

# INSTALLATION MANUAL

*The Solution in Black*  
*The Comax Solution*  
*The Quadmax Solution*  
*The Universal Solution*  
*The Aesthetic Solution*  
*The Utility Solution*  
*The Honey Module*

IEC version

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## **1. DISCLAIMER OF LIABILITY**

The installation, handling and use of Trina Solar Crystalline series modules are beyond company control. Accordingly, Trina Solar does not assume responsibility for loss, damage, injury or expense resulting from improper installation, handling, use or maintenance.

Trina Solar assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of the module. No license is granted by implication or under any patent or patent rights.

Specifications are subject to change without prior notice.

## **2. SAFETY PRECAUTIONS**

- When designing the SPV system, please always take into consideration the variation of the voltage under different temperatures (please check the respective temp. coefficients of the modules, the Voc of the modules will be rise when the temperature drops);  
For example: with TSM-190DC01 modules (Max. System voltage is 1000V) the maximum series modules configuration number should NEVER can exceed  $N = 17$  ( $1000V/56.22V = 17.8$ ), taking into consideration the possible variation of the voltage due to the lowest temperature in winter at specified location can reach  $-40^{\circ}\text{C}$ .
- We suggest that every series SPV module string should be fused prior to be connected with other strings. Please refer to the applicable regional and local codes for additional fuse requirements.
- Solar photovoltaic (SPV) modules generate electricity when exposed to light. An array of many modules can cause lethal shocks and/or burn hazards. Only authorized and trained personnel should have access to the modules.
- Use properly insulated tools and appropriate protective equipment to reduce risk of electric shock.
- Do not stand or step on the module.
- Do not damage or scratch the front or backside surfaces of the module.
- Never use a module with broken glass or torn substrate. Broken modules cannot be repaired and contact with any module surface or frame can lead to electrical shock.
- Do not disassemble the modules or remove any part of the module.
- Protect plug contacts against soiling; do not make any plug connections using soiled plug contacts.
- Do not install or handle modules when they are wet or during periods of high wind.
- Do not short the positive and the negative of a single SPV module.
- Do not disconnect under load.
- Make sure connectors have no gap between insulators. A gap can cause fire hazard and/or danger of an electrical shock.
- Make sure that the polarity of each module or a string is not reversed considering the rest of the modules or strings.
- Artificially concentrated sunlight should not be used on the SPV module.
- Maximum system voltage must not exceed 1000V DC.
- Under normal conditions, a solar photovoltaic module is likely to produce more current and /or voltage than reported under standard test conditions. Accordingly, the value of Isc marked on this module should be multiplied by a factor of 1.25 when determining the conductor current ratings, fuse sizes and size of controls connected to the SPV output.
- Our module application class is class A, modules rated for use in this application class may be used in systems operating at greater than 50V DC or 240W, where general contact access is anticipated.
- It is recommend to choose inverters with isolation transformer in hot and wet area (e.g., seashore, lakeshore, riverside, wetland and etc.), to make sure the modules work under positive voltage.

## **3. UNPACKING AND STORAGE**

- Before installation, keep all modules and electrical contacts clean and dry.
- If it is necessary to store modules temporarily, a dry, ventilated room should be used.
- When unpacking, carry modules with both hands. Do not place modules on top of each other.

## **4. PRODUCT IDENTIFICATION**

We recommend that you take note of the serial number. Each individual module has a unique serial number. It is permanently attached to the backsheet of the module on the product sticker.

## **5. ENVIRONMENTAL CONDITIONS AND SITE SELECTION**

### **5.1 CLIMATE CONDITION**

Install Trina Solar Crystalline series modules in the following conditions:

- Operating temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Storage temperature:  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$
- Humidity: below 85RH%
- Mechanical Load Pressure: below  $112.78\text{lbs}/\text{ft}^2$  (5400Pa)

\*Note: Mechanical load bearing (include wind and snow loads) of the module is based on mounting methods. Professional system installer must be responsible for mechanical load calculation according to system design.

