HYSOLAR

Installation Manual

V.2506

List of Applicable Modules

- Prior to installation, please contact the relevant local authority to determine the installation license and installation inspection requirements that meet local requirements. The installation shall follow the safety rules applicable to all pa r s and components in the system, including cables, connector, charge monitors, storage batteries, and inve r ers, etc.
- The installation and maintenance of PV modules must be done by quali f ed engineers, and they must wear safety helmets, insulating gloves, safety shoes and use insulating tools to avoid direct contact with 30V DC or higher volt- age.
- During the installation and transpo r of module at the project site, rain-proof measures shall be taken to prevent the outer box from being got wet by rain.
- If PV modules are installed or operated on rainy days or in the morning with dew, appropriate protection is required to avoid moisture penetration into the connectors.
- Unauthorized access to the installation area or PV module storage area is prohibited.
- Installation or use of damaged PV modules is prohibited.
- It is prohibited to repair PV modules by users themselves, including but not limited to replacing any PV module pa r s (diode, junction box, or connector, etc.).
- Interconnecting connectors of di f erent types and models is prohibited.
- The PV module is prohibited to be used in the environment containing or in contact with the following substances: grease or organic ester compounds (such as DOP, or plasticizer), aromatic, phenolic, ketone, halogenated substances, mineral oil, butter, edible oil, alkane (such as gasoline, cleaning lubricant, or electronic reactivator), alcohol, ce r ain drugs (BaiHuaYou, woodlock medicated balm, bonesettin, banana oil, or essential balm), adhesive board and potting (only for connectors) that can generate oxime gas.
- TBP (plasticizer), cleaning agent, herbicide, paint remover, adhesive, rust inhibitor, descaling agent, emulsi f er, or cut- ting oil, cosmetics, etc., so as to avoid chemical damage and impact on the electrical safety pe r ormance of PV mod- ules.
- It is forbidden to install the PV module in windy weather
- It is forbidden to irradiate the PV module with focused sunlight.
- It is forbidden to use PV module in places where f ammable gases may be generated.
- It is forbidden to use PV module in places related to mobile platforms, etc.(except for tracker).
- It is prohibited to disassemble and move any pa r of PV module;
- If the PV module connector is wet, do not pe r orm any action to avoid electric shock hazard.
- Do not connect or disconnect PV module when there is current or external current in the PV module.
- The cover of the junction box shall be kept closed at all times.
- And the PV module shall be prevented from pa r ial shadow for a long time. Otherwise, the temperature of the shadow solar cell will rise (hot spot e f ect), and in serious cases, the PV module may be burnt and even a f , th L =

- During transpo r ation and storage, avoid damage or drop of the package; ensure that the packaging box is ventilated, rain-proof and d r ; after arriving at the installation site, carefully open the outer package to prevent the PV modules from being scratched and bumped due to improper unpacking behavior; and the stacking of PV module shall be in strict accordance with the stacking requirements.
- Any pa r of the PV module shall be prevented from being bumped or scratched, so as not to a fect the reliability and safety of the PV module; it is prohibited to stand or walk on the PV module; meanwhile, in order to avoid glass damage, it is forbidden to apply excessive load on the PV module or twist the PV module.
- Do not install or car r the PV module by one person, and it is forbidden to lift, drag or move the PV module by grasping the junction box (including the box body, cable and connector); and when placing a PV module on the plane, be careful and pay attention to the collision of edges and corners.
- When installing or maintaining the PV system, do not wear any metal accessories to avoid an electric shock hazard, or please wear a safety belt if installing far above the ground.
- Please use insulated tools, wear rubber gloves and protective clothing when operating the PV module in the sun. Also, to avoid the risk of arcing and electric shock, please do not touch the junction box and the output cable ends (connectors) directly with naked hands.
- When the PV modules are electrically connected, select the morning or evening with d r and low irradiance; or completely cover the PV module su r ace with an opaque material to prevent the generation of electric current.
- The PV module and the mounting su r ace shall be spaced to avoid direct contact with the junction box.
- When installing on the roof, the f re resistance requirements of the building must be obse r ed. It is recommended that the PV module be installed on f reproof and insulating roof covering layer with adequate ventilation between the PV module and the mounting su r ace. To ensure the f re rating on the roof, the minimum distance between the PV module frame and the roof su r ace is 10cm.
- The connectors must be fully plugged when wiring. If the cable is too long, it is recommended to f x the cable on the installation system with a nylon cable tie with UV resistance. When f xing the conducting wire to the rack, the bending radius of the wire shall not be less than 48mm.

