



Installation & Maintenance Manual

ReneSola Jiangsu Ltd.

**INSTALLATION & MAINTENANCE MANUAL
FOR PV MODULES**



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1. General Information

This general manual offers important information related to the installation, maintenance and handling of Photovoltaic Modules (hereinafter referred to as the Modules) of ReneSola Jiangsu Ltd (hereinafter referred to as ReneSola). All the instructions given in this manual should be read carefully and understood before attempting to install the modules. Failure to follow these instructions may result in death, injury or property damage. Module installation requires specialized skills and should be only performed by licensed professionals.

It is recommended to check regularly on www.renesola.com for latest updated version.

If there is any question, please contact Customer Service of ReneSola for further explanation.

2. Disclaimer of Liability

1. The use of this manual and installation, handling, maintenance and use of modules are beyond ReneSola's control, and ReneSola does not assume any responsibility for loss, damage, injury or expense resulting from such installation, handling, use or maintenance.
2. ReneSola assumes no responsibility for any infringement of intellectual property right (including without limitation patent, copyright and trademark) or other rights of third parties that may result from use of modules. No license in connection with intellectual property right (including without limitation patent, copyright and trademark) or other rights of ReneSola, whether expressly or impliedly, is granted to customer because of use of the Modules.
3. All information stated in this manual is based on ReneSola's knowledge and experience, but no warranty about such information (including modules specifications) is made by ReneSola, whether expressly or impliedly. ReneSola reserves the right to update this manual, modules specifications or relevant information without prior notice.

3. Safety Precautions



Warning: Module interconnects pass direct current (DC) when exposed to sunlight or light sources. Contact with electrically active parts of the module may result in injury or death whether the module is connected or not.

General Safety



1. All PV modules should be installed in compliance with relevant international and local laws/regulations/standards.
2. Module installation should be performed by licensed professionals. The operators shall foresee the injury risk during the processes of installation, wiring, debugging and maintenance of the Modules.
3. Suitable wearing (non - slip gloves, clothes, etc.) is recommended to prevent direct contact with potential voltage and sharp edges during the installation process.
4. Mating connector pairs with original type is strongly recommended.
5. Use suitable insulated tools to reduce the risk of electric shock.
6. To avoid the risk of module damage and people injuries, appropriate safety measures should be taken during the installing, debugging process in adverse conditions (dews, rain, strong wind and etc.).
7. Damaged modules with broken glass may cause electric shock, arcing or fire hazards. Do NOT install or use broken modules.
8. Do NOT attempt to disassemble the Modules or remove any part from the Modules.
9. Do NOT touch the exposed cables or connectors.
10. Do NOT expose the Modules to artificially concentrate sunlight.

4. Transport and Handling

1. It is highly recommended to transport with container and the unfilled space (the gap over 20cm) shall be filled with inflatable bag. As for the non-container transport, the Modules shall be single laid and wholly cared, and some effective measures shall be taken to prevent displacement.
2. The Modules should be transported in the original package only and leave the Modules until you are ready to install.
3. Unpacking process with two operators handling carefully is strongly recommended by ReneSola.

4. Unpacking PV modules from the original package:
 - Step 1: Remove securing straps.
 - Step 2: Remove the pallet lid.
 - Step 3: Unpack the Modules one by one and stack them without removing the paper angle bead.
 - Step 4: If not all modules were needed in one package, secure the remaining modules to prevent them from falling over.
5. Check the module damage due to transportation before the installation.
6. Do NOT move module by pulling the cable. Carry the module with both hands is permitted in certain condition that single operator available .
7. After opening the packing, an opaque cloth or other materials shall be used to cover the frontage of the Modules for the reason that monolithic module may produce potentially fatal current or voltage in direct sunlight or other light source.
8. Keep the Modules away from inflammable gas, hazardous chemicals or fire source.
9. Glass is susceptible to damage that could affect the performance or integrity of the PV module; do not damage the glasses, and do not spray the chemical non-validated or paints/adhesive to any of the glasses. Doing so may degrade performance or cause irreparable damage and will void any applicable warranties.
10. Carry the Modules carefully and handle them on respecting of instruction.
11. Do NOT carry the Modules on head.
12. Do NOT carry wet Modules, falling from heights and impact of falling tools may affect the electrical performance or even broke the module
13. Do NOT trample or strike on the Modules

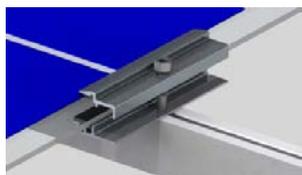
5. Installation

1. System designers and installers shall design a reasonable bracket, Fix the module on the bracket according to the recommended method (Please refer to Point 9 of the Installation part).

