without limitation) and suggestion, does not have any significance as a warranty or constitute an express or implied guarantee. JDGN solar reserves the right to change this manual, PV Module, specifications, or product information sheets without prior notice.
- ✧ JDGN solar shall not bear any expenses arising from damage, loss or installation, operation, use or maintenance if the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic products are beyond JDGN solar’s control. JDGN solar does not cover any legal liability beyond the due function and safety performance. This manual is for reference only.
- ✧ No license is granted by implication or otherwise under any patent or patent rights.
- ✧ As for special modules, please install and use separately according to the module specifications or agreed terms in the contract.
- ✧ If your questions are not adequately addressed in this manual, please contact your system supplier. For more information, please visit website www.ztt.cn.
- ✧ Product Identification
- ✧ Each Module has three labels and provides the following information:
- ✧ nameplate: describes the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current under standard test conditions, certification mark, weight, dimension etc.; And maximum system voltage, fuse current.
- ✧ serial number and Bar Code Label : serial number has 16 digits; Each module has a unique serial number and bar code as a unique identifier , Each Module has three barcodes, one permanently laminated inside the Module ,this label can be normally found in the front side of corner; the other label is pasted on the rear side of the module. another label is pasted on the side of the module frame.
- ✧ Removing the nameplate will make the JDGN warranty invalid .

2. Safe guideline

2.1 General safety Guidelines

Danger! Danger due to Electric shock!

- ✧ All installations must be performed in compliance with all applicable regional and local regulations, or other national or international electrical standards (if applicable) etc.
- ✧ A PV module can generate current and voltage even at low light intensity. Therefore, avoid touching the modules and take care to isolate the live circuit before performing any connection or disconnection operation.
- ✧ Physically disconnecting a live circuit can cause an electric arc that will result in serious or deadly injury. The severity increases with the increase of the module number in series.
- ✧ PV module operation can only be stopped when the PV modules are kept from sunlight or covered by hard board (opaque material) during the entire installation, so that can ensure reliable power-off of the modules.
- ✧ It is strictly prohibited to unplug the plug when the load is on. Be aware that even without light, there is still residual electrical energy. Make sure to disconnect the modules from the inverters first before disconnecting from PV system .
- ✧ Artificially concentrated sunlight shall not be directed on the module.. When the light shines on the front of the module, it generates electricity .The DC voltage may exceed 30V. Contact with a DC voltage of 30V or more is potentially hazardous.
- ✧ There is an extremely low voltage when the module or phase voltage exceeds 120V. Necessary protective and precautionary measures should be taken.
- ✧ Do not insert any conductive components into the connector of junction boxes. Do not touch the plugs or exposed terminals.
- ✧ Keep children and unauthorized persons away from the modules.
- ✧ In case of module damage or wrong operation of the PV array, please contact JDGN Solar customer service.
- ✧ Do not wear metallic ornaments or hold any metallic devices during installation or troubleshooting photovoltaic systems. Please wear appropriate personal protective equipment when installing modules .
  . This includes standard and insulated safety tools and equipment (safety helmet, insulated gloves and rubber shoes, harness or belts, ladder, etc.)
- ✧ In case of fire, please do not use water to extinguish the fire at the power source.
- ✧ Do not use wet tools, and avoid from working in rain, snow or windy conditions.

WARNING! Danger of injury due to broken glass! Risk of injury due to falling modules!

- ✧ modules contain large pieces of glass and must therefore be handled with special care.
- ✧ To ensure safe installation, ensure that you are familiar with all applicable national regulations for safe work and accident prevention.
- ✧ To prevent injury, please wear appropriate protective clothing (such as safety shoes and gloves). The working voltage of the protective clothing provided for the staff shall not be lower than 1500V.
- ✧ Contact with any surface or frame of the assembly will result in electric shock if the Module

glass is broken or the backplane is damaged!

- ✧ Under normal circumstances, photovoltaic modules may encounter conditions that generate more current and/or voltage than under standard test conditions. Therefore, when determining the Module voltage rating, conductor current rating, fuse size, and control device size connected to the PV output, the values of ISC and VOC marked on the Module should be multiplied by 1.25 times.
- ✧ modules in this application class can be used in systems with DC voltages greater than 50V or 240W. modules that pass IEC61730 can be considered to meet the requirements of safety Level II.

2.2 Product Protection

- ✧ Do not attempt to remove the Module.
- ✧ Do not attempt to remove any nameplates or parts.
- ✧ Do not open the junction box under any circumstances.
- ✧ Do not connect blocked or contaminated plugs.
- ✧ You may only modify the modules after JDGN's written confirmation.

- ✧ Do not attempt to drill holes in the modules (for example, to install fasteners).
- ✧ Use only insulation tools special for electrical installation.
- ✧ Do not use a concentrating device (such as a mirror or lens) to try to increase the power generation of the Module. This allows the modules to be damaged and not covered.
- ✧ Do not squeeze, hit, or scratch the tempered glass of the photovoltaic module with sharp objects.

2.3 Transport and Storage Safety Guidelines

Improper transportation and installation may damage modules. To prevent damage to modules:

- ✧ Transport modules in their original packaging until installation.
- ✧ Store modules safely in a dry, ventilated space. The outer packaging of the modules is non-weather resistant!
- ✧ Ensure that modules (especially when edges are struck or improperly stored) are protected from scratching and other damage.
- ✧ Ensure that the Module does not bend under its own weight.
- ✧ Do not place the Module without any protection. The Module and frame are vulnerable to damage.

- ✧ Do not use the cable or junction box to lift or move the assembly under any circumstances!
- ✧ Do not place any hard objects on the upper and lower surfaces of the assembly.
- ✧ Do not expose the surface of the Module to mechanical stress.
- ✧ Do not stand on modules.
- ✧ Do not drop or place objects on the modules.

3. Mechanical Installation

3.1 site selection

- ✧ modules are certified to standards such as IEC 61215 for safe operation in mild weather conditions. When installing modules at high altitudes, consider the impact of high altitudes on Module operation.
- ✧ Do not install or use the modules in the presence of highly corrosive substances such as salt, salt spray, salt water, active chemical vapors, acid rain, or any other substance that may corrode the modules or affect their safety or performance.
- ✧ Do not place modules in water. The junction box is IP68 protected.
- ✧ Do not install modules near flammable gases and vapors (such as gas tanks) or near open flames and flammable materials. Photovoltaic modules are not explosion-proof items.
- ✧ Risk of corrosion from prolonged exposure to salt spray (i.e. Marine environment) and sulfur-containing (i.e. sulphur source, volcanic) environments. Do not install modules within 0.1Km from the Marine environment. At distances between 0.1Km and 1Km, install salt spray resistance modules.
- ✧ modules should not be shaded year-round (e.g., by buildings, chimneys, trees), even if partial shading (e.g., by overhead lines, dirt, snow) should be avoided.

