



MAGE
POWERTEC[®] PLUS
Solar Modules

INSTALLATION AND SAFETY GUIDELINES

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Introduction

Solar modules consist of crystalline solar cells coated with low-iron, high impact-resistant glass with high transmission degree, non-aging EVA and flame-resistant TPT. The frame is made of an anodized aluminum alloy. The solar modules feature high efficiency, long operating life, and simple installation, as well as resistance against wind, hail, etc.



Safety Precautions

DANGER!

Interconnected modules pass direct current (DC) and are sources of voltage when the module is under load and when 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 leads that are frayed or torn. Do not connect or disconnect modules when current from modules or an external source is present.

WARNING!

MAGE SOLAR® products are quality-tested to meet the specifications stated on our data sheets when they are installed properly by a skilled and qualified professional. Failure to install properly may decrease the performance of the installation. All instructions and data sheets should be read and understood before attempting to install, wire, operate, and maintain the product.

CAUTION!

All national and regional safety precautions should be adhered to when installing MAGE SOLAR® products. Installation should only be done by professional installers with a working knowledge of safe construction practices. Proper fall protection requirements should be reviewed and implemented prior to rooftop installation. Tools and materials should also be secured to prevent injury from falling objects. Cap all exposed wire ends to avoid injury.

- Cover all modules in the PV array with an opaque material before making or breaking electrical connections.
- All installations must be performed in compliance with the National Electrical Code (NEC) and any applicable local code.
- Do not attempt to repair any part of the module.
- Installation should only be performed by authorized personnel.
- Do not wear metallic rings or watchbands; ear, nose, or lip rings; or other metallic devices while installing or troubleshooting photovoltaic systems.
- Use insulated tools to reduce your risk of electrical shock.
- Do not stand on, drop, scratch, or allow objects to fall on modules.
- Do not install or handle modules when they are wet or during periods of high wind.
- Do not use mirrors or other hardware to artificially concentrate sunlight on the module.

Electrical Characteristics

The modules' electrical ratings are measured under Standard Test Conditions (STC) or 1 kW/m² irradiation with AM 1.5 spectrum and a cell temperature of 25°C/77°F.

Please refer to the data sheet for each module type.

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 the I_{sc} marked on the module should be multiplied by a factor of 1.25 when determining component ampacity ratings to comply with NEC article 690.8(A). An additional 1.25 multiplier may be required by the NEC for sizing fuses and conductors as described in NEC Section 690-8(B).

Voc should be increased by a factor based on the lowest ambient temperature for the location of the modules. To determine the corrected value for maximum system voltage, follow guidelines in Article 690.7 of the NEC. MAGE SOLAR® recommends the use of the open-circuit voltage temperature coefficients listed in the data sheet when determining maximum system voltage.

Electrical Connections

Modules may be connected in serial connection and/or parallel connection to achieve the desired electrical output as long as certain conditions are met. Don't use different modules in a combined source circuit. The PV module features a pair of water-resistant connectors. For an electrical connection, you have to connect the positive (+) connector of the first PV module with the negative (-) connector of the next module. Plug the output cable of the device properly and use special plugs and cables from the company. Do not short-circuit the positive and negative poles. Screw on the connectors and make sure that there is no space between the insulators. A space between the insulators may result in sparking. As a minimum requirement, a PV solar cable at least 4 mm², double insulated, and with a temperature rating from -40°C/-40°F to 125°C/257°F should be used.

Use the special plugs and cables of MAGE SOLAR®. Do not shorten the positive and negative poles.

