

# Installation Guide for InstaGen Photovoltaic Module

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## Purpose of this guide

- This guide contains information regarding the installation and safe handling of our photovoltaic module (hereafter referred to as “module”).
- Installers must read and understand this guide prior to installation. For any questions, please contact our Global Quality & Customer Support department for further information. Installers should follow all safety precautions described in this guide as well as local codes when installing a module.
- Before installing a solar photovoltaic system, installers should familiarize themselves with its mechanical and electrical requirements. Keep this guide in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

## General safety

- Modules that fall under this application class may be used in system operating at more than 50V DC or 240W, where general contact access is anticipated. The module is considered to be in compliance with IEC61215:2016&61730:2016 only when the modules mounted in the manner specified by the mounting instructions below.
- A module with exposed conductive parts is considered to be in compliance with IEC61215:2016&61730:2016 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.
- Installing solar photovoltaic systems requires specialized skills and knowledge. Installation should only be performed by qualified persons.
- Installers should assume all risks of injury that might occur during installation, including, but not limited to, the risk of electric shock.
- One single module may generate more than 30V DC when exposed to direct sunlight. Contact with a DC voltage of 30V or more is potentially hazardous.
- Do not disconnect underload.
- Photovoltaic solar modules convert light energy to direct current electrical energy. They are designed for outdoor use. Modules can be ground mounted, mounted on rooftops, vehicles or boats. The proper design of support structures lies within responsibility of the system designers and installers.

## Handling safety

- Do not lift the module by grasping the module’s junction box or electrical leads.
- Do not stand or step on the module.
- Do not drop the module or allow objects to fall on the module.
- To avoid glass breakage, do not place any heavy objects on the module.
- Be cautious when setting the module down on to a surface.

- Inappropriate transport and installation may break the module.
- Do not attempt to disassemble the modules, and do not remove any attached nameplates or components from the modules.
- Do not apply paint or adhesive to the module top surface.
- To avoid damage to the back sheet, do not scratch or hit the back sheet.
- Do not drill holes in the frame. This may compromise the frame strength and cause corrosion of the frame.
- Do not scratch the anodized coating of the frame (except for grounding connection). It may cause corrosion of the frame or compromise the frame strength.
- Be careful when setting the panel down onto a surface, particularly when placing it on corner.
- A panel with broken glass or torn back sheet cannot be repaired and must not be used since contact with any panel surface or the frame can cause an electric shock.
- Work only under dry conditions and use only dry tools. Do not handle panels when they are wet unless you wear appropriate protective equipment.
- When storing uninstalled panels outdoors for any period of time, always cover the panels and ensure that the glass faces down to stop water from collecting inside the panel and causing damage to exposed connectors.

### Installation safety

- Any module without a frame (laminated) shall not be considered to comply with the requirements of IEC61215:2016&61730:2016 unless the module is mounted with hardware that has been tested and evaluated with the module under this standard or by a field inspection
- certifying that the installed module complies with the requirements of IEC61215:2016&61730:2016.
- Never open electrical connections or unplug connectors while the circuit is under load. And do not disconnect during load connection for a removable connector.
- Contact with electrically charged parts of the panels, such as terminals, can result in burns, sparks and lethal shock whether or not the panel is connected.
- Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot; there is a risk of burns and electric shock.
- Do not work in the rain, snow or in windy conditions.
- Avoid exposing cables to direct sunlight in order to prevent their degradation.
- Keep children well away from the system while transporting and installing mechanical and electrical components.
- Do not expose the artificially sunlight to a module or panel. And completely cover the module with an opaque material during installation to prevent electricity from being generated.
- Do not wear metallic rings, watchbands, ear, nose, lip rings or other metallic objects while installing or troubleshooting photovoltaic systems.

- Use only insulated tools that are approved for working on electrical installations.
- Follow the safety regulations for all other system components, including wires and cables, connectors, charging regulators, inverters, storage batteries, rechargeable batteries, etc.
- Under normal outdoor conditions the current and voltage generated by the system will differ from those listed on the datasheet. Datasheet values are the values measured under standard test conditions. Accordingly, during system designing phase, current and short-circuit current should be multiplied by a factor of 1.25 to determine components ratings.
- Only use connectors to connect modules to form a string or connect to another device. Removing the connectors will make the warranty void.

