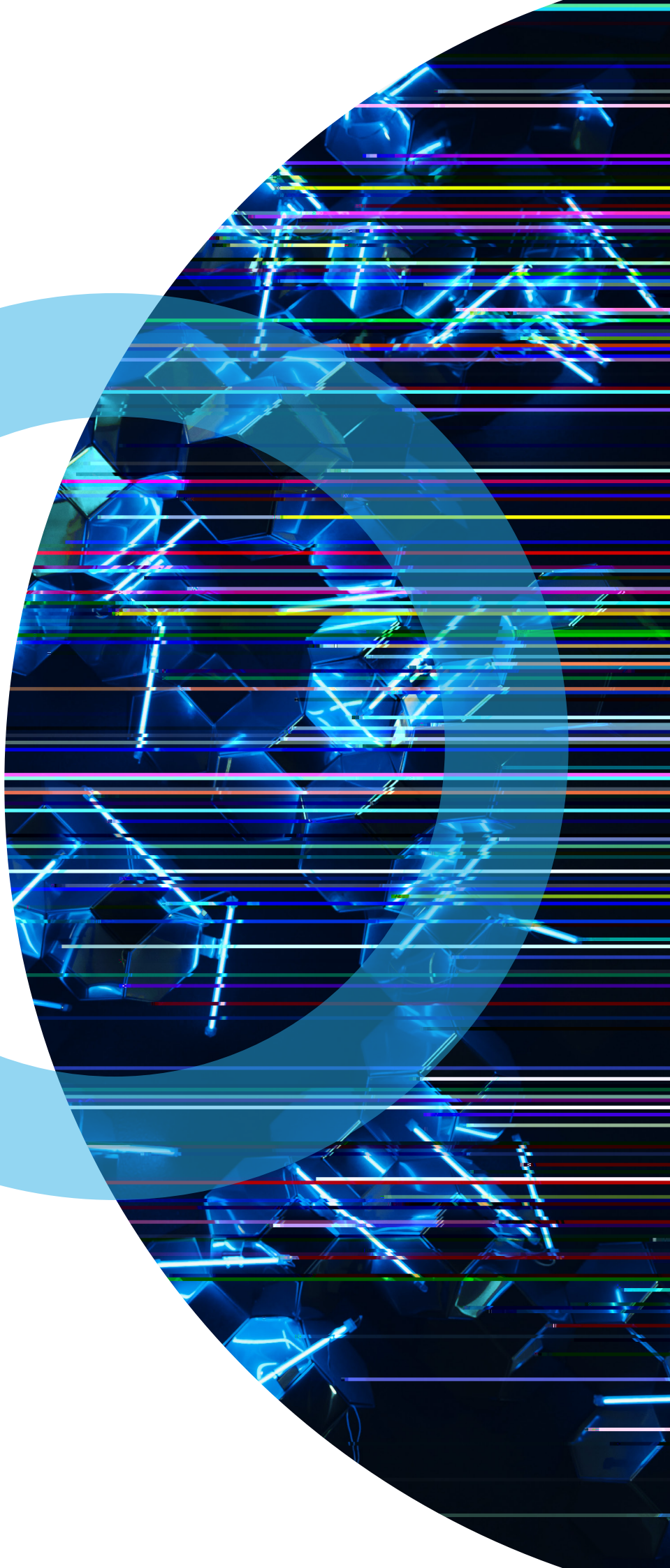
HY SOLAR

EFFICIENT NET-ZERO PV INDUSTRY INTEGRATOR



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

Please read all instructions in this manual and the electrical and mechanical requirements carefully before installation.

3.1 General safety measures

- 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 parts and components in the system, including cables, connector, charge monitors, storage batteries, and inverters, etc.
- 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 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 parts (diode, junction box, or connector, etc.).
- Interconnecting connectors of different 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, certain 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, emulsifer, 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 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 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.
- 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 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 caused.
- For PV modules used in desert or sandy areas, it is recommended to use connector dust cap before installation, or take other measures to prevent sand from entering the connector, otherwise it may cause plugging problems or electrical safety hazards.
- After the module is installed on the rack, it is recommended to interconnect the connector on the same day to prevent moisture or sand entering metal parts, which may cause plugging or use problems.
- For field wiring, special photovoltaic cables with minimum 90 temperature resistance, light resistance, and cross section of not less than 4mm² shall be used as the PV connection line.

