



INSTALLATION MANUAL



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1. INSTALLATION

Models List Applicable To Installation Manual				
Type	Module	A	B	W
Type-1	SP-N16/156HG-xxxW	2465	1134	35(30)
Type-2	SP-N16/144HG-xxxW	2278	1134	35(30)
Type-3	SP-N16/132HG-xxxW	2092	1134	35(30)
Type-4	SP-N16/120HG-xxxW	1903	1134	35(30)
Type-5	SP-N16/108HG-xxxW	1722	1134	35(30)
Type-6	SP-N16A/144HG-xxxW	2382	1134	35(30)
Type-7	SP-N16A/132HG-xxxW	2185	1134	35(30)
Type-8	SP-N16A/120HG-xxxW	1994	1134	35(30)
Type-9	SP-N16A/108HG-xxxW	1800	1134	35(30)
Type-10	SP-N16B/132HG-xxxW	2382	1134	35(30)
Type-11	SP-N16B/120HG-xxxW	2172	1134	35(30)
Type-12	SP-N16B/108HG-xxxW	1960	1134	35(30)
Type-13	SP-N16B/96HG-xxxW	1762	1134	35(30)
Type-14	SP-N18/132HG-xxxW	2384	1303	33
Type-15	SP-N18/120HG-xxxW	2172	1303	33

Note: A is the length of the long side of the module, B is the length of the short side, W is the width of the module, xxx=output power. For details, please refer to Datasheet&Certificate.

1.1 INSTALLATION SAFETY

Solar N Plus modules can be mounted horizontally or vertically. Horizontal mounting minimizes shading of the solar cells by dust. Please note that when the customer selects the horizontal mode, framed modules other than Type 5/ Type 9/ Type 13 are recommended to be mounted in the long side frame of the vertical racking and are not recommended to be mounted in the horizontal racking. Type 5/ Type 9/ Type 13 framed modules can be mounted either in the long side frame or in the short side frame. However, when the customer selects landscape mode, it is not recommended that the Type 5/ Type 9/ Type 13 Framed Module be mounted in a long side frame that is shared with the same horizontal bracket.

Always wear dry insulation protection equipment: insulated tools, head gear, insulated gloves, safety belt and safety shoes (with rubber soles).

Do NOT wear metallic jewelry which can cause electric shock during installation.

Do NOT install modules under rainy, snowy or windy conditions.

Please keep the connector dry and clean during installation to avoid the risk of electric shock. It is recommended to install it immediately after unpacking.

Due to the risk of electrical shock, do NOT perform any work if the terminals of PV module are wet. Please install immediately after you unpacking.

The application level of Solar N Plus module is Class A, which can be used in systems operating at greater than 50 V DC or 240 W, where general public contact access is anticipated.

Keep the PV module packed in the Solar N Plus carton until installation.

Please use an opaque material to completely cover the PV module surface during PV module installation and wiring.

Do NOT unplug the connector if the system circuit is connected to a load.

Do NOT stand on the module glass while installing. There is a risk of injury or electric shock if glass is broken.

Do NOT work alone (always work as a team of 2 or more people).

Do NOT damage the back sheet of PV modules when fastening the PV modules to a support with bolts.

Do NOT damage the surrounding PV modules or mounting structure when replacing a PV module.

Cables shall be located and secured so that they will not be exposed to direct sunlight after installation to prevent degradation of cables. Low drooping of cables from the terminal box must be avoided. Low hanging cables could cause various problems such as animal biting, electricity leakage in water, and fire.

Modules with different color codes are not recommended to be installed in one block or the same rooftop

1.2 INSTALLATION METHOD

1.2.1 MECHANICAL INSTALLATION AND WARNING

The connection of the module to the racking system can be created through the mounting holes, with clamps, or an embedded system on the frame. The modules must be installed according to the following examples and recommendations. If a different installation method is desired, please contact Solar N Plus customer service or technical support team for consultation. Improperly mounted modules may be damaged. If alternative mounting method is used and not approved by Solar N Plus, the modules will not continue to have a valid warranty.

The minimum distance between two modules is 10mm (0.4in).

Modules must not be subjected to wind or snow loads exceeding the maximum permissible loads, and must not be subjected to excessive forces due to the thermal expansion of the support structures.

The module frame drain holes cannot be blocked in any situation during installation or use.

* Notes

The design loading of modules have been evaluated by TUV according to IEC61215 with 1.5 times safety factor; The mechanical load bearing is dependent upon the mounting methods used and failure to follow the instructions of this manual may result in different capabilities to withstand snow and wind loads; The system installer must ensure that the installation methods used meet these requirements and any local codes and regulations.

The modules depicted are mounted on continuous rails that extend beneath the modules. If modules are mounted without continuous rails below them, the maximum allowable loading will be reduced and is subject to review by Solar N Plus.

A.Mounting with Bolts(4- ϕ 9*14mm mounting holes)

Modules can be attached using the mounting holes on the back of the module frame, by fixing the module to the support rails with bolts. The mounting details are shown in the following figures.

The frame of each module has 4- ϕ 9*14mm mounting holes, ideally placed to optimize the load handling capability, to secure the modules to the supporting structure. Installation holes of 4-9*14 mm are used for routine installation, as shown in Figure 1:

To maximize mounting longevity, Solar N Plus strongly recommends the use of corrosion proof (stainless steel) attachment hardware.