If the PV module is not used for the time being, please do not open the product package. The goods shall be stored in a d r and ventilated place protected from light.

It is suggested to unpack an appropriate amount of PV modules eve r day according to the progress of the project, and the unpacked PV modules shall be installed within the same day. Since the PV modules are stacked on the ground after unpacked, the PV modules may be immersed in water for a long time in case of severe weather such as rainstorm, which may a f ect the reliability of the product. In case of severe weather such as typhoon, the uninstalled PV modules may also be blown away.

When the PV module is transpo r ed to the project site, it must be transpo r ed in the packing box provided by HY SOLAR, and shall be stored in the original packing box before installation. Please protect the packing from damage.

The safety of the PV module shall be protected during unloading, especially during the hoisting of roof projects. The PV modules shall be placed in protective devices before being hoisted to the roof to avoid collision with the wall during hoisting.

There are two packing methods for modules: sho r -side ve r ical and long-sid صلم b s א Tde x
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Precautions for forklift truck unloading are as follows:

1. When the forklift truck unloading is adopted for the platform truck, it shall be unloaded from both sides of the vehicle.

Schematic Diagram of Forklift Unloading

Due to the limitation of the container height, when the PV module is moved out of the container, the forklift truck shall lift the module, and the distance between the bottom surface of the package and the bottom surface of the container shall be less than 50mm; otherwise, the product package may collide with the door frame of the container, which may cause damage to the PV module. When unloading from the container, after each row of products is unloaded, the modules in the front row can be lifted and unloaded in turn.

Precautions for packaging turnover are as follows:

1. During turnover of long-side vertical modules, the packing box shall be propped against the forklift truck mast. The mast shall be vertical to the fork. The mast structure shall be frm (bearable pressure≥1.5t). When the whole pallet of module leans against the mast, the mast shall not be deformed due to the pressure. Two safety ropes with tensile strength ≥2000kgf shall be fastened on the forklift truck, and safety guardrails shall be installed on both sides of the front end of the forklift.

2. The straight-line running speed of the vehicle shall be controlled to be ≤5km/h, and the turning speed shall be ≤3km/h to avoid emergency stop and rapid star.

3. When the manual hydraulic lift is used for turnover, the distance between the upper surface of the forks and the ground shall be ≤75mm.

Before unpacking, please confirm that the outer package is intact. It is recommended to use an air knife to remove the packing straps and wrapping film. It is forbidden to dismantle by force so as to avoid scratching the modules in the box. It is forbidden to unpack in case of wind force > Level 6, in rainy or snowy weather.

Follow the recommended steps below to unpack the modules. When unpacking, there shall be more than 2 persons working, and insulating gloves shall be worn during handling.

If it is not installed in a short time after unpacking, it shall be fixed on the leaning frame with safety rope; in case of long-term non-operation, the modules shall be laid flat on two pallets with suitable size, and it is recommended no more than 14 pieces of modules on a single pallet.

1. Prepare tools before unpacking: air knife (scissors), safety helmet, anti-falling bracket, safety shoes, and insulating gloves, etc.

2. For the long-side vertical unpacking steps, a special anti-falling bracket must be used:

(1) Cut the wrapping straps, get rid of the wrapping film, and remove the upper cover and the carton;

(2) Insert the anti-falling bracket into the bottom of the pallet from the glass surface or the back plate surface of the module;

(3) Insert the fixing pin into the front hole of the bracket;

(4) Cut off all the transverse packing straps inside;

(5) Cut off the rest packing straps in the longitudinal direction except the inner two;

(6) Slowly push the module against the bracket;

(7) Cutting off the remaining packing straps;

(8) Tear off the anti-dump adhesive tape on both sides, notice to tear off only one piece of anti-dump adhesive tape with module thickness at a time, and then take out the modules one by one in sequence.

When the PV module is taken out of the packaging box, the cardboard shall be laid on the ground to prevent the PV module from being scratched due to collision and friction with hard objects on the cement surface/ground, or color steel tiles, or metal corrugations, etc.

The PV modules shall be stacked on the horizontal plane in an orderly and stable manner. The piece of module at the bottom shall be stacked with the glass upside and the rest shall be stacked with the glass downside. At the same time, cardboard shall be laid under the PV modules. The stacking quantity is recommended to be no more than 14 pieces. Objects such as installation tools, etc. shall be avoided from being placed on the surface of the PV module.

