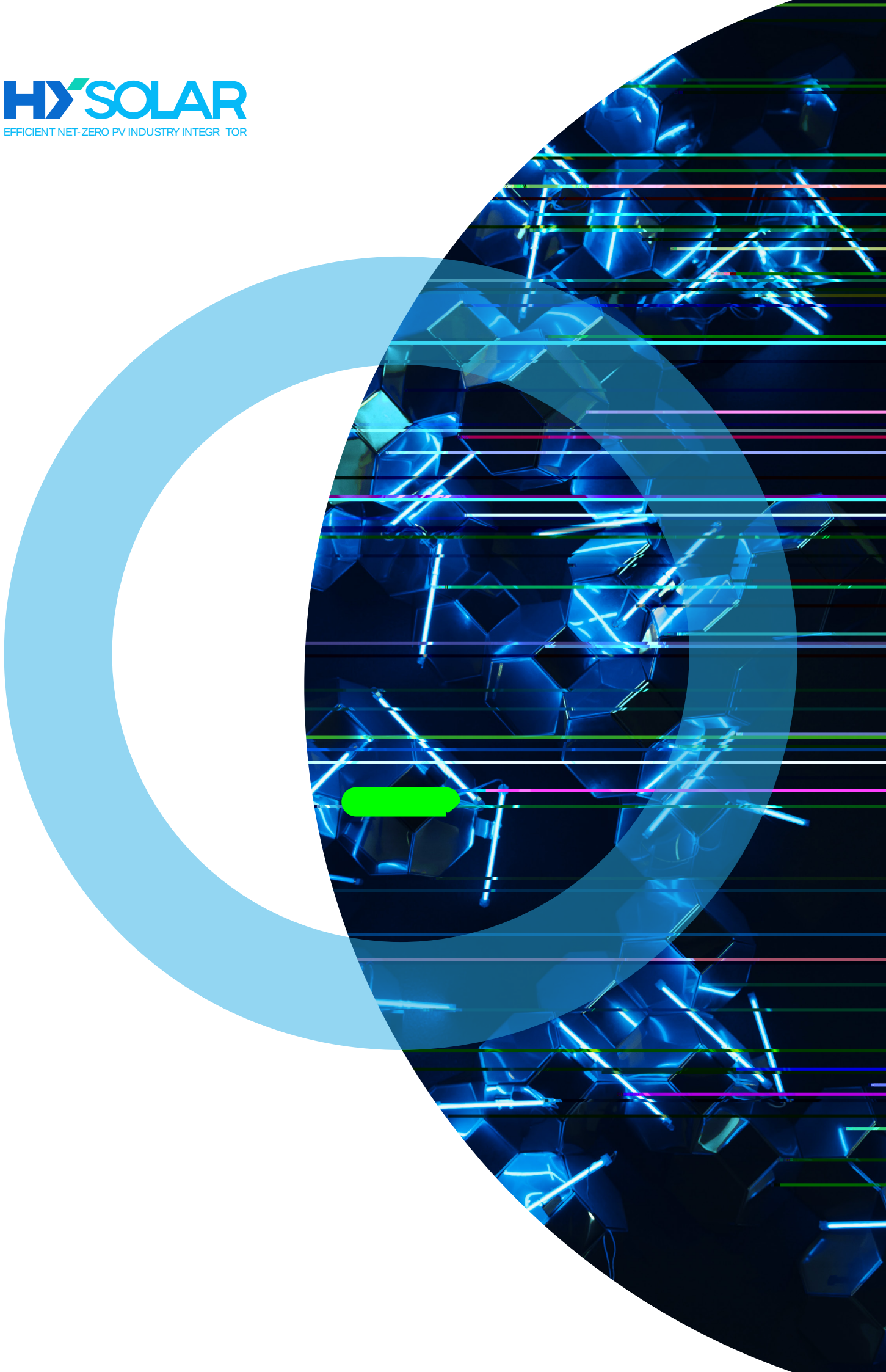




List of Applicable Modules

Module type	Module model
Single- glass module	HY- NT10/54H HY- NT10/54BH
	HY- NT10/60H
	HY- NT10/72H
	HY- P10/54H HY- P10/54BH
	HY- P10/60H
	HY- P10/72H
	HY- NT11/48H HY- NT11/48BH
	HY- NT11/54H HY- NT11/54BH
	HY- NT11/60H
	HY- NT11/66H
	HY- NT12/60H
	HY- NT12/66H
	HY- P12/60H
	HY- P12/66H
Double- glass module	HY- NT10/54GDF HY- NT10/54BGDF HY- NT10/60GDF HY- NT10/60BGDF HY- NT10/72GDF HY- NT10/78GDF
	HY- P10/54GDF
	HY- P10/60GDF
	HY- P10/72GDF
	HY- NT11/48GDF HY- NT11/48BGDF HY- NT11/48GSF HY- NT11/48BGSF
	HY- NT11/54GDF HY- NT11/54BGDF HY- NT11/54GSF HY- NT11/54BGSF
	HY- NT11/48QGDF HY- NT11/48QGSF
	HY- NT11/60GDF
	HY- NT11/66GDF
	HY- NT11/66QGDF
	HY- NT11/78GDF
	HY- NT12/60GDF
	HY- NT12/66GDF
	HY- P12/60GDF
	HY- P12/66GDF