3.2 Select an appropriate support for installation

Guidelines and safety precautions should also be followed at all times when mounts and modules are installed and used. The mounting bracket structure of each Module shall meet:

- ✧ Use durable, corrosion-resistant, UV-resistant materials.
- ✧ provides a good transfer of stress from the assembly to the mounting bracket structure.
- ✧ Ensure that the modules do not cause any mechanical stress (e.g. due to vibration, distortion or expansion).

- ✧ Ensure adequate ventilation at the back of the Module.
- ✧ Ensure the long-term stability of the support.
- ✧ Ensure that electrochemical corrosion is not caused by the use of metals in direct contact (i.e. ground wires, screws, washers, etc.).
- ✧ Allow for strain-free expansion and contraction due to changes in the natural ambient temperature.

3.3 Universal installation

Assemblies installed in series shall ensure the same orientation and inclination Angle. Differences in orientation or inclination (different illumination) can result in loss of output power.

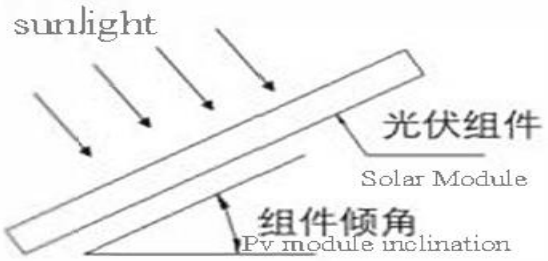


Figure1 Angle of Module installation

- ✧ When developing the final layout of the PV system, adequate personnel access should be ensured for subsequent maintenance. Minimize the risk of indirect shock as much as possible and avoid closing the loop when designing the system.
- ✧ modules can be mounted horizontally or vertically.
- ✧ Keep a minimum distance of 10mm between the two modules.
- ✧ Do not block the drainage holes when selecting the installation mode. Keep the drainage holes unblocked during installation and use.
- ✧ Vertical installation is recommended. Vertical installation is recommended only in an area where the average humidity is greater than 70%.
- ✧ The optimum tilt Angle of the Module depends on the corresponding latitude. It is recommended to use professional PV system software to obtain this data.

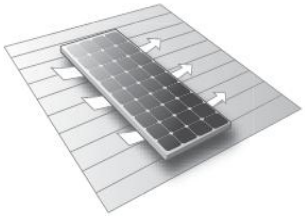
Ground mounting

- ✧ ensures that the lowest edges of the assembly are not subject to prolonged snow coverage, especially in areas with prolonged snow in winter.

✧ Make sure that the lowest part of the assembly is placed high enough so that it is not obscured by trees or plants, or by wind-swept dust stones, etc.

Roof installation

✧ When installing modules on the roof of a building, ensure in advance that the roof is installable. Ensure that it is securely secured, does not fall due to wind or snow loads, and maintains a safe working area at the edge of the roof and in the assembly array.



✧ Ensure that there is sufficient ventilation space under the assembly. A gap of at least 10 mm between multiple modules is required to allow thermal expansion of the bracket. If other installation methods are used, the UL certification or fire rating may be affected.

✧ Roof installation shall be suitable for roofing with corresponding fire rating. According to UL790 standard, Jiangdong Solar modules are certified as Class C fire protection rating.

✧ Any roof penetration required to load modules must be properly sealed to prevent leaks.

✧ In some cases, additional support borders may be required.

✧ Rooftop installation of photovoltaic modules may affect the fire protection of the building.

✧ As a precaution, do not install modules on the roof of a building during strong winds.

✧ Before installation, ensure that all support structures supporting the PV modules are at the correct Angle to withstand wind and snow loads as required by regional or local regulations.

Column installation

✧ When installing column modules, select a column and installation structure that can withstand the expected wind force.

3.4 installation method

✧ You are advised to install two-sided modules using mounting holes or pressing blocks. To avoid blockage and meet load requirements, install the installation structure parallel to the long side frame and use the installation holes reserved in the frame.

Installation Guide

✧ The support for installing photovoltaic modules must be made of durable, corrosion-resistant, and UV-resistant materials. The support must be inspected and tested by a third-party testing organization with static mechanical analysis capabilities to meet the local, regional, or

international standards.

- ✧ he photovoltaic module must be securely secured to the mounting bracket. If the PV module is installed in a snow covered area, the height of the support should ensure that the lowest point of the PV module will not be covered by snow. In addition, it should be ensured that the lowest point of the photovoltaic module is not blocked by surrounding trees or other plants.
- ✧ When the PV module is installed on a support parallel to the roof, the minimum clearance between the frame of the PV module and the roof is 10cm. Air circulation is required to prevent damage to the wiring of the PV module.
- ✧ The frame of the photovoltaic module will expand and shrink. The spacing between the two adjacent photovoltaic module frames should not be less than 10mm.
- ✧ For special installation areas (such as high altitudes, mountain tops, coastal areas, and tuyere) where strong winds frequently occur, you are advised to install and secure modules using square gaskets, anti-loosening nuts, anti-loosening gaskets, and thickening gaskets.
- ✧ For the specific installation method, please refer to the following installation specifications, if the use of inappropriate fixture or incorrect installation method, Jiangdong Solar limited warranty will be invalid.

Bolted system

All PV modules must be secured with at least 4 bolts. The specific installation methods and corresponding load values are shown in Table 2.

! Note: Solid red arrows in the installation diagram in Table 2 indicate bolt positions. The bolt installation steps are described below (see Figure 2).

① The photovoltaic module is placed on the bottom support column.

② Insert four stainless steel bolts (M8) into the mounting holes (9x14mm). Four M6 stainless steel bolts are required for mounting holes with a 400mm spacing of 7x10mm.

③ Ensure that each bolt uses two stainless steel washers, one on one side of the bracket, the minimum thickness of the washers is 1.5mm and the outer diameter is 16~18mm; And screwed over a stainless steel spring washer or toothed lock washer. Finally, lock with stainless steel nuts. The tolerance requirements of flat gaskets are in accordance with GB /T 3103.3-2020 Class A standards.

④ The recommended tightening torque for M6 bolts is 9-12 N•m, and the recommended tightening torque for M8 bolts is 16-20 N•m. As bolt material may be different, the specific torque value is subject to the confirmation of the bolt supplier.

⑤When selecting a 30mm height frame assembly, it is recommended to select fasteners with a length of less than 20mm.

