



**INSTALLATION MANUAL  
OF ALUMINUM FRAME  
DYMOND MODULE**

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## 1.0

### GENERAL INFORMATION

This general manual provides important safety information relating to the installation, maintenance and handling of aluminum frame Dymond 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 requires 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 aluminum frame Dymond solar modules.

This manual is only valid for the module types CS6K-P-AG, CS6K-MS-AG, CS3U-P-AG, CS3U-MS-AG, CS3K-P-AG and CS3K-MS-AG.

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

This installation manual is applicable for EU and EEA countries only.

## 1.1

### INSTALLATION MANUAL DISCLAIMER

The information contained in this manual is subject to change by Canadian Solar Inc. without prior notice. Canadian Solar Inc. 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.canadiansolar.com> as such lists are updated on a regular basis.

## 1.2

### LIMITATION OF LIABILITY

Canadian Solar Inc. 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 interconnectors 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 latest National Electrical Code (USA) or Canadian Electric Code (Canada) or other national or international electrical codes.



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



Use electrically insulated tools to reduce the risk of electric shock.



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



If the disconnects and over current protection devices (OCPD's) 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.

- When installing modules in light rain, morning dew, take

appropriate measures to prevent water ingress into the connector.

- Do not install modules in strong wind.
- Do not use or install damaged modules.
- Contact with module surfaces or frames may cause electric shock if the front glass is broken.
- 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.
- Do not allow children or unauthorized persons near the installation site or module storage area.

## 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 coating of the ribbon of our solar modules 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 Canadian Solar Inc. crystalline silicon PV modules can be found in Annex C (Module Specifications) on [www.canadiansolar.com](http://www.canadiansolar.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 at 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 is the lowest expected ambient temperature at the system installation site.

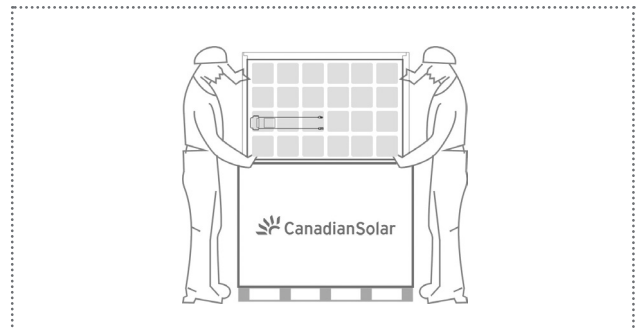
$\alpha_{voc}$  (%/°C) is the voltage temperature coefficient of the selected module (refer to corresponding datasheet). Electrical calculations and design must be performed by competent engineer or consultant.

#### 4.0 UNPACKING AND STORAGE

##### **NOTICE**

##### **PRECAUTIONS**

- Module 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.
- 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 Canadian Solar Inc's warranty.
- 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 glass 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.

## PRODUCT IDENTIFICATION

- Each module is equipped with three identical barcodes (one in the laminate under the front glass, the second on the rear side of the module, the third one on the frame) that act as a unique identifier. Each module has a unique serial number containing 14 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.
- Aluminum frame Dymond 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 50 V or power above 240 W, where general contact access is anticipated.
- Canadian Solar Inc. modules have been certified as Type 13 or Type 3 according to UL 1703 and Class A according to IEC 61730-2, 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 1703 SYSTEM FIRE RATING REQUIREMENTS

- A photovoltaic systems composed of UL 1703 certified modules mounted on a UL 2703 certified mounting system should be evaluated in combination with roof coverings in accordance with UL 1703 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 fire rated Type 13 or Type 3 rated modules, are considered acceptable for use with Canadian Solar Inc. modules, provide 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.
- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- When installing the modules on rooftop, ensure the assembly is mounted over a fire resistant roof covering rated for the application.

## 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 Canadian Solar Inc. technical support department for more information on the use of modules in special climates.



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.

- Failure to comply with these instructions will void Canadian Solar Inc. 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, 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.
- Only modules with similar electrical outputs should be connected in the same series 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.
- 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 your annual yield, find out the optimum orientation and tilt for PV modules in your region. 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 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 10 cm (3.94 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 enables condensation or moisture to dissipate.
- According to UL 1703, 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

- 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.

### CORRECT CONNECTION OF PLUG CONNECTORS

- Make sure that all connections are safe and properly mated. The PV connector should not be subjected 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 should be taken to avoid moisture and dust penetrating into the connector.