2. In the Standard Test Condition (STC: irradiance of 1000 W/m², battery tag temperature of 25°C and spectrum of AM1.5), the electrical performance parameters of the Modules, such as I_{sc}, V_{oc} and P_{max} have a ±10% deviation with the nominal value.
3. Do not disconnect the cable under a load circumstance.
4. Any part of module (including cable and connector) to soak in water for a long time (more than 24h) is not permitted.
5. Under normal conditions, a Photovoltaic Module may be able to produce voltage and current higher than in standard test condition. Accordingly, when determining component rated voltage, conductor ampacities, fuse current and size of controls connected to the PV output, the short circuit current and open circuit voltage value marked on this module shall be multiplied by a factor (safety factor) of 1.25.*

**** Note: The safety factor for component rated voltage, conductor ampacities, fuse current and size of controls connected to the PV output is subject to the meteorological conditions of project sites.***

6. The Modules shall be installed in the position of the sun exposures fully and to ensure that not to be shaded by trees, buildings or anything others surrounding, such as in the northern hemisphere installed towards the south and in the southern hemisphere installed towards the north.
7. Use the bracket structure that could withstand the pressure of strong winds or heavy snow according to your practical installation condition. The bracket structure must be made from durable, corrosion resistant, UV resistant materials.
8. The installation structure must be designed by registered professional engineers, and installation design and procedures shall be consistent with the local relevant provisions.
9. You could choose either fixing method mentioned below per the actual condition :
Fixture-fixing system or Hook System.



Drawing 1: Fixture-fixing system



Drawing 2: Hook system

10. Please ensure the cable of module be connected with smooth angles. The bending diameter should be larger than 80mm. Long term of live and alternating hot and cold environment will exacerbate stress concentration, or accelerate the aging of cable materials.

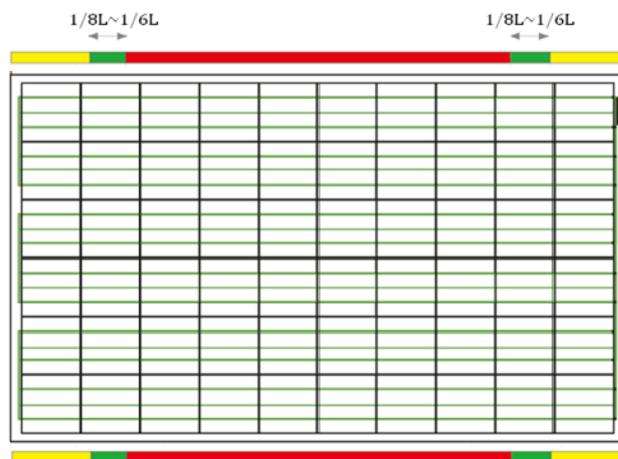
11. Installation method and location

11.1 Fixture-fixing :

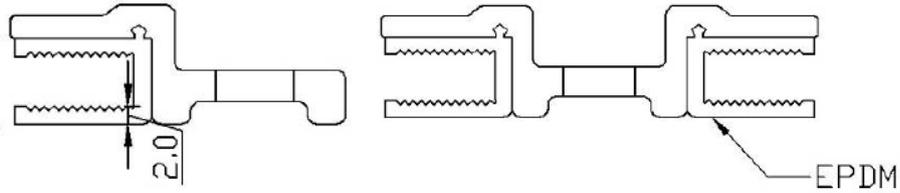
Fix the module safely and effectively on the brackets with specialized installation tools. The panels should be fixed on the long side of the panel within the constraints shown in Drawing 3.

The recommended maximum compression for each clamp is 20 MPa. Clamp length should larger than 80mm.

- ✓ Clamping within the green zone is designed for surface loads up to 2400 Pa with 4 clamps.
- ✓ Clamping within the red zone is not permitted.
- ✓ Modules clamp with rubber pads like EPDM should be used. The thickness of EPDM should larger than 2mm shown in Drawing 4
- ✓ The clamp must overlap the module edge 10mm but no more than 14mm.
- ✓ Be sure to avoid shadings from the clamps
- ✓ When choosing bolts and nuts for the clamp , please note your racking design first
Renesola suggests using M8 bolt to fixing clamp , the torque for screws should be suitable to avoid damage the glass.



