

INSTALLATION MANUAL OF  
**ONLY SOLAR**  
PV MODULE



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## 1.0 GENERAL INFORMATION

This general manual provides important safety information relating to the installation, maintenance and handling of CS-series solar modules.

Professional installer must read these guidelines carefully and strictly follow these instructions. Failure to follow these instructions may result in death, injury or property damage. The installation and handling of PV modules require professional skills and should only be performed by qualified professionals. The installers must inform end-users (consumers) the aforesaid information accordingly. The word "module" or "PV module" used in this manual refers to one or more CS-series solar modules.

This manual is only valid for the standard module types RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M, RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M.

Please retain this manual for future reference. We recommend checking [www.ONLYSOLAR1.COM](http://www.ONLYSOLAR1.COM) regularly for the most updated version.

### 1.1 INSTALLATION MANUAL DISCLAIMER

The information contained in this manual is subject to change by Only Solar without prior notice. Only Solar gives no warranty of any kind whatsoever, either explicitly or implicitly, with respect to the information contained herein.

In the event of any inconsistency among different language versions of this document, the English version shall prevail. Please refer to our product lists and documents published on our website at: <http://www.ONLYSOLAR1.COM> as these lists are updated on a regular basis.

## 1.2 LIMITATION OF LIABILITY

Only Solar shall not be held responsible for damages of any kind, including – without limitation – bodily harm, injury or damage to property, in connection with handling PV modules, system installation, or compliance or non-compliance with the instructions set forth in this manual.

## 2.0 SAFETY PRECAUTIONS



### Warning

Before attempting to install, wire, operate and/or service the module and other electrical equipment, all instructions should be read and understood. PV module connectors pass direct current (DC) when exposed to sunlight or other light sources. Contact with electrically active parts of the module, such as terminals, can result in injury or death, irrespective of whether or not the module and the other electrical equipment have been connected.



### Avertissement

Toutes les instructions devront être lues et comprises avant de procéder à l'installation, le câblage, l'exploitation et/ou l'entretien des panneaux. Les interconnexions des panneaux conduisent du courant continu (CC) lorsque le panneau est exposé à la lumière du soleil ou à d'autres sources lumineuses. Tout contact avec des éléments sous tension du panneau tels que ses bornes de sortie peut entraîner des blessures ou la mort, que le panneau soit connecté ou non.

### General Safety

All modules must be installed by licensed electricians in accordance to the applicable electrical codes such as, the international applicable electrical codes.



Protective clothing (non-slip gloves, clothes, etc.) must be worn during installation to prevent direct contact with 30V DC or greater, and to protect hands from sharp edges.





Prior to installation, remove all metallic jewelry to prevent accidental exposure to live circuits.



When installing modules in light rain, morning dew, take appropriate measures to prevent water ingress into the connector.



Do not allow children or unauthorized persons near the installation site or module storage area.

- Do not install modules in strong wind.
- Use electrically insulated tools to reduce the risk of electric shock.
- If the disconnects and over current protection devices (OCPDs) cannot be opened or the inverter cannot be powered down, cover the fronts of the modules in the PV array with an opaque material to stop the production of electricity when installing or working on a module or wiring.
- Carry the panels using both hands and do not use the junction box or cables as a grip
- Do not allow the panels to sag or bow under their own weight when being carried.
- Do not subject panels to loads or stresses, e.g., leaning on them or through the placing of weight on them.
- Do not use or install damaged modules
- Contact with module surfaces or frames may cause electric shock if the front glass is broken or the backsheet is torn.
- The PV module does not contain any serviceable parts. Do not attempt to repair any part of the module.
- Keep the junction box cover closed at all times.
- Do not disassemble a module or remove any module part.
- Do not artificially concentrate sunlight on a module.
- Do not connect or disconnect modules when current from the modules or an external source is present.

## 2.1 INFORMATION PURSUANT TO ART. 33 OF THE REACH REGULATION

Pursuant to Art. 33 of Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (the "REACH Regulation"), we inform you that our solar modules contain a Substance of Very High Concern ("SVHC") in a concentration above 0.1 % (weight by weight).

The copper ribbons used in our solar modules to interconnect solar cells use a thin solder coating layer that contains lead (CAS no. 7439-92-1).

Under normal or reasonably foreseeable conditions of use, exposure to the lead that is contained in our solar modules can be excluded. However, a release of, and exposure to, lead can take place (i) when the different components of the solar modules are disassembled, in particular for recycling purposes, and (ii) in instances of fire. Lead may damage fertility or the unborn child, causes damage to organs through prolonged or repeated exposure, is very toxic to aquatic life with long lasting effects, may cause cancer, is very toxic to aquatic life, and may cause harm to breast-fed children.

Therefore, recycling and all other types of comparable disassembly of the solar modules have to be performed by a qualified waste management company, in compliance with national and local waste management regulations.

In the instance of fire, please keep away from the fire, and call the local fire brigade.

## 3.0 MECHANICAL / ELECTRICAL SPECIFICATIONS

Module electrical ratings are measured under Standard Test Conditions (STC) of 1000 W/m<sup>2</sup> irradiance, with an AM1.5 spectrum, and a cell temperature of 25°C. Detailed



electrical and mechanical characteristics of Only Solar crystalline silicon PV modules can be found in Annex A (Module Specifications) on [www.ONLYsolar1.com](http://www.ONLYsolar1.com). Main electrical characteristics at STC are also stated on each module label. Please refer to the datasheet or the product nameplate for the maximum system voltage.

Under certain conditions, a module may produce more current or voltage than its Standard Test Conditions rated

power. As a result, the module short-circuit current under STC should be multiplied by 1.25, and a correction factor should be applied to the open-circuit voltage (see Table 1 below), when determining component ratings and capacities. Depending on your local regulations, an additional 1.25 multiplier for the short-circuit current (giving a total multiplier of 1.56) may be applicable when sizing conductors and fuses.

**Table 1: Low temperature correction factors for open-circuit voltage**

Lowest Expected Ambient Temperature (°C/°F)	Correction Factor
24 to 20 / 76 to 68	1.02
19 to 15 / 67 to 59	1.04
14 to 10 / 58 to 50	1.06
9 to 5 / 49 to 41	1.08
4 to 0 / 40 to 32	1.10
-1 to -5 / 31 to 23	1.12
-6 to -10 / 22 to 14	1.14
-11 to -15 / 13 to 5	1.16
-16 to -20 / 4 to -4	1.18
-21 to -25 / -5 to -13	1.20
-26 to -30 / -14 to -22	1.21
-31 to -35 / -23 to -31	1.23
-36 to -40 / -32 to -40	1.25

Alternatively, a more accurate correction factor for the open-circuit voltage can be calculated using the following formula:

$$C_{Voc} = 1 - \alpha_{Voc} \times (25 - T)$$

T (°C) is the lowest expected ambient temperature at the system installation site.

$\alpha_{voc}$  (%/°C) is the voltage temperature coefficient of the selected module (refer to corresponding datasheet).

Electrical calculations and design must be performed by a competent engineer or consultant.

Please contact Only Solar's technical support team for additional information pertaining to engineering optimization and approval of project specific module string lengths.

## 4.0 UNPACKING AND STORAGE

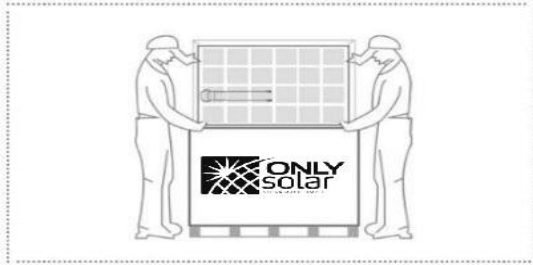
### NOTICE

### PRECAUTIONS

- Modules should be stored in a dry and ventilated environment to avoid direct sunlight and moisture. If modules are stored in an uncontrolled environment, the storage time should be less than 3 months and extra precautions should be taken to prevent connectors from being exposed to moisture or sunlight, like using connector endcaps.
- When unloading modules pallets from containers, please use a fork lift to remove the module pallets, and the forklift should be close to the ground in order to avoid the top of module pallets touching the top of the cabinet door. The thickness of forklift teeth should be less than 75mm, and the length of the forklift teeth should be longer than 2300mm, when unloading the module pallets with short side. For unloading CS7N-MS and CS7L-MS modules, the length of the forklift teeth should be longer than 1250mm and the width of forklift teeth should be wider than 600mm (from outer edge to outer edge ).