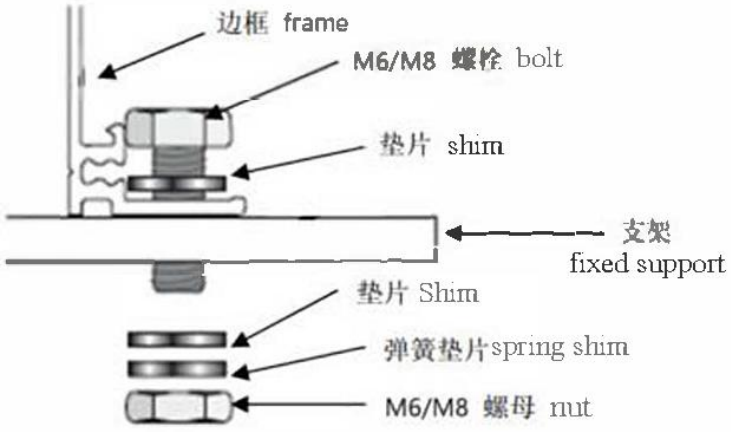
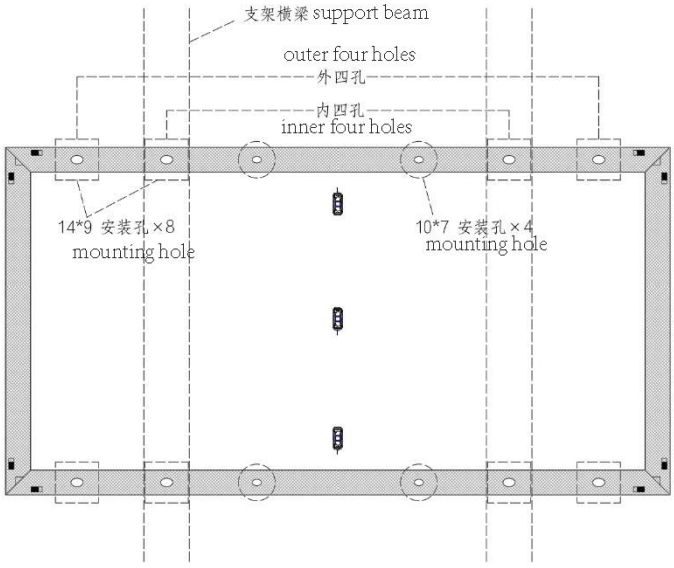


Figure2 Diagram of bolt installation process

3.4.1 mounting hole installation

Bolt mounting mode (inner 4 holes perpendicular to the long side)

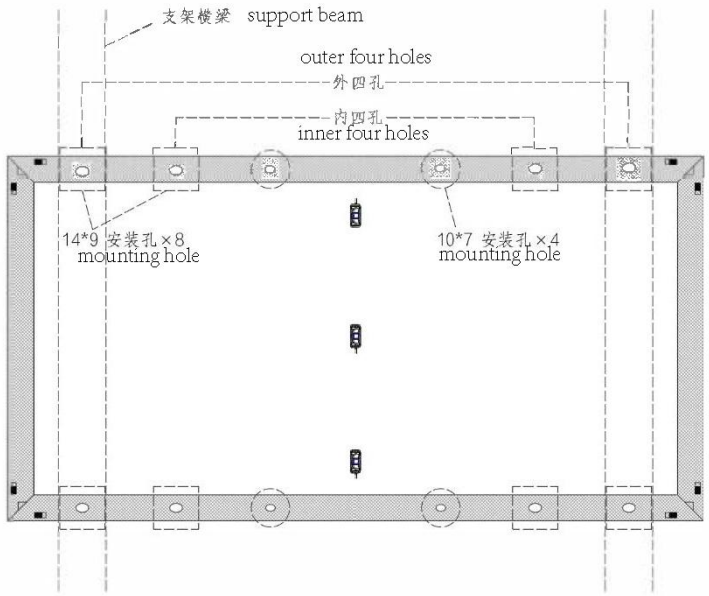


Module type	Photovoltaic module size L*W*H (mm)	Four hole mounting in bolt (test load Pa)
ZTT-ND78HD	2465*1134*30	+ 5400Pa/-2400Pa
ZTT-ND72HD	2278*1134*30	+ 5400Pa/-2400Pa

ZTT-ND60HD	1908*1134*30	+ 5400Pa/-2400Pa
ZTT-ND54HD	1722*1134*30	+ 5400Pa/-2400Pa
ZTT-NE48HD	1762*1134*30	+ 5400Pa/-2400Pa
ZTT-NE66HD	2382*1134*30	+ 5400Pa/-2400Pa

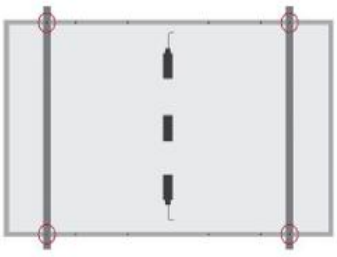
Test loads installed in four holes (perpendicular to the long side) in different Module models

Bolt mounting method (outer 4 holes)

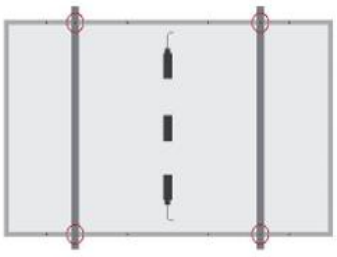


Module type	Photovoltaic module size L*W*H (mm)	Four hole mounting in bolt (test load Pa)
ZTT-ND78HD	2465*1134*30	+ 5400Pa/-2400Pa
ZTT-ND72HD	2278*1134*30	+ 5400Pa/-2400Pa
ZTT-ND60HD	1908*1134*30	+ 5400Pa/-2400Pa
ZTT-ND54HD	1722*1134*30	+ 5400Pa/-2400Pa
ZTT-NE48HD	1762*1134*30	+ 5400Pa/-2400Pa
ZTT-NE66HD	2382*1134*30	+ 5400Pa/-2400Pa

Test loads for external four-hole mounting of different Module



External four hole bolt mounting (The beam is perpendicular to) the long side)



Inner four hole bolt mounting (The beam is perpendicular to the long side)

Inner four hole bolt mounting (The beam is parallel to the long side)

