

# INSTALLATION GUIDE



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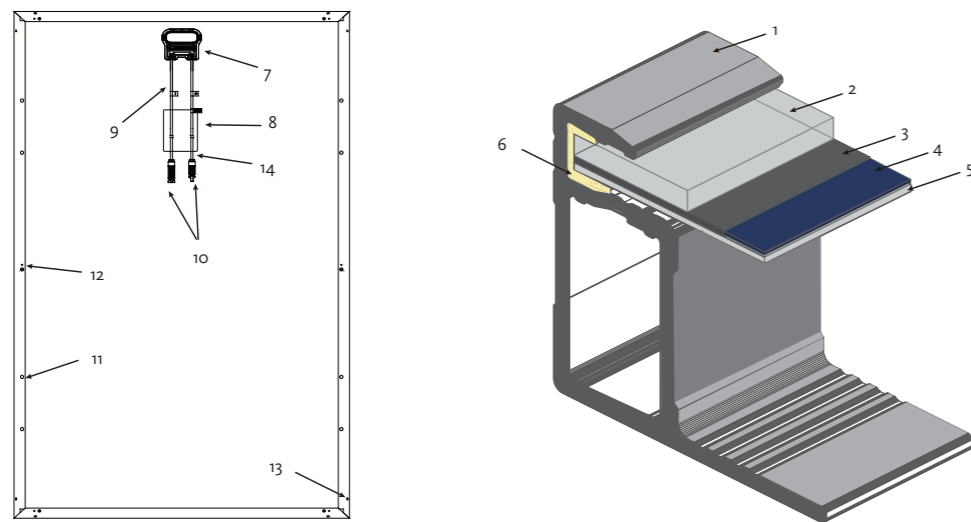
## I Before Use

- 1) This installation manual (hereinafter referred to as "this manual") includes installation and maintenance methods, and important safety instructions for the PV module(hereinafter referred to as "PV module") produced and sold by **S-Energy**. Please store this manual in the visible area for future reference after installation.
- 2) Any troubles caused by failure to comply with these instruction during the installation, use, operation, maintenance of the module may be excluded for warranty.
- 3) All installation, operation shall be based on this manual, and the actual installation, use, operation and maintenance should be performed by qualified personnel with electrical license.
- 4) For the detailed quality warranty policy of the product, please refer the quality assurance provided by **S-Energy Co., Ltd.**
- 5) When the contents of this manual conflict with the quality assurance, the quality assurance takes precedence.
- 6) In order to provide better service, the information included in this manual is subject to change without prior notice.

## 1. Accessories

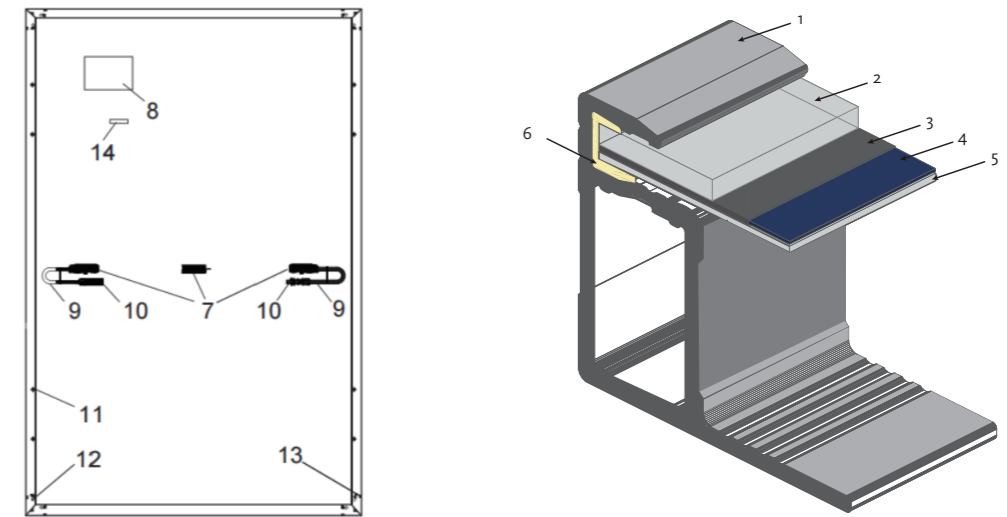
The name of each part of Standard type solar module is presented as 'Fig. 1'. , Half-cut type solar module is presented as 'Fig.2' and Bifacial type solar module is presented as 'Fig. 3.'

When requesting maintenance, please inform malfunction part and its performing status including the name of each part by referencing the below figure.