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First of all, thank you very much for using the photovoltaic modules produced by HONGYUAN GREEN ENERGY CO.,LTD. (hereinafter referred to as HY SOLAR)

in this work. All safety precautions in this manual must be strictly observed during installation, and this manual shall be kept for further reference. At the same time, the installer must inform the end customer (or consumer) of the above

1.1 Purpose

This manual provides detailed instructions and important safety precautions, to electrical connection and maintenance of crystalline silicon PV modules (hereinafter referred to as PV modules) manufactured by HY SOLAR.

1.2 Scope of liability

control of HY SOLAR, this manual does not have the any significance of warranty, whether expressed or implied. HY SOLAR will not be liable for any kind of injury, including but not limited to loss, damage, personal injury or extra

HY SOLAR reserves the right to update this manual without prior notice. In case of any inconsistency between different

requirements of electrical laws, building laws and electric connection. These regulations vary depending on the location of the installation, e. g. building roofs, and water surfaces, etc.; and they may also vary depending on the voltage of the installation system and the use of DC or AC. Please contact the local authority for specific terms.

The design of HY SOLAR's PV module meets the standards of IEC61215, IEC61730 and UL61730. The PV module

PV modules can be used in systems that are accessible to the public, greater than DC 50V or 240W. It can meet Class C fire rating (IEC61730) and Category 4 fire rating (UL61730)

Warning

All safety articles should be read and understood prior to operations such as installation and wiring, etc. or sources. Whether or not connecting with PV modules, any direct contact with live parts of PV modules, such as connecting terminals, may result in personal injury or death.

3.1 General safety measures

- parts and components in the system, including cables, connector, charge monitors, storage batteries, and inverters.
- The installation and maintenance of PV modules must be done by qualified engineers, and they must wear safety helmets, insulating gloves, safety shoes and use insulating tools to avoid direct contact with 30V DC or higher voltage.
- During the installation and transport of module at the project site, rain-proof measures shall be taken to prevent the
-
-
-
- It is prohibited to repair PV modules by users themselves, including but not limited to replacing any PV module parts (diode, junction box, or connector, etc.).
- Interconnecting connectors of different types and models is prohibited.
- :
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, certain drugs (BaiHuaYou, woodlock medicated balm, bonesetting, 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, emulsifier, or cutting oil, cosmetics, etc., so as to avoid chemical damage and impact on the electrical safety performance of PV modules.
-
-
- It is forbidden to use PV module in places where flammable 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 part of PV module;
- If the PV module connector is wet, do not perform any action to avoid electric shock hazard.
-
- The cover of the junction box shall be kept closed at all times.
- And the PV module shall be prevented from partial shadow for a long time. Otherwise, the temperature of the shadow solar cell will rise (hot spot effect), and in serious cases, the PV module may be burnt and even a fire may be
- For PV modules used in desert or sandy areas, it is recommended to use connector dust cap before installation, or
-
- prevent moisture or sand entering metal parts, which may cause plugging or use problems.
- For field wiring, special photovoltaic cables with minimum 90 °C temperature resistance, light resistance, and cross

3.2 Operation safety measures

- During transportation 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
- Any part of the PV module shall be prevented from being bumped or scratched, so as not to affect 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
- Do not install or carry 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
- When installing or maintaining the PV system, do not wear any metal accessories to avoid an electric shock hazard,
- 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 surface with an opaque material to prevent the generation of electric current.
- The PV module and the mounting surface shall be spaced to avoid direct contact with the junction box.
- When installing on the roof, the fire resistance requirements of the building must be observed. It is recommended that the PV module be installed on fireproof and insulating roof covering layer with adequate ventilation between the PV module and the mounting surface. To ensure the fire rating on the roof, the minimum distance between the PV module frame and the roof surface is 10cm.
- The connectors must be fully plugged when wiring. If the cable is too long, it is recommended to fix the cable on the installation system with a nylon cable tie with UV resistance. When fixing the conducting wire to the rack, the bending radius of the wire shall not be less than 48mm.
-
-
-
- It is strictly prohibited to paint or apply any adhesive on the surface of PV module.
-
- It is forbidden to scratch anodized coating on the surface of aluminum alloy frame (except for grounding connection). Scratches may cause corrosion of the frame, affecting its load resistance and long-term reliability.
-
- separate the PV module from the field or circuit.
- Do not touch the wet PV module unless wearing the qualified anti-electric shock equipment.
- When professional personnel replace or repair PV modules, please do not damage the peripheral PV modules or their support structure.
- When cleaning the PV module, the cleaning requirements of PV modules must be followed.
- Connectors must be kept d r and clean to ensure they are in good working condition. Do not insert other metal objects into the connector or make electrical connections in any other way.