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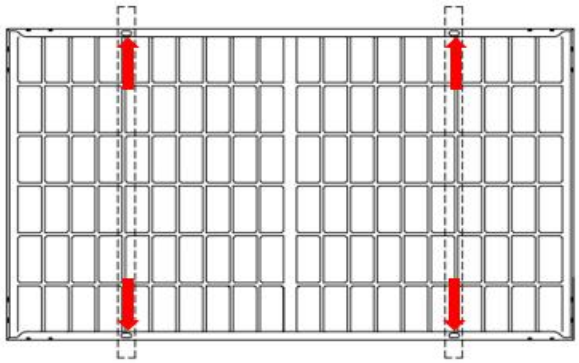
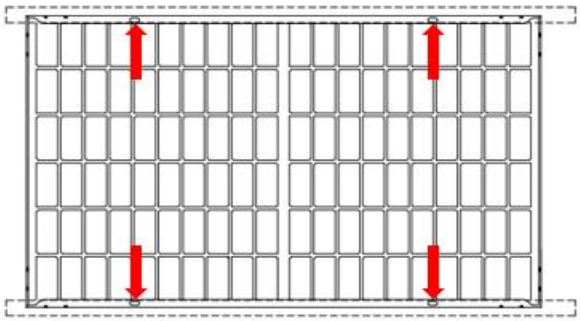
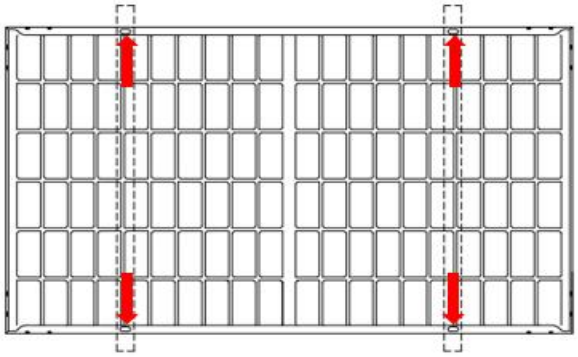
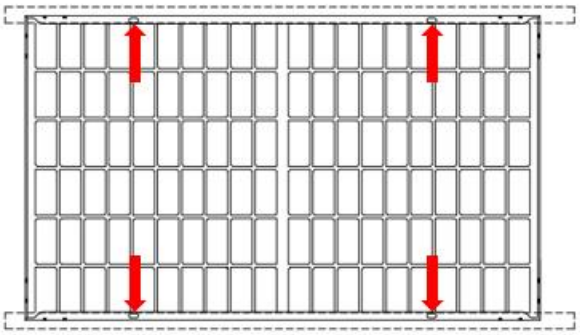
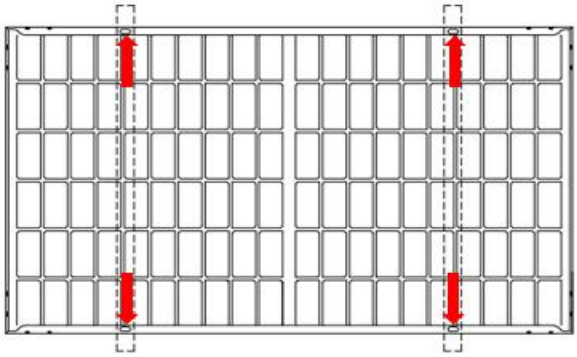
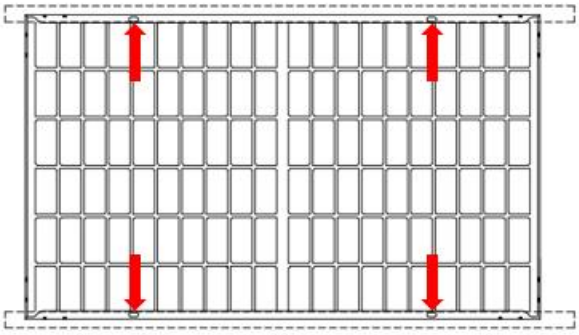
Bolt hole installation diagram

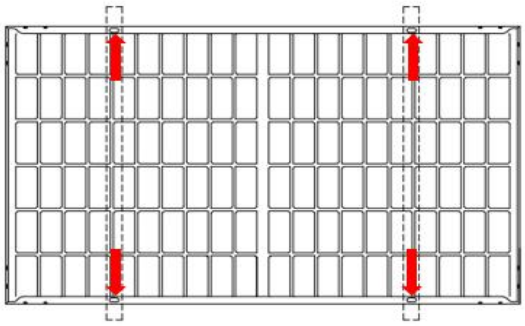
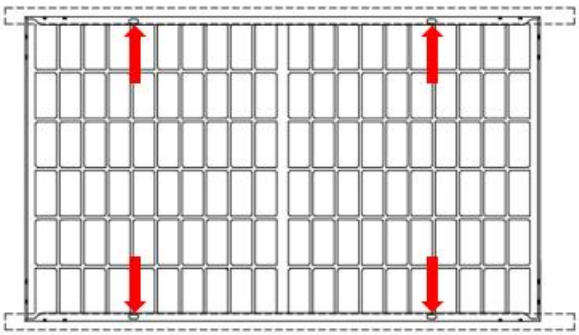
Module type	Photovoltaic module size L*W*H (mm)	Installation diagram	Load value
ZTT-ND54HD ZTT-NE48HD	1722*1134*30 1762*1134*30	 The long frame is mounted with 4 bolts (1100mm holes), and the guide rail is vertically long	+5400Pa /-2400Pa
		 The long frame is installed with 4 bolts (1100mm holes), and the guide rail coincides with the long frame	+3600Pa /-2400Pa

Module type	Photovoltaic module size L*W*H (mm)	Installation diagram	Load value

ZTT-ND60HD	1908*1134*30	 The long frame is mounted with 4 bolts (1400mm holes), and the guide rail is vertically long	+ 5400Pa /-2400Pa
		 The long frame is installed with 4 bolts (790mm holes), and the guide rail coincides with the long frame	+ 3600Pa /-2400Pa

Module type	Photovoltaic module size L*W*H (mm)	Installation diagram	Load value
ZTT-ND72HD ZTT-NE66HD	2278*1134*30 2382*1134*30	 The long frame is mounted with 4 bolts (1400mm holes), and the guide rail is vertically long	+ 5400Pa /-2400Pa

		 The long frame is installed with 4 bolts (1400mm holes), and the guide rail coincides with the long frame	+ 3600Pa /-2400Pa

Module type	Photovoltaic module size L*W*H (mm)	Installation diagram	Load value
ZTT-ND78HD	2465*1134*30	 The long frame is installed with 4 bolts (1500mm holes), and the guide rail is vertically long	+ 5400Pa /-2400Pa
		 The long frame is installed with 4 bolts (1500mm holes), and the guide rail coincides with the long frame	+ 3600Pa /-2400Pa

✧ modules shall be bolted to the support through mounting holes located on the back of the frame. Do not drill additional holes or you will not be covered.

- ✧ Use M8 coarse thread bolts for mounting holes A or B; Use M6 coarse thread bolts for mounting holes in C.
- ✧ Each Module is securely secured using at least four mounting holes. Emergency mounting holes are also used if there is additional wind or snow load. System designers and installers should calculate the load in advance to make the correct support structure design.
- ✧ Use appropriate corrosion resistant fasteners including bolts, spring washers, flat washers, nuts. M8 bolt tightening torque reference value 16 ~ 20 N•m; The reference torque of M6 bolts ranges from 9 to 16 N•m. Because bolt materials may vary, the specific torque value depends on the bolt supplier's confirmation. And the parts in contact with the frame shall use a flat washer with a diameter of 16mm or above and a thickness of ≥1.8mm.
- ✧ Follow the installation guidelines recommended by the PV installation supplier. Installation design must be confirmed by a registered professional engineer.
- ✧ Installation design and procedures must comply with local regulations and all competent authorities.
- ✧ Ensure that the border drain hole is open to allow water to drain smoothly. This will prevent frost damage.
- ✧ modules shall be installed in such a way as to ensure that rainwater and snowmelt can slide freely, thereby avoiding accumulation of water or freezing.

