

GW Photovoltaic Modules User Manual

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Gratitude for choosing the products made by GW Solar.

Please read the instruction before installing.

Please keep it properly after reading so that you can check it at any time.

About us

GW Solar about 1000 employees with 1GW total capacity for the solar modules and projects supply chain based in Vietnam. It is a younger, active, developing and more promising manufacturer of Photovoltaic modules, who is rooted in Vietnam and is eyeing the world.

GW Solar is constantly making efforts to provide best high efficiency Photovoltaic products and supreme value-added services to customers, to build up a good corporation focusing on the premium market as well as the low market in terms of maintenance demanding. Also most importantly we would like to devote our attentions to the matched customers.

Certification



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GW Photovoltaic Modules User Manual

Installation | Safety instructions | Maintenance

Photovoltaic modules user manual

Please carefully read the following installation and safety instructions.

Non-compliance with these instructions may void the module warranty.

Purpose of this guide

This guide contains information regarding the installation and safe handling of EP photovoltaic modules (hereafter referred to as "modules"). All instructions should be read and understood before attempting installation. If there are any questions, please contact your dealer or EP for further information.

The installer should conform to all safety precautions in the guide when installing modules. Before installing photovoltaic system, the installer should become familiar with the mechanical and electrical requirements for photovoltaic system. Keep this guide in a safe place for future reference.

1. General

Installing photovoltaic system requires specialized skills and knowledge. The installer assumes all risk of injury, including risk of electric shock. Module installation should be performed only by qualified persons.

All modules come with a permanently attached junction box and #12 AWG (4 mm²) wire terminated in photovoltaic connectors. Your dealer can provide additional extension cables to simplify module wiring.

- ◆ Exercise caution when wiring or handling modules exposed to sunlight.

- ◆ When disconnecting wires connected to a module that is exposed to sunlight, an electric arc may occur. Arcs can cause burns, start fires or otherwise create safety problems. Exercise caution when disconnecting wiring on modules exposed to sunlight.
- Modules convert light energy to direct-current electrical energy, and are designed for outdoor use. Proper design of support structures is the responsibility of the system designer and installer.
- Modules may be ground mounted, pole mounted, or mounted on rooftops. Roof installation need meet local security laws and regulations.



Do not attempt to disassemble the module, and do not remove any attached nameplates or components.



Artificially concentrated sunlight shall not be directed on the module or panel.

- ◆ Do not apply paint or adhesive to the module.
- When installing modules, observe all applicable local, regional and national codes and regulations. Obtain a building and/or electrical permit where required.

2. Safety precaution

- Modules produce electrical energy when exposed to sunlight.
- ◆ Only connect modules with the same rated output current in series. If modules are connected in series, the total voltage is equal to the sum of the individual module voltages.
- Only connect modules or series combinations of modules with the same voltage in parallel. If modules are connected in parallel, the total current is equal to the sum of individual module or series combination currents.
- ◆ Keep children well away from the photovoltaic system while transporting and installing mechanical and electrical components.
- Completely cover all modules with an opaque material during installation to prevent electricity from being generated.



Do not wear metallic rings, watchbands, ear, nose, or lip rings or other metallic devices while installing or troubleshooting photovoltaic systems.



Use appropriate safety equipment (insulated tools, gloves, etc) approved for use on electrical installations.

- Observe the instructions and safety precautions for all other components used in the photovoltaic system, including wiring and cables, connectors, mounting hardware, inverters, power distribution cabinet, etc.
- ◆ Use only equipment, connectors, wiring and mounting hardware suitable for use in the photovoltaic system.
- Always use the same type of module within a particular photovoltaic system.
- ◆ Under normal operating conditions, modules will produce currents and voltages that are different than those listed in the data sheet. Data sheet values are applicable at standard test data.
- Short-circuit current and open-circuit voltages should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacity, fuse sizes and size of controls connected to the module or system output.