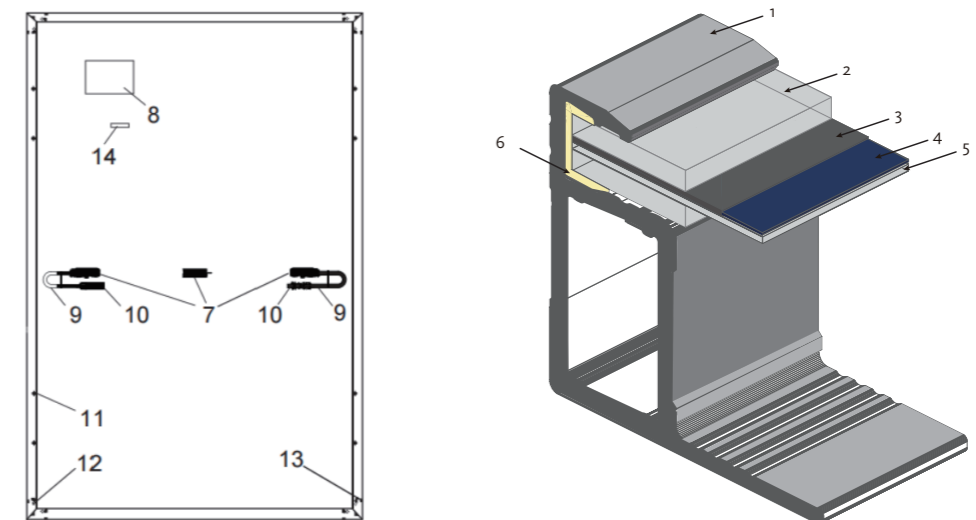
1. Frame	2. Glass	3. EVA	4. Solar Cell
5. Backsheet	6. Silica Gel	7. Junction Box	8. Name Plate
9. Cable	10. Connector	11. Mounting Hole	12. Grounding Hole
13. Drain Hole	14. Bar Code		

< Fig. 1 Standard Module >



1. Frame	2. Glass	3. EVA	4. Solar Cell
5. Backsheet	6. Silica Gel	7. Junction Box	8. Name Plate
9. Cable	10. Connector	11. Mounting Hole	12. Grounding Hole
13. Drain Hole	14. Bar Code		

< Fig. 2 Half-cut Module >



1. Frame	2. Front Glass	3. EVA/POE	4. Solar Cell
5. Back Glass	6. Sealant	7. Junction Box	8. Name Plate
9. Mounting Holes	10. Grounding Holes	11. Drain Holes	12. Bar Code

< Fig. 3 Bifacial Module >

## 2. Safety Precautions

These “Safety Precautions” should be thoroughly understood before installing.



CAUTION



Do not step, stand or sit on the modules to install and clean.



DANGER

When connecting with '+', '-' in module, the cable shall be equipped with direct current, and shall not connect or disconnect with module when electricity flows. If an abnormal or old electrode is connected, you may get injured by sparks arising from direct current.

※ PV module installation should be performed by qualified person only.



CAUTION

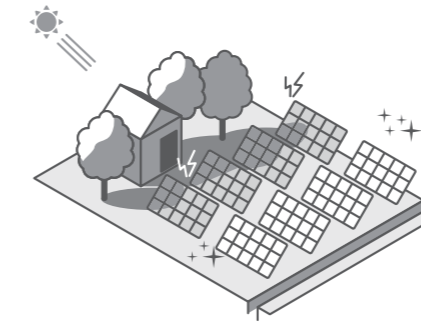
	CAUTION	RECOMMENDATION
	The utmost care is required for preventing corrosion/contamination/deterioration due to mishandling when you load/outdoor load/installation.	Store a module in an indoor warehouse before installing.
	Always wear protective equipment while working with PV modules.	Working on a PV system requires following all applicable local codes and wearing protective equipment, and must be performed by appropriately qualified and authorized personnel only.
	Do not place heavy objects on the module. Stepping on or allowing objects to fall on the module may damage certain parts of the product and slow down the performance significantly, or causes risks to the whole system.	
	Do not install when snowy, rainy, and windy days. Do not install where water remains on the ground.	Install when the weather is clear.
	All surfaces and corners are fragile, so touch only the frame areas when moving/installing. And do not allow direct shock or hit to the module.	PV module should be installed by a two person team. Be careful when handling because the shock may cause damage or low performance.



Safety class rating for PV Modules

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 are qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II.

## 3. Environmental Considerations



ENVIRONMENTAL CONSIDERATIONS

- 1) The shading of the front surface is the main cause of hot spot or performance reduction of power generation.
- 2) The ground should have well drained soil.

	CAUTION	CAUTION
	Do not scratch by a sharp tool on the module frame and surface. Abrasion of the coated surface may lead to oxidize frames or reduce their strength. The scratch of the surface may be the main cause of the module output degradation and decrease in strength.	
	The front surface of the module shall not be exposed to sunlight artificially. [It can cause performance degradation due to solar cell degradation.]	
	Do not touch or give shocks to the Junction box as well as front and rear surface of module, and do not remove the label.	
	Do not touch with wet hands or equipment, which can result in electric shock.	

## 4. Caution before Installation

Please read this instruction before installing PV module.