product package. The goods shall be stored in a dry and ventilated place

It is suggested to unpack an appropriate amount of PV modules every day according to the progress of the project, and the unpacked PV modules

a long time in case of severe weather such as rainstorm, which may affect

4.1 Handling & unloading

When the PV module is transported to the project site, it must be transported in the packing box

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.

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

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 firm (bearable pressure $\geq 1.5t$). When the

ropes with tensile strength $\geq 2000\text{kgf}$ shall be fastened on the forklift truck, and safety guardrails shall be

2. The straight-line running speed of the vehicle shall be controlled to be $\leq 5\text{km/h}$, and the turning speed shall be $\leq 3\text{km/h}$ to avoid emergency stop and rapid start.

3. When the = t tr , and co ő . § mast shall be $\geq 1.5\text{M}$. Forklift truck mast: height ≥ 1.7

4.2 Unpacking

Before unpacking, please confirm that the outer package is intact. It is recommended to use an a r knife to remove the packing straps and wrapping flm. 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

If it is not installed in a sho r time after unpacking, it shall be f xed 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

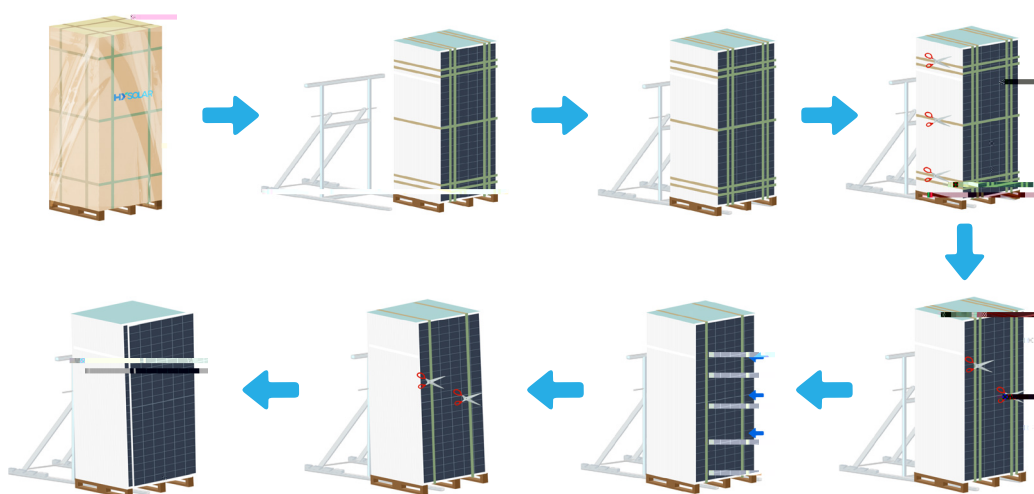
14

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



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

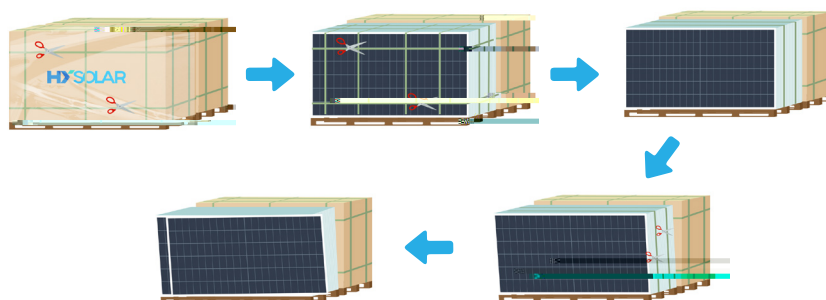
- (1) Cut the wrapping straps, get rid of the wrapping flm, and remove the upper cover and the car on;
- (2) Inse r the anti-falling bracket into the bottom of the pallet from the glass su r ace or the back plate su r ace of the module;
- (3) Inse r the f xing pin into the front hole of the bracket;
- (4) Cut o f all the transverse packing straps inside;
- (5) Cut o f the rest packing straps in the longitudinal direction except the inner two;
- (6) Slowly push the module against the bracket;
- (7) Cutting o f the remaining packing straps;
- (8) Tear o f the anti-dump adhesive tape on both sides, notice to tear o f only one piece of anti-dump adhesive tape



