



Solar PV Module Installation Manual **2024**

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1 General Information

1.1. Overview

Thanks for choosing Solarever Solar PV modules. In order to ensure the PV modules are installed correctly, please read the following installation instructions carefully before modules are installed and used. Please remember that these products generate electricity and certain safety measures need to be taken to avoid danger. Make sure the module array is designed in such a way not to exceed the maximum system voltage of any system component such as connectors or inverters.

This module has a Class C Fire Rating (Canada) or Module Fire performance type 1 (United States of America) and must be installed over a roof which has appropriate fire resistance. Before mounting the module, please consult your local building department to determine approved roofing materials. The modules are qualified for application class A: Hazardous voltage (IEC 61730: higher than 50V DC; EN 61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated. Modules qualified for safety through EN IEC 61730 -1 and - 2 and UL61730 within this application class are considered to meet the requirements for Safety Class II.

1.2 Applicable Products

This document is applicable to the series of solar modules as listed below:

SE-182*91-xxxM-156 (xxx=580-605, in steps of 5, 156 cells)
SE-182*91-xxxM-144 (xxx=535-560, in steps of 5, 144cells)
SE-182*91-xxxM-120 (xxx=440-465, in steps of 5, 120cells)
SE-182*91-xxxM-108 (xxx=395-420, in steps of 5, 108cells)
SE-166*83-xxxM-144N (xxx=425-460, in steps of 5, 144 cells)
SE-166*83-xxxM-120N (xxx=350-380, in steps of 5, 120 cells)
SE-158*79-xxxM-144N (xxx=390-410, in steps of 5, 144 cells)
SE-158*79-xxxM-120N (xxx=315-335, in steps of 5, 120 cells)
SE-158*79-xxxM-144 (xxx=390-410, in steps of 5, 144 cells)
SE-158*79-xxxM-120 (xxx=315-335, in steps of 5, 120 cells)
SE-158*158-xxxM-72 (xxx=380-400, in steps of 5, 72 cells)
SE-158*158-xxxM-60 (xxx=305-325, in steps of 5, 60 cells)
SE-182*105-xxxM-96-BD (xxx=430-450, 96 cells)
SE-182*91-xxxM-144-BH (xxx=550 - 560, 144 cells)
SE-182*91-xxxM-120-BH (xxx=450-460, 120 cells)

1.3. Warnings

PV modules generate DC electrical energy when exposed to sunlight or other light sources. Active parts of module such as terminals can result in burns, sparks, and lethal shock.

- Artificially concentrated sunlight shall not be directed on the module or panel.
- Front protective glass is utilized on the module. Broken solar module glass is an electrical safety hazard (may cause electric shock or fire). These modules cannot be repaired and should be replaced immediately.
- To reduce the risk of electrical shocks or burns, modules may be covered with an opaque material during installation to avoid injury.
- The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- The module is considered to be in compliance with UL61730 only when the module is mounted in the manner specified by the mounting instructions below.
- The installation work of the PV array can only be done under the protection of sunsheltering covers or sunshades and only qualified person can install or perform maintenance work on this module.
- Follow the battery manufacture's recommendations if batteries are used with modules.
- Do not use this module to replace or partly replace roofs and walls of living buildings.
- Do not install modules where flammable gas may be present.
- Do not touch live terminals with bare hands. Use insulated tools for electrical connections.
- Do not remove any part installed by Solarever or disassemble the module.
- All instructions should be read and understood before attempting to install, wire, operate and maintain the module.
- Don't lift up PV modules using the attached cables or the junction box.
- All PV systems must be grounded to earth. If there is no special regulation, please follow the National Electrical Code or other national code.
- Common hardware items such as nuts, bolts, star washers, lock washers and the like have not been evaluated for electrical conductivity or for use as grounding devices should be used only for maintaining mechanical connections and holding electrical grounding devices in the proper position for electrical conductivity. Such devices, where supplied with the module and evaluated through the requirements in UL 61730, may be used for grounding connections in accordance with the instructions provided with the module.

- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. The requirements of the National Electrical Code (NEC) in Article 690 shall be followed to address these increased outputs. In installations, not under the requirements of the NEC, the value of Isc and Voc marked on the module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, overcurrent device ratings, and size of controls connected to the PV output.
- Once the PV module has been shipped to the installation site, all of the parts should be unpacked properly with care.
- Do not stand or step on the PV module like below pictures show. This is prohibited and there is a risk of damage to the module and cause injury for you.
- Only PV modules with the same cell size should be connected in series.
- During transporting modules, please attempt to minimize shock or vibration to the module, as this may damage the module or lead to cell micro cracks.
- During all transportation situations, never drop the module from a vehicle, house or hands. This will damage module.
- Do not clean the glass with chemicals. Only use tap water. Make sure the module surface temperature is cool to the touch. Cleaning modules with cool water when module surface temp is high may result in glass breakage.
- Do not disconnect any of the modules when under load.
- When looking at PV modules with anti-reflection (AR) coating technology, it will be normal to see some cells with a slight color difference at different angles.
- Do not use modules in an environment with aliphatic, aromatic, phenols, ketones, halogenated substance or mineral oil, which may corrode the junction box by chemical attack.