- Unpack module pallets carefully, following the steps shown on the pallet. Unpack, transport and store the modules with care.
- Modules must always be unpacked and installed by two people. Always use both hands when handling modules.



- **Do not** lift modules by their wires or junction box, lift them by the frame.
- Stacks of modules should contain no more than 12 modules, and the frames should be aligned.
- **Do not** place excessive loads on the module or twist the module frame.
- **Do not** stand, step, walk and/or jump on modules under any circumstances. Localized heavy loads may cause severe micro-cracks at cell level, which in turn may compromise module reliability and void Only Solar's warranty.



- **Do not** support the module by the backsheet when handling or installing the module.
- **Do not** carry modules on your head.
- **Do not** drop or place objects (such as tools) on the modules.
- **Do not** use sharp instruments on the modules. Particular care should be taken to avoid module backsheets being damaged by sharp objects, as scratches may directly affect product safety.
- **Do not** leave modules unsupported or unsecured.

- **Do not** change the wiring of bypass diodes.
- Keep all electrical contacts clean and dry at all times.
- **Do not** expose the modules and its electrical contacts to any unauthorized chemical substance (e.g. oil, lubricant, pesticide, etc.).

#### PRODUCT IDENTIFICATION

Each module has three identical barcodes (one in the laminate under the front glass, the second on the rear side of the module and the third on the frame) that act as a unique identifier. Each module has a unique serial number containing 14 digits or 16 digits.

A nameplate is also affixed to the rear of each module. This nameplate specifies the model type, as well as the main electrical and safety characteristics of the module.

#### 5.0 MODULE INSTALLATION



#### PRECAUTIONARY MEASURES AND GENERAL SAFETY

- Prior to installing modules please obtain information about any requirements and necessary approvals for the site, installation and inspection from the relevant authorities.
- Check applicable building codes to ensure that the construction or structure (roof, facade, support, etc.) can bear the module system load.
- Only Solar modules have been qualified for Application Class A (equivalent to Safety Class II requirements). Modules rated under this class should be used in systems operating at voltage above 50V or power above 240W, where general contact access is anticipated.
- Only Solar standard modules have been certified as Type1 or Type 2 according to UL 61730 and Class C according to IEC 61730-2 for fire class performance, please refer to the datasheet or the product nameplate for the detailed types.
- Consult your local authority for guidelines and requirements for building or structural fire safety.

#### UL 61730 SYSTEM FIRE RATING REQUIREMENTS



- Photovoltaic systems composed of UL 61730 certified modules mounted on a UL 2703 certified mounting system should be evaluated in combination with roof coverings in accordance with UL 61730 standard, with respect to meeting the same fire classification as the roof assembly.
- Mounting systems with a System Fire Class Rating (Class A, B or C), tested in conjunction with “Type 1” or “Type 2” fire rated modules, are considered acceptable for use with Only Solar modules, provided that the mounting system does not violate any other requirements of this manual.
- Any mounting system limitations on inclination or accessories required to maintain a specific System Fire Class Rating should be clearly specified in the installation instructions and UL 2703 certification of the mounting system supplier.
- When installing modules, ensure the assembly is mounted over a fire resistant roof covering rated for the application.
- The fire rating for this module is only valid when the product is installed as specified in the mechanical mounting instructions.

### ENVIRONMENTAL CONDITIONS

- The module is intended for use in general open-air climates, as defined in IEC 60721-2-1: Classification of environmental conditions Part 2-1: Environmental conditions appearing in nature. Temperature and humidity.
- Please consult the Only Solar technical support department for more information on the use of modules in special climates, such as an altitude greater than 2000m.



**Do not** install modules near open flames or flammable materials.

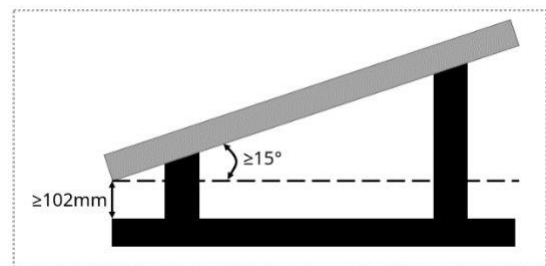


**Do not** immerse modules in water or constantly expose modules to water (either fresh or salt, i.e. from fountains, sea spray).

- Exposing modules to salt (i.e. marine environments) or sulfur (i.e. sulfur sources, volcanoes) incurs the risk of

module corrosion.

- Do not expose modules and their connectors to any unauthorized chemical substances (e.g. oil, lubricant, pesticide, etc.), as modules may incur damages.
- Only Solar modules have passed salt mist corrosion resistance test according to IEC 61701, but the corrosion may still occur on where the modules frame is connected to the bracket or where the grounding is connected. Should the installation location be near the ocean, Only Solar recommends stainless steel or aluminum materials be used in the areas with direct contact with the PV modules, and the connection point should be protected with anti-corrosion measures. For more information, please contact Only Solar technical support team.
- CS7L-MS & CS7N-MS modules, when used in rooftop applications, should be installed in a way that ensures enough ventilation. The clearance between lowest point of module and the roof surface **MUST** be equal to or greater than 102 mm, tilt angle of module to roof surface should be equal to or greater than 15°, and wind shields or decorative sheets which will prevent ventilation around PV array are **NOT** allowed to be installed.



- Failure to comply with these instructions will void Only Solar warranty.

### INSTALLATION REQUIREMENTS

- Ensure that the module meets the general technical system requirements.
- Ensure that other systems components do not damage the module mechanically or electrically.
- Modules can be wired in series to increase voltage or in parallel to increase current. To connect modules in series, connect the cables from the positive terminal of





one module to the negative terminal of the next module. To connect in parallel, connect the cables from the positive terminal of one module to the positive terminal on the next module.

- The quantity of bypass diodes in the module’s junction box provided may vary depending on the model series.
- Only connect the quantity of modules that corresponds to the voltage specifications of the inverters used in the system. In addition modules must not be connected together to create a voltage higher than the maximum permitted system voltage stated on the module nameplate, even under the worst local temperature conditions (see Table 1 for the correction coefficients that apply to open-circuit voltage).
- A maximum of two strings can be connected in parallel without using an over-current protection device (fuses, etc.) incorporated in series within each string. Three or more strings can be connected in parallel if an appropriate and certified over-current protection device is installed in series within each string. And it shall be ensured in the PV system design that the reverse current of any particular string is lower than the module maximum fuse rating at any circumstances.
- Only modules with similar electrical parameters should be connected in the same string to avoid or minimize mismatch effects in arrays.
- To minimize risk in the event of an indirect lightning strike, avoid forming loops with the wiring when designing the system.
- The recommended maximum series fuse rating is stated in a table in the Annex A.
- Modules should be safely fixed to bear all expected loads, including wind and snow loads.
- A minimum clearance of 6.5 mm (0.25 in) between modules is required to allow for thermal expansion of the frames.
- The small drainage holes on the underside of the module must not be blocked.

#### OPTIMUM ORIENTATION AND TILT

- To maximize the annual yield, please calculate the

optimum orientation and tilt for PV modules in that specific installation site. The highest yields are achieved when sunlight shines perpendicularly onto the PV modules.