Long-side ve rical unpacking steps

3. For the short-side vertical unpacking steps, the module shall be provided with fixed supports (wall surfaces, brackets, or unpacked modules, etc.):

- (1) Cut all the packing straps of the outer box, remove the wrapping film, and remove the upper cover and the carton;
- (2) Cut off all the transverse packing straps inside, and cut off the rest packing straps in the longitudinal direction except the two inside packing belts;
- (3) Push the module against the stable support;
- (4) Cutting off the remaining packing straps;
- (5) Take out the modules one by one in sequence.



Short-side vertical unpacking steps

4.3 Stacking of PV modules

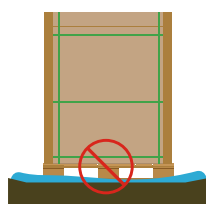
When the PV module is taken out of the packaging box, the cardboard shall be laid on the ground to prevent the PV module from being scratched due to collision and friction with hard objects on the cement surface/ground, or color

14

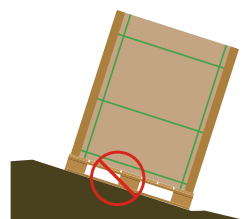
Objects such as installation tools, etc. shall be avoided from being placed on the surface of the PV module.

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 require-

> 4°.



It is forbidden to stack in the place where the foot is



> 4°.

05 Mechanical installation

5.1 Installation environment

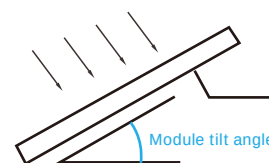
- Recommended ambient temperature: -20°C to $+50^{\circ}\text{C}$; extreme operating ambient temperature of PV module: -40°C to $+85^{\circ}\text{C}$.
- PV module mechanical load: Under standard installation conditions, the maximum test snow/wind load is 5400Pa/2400Pa respectively, and the design load (considering 1.5 safety factor) is 3,600Pa/1,600Pa. For specific PV Module.

- PV modules should not be installed in corrosive environments (such as salt, salt mist, salt water, active chemical vapor, acid rain, strong vapor enclosed environment or any other substances that will corrode the PV module and affect the safety or performance of the PV module).
- If PV modules are to be installed in high-temperature and high-humidity environment, wet salt mist environment (in the C3 area and above specified in ISO9223), water, farms and other special environments, the Buyer or the user shall inform HY SOLAR in advance. The type, BOM and quality warranty of PV modules used in such areas shall be determined by both parties through re-agreement.

If the above precautions are not observed, the warranty of HY SOLAR shall be invalid.

5.2 Selection of installation inclination angle

- The installation angle of the PV module refers to the angle between the PV module surface and the ground plane, as shown in Figure 5-1.
- When installed in the northern hemisphere, the PV modules should preferably face south. When installed in the southern hemisphere, the PV modules should preferably face north. For detailed installation inclination angle, please follow local regulatory guidelines or recommendations from experienced PV module installers. The installation tilt angle of the PV module recommended by HY SOLAR is not less than 10° , so that the dust on the surface of the PV module is easy to be taken away by rain when it rains, so as to reduce the cleaning times of the PV module; meanwhile, it is beneficial for the accumulated rainy water on the surface of PV modules to flow away, so as to avoid a large amount of long-time accumulated water from leaving marks on the glass surface, thereby affecting the appearance and performance of the



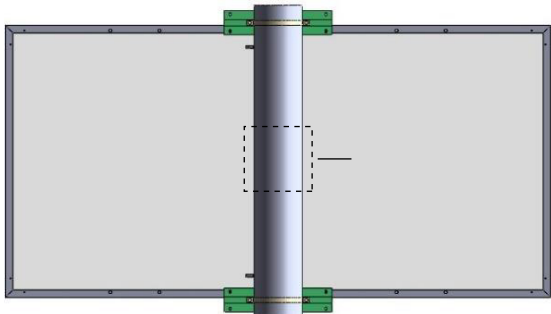
Tilt Angle of PV Module

angle. Different orientations and angles may result in different amounts of solar radiation.

5.3 Installation guidelines

- The mounting rack system must be subjected to static mechanical analysis test by the competent third-party testing agency to meet the requirements of the country, region or corresponding international standards.
- When the PV module is mounted on the ground, it is recommended that the minimum distance from the floor to the

bottom of the module be at least 60cm.

