

SUNPOWER®

NEW REVISION: G

Safety and Installation Instructions

for Europe, Asia, Australia, Latin America and Africa

This document applies to SunPower PV Modules

Languages:

English
Dutch
French
German
Italian
Japanese
Korean
Spanish

SunPower Corporation
www.sunpowercorp.com

Document 001-15497 Rev *G
P/N 95-01007-01

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Safety and Installation Instructions

(English - IEC version)

NEW:

This document includes references to new SunPower PV Modules (e.g. SPR-XXXNE-WHT/BLK- D). These new modules do not have grounding restrictions and are compatible with transformer-less inverters (ref. section 4.1)

1.0 Introduction

This manual provides safety and installation instructions for IEC-listed SunPower photovoltaic (PV) modules carrying the TUV logo on the product label (Figure 1). **Note.** The actual **ID** number may vary.



Figure 1

Important! Please read this instruction sheet in its entirety before installing, wiring, or using this product in any way. Failure to comply with these instructions will invalidate the SunPower Limited Warranty for PV Modules.

1.1 Disclaimer of Liability

The installation techniques, handling and use of this product are beyond company control. Therefore, SunPower does not assume responsibility for loss, damage or expense resulting from improper installation, handling or use.

1.2 International Electrotechnical Commission (IEC) Listing Information

This product meets or exceeds the requirements set forth by IEC 61215 Edition 2 for PV Modules, as well as IEC 61730 for Class A applications. The IEC Standard covers flat-plate PV modules intended for installation on buildings and those intended to be freestanding. This product is not intended for use where artificially concentrated sunlight is applied to the module.

1.3 Limited Warranty

Module limited warranties are described in the SunPower warranty certificates obtainable at www.sunpowercorp.com.

Warranties do not apply to any of the following;

PV modules which in SunPower's absolute judgment have been subjected to: misuse, abuse, neglect or accident; alteration, improper installation, application or removal (including but not limited to installation, application or removal by any party other than a qualified personnel; non-observance of SunPower's installation, users and/or maintenance instructions; repair or modifications by someone other than an approved service technician; power failure surges, lightning, flood, fire, accidental breakage or other events outside SunPower's control.

2.0 Safety Precautions

Before installing this device, read all safety instructions in this manual.

Danger! Module interconnects pass direct current (DC) and are sources of voltage when the module is under load and when it is exposed to light. **Direct current can arc across gaps and may cause injury or death if improper connection or disconnection is made, or if contact is made with module components that are damaged.** 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 cloth or material before making or breaking electrical connections.
- It is imperative to use the supplied locking connectors and safety clips in order to defend against untrained personnel disconnecting the modules once they have been installed.
- All installations must be performed in compliance with all applicable regional and local codes.
- There are no user serviceable parts within the module. Do not attempt to repair any part of the module.
- Installation should be performed only by qualified personnel.
- Remove all metallic jewelry prior to installing this product to reduce the chance of accidental exposure to live circuits.
- Use insulated tools to reduce your risk of electric shock.
- Do not stand on, drop, scratch or allow objects to fall on modules.
- Damaged modules (broken glass, torn back sheet, broken j-boxes, broken connectors, etc) can be electrical hazards as well as laceration hazards. Contact with damaged module surfaces or module frame can cause electric shock. The dealer or installers should remove the module from array and contact the supplier for disposal instructions.
- Do not install or handle the modules when they are wet or during periods of high wind.
- Contact your module supplier if maintenance is necessary.
- Save these instructions!

3.0 Electrical Characteristics

The module electrical ratings are measured under Standard Test Conditions (STC) of 1 kW/m² irradiance with AM 1.5 spectrum and a cell temperature of 25° C. SunPower modules have specific electrical characteristics as shown on the datasheets.

Bypass diodes for each module are factory installed in the modules. The diodes have one of the following ratings;

1. 8A, 45 PIV (Peak Inverse Voltage) for 72 & 96 cell modules.
2. 12A, 200 PIV (Peak Inverse Voltage) for 128 cell modules.

A photovoltaic module may produce more current and/or voltage than reported at STC. Sunny, cool weather and reflection from snow or water can increase current and power output. Therefore, the values of I_{sc} and V_{oc} marked on the module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to PV output. An additional 1.25 multiplier may be required by certain codes for sizing fuses and conductors.

SunPower recommends the use of open-circuit voltage temperature coefficients listed on the datasheets when determining Maximum System Voltage.

4.0 Electrical Connections

Modules may be connected in series and/or parallel to achieve the desired electrical output as long as certain conditions are met. Please use only the same type of modules in a combined source circuit.