3.4.2 Block installation mode

When installing double-sided photovoltaic modules, each photovoltaic module must be fixed using at least 4 blocks, as shown in Figure 3, Figure 4, Figure 5.

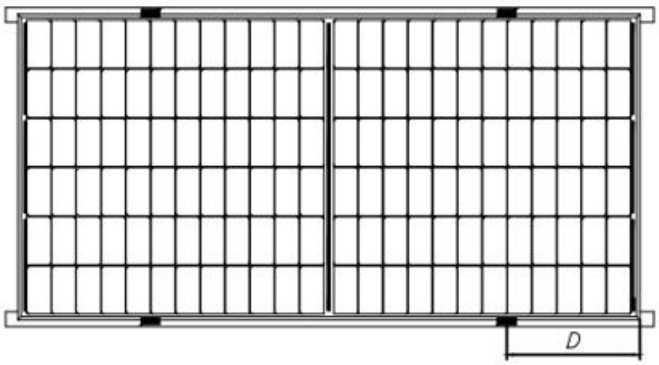


Figure3 The guide rail is fitted with a long frame

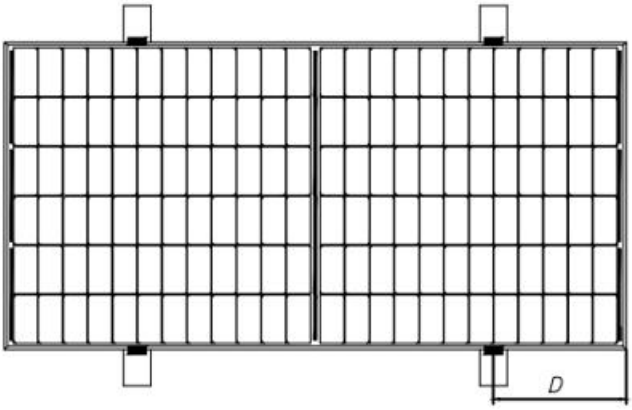


Figure4　Rail vertical long frame mounting

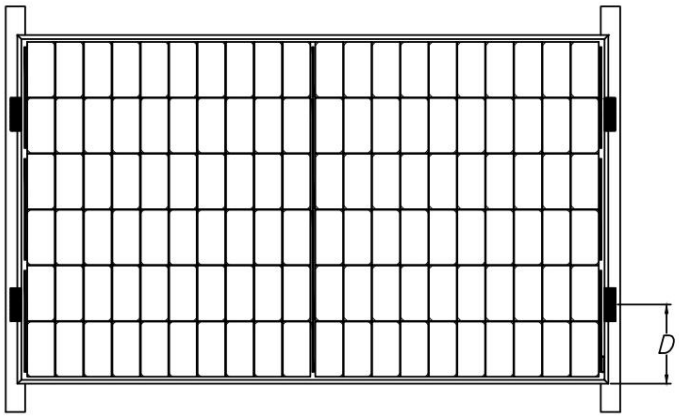


Figure5　The guide rail is fitted with a short frame

! Note:

the length of the bracket must be longer than the size of the photovoltaic module, otherwise it should be confirmed by Jiangdong Light Energy in advance; The above diagram is the installation method using aluminum pressing blocks (also known as fixtures). “D” indicates the allowable installation range of aluminum block. For specific recommended installation positions and corresponding on-board values, see Table 3; Each aluminum block is fitted with an M8 bolt, two flat washers, a spring washer, and an M8 nut. The securing steps are as follows:

①Place the assembly on two supports (not provided). The bracket must be made of stainless steel

or have been treated with anti-corrosion (such as hot-dip galvanizing). Each photovoltaic module needs at least four press blocks to fix. During installation, do not let the press block directly touch the glass and deform the frame, otherwise the Module will be damaged.

②Be sure to avoid the shadow caused by the fixture on the Module shielding effect. The leak hole should not be blocked by the fixture. The fixture must overlap with the assembly frame by at least 8mm but not more than 11mm (the fixture section can be changed if the assembly is installed reliably).

③The upper surface of the bracket in contact with the assembly frame shall have a groove matching the M8 bolt.

④ If there is no groove on the support, it is necessary to drill a hole with a suitable diameter in the above mentioned position for bolt fixing.

⑤Ensure that the installation sequence of each press block is flat washer, spring washer, nut.

⑥Figure 7 and 8 are the schematic diagram of the block, and Figure 9 and Figure 10 are the schematic diagram of the installation of the block. The size of the block is a≥60 mm, b≥16 mm, c≥5 mm, d ≥8mm, e ≥15mm, Ø= 9 mm, and the thickness of the block is ≥3mm. When bolts and screws are rated 8.8, the recommended tightening torque is 17 to 23N•m.