Secure the module in each mounting location with an M8 bolt and a flat washer, spring washer and nut and tighten to a torque of 16~20 N.m(140-180lbf.in).

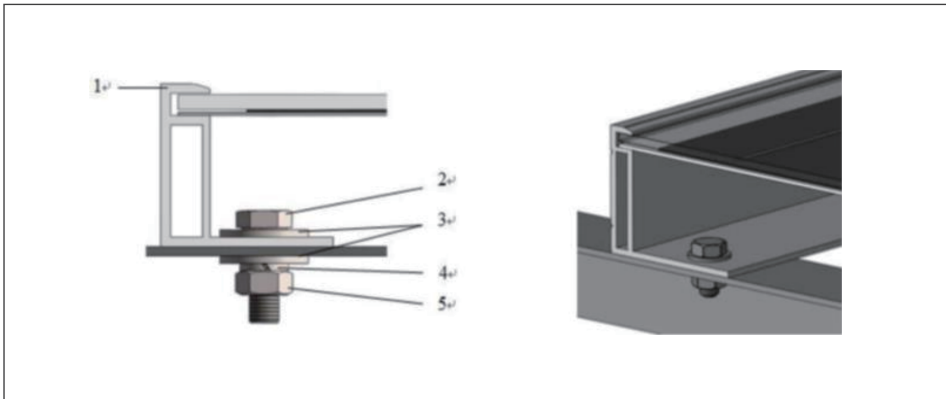


Fig.1 Backsheet-Glass/Dual-Glass module

- 1) Aluminum Frame
- 2) M8 Stainless Bolt
- 3) Flat Stainless Washer
- 4) Spring Stainless Washer
- 5) HEX Stainless Nut

Module	Mechanical Load Pressure	Safety factor	Mounting Direction
Type5 Type9 Type13	+3600 Pa /-1600Pa	1.5	
Type1 Type8 Type2 Type10 Type3 Type11 Type4 Type12 Type6 Type14 Type7 Type15	+3600 Pa /-1600Pa	1.5	

B. Mounting with Single-axis Tracking System(4- $\phi 7*10$ mm mounting holes).

Modules can be attached using the mounting holes on the back of the module frame, by fixing the module to the support rails with bolts. The mounting details are shown in the following figures.

The frame of each module has 4- $\phi 7*10$ mm mounting holes, ideally placed to optimize the load handling capability, to secure the modules to supporting structure. 4 installation holes of 7*10 mm are used for Single-axis tracking system installation, as shown in Figure 2.

To maximize mounting longevity, Solar N Plus strongly recommends the use of corrosion proof (stainless steel) attachment hardware.

Secure the module in each mounting location with an M6 bolt and a flat washer, spring washer and nut and tighten to a torque of 16~20 N.m(140-180lb.in.).

Flat stainless steel gaskets with a minimum thickness of 1.5mm and an external diameter of 16-20mm (0.63-0.79 inches) shall be used in all parts of the components connected to the Single-axis tracking system.

Mechanical Load Pressure under this method: 30 lbs.ft² max from the front side & 30 lbs.ft² max from the rear according to UL1703

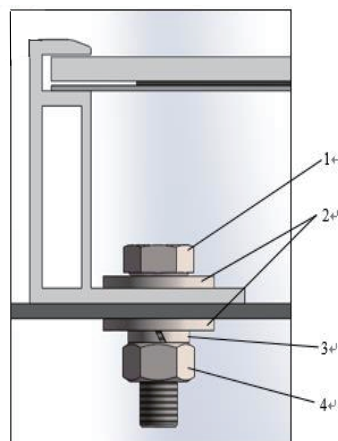
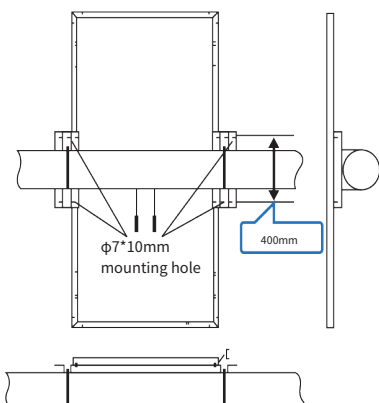
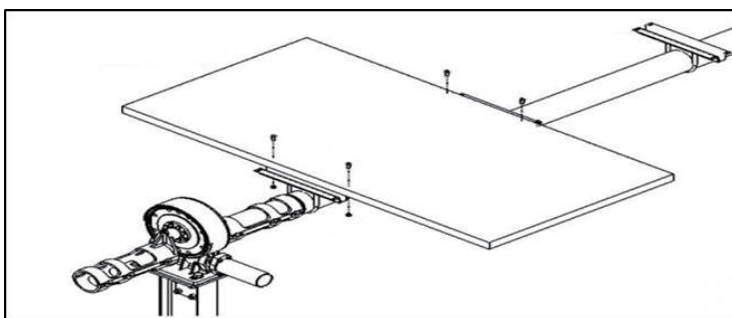
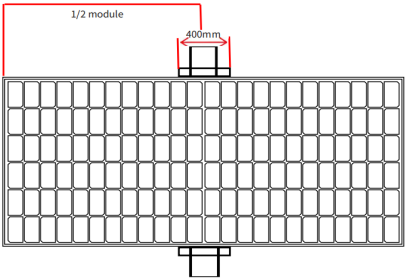


Fig 2. Backsheet-Glass/ Dual-Glass module with Single-axis Tracing System

- 1) M6 hex bolt M6
- 2) flat stainless washer
- 3) spring stainless washer
- 4) hex stainless nut

Module	Mechanical Load Pressure	Safety factor	Mounting Direction
Type1 Type8 Type2 Type10 Type3 Type11 Type4 Type12 Type6 Type14 Type7 Type15	+1600 Pa /-1600 Pa	1.5	

C. Mounting with Clamps

Solar N Plus has tested its modules with a number of clamps from different manufacturers, mounting bolt of at least M8.