#### AVOID SHADING

- Even minor partial shading (e.g. from dirt deposits) reduces yields. A module can be considered to be unshaded if its entire surface is free from shading all year round. Sunlight should be able to reach at least the module even on the shortest day of the year.
- Constant shading conditions can affect module service lifetime, due to accelerated ageing of the encapsulation material and thermal stress on the bypass diodes.

#### RELIABLE VENTILATION

- Sufficient clearance (at least 102 mm (4.02 in)) between the module frame and the mounting surface is required to allow cooling air to circulate around the back of the module. This also allows condensation or moisture to dissipate.
- According to UL 61730, any other specific clearance required for maintaining a system fire rating should prevail. Detailed clearance requirements pertaining to system fire ratings must be provided by your racking supplier.

### 5.1 MODULE WIRING

#### CORRECT WIRING SCHEME

- Cable management scheme should be reviewed and approved by the EPC contractor; in particular required cable lengths should be cross-checked considering the specificities of the tracker structure like bearing house gaps. If longer cable or additional jumper cable is requested, please contact Only Solar’s sales representative in advance.
- Ensure that the wiring is correct before starting up the system. If the measured open circuit voltage (Voc) and short-circuit current (Isc) differ from the specifications, this indicates that there is a wiring fault.
- When modules have been pre-installed but the system has not been connected to the grid yet, each module



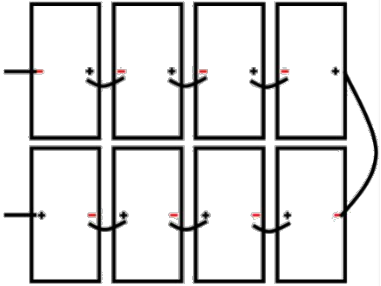
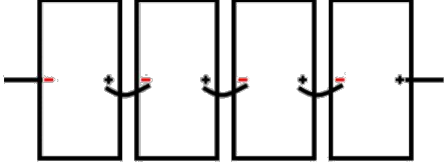
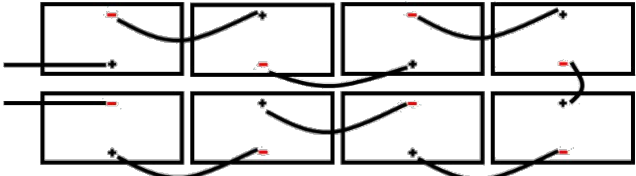
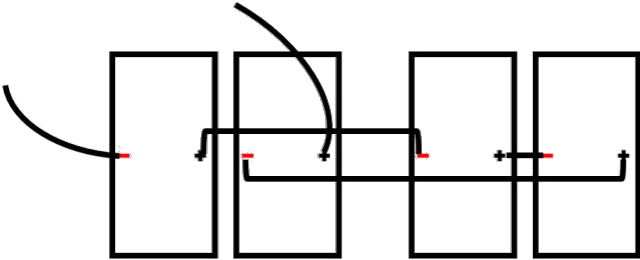
string should be kept under open-circuit conditions and proper actions should be taken to avoid dust and moisture penetration inside the connectors.

- Do not connect different connectors (brand and model) together.
- In case where a cable connection method not included

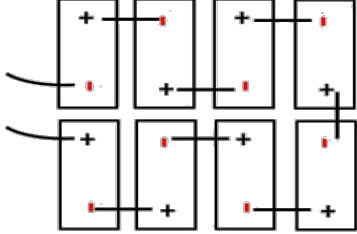
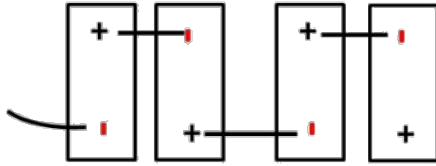
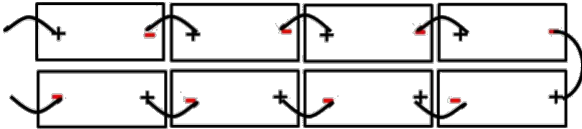
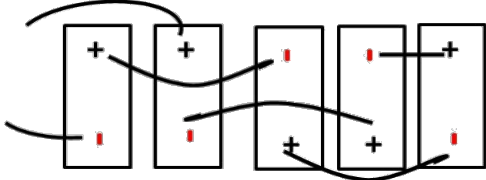
in the below table is used, please confirm the suitable cable length with Only Solar's sales representative.

- For different CSI module types, Only Solar offers optional cable specifications lengths to match various system configurations. Recommended system cable schemes are shown in table 2 & 3 below

**Table 2: System Cable Scheme for RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M, RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M Modules**

Module types	Standard cables
<p>RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M</p>	 <p style="text-align: center;">Portrait two rows installation</p> <p>Note: Adjacent two modules (up and down) need to be rotated 180 degrees</p>
<p>RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M</p>	 <p style="text-align: center;">Portrait one row installation</p>
	 <p style="text-align: center;">Landscape installation</p> <p>Note: Adjacent two modules (left to right) need to be rotated 180 degrees</p>
<p>RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M, RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M</p>	 <p style="text-align: center;">Leap-frog</p>

**Table 2: System Cable Scheme for RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M, RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M Modules**

Module types	Standard cables
RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M, RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M	 <p style="text-align: center;">Portrait two rows installation                      Note: Adjacent two modules (left to right) need to be rotated 180 degrees</p>
	 <p style="text-align: center;">Portrait one row installation                      Note: Adjacent two modules (left to right) need to be rotated 180 degrees</p>
	 <p style="text-align: center;">Landscape installation                      Note: Adjacent two modules (up and down) need to be rotated 180 degrees</p>
	 <p style="text-align: center;">Leapfrog</p>

The maximum distance between two adjacent module frames should be within 50 mm (1.96in) for the side with mounting clamps, and within 25 mm (0.98in) for the side without mounting clamps, in order to meet the system cable scheme.

### CORRECT CONNECTION OF CONNECTORS

- Make sure that all connections are safe and properly mated. The PV connector should not be subject to stress from the exterior. Connectors should only be used to connect the circuit. They should never be used to turn the circuit on and off.
- Connectors are not waterproof when unmated. When installing modules, connector should be connected to each other as soon as possible or appropriate measures (like using connector endcaps) should be taken to avoid moisture and dust penetrating into the connector.
- Do not clean or precondition the connectors using lubricants or any unauthorized chemical substances.

### USE OF SUITABLE MATERIALS

- Only use dedicated solar cable and suitable connectors (wiring should be sheathed in a sunlight-resistant conduit or, if exposed, should itself be sunlight-resistant) that meet local fire, building and electrical regulations. Please ensure that all wiring is in perfect electrical and mechanical condition.
- Installers may only use single-conductor cable listed and labeled as USE-2 or PV wire which is 90°C wet rated in North America, and single conductor cable, 2.5-16 mm<sup>2</sup> (5-14 AWG), 90°C wet rated in other areas (i.e. IEC 62930 approved), with proper insulation which is able to withstand the maximum possible system open-circuit voltage.
- Only copper conductor material should be used. Select a suitable conductor gauge to minimize voltage drop and ensure that the conductor ampacity complies with local regulations (i.e. NEC 690.8(D)).


### Cable and connector protection

- Secure the cables to the mounting system using UV-resistant cable ties. Protect exposed cables from damage by taking appropriate precautions (e.g. placing them inside a metallic raceway like EMT conduit). Avoid exposure to direct sunlight.
- A minimum bending radius of 60 mm (2.36 in) is required when securing the junction box cables to the

racking system.

- Protect exposed connectors from weathering damage by taking appropriate precautions. Avoid exposure to direct sunlight.
- Do not place connectors in locations where water could easily accumulate.