- 1) The installation of PV module should be performed by qualified personnel only.
- 2) When installing PV module, you should wear protective equipment. [electric shock or falling accident risk.]
- 3) When installing PV module, do not step up onto the PV module or place the object on it.
- 4) After installation, qualified person shall check whether it operates properly or not.
- 5) Disassembling or replacing of the PV module part is not allowed without permission by manufacturer, and if you disassemble or replace anything, please inform the PV module manufacturer.
- 6) When disassembling or replacing the part with manufacture's permission, it should be performed by qualified person only, and use the certified accessories.
- 7) All installation work must be done to meet the local applicable standards, such as the recent National Electrical Code or National Electrical Standards.
- 8) When the PV module is damaged or stopped, anyone, even who has useful knowledge for the PV module, should not approach to the PV module. Touch or approach may cause serious injury, in which case manufacturer is not responsible for the damage therefrom.
- 9) PV module's orientation shall be at equator direction, and be installed at the same angle as the latitude of the installation location for the optimal generation performance. If it is installed at a different angle or direction, it may adversely affect an annual generation capacity. In case of horizontal installation, **S-Energy** recommends regular cleaning to remove dust on the surface.
- 10) PV module generates the voltage even without load connection. So, be careful for sparks especially when assembling / disassembling PV module.
- 11) PV module is intended to be installed on the ground or building. If you need to install on the vehicle(car, train, etc.) or ship, please request special modules.
- 12) Snow, water, dust, or other foreign substance on the surface may increase reflection of the light and eventually reduce the PV module's output. [Regular cleaning of module surface can improve performance.]
- 13) Standard specifications was measured at STC rating conditions, temperatures can get very effective in increasing power generation is low.
- 14) Before installation, modules should be stored under packing condition.
- 15) Irrespective of module connection, contacting current carrying part may cause a burn or fatal electrical shock from sparks.
- 16) The shading of the front surface of the module can cause the module degradation by fire or reduce its lifecycle.
- 17) When working with the PV module wire, connect the wire with a hanger to avoid contact on the roof or ground.
- 18) Potential Induced Degradation [PID] may be caused by ambient high temperature, humidity, and high system voltage. S-Energy's PV module equipped with Enhanced PID module can endure these degradation, but a long term exposure may also cause PID. To completely prevent PID, trans inverter and Negative GND should be connected to the (-) GND with the module frame.
- 19) Do not use or install broken modules; Failure to comply may result in fire, electric shock, and injury.

## 5. Caution when Installed

- 1) Please make sure that installed module wire distribution is correct, and insulation and waterproof performance of connect part is suitably installed.
- 2) Check if there are any scratches on the frame and front surface of the glass. [The scratch may lead oxidation and reduce the strength.]
- 3) Regularly clean the module with water, and if the module is not cleaned with water, request to the manufacturer. [Regular cleaning can significantly improve the output capacity.]
- 4) The front surface of glass is specially treated, so do not apply any abrasive cleaning product or chemicals.
- 5) Periodic inspection should be performed only by qualified personnel with protective equipment.
- 6) To avoid shade by the vegetation environment, regular weeding is needed.

## 6. Mechanical Installation

### 1) Grade[Class A]: The module is a 'Class A' grade.

Class A: This grade is regarded as a device operated above 50V or above 240W and a product where an ordinary person's approach is expected. It acquired the safety standard under IEC 61730-1 and IEC 61730-2.

### 2) Installation site: The module should be installed at a place satisfying the following Respect.

#### • Safety load

A 60/72 cells series products were designed to tolerate the wind load(the back side) of 30lbs/ft<sup>2</sup>(UL 1703) and 2400Pa(IEC 61215), snow load(the front side) of 30lbs/ft<sup>2</sup>(UL 1703) and 5400Pa(IEC 61215).

When the maximum snowfall and wind load on the site are above the standard, a structure to install the module on should be designed to satisfy the mechanical load of the site.

#### • Operating temperature

A ambient temperature of module installation site is limited by the minimum and maximum temperature as shown below.

[Considerations when temperature rises: output is reduced due to characteristics of the module.]

- Maximum operating temperature: +85 °C [Under the hot temperature, ventilation should be considered.]

- Minimum operating temperature: -40 °C

#### • Places where the installation is prohibited

- A site directly contacting salt injury.

- A site having poor drainage. [Poor drainage can shorten the module life.]

- A site having a shade caused by the geographic features of the surrounding area.

- A site where stones and foreign matters are often thrown near to the modules.

[There are concerns for damage to the front window of the module.]

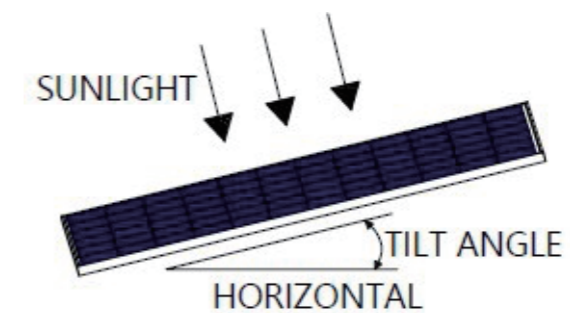
- The heating properties of extremely high gas or vapor (filling stations, gas cylinders, paint, etc.) nearby flame or combustible materials.