### 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. TUV 2PFG1169 or EN50618 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.
- 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 1703 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 Canadian Solar Inc. 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 that they be grounded and that module installation should comply with all 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 . All conductive connection junctions must be firmly fixed.
- Do not drill any extra ground holes for convenience 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.
- Canadian Solar Inc. does not provide grounding hardware.
- One grounding method is recommended for Canadian Solar Inc. standard modules, as described below. For alternative grounding methods, please refer to Annex B (Alternative Grounding Methods) on the website ([www.canadiansolar.com](http://www.canadiansolar.com)).

### GROUNDING METHOD:

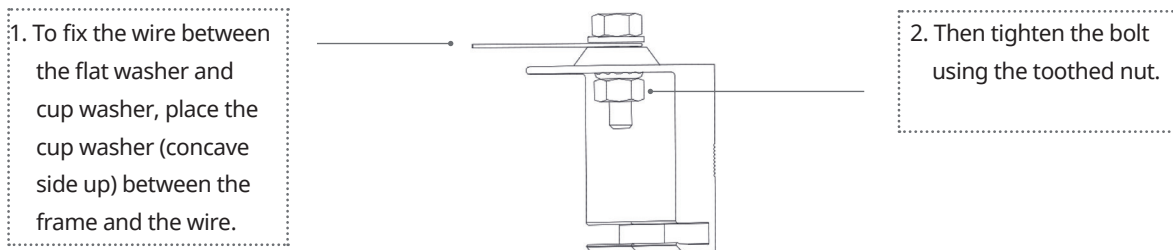
#### BOLT + TOOTHED NUT + CUP WASHER

- 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).

## 6.0 MOUNTING INSTRUCTIONS

- 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 and IEC 61215 only when the module is mounted in the manner specified by the mounting instructions included in this installation manual.
- Any module without a frame (laminate) shall not be considered to comply with the requirements of UL 1703 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.
- Canadian Solar Inc. does not provide mounting hardware.
- Standard modules can be mounted onto a support structure using one of several approved methods. One of such mounting methods is described below. For details of other mounting methods and the methods recommended by Canadian Solar Inc. for special module ranges, please refer to the Annex A (Alternative Mounting Methods) on our website ([www.canadiansolar.com](http://www.canadiansolar.com)). For information about other installation methods, please contact your local representative. Failure to use a recognized installation method will void the Canadian Solar Inc. 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 as the use of additional support bars should be considered to avoid snow loads damaging the lowest row of modules.



act your professional structural engineer.

- 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. Canadian Solar Inc. recommends bars with a minimum thickness of 50mm (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 load described in this manual corresponds to test load. For installations complying with IEC 61215-2:2016 and UL 1703, 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 or professional engineers. For detailed information, please follow local structural code or con-

## 6.1 MOUNTING METHOD: BOLTING

- The mounting method has been qualified by Canadian Solar Inc., as well as certified by VDE and CSA.
- Modules should be bolted to support 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 (5/16") bolt and nut should be used.

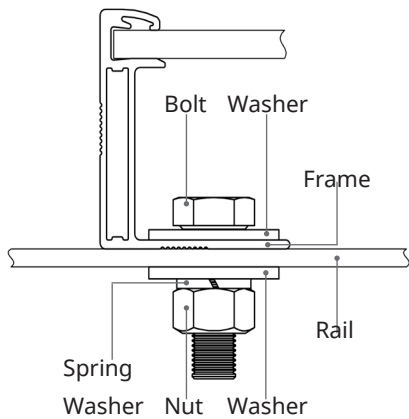
The yield strength of bolt and nut should not be less than 450 MPa.

- Tightening torques should be within 17-23 Nm

(12.5~17.0 ft-lbs) for M8 (5/16") coarse thread bolts, depending on bolt class.

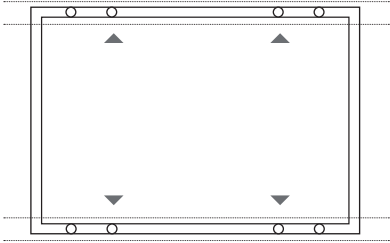
- In areas with heavy wind loads, additional mounting points should be used. The system designer and the installer are responsible for calculating the load and ensuring that the support structure meets the requirements.