3. Code and standard

- For UL listed products only: module fire performance: Type 2
- ◆ For UL listed products only: fire class rating: C
- Advising that artificially concentrated sunlight shall not be directed on the module.
- ◆ "Rated electrical characteristics are within 10 percent of measured values at standard test conditions of: 1000 W/m², 25°C cell temperature and solar spectral irradiance per ASTM E 892" or irradiation of AM1.5 spectrum."
- "Under normal conditions, module may experience conditions that produce more current and/or voltage than reported at standard test conditions.
- "Refer to section 690-8 of the national electric code for an additional

multiplying factor of 1.25 which may be applicable. "

- The recommended standoff height is 50 mm. If other mounting means are employed this may affect the UL listing or the fire class ratings.
- A minimum slope of 5 in/ft for installation over a roof, is required to maintain the fire class ratings.
- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The system fire class rating of the module in a mounting system in combination with a roof covering complete with requirements to achieve the specified system fire class rating for a non-BIPV module. Any module mounting system limitations on inclination required to maintain a specific system fire class rating
- ◆ Installation instructions shall specify that the modules have been evaluated by UL for a maximum positive or negative design loading of 30 lbs/ft².
- The installation instructions shall specify that the modules have been evaluated by UL for mounting using the 4 provided mounting holes in the frame.
- CNL model instruction manuals shall also include a statement that installation shall be in accordance with CSA C22.1, safety standard for electrical installations, Canadian electrical code, Part 1.
- ◆ If instructions are provided allowing modules to be installed in parallel electrically, the installation instructions shall specify that each module (or series string of modules so connected) shall be provided with the maximum series fuse as specified.
- The installation instructions shall specify that grounding is achieved through securement to the array frame. The array frame shall be grounded in accordance with NEC article 250.
- ◆ The installation instructions shall specify that the use of the following hardware is required in order to provide a reliable grounding connection to the module frame.
- The following UL listed grounding clips/Lugs in combination with the following model number of the modules.

- ◆ The installation instructions shall specify that the modules shall be mounted so that the junction box shall be in the uppermost position to minimize the ingress of water.

4. Mechanical instruction

4.1 General installation note

- Drainage holes must not be covered with parts of the mounting system. The junction box has a breather port which must be mounted facing downward and cannot be exposed to the rain. The junction box should be on the higher side of the module when it is mounted in order to orient the breather port correctly.
- ◆ Do not lift the module by grasping the module's junction box or electrical leads.
- Do not stand or step on module.
- ◆ Do not drop the module or allow objects to fall on the module.
- Do not place any heavy objects on the module.
- Inappropriate transport and installation may damage the module glass or frame.
- For optimum performance, the module must be facing true south in northern latitudes or true north in southern latitudes.
- For detailed information on optimal module orientation, refer to standard photovoltaic installation guides or a reputable installer or systems integrator.

4.2 Installation environment

- Modules should be installed in a location where they will receive maximum sunlight throughout the year.
- ◆ The module should not be shaded at any time of the day. During installation, the module surface shall not be partly shaded by clothes, tools, packaging materials, etc.
- Modules connected in series should be at the same tilt and azimuth. Differing orientations or angles may cause a loss of power output due to differing amount of sunlight exposure for each module.

- ◆ Install the module in well ventilated place and guarantee that adequate natural air heat dissipation channels are provided at the back and sides of the module to ensure that the heat generated during operation is radiated in time.
- Do not install the module near equipment or in locations where flammable gases can be generated or collected.
- GW Solar's modules have passed the certification of IEC 61701 with 5% NaCl. But near the beach, mounting structures could occurs corrosion. Modules should not be installed in the site which is within 500m away from the sea.

4.3 Selecting the proper mounting structure and hardware

- Observe all instructions and safety precautions included with the mounting system to be used with the module.



Do not drill holes in the module glass surface. Do not drill additional mounting holes in the module frame. Doing so will void the warranty.

- Modules must be securely attached to the mounting structure using four mounting points for normal installation. If heavy wind or snow loads are anticipated, additional mounting points should also be used.
- Mounting structure would endure 20 years, and is made of anticorrosive material. Hot-dip galvanized steel and stainless steel is recommended.
- ◆ Mounting structure should be solid enough to resist continuous load, pressure from wind ,snow, earthquake and other outside force.
- Load calculations are the responsibility of the system designer or installer.
- ◆ The mounting structure and hardware must be made of durable, corrosion-and UV-resistant material.
- The modules have been evaluated by TUV for mounting using the 8 provided mounting holes in the frame.
- ◆ Each module (or series string of modules so connected) shall be provided with the maximum series fuse as specified.

4.4 Mounting location

4.4.1 Pitched roof mounting

It is necessary to provide a special support frame for the roof mounting. When installing a module on a roof or building, ensure that it is securely fastened and cannot fall or be damaged as a result of strong winds or heavy snows. During roof mounting, check the building codes being used to ensure that the building and its structure where the module is installed have adequate bearing capacity. The roof needs to be penetrated during module installation and fixing shall be sealed to avoid rainwater seepage.