2. Module connection

Standard connectors are used to connect solar panel modules securely and reliably. These connectors ensure proper electrical connections while being weatherproof and durable.

Male and Female Connectors:

Male Connector: The male connector has a protruding pin.

Female Connector: The female connector has a recessed pin.

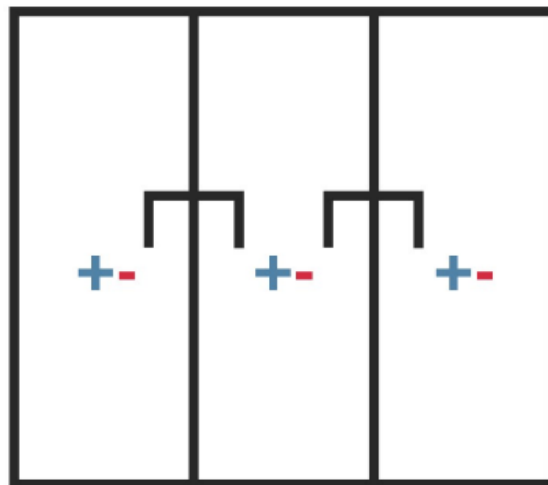
Steps to Connect the Modules

Series Connection

1. Identify Connectors:
 - Find the male and female connectors on each module.
 - Identify the positive and negative terminals.
2. Connect Modules in Series for each string:
 - Plug the positive (+) terminal of the first module into the negative (-) terminal of the second module.
 - Continue this pattern for all modules, connecting the positive terminal of one module to the negative terminal of the next.

Final Connection:

The unconnected positive terminal of the first module and the unconnected negative terminal of the last module will be used to connect to the charge controller or inverter.



3 Installation

3.1 Installation safety

- Always wear protective head gear, insulating gloves and safety shoes (with rubber soles).
- Keep the PV module packed in the carton until installation.
- Do not touch the PV module unnecessarily during installation. The glass surface and the frame may be hot. There is a risk of burns and electric shock.
- Do not work in rain, snow or windy conditions.
- Due to the risk of electrical shock, do not perform any work if the terminals of the PV module are wet.
- Use insulated tools and do not use wet tools.
- When installing PV modules, do not drop any objects (e.g., PV modules or tools).
- Make sure flammable gasses are not generated or present near the installation site.
- The modules are equipped with PV wiring connectors that comply with UL 6703, Standard for Connectors for use in Photovoltaic Systems. Connectors from other manufactures should not be mated with each other connectors.
- Insert module connectors fully and correctly. An audible "click" sound should be heard. This sounds confirms the connectors are fully seated. Check all connections.
- The module leads should be securely fastened to the module frame, Wire Management should be done in a way to avoid the connector from scratching or impacting the back sheet of the module.
- Do not touch the junction box and the end of the interconnect cables (connectors) with bare hands during installation or under sunlight, regardless if the PV module is connected to or disconnected from the system.
- Do not expose the PV module to excessive loads on the surface of the PV module or twist the frame.
- Do not hit or put excessive load on the glass or back sheet, this may break the cells or cause micro cracks.
- During the installation or operation, don't use sharp tools to wipe the back sheet and glass. Scratches can appear on the module.
- Do not drill holes in the frame. It may cause corrosion of the frame.
- When installing modules on roof mounted structures, please try to follow the "from top to bottom" and/or "from left to right" principle, and don't step on the module. This will damage the module and would be dangerous for personal safety. For roof mounted applications, the assembly is to be mounted over a fire resistant roof covering rated for the application.
- All PV systems must be grounded to earth (Refer to 3. "Wiring and connection" for specific grounded).

3.2 Installation Condition

3.2.1 Climate condition

Please install the modules in the following conditions:

- a) Operating temperature: within -40°C (-40°F) to 85°C (185°F).
- b) Humidity: $< 85\text{RH}\%$.

* Note:

The mechanical load bearing (including wind and snow loads) of the module is based on the approved mounting methods. The professional system installer must be responsible for mechanical load calculation according to the system design.

