



SUNERGY USA WORKS LLC

INSTALLATION INSTRUCTION MANUAL

CRYSTALLINE PV MODULE

1. INTROUDUCTION

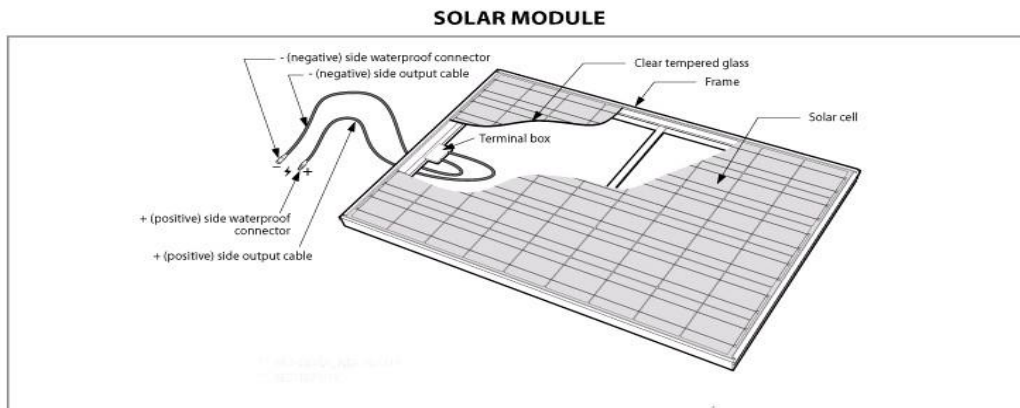
SUNERGY USA WORKS LLC is a high-tech company engaged in development, research, production, sales, and service of solar panels, and photovoltaic systems.

SUNERGY USA WORKS LLC supply products to more than 60 countries and regions on five continents, such as Germany, Spain, Italy, America, Canada, Korea, Japan, and China and so on. Our solar panels are widely used in commercial, residential and industrial solar power system (on-grid&off-grid), PV power station and many other different regions.

SUNERGY USA WORKS LLC is located in 1330 St.Mary's Street, Ste.330, Raleigh, NC, 27605, WAKE, USA

1.1 POWER MODULE

SUNERGY USA WORKS LLC Solar Photovoltaic modules consist of a series of electrically interconnected crystalline silicon solar cells. Which are permanently encapsulated between a tempered glass superstrate and substrate. The entire laminate is secured within an anodized aluminum frame for structural strength; ease of installation and to protect the cells from the most severe environmental conditions.



1.2 Label

Each module has a label on its rear side providing the following information: the product type, rated power, rated current, rated voltage, open circuit voltage, short circuit current, all as measured under standard test conditions, and weight, dimension, the maximum system voltage, maximum fuse rating and so on.

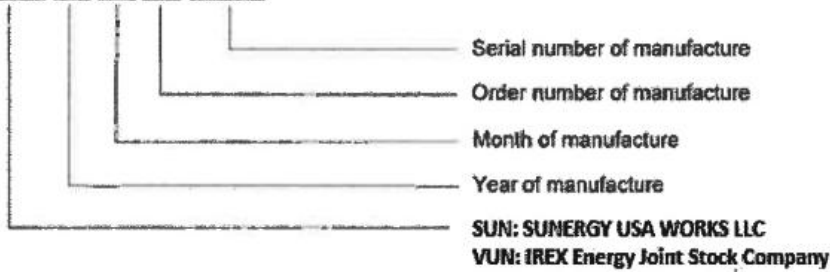
Each module has only one bar code as shown below:



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SUN XX XX XX XXXX



1. APPLICATIONS

SUNERGY Solar PV modules are a highly reliable, virtually maintenance-free direct current (DC) power source, designed to operate most efficiently in sunlight. SUNERGY series modules are ideal to power remote homes, recreational vehicles, water pumps, telecommunications systems and many other applications either with or without the use of storage batteries. Class A, Modules rated for use in this application class may be used in systems operating at greater than 50V DC or 240W, where general contact access is anticipated. Modules qualified for safety through this part of IEC 61730-1 and IEC 61730-2 and within this application class are considered to meet the requirements for safety class II.