**MOUNTING METHOD: BOLTING**



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

**TABLE 2: APPROVED BOLTING METHODS**

<p>Bolting on long frame side using four innermost mounting holes Mounting rails run perpendicularly to the long frame side</p>  <p>Maximum Load: Uplift load ≤ 2400 Pa Downforce load ≤ 5400 Pa Compatible module type: CS6K-P-AG and CS6K-MS-AG CS3U-P-AG and CS3U-MS-AG CS3K-P-AG and CS3K-MS-AG</p>
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**7.0 MAINTENANCE**

- Do not make modifications to the PV components (diode, junction box, plug connectors).
- 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 do 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.
- Please refer to Annex D (Module Cleaning Guide) for more information on module cleaning.

**AMENDED EDITIONS AND DATES**

- Rev 1.1 was released in April, 2019.

**CANADIAN SOLAR INC.**

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**INSTALLATION MANUAL  
ANNEX OF ALUMINUM  
FRAME DYMOND MODULE**

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## ANNEX A: ALTERNATIVE MOUNTING METHODS

All the basic requirements of the main aluminum frame Dymond installation manual should also apply to alternative mounting methods, unless otherwise specified.

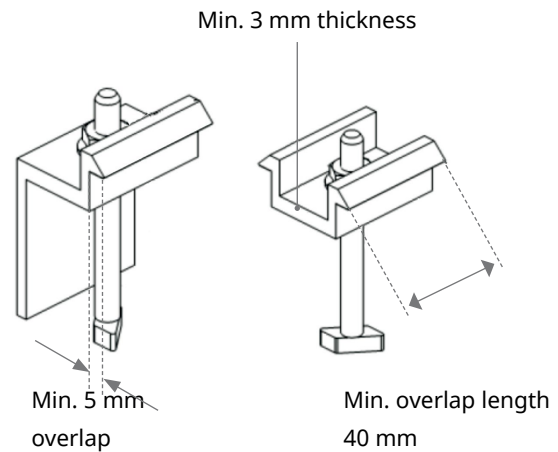
The loads described in this manual correspond to test loads. For installations complying with IEC 61215-2:2016 and UL 1703, a safety factor of 1.5 should be applied for calculating the equivalent maximum authorized design loads. Project design loads depend on construction, applicable standards, location and local climate. Determination of the design loads is the responsibility of the racking suppliers or professional engineers. For detailed information, please follow local structural code or contact your professional structural engineer.

### CLAMPING METHODS

- The mounting method has been qualified by Canadian Solar Inc. as well as certified by VDE and CSA.
- 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 defined in table A. 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. The yield strength of bolt and nut should not be less than 450 MPa.
- Tightening torques should be within 17~23 Nm (12.5~17.0 ft-lbs) for M8 (5/16"-18 Grade B7) 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.
- Canadian Solar Inc.'s warranty may be void in cases where improper clamps or unsuitable installation methods are found. When installing inter-modules or end-type clamps, the clamps must:
  - ① Not bend the module frame
  - ② Not touch or cast shadows on the front glass
  - ③ Not damage the surface of the frame (to the exception of the clamps with bonding pins)
  - ④ Ensure to overlap the module frame by at least 5 mm

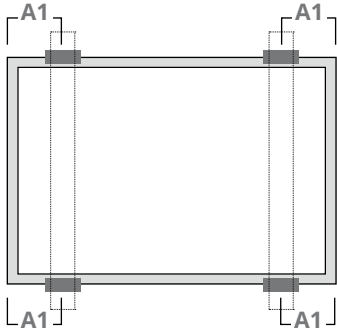
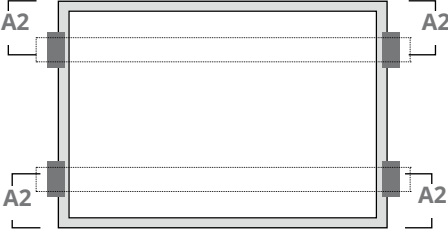
(0.2 in)

- ⑤ Ensure to overlap in length by at least 80 mm (3.15 in). when uplift load  $\leq 4000$  Pa, 40 mm (1.57 in) when uplift load  $\leq 2400$  Pa.
- ⑥ Ensure to have a thickness of at least 3 mm (0.12 in)

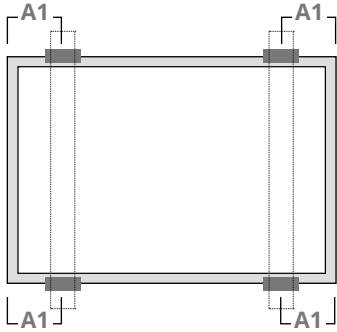


- Clamp material should be anodized aluminum alloy or stainless steel.
- Clamp positions are of crucial importance for the reliability of the installation. The clamp centerlines must only be positioned within the ranges indicated in table A, depending on the configuration and load.