		Installation mode B:		
				
Maximum design load corresponding to installation of single-glass module				
	Mounting mode		Mounting mode B	
	400 holes	790 holes		
- 10/54	---	---	3600/1600	---
- 10/54BH	---	---	3600/1600	---
- 10/54	---	---	3600/1600	---
- 10/54BH	---	---	3600/1600	---
- 10/60	---	---	3600/1600	---
- 10/60	---	---	3600/1600	---
- 10/72H(35H)	1600/1266	---	---	3600/1600
- 10/72H(30H)	---	1600/1600	---	3600/1600
- 10/72 (35H)	1600/1266	---	---	3600/1600
- 10/72 (30H)	---	1600/1600	---	3600/1600
- 12/60	1266/1266	1600/1600	---	3600/1600
- 12/66	1266/1266	1600/1600	---	3600/1600
- 11/48	---	---	---	3600/1600
- 11/48B	---	---	---	3600/1600
- 11/54	---	---	---	3600/1600
- 11/54BH	---	---	---	3600/1600
- 11/60	---	1600/1600	---	3600/1600
- 11/66	---	1600/1600	---	3600/1600

Maximum design load corresponding to installation of double-glass module				
	Mounting mode A		Mounting mode B	
	400 holes	790 holes		
HY-NT10/54GDF	---	---	3600/1600	---
HY-NT10/54BGDF	---	---	3600/1600	---
HY-P10/54GDF	---	---	3600/1600	---
HY-NT10/60GDF	---	---	3600/1600	---
HY-NT10/60BGDF	---	---	3600/1600	---
HY-P10/60GDF	---	---	3600/1600	---
HY-NT10/72GDF	1200/1200	1600/1600*	---	3600/1600
HY-P10/72GDF	1200/1200	1600/1600*	---	3600/1600
HY-NT10/78GDF(35H)	---	---	---	3600/1600
HY-NT10/78GDF(30H)	---	1600/1600*	3600/1600	2400/1600
HY-NT12/60GDF(35H)	1466/1466	---	---	3600/1600
HY-NT12/60GDF(33H)	1333/1333	1866/1600*	---	3600/1600
HY-NT12/66GDF 35H	1466/1466	---	---	3600/1600
HY-NT12/66GDF(33H)	1333/1333	1866/1600*		3600/1600
HY-NT11/48GDF	---	---	---	3600/1600
HY-NT11/48BGDF	---	---	---	3600/1600
HY-NT11/48GSF	---	---	---	3600/1600
HY-NT11/48BGSF	---	---	---	3600/1600
HY-NT11/48QGDF	---	---	---	3600/1600
HY-NT11/48QGSF	---	---	---	3600/1600
HY-NT11/54GDF	---	---	---	3600/1600
HY-NT11/54BGDF	---	---	---	3600/1600
HY-NT11/54GSF	---	---	---	3600/1600
HY-NT11/54BGSF	---	---	---	3600/1600
HY-NT11/60GDF	1066*	1600/1600*	---	3600/1600
HY-NT11/66GDF	1066*	1600/1600*	---	3600/1600
HY-NT11/66QGDF	1066*	1600/1600*	---	3600/1600
HY-NT11/78GDF	---	---	3600/1600	3600/1600

Maximum design load corresponding to installation of double-glass module				
	Mounting mode A		Mounting mode B	
	400 holes	790 holes		
HY-NT10/54GDF 188	---	---	3600/1600	---
HY-NT10/54BGDF 188	---	---	3600/1600	---
HY-NT10/60GDF 188	---	---	3600/1600	---
HY-NT10/60BGDF 188	---	---	3600/1600	---

Note: Test load=ym (1.5 times safety factor)×design load. Cushion blocks are used for those marked with "*".
 "(188)" represents a 182.2*188 cell.

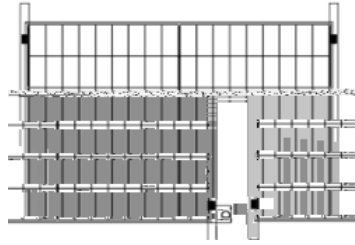
5.3.2 Fixing method of clamp

The quantity and position of clamp are very crucial for the reliability of installation. Generally, the number of clamp must not be less than 4. According to the requirements of different loads and installation methods, the position of the center line of the clamp is specified. During installation, the clamp must be within

