

INSTALLATION INSTRUCTIONS

FOR THE CS –E SERIES SOLAR MODULES



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GENERAL INFORMATION

This user manual provides important safety and installation instructions that you should read carefully and follow. Failure to follow these instructions may result in bodily injury or damage to property. *Keep these instructions*

DISCLAIMER OF LIABILITY

Since the conditions or methods of installation, operation, use and maintenance of PV modules are beyond its control, Canadian Solar Inc. does not assume responsibility and expressly disclaims liability for loss, damage or expense arising out of or in any way connected with such installation, operation, use or maintenance.

SAFETY PRECAUTIONS



Warning: Module interconnects pass direct current (DC) when the module is under load. Direct current can arc across gaps and may cause injury or death if improper connection is made.

- Do not connect or disconnect modules when current from the modules or an external source is present.
- Cover all modules in the PV array with an opaque material to halt production of electricity when installing or working with module or wiring.
- All installations must be performed in compliance with all applicable regional and local codes (such as U. S. NEC and Canadian Electrical Code).
- There are no user serviceable parts within the photovoltaic module. Do not attempt to repair any part of the module.
- Remove all metallic jewellery prior to installing this product to reduce the chance of accidental exposure to live circuits.
- Use electrical insulated tools to reduce your risk of electronic shock.
- If the front glass is broken, or the back sheet is torn, contact with any module surface or the frame can cause electric shock.
- Do not install or handle the modules when they are wet or during periods of high wind.
- *Keep the Junction box cover closed at all times.*

MECHANICAL / ELECTRICAL SPECIFICATIONS

Under certain conditions, a module may produce more current or voltage than reported at STC. Accordingly, a module's open-circuit voltage and short-circuit current at STC should be multiplied by 1.25 when determining component ratings and capacities. An additional 1.25 multiplier for short-circuit current (for a total of 1.56), and a correction factor for open circuit (see Table 1 below) for sizing conductors and fuses is applicable, as described in section 690-8 of U.S. NEC.

Lowest Expected Ambient Temperature (°C/ °F)	Correction Factor
25 to 10 / 77 to 50	1.05
9 to 0 / 49 to 32	1.10
-1 to -10 / 31 to 14	1.15
-11 to -20 / 13 to -4	1.20
-21 to -40 / -5 to -40	1.30

Table 1. Low Temperature Correction Factors Table for Open-Circuit Voltage

Table 2 presents the electrical and mechanical characteristics of Canadian Solar Inc. crystalline silicon PV modules, and the major electrical characteristics at Standard Test Conditions (STC) appear on each module label.

Model Number	Voc (V) Open-circuit voltage	Isc (A) Short-circuit current	Vmp (V) Operating voltage	Imp (A) Current at rated operating voltage	Power (W) rated power	Overall dimension (mm)	Weight (Kg)
CS6A-120	28.5	5.89	22.9	5.24	120	1324X982X40	16
CS6A-125	28.6	6.10	22.9	5.45	125		
CS6A-130	28.6	6.31	23.0	5.66	130		
CS6A-135	28.7	6.52	23.0	5.87	135		
CS6A-140	28.7	6.72	23.0	6.08	140		
CS6A-145	28.8	6.92	23.0	6.29	145		
CS6A-150	28.8	7.12	23.1	6.50	150		
CS6A-155	28.8	7.32	23.1	6.71	155		
CS6A-160	28.9	7.51	23.1	6.92	160		
CS6A-165	29.0	7.69	23.1	7.13	165		
CS6A-170	29.2	7.85	23.2	7.33	170		
CS6A-175	29.3	8.03	23.4	7.49	175		
CS6A-180	29.4	8.20	23.6	7.62	180		
CS6A-185	29.5	8.37	24.0	7.71	185		
CS6A-190	29.6	8.54	24.2	7.84	190		
CS6A-195	29.6	8.72	24.4	7.98	195		
CS6P-150	35.6	5.90	28.6	5.25	150		
CS6P-155	35.6	6.08	28.6	5.42	155		
CS6P-160	35.7	6.26	28.6	5.59	160		
CS6P-165	35.7	6.45	28.7	5.76	165		
CS6P-170	35.8	6.62	28.7	5.93	170		
CS6P-175	35.9	6.80	28.7	6.10	175		
CS6P-180	35.9	6.98	28.7	6.26	180		
CS6P-185	36.0	7.16	28.8	6.43	185		
CS6P-190	36.0	7.33	28.8	6.60	190		
CS6P-195	36.1	7.51	28.8	6.76	195		
CS6P-200	36.2	7.68	28.9	6.93	200		
CS6P-205	36.2	7.80	28.9	7.10	205		
CS6P-210	36.4	7.91	28.9	7.26	210		

Table 2. Specifications for CS-series photovoltaic modules.

Standard Test Conditions are irradiance of 1 kW/m², AM 1.5 spectrum, and cell temperature of 25°C. Pmax, Voc and Isc of any individual module will be within 10% of these specified values. Specifications subject to change without notice.

UNPACKING THE MODULES AND STORAGE

- The utmost care is required when handling the modules. Be careful when unpacking, transporting and storing the modules.
- Do not transport modules in an upright position.
- Do not stand on, drop, scratch or allow objects to fall on modules.
- Carry modules with both hands. Do not use the connection cables as handles.
- Ensure modules do not bow under their own weight.
- Do not place modules on top of each other.
- Do not subject to load, do not stand on them.
- Do not mark using sharp implements.
- Keep all electrical contacts clean and dry.
- If it is necessary to store the modules temporarily, a dry, ventilated room should be used.

INSTALLING THE MODULES

- When installing the modules, please ensure the assembly is mounted over a fire resistant roof covering rated for the application and required a slope less than 5in/ft (127mm/305mm) to maintain a fire class rating.