#### • Limitations to orientation and slope for installing PV Modules

- Tilt angle selection

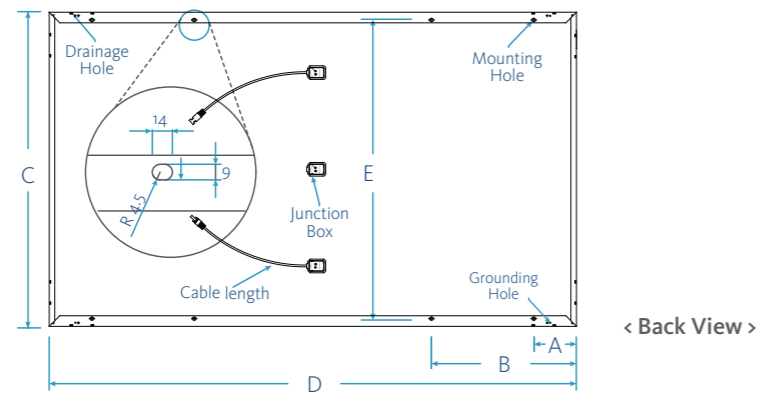
- The tilt angle of the PV module is measured between the surface of the PV module and a horizontal ground surface (Fig. 6). The PV module generates maximum output power when it faces the sun directly.

- 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 sufficient when irradiance is low (e.g., winter), then the angle chosen should be sufficient 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.



< Fig. 6 Tilt angle of PV module >

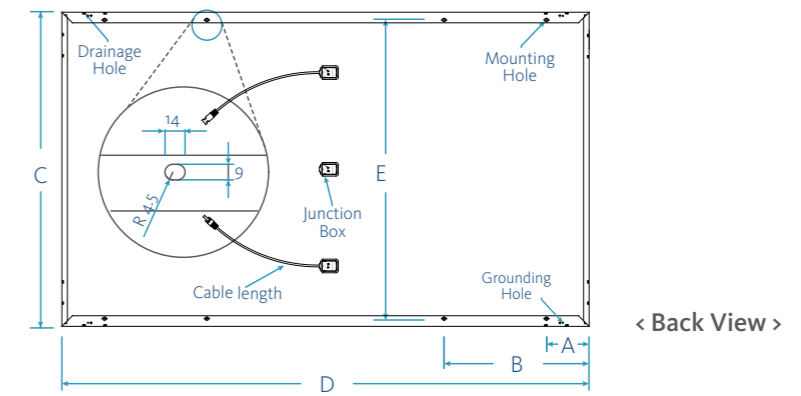
- Half-cut Series  
& Bifacial Half-cut  
Series(M10, G12-MBB)



Unit: mm

Position	72 Cells Half-cut Series	72 Cells Bifacial Half-cut Series
	M10	M10
	SL65-72MAJ-xxxR	SL65-72BDJ-xxxR
A	439	439
B	589	589
C	1133	1133
D	2279	2279
E	1084	1084
Module thickness	35	30
Cable length	300 ~ customized	300 ~ customized
Position	66 Cells Bifacial Half-cut Series	
	G12	
	SL85-66BDL-xxxR	
A	491.5	
B	641.5	
C	1302	
D	2383	
E	1252	
Module thickness	35	
Cable length	300 ~ customized	

- N-Type Bifacial  
Half-cut Series  
(M10-MBB)



Unit: mm

Position	54 Cells Bifacial Half-cut Series	72 Cells Bifacial Half-cut Series
	N-Type / M10	N-Type / M10
	SL65-54TDP/TEP-xxxR	SL65-72TDP-xxxR
A	211	439
B	411	589
C	1133	1133
D	1722	2278
E	1096	1096
Module thickness	30	30
Cable length	300 ~ customized	300 ~ customized
Position	78Cells Bifacial Half-cut Series	
	N-Type / M10	
	SL65-78TDP-xxxR	
A	482.5	
B	632.5	
C	1133	
D	2465	
E	1096	
Module thickness	30	
Cable length	300 ~ customized	

※ How to use a frame installation hole

a) How to use a frame installation hole

b) Confirmation matter

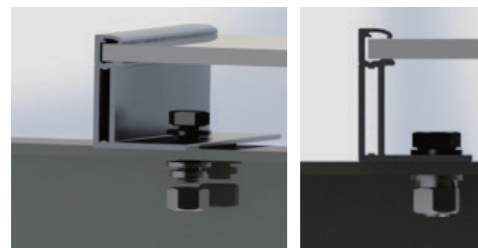
- To improve module's electrical insulation and durability, the back side [Junction Box] of module should be protected to avoid exposure to moisture, and PV module wiring should be installed considering thermal expansion due to ambient temperature and vibration due to wind.
- When a PV module is installed on a roof, between the back side of the PV module and roof is maintained at a sufficient distance(minimum above 2 inch) to be well ventilated.
- According to the laws of the applicable site, the PV module can be installed on a fire resistance roof.
- For UL 1703, the PV module's system class 'A' fire rating. And for IEC 61730, the fire rating is 'C'.
- Only for UL 1703, the modules with the specified construction in below table, when used with a Listed mounting system that has been rated as a Class 'A' System when installed with type 1 or type 2 modules, is suitable to maintain the System Class 'A' Fire Rating.
- Only for UL 1703, The fire rating of the module is valid only when mounted in the manner specified in the mechanical mounting instructions.