## 5.2 SITE SELECTION

- In most applications, Trina Solar SPV modules should be installed in a location where they will receive maximum sunlight throughout the year.
- Modules should not be shaded at any time of the day because of buildings, trees, chimney, etc.
- Do not install SPV modules in a location where they will be immersed in water or continually exposed to water from a sprinkler or fountain, etc.
- For roof installation, Modules should be mounted over a fire resistant covering, with adequate ventilation between the module backsheet and the mounting surface. Any slope of less than 127mm/305mm is required to maintain the fire class rating.
- Do not mount SPV module in such way that the drain holes will block up.
- According to, the 3<sup>rd</sup> party test to IEC 61701, First edition, 1995.3, Salt mist corrosion testing of photovoltaic (PV) modules by Intertek, Trina modules can be installed in corrosive salt areas within proximity of the ocean or sulfurous area.
- According to the 3<sup>rd</sup> party test to 2 PfG 1917/05.11 “Ammonia corrosion testing of photovoltaic (PV) modules” in TUV Rheinland and DLG Fokus Test “Ammonia resistance”, Trina modules can be installed in ammonia environment, like farm house.

## 5.3 MODULE TILT ANGLE

Trina Solar SPV modules connected in series should be installed at same orientation and angle. Different orientation or angle may cause loss of output power due to difference of amount of sunlight exposed to the module.

Typically, the optimal tilting of SPV module is almost the same as the latitude of installation location.

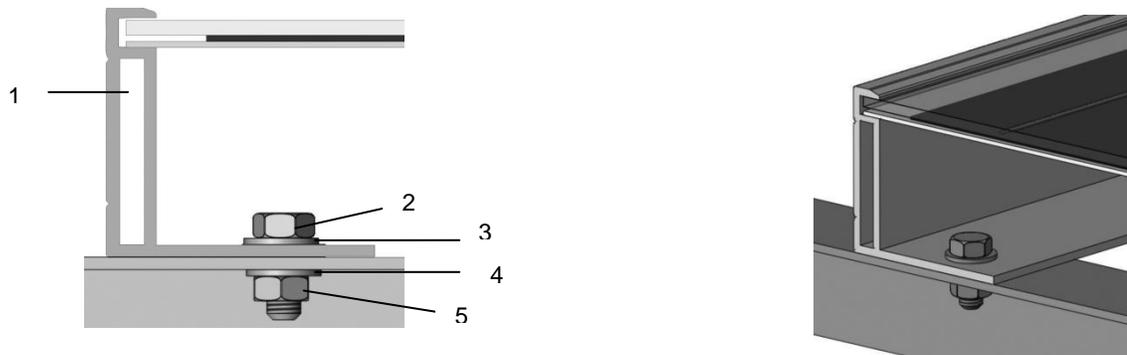
## 6. MOUNTING INSTRUCTIONS

### 6.1 MOUNTING METHODS

PV modules can be mounted to the substructure using the following methods:

**(1) Screw fitting:** Using corrosion-proof screws (M8) in the existing installing holes in the module frame. The frame of each module has 4 mounting holes used to secure the modules to supporting structure.

- Module frame must be attached to a mounting rail using M8 corrosion-proof screws together with spring washers and flat washers in four symmetrical locations on the SPV module.
- The modules have been evaluated by for mounting using the 4 provided mounting holes in the frame.
- Applied torque should be 8 Nm. Please find detailed mounting information in the below illustration below:



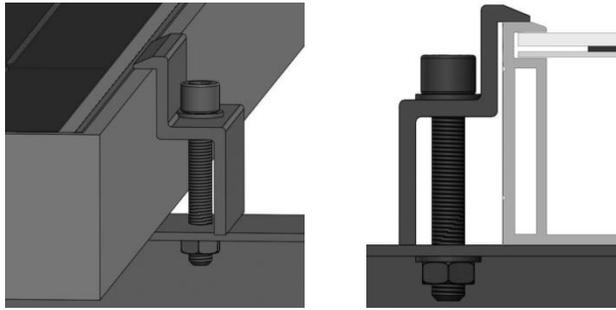
**Figure1. SPV module installed with Screw fitting method**

