

# Sunmodule<sup>+</sup>

User Instructions



07/2012

Sunmodule Plus SW xxx poly  
Sunmodule Plus SW xxx mono (black)

[www.solarworld-usa.com](http://www.solarworld-usa.com)



We turn sunlight into power.

## DANGER!

### ⚠ Electric shock

The connection of two or more modules in series results in the accumulation of voltage and imposes danger. Do not insert electrically conductive parts into connectors! Do not attach solar modules and wiring with wet connectors! Make sure to work with dry tools and under dry working conditions!

### ⚠ Work on live parts

When working on wiring, use and wear protective equipment (insulated tools, insulated gloves, etc.)!

## WARNING!

### ⚠ Arcing

Modules generate direct current (DC) when exposed to light. When breaking a closed circuit, a dangerous arc may be generated. Do not cut any live wires.

### ⚠ Safe installation

Do not carry out installation work in strong winds. Secure yourself and other persons against falling. Secure work materials against dropping. Ensure a safe working environment so as to prevent accidents.

### ⚠ Fire protection/explosion protection

Modules must not be installed in the vicinity of highly flammable gases, vapors or dusts (e.g. filling stations, gas tanks, paint spraying equipment). The safety instructions for other system components must also be followed. Make sure to comply with local standards, building regulations and accident prevention regulations during installation. For roof installation, modules must be mounted on a fire-resistant base material.

## ATTENTION

Do not use damaged modules. Do not dismantle modules. Do not remove any parts or nameplates fitted by the manufacturer. Do not apply paint or adhesives to the module, nor work on it with sharp objects.

## Unpacking and intermediate storage

Do not use the junction box as a handle. Do not place modules roughly on hard floor or on their corners. Do not place modules on top of each other. Do not step or stand on modules. Do not place any objects on modules. Do not work on modules with sharp objects; store modules in a dry place.

## Grounding of module and frame

We recommend ensuring the functional grounding of the module metal frame. If an exterior lightning protection system is already provided, the PV system has to be integrated into the protection concept against direct lightning stroke. Local standards shall be observed.

## Grounding in the US and Canada

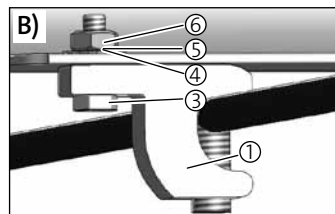
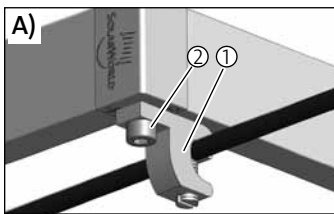
The modules can be connected to the grounding holes using a lay-in lug. The lug can be fixed:

- A) at the module corner by using a socket head cap screw, or
- B) at the hole provided in the flange by using a screw with a serrated washer, a washer and a nut.

Any grounding method and components listed according to NEC requirements are also acceptable in the US and Canada.

Table: Recommended components for grounding in the US and Canada

Item	Manufacturer/Description	Tightening torque
Lay-in lug ①	IlSCO GBL-4DB (E34440)	35 lbf-in, 4-6 AWG str 25 lbf-in, 8 AWG str 20 lbf-in, 10-14 AWG sol/str
Socket head cap screw ②	10-24, 5/8", SS 18-8	62 lbf-in (7.0 Nm)
Bolt ③	#6-32, SS	25 in-lbs (2.9 Nm)
Serrated washer ④	M5, SS	
Washer ⑤	ID 9/64", OD 3/8", SS	
Nut ⑥	#6-32, SS	



## Underwriters Laboratories Information (U.S. and Canada)

For the electrical ratings please refer to the datasheet. The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions. The module is considered to be in compliance with UL 1703 only when the module is mounted in the manner specified by the mounting instructions below. A module with exposed conductive parts is considered to be in compliance with UL 1703 only when it is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code. Where common grounding hardware (nuts, bolts, star washers, split-ring lock washers, flat washers and the like) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions. Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices and should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in UL 1703, may be used for ground-

ing connections in accordance with the instructions provided with the module. The electrical characteristics are within  $\pm 10$  percent of the indicated values of ISC, VOC, and Pmax under standard test conditions (irradiance of 100 mW/cm<sup>2</sup>, AM 1.5 spectrum, and a cell temperature of 25°C (77°F)). Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690-8 shall be followed to address these increased outputs. In installations not under the requirements of the NEC, the values of ISC and VOC marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output. To reduce the operating temperature the module has to be mounted on any surface with a minimum distance of 4 inches (10 cm).

In Canada the installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1.

## Suitable ambient conditions

The module is intended for use in moderate climatic conditions. Artificially concentrated sunlight shall not be directed on the module or panel. The module must neither be immersed in water nor be exposed to continuous wetting (e.g. by fountains). Exposure to salt or sulfur (sulfur sources, volcanoes) implies a risk of corrosion. The module must not be used for maritime (e.g. boats) or automotive (vehicles) purposes. The module must not be exposed to extraordinary chemical loads (e.g. emissions from manufacturing plants). If the modules are installed on stables, a distance of 1 m to ventilation openings shall be ensured; apart from this, the modules shall not be used as a direct roof panel on stables.