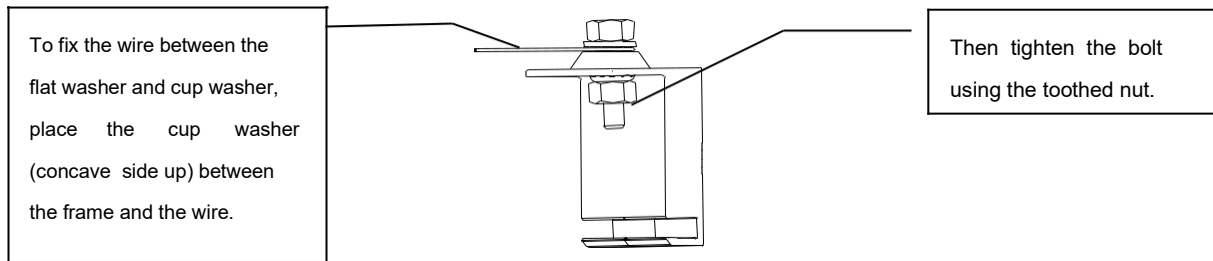
### 5.2 GROUNDING

- For grounding requirements in North America, a module with exposed conductive parts is considered to comply with UL 61730 only when it is electrically grounded in accordance with both the instructions presented below and the requirements of the National Electrical Code. Any grounding means used with Only Solar modules should be NRTL certified to UL 467 and UL 2703 standards. Please consult our technical service team for the formal approval process.
- For grounding requirements in other areas, although the modules are certified to Safety Class II, we recommend them to be grounded and that module installation should comply with all applicable local electrical codes and regulations. Grounding connections should be installed by a qualified electrician. Connect module frames together using adequate grounding cables: we recommend using 4-14 mm<sup>2</sup> (AWG 6-12) copper wire. Holes provided for this purpose are identified with a grounding symbol  (IEC 61730-1). All conductive connection junctions must be firmly fixed.
- Do not drill any extra ground holes for convenience as this will void the modules warranty.
- All bolts, nuts, flat washers, lock washers and other relevant hardware should be made of stainless steel, unless otherwise specified.
- Only Solar does not provide grounding hardware.
- The grounding method described below is recommended for Only Solar.





**GROUNDING METHOD: BOLT + TOOTHED NUT + CUP WASHER.**



- A grounding kit containing an M5 (3/16") SS cap bolt, an M5 (3/16") SS flat washer, an M5 (3/16") SS cup washer, and an M5 (3/16") SS nut (with teeth) is used to attach copper grounding wire to a pre-drilled grounding hole on the frame (see image above).
- Place the wire between the flat washer and the cup washer. Ensure that the cup washer is positioned between the frame and the wire with the concave side up to prevent galvanic corrosion. Tighten the bolt securely using the SS toothed nut. A wrench may be used to do this. The tightening torque is 3-7 Nm (2.2-5.2 ft-lbs).

considered to comply with the requirements of UL 1703 or UL 61730 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 UL 1703 or UL 61730.

**6.0 MOUNTING INSTRUCTIONS**



The applicable regulations pertaining to work safety, accident prevention and securing the construction site must be observed. Workers

and third party personnel shall wear or install fall arrest equipment. Any third party need to be protected against injuries and damages.

- The mounting design must be certified by a registered professional engineer. The mounting design and procedures must comply with all applicable local codes and requirements from all relevant authorities.
- The module is considered to be in compliance with UL 1703 or UL 61730 and IEC 61215 only when the module is mounted in the manner specified by the mounting instructions included in this installation manual.
- The system designer and installer are responsible for load calculations and for proper design of support structure.
- Any module without a frame (laminated) shall not be

- Only Solar does not provide mounting hardware.
- Standard modules can be mounted onto a support structure using one of several approved methods as described below. For information about other installation methods, please contact your local representative. Failure to use a recognized installation method will void the Only Solar warranty.
- Use appropriate corrosion-proof fastening materials. All mounting hardware (bolts, spring washers, flat washers, nuts) should be hot dip galvanized or stainless steel.
- Use a torque wrench for installation.
- Do not drill additional holes or modify the module frame. Doing so will void the warranty.
- Standard modules can be installed in either landscape or portrait orientations. Refer to the detailed instructions for further guidance. Please note that in areas with heavy snowfall (> 2400 Pa) further countermeasures such the use of additional support bars should be considered to avoid snow loads damaging the lowest row of modules.
- In cases where an additional support bar is recommended to improve both mechanical stability and long-term module performance, we recommend selecting a sufficiently resistant material. Only Solar recommends bars with a minimum thickness of

50 mm (1.97 in). The support bar centerline should be positioned within 100 mm (3.94 in) of the side frame centerline (slight shifts may be necessary to access module grounding holes).

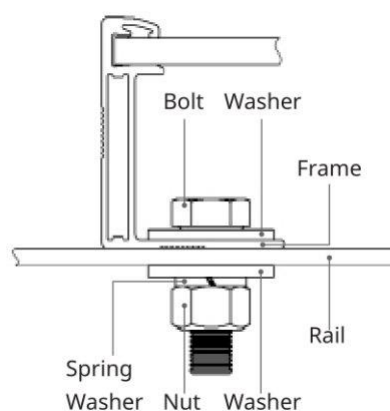
- The loads described in this manual correspond to test loads. For installations complying with IEC 61215-2:2016 and UL 61730, a safety factor of 1.5 should be applied for calculating the equivalent maximum authorized design loads. Project design loads depend on construction, applicable standards, location and local climate. Determination of the design loads is the responsibility of the racking suppliers and/or professional engineers. For detailed information, please follow local structural code or contact your professional structural engineer.

### 6.1 MOUNTING METHOD: BOLTING

- The mechanical load test with these mounting methods were performed according to IEC 61215.
- Modules should be bolted to supporting structures through the mounting holes in the rear frame flanges only.
- Each module must be securely fastened at a minimum of 4 points on two opposite sides.
- M8 X 1.25 - Grade 8.8 (5/16"-18 Grade B7) galvanized or A2-70 stainless steel bolt and nut should be used.

- The yield strength of bolt and nut should not be less than 450MPa.
- Tightening torques should be 16~20 Nm (11.8~14.75 ft-lbs) for M8 (5/16"-18) coarse thread bolts, depending on bolt class.
- In areas with heavy wind loads, additional mounting points should be used. The system designer and the installer are responsible for correctly calculating the loads and ensuring that the supporting structure meets all the applicable requirements.

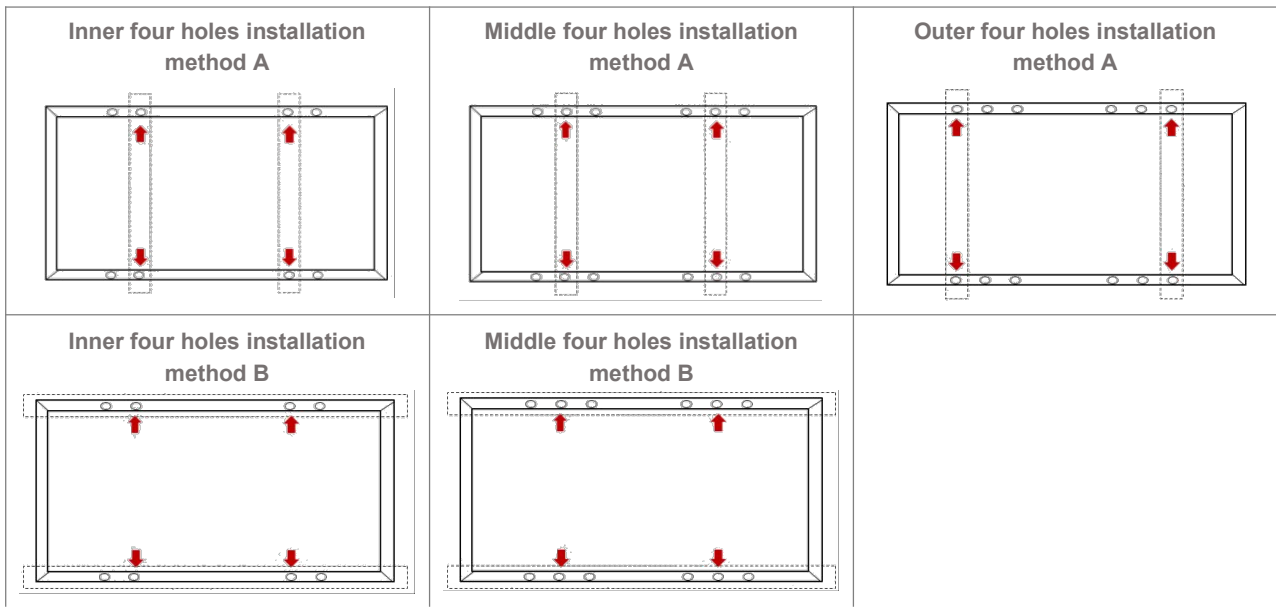
#### Mounting method: Bolting



- Modules should be bolted at the following hole locations depending on the configuration and loads:



Table 5: Approved bolting methods



Installation Method Module Types	Inner four holes installation method A	Inner four holes installation method B	Middle four holes installation method A	Middle four holes installation method B	Outer four holes installation method A
RS6K-M, RS6I-M RS7K-M, RS7I-M RS8K-M, RS8I-M	+5400Pa/-2400Pa	+4000Pa/-2400Pa	/	/	/
RT6K-M, RT6I-M RT7K-M, RT7I-M RT8K-M, RT8I-M	/	/	+5400Pa/-2400Pa	+5400Pa/-2400Pa	/
RT6K-M, RT6I-M RT7K-M, RT7I-M RT8K-M, RT8I-M	/	/	+5400Pa/-2400Pa	+3600Pa/-2400Pa	/

Note: The installation method of bolt is based on the experimental results, “/” means not tested.



## 6.2 MOUNTING METHOD: CLAMPING

- The mechanical load test with these mounting methods were performed according to IEC 61215.
- Top or bottom clamping methods will vary and are dependent on the mounting structures. Please follow the mounting guidelines recommended by the mounting system supplier.
- Each module must be securely fastened at a minimum of four points on two opposite sides. The clamps should be positioned symmetrically. The clamps should be positioned according to the authorized position ranges.
- Install and tighten the module clamps to the mounting rails using the torque stated by the mounting hardware manufacturer. M8 X 1.25 (5/16") bolt and nut are used for this clamping method.
- Tightening torques should be within 16~20 Nm (11.8~14.75 ft-lbs) for M8 (5/16") coarse thread bolts, depending on the bolt class. For the bolt grade, the technical guideline from the fastener suppliers should be followed. Different recommendations from specific clamping hardware suppliers should prevail.
- The system designer and installer are responsible for load calculations and for proper design of support structure.
- Only Solar's warranty may be void in cases where improper clamps or unsuitable installation methods are found. When installing inter-modules or end-type clamps, please take the following measures into account:

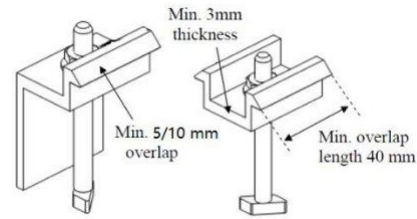
1. Do not bend the module frame.
2. Do not touch or cast shadows on the front glass.
3. Do not damage the surface of the frame (to the exception of the clamps with bonding pins).
4. Ensure the clamps overlap the module frame by at least 10 mm (0.4 in) for CS6W, CS7N and CS7L, 5mm (0.2in) for others.

5. Overlap in length by at least

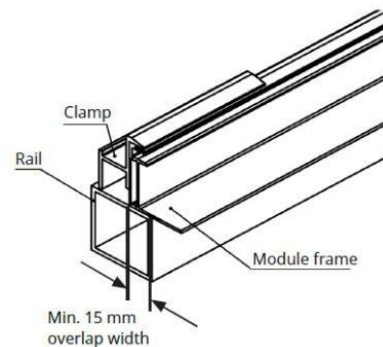
- a) 80 mm (3.15 in) when uplift load > 2400 Pa is required.

- b) 40 mm (1.57 in) when uplift load ≤ 2400 Pa is required.

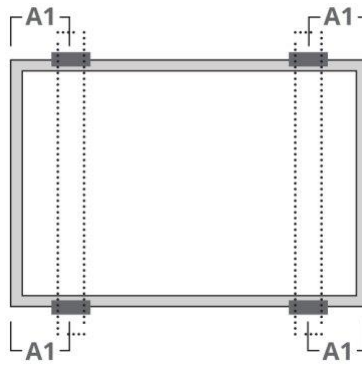
6. Ensure the clamp thickness is at least 3 mm (0.12 in).



- Clamp material should be anodized aluminum alloy or stainless steel.
- Clamp positions are of crucial importance for the reliability of the installation. The clamp centerlines must only be positioned within the ranges indicated in table below, depending on the configuration and load. For configurations where the mounting rails run parallel to the frame, precautions should be taken to ensure the bottom flange of the module frame overlaps the rail by 15 mm (0.59 in) or more.

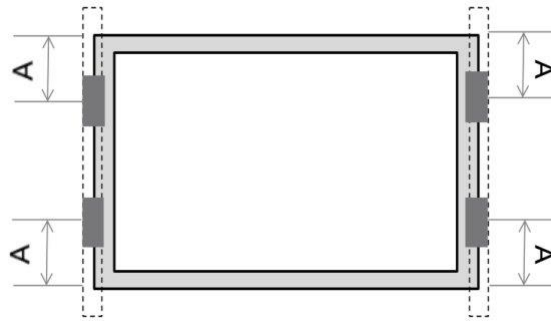


6.2.1 Four clamps on long side of frame and rails perpendicularly to the long side frame



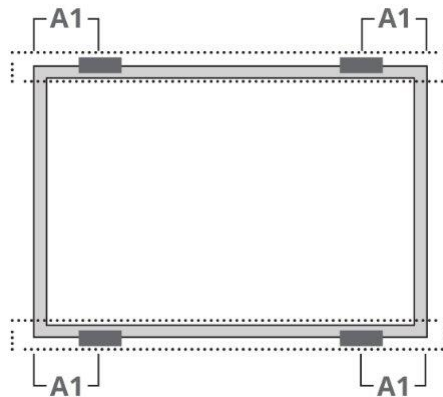
Module Types	Max Mechanical Load (Pa)					
	+2000/ -2000	+2400/ -2400	+3600/ -2400	+5400/ -2400	+5400/ -3600	+7000/ -5400
	A1 Range (mm)					
RS6K-M, RS6I-M,	/	340-550	/	410-490	/	/
RS7K-M, RS7I-M,	/	/	300-600	/	350-550	400-500
RS8K-M, RS8I-M	/	331-550	/	/	240-330	/
RT6K-M, RT6I-M,	/	300-600	/	/	400-500	/
RT7K-M, RT7I-M,	/	300-600	/	400-500	/	/
RT8K-M, RT8I-M	/	/	300-600	400-500	/	/

6.2.2 Four clamps on short side of frame and rails perpendicular to the long side frame.



Module Types	A Range (mm)	
	0-200	200-250
	Max Mechanical Load (Pa)	
RS7K-M, RS7I-M,	+1200/-1200	+1400/-1400
RS8K-M, RS8I-M	+1000/-1000	+1200/-1200
RT6K-M, RT6I-M,	+2000/-2000	+2200/-2200
RT7K-M, RT7I-M,	+1600/-1600	+1800/-1800
RT8K-M, RT8I-M	+1400/-1400	+1600/-1600

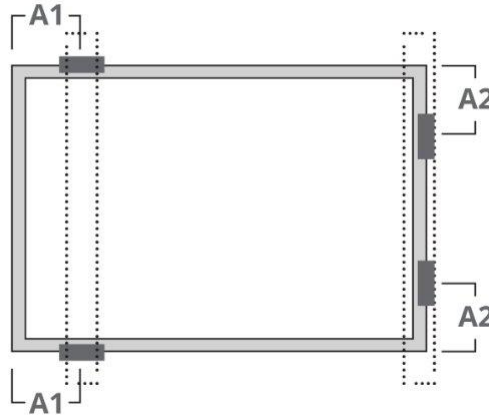
6.2.3 Four clamps on long side of frame and rails parallel to the long side frame.