3.2 Operation safety measures

- 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.
- Avoid direct exposure of cables and connectors to sunlight. Use UV resistant cables.
- Please do not disconnect the electrical connection under load.
- It is forbidden to attempt to disassemble the PV module, remove the nameplate of the PV module or other components on the PV module.
- It is strictly prohibited to paint or apply any adhesive on the su r ace of PV module.
- It is forbidden to drill holes in the PV module frame.
- It is forbidden to scratch anodized coating on the su r ace of aluminum alloy frame (except for grounding connection). Scratches may cause corrosion of the frame, a fecting its load resistance and long-term reliability.
- If the PV module glass or other encapsulated material is damaged, please wear personal protective equipment to separate the PV module from the f eld or circuit.
- Do not touch the wet PV module unless wearing the quali fed anti-electric shock equipment.
- When professional personnel replace or repair PV modules, please do not damage the peripheral PV modules or their suppo r 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 inse r other metal objects into the connector or make electrical connections in any other way.

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.

4.1 Handling & unloading

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 SOLA l and orm ş ş ş aiking bo ' d '

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.

mast shall be ≥1.5M. Forklift truck mast: height ≥1.7M, width ≥1.5M; cushion

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 ob Š Vo co h et th Í ˝E(mÐe l· bC 8

bottom of the module be at least 60cm.

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

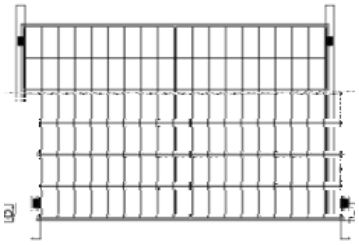
5.3.2 Fixing method of clamp

Installation mode C: four clamps are fxed, and the beam is perpendicular to the long frame

Product type	Mounting mode C	
	Installation range D (mm)	Design load (pa)

HY-P10/54GDF
HY-P10/54BGDF
HY-NT10/54GDF
HY-NT10/54BGDF
HY-P10/60GDF
HY-NT10/54BGD ẁ -P10/60GDF-P10/60GDF-P10/60G ő F
Y-P10/ 60G Ļ FH ó Y-P10/60GĦĻŸF Y-P10/60G Ļ FH ð Y-P10/60G Ļ FHY-NT10/54G £ F
H ñ ỻ -P10/60G ĻĦFð Ħ F
H õ ỻ -P10/60G Ļ F-P10/54BGDFHY-NT10/54GDF

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

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

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 difference is greater than 10V, the structural configuration 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 configuration. The PV modules of different electric performance 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 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 specially designed binding coils and wire clamps that are resistant to ultraviolet light. Avoid direct sunlight and water soaking of cables.

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 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 insert or unplug the connector. When it is necessary 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 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

07 Maintenance

The PV modules must be checked and maintained regularly, especially during the warranty period. This is the liability that the user shall undertake, which will help to identify and eliminate problems in time and ensure the safe and effective operation of the PV system.

7.1 Routine inspection

Regularly check must be conducted to see whether the PV modules in the PV array are damaged, such as broken glass, broken cables, damaged junction boxes, damaged cells, cracked back-sheet and other factors that may lead to functional and safety failures of PV modules. In case of the above problems, the supplier shall be informed to replace the PV module of the same type in time.

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 death.

Routine maintenance measures shall be taken to keep PV modules free of snow, bird droppings, seeds, pollen, leaves, branches, dust, and stains, etc.

7.2 PV module cleaning

If there is a lot of dir 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/), and it is strictly prohibited to carr 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, so as to prevent the glass cover plate from cracking due to the heat and cold action of the PV module.

Requirements of Cleaning Fluid:

1) Water shall be neutral, with PH: 6-8;

2) Electroconductibility: ≤500μs/cm;

3) Total dissolved solid volume: ≤1000mg/L;

4) Water hardness: ≤300mg/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 dr 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, insulation gloves, safety shoes, protective clothing and other safety protection tools correctly before and during cleaning to prevent falling and electric shock.

In accordance with the conditions specifed 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.

1."Offshore 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 modules must not come into contact with the highest water level during high tide.

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 photovoltaic system.

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 photovoltaic modules, strings and the coastline.

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.Do not alter the module structure, such as drilling holes in the module frame.

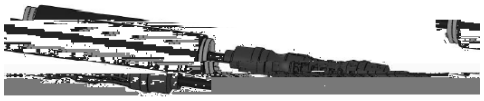
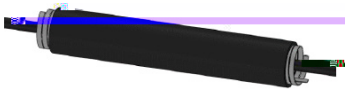
8.The process specifications of parts and components must comply with relevant international anti-corrosion standards.

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 sulfur, strong acids, strong alkalis, and other substances that pose a corrosion risk to the products. They are also prohibited 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 moistureev ɪ Ĥ Ű† con o η = f l'

Guidelines and Recommendations for Cold Shrink Tube Installation

Step	Method Description	Example
2		
3		
4		
5		
6		

Installation and Precautions for Cold Shrink Tubes:

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 dispos pr d ồ os ḍ ỉ



Group Headqua r er

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

E-mail

info@hysolar.com

Module Manufacturing Base

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

Tel

0510-8595 1888