Installation mode C: four clamps are fixed, and the beam is perpendicular to the long frame		
Maximum design load corresponding to installation of single-glass module		
	Mounting mode C	
	Installation range D (mm)	Design load (pa)
- 10/54	316≤ ≤416	3600/1600
- 10/54B	316≤ ≤416	3600/1600
- 10/54	316≤ ≤416	3600/1600
- 10/54BH	316≤ ≤416	3600/1600
- 10/60	335≤ ≤435	3600/1600
- 10/60	335≤ ≤435	3600/1600
- 10/72	400≤ ≤500	3600/1600
- 10/72	400≤ ≤500	3600/1600
- 12/60	385≤ ≤485	3600/1600
- 12/66	450≤ ≤550	3600/1600
- 11/48	316≤ ≤416	3600/1600
- 11/48B	316≤ ≤416	3600/1600
- 11/54	345≤ ≤445	3600/1600
- 11/54BH	345≤ ≤445	3600/1600
- 11/60	385≤ ≤485	3600/1600
- 11/66	475≤ ≤525	3600/1600

HY-P10/54GDF
 HY-P10/54BGDF
 HY-NT10/54GDF
 HY-NT10/54BGDF
 HY-P10/60GDF
 HY-NT10/64BGDF
 HY-P10 100GDF

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



⚠ Special Notes

The length of the rack must be longer than the size of the PV module, or it shall be confirmed 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 specific 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 flat washer, a spring washer and an M8 nut, square nut is recommended, and the fixing 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 fix.

Be sure to avoid the shading effect 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 fixing.

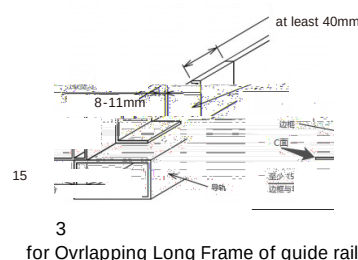
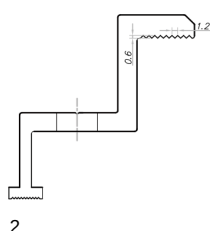
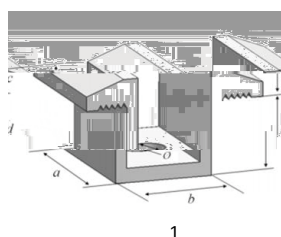
Make sure that the installation sequence of each clamp is flat washer, spring washer and nut.

1 section view. The size of the middle and side pressing blocks are $a \geq 50\text{mm}$, $b \geq 26\text{mm}$, $c \geq 5\text{mm}$, $d \geq 28\text{mm}$, $\square = 9\text{mm}$ and the recommended wall thickness $\geq 4\text{mm}$. When the bolts and screws are of Grade 8.8, the recommended tightening torque is 17-23Nm. Consult the installer or rack supplier for specific torque values.

In order to prevent the module from falling off from the frame after installation, it is recommended to select the clamp with patterned groove structures for edge and intermediate clamping 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 2.

The PV module shall be fixed by using professional solar clamp (as shown in Figure 3), and the overlapping part between the surface C of PV module and the guide rack shall be $\geq 15\text{mm}$. 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 $\geq 60\text{mm}$, thickness $\geq 5\text{mm}$, material 6005-T6, $R_{p0.2} > 225\text{MPa}$, and $R_m \geq 265\text{MPa}$. Technical requirements and details of pressing clamps can be consulted by after-sales service team of HY SOLAR.



3 for Overlapping Long Frame of guide rail

The rated electric performance data of the modules were measured under standard test conditions (STC: irradiance 1000W/m², AM1.5, cell temperature 25°C). For the main electric performance parameters, maximum system voltage and Isc, Voc and Pmpp, please refer to the product datasheet or nameplate of HY SOLAR Module.

In some circumstances, the current or voltage generated by the PV Module may be greater than the operating current or voltage in its standard testing environment (STC). Therefore, in determining ratings and loads of the module, the module short-circuit current at the STC should be multiplied by 1.25 and the open-circuit voltage should be multiplied by a more conservative correction factor (see Table 2 below), and the module short-circuit current should be multiplied by 1.25 (i. e., multiplied by 1.56) according to local regulations when determining the appropriate conducting wire and fuse specification.