Module Types	Max Mechanical Load (Pa)	
	+4000/-2400	+5400/-2400
	A1 Range (mm)	
RS7I-M, RS8K-M, RS8I-M	/	410-490
RT6K-M, RT6I-M, RT7K-M,	240-330	/
RT7I-M, RT8K-M, RT8I-M	270-330	/

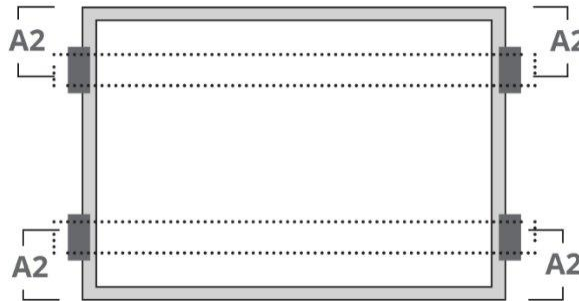


6.2.4 Two clamps on the long side and two clamps on the short side of frame. Rails run perpendicular to the long side frame.



Module Types	Max Mechanical Load (Pa)		
	+2400/-2400		
	A1 Range (mm)		A2 Range (mm)
RS7I-M, RS8K-M, RS8I-M	300-550		200-250
RT7I-M, RT8K-M, RT8I-M	100-550		200-250

6.2.5 Four clamps on short side of frame and rails parallel to the long side frame.



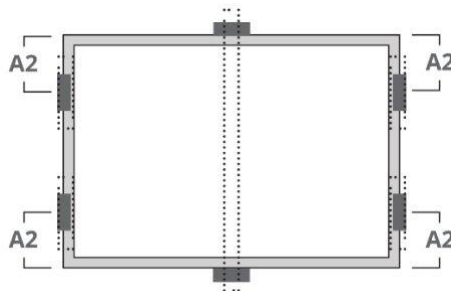
Module Types	A2 Range (mm)			
	0-200	170-210	200-250	230-250
	Max Mechanical Load (Pa)			
RS6K-M, RS6I-M,	/	/	+2400/-2400	/
RS7K-M, RS7I-M,	/	+2400/-2400	/	/
RS8K-M, RS8I-M	/	/	+2000/-2000	/
RT6K-M, RT6I-M,	/	230-250	/	+2200/-2200
RT7K-M, RT7I-M,	+1600/-1600	/	+1800/-1800	/
RT8K-M, RT8I-M	+1400/-1400	/	+1600/-1600	/

6.2.6 Four clamp mounting on short side of frame.



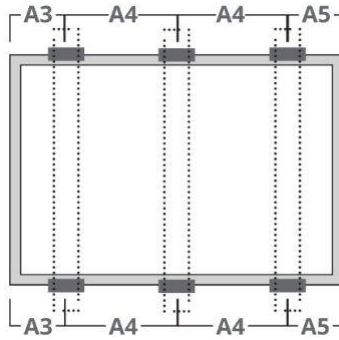
Module Types	Max Mechanical Load (Pa)		
	+2000/-2000	+2200/-2200	+2400/-2400
	A2 Range (mm)		
RS7I-M, RS8K-M, RS8I-M	/	/	0-250
RT6K-M, RT6I-M, RT7K-M,	0-210	/	/
RT7I-M, RT8K-M, RT8I-M	0-200	200-250	/

6.2.6 Four clamp mounting on short side of frame, and an additional support bar placed below the center of the module.



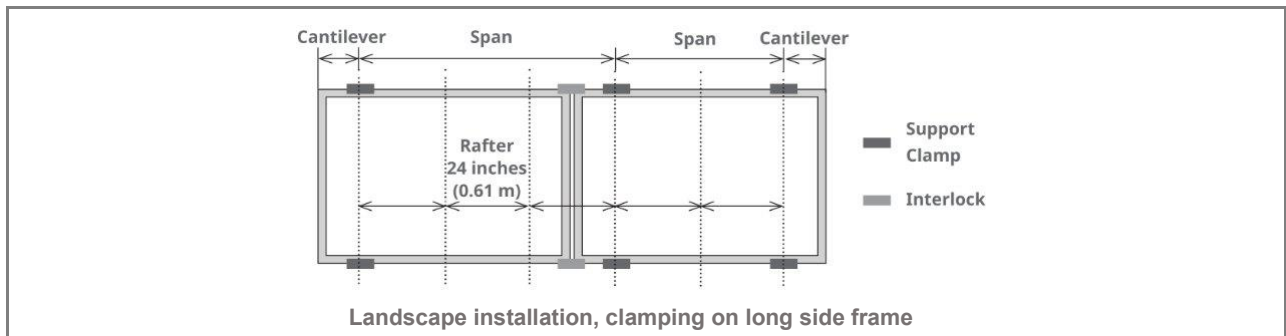
Module Types	Max Mechanical Load (Pa)	
	+5400/-2400	
	A2 Range (mm)	
RS7I-M, RS8K-M, RS8I-M	200-250	
RT7I-M, RT8K-M, RT8I-M	170-210	

6.2.7 Six clamps on long side of frame and rails perpendicularly to the long side frame



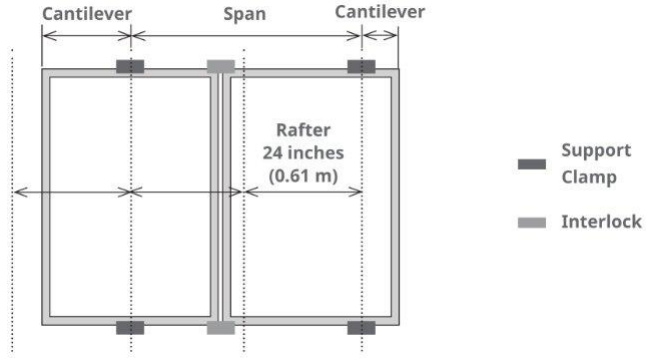
Module Types	Max Mechanical Load (Pa)		
	+5400/-2400	+5400/-3600	+6000/-4000
	A3 & A5 Range (mm)		
RS6K-M, RS6I-M, RS7K-M,	80-380	/	0-250
RS7I-M, RS8K-M, RS8I-M	250-350	/	/
RT6K-M, RT6I-M, RT7K-M,	/	140-440	/
RT7I-M, RT8K-M, RT8I-M	/	/	80-380

6.2.8 Rail-less clamping



Module Type	Max Span	Max Cantilever length	Downforce	Uplift
RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M	72 inches (1.83 m)	24 inches (0.61 m)	2200 Pa	1400 Pa
	64 inches (1.63 m)	21.3 inches (0.54 m)	2400 Pa	1400 Pa
	48 inches (1.22 m)	16 inches (0.41 m)	3400 Pa	1800 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	4800 Pa	2400 Pa
RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M	72 inches (1.83 m)	24 inches (0.61 m)	2650 Pa	2400 Pa
	64 inches (1.63 m)	21.3 inches (0.54 m)	2800 Pa	2400 Pa
	48 inches (1.22 m)	16 inches (0.41 m)	3850 Pa	3600 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	5400 Pa	3600 Pa