### Fire Safety

- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The fire rating of the module is class C.
- Consult your local authority for guidelines and requirements for building or structural fire safety.
- Roof constructions and installations may affect the fire safety of a building; Improper installation may create hazards in the event of a fire.
- Use components such as ground fault circuit breakers and fuses as required by local authority.
- Do not use panels near equipment or in places where flammable gases may be generated.
- Do not use non-integral module and panel are installed on a roof that has fire danger.
- The safe distance between the module and the roof we suggest is 20~30 centimetres.

### Product Identification

Each module has two labels providing the following information:

**Nameplate:** describes the product type; rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions; weight, dimensions etc.; the maximum system voltage of 1500 volts DC.

**Barcode:** each individual module has a unique serial number. The first to the fourth represents, the fifth to the sixth represents the processing manufacturer, the seventh to the eleventh represents the order number of the component products, the twelfth to the Fifteen represents the production date, and the 16th to the twentieth represents the serial number of the components. It is permanently attached to the interior of the module and is visible from the front of the module. This bar code is inserted prior to laminating



## Mechanical installation

### Selecting the location

Select a suitable location for installing the modules.

The modules should face south in northern latitudes and north in southern latitudes.

For detailed information on the best installation angle, refer to standard solar photovoltaic installation guides or consult a reputable solar installer or systems integrator.

Modules should not be shaded at any time. If a module is shaded or even partially shaded, it will fail to perform at ideal conditions and result in lower power output. A permanent and/or regular shade on the module voids the warranty.

This installation manual is applicable for all PV system of 500 m or more away from the coastline.

Do not use modules near equipment or in locations where flammable gases may be generated or collected.

### General Installation

Before installing modules check for any optical deviations. Any optical deviations noticed after system installed may void warranty. Any potential costs for labor, material or other cost such as documentation, safety or performing the (de/ re-) installation will not be covered.

The module mounting structure must be made of durable, corrosion-resistant and UV-resistant material. Always use a tested and certified mounting structure approved for your system design.

In regions with heavy snowfall in winter, select the height of the mounting system so that the lowest edge of the module is not covered by snow for any length of time. In addition, ensure that the lowest portion of the module is placed high enough so that it is not shaded by plants, trees or damaged by ground soil moved by or through the air.

For ground mounting systems, the minimum distance thecom[ recommend from the ground to the bottom of the module is at least 24 inches (60cm).

Modules must be securely attached to the mounting structure. For Clamping System installation methods, the recommended maximum compression for each clamp is 2900 PSI (20 Mpa) in order to avoid potential damages to module frames. Follow the instruction of the clamping system supplier.

Provide adequate ventilation under the modules in conformity to your local regulations. A minimum distance of 10 cm between the roof plane and the frame of the module is generally recommended.

Always observe the instructions and safety precautions included with the module support frames.

Before installing modules on a roof, always ensure the roof construction is suitable. In addition, any roof penetration required to mount the module must be properly sealed to prevent leaks.

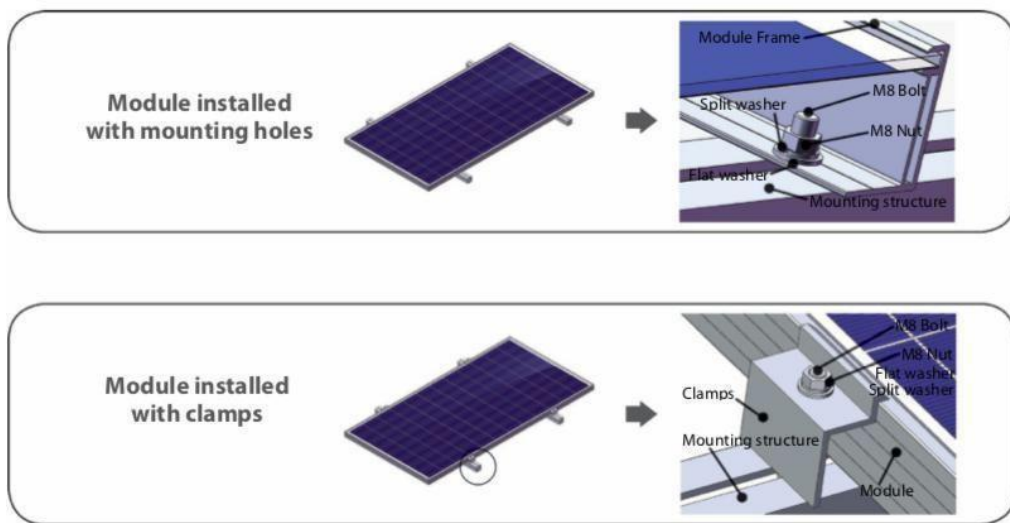
Dust building up on the surface of the module can impair with the module performance. The modules shall be installed with a tilt angle no less than 10 degrees, making it easier for dust to be removed by rain. A flat angle requires more frequent cleaning.