Notes: The recommended maximum series/parallel module configurations are as follow:

72 6 " mono series: 16/1	60 6 " mono series: 20/1
54 6 " mono series: 21/1	36 6 " mono series: 32/1
72 6 " poly series: 17/1	60 6 " mono poly: 20/1
54 6 " poly series: 23/1	36 6 " mono poly: 34/1

2. PERMIT

Before installing your system, contact local authorities to determine the necessary permit, installation and inspection requirements.

3. CLIMATE CONDITION

Install the SUNERGY Solar crystalline series modules in the following conditions:

Ambient temperature:	-20°C to + 40°C
Operating temperature:	-40°C to +85°C
Storage temperature:	-40°C to +40°C
Humidity:	below 85RH%
Wind pressure:	below 50.12lb / ft ² (2400Pa)
Corrosion resistance:	Except for corrosive salt area and sulfurous area.

4. WARNING AND NOTES FOR SAFE INSTALLATION WORK

This system shall be installed only by engineers who have completed the training course. Each solar panel has a junction box, can provide cable according to customer's requirement.



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Installers must know the possible danger of death or serious bodily injury.

Do not cut the connection wire under the loading.

Do not modify solar panel, move any labels or other parts.

Do not use chemicals on solar panel surfaces.

Do not expose solar panels to sunlight that is concentrated with mirrors, lenses or similar means.

Solar panel installation must obey the local law, even it should get the Construction Licence.

Do not wear the things, such as rings, metal jewelry, diamond jewelry or tools. which can damage the surface of module during the installation process.

5. SAFETY REGULATIONS REGARDING INSTALLATION OF SOLAR POWER SYSTEMS

6.1 Take the following precautions before starting work

Plan the job and visit the site before starting work. On site, do not work alone. Always work with at least one other person. Inspect power tools before using them

6.2 Observe safety regulations during installation

Do not wear metallic jewelry, which may cause electrical shock

Keep the back side of solar panel surfaces free of foreign objects

Completely cover solar panel with opaque materials when wiring to halt productions of electricity.

6. REQUIRED INFORMATION

Artificially concentrated sunlight shall not be directed on the panel.

“Rated electrical characteristics are within 10 percent of measured values at Standard Test Conditions of: 1000 W/m², 25 °C cell temperature and solar spectral irradiance per ASTM E 892 or irradiation of AM 1.5 spectrum.

Under normal conditions, a photovoltaic panel may experience conditions that produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of I_{sc} and V_{oc} marked on should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor capacities, fuse sizes and size of controls connected to the panel output. Refer to Section 690-8 of the National Electric Code for an additional multiplying factor of 1.25 which may be applicable.

8. POINTS TO CHECK WHEN SELECTING THE INSTALLATION LOCATION

8.1 The direction toward the equator to install solar modules, if possible. Installations facing east and west are also possible, although the amount of power generated will be lower.

8.2 Install in a location that has good sun exposure throughout the year. Less power is generated in shaded locations.

8.3 The output of a series string of solar panels is connected to the input of the inverter. Always install solar panels so that all elements of the array receive the same amount of sunlight.

8.4 It may not be possible to install solar panels in regions where maximum snow accumulation exceeds the maximum allowable load.

9. MOUNTING AND NOTES

The module frame is made of anodized aluminum, and therefore corrosion can occur if the modules is subject to a salt water environment with contact to a rack of another type of metal (Electrolysis Corrosion). If required, PVC or stainless steel washers can be placed