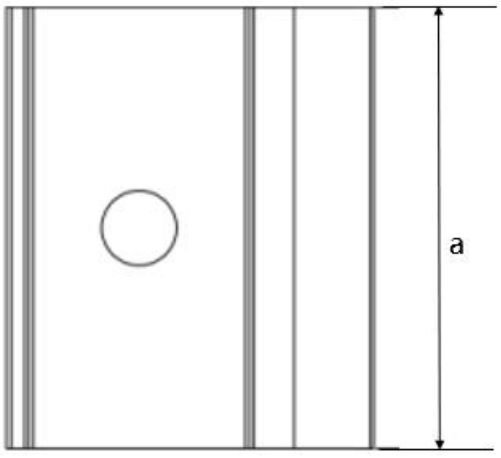


Figure7 Top view of side press block

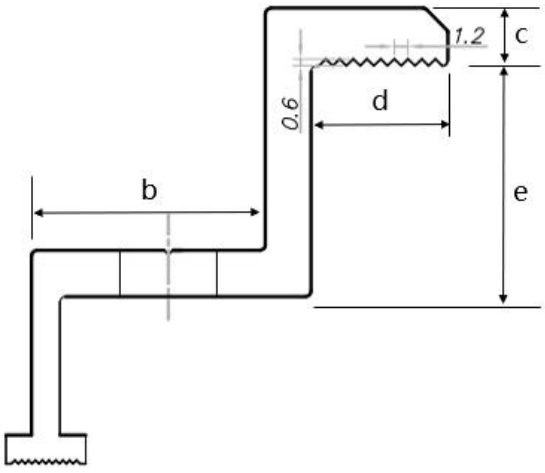


Figure8 Cross-section diagram of the side pressing block

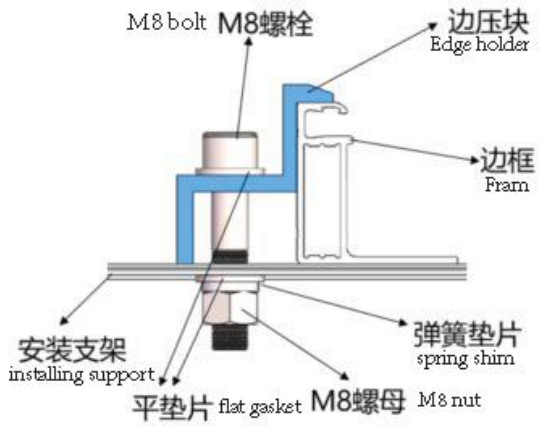


Figure9 Installation diagram of edge block

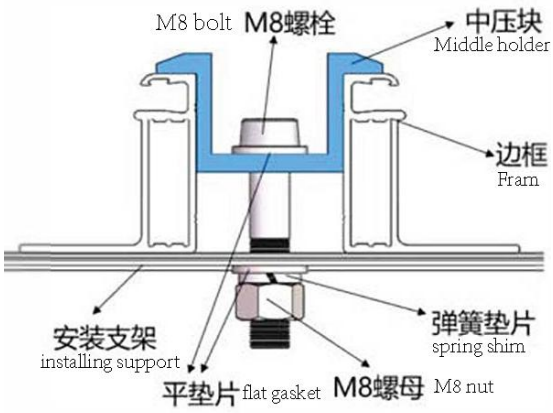


Figure10 Installation diagram of medium pressure block

⑦To prevent the assembly from falling off the frame after installation, it is recommended to select the edge mounting press block and the middle mounting press block with pattern groove structure on the contact surface of the frame A, the recommended number of pattern groove structure is about 9, the distance between adjacent pattern groove is about 1.2mm, and the depth of pattern groove is about 0.6mm, as shown in Figure 8. 8 For the installation method shown in Figure 3, the overlap between surface C of the Module and the guide rail should be ≥25mm. If you use an inappropriate fixture or an incorrect mounting method, the limited warranty will be void.

- ✧ modules can be mounted using a press block. The assembly shall be firmly secured to the mounting bracket by pressing at least 4 pressure blocks on the frame.
- ✧ The assembly must be securely attached to the support. It is the responsibility of the installer to ensure that the compactor itself is of sufficient strength for installation.
- ✧ modules cannot be placed in wind or snow environments that exceed their maximum allowable load.
- ✧ The mounting block shall not be in contact with the front glass of the Module or deform the frame. The block must not have a masking effect on the Module. The block cannot block the flow hole in the frame.
- ✧ The different values of "A" and "B" are shown in the following table (single-sided or double-sided guide rails are installed on vertical long side, double-sided guide rails are installed on flat long side), safety factor γm=1.5.
- ✧ The installation structure of the modules must be of corrosion-resistant and UV-resistant

materials. For example, tighten the M8 bolt to a torque ranging from 16 to 20N•m. Ensure that the crimper does not fail due to deformation or corrosion when the whole Module is loaded.

- ✧ The minimum recommended length of the block is 50mm, overlapping the assembly frame by at least 8mm but not more than 12mm.
- ✧ If the Module is not installed as described above, the actual load bearing value may be reduced.

Module type	Photovoltaic module size L*W*H (mm)	Refer to Figure 3 for installation methods	Refer to Figure 4 for installation methods	Refer to Figure 5 for installation methods
ZTT-ND54HD	1722*1134*30	+3600Pa/-2400Pa fitting limit D 266~466mm	+5400Pa/-2400Pa fitting limit D 266~466mm	+1800Pa/-1800Pa fitting limit D 150~250mmPa
ZTT-NE48HD	1762*1134*30	+3600Pa/-2400Pa fitting limit D 266~466mm	+5400Pa/-2400Pa fitting limit D 266~466mm	+1800Pa/-1800Pa fitting limit D 150~250mm
ZTT-ND60HD	1908*1134*30	+3600Pa/-2400Pa fitting limit D 320~520mm	+5400Pa/-2400Pa fitting limit D 320~520mm	+1800Pa/-1800Pa fitting limit D 150~250mm

ZTT-ND72HD	2278*1134*30	+3600Pa/-2400Pa fitting limit D 430~530mm	+5400Pa/-2400Pa fitting limit D 430~530mm	---
ZTT-NE66HD	2382*1134*30	+3600Pa/-2400Pa fitting limit D 470~560mm	+5400Pa/-2400Pa fitting limit D 470~560mm	---
ZTT-ND78HD	2465*1134*30	---	+5400Pa/-2400Pa fitting limit D 480~530mm	---

4. electrical installation

4.1 Module selection

modules of the same type, the same structure and the same power are selected in the same system. This is the only way to achieve the best output value.

4.2 security coefficient

Under normal circumstances, photovoltaic modules may be subjected to higher currents and/or voltages than under standard test conditions. Therefore, when determining the Module rated voltage, rated current, fuse current, and controller size, the Isc and Voc values should be multiplied by 1.25 times. Alternatively, a valid national electrical system installation guide can be used. Avoid PID at the installation end of the system during installation.

4.3 Universal installation

- ✧ Before installing modules, contact the appropriate authorities to determine the permissions, installation and inspection requirements applicable to your site selection and installation.
- ✧ Check applicable building codes to ensure that support structures (roofing, exterior walls, supports, etc.) are sufficient to support the weight of modules and all other system modules.
- ✧ When high current is needed, several PV modules can be connected in parallel; The total current is equal to the sum of the respective currents, and each Module (or a series of modules in series) must be configured with a specified maximum current fuse. The recommended number of parallel modules is 1.

- When a high voltage is required, several PV modules may be connected in series with a total voltage equal to the sum of their respective voltages, provided that the maximum voltage of the system must be lower than the maximum certified voltage and the maximum input voltage of the frequency converter and other electrical equipment in the installed system. The maximum number of modules in series is (N) ≤ system Vmax / {Voc (in STC) ×[1+ (T-25) *Kv]}, where:

  System Vmax: the smaller of the highest certified voltage, the highest output voltage of the system inverter or other electrical equipment

  Voc: photovoltaic module open circuit voltage (v)

  t: Ambient minimum Temperature (° C)

  Kv: Temperature coefficient of the open circuit voltage of the PV module (/ ° C) -- see the product specification