Observe and take into account the linear thermal expansion of the module frames (the recommended minimum distance between two modules is 2 cm).

Always keep the front and back sheet of the module free from other objects, plants and vegetation, structural elements, which could come into contact with the module, especially when the module is under mechanical load.

When installing a module on a pole, select a pole and module mounting structure that will withstand the anticipated wind load and snow load for the area.

Ensure modules are not subjected to wind or snow loads exceeding the maximum permissible loads and are not subject to excessive forces due to the thermal expansion of the support structures. Never allow modules overlap or exceeds the rooftop: Refer to the following installation methods for more detailed information.



*\* The minimum recommended length for each clamp is 50 mm.*

Module can be installed in both landscape and portrait modes.

The modules must be properly secured to their support so that they can withstand live load conditions, including positive and negative load, to the pressure they have been certified for. It is the installer's responsibility to ensure that the clamps used to secure the modules are strong enough.

InstaGen-GPNE-S108/M10N-435-BG	1724mm×1134mm×30mm
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4 bolts installation	<p>Test load</p> <p>Positive: 5400Pa</p> <p>Negative: 2400Pa</p> <p>Design load</p> <p>Positive: 3600Pa</p> <p>Negative: 1600Pa</p> <p>Safety factor: 1.5</p>		InstaGen-GPNE-S108/M10N-435-BG
4 clamps installation	<p>Test load</p> <p>Positive: 5400Pa</p> <p>Negative: 3800Pa</p> <p>Design load</p> <p>Positive: 3600Pa</p> <p>Negative: 2500Pa</p> <p>Safety factor: 1.5</p>	<p style="text-align: center;">L=250mm</p> <p style="text-align: center;">Clamp zone: A=200mm</p> <p style="text-align: center;">Clamp zone: A=200mm</p>	InstaGen-GPNE-S108/M10N-435-BG

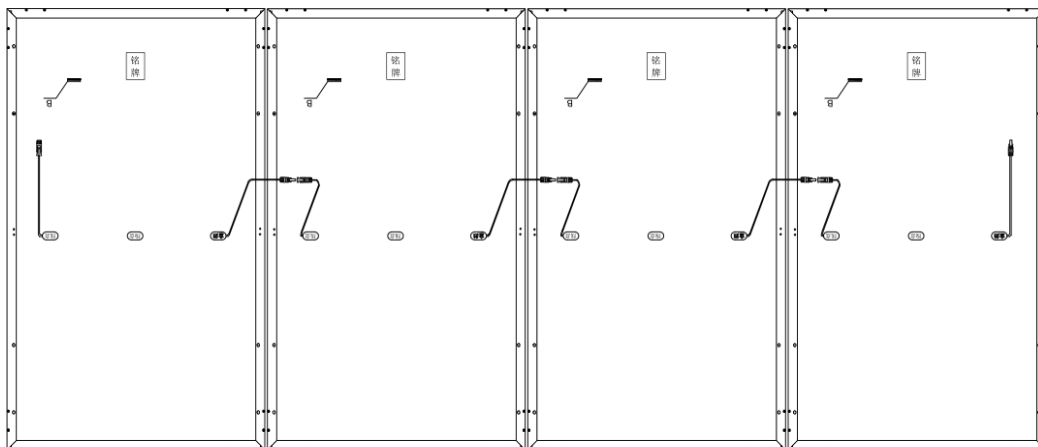
\* The module clamps must not come into contact with the front glass or deform the frame in any way. Avoid shading effects from the module clamps and insertion systems. Drainage holes in the module frame must not be closed or obscured by the clamps.