## Appropriate installation situation

Make sure that the module meets the technical requirements of the overall system. Other system components should not exert any adverse mechanical or electrical influences on the module. Modules may bend under high loads. For this reason, sharp-edged fixing elements or other sharp objects (e.g. cable ties on mounting sections must not be mounted near the module back side. For modules connected in series, only modules of the same amperage rating may be used together. For modules connected in parallel, modules with the same voltage ranges must be used together. The modules must not be operated at a higher voltage than the permissible system voltage. The inside opening of the frame corner element is intended for water drainage and must not be blocked. For system documentation, please note the serial numbers.

## Optimum installation

In order to avoid performance losses, all modules connected in series should be arranged with the same orientation and tilt angle. The modules should be installed in an all-season shadow-free area. Even partial shadowing results in yield losses and is to be avoided. Ventilation of the module back side will prevent heat build-up adversely affecting performance.

## Mounting

The modules must be securely fixed at a minimum of 4 locations on the substructure. Fixing is only allowed in designated areas or at the provided mounting holes. These designated areas for fixing are located on the module long sides. They are located between 1/8 of the module length and 1/4 of the module length, measured from the module corner. Fixing the module on its narrow sides is not sufficient. In regards to "Top-Down" mounting methods, the clamping area on the module frame must be at least 130 mm<sup>2</sup> (0.20 in<sup>2</sup>) for each fixing point. The required clamping pressure is 100 N/mm<sup>2</sup> (14.5 lbf/in<sup>2</sup>). For "Bottom-Up" mounting methods, use a stainless steel serrated lock nut and M8 (5/16") bolt to secure the module to the mounting structure with the provided mounting holes. The bolts must be tightened to 20 Nm (15 ft-lbs). Do not drill any holes into the module. Use corrosion-proof fixing material.

## Electrical connection

The modules are provided with factory-assembled cables and connectors. Do not open the junction box in any case. Connectors may only be connected under dry conditions. Make sure to avoid gaps in a plugged connection. Only single-core solar cables with an adequate cross-section (4 mm<sup>2</sup> minimum) and appropriate connectors may be used for connecting the modules. Cables should be attached to the installation system by means of UV-resistant cable ties. Exposed cables should be protected against sunlight and damage by suitable precautions (e.g. conduits). In order to limit voltages released by indirect lightning shock, the area of all conductor loops must be reduced to a minimum. Check that wiring is correct (polarity!) prior to starting the generator.

## Cleaning

In general, the modules do not need any cleaning if the tilt angle is sufficient (> 15°; self-cleaning by rain). In case of heavy soiling, it is recommended to clean the modules with plenty of water (low pressure hose) and without the use of cleaning agents. If necessary, a soft cleaning device (sponge) may be used. Never scrape or rub off dirt as this may result in micro-scratches.

## Maintenance

We recommend regular inspections of the system to ensure that:

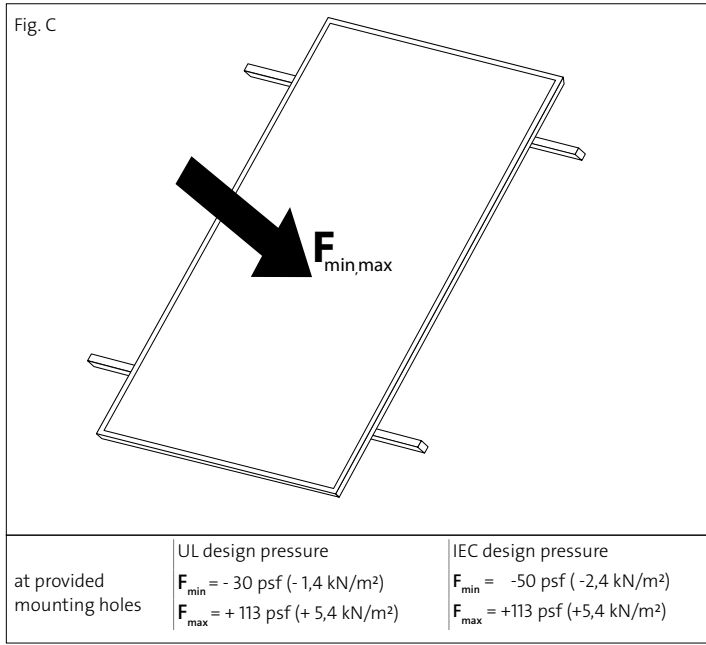
1. All fixtures are securely tightened and corrosion-free;
  2. Wiring is securely connected, properly arranged and free of corrosion;
  3. Cables are free of damage;
- Please also observe applicable standards.