To be suitable for operation, reduce steam condensation and facilitate the ventilation and heat dissipation of the module during tile installation, the module shall be parallel to the wall or roof surface of the building, and the clearance between module and surface of the wall or roof shall be at least 115mm to prevent wiring damage and to allow air circulation, ventilation and heat dissipation behind the module. During stacking type installation, the module shall be installed on the fire-resistant roof. Do not install modules on a roof or building during strong winds.

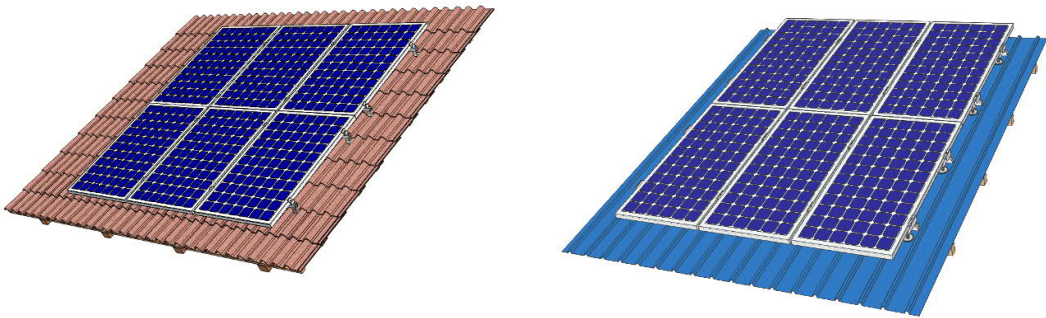


Figure 1: Pitched roof mounting

4.4.2 Ground or concrete flat roof mounting

Select the height of the mounting system to prevent the lowest edge of the module from being covered by snow for a long time in winter in areas that experience heavy snowfalls. The module shall be installed on the mounting system with appropriate height instead of being directly laid on the ground or concrete flat roof. In addition, assure the lowest portion of the module is placed high enough, so that it is not

shaded by plants or trees, and the module is not damaged by sand and stone driven by wind, or the module surface is not shaded by the mud splashed by rain water.

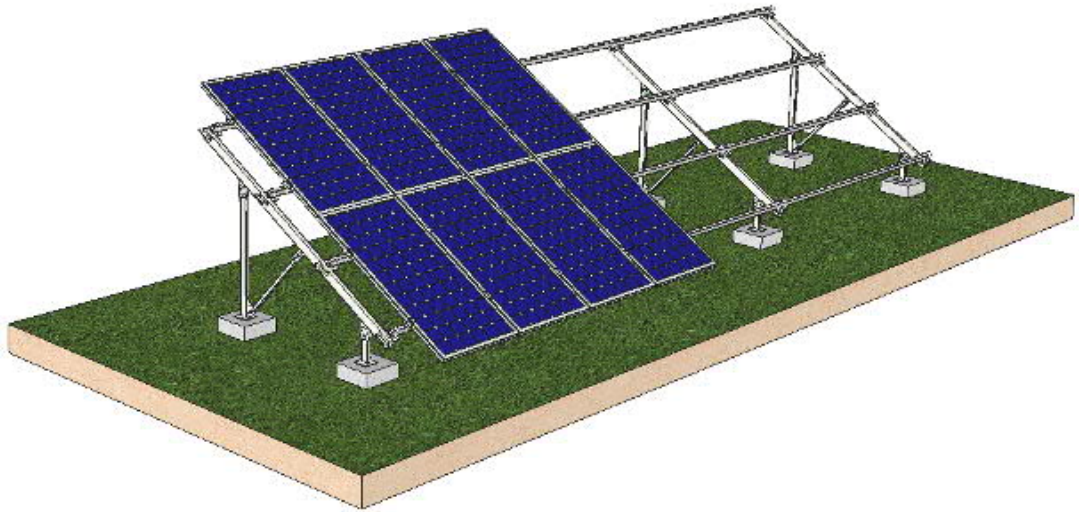


Figure 2: Ground or concrete flat roof mounting

4.4.3 Pole mounting

When installing a module on a pole, choose a pole and module mounting structure that will withstand the anticipated wind power of the local area. The support rod must be constructed on a solid foundation.