- 1) Aluminum Frame
- 2) M8 Stainless screw
- 3) Flat Stainless Washer
- 4) Spring Stainless Washer
- 5) HEX Stainless Nut

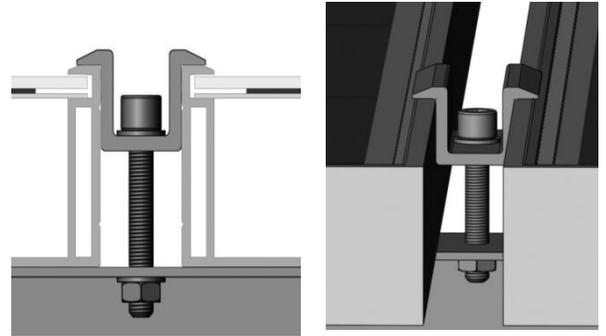
**(2) Clamp fitting:** Using suitable module clamps on the side of the module frame to mount the modules (including “portrait orientation” and “landscape orientation”)

- Use at minimum 4 clamps to fix modules on the mounting rail.
- Modules clamps should not come into contact with the front glass and must not deform the frame.
- Be sure to avoid shadowing effects from the module clamps.
- The module frame is not to be modified under any circumstances.
- When choosing this type of clamp-mounting method, please be sure to use at least four clamps on each module, two clamps should be attached on each long sides of the module (for portrait orientation) and each short sides of the module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure modules can bear the load.
- Applied torque should be 8 Nm. Please find detailed mounting information in the illustration below:

**Fringe modules installation**



**Middle modules installation**



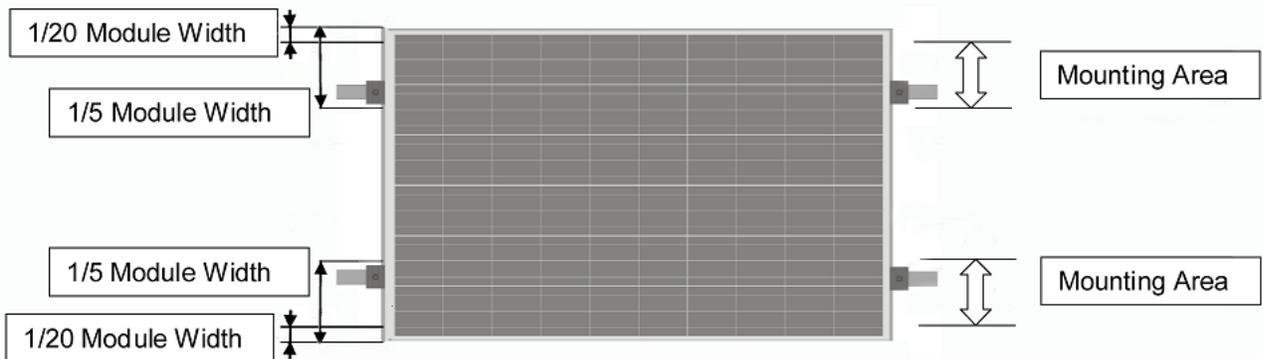
**Figure2. SPV module installed with clamp fitting method\***

Notes:

- Clearance between modules frames and surface of the wall or roof is required to prevent wiring damage and to allow air to circulate behind the module. Recommended stand-off height is 115mm.
- Observe the linear thermal expansion of the module frames. The recommended minimum distance between two modules is 10 mm.
- Ensure panels 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.
- Do not mount SPV modules in such way that drain holes of modules are blocked.

