victron energy
BLUE POWER

Instructions CN

Solar module

Victron Energy Bluesolar poly and mono 20 Wp to 360 Wp

Contents

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1. Purpose of this manual

2. General

3. Safety precautions for installing a solar photovoltaic system

4. Mechanical installation

4.1 Site selection
4.2 Choosing the right support frame
4.3 Ground mounting
4.4 Roof mounting
4.5 Pole mounting
4.6 General installation

5. Electrical installation

5.1 Electrical system connected to the mains
5.2 Earthing
5.3 General installation

6. Commissioning and maintenance

6.1 Blocking and bypass diodes
6.2 Testing, commissioning and troubleshooting
6.3 Low voltage fault troubleshooting
6.4 Maintenance

7. Disclaimer

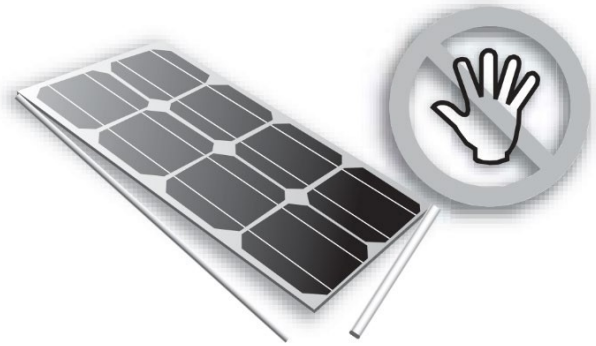
1. PURPOSE OF THIS MANUAL

This manual contains information regarding installation and safe handling.
Installation technicians must read and understand the manual before installation. If you have any questions, please contact our sales department for further clarification. The installation technician must observe all safety precautions listed in this manual and local regulations when installing the module.
Before installing a solar photovoltaic system, installers must familiarise themselves with the mechanical and electrical requirements for this system. Keep these instructions in a safe place for future reference (care and maintenance) and in case of sale or disposal of the modules.

2. General

The installation of solar photovoltaic systems may require specialist knowledge and skills. Installation must only be carried out by qualified persons.
Each module is supplied with a permanently attached connector. If necessary, we can supply customers with customised cables to facilitate installation.
Installers must assume the risk of injury that may occur during installation, including the risk of electric shock.
When exposed to direct sunlight, a single module can generate a DC voltage of more than 30 V. Contact with DC voltages of 30 V or higher is potentially dangerous.
Do not disconnect under load.

Photovoltaic solar modules convert light energy into direct current electrical energy. They are designed for outdoor use. The modules can be mounted on the ground, roofs, vehicles or boats. The correct design of support structures is the responsibility of designers and installation technicians. The use of mounting holes is recommended in the following paragraph.
Do not attempt to disassemble the modules and do not remove any attached labels or components from the modules.

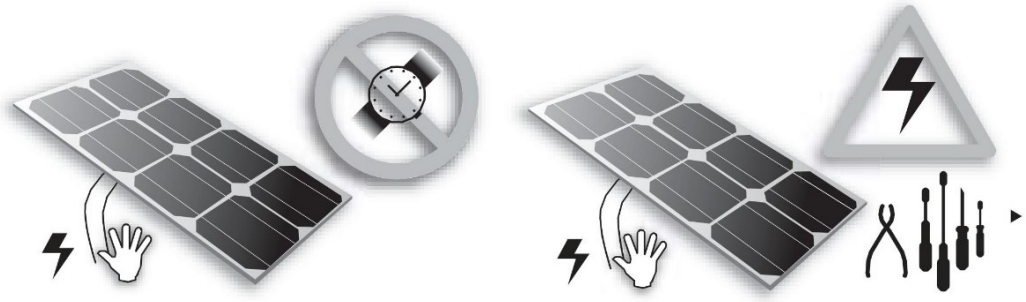


Do not paint or glue the top surface of the module.
Do not use mirrors or magnifying glasses to artificially concentrate sunlight on the modules. Do not expose the film on the back to direct sunlight.

When installing the system, comply with all local, regional and national legal regulations. Obtain a building permit if necessary.