## Disclaimer of liability

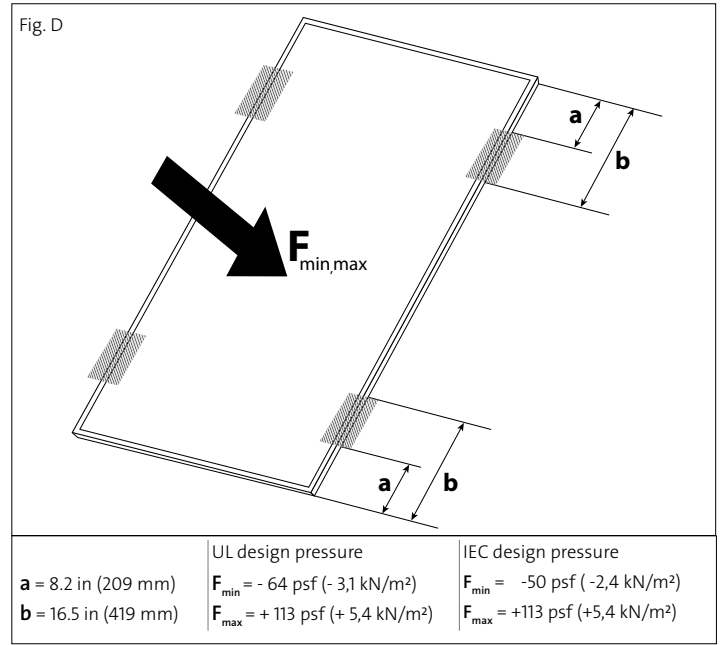
SolarWorld AG does not guarantee the operational capability and functionality of modules if the instructions contained in the present user information are not complied with. Since compliance with these instructions and the conditions and methods of installation, operation, use and maintenance of the modules are not checked or monitored by SolarWorld AG, SolarWorld AG accepts no liability for damage arising through improper use or incorrect installation, operation, use or maintenance. Furthermore, liability for infringements of patent law or of other third party rights arising from the use of the modules is excluded unless we are automatically liable by law.



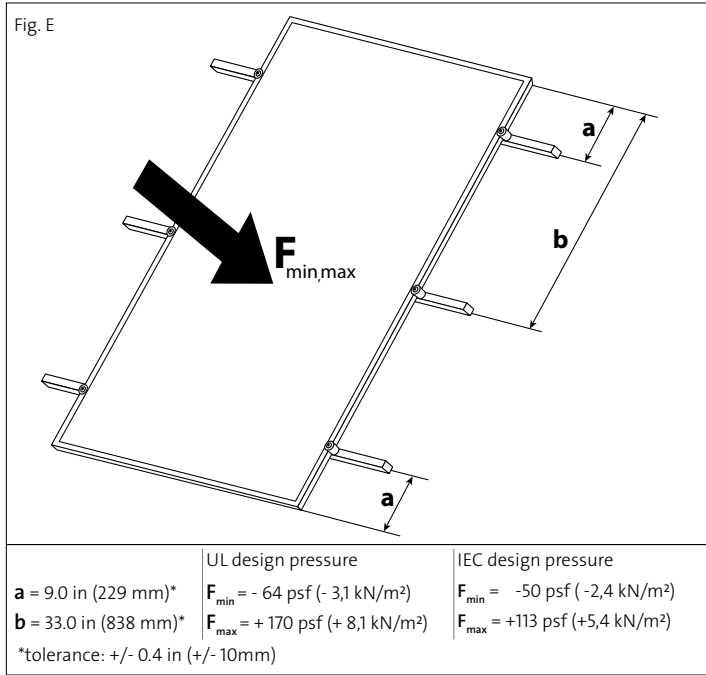
**Bottom – Up mounting method**



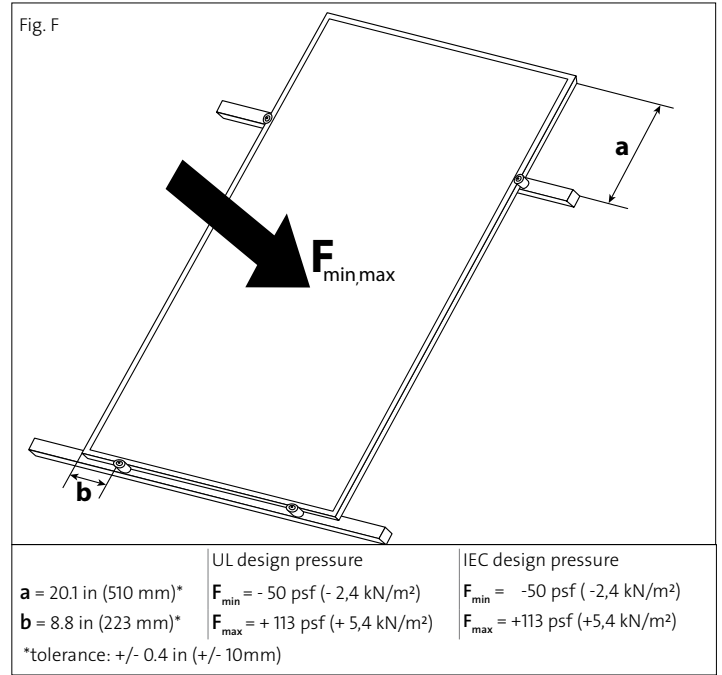
**Top-Down mounting method**



**Top-Down mounting method**



**Top-Down mounting method**



Revisions		
Version	Changes	Date
1.0	New document	2012-07-12

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