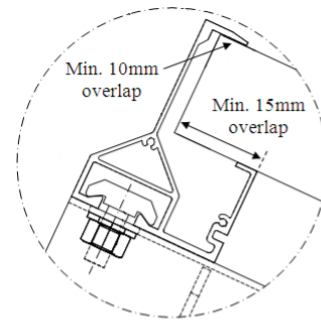
Portrait installation, clamping on short side frame




Module Type	Max Span	Max Cantilever length	Downforce	Uplift
RS6K-M, RS6I-M, RS7K-M, RS7I-M, RS8K-M, RS8I-M	48 inches (1.22 m)	16 inches (0.41 m)	1800 Pa	800 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	1800 Pa	1200 Pa
	24 inches (0.61 m)	8 inches (0.2 m)	1800 Pa	1800 Pa
RT6K-M, RT6I-M, RT7K-M, RT7I-M, RT8K-M, RT8I-M	48 inches (1.22 m)	16 inches (0.41 m)	1800 Pa	1800 Pa
	32 inches (0.81 m)	10.7 inches (0.27 m)	1800 Pa	1800 Pa
	24 inches (0.61 m)	8 inches (0.2 m)	2000 Pa	2000 Pa

### 6.3 INSERTION SYSTEMS

- This mounting method has been certified by VDE and CSA, or qualified by Only Solar.
- Insertion methods can vary and depend on the mounting structures. The installer needs to follow the mounting guidelines recommended by the mounting system supplier. Each module must be securely maintained through all its length on two opposite sides. Install and tighten the insertion profiles to the support structure using the hardware and instructions provided by the mounting system manufacturer. The system designer and installer are solely responsible for load calculations and for the proper design of support structure.
- Only Solar warranty may be void in cases where improper insertion systems or unsuitable installation methods are found. When installing insertion profiles, please take the following measures into account:

1. Do not bend the module frame.
2. Do not touch the front glass or cast shadow onto it.
3. Do not damage the surface of the frame.
4. Ensure that the insertion profiles overlap the module frame by at least 10 mm (0.39 in).
5. Ensure that the module frame (C-shape) overlaps the insertion profiles by at least 15 mm (0.59 in).
6. Ensure insertion profile thickness and tolerances suit module thickness.

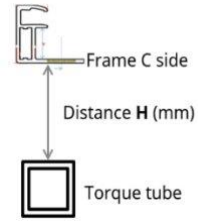


Insertion Method A	Insertion Method B	Insertion Method C
		
Two insertion profiles run parallel to long side frame.	Two insertion profiles run perpendicularly to long side frame.	An additional support bar used with clamps

Installation Method Module Types	Insertion Method A	Insertion Method B	Insertion Method C
RS6K-M, RS6I-M,	+5400Pa/-2400Pa	+1400Pa/-1400Pa	+5400Pa/-2400Pa
RS7K-M, RS7I-M,	+4000Pa/-2400Pa	+2000Pa/-2000Pa	+5400Pa/-2400Pa
RS8K-M, RS8I-M	+4000Pa/-2400Pa	+2400Pa/-2400Pa	+5400Pa/-2400Pa
RT6K-M, RT6I-M,	+2400Pa/-2400Pa	/	+5400Pa/-2400Pa
RT7K-M, RT7I-M,	/	+1200Pa/-1200Pa	/
RT8K-M, RT8I-M	/	+2200Pa/-2200Pa	/

### 6.4 MOUNTING METHODS WITH SINGLE-AXIS TRACKER

- The bolts and clamps used in this section should follow the requirements in 6.1 and 6.2.
- Under any conditions the junction box should not become in contact with the subjacent racking structure except torque tube. For any single axis tracker installation method with portrait one row, bearing house cannot be allowed to locate in junction box position.
- If any racking structures, especially bearing house, have to be located under the modules, the gap H between the frame and the racking structure should be at least 25mm.

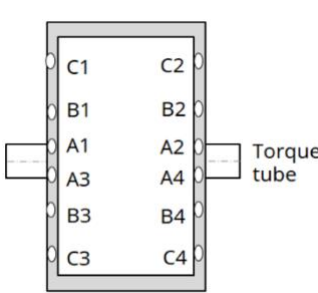


- If your tracker design cannot meet the above distance requirement, please contact Only Solar technical support department in writing for advices.

#### Tracker 1P Bolting method

Install and tighten the module clamps to the mounting rails using the torque stated by the mounting hardware manufacturer. M6 X 1 (1/4") bolt and nut are used for this bolting method.

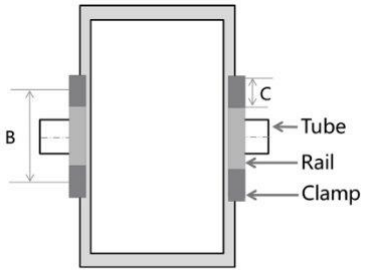
- Tightening torques should be 6~9 Nm (4.5~6.6 ft-lbs) M6 X 1 (1/4") coarse thread bolts, depending on bolt class.



Module type	Mounting hole space (mm)	Fixed mounting hole location	Plain washer outer diameter (mm)	Distance H (mm)	Test load (Pa)
RS6I-M, RS6K-M	A1-A3: 400	A1, A2, A3, A4	18	>40	+1600/-1600
				≤40	+2400/-2200
RS7I-M, RS7K-M	A1-A3: 400 B1-B3: 1155	A1, A2, A3, A4	18	>40	+2400/-2200
		B1, B2, B3, B4	18	≤40	+2800/-2400
RS8I-M, RS8K-M	A1-A3: 400	A1, A2, A3, A4	18	>40	+1600/-1600
				≤40	+2400/-2200
RT7I-M, RT7K-M	A1-A3: 400	A1, A2, A3, A4	18	>40	+1600/-1600
				≤40	+2000/-1800
RT8I-M, RT8K-M	A1-A3: 400	A1, A2, A3, A4	18	>40	+1800/-1600
	B1-B3: 790	B1, B2, B3, B4	18	≤40	+2400/-2100

Note: \* means the module with cross bar.

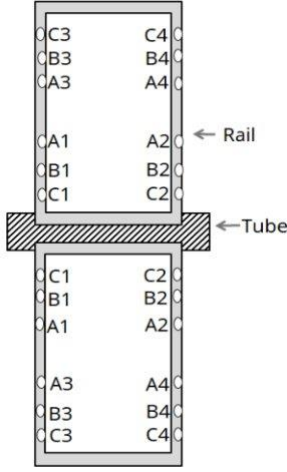
**Tracker 1P Clamping method**



Module type	B Value (mm)	Clamp length C (mm)	Test load (Pa)
RT6I-M, RT8I-M	400	≥40	+2400/-2200
RT6K-M RT7K-M RT8K-M	400	≥40	+1800/-1600
	600	≥80	+2400/-2200

Overlap width between clamp and frame:  
 Frame top side ≥ 10mm  
 Frame bottom side ≥ 15mm

**Tracker 2P Bolting method**



Module type	Mounting hole space (mm)	Mounting hole location	Plain washer outer diameter (mm)	Test load(Pa)
RS6I-M RS6K-M	A1-A3: 400 B1-B3: 1155	B1, B2, A3, A4	18	+1800/-1600
		B1, B2, B3, B4	18	+2400/-2200
RS7I-M RS7K-M	A1-A3: 400 B1-B3: 1155	B1, B2, A3, A4	18	+2400/-2200
RT6I-M RT7I-M RT8I-M	A1-A3: 400 B1-B3: 790	B1, B2, A3, A4	18	+1600/-1600
		B1, B2, B3, B4	18	+1800/-1800
RT6I-M RT7I-M RT8I-M	A1-A3: 400 B1-B3: 790	B1, B2, A3, A4	18	+1800/-1600
		B1, B2, B3, B4	18	+2200/-2200

Note: \* means the module with cross bar.