3. Safety precautions for installing a solar photovoltaic system

Solar modules generate electrical energy when light shines on their front surface. DC voltage can exceed 30 V. If the modules are connected in series, the total voltage is equal to the sum of the voltages of the individual modules. If the modules are connected in parallel, the total current is equal to the sum of the individual currents of the modules.
Keep children away from the system during transport and installation of mechanical and electrical components. Cover the module completely with an opaque material during installation to prevent electricity from being generated.
When installing or removing photovoltaic systems, do not wear metal rings, bracelets, earrings, piercings or other metal devices.



Use only insulated tools approved for working on electrical installations.
Follow safety regulations for all other components used in the system, including cables and wires, connectors, charge controllers, inverters, accumulators and rechargeable batteries, etc.
Only use equipment, connectors, electrical installation and support frames suitable for solar electrical systems. Always use the same type of module within a given photovoltaic system.
The electrical characteristics are within ± 10% of the stated Isc, Voc and Pmax values under standard test conditions (irradiance 100 mW/cm², AM 1.5 spectrum and cell temperature 25 °C).
Under normal ambient conditions, the module will generate currents and voltages that differ from those specified in the technical data sheet. The values in the technical data sheet are those expected under standard test conditions. When designing a system, the short-circuit current and open-circuit voltage values should therefore be multiplied by a factor of 1.25 when determining the nominal voltage values, conductor capacities, nominal fuse values and sizes of control elements connected to the modules or system output.

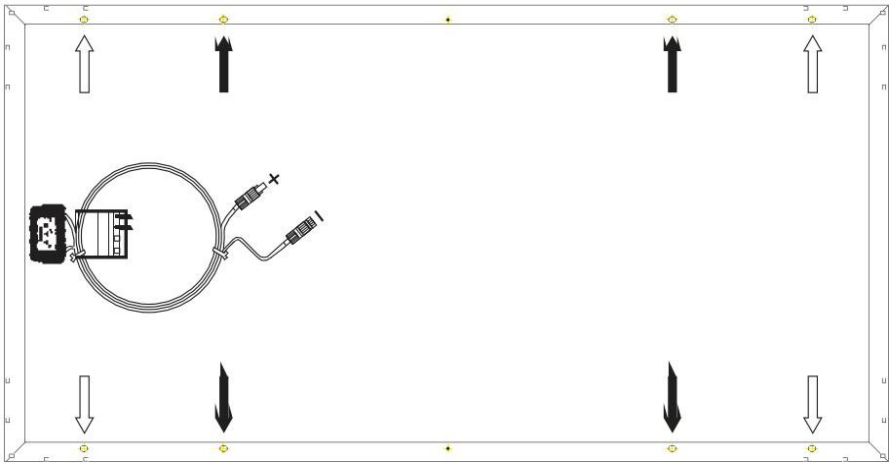
4. Mechanical installation

4.1 Site selection

Select a suitable location for mounting the modules.
The modules must face south in northern latitudes and north in southern latitudes.
For detailed information on the best tilt angle for installation, refer to standard solar photovoltaic system manuals or consult a reputable solar installer or system integrator.
The module should never be shaded during the day.
Do not use the module near equipment or in locations where flammable gases may be generated or accumulated.

4.2 Selecting a suitable support frame

Always follow the instructions and safety precautions provided with the support frames to be used with the modules.
Do not attempt to drill holes in the glass surface of the modules. Doing so will void the warranty. Do not drill additional mounting holes in the module frame. Doing so will void the warranty.
For normal installation, the modules must be securely fastened to the mounting structure using four mounting points. If additional wind or snow loads are expected, additional mounting points shall also be used. See the following figure for details. Load calculations are left to the system designers or installation technicians.



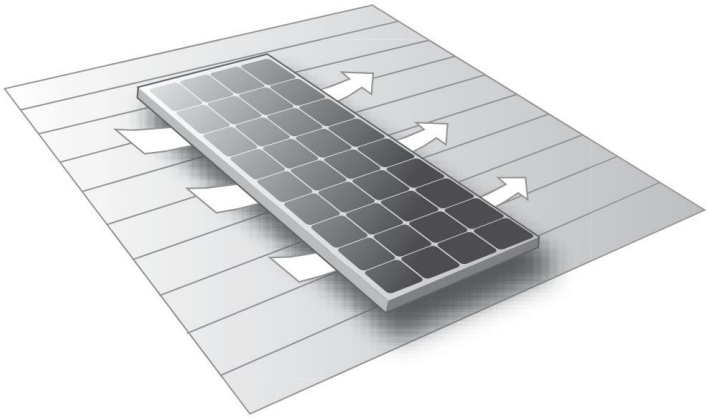
The module's supporting mounting structure must be made of corrosion- and UV-resistant material.