c) Installation hole

The method of installing a frame hole passed a mechanical load test item in accordance with the IEC 61215 and UL 1703 standard, and S-Energy Co., Ltd. recommends the following method of installing a frame hole. As described in <fig. 1>, an installation hole is inserted in the frame, if the frame is randomly processed or the installation hole is changed, the module will be damaged or the strength of frame will be declined.

3) Hole Installation

- Make use of bolts to fix modules on the bracket through mounting holes on the back frame. See details in Figure 5.



< Fig. 7 Bolt Installation Mode >

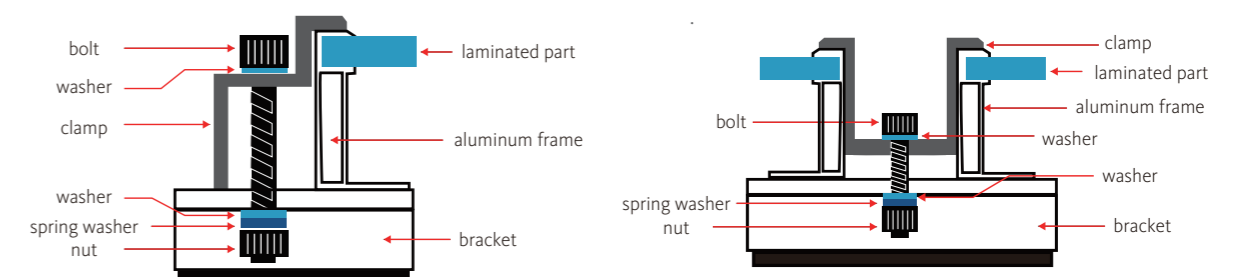
Recommended accessories as below :

Accessories	Model	Material
Bolt	M8	Q235B/SUS304
Washer	2*8	Q235B/SUS304
Spring Washer	8	Q235B/SUS304
Nut	M8	Q235B/SUS304

- Suggest : 1) M8 bolt tightening torque range: 14N·m-20N·m;  
 2) When using S-Energy 30mm (30H) height frame assembly, it is recommended to select L ≤ 20mm length fasteners. (If you have a special model, you can consult S-Energy customer service)

4) Clamp Installation

- The assembly can be mounted using a dedicated fixture, as shown in Figure 6.
- Under no circumstances should the fixture touch the glass or deform the frame of the component. The surface of the fixture that is in contact with the front of the frame must be smooth and flat, otherwise the frame will be damaged and the component will be damaged.
- Be sure to avoid the shadow blocking effect of the fixture. The drain hole cannot be blocked by the fixture. The fixture must maintain an overlap of at least 8 mm but no more than 11 mm with the frame of the assembly.(you can change the cross section of the fixture if the assembly is securely installed)
- At least 4 clamps should be used in each module, and install 2 clamps on each side. For harsh environments, you can consider using 8 clamps to install (install 4 clamps on each side), which can withstand 5400Pa on the back side.



< Fig. 8 Clamp Installation Mode >

⚠ CAUTION

- 1) Be careful to avoid sealing the gap between the module and the structure, because the area should be well ventilated. The module of power performance and life can be affected, if the space between the module and structure is sealed.
- 2) Please leave a space between the modules because the module can be expanded or be shrink depending on the ambient temperature.
- 3) In case of failure to use the accessories recommended by S-Energy Co., Ltd., it may affect the long term reliability of the module, and S-Energy Co., Ltd. do not take any responsibility for life-shortening of the module resulting from such use.