3.2.2 Site selection

In most applications, Solarever solar PV modules should be installed in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the module should typically face south, and in the Southern Hemisphere, the modules should typically face north. Modules facing 30 degrees away from true South (or North) will lose approximately 10 to 15 percent of their power output. If the module faces 60 degrees away from true South (or North), the power loss will be 20 to 30 percent. }

When choosing a site, avoid trees, buildings or obstructions, which could cast shadows on the solar photovoltaic modules especially during the winter months when the arc of the sun is lowest over the horizon. Shading causes loss of output, even though the factory fitted bypass diodes of the PV module will minimize any such loss.

Do not install the PV module near open flame or flammable materials.

When solar modules are used to charge batteries, the battery must be installed in a manner, which will protect the performance of the system and the safety of its users. Follow the battery manufacturer's guidelines concerning installation, operation and maintenance recommendations. In general, the battery (or battery bank) should be away from the main flow of people and animal traffic. Select a battery site that is protected from sunlight, rain, snow, debris, and is well ventilated. Most batteries generate hydrogen gas when charging, which can be explosive. Do not light matches or create sparks near the battery bank. When a battery is installed outdoors, it should be placed in an insulated and ventilated battery case specifically designed for the purpose.

Do not install the PV module in a location where it would be immersed in water or continually exposed to water from a sprinkler or fountain etc.

3.2.3 Tilt angle selection

The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (Figure 1). The PV module generates maximum output power when it faces the sun directly.

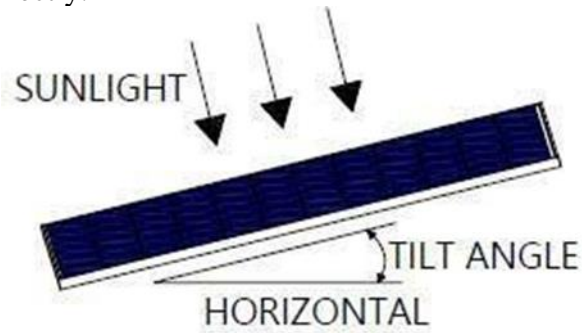


Figure1: PV module tilt angle

For standalone systems with batteries where the PV modules are attached to a permanent structure, the tilt angle of the PV modules should be selected to optimize the performance based on seasonal load and sunlight. In general, if the PV output is adequate when irradiance is low (e.g., winter), then the angle chosen should be adequate during the rest of the year. For grid-connected installations where the PV modules are attached to a permanent structure, PV modules should be tilted so that the energy production from the PV modules will be maximized on an annual basis.

Only for UL listed products. The System Fire Class Rating of the module or panel in a mounting system in combination with a roof covering should complete the requirements to achieve the specified System Fire Class Rating for a non-BIPV module or panel.

Any module or panel mounting system have limitations on inclination required to maintain a specific System Fire Class Rating.

3.3 Mechanical Installation introduction

Solar PV modules usually can be mounted by using the following methods: bolts and clamps.

* Note:

1. All installation methods herein are only for reference, and Solarever will not provide related mounting components, the system installer or trained professional personnel must be responsible for the PV system's design, installation, and mechanical load calculation and security of the system.
2. Before installation, the following items should be addressed:
 - a. Visually check the module for any damage. Clean the module if any dirt or residue remains from shipping.
 - b. Check if module serial number stickers match.
 - c. The minimum distance between modules should be more than 10mm for all installation methods.
3. Solarever modules are designed to meet a maximum positive (or downward) pressure of 3600Pa (Only refer to the mentioned module type in this manual) and negative (or upward) pressure of 1600Pa. This design load was then tested with a safety factor of 1.5 times. So SOLAREVER modules are tested under a maximum downward pressure of 5400Pa and upward pressure of 2400Pa. 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.
4. Where common grounding hardware (nuts, bolts, star washers, spilt-ring lock washers, flat washers and the like) is used to attach a listed grounding/bonding device, the attachment must be made in conformance with the grounding device manufacturer's instructions.
5. The recommended stand off height is 150 mm. If other mounting means are employed this may affect the UL Listing or the fire class ratings.

3.3.1 Mounting with bolts

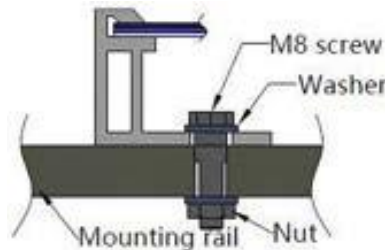
The frame of each module has 8 or 12 mounting holes used to secure the module to the support structure. The module frame must be attached to a mounting rail using M8 corrosion-proof bolts together with spring washers and flat washers in eight symmetrical locations on the PV module. The applied torque value should be big enough to fix the modules steadily. The torque value for a M8 bolt is 16~20 N*m. For special racking systems or special installation requirements, please reconfirm with the supplier for the appropriate torque value.