4.3 Ground mounting

Select the height of the system so as to prevent the bottom edge of the module from being covered by snow for long periods during winter in areas with heavy snowfall. In addition, ensure that the lowest part of the module is positioned high enough so that it is not shaded by plants or trees or damaged by wind-driven sand and stones.

4.4 Roof mounting

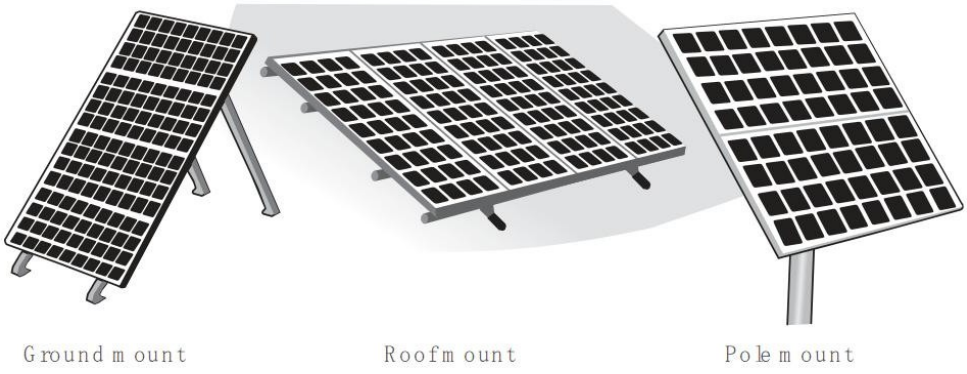
When mounting the module on a roof or building, ensure that it is securely fastened and cannot fall as a result of wind or snow loads. Ensure adequate ventilation under the module for cooling (minimum air gap between the module and the mounting surface 10 cm).



When installing the module on the roof, ensure that the roof structure is suitable. In addition, each roof penetration required for module installation must be properly sealed to prevent leakage.
In some cases, a special support frame may be required.
Roof mounting of solar modules may affect the fire resistance of the building structure.
The modules are classified as fire class C and are suitable for installation on class A roofs. Do not install the modules on the roof or building in strong winds, as this could result in an accident.

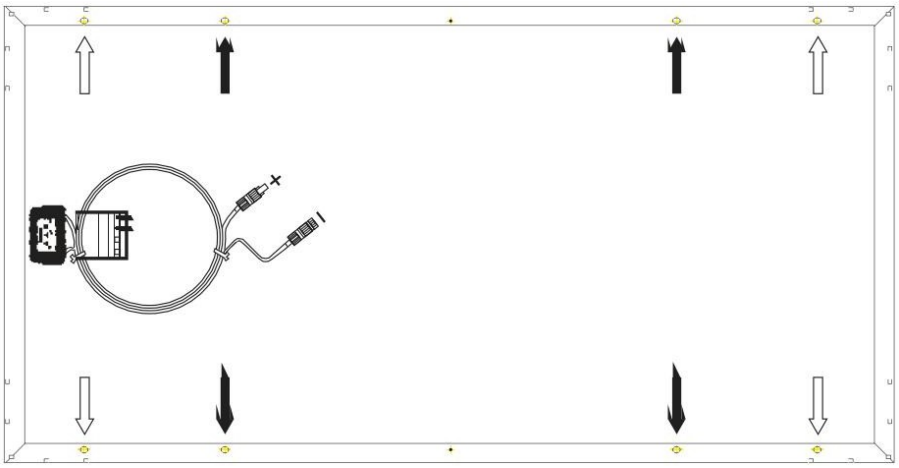
4.5 Pole mounting

When mounting the module on a pole, select a mounting structure for the pole and module that will withstand the expected wind force for the given area.



