

PN-SPR Modules

Safety and Installation Instructions

1.0 Introduction

This manual provides safety and installation instructions for Phaesun photovoltaic (PV) modules manufactured with back-contact PV cells (Model number SPR defines product power output variants).

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

1.1 Disclaimer of Liability

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

1.2 Limited Warranty

Module limited warranties are described in the Phaesun warranty certificates obtainable at www.phaesun.com

1.3 Application Conditions

WARNING! This solar module shall not be used for applications that connect to the utility electricity grid and Phaesun has no liability, and all warranties shall be voided, to the extent the modules are used in any such application.

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.

- If the front glass is broken, or the back sheet is torn, contact with any module surface or module frame can cause electric shock
- 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. Phaesun modules have specific electrical characteristics as shown on the datasheets.

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.

Phaesun 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.

4.1 General Wiring

Phaesun 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.

4.2 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).

4.3 Series Connection

The modules may be wired in series to produce the desired voltage output. Extra care must be taken in case of system voltage above 50V DC. Do not exceed the maximum system voltage.

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

5.1 Site Considerations

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

Maximum Operating Temperature	+90 °C, +194 °F
Minimum Operating Temperature	-40 °C, -40 °F

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

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:

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

5.2 Installation

Modules may be mounted at any angle from horizontal to vertical. Select the appropriate orientation to maximize sunlight exposure.

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 guaranteed 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.

Modules may be mounted using the following methods only:

- 1) Frame Holes:** Secure the module to the structure using the factory mounting holes. Stainless steel bolts, with nuts, washers, and lock washers are recommended per module.
- 2) Pressure Clamps or Clips:** Mount the module with the clips on the side frame of the module. The side frames are attached to the longer sides of the module. 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 Phaesun.
- 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.

6.0 Maintenance

Inspect all modules annually for safe electrical connections, sound mechanical connection and freedom from corrosion. Periodically clean the module surface with water and a soft cloth or sponge. Fingerprints may be removed with standard glass cleaner. 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 will invalidate the product warrant.

7.0 Contact to Phaesun

For technical questions or information about the product, please do not hesitate to contact us.

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