The length of clamp ≥50mm (1.57in).

The clamp must overlap the module frame by at least 7mm (0.28in) but no more than 10mm (0.39in).

Use at minimum 4 clamps to attach modules to the mounting rails.

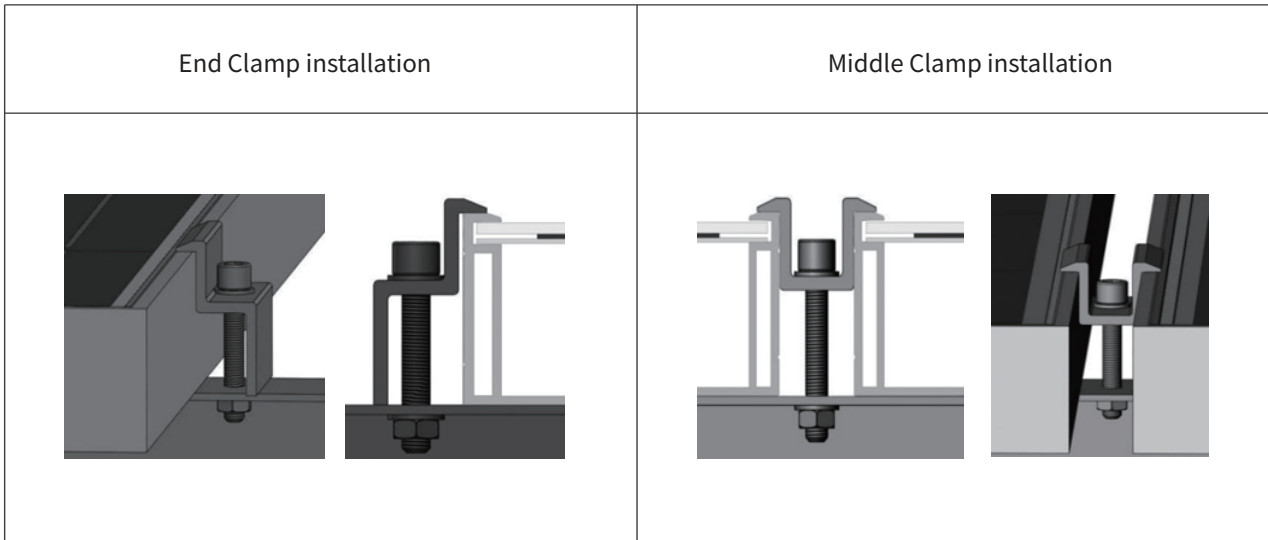
Modules clamps should not come into contact with the front glass and must not deform the frame.

Be sure to avoid shadowing effects from the module clamps.

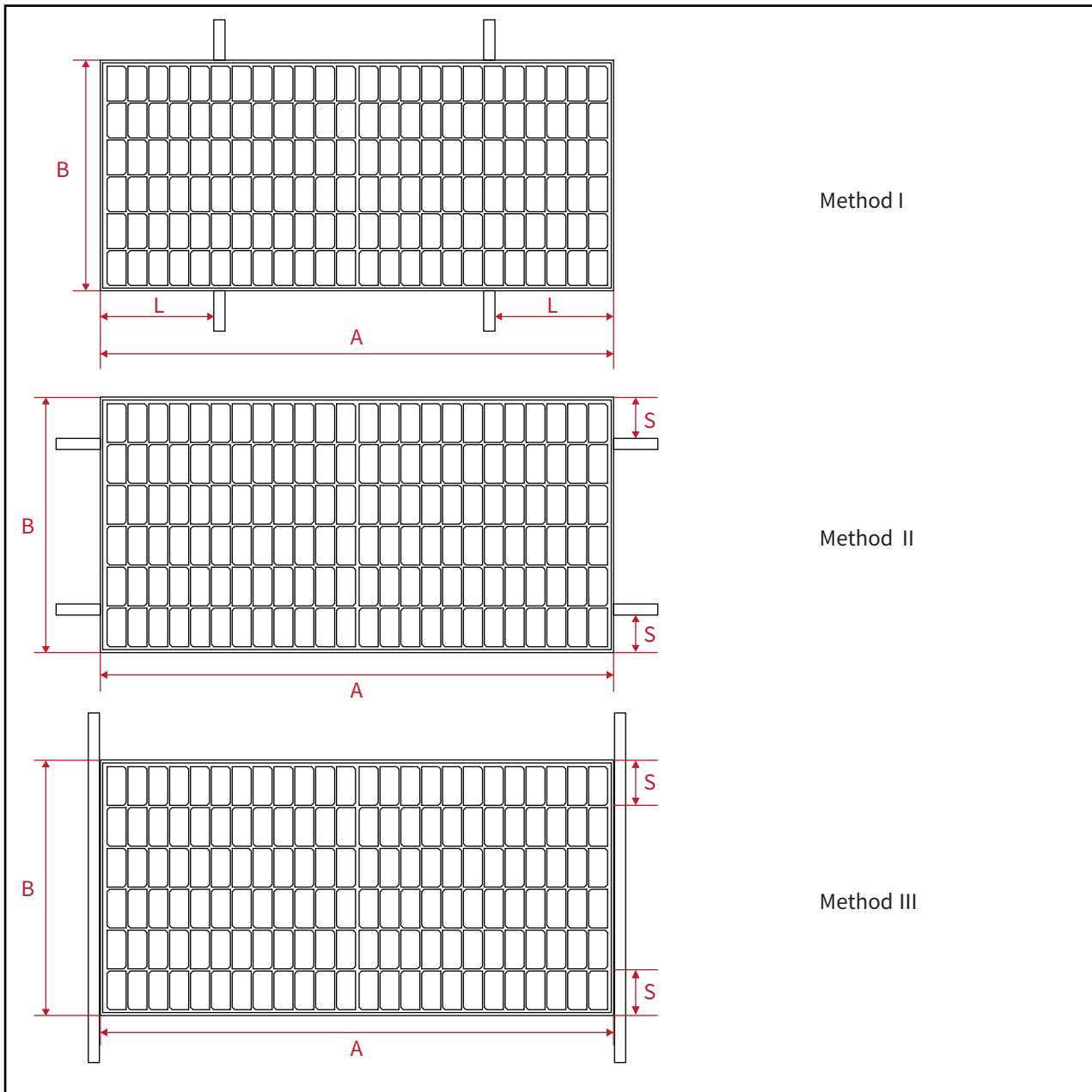
The module frame is not to be modified under any circumstances.