a) Series connection

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

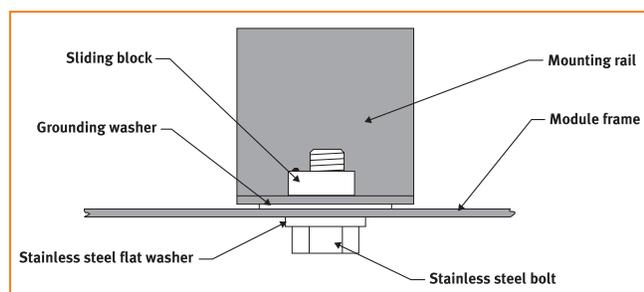
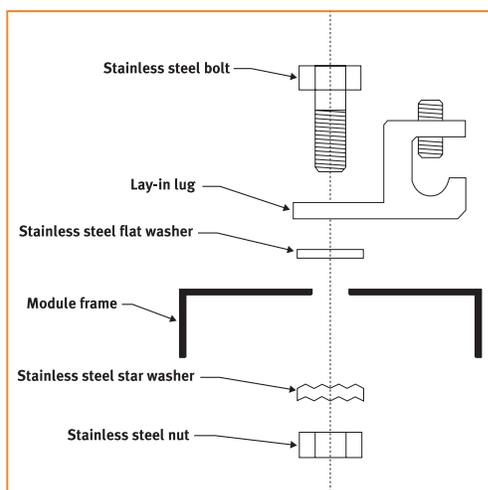
b) Parallel connection

The modules may be combined in parallel connection to produce the desired current output. Each series string or module may need to be fused prior to combining with other strings. The module label describes the maximum fuse size allowed. Please refer to the NEC Article 690 for additional requirements.

Equipment Grounding

To reduce the risk of electrical shock, ground the frame of the modules or array before wiring the system circuit using a grounding method that meets NEC requirements for grounding solar electrical systems. MAGE SOLAR® recommends the following method of grounding the module frame, or other approved method:

All mounted modules should be connected to an Earth ground for safety and protection. There is a grounding screw hole indicated with the symbol  on the frame. The ground wire should be stripped copper wire with the insulation jacket removed. The area of cross-section of ground conductor should not be less than the primary current-carrying conductors 2.1 mm (AWG14). For field grounding practices, please refer to Article 250 of the NEC. The grounding conductor is AWG11. When using copper grounding, the end that is linked to the grounding nut of the frame should be plated tin, or use a transitional washer to prevent electrochemistry corrosion.



Installation

- Ambient temperature: -20°C/-4°F to +40°C /104°F
- Operating temperature: -20°C/-4°F to +80°C/176°F
- Maximum load: 5,400 Pa/113 psf
- Water resistance: Do not install the PV module in places where it is submerged in water or would constantly be exposed to water from a sprinkler system, well, etc.
- Corrosion resistance: Saline and sulfurous environments that cause corrosion should be avoided.
- Install the PV module toward the south (in the Northern Hemisphere) or toward the north (in the Southern Hemisphere). Incorrect installation results in poor performance. If several PV modules will be installed in a row, they should be installed with the same adjustment and at the same angle.
- Install the PV module outside the shadow area. Shadows cause a loss in performance even if the factory-integrated bypass diode of the PV module reduces such loss.
- When affixing the PV module on the rail, use the proper screw and mounting hardware.
- The PV module has to be grounded as required by the NEC.
- Do not install the PV module in the proximity of fire or flammable materials.
- The assembly should be resistant to the effects of wind, snow, etc.
- You must choose the appropriate materials and use suitable corrosion inhibitors for the assembly.
- When assembling the PV module, you have to pay attention to proper installation and fixation. If a module falls, it may cause damage and danger to life and limb.
- Do not disassemble or bend the PV module, do not expose it to impact, do not step on it, and do not throw or drop it.

Module Mounting

The module is UL listed for use only when the factory frame is fully intact. Do not remove or alter the module frame. Do not drill holes in the module frame – this may damage the module and reduce the strength of the frame.

A torsion- and corrosive-resistant anodized aluminum frame ensures dependable performance, even under harsh weather conditions. There are eight predrilled mounting holes located on the alloy frame for ease of installation.

The module must be attached and supported by at least four bolts through the indicated mounting holes and/or brackets.

Maintenance

MAGE SOLAR® recommends the following to ensure optimum performance of the modules:

- Clean the glass surface as necessary. Use water and a sponge for cleaning. Mild, nonabrasive cleaning agents can be used if necessary.
- Electrical and mechanical connections should be checked periodically by qualified personnel to verify that they are clean, secure, and undamaged.

Quality Assurance

Please refer to our current data sheets for warranty information.

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