Please find detailed mounting information in figure 2. The installation instructions shall specify that the modules have been evaluated by UL for bolt mounting using the 8 provided mounting holes in the frame with a torque of 16~20 N*m. The following M8 stainless steel mounting hardware should be included in the installation instructions: For eight or twelve 14x9 holes , mounting hardware is shown below in Table 1.

Module	Mounting hardware configuration				Max. Pressure	
	Hardware	Material	Size (holes)			Number provided
			14x9	10x7		
All	Bolt	Stainless steel	M8	M6	8/12	5400Pa (positive) & 2400Pa (negative) mechanical load
	Spring washer	Stainless steel	M8	M6	8/12	
	Nut	Stainless steel	M8	M6	8/12	

Table 1: The mounting part for mounting holes

*Alternate Mounting Method – bolt mounting method using the 12 provided mounting holes in the frame with a torque of 16~20 N*m. The following stainless steel mounting hardware should be included in the installation instructions.



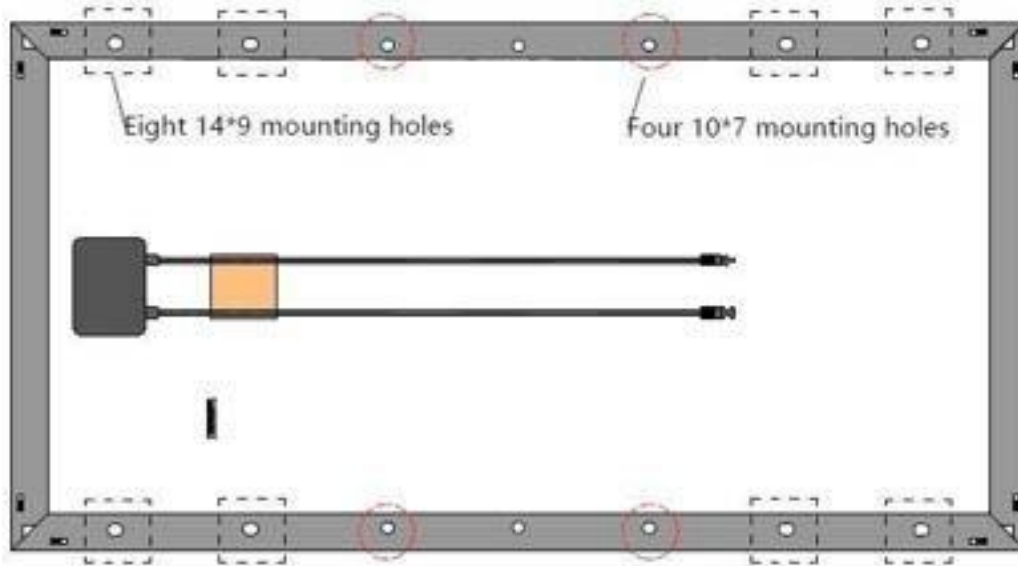


Figure 2: PV module installed with bolt fitting method

3.3.2 Mounting with clamps

The module clamps should not come into contact with the front glass and must not deform the frame. Be sure to avoid shading effects from the module clamps. The module frame is not to be modified under any circumstances. When choosing this type of mounting method, please be sure to use at least four clamps on each module, two clamps should be attached on each long side of the module. The applied torque value should be big enough to mount the modules steadily (An integrated M8 hex head cap screw tightens down to the frame with a torque between 16~20 Nm.). Please find detailed mounting information in the below illustration. The mounting zone is greater than J and less than K. Figure 3 shows how a clamp should be mounted to the module frame.

When installing modules using clamps on the long side of the frame, the applicable product types and installation locations are shown in figure 4 and table 3.

When installing modules using clamps on the short side of the frame, the applicable product types and installation locations are shown in figure 5 and table 4.

When installing modules using clamps on the long side & short side of the frame, the applicable product types and installation locations are shown in figure 6 and table 5.