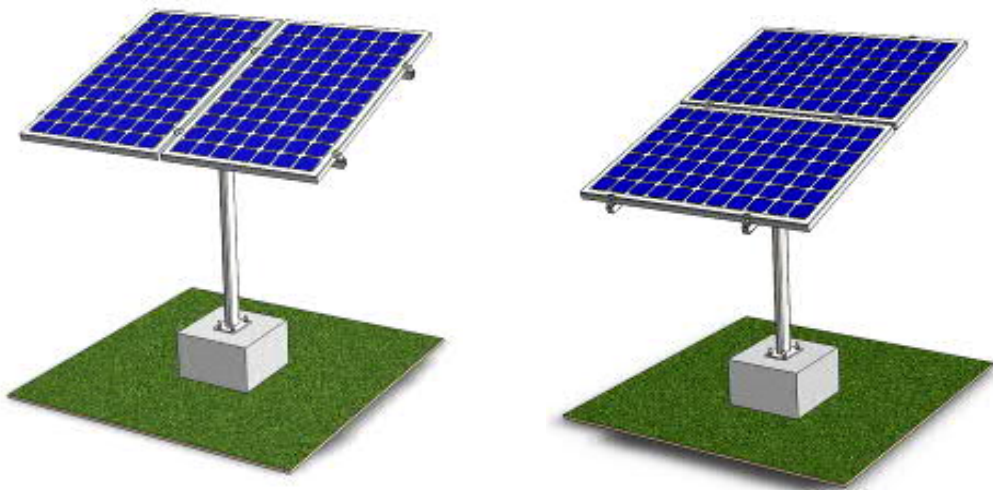


Figure 3: Pole mounting

4.5 Mounting method

4.5.1 Screw fitting

- ◆ The module must be attached and supported by at M8 screw through the indicated mounting holes. The range of torque is 16-20N.M while tightening the screw.
- The module frame has four or eight mounting holes used to secure. As show in Figure 4, four mounting holes are needed in normal. As show in Figure 5, regarding to large modules of type 72, eight mounting holes are needed or in the condition of sustaining higher load.
- The module frame must be attached to the mounting system using M8 stainless steel hardware together with spring washers and flat washers in each places symmetrical on the module, as show in Figure 7.
- ◆ The modules by mechanical load test 5400pa for TUV only. For UL listed, module maximum positive or negative design loading of 30 lbs/ft2.

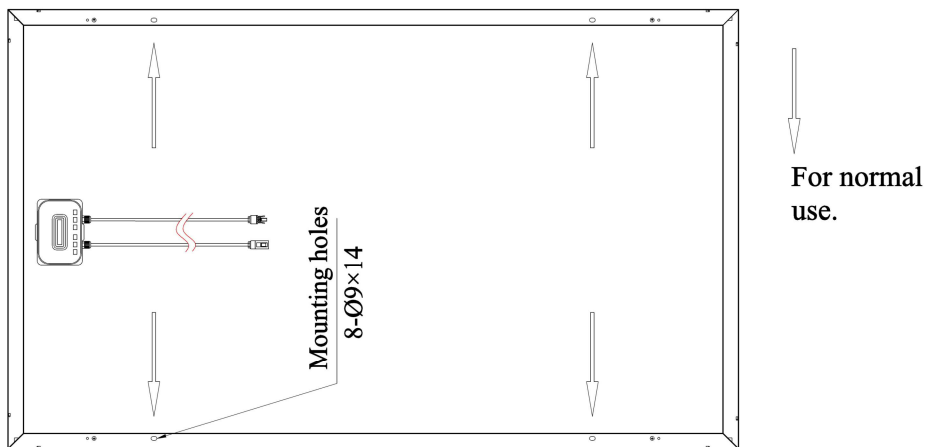


Figure 4: Using 4 mounting holes (2 holes each side frame) to fasten.