The allowable maximum twist angle of the module is 0.5 degree.

- Please contact the tracker manufacturer and Only Solar’s technical support department for details in regard to specific projects



## 7.0 MAINTENANCE

- Do not make modifications to any component of the PV module (diode, junction box, connectors or others).
- Regular maintenance is required to keep modules clear of snow, bird droppings, seeds, pollen, leaves, branches, dirt spots, and dust.
- Modules with sufficient tilt (at least 15°), generally may not require cleaning (rain will have a self-cleaning effect). If the module has become soiled, wash with water and a non-abrasive cleaning implement (sponge) during the cool part of the day. Do not scrape or rub dry dirt away, as this may cause micro scratches.
- Snow should be removed using a soft brush.
- Periodically inspect the system to check the integrity of all wiring and supports.
- To protect against electric shock or injury, electrical or mechanical inspections and maintenance should be performed by qualified personnel only.

## 8.0 MODULE CLEANING GUIDELINES

This manual covers the requirements for the cleaning procedure of Only Solar’s photovoltaic modules. The purpose of these cleaning guidelines is to provide general information for cleaning Only Solar modules. System users and professional installers should read these guidelines carefully and strictly follow these instructions.

Failure to follow these instructions may result in death, injury or damage to the photovoltaic modules. Damages induced by inappropriate cleaning procedures will void Only Solar warranty.



### SAFETY WARNING

- Cleaning activities create risk of damaging the modules and array components, as well as increasing the potential electric shock hazard.
- Cracked or broken modules represent an electric shock hazard due to leakage currents, and the risk of shock is increased when modules are wet. Before cleaning, thoroughly inspect modules for cracks, damage, and loose connections.

- The voltage and current present in an array during daylight hours are sufficient to cause a lethal electrical shock.
- Ensure that the circuit is disconnected before starting the cleaning procedure as contact with leakage of electrically active parts can result in injury.
- Ensure that the array has been disconnected to other active components (such as inverter or combiner boxes) before starting with the cleaning.
- Wear suitable protection (clothes, insulated gloves, etc.).
- Do not immerse the module, partially or totally, in water or any other cleaning solution.
- Rear side cleaning of the modules is not required, if cleaning the rear of a module is desired, care should be taken to ensure there is no damage caused to the backsheet by simply clearing the growth by hand or with a soft sponge.

### HANDLING NOTICE

#### NOTICE

- Use a proper cleaning solution and suitable cleaning equipment.
- Do not use abrasive or electric cleaners on the module.
- Particular attention should be taken to avoid the module backsheet or frame to come in contact with sharp objects, as scratches may directly affect product safety.
- Do not use abrasive cleaners, de-greasers or any unauthorized chemical substance (e.g. oil, lubricant, pesticide, etc.) on the module.
- Do not use cleaning corrosive solutions containing hydrofluoric acid, alkali, acetone, or industrial alcohol. Only substances explicitly approved by Only Solar are allowed to be used for cleaning modules.
- For cleaning methods using rotating brush, please consult with Only Solar’s technical support before using.
- Dirt must never be scraped or rubbed away when dry, as this will cause micro-scratches on the glass surface.



## OPERATION PREPARATION

- Noticeable dirt must be rubbed away by gentle cleaning implement (soft cloth, sponge or brush with soft bristles).
- Ensure that brushes or agitating tools are not abrasive to glass, EPDM, silicone, aluminum, or steel.
- Conduct the cleaning activities avoiding the hottest hours of the day, in order to avoid thermal stress on the module.

We recommend the following to be used:

- Water with low mineral content
- Near neutral pH water
- The maximum water pressure recommended is 4 MPa (40 bar)

## CLEANING METHODS

### Method A: Compressed Air

Only Solar recommends cleaning the soft dirt (like dust) on modules just with air pressure. This technique can be applied as long as the method is efficient enough considering the existing conditions.

### Method B: Wet cleaning

If excessive soiling is present on the module surface, a non-conductive brush, sponge, or other mild agitating method may be used with caution.

- Ensure that any brushes or agitating tools are constructed with non-conductive materials to minimize risk of electric shock and that they are not abrasive to the glass or the aluminum frame.
- If grease is present, an environmental friendly cleaning agent may be used with caution.



## ANNEX A: MECHANICAL AND ELECTRICAL RATINGS

Standard Test Conditions are: Irradiance of 1000 W/m<sup>2</sup>, AM1.5 spectrum, and cell temperature of 25°C. The tolerance of electrical characteristics is respectively within ±3% for Pmax, and ±5% for Isc & Voc. Specifications are subject to change without notice.

Table A: Mechanical and electrical ratings under STC

Electrical Data(STC)						
Rated Power In Watts-Pmax(Wp)	550W	555W	560W	565W	570W	575W
Open Circuit Voltage-Voc(V)	49.90	49.98	50.05	50.20	50.35	50.50
Short Circuit Current-Isc(A)	14.00	14.03	14.07	14.14	14.21	14.28
Maximum Power Voltage-Vmp(V)	41.96	42.06	42.12	42.26	42.42	42.57
Maximum Power Current-Imp(A)	13.11	13.19	13.30	13.37	13.44	13.51
Module Efficiency(%)	21.28%	21.48%	21.67%	21.87%	22.07%	22.26%

STC: irradiance 1000W/m<sup>2</sup>, component temperature 25°C, Air Mass AM1.5 according to EN 60904-3

Electrical Data(NOCT)						
Rated Power In Watts-Pmax(Wp)	416W	420W	424W	428W	432W	436W
Open Circuit Voltage-Voc(V)	46.68	46.78	46.85	46.98	47.11	47.33
Short Circuit Current-Isc(A)	11.17	11.20	11.24	11.28	11.32	11.36
Maximum Power Voltage-Vmp(V)	39.43	39.62	39.67	39.88	40.09	40.30
Maximum Power Current-Imp(A)	10.55	10.60	10.69	10.73	10.78	10.82

NMOT: irradiance 800W/m<sup>2</sup>, ambient temperature 20°C, Air Mass AM1.5, wind speed 1m/s

Mechanical Data	
Solar Cells	Mono N-type 182*91mm,16 BB
Cell Configuration	144cells(6*24)
Module Dimensions	2279*1134*35mm/30mm
Weight	28.6kg/27.2kg
Front Cover	3.2mm Tempered Glass
J-Box	IP68,3 diodes
Cable	4mm <sup>2</sup> (IEC)/12AWG(UL),350mm(+)/450mm(-) or customized length
Connectors	MC4 or MC4 Compatible

Temperature & Maximum ratings	
Nominal Operating Cell Temperature(NOCT)	45°C±2°C
Temperature Coefficient of Voc	- 0.26%/°C
Temperature Coefficient of Isc	0.048%/°C
Temperature Coefficient of Pmax	- 0.32%/°C
Operational Temperature	- 40~+85°C
Maximum System Voltage	1500V(IEC)/1500V(UL)
Max Series Fuse Rating	25A
Limiting Reverse Current	25A



## AMENDED EDITIONS AND DATES

- Rev 1.6 was amended and released on Apr, 2021
- Rev 1.7 was amended and released on May, 2021
- Rev 1.8 was amended and released on Sep, 2021
- Rev 1.9 was amended and released on Oct, 2021
- Rev 2.0 was amended and released on Dec, 2022
- Rev 2.1 was amended and released on Apr, 2022
- Rev 2.2 was amended and released on July, 2022
- Rev 2.3 was amended and released on Oct, 2022
- Rev 2.4 was amended and released on Jan, 2022
- Rev 2.5 was amended and released on March, 2022
- Rev 2.6 was amended and released on April, 2022
- Rev 2.61 was amended and released on April, 2023
- Rev 2.62 was amended and released on April, 2023
- Rev 2.7 was amended and released on April, 2024
- Rev 2.71 was amended and released on April, 2024