**Table A**  
**CS6K-P-AG, CS6K-MS-AG, CS3K-P-AG And CS3K-MS-AG**

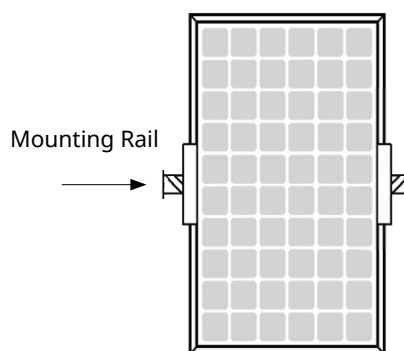
 <p>Use four clamps on the long side. Mounting rails run perpendicularly to the long side frame.</p>	 <p>Use four clamps on the short side. Mounting rails run parallel to the long side frame.</p>
<p>A1 range = (240 – 550) mm  Maximum Load:  Uplift load <math>\leq</math> 3600 Pa  Downforce load <math>\leq</math> 3600 Pa</p>	<p>A2 range = (230 – 270) mm  Maximum Load:  Uplift load <math>\leq</math> 2400 Pa  Downforce load <math>\leq</math> 2400 Pa</p>
<p>A1 range = (270 – 380) mm  Maximum Load:  Uplift load <math>\leq</math> 4000 Pa  Downforce load <math>\leq</math> 8100 Pa</p>	

### CS3U-P-AG and CS3U-MS-AG

 <p>Use four clamps on the long side. Mounting rails run perpendicularly to the long side frame.</p>	
<p>A1 range = (340 – 550) mm  Maximum Load:  Uplift load <math>\leq</math> 3600 Pa  Downforce load <math>\leq</math> 3600 Pa</p>	
<p>A1 range = (410 – 490) mm  Maximum Load:  Uplift load <math>\leq</math> 4000 Pa  Downforce load <math>\leq</math> 8100 Pa</p>	

## MOUNTING METHOD B: CENTER CLAMP MOUNTING METHOD (SINGLE-AXIS TRACKER)

- Canadian Solar Inc. modules can be mounted on single-axis trackers using center clamps or mounting holes as described below. All the requirements of the aluminum frame Dymond module installation manual and specific tracker detailed installation instructions should apply.
- The mounting method has been qualified by Canadian Solar Inc., as well as certified by VDE and CSA.
- Under no load conditions the junction box can be in contact with the subjacent racking structure.



Module Type	Compatible Tracker	Mounting Hardware	Maximum Load (Pa)	Reference Manual (Version No.)
CS3U-P-AG CS3U-MS-AG	ATI DuraTrack™HZ Tracking System(V3)	Clamp Ear (V3)	Uplift load $\leq$ 2400 Pa Downforce load $\leq$ 2400 Pa	DuraTrack HZ Solar Tracker Installation Guide , (June 2017, Rev. B-03)
CS3U-P-AG CS3U-MS-AG	NEXTracker NX Horizon	400mm Short Rail (mounting holes)	Uplift load $\leq$ 2400 Pa Downforce load $\leq$ 2400 Pa	NEXTracker NX Horizon 2.2.1 Short Rail Installation Manual (PDM-000103 Rev. A)

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

Please contact the tracker manufacturer and Canadian Solar Inc. technical support department for details in regard to specific projects.

## ANNEX B: ALTERNATIVE GROUNDING METHODS

Canadian Solar modules can be grounded using third party grounding devices as described below. The grounding methods are certified by CSA according to UL1703. All the basic requirements of the main installation manual should apply to the alternative grounding methods. For detailed grounding instructions, please refer to related third party installation manuals.