- Connect the appropriate number of modules according to the voltage specification of the inverter used in the system. Even under the worst local temperature conditions, the voltage generated by the connected modules must not be higher than the voltage value allowed by the system.
- It is recommended that modules with similar electrical properties be connected on the same string to reduce array mismatch effects.
- Use photovoltaic cables specified by local fire, building and electrical codes and matching plugs (wiring should be placed in light resistant conduits or light resistant material if cable is exposed to air). Make sure they are kept in the best electrical and mechanical conditions.
- Only photovoltaic cables can be used as connection cables. The same type of connectors from the same manufacturer and compatible connectors connected to the inverter are recommended in a PV system. During installation, disassembly, maintenance, and any other related processes, the force applied between the cable and connector shall not be greater than 90N to avoid poor or damaged connector and cable connection caused by human factors, which may affect the electrical safety or service life of the product.
- Ensure that all electrical modules are kept in correct, dry and safe conditions. This avoids electrical short circuits or dangerous contact voltages due to defective or damaged cables.
- Always avoid mechanical stress on connecting cables.
- Ensure tight connections between individual connectors (especially for inverters) and correct

connections.

module wiring

- he electrical properties of the modules were determined under standard test conditions, i.e. light intensity 1000W/m², AM1.5 and ambient temperature of 25 ° C. In some cases, the Module may produce a higher or lower voltage or current value than the rated value. When the rated voltage of the other modules of the photovoltaic system, the rated current of the conductor, the fuse specifications, and the specifications of the control elements connected to the output of the solar module are determined, the short-circuit current and open circuit voltage values marked on the module should be multiplied by a factor of 1.25.
- Cable connections must be connected by qualified personnel in accordance with local laws and procedures. Ensure that the connectors are tight and properly connected, and that the connectors do not withstand external pressure.
- connectors are used for circuit connection only, not for opening and closing the circuit.
- Connector connections should be kept dry and clean to prevent rain and moisture. Keep connectors away from direct sunlight and water.
- connectors are not waterproof before interconnection. When installing modules, connect the connectors or take waterproof measures as soon as possible to protect them from moisture and dust.
- When connecting solar modules with the same gear current in series, the voltage generated by the modules in series cannot be higher than the maximum voltage allowed by the system. The number of modules per string depends on the system design, inverter type and environmental conditions.
- The maximum rated fuse current of each string of modules is indicated in the product label and specification sheet. The rated fuse current corresponds to the maximum reverse current that a Module can withstand. Based on the maximum fuse current and local electrical performance installation requirements, match a proper fuse to protect series-parallel modules in the circuit.
- If one set of arrays is connected to another in opposite polarity, it can cause irreparable damage to the product. Before parallel connection, be sure to confirm the voltage and polarity of each column. If the measurement finds that the polarity between the columns is opposite

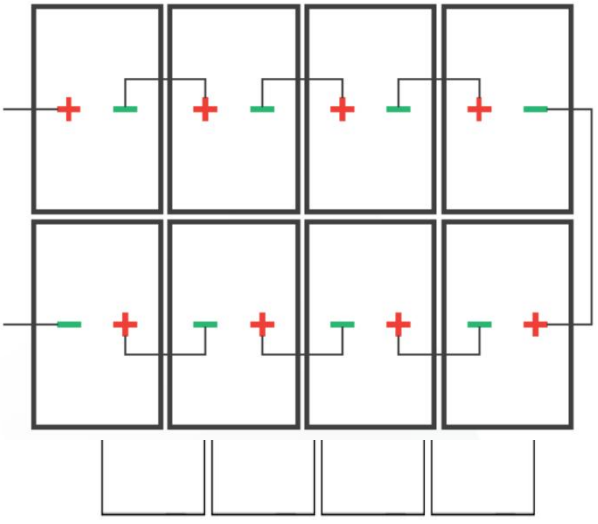
or the voltage difference is greater than 10V, the structural configuration is checked before the connection is made.

- ✧ Jiangdong Solar's solar modules use special photovoltaic cables with a cross-sectional area greater than or equal to 4mm² and are UV-proof. All other cables used to connect DC systems should have similar (or higher) specifications. Jiangdong Light Energy recommends that all cables should be laid in appropriate pipelines or cable slots and away from places prone to water accumulation. The voltage of the string must not be higher than the maximum voltage that the system can withstand, and the maximum input voltage of the inverter and other electrical equipment in the installation system. To ensure this, the open circuit voltage of the array needs to be calculated at the lowest expected ambient temperature at that location.电
- ✧ The outer diameter of the cable ranges from 5 mm to 7mm.
- ✧ Special photovoltaic cables with a minimum temperature and light resistance of 90° C and a cross section of not less than 4mm² shall be used as photovoltaic connection cables for onsite wiring. When installing modules on the roof tile, it is recommended to use 4-6mm² photovoltaic cables.
- ✧ The minimum bending radius of the cable is 43mm.

Wiring mode

Short line straight connection type C

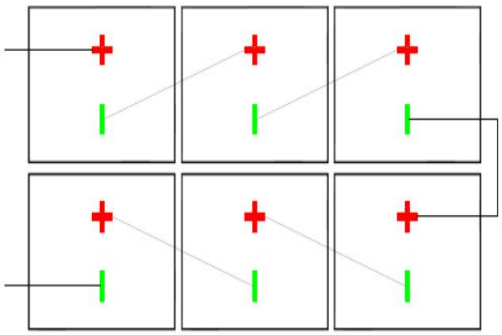
Note: The ends of the upper and lower rows need to be connected in series



Vertical assembly of modules:

Select a standard short cable

Short line straight connection type "—"



Component cross mounting:

Choose from standard long cable or custom

4.4 earthing conductor

- ✧ modules must be grounded. Ensure that the modules meet safety level II, and that the grounding method complies with local national, regional, or international regulations, laws, and standards, and local electrical directives and regulations. The ground connection should be performed by qualified electricians.
- ✧ grounding applies only to the modules with a frame. The frame of the component must be properly grounded. The ground wire must be properly secured to the assembly frame to ensure good electrical contact. Use the recommended type or equivalent connection cable.
- ✧ The design of the photovoltaic module uses anodized corrosion resistant aluminum alloy frame as a rigid support. In order to use safety and avoid the damage of lightning and static electricity, the frame of the photovoltaic module must be grounded. When grounding, the grounding device must be fully in contact with the interior of the aluminum alloy and penetrate the oxide film on the surface of the frame.
- ✧ Do not drill any additional ground holes in the frame of the photovoltaic module.
- ✧ The hole marked with a grounding label on the border can be used for grounding only.
- ✧ In addition, from the system side, the negative grounding of the inverter can effectively reduce the PID effect of the modules. However, professional personnel are required to perform the matched negative grounding operation of the inverter.
- ✧ If a metal frame, the frame must be coated with a protective layer and have good continuous electrical conductivity.
- ✧ The following three grounding methods are used for reference:

Use a grounding clamp to ground

1. Use a grounding hole to ground

There is a ground hole with a diameter of Ø4.2mm in the middle edge of the back frame of the assembly.