The connectors on SunPower modules ship with a locking safety clip, which once connected requires the use of a tool to disconnect module-to-module connections. This defends against untrained personnel disconnecting the modules when under load, in anticipation of a change considered in the next update of IEC 61730.

SunPower recommends that all wiring be double insulated with a minimum rating of 85° C (185° F). All wiring should use flexible copper (Cu) conductors. The minimum size should be determined by the applicable codes. We recommend a size not less than 4mm². The insulation type should be appropriate for the type of installation method used and must meet SCII (Safety Class II) and IEC 61730 requirements.

4.1 System & Equipment Grounding

Please refer to the applicable regional and local codes on grounding PV arrays and mounting frames for specific requirements (e.g. lightning protection).

- Review the following tables for the proper grounding techniques to use for your SunPower solar panels.

Module Name/ Grounding Key	Grounding Key
New SPR modules are compatible with Transformer Less (TL) inverter No frame or system grounding Requirements (including functional frame grounding)	Standard SPR Modules require positive grounding (See instructions below)
SPR-XXXNE-WHT	SPR-XXXE-WHT SPR-XXX-WHT
SPR-XXXNE-BLK	SPR-XXXE-BLK SPR-XXX-BLK

- Standard modules grounding reference

Important! For optimal performance, SunPower modules must only be used in configurations with **galvanically insulated inverters** where the positive (+) polarity of the PV array is connected to ground protected by a fuse. In addition, the module frame should be grounded. **Failure to comply with this requirement will reduce the performance of the system and invalidate SunPower's Limited Power Warranty for PV Modules.**

Grounding of the module frame can be achieved through use of clamps that penetrate the anodization in conjunction with grounding of the mounting system or through direct grounding of the frames by attaching a copper wire to a grounding hole of each module (bolt size, M6 x 1.0 x 50)

For additional assistance, contact SunPower technical support at support@sunpower.de.

4.2 Series Connection

The modules may be wired in series to produce the desired voltage output. Do not exceed the maximum system voltage.

4.3 Parallel Connection

The modules may be combined in parallel to produce the desired current output. Series string must be fused prior to combining with other strings if the resulting maximum reverse current exceeds the fuse rating as shown in the datasheets. Bypass diodes are factory installed in the modules. Please refer to the applicable regional and local codes for additional fusing requirements and limitations on the maximum number of modules in parallel.

5.0 Module Mounting

The SunPower Limited Warranty for PV Modules is contingent upon modules being mounted in accordance with the requirements described in this section.

5.1 Site Considerations

SunPower modules should be mounted in locations that meet the following requirements:

Operating Temperature: All SunPower modules must be mounted in environments that ensure SunPower modules will operate within the following maximum and minimum operating temperatures:

Maximum Operating Temperature	+85° Celsius, +185° Fahrenheit
Minimum Operating Temperature	-40° Celsius, -40° Fahrenheit

Care should be taken to provide adequate ventilation behind the modules, especially in hot environments.

Design Strength: SunPower modules are designed to meet a maximum positive (or upward, e.g. wind) and negative (or downward, e.g. static load) design pressure of 2400 Pa (Pascals; 245 kg/m²) when mounted in **all** of the mounting configurations specified in Section 5.2. A design strength of 2400 Pa corresponds approximately to a wind speed of 200 km/h (125 mph).

SunPower modules are designed to meet a maximum negative (or downward, e.g. snow load) of 5400 Pa (Pascals; 550 kg/m²) for the following mounting configurations **only** when mounted in adherence to Section 5.2 below. 5400 Pa design strength has been verified by SunPower and certified.

- 72 cell modules with dimensions of (1559mm x 798mm) meet 5400 Pa in the following mounting configurations described in Section 5.2 below
 - Frame Holes
 - Pressure Clamps or Clips
 - End Mount
- 96 cell modules with dimensions of (1559mm x 1046mm) meet 5400 Pa in the following mounting configurations described in Section 5.2 below
 - Frame Holes
 - Pressure Clamps or Clips

When mounting modules in snow prone or high wind environments, special care should be taken to mount the modules in a manner that provides sufficient design strength while meeting local code requirements.

Excluded Operating Environments: Certain operating environments are not recommended for specific SunPower modules and are excluded from the SunPower Limited Warranty for these modules.

No SunPower module should be mounted at a site where it may be subject to direct contact with salt water.

5.2 Mounting Configurations

Modules may be mounted at any angle from horizontal to vertical. Select the appropriate orientation to maximize sunlight exposure. Specific information on module dimensions and the location of mounting and grounding holes is provided below (Figures 2, 3 and 4).