Current classification is adopted for HY SOLAR modules. The handling personnel shall place them separately and mark them according to the identification on the power list of the outer package of PV modules. According to the requirements of system design, the same current grade is generally required in the same array during installation.

If the customer requires the PV modules to be distinguished by color, the outer packing box has been marked accordingly, and the PV modules shall be marked to avoid confusion when they are taken out of the packing box and stacked. According to the requirements of system design, the colors of PV modules in the same row or in the same matrix shall be consistent.

It is forbidden to store modules in soft geological conditions or where there is ponding, and it is forbidden to place modules on slopes > 4°.

If the modules need to be stored for a long time, it is recommended to store them in a standard warehouse, check them regularly, and reinforce the abnormal inclined packages in the warehouse in time.

bottom of the module be at least 60cm.

- When the PV module is mounted on a suppo r parallel to the roof, the minimum clearance between the PV module frame and the roof is 10cm and air circulation is required, so as to prevent the PV module from being damaged.
- The PV module frame will have the e f ect of temperature expansion and cold contraction, and the spacing between two adjacent PV module frames during installation shall not be less than 20mm.

For speci f c installation methods, please refer to the following installation speci f cations.

Installation Diagram of Component Mounting Hole

Installation of single-axis tracking system:

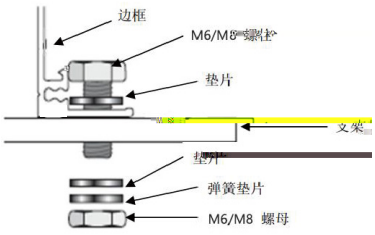
Schematic Diagram of Installation of
Single-Axis Tracking System Module

For maximum safety protection against wind and snow loads, it is recommended that all available mounting holes be used; and in coastal areas, it is recommended to use four bolts plus medium pressure clamp. The bolt installation steps are as follows:

The PV module is placed on the suppo r rack.

As shown in the above bolt installation diagram, inse r 4 stainless steel bolts (M8) into the mounting hole (9x14mm).

The size of mounting holes shall be 7x10mm at 400/790mm spacing and 4 stainless steel bolts of M6 type shall be used.



Ensure that two stainless steel washers are adopted for each bolt, one on the upper side and one on the lower side of the rack. The washer shall have a minimum thickness of 2mm and an outside diameter of 18mm, and is screwed on a stainless steel spring washer or toothed lock washer. Finally, lock with stainless steel nut, square nut is recommended

The tightening torque of M6 bolt is recommended to be 9~12Nm, and the tightening torque of M8 bolt is recommended to be 17~23Nm.

Maximum design load corresponding to installation of double-glass module

Product type	Mounting mode A		Mounting mode B	
	400 holes	790 holes	Inner four holes	External four holes

am is perpendicular to the long frame

Mounting mode C

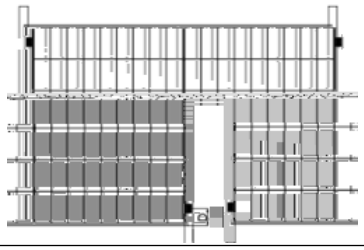
e D (mm)

Design load (pa)

Maximum design load corresponding to installation of double-glass module		
Product type	Mounting mode C	
	Installation range D (mm)	Design load (pa)
HY-P 0/54GDF	3 6≤D≤4 6	3600/ 600
HY-P 0/54BGDF	3 6≤D≤4 6	3600/ 600
HY-NT 0/54GDF	3 6≤D≤4 6	3600/ 600
HY-NT 0/54BGDF	3 6≤D≤4 6	3600/ 600
HY-P 0/60GDF	335≤D≤435	3600/ 600
HY-NT 0/60GDF	335≤D≤435	3600/ 600
HY-P 0/7 GDF	440≤D≤490	3600/ 600
HY-NT 0/7 GDF	440≤D≤490	3600/ 600
HY-NT 0/78GDF	480≤D≤580	3600/ 600
HY-NT /60GDF	450≤D≤530	3600/ 600
HY-NT /66GDF	440≤D≤540	3600/ 600
HY-NT /48GDF	3 6≤D≤4 6	3600/ 600
HY- NT /48BGDF	3 6≤D≤4 6	3600/ 600
HY-NT /54GDF	345≤D≤445	3600/ 600
HY-NT /54BGDF	345≤D≤445	3600/ 600
HY-NT /60GDF	385≤D≤485	3600/ 600
HY-NT /66GDF	440≤D≤540	3600/ 600
HY-NT /78GDF	480≤D≤580	3600/ 600
HY-NT 0/54GDF(88)	3 6≤D≤4 6	3600/ 600
HY-NT 0/54BGDF(88)	3 6≤D≤4 6	3600/ 600
HY-NT 0/60GDF(88)	335≤D≤435	3600/ 600
HY-NT 0/60BGDF(88)	335≤D≤435	3600/ 600