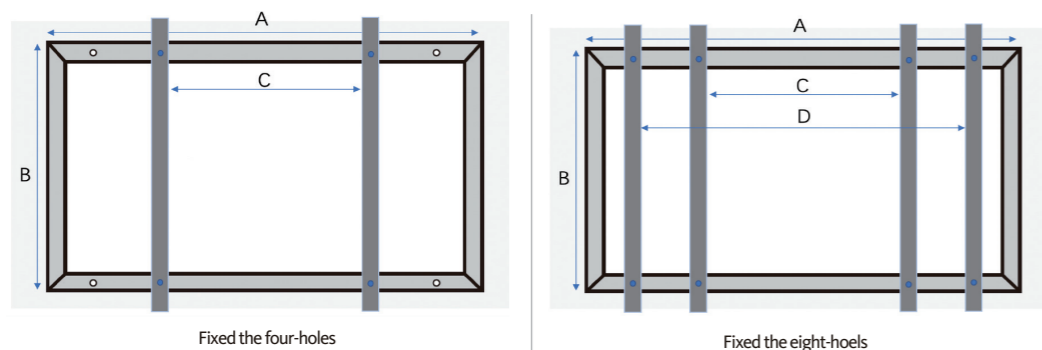
## 07. Installation Instructions

### 1) Regular Requirements

- Screw mounting or clamp mounting: The static load on the largest back of the module is 2400pa (equivalent to wind pressure), and the maximum static pressure on the front is 5400pa (equivalent to wind pressure and snow pressure).
- Make sure that module installation mode and bracket system can meet the expected load, which is requisite assurance that the bracket installer must provide. Installation bracket system shall be tested and inspected by the third party testing institution with static mechanical analysis capacity in accordance with local national standards or international standards.
- Module bracket shall be made from durable, corrosion resistant, UV-proof materials.
- Modules shall be fixed on the bracket solidly.
- If modules are installed on brackets parallel to the roof or wall, the minimum gap between the module frame and the roof/wall shall be 10cm for air ventilation in case of module wire damage.

### 2)Component installation information(with Bolts)

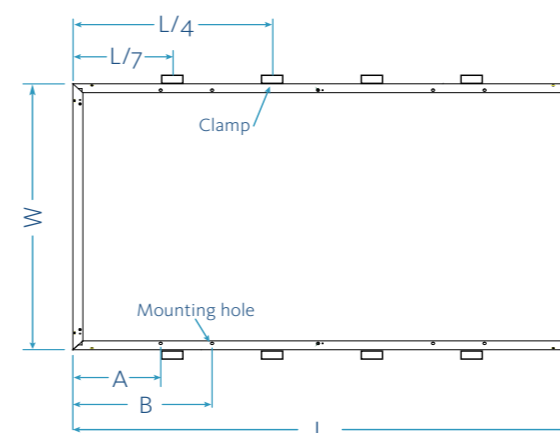
- Built-in standard mounting holes: suitable for most environments, low/normal level load conditions: the maximum static load on the back side of the module is 2400Pa (equivalent to wind pressure), and the maximum static pressure on the front side is 2400Pa (equivalent to wind and snow pressure)
- External mounting hole: The internal test mounting hole is fixed to enhance the load resistance of modules. Suitable for high load conditions: the maximum static load on the back of the module is 2400Pa (equivalent to wind pressure), and the maximum static pressure on the front is 5400Pa (equivalent to wind pressure and snow pressure);
- Installation of pressing block: M8 specification is recommended for bolts (length is determined according to the design height of pressing block) and corresponding gaskets, spring gaskets and nuts are provided; Use a torque wrench to tighten the screw. The torque range is vfrom 18N•m to 24N•m.



Model name	Dimension(mm)	Fixed the four-holes	Fixed the eight-holes	Minimum number of fixed bolts
	L x W x T			
SL65-72MAJ-xxxR	2279 x 1133 x 35	5400PA / 2400PA	5400PA / 2400PA	4 or 8
SL65-72BDJ-xxxR	2278 x 1133 x 30	5400PA / 2400PA	5400PA / 2400PA	4 or 8
SL65-54TDP/TEP-xxxR	1722 x 1133 x 30	5400PA / 2400PA	5400PA / 2400PA	4 or 8
SL65-72TDP-xxxR	2278 x 1133 x 30	5400PA / 2400PA	5400PA / 2400PA	4 or 8
SL65-78TDP-xxxR	2465 x 1133 x 30	5400PA / 2400PA	5400PA / 2400PA	4 or 8
SL85-66BDL-xxxR	2383 x 1302 x 35	5400PA / 2400PA	5400PA / 2400PA	4 or 8

### 3) Component installation information(with Clamp)

- Each module must be secured to the mounting bracket by at least four points. Bolts can be used to secure the assembly to the bracket or the fixture can be used to mount the assembly.
- If the fixture is used to fix the module on a bracket, it is recommended that the contact area of the fixture and the frame be at least 50mm\*4.5mm and the thickness of the fixture be  $\geq 3$ mm. Use at least 4 fixtures to secure the module to the rails, two on each of the two long or short sides. How many fixtures are used depends on the local wind and snow pressure strength. The mechanical design criteria of the bolts used by the customer. The fixture material is anodized aluminum or stainless steel.
- Installation of mounting hole: it is recommended to adopt M8 specification (the length is determined according to the beam design) and be equipped with corresponding gaskets, spring gaskets and nuts; tighten with torque wrench, and the torque range is between 14N•m and 20N•m



Model name	Dimension(mm)			Mechanical Load Front / Rear	Minimum number of pressing blocks
	L x W x T	A	B		
SL65-54TDP/TEP-xxxR	1722 x 1133 x 30	161	366	5400PA / 2400PA	4
SL65-72MAJ-xxxR	2279 x 1133 x 35	L/7 and L/4 $\pm$ 50mm		5400PA / 2400PA	8
SL65-72BDJ-xxxR	2278 x 1133 x 30	L/7 and L/4 $\pm$ 50mm		5400PA / 2400PA	8
SL65-72TDP-xxxR	2278 x 1133 x 30	L/4 $\pm$ 50mm		5400PA / 2400PA	4
SL65-78TDP-xxxR	2465 x 1133 x 30	L/4 $\pm$ 50mm		5400PA / 2400PA	4
SL85-66BDL-xxxR	2383 x 1302 x 35	L/4 $\pm$ 50mm		5400PA / 2400PA	4

- If you have know details informations about other models. can provide in technical part in S-Energy.