The median line of the ground label overlapped with that of the hole in the same direction as the length of the border. The grounding between modules must be confirmed by a qualified electrician, and the grounding device must be manufactured by a qualified electrical manufacturer. The recommended torque value is 2.3N•m. The grounding fixture uses 12AWG size copper core wire. The copper wire cannot be damaged by pressure during installation.

1、Grounding hardware includes ground screws, flat washers, star washers and ground wires. Other related hardware shall be made of stainless steel. Please do not drill or modify the frame of the assembly, as the limited warranty will be void.

2、JDGN recommended grounding resistance < 1Ω. The electrical contact point is formed by penetrating the anodized coating of the aluminum frame and tightening the mounting screw (together with the star washer) to an appropriate torque of 3-7N•m.

零件 part	schematic diagram	连接方式 link mode
		Place star washers, flat washers, and ground wires in turn, thread screws through the ground holes, and tighten them to secure adjacent components.

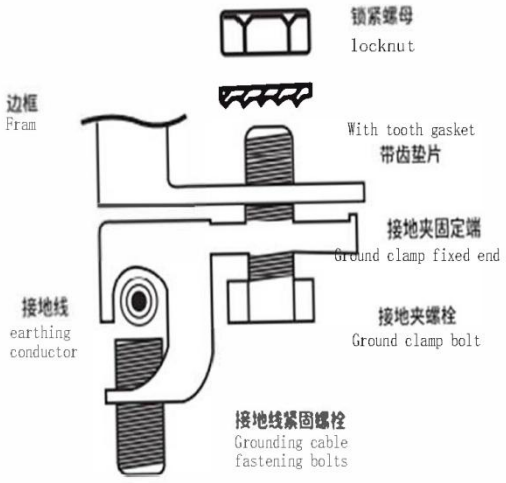
2.Ground an unused mounting hole

An existing but unused mounting hole on the component can be used to install the grounding device.

1、Align the grounding clamp with the mounting hole of the frame. Use the grounding bolt to pass through the grounding clamp and frame.

2、Put the toothed gasket on the other side and screw on the lock nut.

3、Pass the grounding wire through the grounding clamp. The material and size of the grounding wire should meet the relevant regulations, laws and standards of the local country, region or international.



4、tighten the grounding cable fastening bolts, and then the installation is complete.

3. Other third party grounding

The component can be grounded using a third party grounding device, but the grounding must be proven reliable, and the grounding device is operated according to the requirements of the manufacturer.

5. Care and maintenance

5.1 Anti-reflection diodes and bypass diodes

- ✧ The anti-reflex diode prevents current from flowing from the battery to the component when the component is not producing power. Anti-reflex diodes are recommended when no charging regulator is available. Your specialist dealer can recommend the right model.
- ✧ In a system with two or more modules in series, a high reverse current will flow through the battery when one part of the component is obscured and the other parts are exposed to sunlight. These reverse currents can cause the affected cell to heat up and may even damage the component. A bypass diode is used in the component, in order to prevent the component from being subjected to such a large reverse current. All modules with power ratings greater than 55 watts have junction boxes with integrated bypass diodes. In case of diode failure, it can also be easily replaced, and only qualified personnel can perform this operation, otherwise it will violate the warranty.
- ✧ Protect yourself from electric shocks when commissioning or maintaining the photovoltaic system.

5.2 Troubleshooting

Problem Dangerous! Death by electric shock! ...

- ✧ Don't try to solve the problem yourself!
- ✧ In case of problems or component damage (e.g., broken glass, broken cable) please contact your installer or JDGN technical support.

5.3 Maintenance

- ✧ JDGN's modules are periodically checked and maintained after installation.

- Appearance inspection of modules Visually inspect the appearance of modules for defects, in particular:

  1. The glass of the component is broken.

  2. Corrosion at the welding of the battery main gate: during installation or transportation, the surface packaging material is damaged, resulting in moisture entering the component.

  clean

  Rain can wash away dirt. However, rain may not adequately remove the more stubborn dirt (i.e. pollen, vegetation, bird droppings, etc.). This dirt can obscure the power generation part of the component and may degrade system performance. To ensure the best performance of the modules, Jiangdong Solar recommends the following maintenance:

- a)Accumulation of dust or dirt on the surface of the modules will reduce the power generation output. It is recommended to clean the modules once a year, and increase the frequency of cleaning in dusty environments. Use a dry or wet soft cloth for cleaning. Water with a high mineral content will leave deposits on the surface of the glass, so it is not recommended. It is recommended to use neutral water in the PH range of 6.5-8.5 to clean the glass, so as not to cause damage to the glass coating layer;
- b)Do not use materials with rough or sharp surfaces for component cleaning;
- c)In order to reduce potential electric shock or burn, Jiangdong Solar recommends cleaning photovoltaic modules in the early morning or evening when the light is not strong and the module temperature is low, especially for areas with high temperature;
- d)Do not attempt to clean PV modules with broken glass or exposed wires, as this will put you at risk of electric shock;
- e)Do not use chemicals to clean modules as this may affect component maintenance and power output. In the extreme climate environment, if there is a need to use chemicals to clean, please contact the after-sales department of Jiangdong Light Energy for specific requirements;
- f)For double glass modules, clean the back of the component regularly if necessary and in accordance with the requirements of a)-e). Wear insulated gloves and pay special attention to cables and electrical connections when cleaning the back.
- Clean the glass surface if necessary. Make sure to use clean water and a soft sponge or cloth, and use a mild, non-abrasive cleaning agent to remove stubborn stains; Do not use detergent

containing alkali and acid to clean modules. Due to damage caused by improper cleaning methods, Jiangdong Solar Limited warranty will be void

Check connectors and cables

- ✧ It is recommended to perform a preventive inspection every six months as follows:

  1. Check the tightness of connectors and the tightness of cable connections.

  2. Check the sealant at the junction box to ensure that there is no cracking or gap. Check modules for signs of aging. Inspect all wiring for rodent damage and material aging, and all connectors for tight connections and corrosion. Check whether modules are properly grounded.

- ✧ If anything goes wrong, please have it investigated by a qualified person. Note: Read the service instructions for all system modules (e.g., brackets, charging regulators, inverters, batteries, etc.).

- ✧ The final interpretation right belongs to Jiangsu Jiangdong Solar Technology Co., LTD.

6 Disclaimer

JDGNsolar reserves the right to change the product specifications and this installation manual without prior notice.

We recommend that you refer to the JDGNsolar website (www.JDGNsolar.com) for the latest product and documentation information. JDGNsolar does not accept any responsibility for any loss, damage or expense arising from the installation, operation, use or maintenance of the Module, as the use of this manual and the conditions under which the Module is installed, operated, used, and maintained are beyond JDGNsolar's control.

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Jiangsu Jiangdong Solar Technology Co., LTD.
Location：NO.17 Jiqing Road , Nantong Economic Development Zone,
Postal code：226001
Website：www.ztt.cn