When choosing this type of clamp-mounting method, use at least four clamps on each module, two clamps should be attached on each long sides of the module (for portrait orientation) or each short sides of the module (for landscape orientation). Depending on local wind and snow loads, additional clamps may be required to ensure that modules can bear the load.

Applied torque should refer to mechanical design standard according to the bolt customer is using, ex: M8 16-20N.m(140-180lbf.in).



2.3.2.1 Different methods of clamp installation



Mechanical loads for different clamp installation			
Type	Module	Clamp installation on long side (+ 5400Pa/- 2400Pa) L in Method I	Clamp installation on short side (±1600Pa) S in Method II/ III
Type-1	SP-N16/156HG-xxxW	A/5~A/4	/
Type-2	SP-N16/144HG-xxxW	A/5~A/4 (A/4±50mm)	/
Type-3	SP-N16/132HG-xxxW	A/4±50mm	/
Type-4	SP-N16/120HG-xxxW	A/4±50mm	130~240mm
Type-5	SP-N16/108HG-xxxW	A/5±50mm	100~240mm
Type-6	SP-N16A/144HG-xxxW	A/5~A/4 (A/4±50mm)	/
Type-7	SP-N16A/132HG-xxxW	A/4±50mm	/
Type-8	SP-N16A/120HG-xxxW	A/4±50mm	130~240mm
Type-9	SP-N16A/108HG-xxxW	A/5±50mm	100~240mm
Type-10	SP-N16B/132HG-xxxW	A/5±50mm	/
Type-11	SP-N16B/120HG-xxxW	A/4±50mm	130~240mm
Type-12	SP-N16B/108HG-xxxW	A/5±50mm	100~240mm
Type-13	SP-N16B/96HG-xxxW	A/5±50mm	/
Type-14	SP-N18/132HG-xxxW	A/4±50mm	/
Type-15	SP-N18/120HG-xxxW	A/4±50mm	/

Note: A is the length of the long side of the module, B is the length of the short side, xxx=output power. For details, please refer to Datasheet&Certificate.

1.2.2 GROUNDING

All module frames and mounting racks must be properly grounded in accordance with appropriate respective National Electrical Code.

Proper grounding is achieved by bonding the module frame(s) and all metallic structural members together continuously using a suitable grounding conductor. The grounding conductor or strap may be copper, copper alloy, or any 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.

Solar N Plus modules can be installed with the use of third party listed grounding devices for grounding the metallic frames of PV modules.

The devices have to be installed in accordance with the grounding device manufacturer's specified instructions.

1.2.2.1 SITE SELECTION AND ANGLE

INSTALLATION ENVIRONMENT SELECTION

Solar N Plus recommends that the module should be installed in a working environment with an ambient temperature of -20 to 50 , but not exceed the temperature limit of -40 to 85 .

The modules shall be installed in shadow-free areas throughout the year. Do not install the PV modules at a place where water damage may occur. When installing solar modules on the rooftop, a safe working area must be left between the roof edge and the outer edge of the PV array.

When stacking module on the rooftop, the rooftop should be tested for such loading and the installation plan must be developed in accordance with the specification requirements.

When using the modules in areas with high wind load and snow load, the supporting structure design should be carried out in strict accordance with the local design specifications, to ensure that the external load does not exceed the mechanical strength limit that the modules can withstand. Salt spray corrosion tests conducted in accordance with IEC 61701 have shown that Solar N Plus's PV modules can be installed near offshore or in the corrosive environment.