In order to prevent water from entering the junction box, which could present a safety hazard, modules should not be mounted such that the front/top glass faces downward (e.g., on a tracking structure that positions the module with the junction box facing skyward during sleep mode).

Clearance between the module frames and structure or ground is required to prevent wiring damage and allows air to circulate behind the module.

When installed on a roof, the module shall be mounted over a fire-resistant roof covering rated for the application.

The module is only IEC Listed for use when its factory frame is fully intact. Do not remove or alter the module frame. Creating additional mounting holes may damage the module and reduce the strength of the frame.

Using mounting Clamps or clips with additional grounding bolts or grounding metal sheets is in compliance with this Safety and Installation Instructions manual.

Modules may be mounted using the following methods only:

- 1) **Frame Holes:** Secure the module to the structure using the factory mounting holes. Four M6 (¼") stainless steel bolts, with nuts, washers, and lock washers are recommended per module. Refer to Figure 2, 3 and 4 for the module dimensions and mounting hole locations. Only the mounting holes that are 322mm from the short end of the module can be used for the module to meet a 5400 Pa (Pascals; 550 kg/m² e.g. snow load) design strength.
- 2) **Pressure Clamps or Clips:** Mount the module with the clips on the longer side of the frame of the module. The centerline of the clips should be between 160mm–400mm from the short end of the module for 2400 Pa (Pascals; 245 kg/m²) design strength and between 250mm–400mm from the short end of the module for 5400 Pa (Pascals; 550 kg/m² e.g. snow load) design strength. Installers should ensure the clamps are of sufficient strength to allow for the maximum design pressure of the module. Clips and clamps are not provided by SunPower.
- 3) **End Mount:** End mounting is the capture mounting of the length of the module's end frame to a supporting rail. The end frames are on the shorter sides of the module. The end-mounting rail and clips or clamps must be of sufficient strength to allow for maximum design pressure of the module. Verify this capacity with the mounting system vendor before installation.

- 4) **Center Mount: (Only for T0 & T20 Trackers)** A continuous clamp may be used to clamp the bottom flange of the frame at the center of the long sides. Minimum clamping length shall be 150 mm on top of flange and 100 mm on bottom. The clamps must be of sufficient strength to allow for the maximum design pressure of the module. Verify this capacity with the mounting system vendor before installation.

- 5) **SunPower specified or SunPower supplied mounting systems.** Modules mounted with strict adherence to SunPower documentation, using hardware systems supplied by or specified by SunPower

5.3 Handling of Modules during Installation

Do not place modules face forward in direct contact with abrasive surfaces like roofs, driveways, wooden pallets, railings, stucco walls, etc....

The module front surface glass is sensitive to oils and abrasive surfaces, which may lead to scratches and irregular soiling.

Modules that feature antireflective coated glass are prone to visible finger print marks if touched on the front glass surface. SunPower recommends handling modules with anti-reflective glass with gloves or limiting touching of the front surface. Any finger print marks resulting from installation will naturally disappear over time or can be reduced by following the washing guidelines in Section 6.0 below. Product datasheets specify the glass type used by a particular module.

6.0 Maintenance

SunPower recommends visual inspection on a regular basis of all modules for safe electrical connections, sound mechanical connection, and freedom from corrosion. This visual inspection should be performed by trained personnel.

Periodic cleaning of modules is recommended, but is not required. Periodic cleaning has resulted in improved performance levels, especially in regions with low levels of annual precipitation (less the 18.25 inches (46.3cm)). Consult your dealer or supplier about recommended cleaning schedules for your area.

To clean a module, wash with potable, non-heated, water. Normal water pressure is more than adequate, but pressurized water up to 100 bar (min.50 cm distance) may be used. SunPower recommends to use a large hosepipe and not at high outside temperature. Fingerprints, stains, or accumulations of dirt on the front surface may be removed as follows: first rinse off area and let soak for a short period of time (5 mins). Re-wet and use a soft sponge or seamless cloth to wipe glass surface in a circular motion. Fingerprints typically can be removed with a soft cloth or sponge and water after wetting. Do not use harsh cleaning materials such as scouring powder, steel wool, scrapers, blades, or other sharp instruments to clean the glass surface of the module. Use of such materials or cleaning without consultation will invalidate the product warranty.