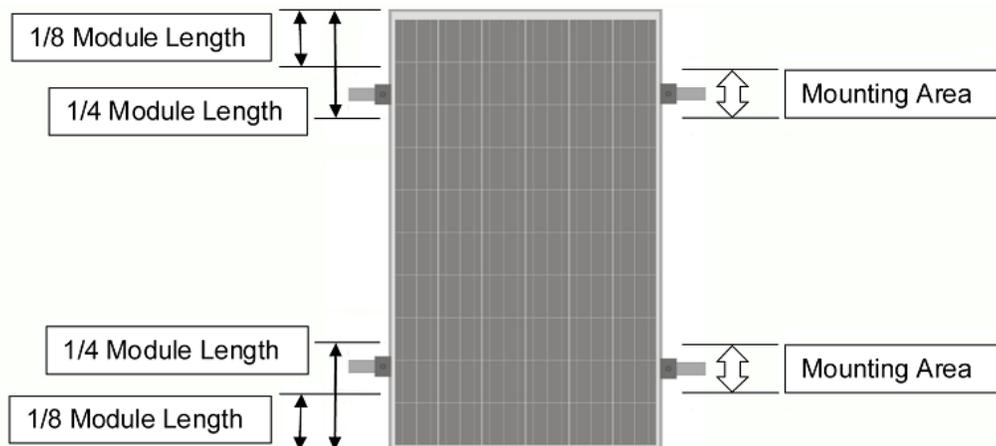
Please note the diagram below when installing:

**(1) landscape orientation installation**



**Figure 3: Mechanical dimensions when modules installed at landscape orientation with Clamp fitting method**

**(2) Portrait orientation installation**

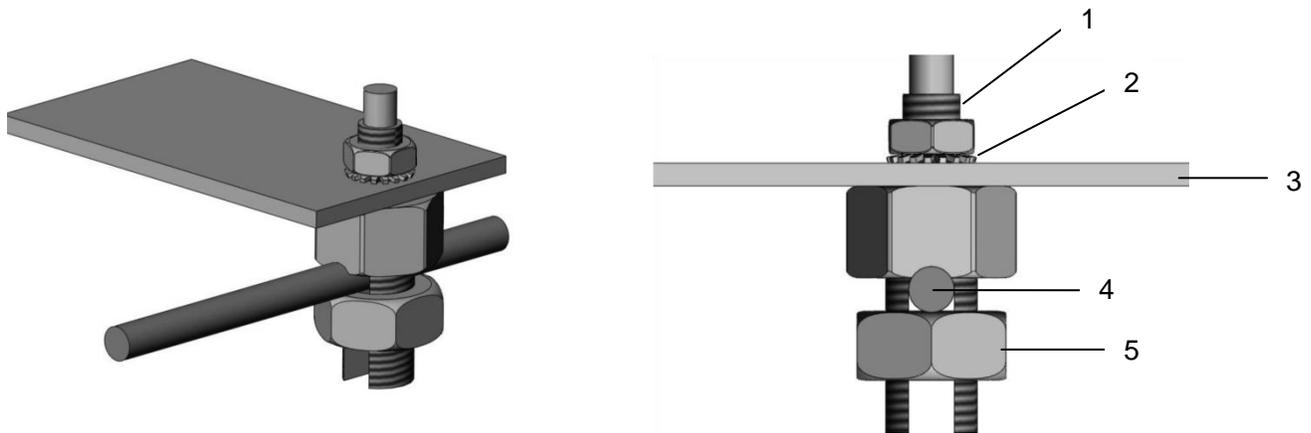


**Figure 4: Mechanical dimensions when modules installed at portrait orientation with Clamp fitting method**

## 6.2 GROUNDING

- All module frames and mounting racks must be properly grounded in accordance with appropriate respective national electrical code.
- Proper grounding is achieved by bonding the module frame(s) and all metallic structural members together continuously using a suitable grounding conductor. Grounding conductor or strap may be copper, copper alloy, or other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.
- Trina Solar modules can be installed with the use of third party listed grounding devices for grounding the metallic frames of PV modules. The devices have to be installed in accordance with the grounding device manufacturer's specified instructions.
- Please refer to the "Product Catalogue" link for detailed grounding hole location and size at [www.trinasolar.com](http://www.trinasolar.com)
- We also recommend using the following methods to ground properly:

### Method 1 : Tyco grounding bolt # 2058729-1:



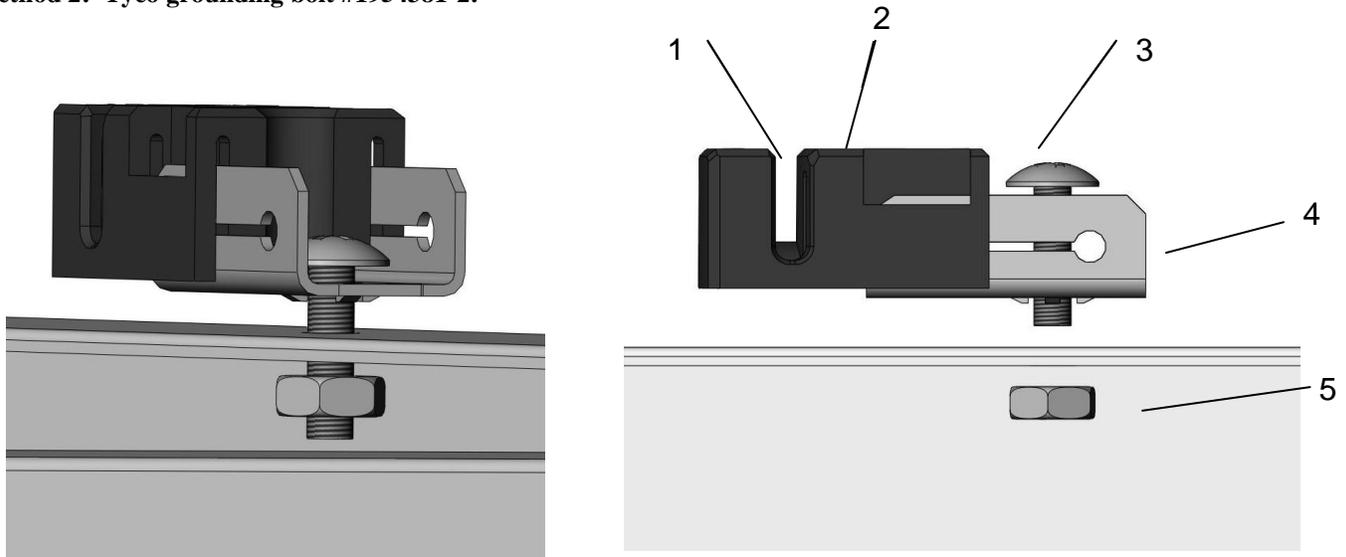
**Figure5. Tyco grounding bolt # 2058729-1**

- 1) Wire bolt and slot
- 2) Mounting wash hex nut
- 3) Aluminium frame

- 4) 4 to 16mm<sup>2</sup> cable
- 5) HEX nut

- Tyco grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut.
- Make electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting hex nut (come with the star washer) to the proper torque of 2.8 Nm.
- Grounding wire size (4 to 16mm<sup>2</sup> solid bare copper) should be selected and installed underneath the wire binding bolt.
- The wire binding bolt should be tightened to the proper torque of 5 Nm.
- The Tyco grounding bolt is only listed for use with 4 to 16mm<sup>2</sup> bare solid copper wire.