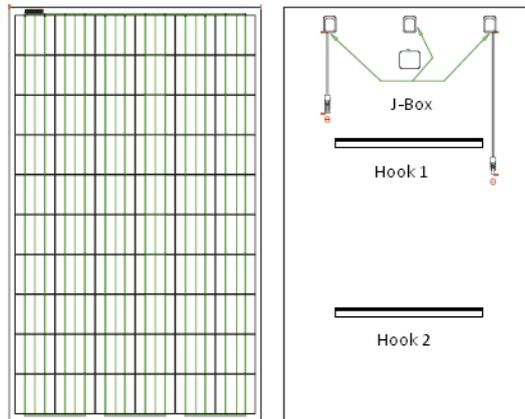
Drawing 3 Clamp Mounting Positions



Drawing 4 Clamp with EPDM

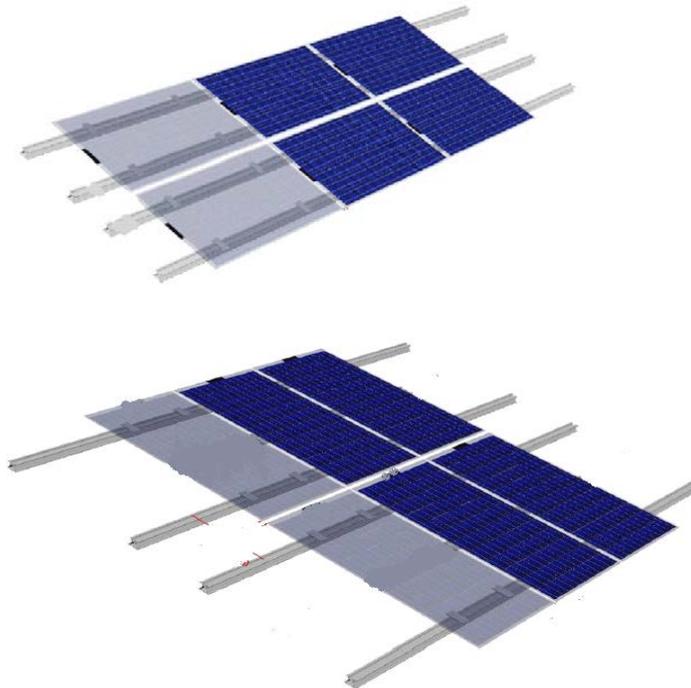
11.2 Hook System :

The hook attached on the back glass with good quality silicon glue shown in Drawing 5.



Drawing 5 Module with hook

Available installation methods for modules (*Drawing 6*)

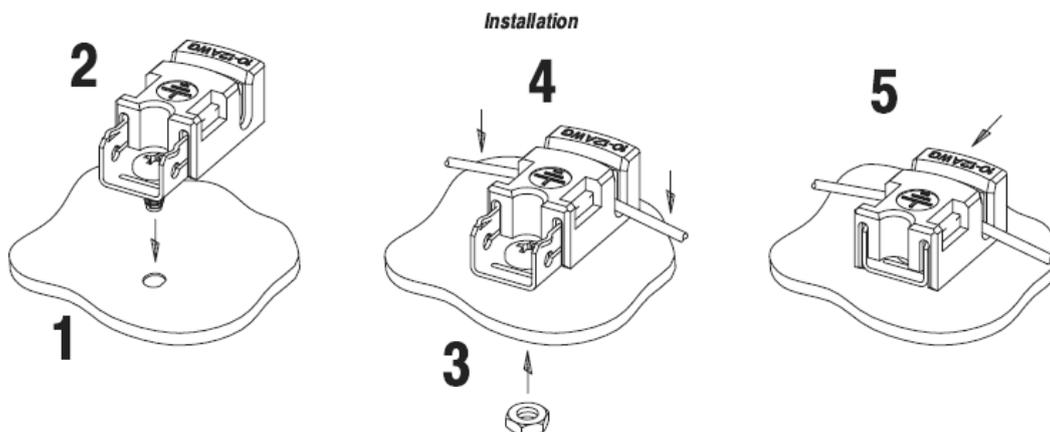


Drawing 6 Installation method for modules

12. When installing the Modules on the roof, ensure there is an appropriate structure, and a suitable seal shall be made between the Modules and the bracket to prevent leaking.
13. Installing the Modules on the roof may affect the fire rating of the house which requires the construction organization to make more accurate assessment.

14. Grounding

- 1) PID (Potential Induced Degradation) due to combined effects of high temperature, high humidity and high voltage, is most likely to be observed in similar climates and mounting surroundings such as India, Southeast Asia, Greece etc. floating designs. Except for equipment grounding, negative system grounding is strongly recommended as the basic solution for PID phenomenon.
- 2) Grounding method shall be consistent with the local standards and regulations. Any grounding system/method, which is designed in accordance with relevant international and local standards and regulations, such as UL2703, UL467, IEC60335, NEC article 250 and section 690.V.43, etc. could be attached to the Modules.
- 3) In case of electrochemical corrosion, the materials, which would contact with module frames, should be properly selected.
- 4) Grounding wire shall be the bare copper wire with simple surface treatment and no insulation sleeve. Wire cable with cross-sectional area of 4~6 mm² (10~12 AWG) and ground clamp (such as Tyco, identification of product: 1954381-2) are recommended (diagrammatic sketches are as follows).