Figure 2: 72-cell

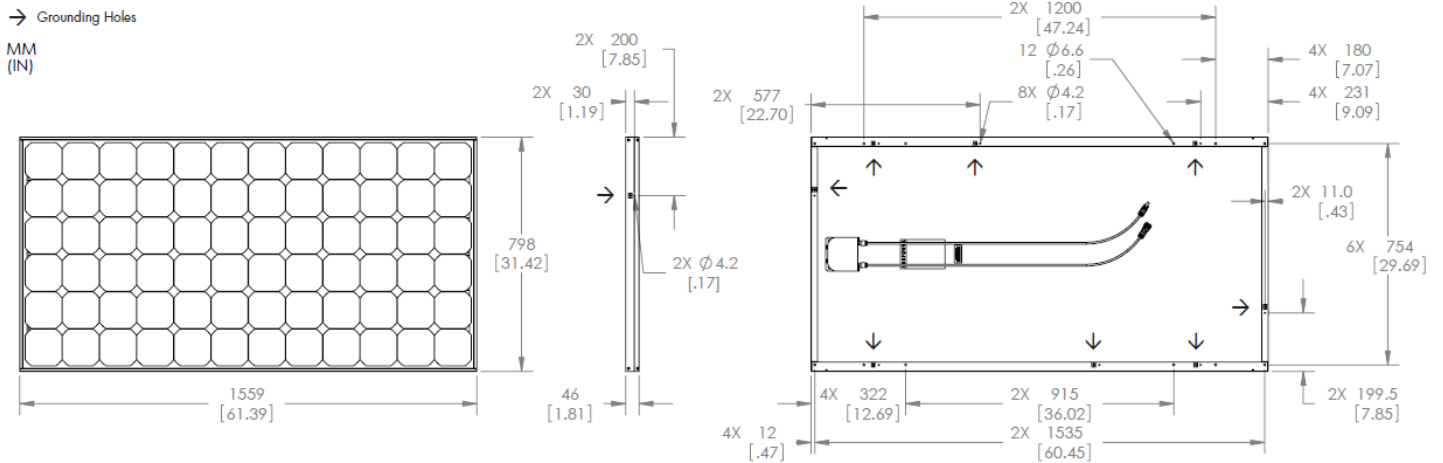


Figure 3: 96-cell (Note that stacking pins are not included on all models – check datasheet for details)

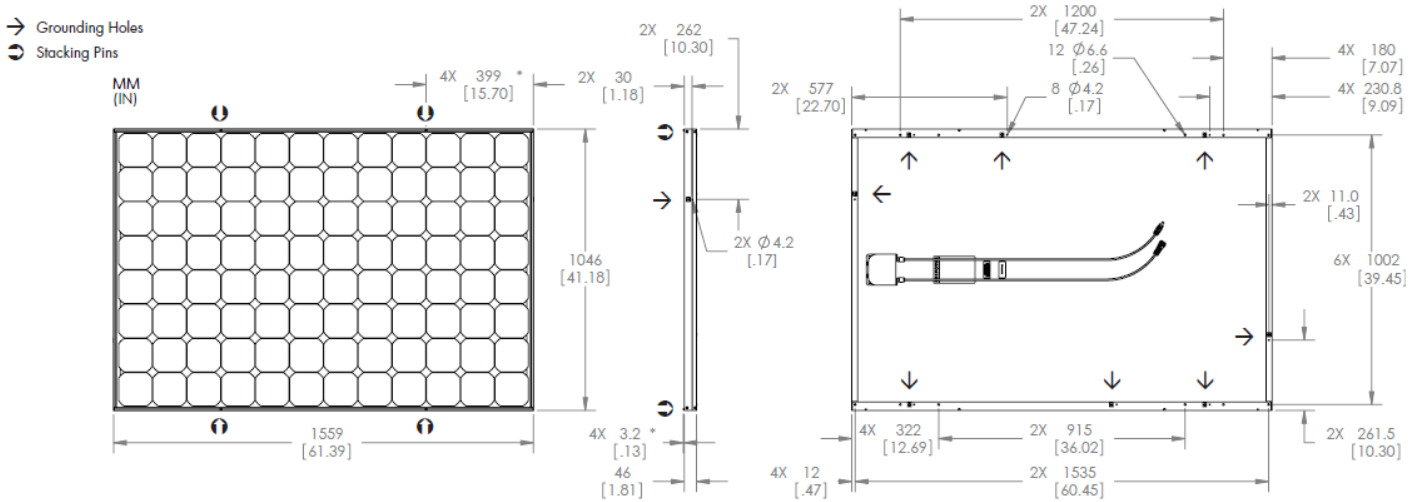


Figure 4: 128-cell