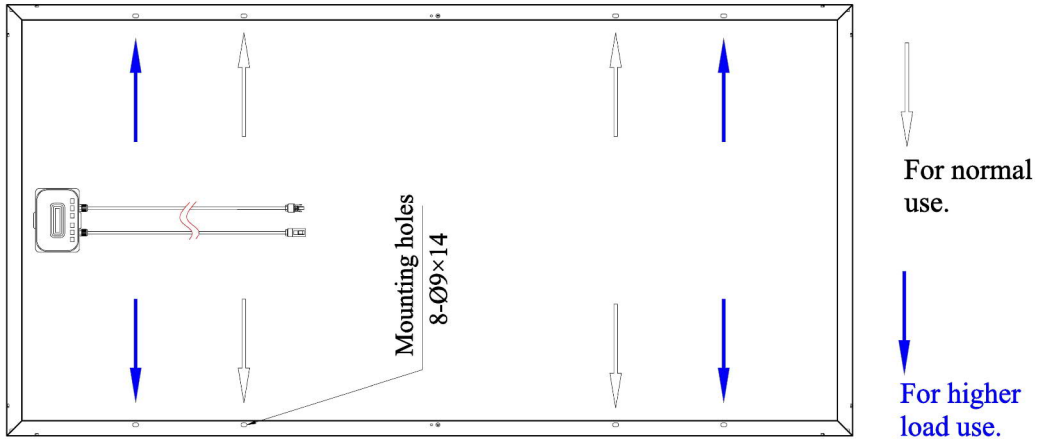


Figure 5: Using 8 mounting holes (4 holes each side frame) to fasten

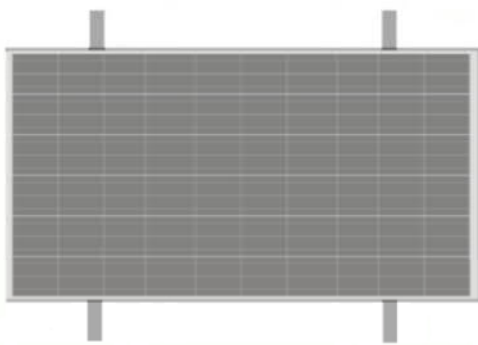


Figure 6(a): Using 4 mounting holes

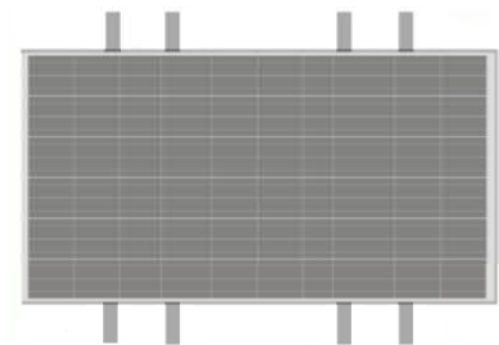


Figure 6(b): Using 8 mounting holes

Figure 6: Module front view of screw fitting method

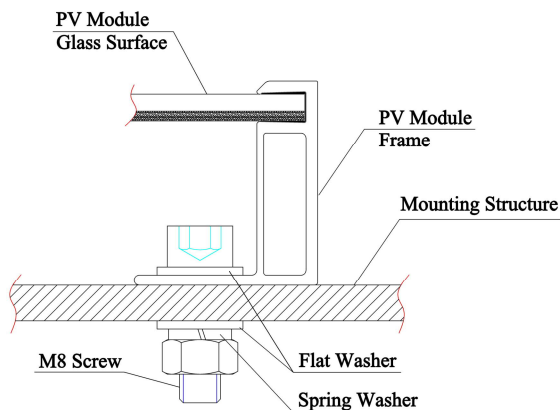


Figure 7: Screw fitting method

4.5.2 Clip fitting (Frame module)

- Using suitable module clips on the side of the module frame to mount the modules, as shown in Figure 8 and Figure 9.
- The thickness of the clip should be no less than 3mm, the length should be no less than 40mm and the length of the overlap should be no less than 8mm.
- At least 4 clips should be used in each module, and install 2 clips on each side.
- The clips should be mounted by screw on mounting structure. The clips should be mounted in a symmetric position respect to the center. The range of torque is 16-20N.M. While tightening the screw.
- ◆ The clips can't be attached with the front glass, and keep the shape of frame while mounting.
- Avoid shading effects creative by clips on the cells of modules' obverse side.
- ◆ If the customer use special clips which are not included in this manual, please contact the local dealer for professional support.
- If heavy snowfall, relatively large snow load or large wind pressure exist in the module installation area, extra clips should be used to improve the bearing capacity of the module.