4.6 General installation

When mounting the module, the pre-drilled mounting holes in the frame must be used.
The most common module installations use four symmetrical points near the inside of the module frames. If excessive wind or snow loads are expected, all eight mounting holes must be used. Do not lift the module by grabbing the junction box or electrical wires.
Do not climb on the module.
Do not drop the module or allow objects to fall on the module.
To avoid breaking the glass, do not place any heavy objects on the module. Do not press the module firmly against any surface.
Incorrect transport and installation may cause the module to break.



Mounting holes for normal installation

For high wind and snow-loads, these mounting holes must also be used

5. Electrical installation

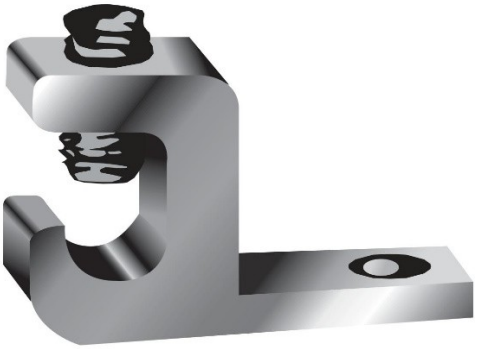
This manual describes some of the most important typical applications as representative examples.

5.1 Grid-connected electrical system

Direct current electrical energy generated by photovoltaic systems can also be converted to alternating current and connected to the grid. Since local regulations regarding the connection of energy systems with renewable energy sources vary from region to region.
For the design of such a system, consult a qualified designer or integrator. Permits are usually required for the installation of such a system, and a technician must formally approve and inspect such a system before it is accepted.

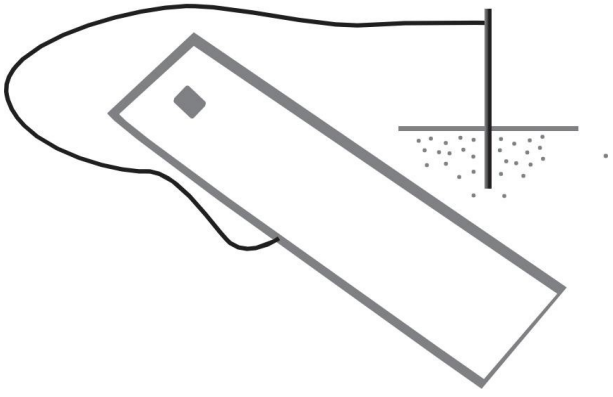
5.2 Grounding

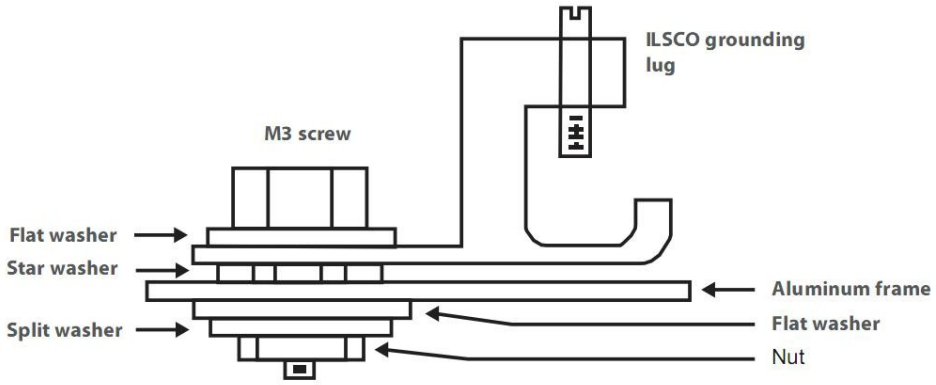
The module frame must be properly grounded. The grounding conductor must be properly attached to the module frame to ensure good electrical contact. Use the recommended type or equivalent connector for this conductor.
If the support frame is made of metal, the surface of the frame must be electroplated and have excellent conductivity.
We recommend using a mounting bracket (Cat. GBL4-DBT recommended by the manufacturer) for grounding. First, carefully strip the insulation 16 mm from the end of the grounding conductor to avoid cutting or shearing the conductors, insert the conductor into the eye lug (see figure) and tighten the slotted screw. Be careful not to damage the conductor core. Then tighten the screw.