Environmental conditions

- The module is intended for use in temperate climatic conditions. The module must not be installed in the proximity of highly flammable gases and vapours (e.g. filling stations, gas containers, paint equipment).
- The module must not be installed near naked flames or flammable materials.
- Do not expose modules to artificially concentrated light sources.
- The module must not be immersed in water or constantly be exposed to water (e.g. from fountains).
- If there is exposure to salt (it is recommended that modules are installed at least 500m from the sea) and sulphur (sulphur sources, volcanoes); there is a risk of corrosion.

Requirements of installation

- Make sure the module meets the technical requirements of the system as a whole. Do not use modules of different configurations in the same system.
- Ensure that other systems components do not exert damaging mechanical or electrical influences on the modules.
- Modules can be wired in series to increase voltage or in parallel to increase current. To connect in series, connect cables from the positive terminal of one module to the negative terminal of the next module. To connect in parallel, connect cables from the positive terminal of one module to the positive terminal on the next module.
- Bypass diodes installed in the J-Box are not allowed to be removed/changed without the permission of the manufacturer.
- Connect the quantity of modules that match the voltage specifications of the devices used in the system. The modules must not be connected together to create a voltage higher than the permitted system voltage.
- [In order to avoid \(or minimize\) mismatch effects in arrays, it is recommended that low voltage and small capacity inverters should be used rather than the large central invertors.](#)
- To minimize risk in the event of an indirect lightning strike avoid forming loops when designing the system.
- Modules should be firmly fixed in place in a manner suitable to withstand all expected loads, including wind and snow loads.
- Precipitation can run out through small openings on the underside of the module. Make sure that these openings are not obstructed after mounting.

Optimum orientation and tilt

- To achieve the maximum annual yield determine the optimum orientation and tilt of the PV modules. Generation of maximum power occurs when sunlight shines perpendicular onto the PV modules.

Avoid shading

- Even the slightest partial shading (e.g. from dirt deposits) will cause a reduction in yield. A module is considered “shadow-free” if it is unobstructed across its entire surface for the whole year and even on the shortest day of the year unobstructed sunlight can reach the module.

Reliable ventilation

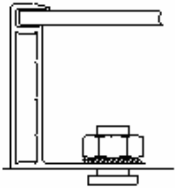
- Sufficient clearance between the module frame and the mounting surface is required to allow cooling air to circulate around the back of the module. This also allows any condensation or moisture to dissipate. Clearance of 1/4 inch or more between modules is required to allow for thermal expansion of the frames.

- Grounding**
- Although the modules are certified to safety class II, it is recommended they be grounded.
 - Connect module frames to each other using cables with cable lugs. Holes provided for this purpose are identified with a green label. Use a serrated washer or a self-tapping screw to create the conductive connection. This may be required by your local code.
 - The earth grounding connection should be made by a qualified electrician.
 - All the junctions on the conductive connection must be fixed. Metal containing iron in the conductive connection should be treated against corrosion by anodization, spray-painting, or galvanization to prevent rusting and corrosion. Stainless steel does not need to be treated.

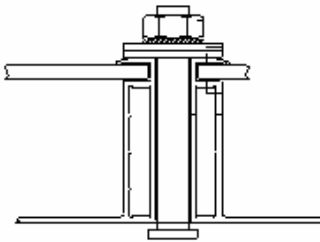
MOUNTING INSTRUCTIONS

- Modules should be bolted to support structures through mounting holes located in the frame's back flanges only (see Example A). Do not drill additional holes. Doing so would void the warranty. Each module must be securely fastened at a minimum of 4 points.
- Top or bottom clamping methods (see Example B) will vary and dependent on the mounting structures. It must be certified by a registered professional engineer, and in compliance with local codes.
- Use appropriate corrosion-proof fastening materials.

Example A:
Bolting



Example B:
Clamping on



- Use a torque wrench for installation. The above figure shows methods of fastening module to support structure. In example B, the tightening torque (using stainless steel M8 bolts) is 17 Nm.

MODULE WIRING

Correct wiring scheme

- When designing the system, avoid forming loops (to minimize risk in the event of an indirect lightning strike). Check that wiring is correct before starting up the system. If the measured open circuit voltage (V_{oc}) and short-circuit current (I_{sc}) differ from the specifications, then there is a wiring fault.

Correct connection of plug connectors

- Make sure that the connection is safe and tight. The plug connector should not receive outer stress. The connector should only be used to connect the circuit. It should never be used to turn the circuit on and off.

Use of suitable materials

- Use special solar cable (Wiring should be placed in conduit that is sunlight-resistant or, if exposed, should be sunlight-resistant type UF cable, 8-14 AWG (9-3mm²), 90°C wet rated in accordance with local fire, building and electrical code) and suitable plugs only. Ensure that they are in perfect electrical and mechanical condition. Use only single-wire cables. Select a suitable conductor gauge to minimize voltage drop.

Cable protection

- Secure the cables to the mounting system using UV-resistant cable ties. Protect exposed cables from damage using suitable precautions (e.g. locate them within plastic conduit). Avoid exposure to direct sunlight.

MAINTENANCE

- Do not change the PV components (diode, junction box, plug connectors).
- Given a sufficient tilt (at least 15°), it is not generally necessary to clean the modules (rainfall will have a self-cleaning effect). When there is a noticeable buildup of soiling deposits on the module surface, wash the PV array using water without cleaning agents and a gentle cleaning implement (a sponge), during the cool of the day. Dirt must never be scraped or rubbed away when dry, as this will cause micro-scratches.
- If snow is present, a brush with soft bristles can be used to clean the surface of the module.
- Periodically inspect the system to make sure all wiring and supports stay intact.

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