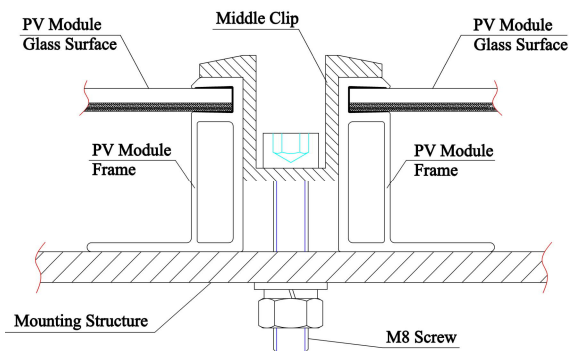


Figure 8(a): Middle clip fitting method

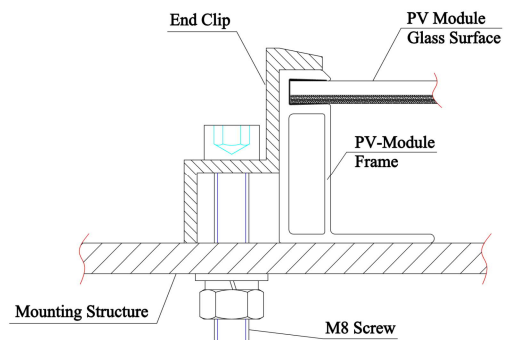


Figure 8(b): End clip fitting method

Figure 8: Clip fitting (Frame module) method

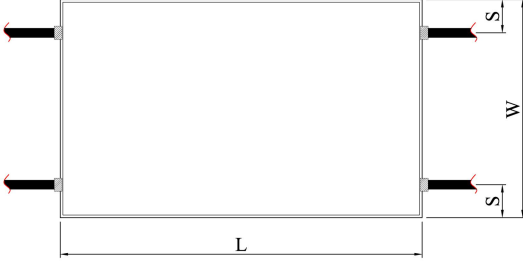
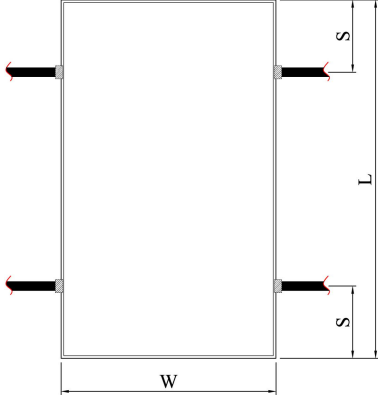
Short Side	Long Side
	
<ul style="list-style-type: none"> ◆ Back static load $\leq 2000\text{Pa}$, Front static load $\leq 2000\text{Pa}$: $0 \leq S \leq (W/4)$. ◆ Back static load $\leq 2400\text{Pa}$, Front static load $\leq 2400\text{Pa}$: $(W/20) \leq S \leq (W/5)$. 	<ul style="list-style-type: none"> ◆ Back static load $\leq 2000\text{Pa}$, Front static load $\leq 2000\text{Pa}$: $0 \leq S \leq (W/4)$. ◆ Front static load $\leq 2400\text{Pa}$, Back static load $\leq 2400\text{Pa}$: $(L/8) \leq S \leq (L/4)$. ◆ Front static load $\leq 5400\text{Pa}$, Back static load $\leq 2400\text{Pa}$: $(L/4-50) \leq S \leq (L/4+50)$.

Figure 9: Module front view of clip fitting (Frame module) method

4.5.3 Clip fitting (Non-frame double glass module)

- ◆ Use of the clips which must have EPDM or similar insulating washer in contact surface between clips and double glass module. As shown in Figure 10 and Figure 11.
- ◆ The clips length should be no less than 150mm, and the clips must overlap the module edge by at least 14 mm.
- ◆ Fixing bolt thread diameter of at least M8, the range of torque is 16-20N.M while tightening the screw.
- ◆ Use at least four clips on each module. Two clips should be attached on each long side of the module.
- ◆ Avoid shading effects created by clips on the cells of modules' obverse side.

- ◆ If the customer use special clips which are not included in this manual, please contact the local dealer for professional support.
- ◆ If heavy snowfall, relatively large snow load or large wind pressure exist in the module installation area, extra clips should be used to improve the bearing capacity of the module.

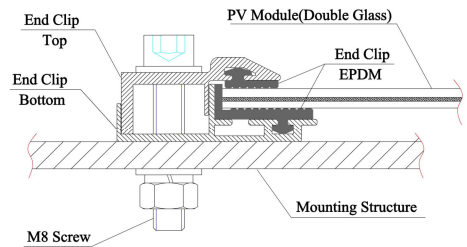
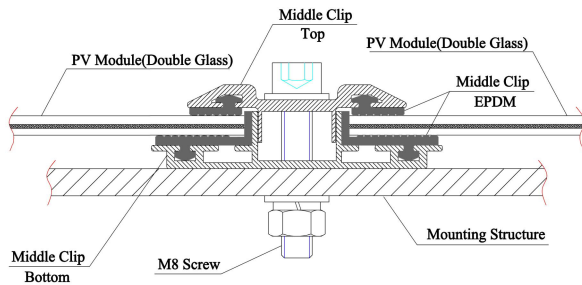