However, the modules shall not be immersed in water or in a permanently wet environment (e.g., fountains, spindrift, etc.). There is a risk of corrosion if the module is placed in a salt spray (i.e., a marine environment) or in an environment containing sulfur (e.g., volcanoes, etc.).

In the place, 50~500 m away from the sea, stainless steel or aluminum materials need to be used in where contacting PV modules, and the installation position must be processed with anti-corrosion treatment. For detailed installation requirements.

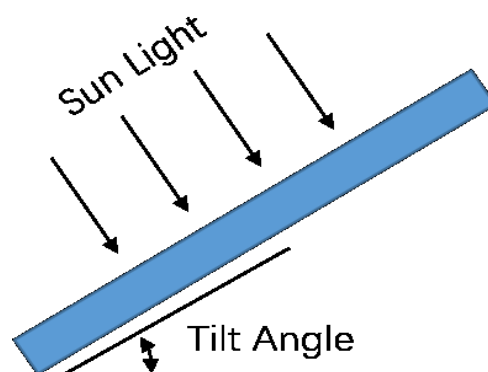
INCLINATION SELECTION

The tilt angle of the PV module refers to the angle between the module and the horizontal ground.

The tilt angle shall be selected according to the local conditions for different projects. Solar N Plus recommends that the mounting tilt angle should not be less than 10°. For specific tilt angles, it shall be chosen in accordance with the local design procedures, specifications and regulations, or following the recommendations of the experienced PV module installers.

The PV modules is highly recommended facing south in the northern hemisphere and north in the southern hemisphere to get the best performance.

Following the local regulations, if PV modules are installed in North America and any other country or region comply to UL standard. A minimum of 155 mm (6.10 inch, recommended value) clearance shall be left between the PV module (backside) and the wall or roof surface. If other installation methods are used, the PV module's UL certification or fire class rating may get affected.



Solar N Plus modules can be installed with the use of third party listed grounding devices for grounding the metallic frames of PV modules.

The devices have to be installed in accordance with the grounding device manufacturer’s specified instructions.

Please refer to the “Product Catalogue” link for detailed grounding hole locations and size at www.solarnplus.com
Solar N Plus recommends using the following methods to ground modules properly:

Method 1: Grounding bolt # 2058729-1:

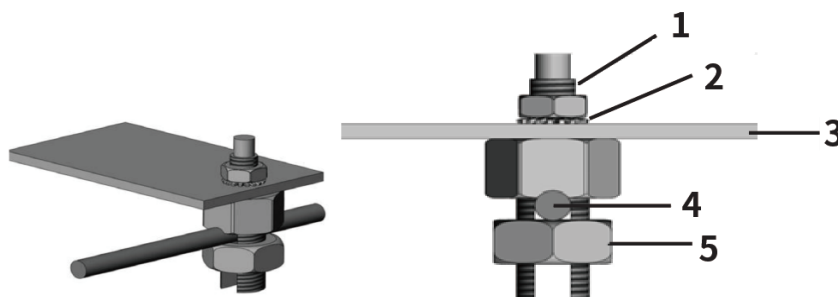


Figure 4. Grounding bolt # 2058729-1

- 1) Wire bolt and slot
- 2) Mounting wash hex nut
- 3) Aluminum frame
- 4) 4 to 16 mm² cable
- 5) Hex Nut

Grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut.

Electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting hex nut (come with the star washer) to the proper torque of 5N.m(44 lbf.in).

Grounding wire size (6 to 12 AWG solid bare copper) should be selected and installed underneath the wire binding bolt.

The wire binding bolt should be tightened to the proper torque of 6N.m(53 lbf.in)

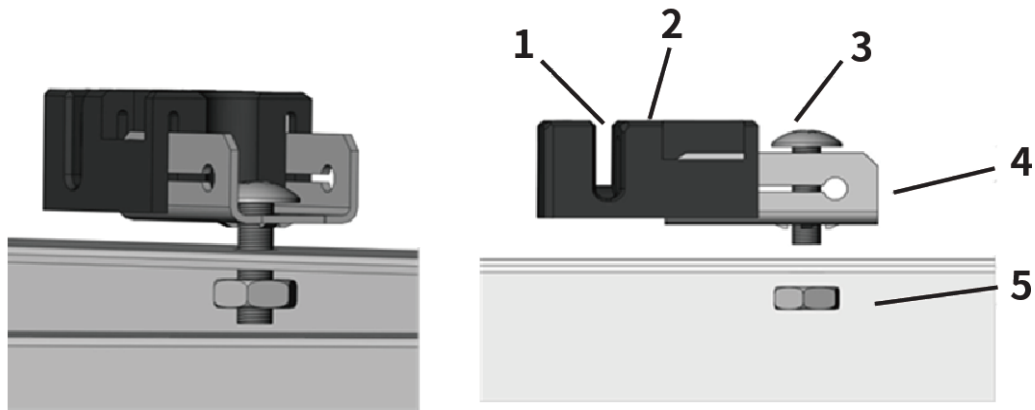
Method 2: Grounding bolt #1954381-2:

Figure 5. Grounding bolt # 1954381-2

- 1) Wire slot (available for 4 to 16 mm² cable)
- 2) Slider
- 3) Bolt
- 4) Base
- 5) Nut

Grounding hardware comes in a package that includes the grounding bolt, mounting and grounding hex nut.