Company	Grounding hardware	Compatible Mounting System	Reference Manual (Version No.)
Variety	Lay-in-Lug + Star Washer (UL2703&UL467 certified)	Variety	Related reference installation manual
Array Technologies Inc.	Grounding Strip	ATI Duratrack HZ Solar Tracker(V3)	DuraTrack HZ Solar Tracker Installation Guide , (June 2017, Rev. B-03)
DYNORAXX Inc.	DynoRaxx® DynoBond spring clips	-----	DynoRaxx® DynoBond Installation Manual (publication no 090413)
RBI Solar Inc.	Raised Zee purlin integrated with pre-punched grounding holes	RBI Solar Ground Mount System Model GM-I	Ground Mount System Model GM-I Module Installation Manual (14 April 2014, version 21)
NEXTracker Inc.	1/4-in collar and 1/4-in pin	NX Horizon 2.2.1	NEXTracker NX Horizon 2.2.1 Short Rail Installation Manual (PDM-000103 Rev. A)
BURNDY LLC.	WEEB-UIR	RBI Solar Groundmount	Weeb Installation Instructions For RBI Solar Groundmount Only(104-0404-000074-003)

## ANNEX C : 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 electrical characteristics are respectively within ±10% or [0; +5 W] of the indicated values for Isc, Voc and Pmax. Specifications are subject to change without notice.

TABLE C: MECHANICAL AND ELECTRICAL RATINGS UNDER STC

Model Type	Maximum power Pmax<W>	Operating voltage Vmp <V>	Operating current Imp <A>	Open Circuit Voltage Voc <V>	Short Circuit Current Isc <A>	Max. Series Fuse Rating <A>	Overall Dimension <mm>	Weight <Kg>
CS6K-245P-AG	245	30.0	8.17	37.1	8.74	15	1658× 992 × 35 (65.3 × 39.1 × 1.38 in)	21.7 (47.8 lbs)
CS6K-250P-AG	250	30.1	8.30	37.2	8.87			
CS6K-255P-AG	255	30.2	8.43	37.4	9.00			
CS6K-260P-AG	260	30.4	8.56	37.5	9.12			
CS6K-265P-AG	265	30.6	8.66	37.7	9.23			
CS6K-270P-AG	270	30.8	8.75	37.9	9.32			
CS6K-275P-AG	275	31.0	8.88	38.0	9.45			
CS6K-280P-AG	280	31.3	8.95	38.2	9.52			
CS6K-285P-AG	285	31.4	9.06	38.3	9.64			
CS6K-290P-AG	290	31.6	9.18	38.5	9.72			
CS6K-295P-AG	295	31.8	9.28	38.6	9.81			
CS6K-300P-AG	300	32.0	9.38	38.8	9.92	15	1658× 992 × 35 (65.3 × 39.1 × 1.38 in)	21.7 (47.8 lbs)
CS6K-250MS-AG	250	30.5	8.2	37.7	9.03			
CS6K-255MS-AG	255	30.7	8.31	37.9	9.11			
CS6K-260MS-AG	260	30.9	8.42	38.1	9.19			
CS6K-265MS-AG	265	31.1	8.53	38.3	9.27			
CS6K-270MS-AG	270	31.3	8.63	38.5	9.35			
CS6K-275MS-AG	275	31.5	8.74	38.7	9.43			
CS6K-280MS-AG	280	31.7	8.84	38.9	9.51			
CS6K-285MS-AG	285	31.9	8.94	39.1	9.59			
CS6K-290MS-AG	290	32.1	9.05	39.3	9.67			
CS6K-295MS-AG	295	32.3	9.14	39.5	9.75			
CS6K-300MS-AG	300	32.5	9.24	39.7	9.83	30	2000× 992 × 35 (78.7 × 39.1 × 1.38 in)	27 (59.5 lbs)
CS6K-305MS-AG	305	32.7	9.33	39.9	9.91			
CS6K-310MS-AG	310	32.9	9.43	40.1	9.99			
CS3U-350MS-AG	350	38.8	9.03	46.6	9.53			
CS3U-355MS-AG	355	39.0	9.11	46.8	9.61			
CS3U-360MS-AG	360	39.2	9.19	47.0	9.69			
CS3U-365MS-AG	365	39.4	9.27	47.2	9.77			
CS3U-370MS-AG	370	39.6	9.35	47.4	9.85			
CS3U-375MS-AG	375	39.8	9.43	47.6	9.93	30	2000× 992 × 35 (78.7 × 39.1 × 1.38 in)	27 (59.5 lbs)
CS3U-380MS-AG	380	40.0	9.50	47.8	10.01			
CS3U-385MS-AG	385	40.2	9.58	48.0	10.09			

