



Instruction Sheet

Crystalline Silicon Photovoltaic Modules

Gebrauchsanweisung

PV-Module aus kristallinem Silizium

Hoja de instrucciones

Módulos fotovoltaicos de silicio cristalino

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Modules photovoltaïques au silicium cristallin

手引書

結晶シリコン太陽光発電モジュール

General Information

This instruction sheet provides information about BP Solar crystalline silicon photovoltaic modules.

NOTE

Read this instruction sheet in its entirety before installing, wiring, or using a module. Module installation and wiring should be performed by or under supervision of a licensed electrician.

Disclaimer of Liability

Since the conditions or methods of installation, operation, use and maintenance of PV modules are beyond its control, BP Solar 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.

Limited Warranties

Module Limited Warranties are described on the Warranty Certificate.

General Handling and Use

⚠ WARNING

Electrical Shocks & Burn Hazards

Photovoltaic (PV) modules generate electricity when exposed to light, even when they are not connected in a circuit. Shocks and burns can result from contact with module output wiring. These hazards are increased when multiple modules are interconnected to increase array output current or voltage.

Cover module front surfaces completely with an opaque cloth or other opaque material before performing any operation involving module or system electrical connections. Use appropriate safety equipment (insulated tools, insulating gloves, etc.) and procedures.

CAUTION

It is recommended to handle modules by their long sides only.

- Do not bend or disassemble modules.
- Do not walk on modules.
- Do not attempt to increase module output by concentrating light on its surface.
- If the PV power system includes other components (batteries, charge controllers, inverters, etc.) be sure to follow the safety recommendations of their manufacturers.

Application Information

BP Solar PV modules produce DC electricity. They may be used in single-module and multiple-module systems to meet the current or voltage requirements of a wide range of applications. Some applications may require the use of a blocking diode, which prevents battery discharge during periods of darkness, or a battery

charge regulator, which prevents overcharging and possible battery damage. Contact your distributor or a BP Solar representative for additional information.

Codes

In some areas, local or national codes (such as the United States NEC) may govern the installation and use of PV modules. In particular, these codes may specify requirements for module installation on rooftops, exterior walls, and vehicles. Installers must comply with these codes when applicable.

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

Underwriters Laboratories (UL) Listing Information

To satisfy the conditions of the UL Listing for modules installed in a system, you must: mount modules using standoff or rack methods when installing on a building. The module listing does not cover modules mounted integral with the roof or wall of the building and does not cover marine or vehicle application, where additional requirements may apply. If using laminates as part of BP Solar UL-listed mounting system, follow the installation and operating instructions provided with the mounting system.

Module Characteristics

Table C-1 presents the electrical and mechanical characteristics of BP Solar crystalline silicon PV modules, and the major electrical characteristics at Standard Test Conditions (STC) appear on each module label. Standard Test Conditions are irradiance of 1 kW/m², AM 1.5 spectrum, and cell temperature of 25°C. P_{max}, V_{oc}, and I_{sc} of any individual module will be within 10% of these specified values.

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 voltage (see Table 1 below) for sizing conductors and fuses is applicable, as described in Section 690-8 of the U.S. NEC.

Lowest Expected Ambient Temperature (°C/°F)	Correction Factor
25 to 10 / 77 to 50	1.06
9 to 0 / 49 to 32	1.10
-1 to -10 / 31 to 14	1.13
-11 to -20 / 13 to -4	1.17
-21 to -40 / -5 to -40	1.25

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

Electrical Connections

⚠ WARNING

Grounding

To avoid electrical shock, ground the frame of module or array before wiring the circuit. Attach a ground conductor at one of the ground holes on the module frame using the self-tapping screw supplied with the module. This may be required by your local codes.

NOTE

Use wiring and connection techniques consistent with outdoor installations. Wiring should be placed in conduit that is sunlight-resistant or, if exposed, should be sunlight-resistant type UF cable. Alternative grounding methods in compliance with articles 690 and 250 of the US NEC may be used.

CAUTION

To prevent stripping junction box screws, observe the torque limits in Table 2. Use wires of the same type (stranded or solid) under one terminal. If different wire gauges are used, limit the difference to 2 mm² or one AWG number.