\*\* The loads of 2400 Pa and 5400 Pa are under IEC standard. The installation methods applicable for 5400 Pa are also relevant for 2400 Pa.

\*\*\* The mounting holes reserved for Nextracker mounting system with special accessories.

Greenbauer new energy half-cell module recommended connection method:

The modules are installed horizontally in the square array, and the module line length: the length of the positive and negative lines is not less than 0.30 m.



## Electrical Installation

### General installation

Any hardware used must be compatible with any other used material to avoid galvanic corrosion. Defects caused by corrosions void the warranty.

It is not recommended to use modules with different configurations (grounding, wiring) in the same system.

Excessive cables must be organized or fixed in an adequate way,

e.g. attached to the mounting structure by using non-metallic cable ties. Solar cables, connectors and junction boxes should not be exposed to water exposure, and snow, and rain or water submersion for a long period of time (IP65/67/68).

For applications requiring high operating voltage several modules can be connected in series to form a string of modules; the system voltage is then equal to the sum of the voltage of each module.

For applications requiring high operating currents several strings of modules can be connected in parallel; the system current is then equal to the sum of the current of each string of modules. The maximum system voltage is 600 volts ,1000 volts or 1500 volts depending on the product family DC according to standards.

The maximum number of series connected modules depends on system design, the type of inverter used and environmental conditions.

Based on the maximum series fuse rating of module and local electrical installation code, always make sure modules are assembled with the appropriate string fuse for circuit protection.

There is no specific limitation on the number of modules that can be connected in parallel, the number of modules is determined by system design parameters such as current or power output. To prevent the cables and the connectors from overheating, the cross section of the cables and the capacity of the connectors must be selected to suit the maximum system short circuit current. The recommended cable is 62930 produced by Wuxi Xinhongye Wire

Caution: do not secure the cables too tight. Any cable damage caused by cable management system is not covered under Jiangsu VDS Renewable Technology Co., Ltd's warranty.

Always refer to the cable manufacturer's bending radius which includes the radius just behind the connectors.

When designing large modules arrays connected to a single inverter, always take into account the resulting isolation resistance (Riso), which decrease increasing the number of modules in the array. A too low Riso can results in inverter faults. Please refer to local regulations to determine the system wires size, type and temperature.

Modules are supplied with connectors used for DC system electrical connections. The recommended connectors are Multi Contact MC4 connectors. Any choice of a different connector type other than specified may void the warranty of the module.

To ensure reliable electric connection and to prevent possible intrusion of humidity, two connectors must be mated and locked together until a click can be heard.

Long-term exposure to wet environments may cause connectors' poor connectivity, resulting in current leakage and poor conductivity which voids the warranty. We recommend proper connector/cable/wire management to prevent moisture intrusion. Depending on the amount of humidity, we recommend periodic inspections of the installation system to maintain optimal module performance.

The DC current generated by photovoltaic systems can be converted into AC and fed into a public Grid. As local utilities' policies on connecting renewable energy systems to the Grids vary from region to region. Always seek the advice from a qualified system designer or integrator. Building permits, inspections and approvals by the local utility are generally required.

Especially for larger installations we recommend lightning protection following the local requirements and regulations.

When the installation is finished and after connection to the grid, please do a professional hand over to the owner including an installation protocol is required. Provide a clear documentation of the system to the owner consisting of following minimum data such as user guide, system layout, data sheets, performance expectations, electrical system data e.g. a copy of the installation test report following minimum requirements of IEC 62446 / IEC 60364-6.

## Grounding

For grounding and bonding requirements, please refer to regional and national safety and electricity standards. If grounding is required, use a recommended connector type for the grounding wire.

For grounding, this guide refers to module frame grounding. If grounding is required, make sure module frames (metal exposed to touch) are always grounded.

We recommend always referring to local state and national code requirements for PV module grounding and recommend negative grounding if it's allowed by local authorities.

When attaching the frame grounding hardware and wire to the frame it must be placed corresponding to the ground symbol stamped location to ensure proper electrical connection. We recommend one of the following parts for grounding:

Use M5 bolt and washer to bond the ground wire and aluminium frame through the grounding hole (as shown below). The tightening torque is 3-7Nm. All nuts and washers should be made of stainless steel. 4-14 mm<sup>2</sup> (AWG 6-12) exposed copper wire is recommended as ground wire.