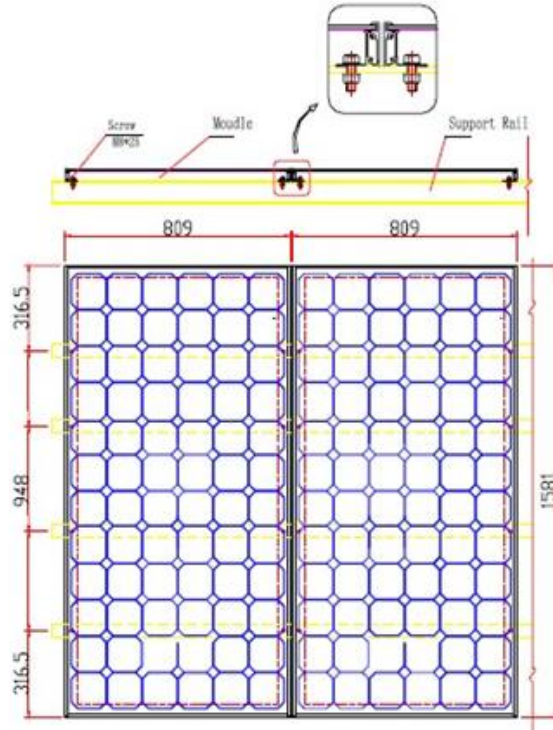


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between the module frame and support structure to prevent this type of corrosion. Module support structures that are to be used to support modules at correct tilt angles should be wind and snow load rated for use by the appropriate local and civil codes prior to installation.

SUNERGY modules can be mounted as following method:

Using corrosion-proof screws (M8) on the existing installing holes in the module frame.



Mounting Drawing 2 (with screws)

The frame of each module has 8 mounting holes (12mm*9mm) used to secure the modules to supporting structure. The module frame must be attached to a supporting structure using M8 stainless steel hardware together with spring washers and flat washers in eight places symmetrical on the SUNERGY module. The applied torque is about 8 Newton-meters.

The module can't be installed using clamps.

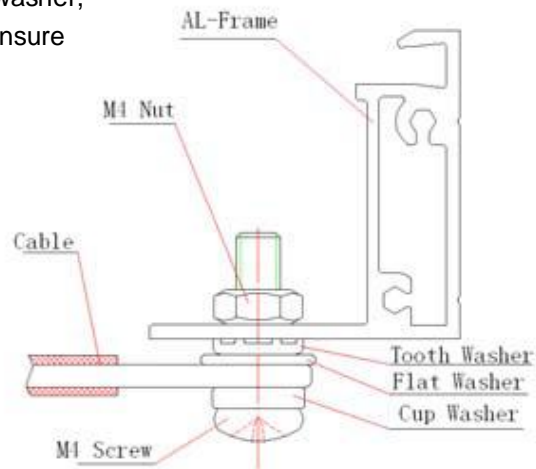
It is not permitted to modify the module frame under any circumstances. Recommended distance between 2 solar modules is 5mm considering linear thermal expansion of the module frames. Clearance between the module frame and mounting surface may be required to prevent the junction box from touching the surface, and to circulate cooling air around the back of the module.

10. GROUNDING

All module frames and mounting racks must be properly grounded in accordance with the appropriate respective national electrical code. Proper grounding is achieved by connecting the module frame(s) and structural members contiguously one to another using a suitable grounding

conductor. The grounding conductor or strap may be copper, copper alloy, or other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must then make a connection to earth using a suitable earth ground electrode.

Attach a separate conductor as grounding wire to one of the 4mm diameter grounding marked \perp on the module frame with a set of M4 screw, cup washer, flat washer, tooth washer, and M4 nut. This is to ensure positive electrical contact with the frame.



**Schematic drawing
for SPV module grounding**

11. INSTALLATION WORK

Using corrosion-proof screws (M8) on the existing installing holes in the module frame.

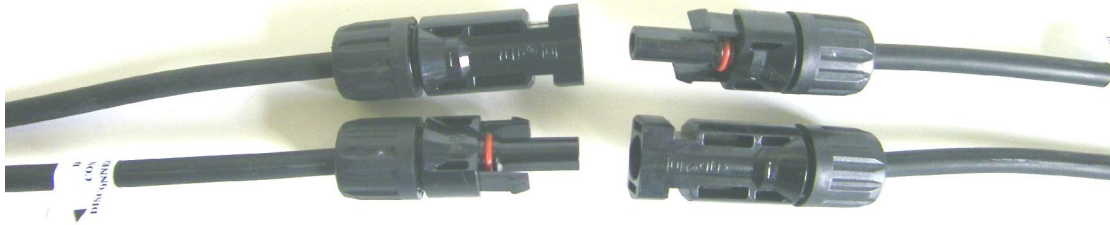
- 11.1 Secure the supporting structure according to the mounting holes in the frame of each module.
- 11.2 The module frame must be attached to a supporting structure using M8 stainless steel hardware together with spring washers and flat washers in eight places symmetrical on the module.
- 11.3 Clearance between the module frame and mounting surface may be required to prevent the junction box from touching the surface, and to circulate cooling air around the back of the module.
- 11.4 Connecting the solar panels.