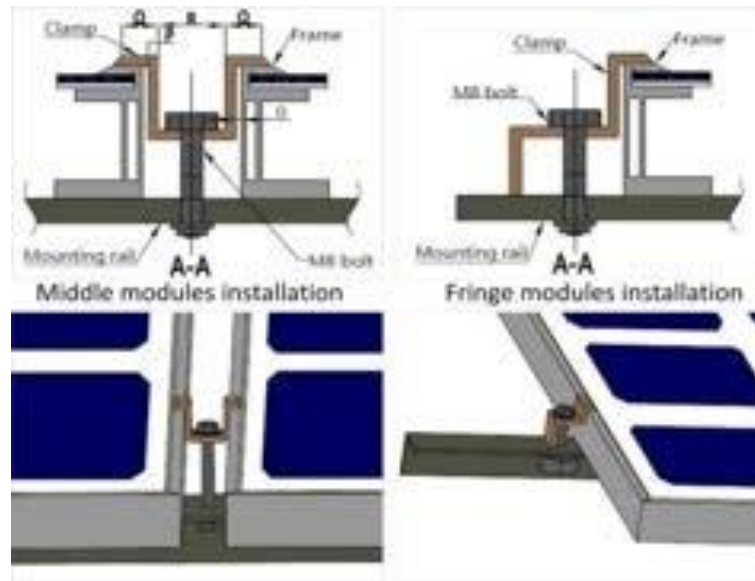


Figure 3: PV module installed with bolt fitting method

Clamp type	Dimension (mm)				Composition material
End Clamp (40mm thickness)	39x50x42				Aluminum-alloy
End Clamp (35mm thickness)	41.5x50x40				
End Clamp (30mm thickness)	41.5x50x35				
Middle Clamp(40 mm & 35 mm thickness)	42x50x28				
	Q	O	R	P	
	13.5	0.5 ~ 2	15	2.5	
Middle Clamp(30 mm thickness)	42x50x29.5				
	Q	O	R	P	
	14	0.5 ~ 2	14	3	

Table 2: Mechanical dimensions, specification and material when modules installed with mid clamps

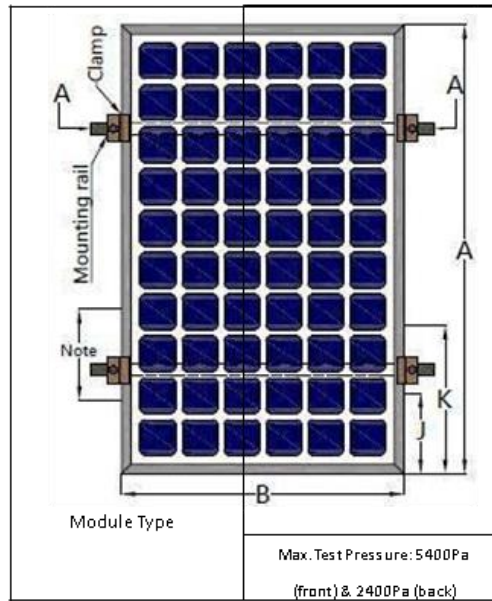


Figure 4: Installation of clamps on long side of frames

Module type	Max. Test Pressure: 5400Pa (front) & 2400Pa (back)		
	A*B	J	K
SE-158*158-xxxM-72	1981*1002	280	480
SE-158*158-xxxM-60	1663*1002	280	420
SE-158*79-xxxM-144N	1981*1002	280	480
SE-158*79-xxxM-120N	1689*1002	280	420
SE-166*83-xxxM-144N	2108*1048	490	520
SE-166*83-xxxM-120N	1768*1048	410	450
SE-158*79-xxxM-144	1981*1002	280	480
SE-158*79-xxxM-120	1689*1002	280	420
SE-182*91-xxxM-156	2486*1144	570	670
SE-182*91-xxxM-144	2300*1144	530	620
SE-182*91-xxxM-120	1928*1144	445	480
SE-182*91-xxxM-108	1742*1144	405	450
SE-182*105-xxxM-96-BD	1762 * 1134	280	440
SE-182*91-xxxM-144-BH	2278 * 1134	490	571
SE-182*91-450M-120-BH	1903 * 1134	280	476

Table 3: Mechanical dimensions of modules installed with clamps on long side of frame

Clamp Mounting on Long Sides of the Frames 6 points fixed

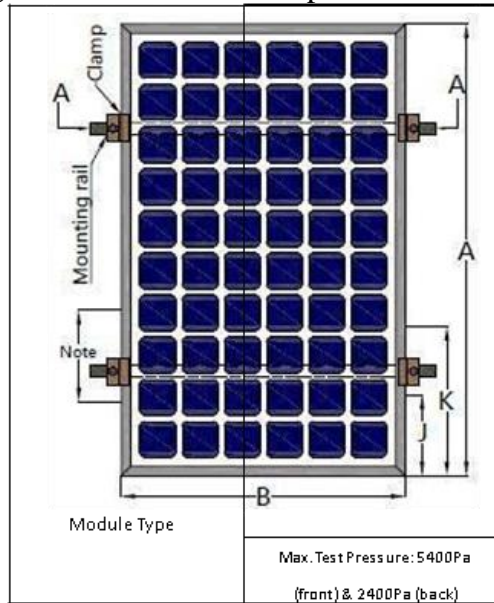


Figure 5: Installation of clamps on long side of frames

	Max. Test Pressure: 5400Pa (front) & 2400Pa (back)		
Module type	A*B	J	K
SE-182*91-xxxM-108	1742*1144	380	420

Table 4: Mechanical dimensions of modules installed with clamps on long side of the frame.