Maximum Torque	
Junction box lid screws	0.57 N.m (5 in-lb)
Terminal block screws	
Conductor 6 or 4 mm ² (AWG # 10 or # 12)	2.7 N.m (24 in-lb)
Conductor smaller than 4 mm ² (AWG # 12)	2.3 N.m (20 in-lb)

Table 2. Maximum Torque for Junction Box and Terminal Block Screws

NOTE

Bypass diodes must be axial-lead Schottky diodes with a rating of at least 150°C junction temperature and current and voltage ratings as shown on the module label. See Table C-1 for maximum number of modules to be connected in parallel or series. Modules wired in the 6V configuration, or modules with 30V maximum system voltage rating should not be connected in series.

- ONLY use modules of same type for series and parallel connections.
- For modules equipped with Junction Box, see Figures A-1 through A-9 for parallel and series wiring details. Modules with plug-and-socket cables are connected in series by connecting the positive (+) connector of one module to the negative (-) connector of the adjacent module. Use UL listed wire kits available from BP solar for array output wiring.

Parallel Connection - If modules or strings of modules are connected in parallel, it is recommended that each string be protected by an externally mounted blocking diode to prevent shaded parallel elements from interacting with unshaded elements.

Series Connection - If two or more crystalline modules are connected in series, a bypass diode is required to protect each cell series string (typically 18 cells.) Modules with rated output above 69W are factory-equipped with bypass diodes. Diodes must be customer-installed on smaller modules as shown in Figures A-1 through A-10.

Mounting Instructions

⚠ WARNING

Falling Hazard

Use caution and be aware of slippery surfaces when installing modules on a roof. Falling can cause serious injury or death.

NOTE

It is the customer's responsibility to assure that its mounting systems are capable of safely supporting BP Solar modules or laminates. BP Solar does not warrant laminates against glass breakage, when mounted in customer-designed systems. All mounting structures must be reviewed by a professional mechanical engineer for wind load and other external loading conditions at that particular site.

Mount modules at an angle of at least 10 degrees from horizontal, and avoid mounting them with the junction box at the lower edge.

Mounting Framed Modules

NOTE

BP Solar modules are certified to IEC 61215 and UL 1703 standards when they are mounted on rigid beams at four inner mounting holes on their side frames as shown in Figures B-1 through B-3. Failure to comply with instructions may invalidate module warranties.

- Standoff or rack methods are acceptable when installing modules on a building. Other methods that have been successfully applied to crystalline modules may also be acceptable.
- To support our modules so that they can perform mechanically to the levels specified in UL1703 our product needs to be attached and supported in the region of its mounting bolt holes (~20% in from the ends), either with bolts through those holes or by an appropriate clamping means, sufficiently to support 45 lbs per square foot (both positive and negative), it is then the structure manufacturer's responsibility to prove and certify that their structure can provide this support. The 45 lbs per square foot is the same value used by UL to evaluate modules for compliance to UL1703.

- A BP Solar installation kit may be required for some mounting methods to comply with local electrical and building codes. Contact your distributor or a BP Solar representative for details.

Mounting Laminates (Unframed Modules)

For a BP Solar Laminate Mounting Systems

- If your laminates have been sold as part of BP Solar UL-listed mounting system, follow the installation and operating instructions provided with the mounting system.

For a Customer-Designed Laminate Mounting System

- Ensure laminate glass does not contact metal or other hard materials under all predictable on-site thermal and mechanical conditions.
- Ensure no shear loads are applied to the laminate. If supporting laminates on only two sides, the supported sides must be the laminate long sides.
- Do not mount laminates by bonding their glass directly to metal or other support beams. Differential thermal expansion in such a system can break the laminate.
- Ensure edges of laminate are protected from damage.

Maintenance

- Inspect all electrical and mechanical connections annually for tightness and freedom from corrosion.
- Periodically, clean the module surface with a soft cloth or sponge using water and mild detergent.

Disposal Considerations

This product must be disposed of in accordance with all relevant local, state, and national laws and regulations. It is the responsibility of the user to ensure that this product is disposed of properly. Please contact BP Solar if you have any questions concerning the proper disposal of this product.

NOTE: This BP Solar information insert, which also contains electrical connection schematics is part #6752.0051

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