Electrical contact is made by penetrating the anodized coating of the aluminum frame, and tightening the mounting hex nut (come with the star washer) to the proper torque of 3N.m(27 lbf.in).

Grounding wire size (6 to 12 AWG solid bare copper) should be selected and installed underneath the wire binding bolt.

The wire binding bolt should be tightened to the proper torque of 6N.m(53 lbf.in).

The Tyco grounding bolt is only listed for use with 6 to 12 AWG bare solid copper wire.

Method 3: Grounding bolt # EL6CS14-6

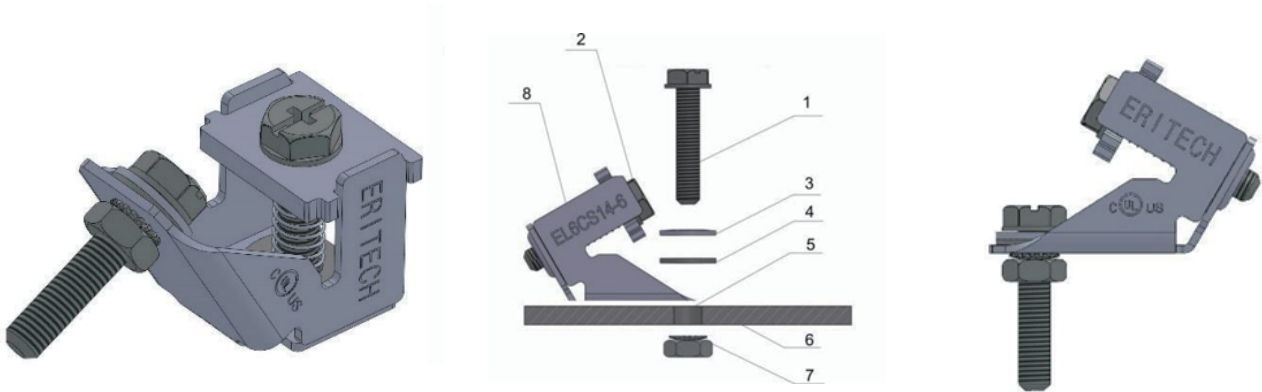


Figure 6. Grounding bolt # EL6CS14-6

- | | | |
|-------------------|--|----------------------|
| 1) Machine Bolt A | 2) Machine Bolt B | 3) Belleville washer |
| 4) Flat Washer | 5) Clearance hole for #10[M5] machine bolt | |
| 6) Aluminum frame | 7) Machine box hex nut with lock washer | |
| 8) Grounding bolt | | |

The lug should be installed on a surface that is larger than the bottom surface of the lug.

The lug should be installed in the grounding holes provided on the PV module.

Machine bolt A should be torqued to 5N.m(44 lbf.in), to secure the grounding bolt to module frame.

The grounding bolt is only listed for use with 6-12 AWG bare solid copper wire.

For proper wire binding, machine bolt B should be torqued to 5N.m(44 lbf.in).

1.2.3 ELECTRICAL INSTALLATION

All wiring should be performed, by qualified installers, in accordance with the local codes and regulations.

Modules can be connected in series to increase the operating voltage by plugging the positive plug of one module into the negative socket of the next. Before connecting modules always ensure that the contacts are corrosion free, clean and dry.

Product can be irreparably damaged if an array string is connected in reverse polarity to another. Always verify the voltage and polarity of each individual string before making a parallel connection. If you measure a reversed polarity or a difference of more than 10V between strings then check the string configuration before making the connection.

Solar N Plus modules are provided with stranded copper cables with a cross sectional area of 4mm²(0.006in²) which are UV resistant. All other cables used to connect the DC system should have a similar (or better) specification. Solar N Plus recommends that all cables are run in appropriate conduits and sited away from areas prone to water collection.

The maximum voltage of the system must be less than the maximum certified voltage and the maximum input voltage of the inverter and of the other electrical devices installed in the system. To ensure that this is the case, the open circuit voltage of the array string needs to be calculated at the lowest expected ambient temperature for the location. This can be done using the following formula.

$$\text{Max System voltage} \geq N * \text{Voc} * [1 + \text{TCvoc} * (\text{Tmin}-25)]$$

Where

- N Number of modules in series
- Voc Open circuit voltage of each module (refer to product label or data sheet)
- TCvoc Thermal coefficient of open circuit voltage for the module (refer to data sheet)
- Tmin The lowest expected ambient temperature

Each module has two standards 90°C sunlight resistant output cables each terminated with plug & play connectors. The PV Wire cables are 12AWG in size. This cable is suitable for applications where wiring is exposed to the direct sunlight. We require that all wiring and electrical connections comply with the appropriate National Electrical Code.

The minimum and maximum outer diameters of the cable are 5 to 7mm (0.038 to 0.076in²).

For field connections, use at least 4mm² copper wires insulated for a minimum of 90°C and sunlight resistance with insulation designated as PV Wire.

The minimum bending radius cables should be 43mm (1.69in).

Do not bend the cables less than 43 mm (1.69 inch) radius. PV cables will be damaged if bending radius less than 43 mm.



Figure 5. The correct routing and minimum bending radius of cables.