## 8. Grounding Method

**For preventing electric shock and fire, the frame of PV module shall be grounded properly.**

In design of modules, the anodized corrosion resistant aluminum alloy frame is used for rigidity support. For safety utilization and to protect modules from lightning and static-electricity damage, the module frame shall be grounded. The grounding device shall be in full contact with inner side of the aluminum alloy and penetrate the frame surface oxide film. Do not drill additional grounding holes on module frame.

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.

Holes marked with a grounding mark on the frame can only be used for grounding and not for component mounting. Frameless double glass modules have no exposed conductor, and therefore according to regulations it did not need to be grounded.

Grounding methods below are permissible

### 1. Grounding by grounding clamp

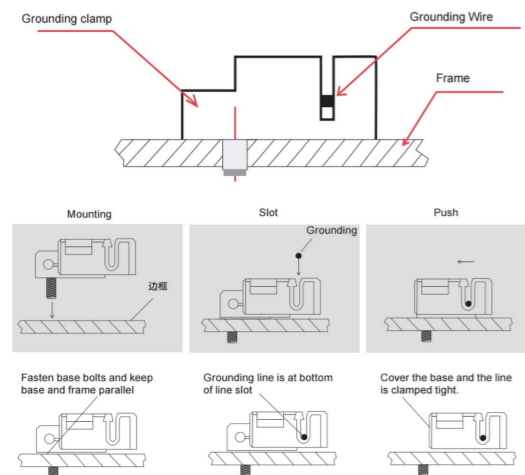
There is a grounding hole with the diameter of  $\varnothing 4.2$  mm at the edge of the module back frame. The central line of the grounding sign also located on the edge of the module back frame overlaps with that of the grounding hole.

Grounding between modules shall be confirmed by qualified electricians and grounding devices shall be manufactured by qualified electric manufacturer. The torque is recommended to be  $2.3\text{N}\cdot\text{m}$ . 12 AWG copper core wire is used for the grounding clamp. And copper wires cannot be pressed damaged during installation.

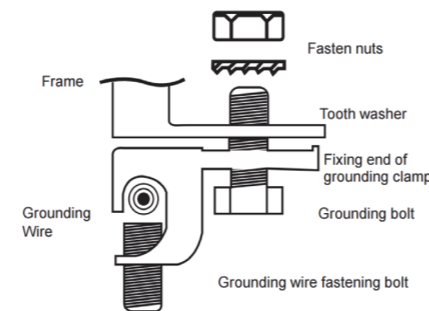
### 2. Grounding by unoccupied mounting holes

Mounting holes on modules that are not occupied can be used for installing grounding devices.

- Align grounding clamp to the frame mounting hole. Use grounding bolt to go through the grounding clamp and frame.
- Put the tooth side of the washer on the other side and fasten the nuts.
- Put grounding wires through the grounding clamp and grounding wire material and dimension shall meet requirements in local national and regional law and regulations.
- Fasten bolts of grounding lines and installation ends.



< Fig. 4 Grounding Clamp Installation >



< Fig. 5 Install Method >

## 9. Electrical Installation

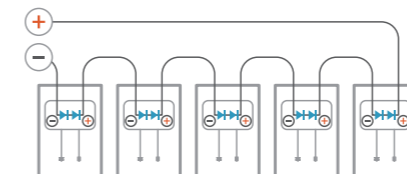


CAUTION

- 1) Electrical risks must be prevented during installation, distribution, generation, and maintenance of PV module.
- 2) During installation of PV module, system voltage should not exceed. [IEC 1000V or 1500V]
- 3) When installing the system, use same rate of model. [If you use a electrically and physically different type of module, output capacity or system performance may be reduced due to fire.]
- 4) When wiring, you should connect polarity appropriately, and if not, it can cause abnormal generation performance and PV module degradation by fire.
- 5) For the reverse current value, refer the Fuse rating value specified in '11. Detailed module specification'. If exceed its value, connect the rated overcurrent protective device(permitted by local regulation) to the module string in series wiring.
- 6) Junction box is in the rear surface of the module. This box is an important device for the module generation, and never unpack it in any circumstance in the field. [Once the junction box is opened, warranty will be invalidated.]
- 7) If the PV module have any electrical problem, you should inspect the module according to the warranty term provided by **S-Energy**, and return it to **S-Energy** for repair and replacement.
- 8) The fire rating of this module is valid only when mounted in the manner specified in the mechanical mounting instructions.
- 9) The module is considered to be in compliance with UL 1703 only when the module in mounted in the manner specified by the mounting instructions below.
- 10) A module with exposed conductive parts is considered to be in compliance with UL 1703 only when is electrically grounded in accordance with the instructions presented below and the requirements of the National Electrical Code.
- 11) Any module without a frame (laminated) shall not be considered to comply with the requirements of UL 1703 unless the module with hardware that has been tested and evaluated with the module under this standard or by a field inspection certifying that the installed module complies with the requirements of UL 1703.