4. Wiring and connection

- a) Before this procedure, please read the operation instructions of the PV system carefully. Make wiring by Multi-connecting cables between the PV modules in series or parallel connection, which is determined by user's configuration requirement for system power, current and voltage.
- b) PV modules connected in series should have similar current, and modules must not be connected together to create a voltage higher than the permitted system voltage divided by 1.25. The maximum number of modules in series depends on system design, the type of inverter used and environmental conditions.
- c) 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. Maximum allowable number of parallel strings are 2 strings.
- d) The maximum fuse rating value in an array string can be found on the product label or in the product datasheet. The fuse rating value is also corresponding to the maximum reverse current that a module can withstand, i.e. when one string is in shade then the other parallel strings of modules will be loaded by the shaded string and the current will pass through to create a current circuit. Based on the maximum series fuse rating of module and local electrical codes and standards, make sure the modules strings in parallel are protected with the appropriate in-line string fusing.
- e) Connect the conductors from the PV arrays to the combiner box in accordance with the design and local codes and standards. The cross-sectional area and cable connector capacity must satisfy the maximum short-circuit of the PV system (for a single component, we recommended that the cross-sectional area of cables be 4mm² and the rated current of connectors be more than 10A), otherwise cables and connectors will become overheating for large current. Please pay attention to the temperature limit of cables is 85°C.
- f) Solarever modules can be grounded using bolts. Attach the equipment grounding conductor to the module frame using the hole and hardware provided. Note that a stainless steel bolt is used between the ground wire and module frame as illustrated in following figure. A washer is used to avoid corrosion due to dissimilar metals. Tighten the screw securely. It is recommended that the applied torque is 1.7~2.0 ft-lbs (2.3 to 2.8 N*m).

Module	Mounting hardware configuration			
	Hardware	Material	Size	Number provided
All	Bolt	Stainless steel	M4	2
	Spring washer	Stainless steel	M4	2
	Nut	Stainless steel	M4	2
	Star washer	Stainless steel	M4	2
	Plain washer	Stainless steel	M4	4

Table 6: The mounting part of the ground mounting hole



Figure 7: Ground installation of PV modules

- g) The module shall be wired in accordance with the NEC, and that the grounding method of the frame of arrays shall comply with the NEC, article 250.
- h) Follow the requirements of applicable local and national electrical codes.
- i) These modules contain factory installed bypass diode, the diodes type is TL3045 and the maximum rating is 30A . If these modules are incorrectly connected to each other, the bypass diodes, cable or junction box may be damaged.
- j) It is recommended that the M8 bolt be tightened to a torque of about 16 ~ 20 N*m .
- k) The cable of the junction box is defined as L/X, as showed below in Figure 7. For Solarever standard module, L is 900 or 1100 mm, X is 450 mm or 1200 mm; and for customized module, X can be based on your condition. Please take the cable length into consideration before designing the wiring layout. The connector we are using is an MC4 compatible connector , the type is TL-CABLE01S-F,and the Manufacturer is JIANGSU TONGLIN ELECTRIC CO LTD. Different type(eg. Different voltage class or different shape) of connector can not be connected together.
- l) It is recommended to use negatively grounded inverters to avoid the PID effect for non-PID free modules.
- m) The module is considered to be in compliance with this standard only when the module is either mounted in the manner specified by the mounting instructions, or when the mounting means has been evaluated with this PV module to UL 2703. A module with exposed conductive parts is considered to be in compliance with this

standard only when it is either electrically grounded in accordance with the manufacturer's instructions and the requirements of the National Electrical Code, ANSI/NFPA 70 (2014-2017), or when the bonding means has been evaluated with this PV module to UL 2703.

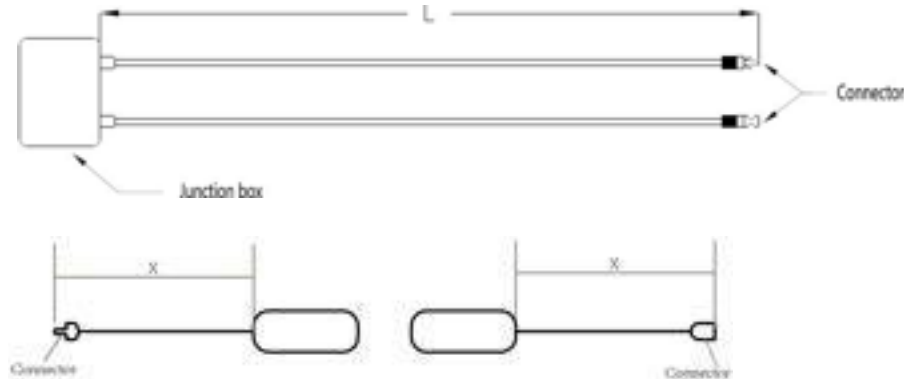


Figure 8: Junction box

5. Maintenance and care

It is required to perform regular inspection and maintenance of the modules, especially during the warranty period. To ensure optimum module performance, Solarever recommends the following maintenance measures:

5.1 Visual Inspection

Inspect the modules visually to find if there are any visual defects, If there are, the following items should be evaluated:

- a) If modules are observed having slight cell color differences at different angles, this is a normal phenomenon of modules with anti-reflection coating technology.
- b) Whether the glass is broken.
- c) No sharp objects are in contact with the PV module surfaces.
- d) PV modules are not shaded by unwanted obstacles and; or foreign material.
- e) Corrosion along the cells' bus-bar. The corrosion is caused by moisture intrusion through the module backsheet. Check the backsheet for damage.
- f) Check whether the backsheet is burn out.
- g) Check if screws and mounting brackets are tight, adjust and tighten as necessary.

5.2. Cleaning

- a) A buildup of dust or dirt on the module(s) front face will result in a decreased energy output. Clean the panel(s) preferably once per annum if possible (depend on site conditions) using a soft cloth dry or damp, as necessary. Water with high mineral content may leave deposits on the glass surface and is not recommended.

- b) Never use abrasive material under any circumstances.
- c) In order to reduce the potential for electrical and thermal shock, Solarever recommends cleaning PV modules during early morning or late afternoon hours when solar radiation is low and the modules are cooler, especially in regions with hotter temperatures.
- d) Never attempt to clean a PV module with broken glass or other signs of exposed wiring, as this presents a shock hazard.
- e) Never use chemicals when cleaning modules as this may affect the module warranty and energy output.

5.3. Inspection of Connector and Cable

It's recommended to implement the following preventive maintenance every 6 months:

- a) Check the sealing gels of the junction box for any damage.
- b) Examine the PV module(s) for signs of deterioration. Check all wiring for possible rodent damage, weathering and that all connections are tight and corrosion free. Check electrical leakage to ground.

6. Electrical specifications

MODEL	Rated maximum power at STC	Maximum system voltage (VDC)	VOC	ISC	VMP	IMP	Isc Temp Coefficient (% change / deg. K rise)	Voc Temp Coefficient (% change / deg. K rise)	Pmax Temp Coefficient (% change / deg. K rise)	Maximum series fuse (A)	Protection Class	Tolerance for Pmax, Isc, Voc
SE-158*79-390M-144N	390	1500	49.3	10.12	41.1	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-395M-144N	395	1500	49.5	10.23	41.4	9.55	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-400M-144N	400	1500	49.8	10.36	41.7	9.6	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-405M-144N	405	1500	50.1	10.48	42	9.65	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-410M-144N	410	1500	50.4	10.6	42.3	9.69	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-315M-120N	315	1500	40.7	10.04	33.2	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-320M-120N	320	1500	40.9	10.15	33.4	9.59	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-325M-120N	325	1500	41.1	10.2	33.6	9.68	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-330M-120N	330	1500	41.3	10.31	33.8	9.77	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-335M-120N	335	1500	41.5	10.36	34	9.87	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-425M-144N	425	1500	49	11.11	40.4	10.52	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-430M-144N	430	1500	49.2	11.19	40.6	10.6	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-435M-144N	435	1500	49.4	11.26	40.8	10.67	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-440M-144N	440	1500	49.6	11.33	41	10.74	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-445M-144N	445	1500	49.8	11.4	41.2	10.8	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-450M-144N	450	1500	50	11.47	41.4	10.87	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-455M-144N	455	1500	50.2	11.54	41.6	10.93	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-460M-144N	460	1500	50.4	11.61	41.8	11	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-350M-120N	350	1500	40.8	11.12	33.2	10.54	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-355M-120N	355	1500	41	11.21	33.4	10.63	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-360M-120N	360	1500	41.2	11.28	33.6	10.71	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-365M-120N	365	1500	41.4	11.36	33.8	10.8	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%