1.2.3.1 WIRING

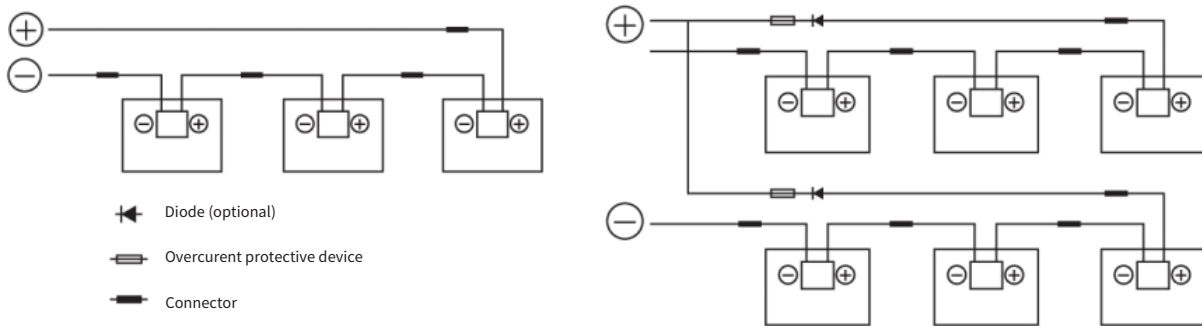
To ensure proper system operation the correct cable connection polarity should be observed when connecting the modules to each other or to a load, such as inverter. If modules were not connected correctly, the bypass diode could be destroyed. PV modules can be wired in series to increase voltage. A series connection is made when the wire from the positive terminal of one module is connected to the negative terminal of the next module. Figure 1 shows modules connected in series. PV modules can be connected in parallel to increase current. A parallel connection is made when the wire from the positive terminal of one module is connected to the positive terminal on the next module.

The number of modules in series and in parallel shall be designed reasonably according to the system configuration. All instructions above have to be obeyed to maintain Solar N Plus limited warranty.

When conducting electrical connection of the modules, please use diagonal pliers to cut the cable tie. When cutting the tie, be careful not to scratch the cable and backsheet. According to the electrical requirements. The positive and negative connectors should be connected in turn, and confirm that you hear a "click" to indicate that the connection is successful. Otherwise, during the operation of the modules, this could lead to electric arc due to poor connections and can burn the connectors.

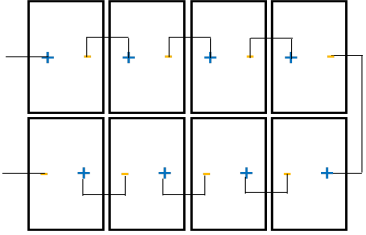
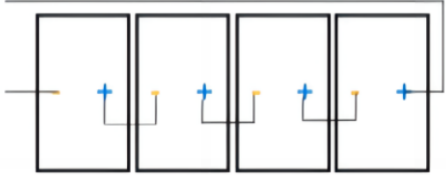
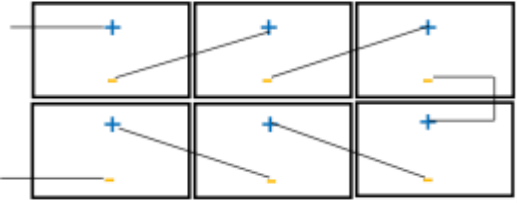


All the above instructions must be followed to meet Solar N Plus's warranty conditions.



Series and parallel connection circuit diagram.

Solar N Plus recommends the following two wiring methods for portrait and landscape installations with short and long cable lengths, respectively. For specific standard cable lengths, please refer to the datasheets of the products.

Recommended Wiring Methods	Graphical View
<p>Portrait installation: Standard short cable length</p>	 <p>C-type Wiring Note: One end of the single row needs to be extended</p>
<p>Portrait installation: Standard short cable length</p>	 <p>Linear Wiring Note: One end of the single row needs to be extended</p>
<p>Landscape installation: Standard long cable length or customized length</p>	

1.2.3.2 FUSING

When fuses are fitted they should be rated for the maximum DC voltage and connected in each, non-grounded pole of the array (i.e. if the system is not grounded then fuses should be connected in both the positive and negative poles).

The maximum rating of a fuse connected in series with an array string is typically 20A but the actual module specific rating can be found on the product label and in the product datasheet.

This fuse rating value also corresponds to the maximum reverse current that a module can withstand (when one string is shaded then the other parallel strings of modules will be loaded by the shaded string and current will flow) and therefore impacts the number of strings in parallel.

Do NOT share a fuse in a Combiner Box with two or more strings in parallel connection.

2. INVERTER SELECTION AND COMPATIBILITY

When installed in systems governed by IEC regulations, Solar N Plus modules normally do not need to be electronically connected to earth and therefore can be operated together with either galvanically isolated (with transformer) or transformerless inverters.

Choose inverters with isolation transformers in hot and wet areas (such as shores, wetlands), to ensure proper module function under positive voltage.

3. MAINTENANCE FOR PV MODULE

3.1 MODULE VISUAL INSPECTION AND REPLACEMENT

The modules in a PV array should be regularly checked for damage. Factors such as glass breakage, cable breakage, and junction box damage may lead to function and safety problems. In the case of a damaged module, replace it with the same type of module. Refer to the appropriate Product Installation Manual for installation and dis-assembly of module.

It is recommended to perform a preventive inspection every six months without changing the components of the module. If electrical or mechanical appliances are used for inspection or maintenance, they should be operated by qualified professionals to avoid any electric shock or loss of life

Replacement modules must be of same type. Do NOT touch live parts of cables and connectors. Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules.