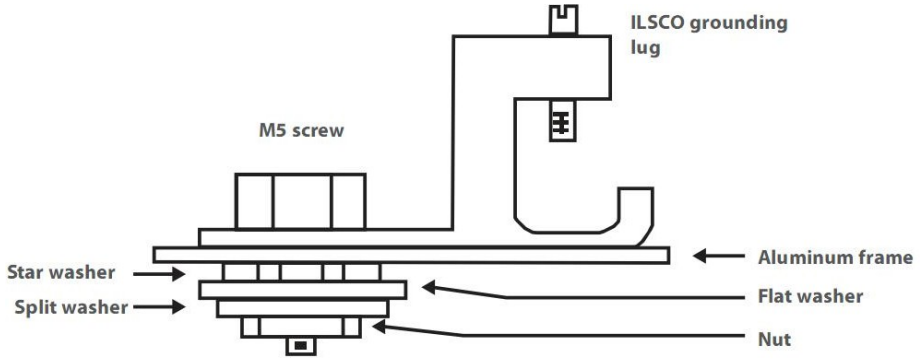
Insert the grounding conductor here.

Next, mount the recommended ILSCO grounding pin into the aluminium frame using an M3 or M5 stainless steel screw and fasteners, as shown below. Note: there are two different sizes of grounding holes, the smaller of which is being phased out.
The amount of fasteners for mounting the grounding pin is the same - with the exception of the M3 screw, an additional washer is mounted directly under the head of the M3 screw. The fan washer is located directly under the grounding pin and penetrates the anodised coating of the aluminium frame with an electrical contact. The screw assembly is further equipped with a flat washer, a split lock washer and finally a nut to secure the entire assembly, as shown below. The recommended torque for M3 or M5 screws is 0.8 Nm or 1.5 Nm.





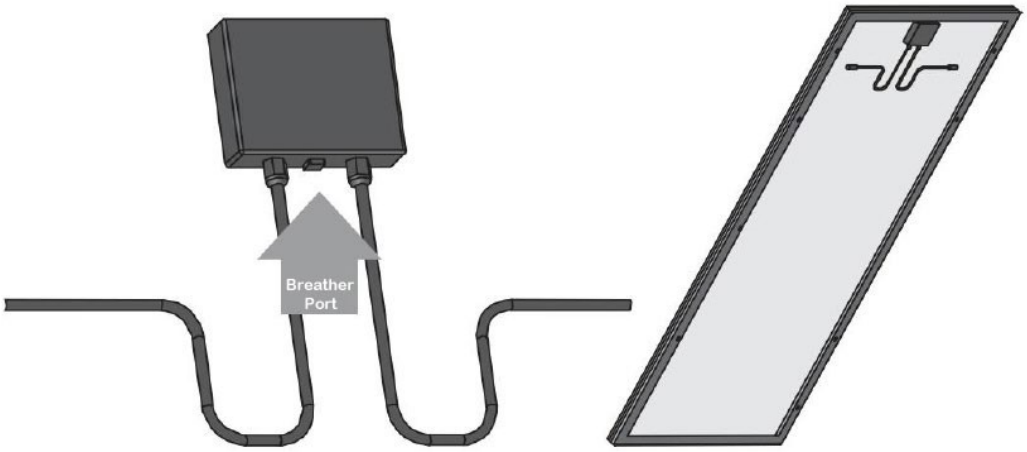
For module with Φ4mm grounding holes



For module with Φ5.1mm grounding holes

5.3 General installation

Do not use modules of different configurations in the same system. Max. number of modules (N) = Vmax system / [Voc(at STC)].
Several modules are connected in series and then in parallel to create a PV generator, especially for use with high operating voltages. When modules are connected in series, the total voltage is equal to the sum of the individual voltages.
For applications requiring high currents, several photovoltaic modules can be connected in parallel; the total current is equal to the sum of the individual currents.
The module is supplied with connectors for electrical connection to the system.
Consult local electrical wiring regulations to determine the size, type and temperature of the system conductor.
The cable cross-section and connector capacity must be selected to match the maximum short-circuit current of the system (the recommended cable cross-section is 4 mm² for one module and the rated current of the connector is greater than 10 A), otherwise the cable and connector will overheat under high current. Please note that the upper temperature limit for the cable is ≥85 °C and for the connector ≥105 °C.
The distribution box has a vent hole. The vent hole must be mounted facing downwards and must not be exposed to rain. Therefore, the distribution box must be mounted on the higher side of the module.