12. Connect each array according to the solar array connection examples.

- 12.1 The cable must not be bent or crushed on the direct exit of the cable screw joint include connector and junction box. A minimum bending radius $R \geq 4 \times$ cable diameter must be maintained. The cable must be routed in a way that tensile stress on the conductor or connections is prevented. The cable must meet EN 50618.
- 12.2 There is a cable (+) and a cable (-) on the rear side of each solar panel. Connect the waterproof connectors on these cables, making sure to push the connectors all the way in.



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12.3 On the first solar panel, connect the positive home run cable to the positive array output cable, and connect the negative cable to the positive cable of the second solar panel. On the second solar panel, connect the negative cable to the positive cable of the third solar panel. Continue until you have series connected the appropriate number of panels for the desired voltage.

12.4 When you have made direct connections between the specified number of solar panels, use a digital multimeter to measure the voltage and current output of the array.

12.5 Organize the cables between solar panels.

13. Daily maintenance instructions

13.1 Do not clean the modules without professional authorized, and ensure the appropriate facilities to conduct security operations and aerial work with high-altitude awareness of the danger.

13.2 Checking the glass for cracks and damage before cleaning the module. If the modules have been broken, do not be cleaned, and immediately inform the installer or maintainer.

13.3 Do not use cleaning components of a strong type of chemical or abrasive detergent and disinfectant operations. To prevent serious pollution will reduce the output power. We recommend using water to clean modules. If the animals that produce the dirt, a mild soapy water and neutral disinfectant will be recommended. If necessary use a soft sponge or cloth to wipe the modules, do not force or scratch the modules hard. Do not wear jewelry or watches during cleaning the modules, Do not scraped off the dirt of animal from the components hard. Over scratches cause power attenuation, and void your warranty policy. When the module of the tilt angle is more than 15 degrees, the modules can self-clean naturally; when the component's angle less than 15 degrees, regular cleaning is necessary. Regular inspection mounting bracket corrosion or not, if we find evidence of corrosion, please consult installers; Regularly check the integrity of the ground terminal, but do not try to change the electrical connection, if you suspect a loose connection, please contact the installer.



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Date sheet for all module types of the family

Product Electrical Ratings:						
Module type	SUN330-72 M	SUN335-72 M	SUN340-72 M	SUN345-72 M	SUN350-72 M	SUN355-72 M
Voc [V] /Tolerance	45.5±5%	45.90±5%	46.3±5%	46.9±5%	47.5±5%	47.7±5%
Vmp [V]	38.1	38.3	38.4	38.5	38.7	38.8
Isc [Adc] /Tolerance	9.24±5%	9.31±5%	9.35±5%	9.45±5%	9.53±5%	9.65±5%
Imp [Adc]	8.66	8.74	8.85	8.96	9.04	9.15
Pmp [W] /Tolerance	330±5%	335±5%	340±5%	345±5%	350±5%	355±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15
Module type	SUN360-72 M	SUN365-72 M	SUN370-72 M	SUN275-60 M	SUN280-60 M	SUN285-60 M
Voc [V] /Tolerance	47.9±5%	48.1±5%	48.3±5%	38.0±5%	38.2±5%	38.7±5%
Vmp [V]	38.9	39.1	39.3	31.9	31.1	32.2
Isc [Adc] /Tolerance	9.75±5%	9.82±5%	9.85±5%	9.21±5%	9.35±5%	9.48±5%
Imp[Adc]	9.25	9.34	9.41	8.63	8.72	8.85
Pmp [W] /Tolerance	360±5%	365±5%	370±5%	275±5%	280±5%	285±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15