Figure 10(a): Middle clip fitting method

Figure 10(b): End clip fitting method

Figure 10: Clip fitting (Non-frame double glass module) method

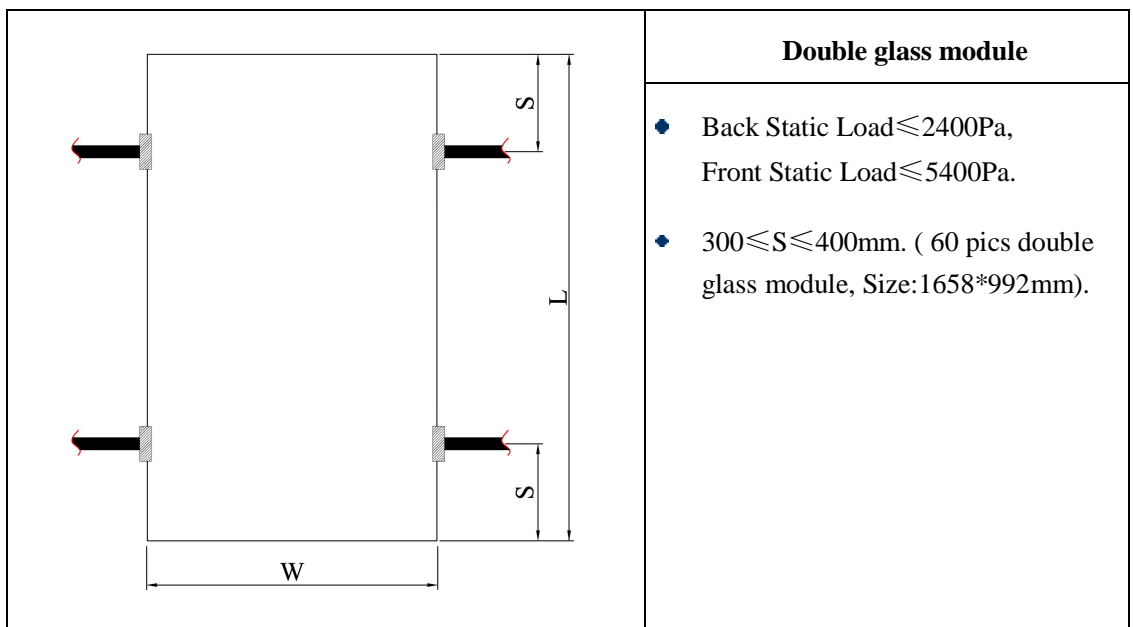


Figure 11: Module front view of clip fitting (Non-frame double glass module) method



GW 's limited warranty will be void in cases where improper clamps or installation methods deviating from this manual are used. When installing inter-modules or end type clamps, take measures so as:

- (A) Not to bend the module frame.
- (B) The clips must only fix the modules by the contact with the frame. Do not allow contact between clip and glass.
- (C) Not to damage the surface of the frame.
- (D) When mounting, be sure that the module's drain holes are not blocked.

4.6 Other

- ◆ The recommended standoff height is 5 cm. If other mounting means are employed this may affect the TUV Listing.
- Direction of module installation: module are rectangle shaped; module array longitudinal installation (the way that installs the module by long side longitudinal) is mostly used because the transverse installation (the way that installs the module by long side transversely) has less rain cleaning ability.
- For distance between the modules, longitudinal distance (along the roof gradient) should be enough for installation and disassembly; transverse distance should be 3-10cm.
- ◆ Other mounting methods are acceptable as long as the minimum requirements as described above. Above requirements are only basic instructions.

5. Electrical installation

5.1 General electrical installation

- ◆ Do not use modules of different configurations in the same system.
- This module is supplied with multi contact connectors for electrical connections.
- Refer to section 690.31 of the NEC to determine appropriate types and temperature ratings of conductors. Wiring should be #12 AWG (4mm²)

(minimum) and must be temperature rated at 90 °C (minimum).

- Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.
- Refer to sections 690.8 and 310 of the NEC to determine over current, conductor capacity and size requirements.
- In Canada, installation shall be in accordance with CSA C22.1, safety standard for electrical installations, Canadian electrical code, part 1.
- For best performance, ensure that positive and negative DC wires run closely together avoiding loops.



Electrical shock hazard! Do not touch bare conductors or other potentially energized parts.

5.2 Concerned module

5.2.1 Application class A

- Class A: General access, hazardous voltage, hazardous power applications. Modules rated for use in this application class may be used in systems operating at greater than 50 V DC or 240 W, where general contact access is anticipated.
- Modules qualified for safety through IEC 61730-1 and this part of IEC 61730 within this application class are considered to meet the requirements for safety class II.

5.2.2 Maximum overload protection current

- ◆ Maximum overload protection current of the module is 15A for 6” cells modules.
- Maximum overload protection current of the module is 10A for 5” cells modules.
- ◆ Over-current protection device for the bypass diode.