6. Commissioning and maintenance

6.1 Blocking and bypass diodes

Blocking diodes prevent current from flowing from the battery to the module when no electricity is being generated. If a charge controller is not used, it is recommended to use blocking diodes. Your specialist dealer will advise you on suitable types.
In systems with more than two modules in series, high reverse currents can flow through cells that are partially or completely shaded when part of the module is shaded and the rest is exposed to the sun. These currents can cause the affected cells to overheat and may even damage the module. Bypass diodes are used in the module to protect it from such high reverse currents. All modules have bypass diodes already integrated in the junction box. In the unlikely event of a diode failure, it can be easily replaced.
Protect yourself from electric shock when tuning or maintaining your solar system.

6.2 Testing, commissioning and troubleshooting

Check all electrical and electronic components of the system before use. Follow the instructions in the manuals supplied with the components and equipment.
Test modules connected in series before connecting them to the system.
Check the open-circuit voltage of each series module using a digital multimeter (the Fluke 170 series is recommended). The measured values should correspond to the sum of the open-circuit voltages of the individual modules. The nominal voltage can be found in the technical specifications for the type of module used. If the measured value is significantly lower than the expected value, follow the instructions in the section "Troubleshooting low voltage".
Check the short-circuit current of each series circuit. It can be measured directly using a digital multimeter (Fluke 170 series recommended) connected to two terminals of the series circuit or module, or with any load, such as photovoltaic lighting, to perform a rough measurement. Note that the rated range of the ammeter or the rated load current should be greater than 1.25 times the rated short-circuit current of the series module. The rated current can be found in the technical specifications of the module type used.
The measured value may vary significantly depending on weather conditions, time of day and module shading.

6.3 Low voltage fault troubleshooting

Identify normal low voltage and excessively low voltage. The low voltage referred to here is usually a voltage drop in the open circuit of the module, which is caused by an increase in the temperature of the solar cells or lower irradiation. Excessively low voltage is usually caused by incorrect wiring at the terminals or faulty diodes.
First, check the wiring to ensure that there are no open circuits and that everything is connected correctly. Check the open-circuit voltage of each module:

1. Completely cover the modules with opaque material.
2. Disconnect the wiring at both terminals of the modules.
3. Remove the opaque material from the module to be checked and measure the open-circuit voltage at the terminals.

If the measured voltage is only half, there is a bypass diode fault. See "Testing and replacing bypass diodes".
If the radiation intensity is not too low, but the voltage at the terminals differs from the nominal value by more than 5%, this indicates a poor electrical connection.

6.4 Maintenance

To ensure optimal module performance, we recommend the following maintenance:
Clean the glass surface of the module as needed. Always use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove stubborn dirt.
Check the electrical and mechanical connections every six months to ensure they are clean, secure and undamaged.
If any problems arise, have them examined by a competent specialist. Follow the maintenance instructions for all components used in the system, such as support frames, charge controllers, inverters, batteries, etc.

7. Disclaimer

As the use of this manual and the conditions or methods of installation, operation, use and maintenance of photovoltaic (PV) products are beyond our control, we accept no responsibility and expressly disclaim liability for any loss, damage or expense arising from or resulting from the use of equipment associated with such installation, operation, use or maintenance.
We assume no responsibility for any infringement of patents or other rights of third parties that may result from the use of the photovoltaic product. No licence is granted implicitly or otherwise under any patents or patent rights.
The information in this manual is based on our knowledge and experience and is considered reliable; however, this information, including product specifications (without limitation) and suggestions, does not constitute a warranty, either express or implied. We reserve the right to make changes to the manual, PV system, specifications or product data sheets without prior notice.

BlueSolar Polycrystalline panels

www.victronenergy.com

BlueSolar Polycrystalline Panel 175W

- Low temperature coefficient improves performance at high temperatures.
- Exceptional performance in low light conditions and high sensitivity to light across the entire solar spectrum.
- 25-year limited warranty on performance and output.
- 5-year limited warranty on materials and workmanship
- Sealed, waterproof, multifunctional junction box provides a high level of safety.
- High-performance bypass diodes minimise power loss caused by shading.
- The advanced EVA (Ethylene Vinyl Acetate) encapsulation system with a three-layer back sheet meets the most stringent safety requirements for high-voltage operation.
- A robust anodised aluminium frame allows for easy installation of modules on roofs using various types of standard mounting systems.
- High-quality tempered glass with high transmittance provides increased rigidity and impact resistance.
- High-performance models with pre-wired quick-connect system with MC4 connectors (PV-ST01).