Note: Test load=ym (1.5 times safety factor)×design load."(188)" represents a 182.2*188 cell.

Installation mode D:Sho r edge installation. Four clamps are fxed, and the beam is perpendicular to the long frame.
Overlap width between the beam and the sho r side of the module shall be≥ 20mm.
The length of the clamps shall be ≥60mm. It is recommended to use clamps with an arc design to ft the A-side frame, featuring a non-slip and anti-detachment design.



Maximum design load corresponding to installation of double-glass module		
Product type	Mounting mode D	
	Installation range D (mm)	Design load (pa)
HY-NT /48GDF	50≤D≤ 50	066/ 066
HY-NT /48BGDF	50≤D≤ 50	066/ 066
HY-NT 0/54GDF(88)	50≤D≤ 50	066/ 066
HY-NT 0/54BGDF(88)	50≤D≤ 50	066/ 066
HY-NT 0/60GDF(88)	50≤D≤ 50	866/666
HY-NT 0/60BGDF(88)	50≤D≤ 50	866/666

Note: Test load=ym (1.5 times safety factor)×design load."(188)" represents a 182.2*188 cell.

The length of the rack must be longer than the size of the PV module, or it shall be confrmed by HY SOLAR in advance;

The above two diagrams show the installation method by using aluminum clamp . "D" indicates the allowable installation range of aluminum clamp, and the specifc recommended installation position and corresponding load are as shown in Table 1("---" indicates that the PV module is not applicable to the above installation method).

Each aluminum clamp is matched with an M8 bolt, a fat washer, a spring washer and an M8 nut, square nut is recommended, and the fxing steps are as follows:

Place the PV module on two racks (not provided). Which must be made of stainless steel or be treated with corrosion protection (e. g. hot-dip galvanized treatment). Each PV module needs at least 4 clamps to fx. During installation, please do not let the clamp directly contact the glass and deform the frame, otherwise it will result in PV module damaged.

Be sure to avoid the shading efect of the PV module due to the shadow formed by the clamp. The drain hole shall not be covered by the clamp . The clamp must have an overlap of at least 10mm with the PV module frame (the section of the clamp can be changed on the premise of ensuring the reliable installation of the PV module).

The upper surface of the rack in contact with the PV module frame shall be provided with a groove matched with the M8 bolt.

If there is no groove on the rack, a hole of appropriate diameter shall be drilled at the position mentioned above for bolt fxing.

Make sure that the installation sequence of each clamp is fat washer, spring washer and nut.

Figure 1 shows the middle mounting clamp , and Figure 2 shows the edge mounting clamp and its cross section view. The size of the middle and side pressing blocks are a≥50mm, b≥26mm, c≥5mm, d≥28mm, =9mm and the recommended wall thickness≥4mm. When the bolts and screws are of Grade 8.8, the recommended tightening torque is 17-23Nm. Consult the installer or rack supplier for specifc torque values.

In order to prevent the module from falling of from the frame after installation, it is recommended to select the clamp with patterned groove structures for edge and intermediate clamp k with contact surfaces with frame A. The recommended number of groove structures is about 9, the distance between adjacent grooves is recommended to be about 1.2mm, and the groove depth is recommended to be about 0.6mm, as shown in Figure 2.

The PV module shall be fxed by using professional solar clamp (as shown in Figure 3), and the overlapping par between the surface C of PV module and the guide rack shall be ≥15mm. If improper clamp or incorrect installation method is used, the warranty of HY SOLAR will be invalid.