Cover the front surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate high voltage and are dangerous.

Solar N Plus PV modules are equipped with bypass diodes in the junction box. This minimizes module heating and current losses.

Do NOT open the junction box to change the diodes even if they malfunction.

In a system using a cell, blocking diodes are typically placed between the cell and the PV module output to prevent cell discharge at night.

In the event that a module is damaged (broken glass or a scratch on back sheet) and needs to be replaced.

Observe the safety precautions listed earlier in this Manual.

Wear cut resistant gloves and other personal protective equipment required for the particular installation.

Isolate the impacted array string to prevent current flow before attempting to remove the module.

Disconnect the connectors of the affected module using the related disconnect tool provided by suppliers.

Replace the damaged module with a new functional module of the same type.

Check the open circuit voltage of the array string and verify that this is within 10V of the other strings to be connected in parallel.

3.2 CONNECTOR AND CABLE INSPECTION

Inspect all cables to verify that connections are tight; the cables are protected from direct sunlight and sited away from areas of water collection.

It is recommended to check the torque of terminal bolts and the general condition of wiring at least once a year. Also, check that mounting hardware is properly torqued. Loose connections will result in damage to the array.

3.3 CLEANING

The amount of electricity generated by a solar module is proportional to the amount of light falling on it. A module with shaded cells will produce less energy and therefore it is important to keep all PV modules clean.

Clean PV modules when the irradiance is below 200W/m²; liquid with a large temperature difference from the modules must not be used for cleaning the modules.

It is forbidden to clean PV modules under the weather conditions of wind more than 4 grades, heavy rain or heavy snow.

When cleaning with pressurized water, the water pressure on the glass surface of the module must not exceed 700 KPa (14619.80psf); the module must Not bear the extra force.

When cleaning PV modules, do NOT step on the modules; do NOT spray water on the backside of the module or the cables; keep the connectors clean and dry; prevent fire and electrical shock from occurring; do NOT use steam cleaner.

The back surface of the module normally does not need to be cleaned but, in the event this is deemed necessary, avoid the use of any sharp projects that might damage the penetrating the substrate material.

Periodically trim any vegetation which may shade the solar array thus impacting performance.

If there is greasy dirt or other substances which are difficult to clean, conventional household glass cleaning agents can be used. Pay attention not to use alkaline and strong acidic solvents, including hydrofluoric acid, alkali, acetone.

3.3.1 MODULE INSPECTION AFTER CLEANING

Ensure that the module under visual inspection is clean, bright and free of stains.

Spot check to verify whether there is soot deposit on the module surface.

Check to see there are no visible scratches on the surface of the module.

Check to see there are no man-made cracks are on the module surface.

Check to see whether the module support structure is leaning or bent after cleaning.

Check to see whether the wiring terminals of the module are detached.

After cleaning PV modules, fill out the PV module cleaning record.

3.3.2 TROUBLESHOOTING

If your installation does not work properly, please inform your installer immediately. It is recommended to perform a preventive inspection every six months without changing the components of the modules. If electrical or mechanical appliances are used for inspection or maintenance, they should be operated by qualified professionals to avoid any electric shock or loss of life.

4. REPORTING TECHNICAL ISSUES or CLAIMS

Contact your installer.

Contact Solar N Plus after sales service team at www.solarnplus.com

Submit the Customer Feedback form at: www.solarnplus.com and one of our technical service representatives will contact you within 5 business days.

For module specifications or datasheets, please download from: www.solarnplus.com

MODEL RANGE

The installation manual applicable module types are as follows. PV module Protection Class II and Safety Class II.

Model Type	Dimension (L*W*H mm)	Pmpp (W)	Vmpp (V)	Imp (A)	Voc (V)	Isc (A)
SP-N16/156HG-xxxW	2465*1134*30	625	48.76	12.82	56.85	13.55
		630	48.96	12.87	57.05	13.60
		635	49.16	12.92	57.25	13.65
		640	49.36	12.97	57.45	13.70
SP-N16/144HG-xxxW	2278*1134*30	550	43.95	12.52	51.40	13.27
		555	44.15	12.57	51.60	13.32
		560	44.35	12.63	51.80	13.37
		565	44.55	12.68	52.00	13.42
		570	44.75	12.74	52.20	13.47
		575	44.95	12.79	52.40	13.52
		580	45.15	12.85	52.60	13.57
		585	45.35	12.90	52.80	13.62
		590	45.55	12.96	53.00	13.67
		595	45.75	13.01	53.20	13.72
SP-N16B/96HG-xxxW	1762*1134*30	435	29.00	15.00	35.05	15.83
		440	29.20	15.07	35.25	15.90
		445	29.40	15.14	35.45	15.96
		450	29.60	15.20	35.65	16.02
SP-N16/108HG-xxxW	1722*1134*30	415	33.10	12.54	38.65	13.41
		420	33.30	12.61	38.85	13.46
		425	33.50	12.69	39.05	13.51
		430	33.70	12.76	39.25	13.56
		435	33.90	12.83	39.45	13.61
		440	34.10	12.91	39.65	13.66
		445	34.30	12.98	39.85	13.71

Note: PV module Protection Class II; PV module safety class II; xxx=output power.