In addition, a more accurate open circuit voltage correction coefficient can be calculated according to the following :

$$C_{voc}=1-$$

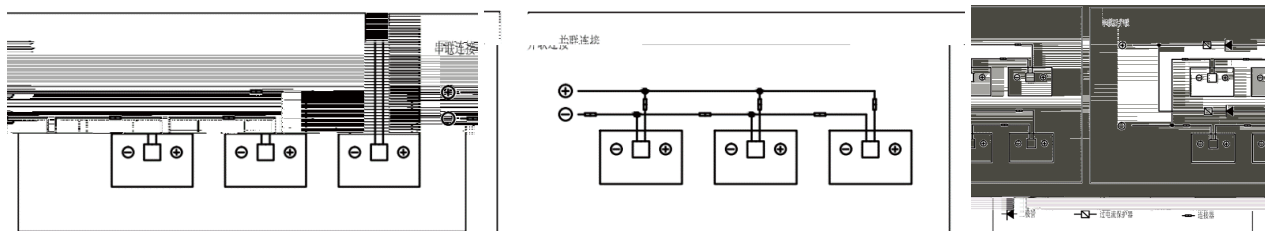
Where: C_{voc} is the open circuit voltage correction coefficient. α_{voc} (%/ ° C) is the temperature coefficient of the open-circuit voltage of the selected module (refer to the module specification). T_{min} (° C) is the lowest expected ambi-

maximum input voltage of the inverter and other electrical equipment in the installation system. To ensure this, the :

The electrical design and calculation of the system shall be determined by the qualified electrical engineers.

6.2 Electric connection

In order to ensure the normal operation of the system, when connecting the PV module or connecting the load (such as frequency converter, or battery, etc.), it is necessary to observe and ensure that the polarity of the cable is connect-



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 difference is greater than 10V, the structural configuration must be checked before making the connection.

system configuration. The PV modules of different electric performance models cannot be connected in one

4 2(12AWG), and must withstand the maximum open circuit volt-

When the cable is fixed on the rack, it is necessary to avoid mechanical damage to the cable or PV module, and do not press the cable with force. Cables shall be fixed by proper means, and shall be fixed on the rack by spe-

Keep the connector dry 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, dirty or in other bad conditions. Protect

When the PV module is in load condition, please do not insert or unplug the connector. When it is necessary to

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 performance degradation caused by shadow or covering. Please refer to the junction box diode specification provided in the relevant product specification.

When the local hot spot phenomenon of the PV module occurs due to shadow or covering, the diode in the junction box is triggered in active condition, so that the current of the PV module does not flow through the hot spot cell any more, thereby limiting the heating and performance loss of the PV module. When suspecting or finding that the diode is faulty, please contact HY SOLAR and do not try to open the junction box cover by your-

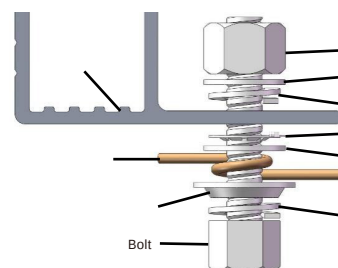
6.3 Grounding

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

the frame of the PV module must be grounded. When grounding, the grounding device must be in full contact with the interior of the aluminum alloy to penetrate the anodized coating on the surface.

There is a grounding hole with a diameter of about $\Phi 4\text{mm}$ on the edge of the module frame. As well as standard grounding symbol mark “ $\equiv$ ” beside the grounding hole. The grounding wire can be connected with bolts. Please do

The grounding bolt is made of stainless steel. First insert the bolt through the spring washer, cup washer, fat washer and star washer, and then pass through the grounding hole, spring washer and fat washer of the frame, and finally tighten the bolt with the nut. Please note: the upper limit of temperature of the wire is 85°C . Refer to the Figure for installation of grounding



Grounding Aluminum Bezel With Copper Cable

Modules are grounded to each other:

4 2 copper core wire can be adopted between modules to contact the grounding holes of adjacent

Connection mode	Parts	Schematic diagram
adjacent modules, and then use the nut to tighten and fix the grounding adjacent modules.		

Warning

The welding and grounding devices, including Burndy (formerly Wiley Electronics) WEEB and similar equipment such as barb washers, to compliance with the UL-467 and suitable for electrical welding and grounding of PV

Other methods of grounding may be used when testing support systems as required by UL2703. Do not drill any

07 Maintenance

that the user shall undertake, which will help to identify and eliminate problems in time and ensure the safe and effective

7.1 Routine inspection

glass, broken cables, damaged junction boxes, damaged cells, cracked back-sheet and other factors that may lead to

It is recommended to perform a preventive inspection every 6 months, and not to replace components of PV modules without authorization. If inspection or maintenance of electrical or mechanical performance is required, it is recommended that the operation be carried out by a qualified professional to avoid electric shock or personal injury or

7.2 PV module cleaning

If there is a lot of dirt accumulation on the surface of PV module, which has seriously affected the power generation, the cleaning shall be carried out in the early morning, evening, or cloudy day (when the irradiance is lower than 500W/m²), and it is strictly prohibited to carry out the cleaning operation before or after noon or in the period of strong direct sunlight; and when cleaning in the morning and evening, it shall be carried out in the period with weak sunlight,

Requirements of Cleaning Fluid:

- 1) Water shall be neutral, with PH: 6-8;
- 2) Electroconductibility: $\leq 500\mu\text{S}/\text{cm}$;
- 3) Total dissolved solid volume: $\leq 1000\text{mg}/\text{L}$;
- 4) Water hardness: $\leq 300\text{mg}/\text{L}$;
- 5) Water pressure at nozzle: not more than 0.5Mpa.