### Method 2: Tyco grounding bolt #1954381-2:



**Figure 6. Tyco grounding bolt # 1954381-2**  
(Not applicable for TRINAMOUNT module series)

- 1) Wire slot (available for 4-6 mm<sup>2</sup> cable)
- 2) Slider
- 3) Screw
- 4) Base
- 5) Nut

- Tyco Grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut.
- Electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting hex nut (come with the star washer) to the proper torque (2.8 Nm.)
- Grounding wire size (4-16 mm<sup>2</sup> solid bare copper) should be selected and installed underneath the wire binding bolt.
- The wire binding bolt should be tightened to the proper torque of 5 Nm.
- The Tyco grounding bolt is only listed for use with 4-16 mm<sup>2</sup> bare solid copper wire.

**Method 3: EROCO grounding bolt # EL6CS14-6**



**Figure 7. ERICO grounding bolt # EL6CS14-6**  
(Not applicable for TRINAMOUNT module series)

- 1) Machine screw A
- 2) Machine screw B
- 3) Belleville washer
- 4) Flat washer
- 5) Clearance hole for #10[M5] machine screw
- 6) Aluminum frame
- 7) Machine screw hex nut with lock washer
- 8) Grounding bolt

- The lug should be installed on a surface that is larger than the bottom surface of the lug.
- The lug should be installed in the grounding holes provided on the PV module
- Tighten machine screw A should be torqued to 4 Nm, to secure the grounding bolt to module frame
- The grounding bolt is only listed for use with 4-16 mm<sup>2</sup> bare solid copper wire.
- For proper wire binding, machine screw B should be torqued to 4 Nm

**6.3 MODULE WIRING**

- Each module has two standard 90 °C sunlight resistant output cables each terminated with plug & play connectors. The wire type and gauge of the output cables are 1000V rated PV Wire cable and are 4 mm<sup>2</sup> in size. This cable is suitable for applications where wiring is exposed to the direct sunlight. We required that all wiring and electrical connections comply with the appropriate national electrical code.
- The minimum and maximum outer diameters of the cable are 5 to 7mm<sup>2</sup>.
- For field connections, use at least 4 mm<sup>2</sup> copper wires insulated for a minimum of 90 °C and sunlight resistance with insulation designated as PV Wire. .

**7. MAINTENANCE AND CARE**

- Under most weather conditions, normal rainfall is sufficient to keep the PV module glass surface clean. If dust or dirt build-up becomes excessive, clean the glass only with a soft cloth using mild detergent and water.
- Do not clean the modules with cold water during the warmer hours of the day in order to avoid creating any thermal shock that may damage the module.
- Be cautious when cleaning the back surface of the module to avoid penetrating the substrate material. Modules that are mounted flat (0 ° tilt angle) should be cleaned more often, as they will not "self clean" as effectively as modules mounted at a 15 ° tilt or greater.
- At least once a year, it is recommended to check the torque of terminal screws and the general condition of wiring. Also, check that mounting hardware is properly torqued. Loose connections will result in damage to the array.
- Replacement modules must be of same type. Do not touch live parts of cables and connectors. Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules.
- Cover the front surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate

high voltage and are dangerous.

- Trina Solar SPV modules are equipped with bypass diodes in the junction box. This minimizes module heating and current losses.
  - 1、 Do not try to open the junction box to change the diodes even if it malfunctions.
  - 2、 In a system that uses a battery, blocking diodes are typically placed between the battery and the SPV module output to prevent battery discharge at night.
- Troubleshooting:

If your installation does not work properly, please inform your installer without any delay.
- Technical issues or claim:

If you have any technical issues and/or a claim, you can:

  - 1、 contact your installer,
  - 2、 contact Trina Solar after sales service team at [aftersales@trinasolar.com](mailto:aftersales@trinasolar.com) or,
  - 3、 submit the Customer Feedback form at: [www.trinasolar.com](http://www.trinasolar.com), one of our technical service representatives will contact you as quickly as possible.

## 8. SPECIFICATIONS

For module specifications, please visit Trina Solar website for the “Product Catalogue” link at [www.trinasolar.com](http://www.trinasolar.com).

**WARNING: For any electrical maintenance, the PV system must first be shut down. Improper maintenance can cause lethal electric shock and/or burns.**