5.2.3 Electricity rated of module

- The electrical characteristics ISC, VOC, and Pmax under standard test

conditions (irradiance of 1000 W/m², AM 1.5 spectrum, and a cell temperature of 25°C/77°F).

- Under normal conditions, module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of ISC and VOC marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor current ratings, and relay controls connected to the module output.

5.3 Grounding

- ◆ All module frames and mounting racks must be properly grounded. As shown in Figure 12. The grounding wire must be properly fastened to the module frame to assure good electrical contact. Use the recommended type, or an equivalent, connector for this wire.
- If the mounting structure is made of metal, the surface of the mounting structure must be electroplated and have excellent conductivity.
- Proper grounding is achieved by connecting the module frame and mounting structure members contiguously using a suitable grounding conductor.
- The grounding conductor must then make a connection to earth using a suitable earth ground electrode. Recommend to use the ground wire accessories (lugs) connected to ground cable. Welding ground cable to the jack of lugs, and then with the M4 screws inserted into the wiring nose ring and the grounding hole of the module frame, fastening with nuts. Star spring washers should be used to prevent the screws from loosening and lead to poor grounding, as shown in Figure 13.
- The module frame to earth resistance must be less than 10Ω.
- ◆ If the modules are used in high-temperature and high-humidity environment, requires to ground the negative end of the inverter. Offset box or PID box can also be used instead to apply a positive voltage to the module arrays at night to avoid PID.

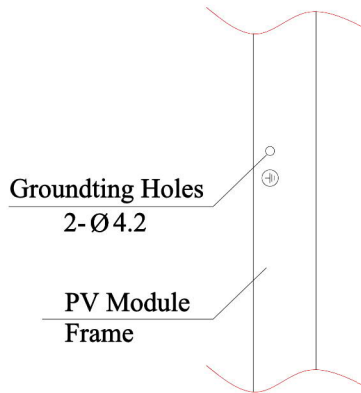


Figure 12: Grounding hole

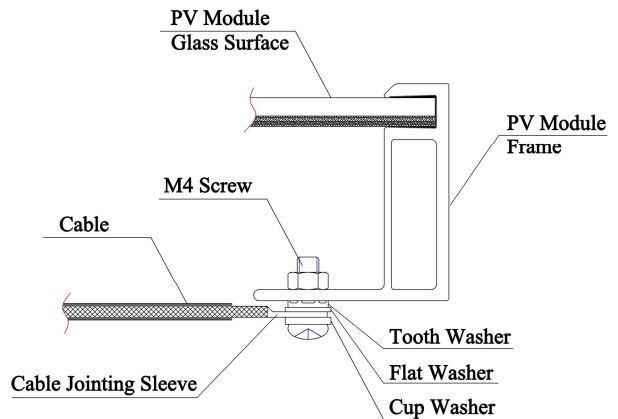


Figure 13: Grounding method

6. Maintenance

EP recommends the following maintenance items to ensure optimum performance of the module:

- ◆ Clean the glass surface of the module as necessary. Use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used if necessary. Do not use dishwasher detergent.
- Electrical and mechanical connections should be checked periodically by qualified personnel to verify that they are clean, secure and undamaged.
- ◆ Check the electrical and mechanical connections periodically to verify that they are clean, secure and undamaged.
- Problems should only be investigated by qualified personnel.
- Observe the maintenance instructions for all other components used in the system.
- ◆ Artificially concentrated sunlight shall not be directed on the module.

7. Shutting down the system

- Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.

- ◆ Disconnect system from all power sources in accordance with instructions for all other components used in the system.
- ◆ The system should now be out of operation and can be dismantled. In doing so, observe the all safety instructions as applicable to installation.

8. Disclaimer of liability

Because the use of this manual and the conditions or methods of installation, Operation, use and maintenance of photovoltaic products are beyond GW Solar's control; GW Solar does not accept responsibility and expressly disclaims liability for loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance. No responsibility is assumed by GW Solar's for any infringement of patents or other rights of third parties, which may result from use of the PV product. No license is granted by implication or otherwise under any patent or patent rights. The information in this manual is based on EP's knowledge and experience and is believed to be reliable, but such information including product specification (without limitations) and suggestions does not constitute a warranty, expressed or implied.

GW Solar reserves the right to change the manual, the product, the specifications, or product information sheets without prior notice.

Please consult your dealer or the manufacturer concerning the warranty of your modules. If you have any further questions, your dealer will gladly assist you. Subject to technical modifications without notice.

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