Model Type	Maximum power Pmax<W>	Operating voltage Vmp <V>	Operating current Imp <A>	Open Circuit Voltage Voc <V>	Short Circuit Current Isc <A>	Max. Series Fuse Rating <A>	Overall Dimension <mm>	Weight <Kg>
CS3U-390MS-AG	390	40.4	9.66	48.2	10.17			
CS3U-395MS-AG	395	40.6	9.73	48.4	10.25			
CS3U-400MS-AG	400	40.8	9.81	48.6	10.33			
CS3U-405MS-AG	405	41.0	9.88	48.8	10.41			
CS3U-410MS-AG	410	41.2	9.96	49.0	10.49			
CS3U-310P-AG	310	37.2	8.34	44.7	8.88	30	2000× 992 × 35 (78.7 × 39.1 × 1.38 in)	27 (59.5 lbs)
CS3U-315P-AG	315	37.4	8.43	44.9	8.96			
CS3U-320P-AG	320	37.6	8.52	45.1	9.04			
CS3U-325P-AG	325	37.8	8.60	45.3	9.12			
CS3U-330P-AG	330	38.0	8.69	45.5	9.20			
CS3U-335P-AG	335	38.2	8.77	45.7	9.28			
CS3U-340P-AG	340	38.4	8.86	45.9	9.36			
CS3U-345P-AG	345	38.6	8.94	46.1	9.44			
CS3U-350P-AG	350	39.2	8.94	46.6	9.51			
CS3U-355P-AG	355	39.4	9.02	46.8	9.59			
CS3U-360P-AG	360	39.6	9.10	47.0	9.67			
CS3U-365P-AG	365	39.8	9.18	47.2	9.75			
CS3U-370P-AG	370	40.0	9.26	47.4	9.83			
CS3K-280MS-AG	280	31.7	8.84	38.5	9.49	30	1675× 992 × 35 (65.9 × 39.1 × 1.38 in)	22.5 (49.6 lbs)
CS3K-285MS-AG	285	31.9	8.94	38.7	9.57			
CS3K-290MS-AG	290	32.1	9.04	38.9	9.65			
CS3K-295MS-AG	295	32.3	9.14	39.1	9.73			
CS3K-300MS-AG	300	32.5	9.24	39.3	9.82			
CS3K-305MS-AG	305	32.7	9.33	39.5	9.90			
CS3K-310MS-AG	310	32.9	9.43	39.7	9.98			
CS3K-315MS-AG	315	33.1	9.52	39.9	10.06			
CS3K-320MS-AG	320	33.3	9.61	40.1	10.14			
CS3K-325MS-AG	325	33.5	9.71	40.3	10.22			
CS3K-330MS-AG	330	33.7	9.80	40.5	10.30			
CS3K-250P-AG	250	30.0	8.34	36.7	8.98	30	1675× 992 × 35 (65.9 × 39.1 × 1.38 in)	22.5 (49.6 lbs)
CS3K-255P-AG	255	30.2	8.45	36.9	9.06			
CS3K-260P-AG	260	30.4	8.56	37.1	9.14			
CS3K-265P-AG	265	30.6	8.66	37.3	9.22			
CS3K-270P-AG	270	30.8	8.77	37.5	9.30			
CS3K-275P-AG	275	31.0	8.88	37.7	9.38			
CS3K-280P-AG	280	31.2	8.98	37.9	9.47			
CS3K-285P-AG	285	31.4	9.08	38.1	9.56			
CS3K-290P-AG	290	32.3	8.98	38.9	9.49			
CS3K-295P-AG	295	32.5	9.08	39.1	9.57			
CS3K-300P-AG	300	32.7	9.18	39.3	9.65			
CS3K-305P-AG	305	32.9	9.28	39.5	9.73			
CS3K-310P-AG	310	33.1	9.37	39.7	9.81			

## ANNEX D: MODULE CLEANING GUIDELINES

This manual covers the requirements for the cleaning procedure of Canadian Solar Inc. photovoltaic modules. The purpose of these cleaning guidelines is to provide general information for cleaning Canadian 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 Canadian Solar Inc. 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.

### HANDLING 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 glass or frame to come in contact with sharp objects, as scratches may directly affect product safety.

- Do not use de-greasers on the module.
- Do not use cleaning corrosive solutions containing acid, alkali, acetone, or industrial alcohol.
- Canadian Solar Inc. recommends to avoid rotating brush cleaning methods, as they could create micro-cracks in the PV modules.
- 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

Canadian Solar Inc. 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.

## AMENDED EDITIONS AND DATES

- Rev A0 is released in October, 2017.
- Rev A1 is released in February, 2018.

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