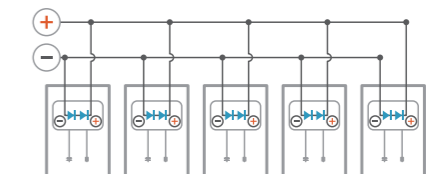
In normal conditions, PV modules may produce larger current and/or voltage than reported in the standard test conditions. Therefore, when voltage evaluations for components, capacity of conductors, size of fuses, and size of control systems connected to the module output are determined, multiply the values of short-circuit current (Isc) and open-circuit voltage (Voc) that are marked in SN series modules by the NEC, 1.25 (Source: American National Electrical Code)

### A. Series Wiring



- Wires may be connected in series to generate the required voltage output.
- Series wiring should be configured at the same rate. (current)
- Only for UL 1703, When wires are connected in series, the maximum voltage should be under 800Vdc that is 80% of system Voltage 1000Vdc

### B. Parallel Wiring



- Wires may be connected in parallel to generate the required current output.
- Even when wires are connected in parallel, the intensity of voltage in inverter should be considered.
- Before connected to other modules, all modules should be wired with a fuse. For the number of additional fuses and maximum number of module should refer and follow the related local regulations.

#### • Material :

All the wire for the PV module connection should be configured with PV cable only. [Cable for PV : double insulation, UV resistance, temperature resistant for more than minimum 90°C.] Use copper wire for all wiring.

#### • Diameter:

At least larger than minimum 12AWG. [4mm<sup>2</sup>] [wiring diameter should confirm the local regulation, and S-Energy Co., Ltd. recommends the customer use wires with a diameter larger than the above number at minimum.]

#### • Module configuration[Series wiring]

[[Min Temp °C - 25 °C x (Voc x -Temperature coefficient of Voc) + Voc] x Panels per string = Maximum system Voltage  
To guarantee the maximum voltage limitation condition, ensure the general temperature condition according to the National Electric Code (690.7)



## 10. Maintenance

S-Energy Co., Ltd. to ensure optimal performance of the module, it is recommended to maintain.

To ensure the electrical and mechanical safety of module, check the electrical and physical connection on a regular basis.

- Modules and structural loosening bolts, check that there are indisposition grounded and the ground wire corrosion.
- Please confirm that no shading occurs due to the surrounding vegetation and buildings in front of the module.
- Junction box and connectors, check that there are no loose and damaged the fixed site.

To maintain a stable generation performance please check the regularly around the module front and rear.

- Please confirm that there are no front glass breakage.
- Please check back Backsheet there is burnout.
- Make sure there are no heat problems during generate of the module.
- Please confirm that no modification coating module wiring section and burnout.



CAUTION

- ※ Installation and maintenance of the photovoltaic modules must be carried out only by qualified personnel held.
- ※ Wear safety equipment during maintenance.
- ※ Maintenance of the photovoltaic modules other components, please refer to the vendor Maintenance Manual.

## 11. Cleaning Instructions

The front glass of the modules produced in S-Energy Co., Ltd. is using the general low iron glass and the ARC glass to minimize with light reflection. Cleaning time is taking into account the thermal shock and power generation, please proceed early in the morning and cloudy weather.

### Cleaning method and procedure

#### Step 1: Off bets

Such as dry leaves and debris on the module surface will have to pay it off with a dry cloth or dust tremble. If there is debris on the module surface, cleaning of these steps will be omitted because it is completed.

#### Step 2: Wipe

Dirt, bird secretions, twigs, leaves, etc., if solid foreign objects attached to the module, please wipe gently with a soft cloth that do not cause injury to the module.

#### Step 3: Rinse bet

Bird secretions, unable to shake off the dust cause of external humidity or plant essences such as colored debris on the module surface, should be removed by rinse bet method. For the colored debris remove give neutral water sprayed on the affected area and wipe gently with a soft cloth, makes regular cleaning necessary.



CAUTION

- ※ **S-Energy** modules are designed to withstand pressure 5,400Pa(IEC 61215). If you decide to clean the snow in order to ensure the long-term growth and performance of the power generation module, the module's surface, do not remove the ice. Scratch the surface can be generated.
- ※ There is a danger of electric shock, broken glass and broken wires, exposed wires, do not wash.
- ※ Do not use the grinding dust, polish, sodium, benzene, alkali, and other chemical substances.



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