For the modules with the length of more than 2.2m or the width of more than 1.3m, it is recommended to use the clamp with special anti-skidding design. If it is attached to the arc-shaped pressing surface of side A of the frame, or with the structure design of clamping, the clamp shall meet the requirements of length a≥ 60mm, thickness ≥5mm, material 6005-T6, Rp0.2>225MPa, and Rm265MPa. Technical requirements and details of pressing clamps can be consulted by after-sales service team of HY SOLAR.

Figure 1
Schematic Diagram of Intermediate Clamp

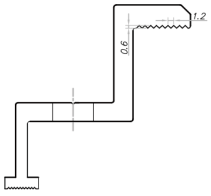


Figure 2 Schematic Diagram of Cross Section of Edge Clamp

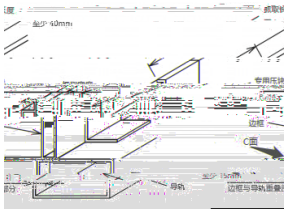


Figure 3 Requirements for Installation of Clamp for Ovrlapping Long Frame of guide rail

6.1 Electrical pe r ormance

If one group of arrays is connected to another with opposite polarity, irreparable damage to the product can occur. Be sure to verify the voltage and polarity of each string before connection in parallel. If the measurement shows that the polarity between the string is reversed or the voltage dif erence is greater than 10V, the structural conf guration must be checked before making the connection.

The number of PV modules connected in series and in parallel shall be reasonably designed according to the system conf guration. The PV modules of dif erent electric per ormance models cannot be connected in one string.

Solar dedicated cables and connectors shall be used in the system, and all connections shall be securely fastened. The cable size shall be not less than 4mm2(12AWG), and must withstand the maximum open circuit voltage of the PV system.

When the cable is f xed on the rack, it is necessar to avoid mechanical damage to the cable or PV module, and do not press the cable with force. Cables shall be f xed by proper means, and shall be f xed on the rack by specially designed binding coils and wire clamps that are resistant to ultraviolet light. Avoid direct sunlight and water soaking of cables.

Keep the connector dr and clean, and make sure that the nut of the connector is in a tightened state before connecting. Do not connect the connector when it is found to be wet, dir y or in other bad conditions. Protect connectors from direct sunlight and immersion in water. Avoid landing the connector on the ground or on the roof.

When the PV module is in load condition , please do not inser or unplug the connector. When it is necessar to disconnect the connector, it is required to ensure that the PV module is in load condition and professional unlocking tools and safety protection measures must be used. It is forbidden to pull or damage the locking structure.

The junction box of the PV module contains a bypass diode which is connected in parallel with the cell string of the PV module. The bypass diode in the junction box can avoid the PV module per ormance degradation caused by shadow or covering. Please refer to the junction box diode specif cation provided in the relevant product specif cation.

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In the design of the PV module, the anodized corrosion-resistant aluminum alloy frame is adopted as the rigid suppo r .

Appendix A: Installation Guidelines for Offshore Photovoltaic Modules

In accordance with the conditions specified in the HY SOLAR Module Installation Manual and the warranty statement, the installation of our company's photovoltaic modules in offshore areas must be carried out strictly in accordance with this installation guide.

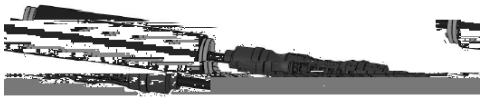
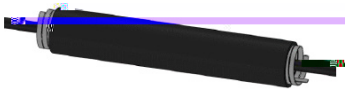
This appendix is intended to allow customers to install photovoltaic modules within offshore areas. It specifies the general requirements for ensuring the correct and reliable installation of our company's photovoltaic modules in offshore areas, including but not limited to the anti-corrosion principles for modules and related installation systems.

Before installing photovoltaic modules in offshore areas, please carefully read this appendix and strictly follow the relevant guidelines. Failure to comply with these guidelines and other general anti-corrosion principles may result in environmental corrosion damage to photovoltaic modules and bracket systems, and render HY SOLAR's product and performance limited warranty invalid. For further consultation, please contact our technical after-sales service department for more information.

The reliability of photovoltaic modules is closely related to their distance from the coastline. Offshore land areas are divided according to their distance from the coastline. HY SOLAR usually divides coastal photovoltaic installation types into 5 different usage scenarios, as shown in the following table:

Scenario Definition	
Offshore (Floating)	Standard double-glass product.
	Standard double-glass or conventional single-glass product.

Guidelines and Recommendations for Cold Shrink Tube Installation

Step	Method Description	Example
2		
3		
4		
5		
6		

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