SE-166*83-365M-120N	365	1500	41.4	11.36	33.8	10.8	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-370M-120N	370	1500	41.6	11.45	34	10.88	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-375M-120N	375	1500	41.8	11.53	34.2	10.96	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-166*83-380M-120N	380	1500	42	11.61	34.4	11.04	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-305M-60	305	1500	40.3	9.83	32.8	9.3	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-310M-60	310	1500	40.5	9.92	33	9.4	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-315M-60	315	1500	40.7	10.04	33.2	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-320M-60	320	1500	40.9	10.15	33.4	9.59	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-325M-60	325	1500	41.1	10.2	33.6	9.68	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-380M-72	380	1500	48.9	9.75	40.5	9.39	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-385M-72	385	1500	49.1	9.92	40.8	9.44	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-390M-72	390	1500	49.3	10.12	41.1	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-395M-72	395	1500	49.5	10.23	41.4	9.55	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*158-400M-72	400	1500	49.8	10.36	41.7	9.6	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-315M-120	315	1500	40.7	10.04	33.2	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-320M-120	320	1500	40.9	10.15	33.4	9.59	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-325M-120	325	1500	41.1	10.2	33.6	9.68	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-330M-120	330	1500	41.3	10.31	33.8	9.77	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-335M-120	335	1500	41.5	10.36	34	9.87	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-390M-144	390	1500	49.3	10.12	41.1	9.49	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-395M-144	395	1500	49.5	10.23	41.4	9.55	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%
SE-158*79-400M-144	400	1500	49.8	10.36	41.7	9.6	+0.048%/°C	-0.28%/°C	-0.37%/°C	20	Class II	±3%

SE-158'79-405M-144	405	1500	50.1	10.48	42	9.65	+0.048%/PC	-0.28%/PC	-0.37%/PC	20	Class II	±3%
SE-158'79-410M-144	410	1500	50.4	10.6	42.3	9.69	+0.048%/PC	-0.28%/PC	-0.37%/PC	20	Class II	±3%
SE-182'91-605M-156	605	1500	54	14.22	46	13.16	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-600M-156	600	1500	53.9	14.12	45.7	13.12	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-595M-156	595	1500	53.8	14.01	45.5	13.08	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-590M-156	590	1500	53.7	13.91	45.3	13.04	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-585M-156	585	1500	53.6	13.81	45	13	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-580M-156	580	1500	53.6	13.7	44.8	12.96	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-560M-144	560	1500	49.9	14.22	42.6	13.16	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-555M-144	555	1500	49.8	14.12	42.3	13.12	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-550M-144	550	1500	49.7	14.01	42.1	13.08	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-545M-144	545	1500	49.6	13.91	41.8	13.04	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-540M-144	540	1500	49.5	13.81	41.6	13	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-535M-144	535	1500	49.4	13.7	41.3	12.96	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-465M-120	465	1500	41.3	14.22	35.3	13.16	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-460M-120	460	1500	41.1	14.12	35.1	13.12	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-455M-120	455	1500	41	14.01	34.8	13.08	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-450M-120	450	1500	40.8	13.91	34.5	13.04	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-445M-120	445	1500	40.7	13.81	34.2	13	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-440M-120	440	1500	40.6	13.7	34	12.96	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-420M-108	420	1500	36.9	14.22	31.9	13.16	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-415M-108	415	1500	36.8	14.12	31.6	13.12	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-410M-108	410	1500	36.7	14.01	31.4	13.08	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-405M-108	405	1500	36.6	13.91	31.1	13.04	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-400M-108	400	1500	36.5	13.81	30.8	13	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-395M-108	395	1500	36.4	13.7	30.5	12.96	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'105-430M-96-BD	430	1500	34.31	15.85	29.36	14.65	0.046%/PC	-0.25%/PC	-0.3%/PC	30	Class II	±3%
SE-182'105-440M-96-BD	440	1500	34.67	15.95	29.72	14.81	0.046%/PC	-0.25%/PC	-0.3%/PC	30	Class II	±3%
SE-182'105-450M-96-BD	450	1500	35.03	16.05	30.08	14.97	0.046%/PC	-0.25%/PC	-0.3%/PC	30	Class II	±3%
SE-182'91-550M-144-BH	550	1500	49.72	14.02	41.99	13.1	+0.048%/PC	-0.28%/PC	-0.37%/PC	25	Class II	±3%
SE-182'91-450M-120-BH	450	1500	41.09	13.86	34.67	12.98	0.046%/PC	-0.25%/PC	-0.3%/PC	30	Class II	±3%

Rated electrical characteristics (see table) are within 3 percent of measured values at Standard Test Conditions of: 1000 W/m², 25°C cell temperature and solar spectral irradiance per IEC 60904-3. Refer to Section 690-8 of the National Electric Code for an additional multiplying factor of 1.25 which may be applicable.

The module might produce more or less voltage or current than rated value in uncertainty condition. The corresponding electrical specifications can be downloaded from website.

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7 Disclaimer of Liability

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