Precautions for cleaning:

- 1) The temperature difference between the water used for PV module cleaning and the module shall not be greater than 10°C; and when the ambient temperature is lower than 5°C, the PV module shall not be cleaned to avoid cracking PV glass;
- 2) It is forbidden to clean the PV module under the meteorological conditions including wind force greater than level 4, heavy rain or heavy snow, heavy rain, sand blowing and hail;
- 3) The PV modules shall be wiped with dry or damp soft and clean cloth. It is strictly forbidden to use corrosive solvents or hard objects to clean PV modules;
- 4) It is forbidden to wipe the PV module with materials with high roughness and hardness;
- 5) Do not clean module when glass is broken or wires are exposed to avoid electric shock;
- 6) Do not leave any cleaned tools on the glass to avoid hot spots;
- 7) Please do not stand on the surface of the module glass to avoid micro crack of the cell.
- 8) The PV module shall be cleaned by qualified professionals, and they must wear safety helmets, safety belts, insula-

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

1. "Ofshore photovoltaic" module products refer to a type of module products specially designed for offshore areas. These module products have undergone special material matching and strict third-party reliability enhanced testing, and can meet the anti-corrosion installation and use requirements in offshore areas.

2. For "offshore photovoltaic" module products, they must be installed above the sea level, and after installation, the

3. The local environmental conditions have a significant impact on the salt mist deposition rate, which depends to a large extent (but not absolutely) on the specific area and local wind patterns. HY SOLAR reserves the right to modify the above definitions in specific cases. Please contact HY SOLAR's pre-sales technical support to determine the type of your

4. The "coastline" mentioned in this manual refers to the boundary line between seawater and land at high tide.

5. The "distance from the coastline" mentioned in this manual refers to the shortest straight-line distance between the

6. Please contact HY SOLAR's technical support department for more information on the installation of anti-corrosion modules. During installation, the surface of the module must not come into contact with sharp objects, and there must be no scratches on the surfaces of glass, frames, connectors, junction boxes, etc.

7.

8. The process specifications of parts and components must comply with relevant international anti-corrosion standards.

9. Regularly maintain anti-corrosion coatings (photovoltaic brackets, fasteners, grounding devices, etc.).

10. Modules (glass, junction boxes, connectors, etc.) are prohibited from long-term exposure to environments containing
 ited from contacting organic solvents that can damage the anti-reflective coating of the front glass or the polymers of the junction boxes and backsheets.

11. Before installation, the connectors are protected by dust plugs/waterproof plugs (blocking plugs). After removing the dust plugs, the connectors should be connected immediately to prevent moisture, mud, and other foreign objects from entering and corroding the conductive metals inside the connectors. If further enhancement of anti-corrosion per-

tubes are prohibited from being used underwater. (The cold shrink tubes must meet the quality and technical requirements of HY SOLAR.)

	Method Description	
1	the right figure.	

	Method Description	
2		
3		
4	Position the connection interface at the middle	
5		
6		
Before installation, ensure there are no foreign objects such as sand, water droplets, or sharp objects inside the cold shrink tube; It is prohibited to tie nameplates to the cold shrink tube to prevent the cable ties from scratching the tube; Pay attention to on-site environmental protection (proper disposal of support strips, instructions, and packaging bags); There shall be no cracks or gaps at both ends of the cold shrink tube, and no holes on the surface; The cold shrink tube shall shrink smoothly and naturally to fit tightly on the connector and cable, with no		

12. When installing offshore photovoltaic modules, all requirements listed in the HY SOLAR Installation Manual shall be

13. To minimize salt mist corrosion, HY SOLAR recommends the following:

13.1 It is recommended to use anti-corrosion materials for the (support) and system-related installation components (such as SUS 316 stainless steel, hot-dip galvanized carbon steel, new anti-corrosion materials like Zn-Al-Mg composite coated steel, etc.).

13.2

13.3

specified in JIS H 8641 and JIS H 8601 standards.



Group Headquarter

Building 7, Changguangxi Wetland Park,
Lihu Avenue, Binhu District, Wuxi City,
Jiangsu Province, China

E-mail

@ .

Module Manufacturing Base

No.1159 Gangcheng Avenue, Jiangyin City,
Jiangsu Province, China

Tel

0510-8595 1888