MC4 connectors

Item	Description	Net weight	Electrical data STC (1)				
			Nominal power	Maximum voltage	Maximum current	No-load voltage	Short-circuit current
			P_{MPP}	V_{MPP}	I_{MPP}	Voc	Isc
		Kg	W	V	A	V	A
SPP040201200	20W-12VPoly 440 x 350 x 25mm series4a	1.9	20	18.4	1.09	21.96	1.18
SPP040301200	30W-12VPoly 655 x 350 x 25mm series4a	2.8	30	18.2	1.66	21.80	1.80
SPP040451200	45W-12VPoly 425 x 668 x 25mm series4a	3.1	45	19.1	2.36	22.90	2.55
SPP040601200	60W-12VPoly 545 x 668 x 25mm series4a	4	60	19.3	3.12	23.10	3.37
SPP040901200	90W-12V Poly 780 x 668 x 30mm series4a	6.1	90	19.5	4.61	23.44	4.98
SPP041151200	115W-12VPoly 1015 x 668 x 30mm series 4a	8	115	18.9	6.08	22.73	6.56
SPP041151202*	115W-12VPoly 1030 x 668 x 30mm series 4b	8	115	18.9	6.08	22.73	6.56
SPP041751200	175W-12VPoly 1485 x 668 x 30mm series 4a	12	175	18.3	9.56	21.9	10.24
SPP042702000	270W-20VPoly 1640 x 992 x 35mm series 4a	18.4	270	31.7	8.52	38.04	9.21
SPP043302400	330W-24VPoly 1956 x 992 x 40mm series 4a	22.5	330	37.3	8.86	44.72	9.57
SPP043302402*	330W-24VPoly 1980 x 1002 x 40mm series 4b	23	330	37.3	8.86	44.72	9.57

Module	SPP 040201200	SPP 040301200	SPP 040451200	SPP 040601200	SPP 040901200	SPP 041151200	SPP 041151202	SPP 041751200	SPP 042702000	SPP 043302400	SPP 043302402
Nominal power (± 3% tolerance)	20W	30W	45W	60W	90W	115W	115W	175W	270W	330W	330W
Cell type	Polycrystalline										
Number of cells in series	36								60	72	
Maximum system voltage (V)	1000V										
Temperature coefficient PMPP (%)	-0.45/°C	-0.45/°C	-0.45/°C	-0.45/°C	-0.45/°C	-0.45/°C	-0.45/°C	-0.45/°C	-0.47/°C	-0.45/°C	-0.45/°C
Temperature coefficient Voc (%)	-0.35/°C	-0.35/°C	-0.35/°C	-0.35/°C	-0.35/°C	-0.35/°C	-0.35/°C	-0.35/°C	-0.34/°C	-0.35/°C	-0.35/°C
Temperature coefficient Isc(%)	+0.04/°C	+0.04/°C	+0.04/°C	+0.04/°C	+0.04/°C	+0.04/°C	+0.04/°C	+0.04/°C	+0.045/°C	+0.04/°C	+0.04/°C
Temperature range	-40°C to +85°C										
Maximum surface load capacity	200 kg/m²										
Permissible load during hailstorms	23 m/s, 7.53 g										
Control box type	PV-LH0805	PV-LH0806		PV-LH0801		PV-LH0808			PV-JB002		
Cable/connector length	without cable				900 mm / MC4						
Output tolerance	+/-3%										
Frame	Aluminium										
Warranty	5 years										
Performance decline warranty	10 years 90%, 25 years 80% performance										
Smallest unit	1 panel										
Quantity per pallet	380	240	200	140	72	72	72	48	42	37	37
Protection class	Class II										

*New dimension: replacement for 4a model

1) STC (standard test conditions): 1000W/m², 25ºC, AM (air) 1.5

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Date : 6 August 2012

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