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Module type	SUN290-60 M	SUN295-60 M	SUN300-60 M	SUN305-60 M	SUN245-54 M	SUN250-54 M
Voc [V] /Tolerance	39.2±5%	39.6±5%	39.8±5%	40.1±5%	34.9±5%	35.3±5%
Vmp [V]	32.4	32.5	32.7	32.8	28.5	28.7
Isc [Adc] /Tolerance	9.58±5%	9.72±5%	9.78±5%	9.89±5%	9.14±5%	9.23±5%
Imp [Adc]	8.95	9.08	9.17	9.3	8.58	8.71
Pmp [W] /Tolerance	290±5%	295±5%	300±5%	305±5%	245±5%	250±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15
Module type	SUN255-54 M	SUN260-54 M	SUN265-54 M	SUN270-54 M	SUN275-54 M	SUN165-36 M
Voc [V] /Tolerance	35.7±5%	36.2±5%	36.6±5%	36.9±5%	37.3±5%	23.1±5%
Vmp [V]	28.8	29.0	29.1	29.3	29.4	19.1
Isc [Adc] /Tolerance	9.35±5%	9.45±5%	9.6±5%	9.7±5%	9.81±5%	9.17±5%
Imp [Adc]	8.85	8.96	9.1	9.22	9.35	8.62
Pmp [W] /Tolerance	255±5%	260±5%	265±5%	270±5%	275±5%	165±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15
Module type	SUN170-36 M	SUN175-36 M	SUN180-36 M	SUN185-36 M	-	-
Voc [V] /Tolerance	23.4±5%	23.8±5%	24.1±5%	24.5±5%	-	-
Vmp [V]	19.2	19.4	19.5	19.7	-	-
Isc [Adc] /Tolerance	9.35±5%	9.53±5%	9.71±5%	9.85±5%	-	-
Imp[Adc]	8.85	9.04	9.23	9.39	-	-
Pmp [W] /Tolerance	170±5%	175±5%	180±5%	185±5%	-	-
Maximum system voltage [V]	1000	1000	1000	1000	-	-
Maximum Over-Current Protection Rating [A]	15	15	15	15	-	-



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Product Electrical Ratings:						
Module type	SUN330-72P	SUN325-72P	SUN320-72P	SUN315-72P	SUN280-60P	SUN275-60P
Voc [V] /Tolerance	45.50±5%	44.90±5%	44.60±5%	44.30±5%	38.50±5%	38.00±5%
Vmp [V]	37.80	37.70	37.50	37.30	9.29	31.40
Isc [Adc] /Tolerance	9.22±5%	9.10±5%	9.03±5%	8.93±5%	31.60±5%	9.18±5%
Imp [Adc]	8.73	8.62	8.53	8.44	8.86	8.76
Pmp [W] /Tolerance	330±5%	325±5%	320±5%	315±5%	280±5%	275±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15
Module type	SUN270-60P	SUN265-60P	SUN250-54P	SUN245-54P	SUN240-54P	SUN165-36P
Voc [V] /Tolerance	37.20±5%	37.00±5%	34.80±5%	34.30±5%	33.50±5%	23.00±5%
Vmp [V]	31.20	31.00	28.50	28.30	28.10	18.90
Isc [Adc] /Tolerance	9.06±5%	8.94±5%	9.19±5%	9.05±5%	8.95±5%	9.16±5%
Imp[Adc]	8.65	8.54	8.77	8.66	8.54	8.74
Pmp [W] /Tolerance	270±5%	265±5%	250±5%	245±5%	240±5%	165±5%
Maximum system voltage [V]	1000	1000	1000	1000	1000	1000
Maximum Over-Current Protection Rating [A]	15	15	15	15	15	15
Module type	SUN160-36P	-	-	-	-	-
Voc [V] /Tolerance	22.30±5%	-	-	-	-	-
Vmp [V]	18.80	-	-	-	-	-
Isc [Adc] /Tolerance	8.91±5%	-	-	-	-	-
Imp [Adc]	8.51	-	-	-	-	-
Pmp [W] /Tolerance	160±5%	-	-	-	-	-
Maximum system voltage [V]	1000	-	-	-	-	-
Maximum Over-Current Protection Rating [A]	15	-	-	-	-	-



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Temperature cofficient	
Temp. Cofe. Of Isc	0.048 % / °C
Temp. Cofe. Of Voc	-0.30 % / °C
Temp. Cofe. Of Pmax	-0.40 % / °C