Drawing 7 Grounded with Ground clamp

15. When the connecting wire of the Modules cannot meet system design requirements, a proper commercial cable that could endure long-term outdoor use and assorted connector could be used to extend the connecting wire. The cross-sectional area shall be no less than 4 mm², and the connection system shall reach IP65 protection rating.
16. Recommended separation between two Modules shall be more than 10 mm; when installing on the roof, suggested separation between bottom of the Modules and the mounting surface shall be more than 150 mm, and when installing on the ground, more than 450 mm.
17. It had better to use the Modules with same configuration in a series connection system.
18. ReneSola modules have passed the salt mist and ammonia test (Please contact ReneSola or local office for detailed information) and can be installed in some brutal environments such as sea side.
19. The modules should not be installed at the place which is less than 100 meters from the seashore. If the distance of the seashore and the project site is 100~1000 meters, anti-corrosion application should be taken during the installation and grounding processes.

6. Product Identification

Nameplate: describes the product model; rated power; rated current, rated voltage, open circuit voltage, and short circuit current. All above parameters are measured in standard test conditions.

Other information, such as weight, size, maximum system voltage and maximum fuse current are marked on the nameplate as well.

Barcode: the barcode is in the internal of the Modules, which containing the relevant retrospect information of the Modules.

Please do not remove any label, or ReneSola will not provide any warranty.

7. Maintenance

1. Do not touch the live part of the wire cable and the connector. When touching, use the safety equipment (insulating tools, insulating gloves etc.).
2. When maintaining the Modules, use opaque cloth or other materials to cover the frontage of the Modules. Exposed in sunlight, the Photovoltaic Modules may produce high voltage, which is potential danger.
3. Cleaning instruction

Periodic cleaning is necessary for solar module, which could reduce the power loss due to dust and is recommended by ReneSola. The cleaning process should be accomplished by licensed professionals with appropriate qualifications. When cleaning the module surface,

a) rules shown as below must be followed:

- ✓ Only at low irradiance, such as early morning, dawn, cloudy days and so on.
- ✓ Only soft cloth or sponge could be used to clean the glass surface.
- ✓ Only clean water could be used as the cleaning solvent which the PH range should be around 6-9.
- ✓ The temperature discrepancy between water and modules should be less than 10°C.
- ✓ Water pressure on glass surface should be less than 0.1 MPa.
- ✓ Necessary electrical protection should be taken.

b) following notes should be taken into account:

- ✓ No other chemical could be used in cleaning process.
- ✓ No aggressive tool or coarse material is permitted.
- ✓ Do NOT trample or strike on modules.
- ✓ In cleaning process, the modules must not be under a load circumstance.
- ✓ Do NOT touch exposed cables or connectors.
- ✓ Forbidden to remove dust in dry way.
- ✓ Forbidden to clean modules before cooling down.
- ✓ Water containing sands or corrosive components is forbidden to clean the modules.

8. Annual Inspection

1. Check if nuts, bolts of mounting structures are secure and not loose. Tighten the loosen component again, if required.
2. Check the water resistance of the connecting cables, grounding cables and connectors and the performance of the ground resistance.
3. Check all electrical and mechanical connections from freedom of corrosion.
4. Check the ground resistance of metal parts such as the module frames and the mounting structures.

9. Applicable Law and Dispute Settlement

This "**Installations & Maintenance for PV Modules**" shall be governed by and interpreted under the laws of Hong Kong (irrespective of its choice of law principles).

Except for the technical disputes, all disputes arising out of or in connection with this "**Installations & Maintenance for PV Modules**" shall, unless amicably settled between the parties, shall be settled by arbitration in Hong Kong under the Hong Kong International Arbitration Centre Administered Arbitration Rules in force when the Notice of Arbitration is submitted in accordance with these Rules. The language of arbitration shall be English. The award of the Arbitrators will be final and binding upon the Parties. Provided that there is any inconsistency between the sale's contracts to which this "**Installations & Maintenance for PV Modules**" is attached, the terms and conditions of the sales contract shall prevail.

10. Model of the Modules

Renesola Standard PV Module Product Model Names covered under this manual are:

Table 1

	Pattern Name	Type	Explications
Bg Series (60PCS 156 cells double glass)	JC***M-24/Bgs(245-260)	Virtus II	IEC 1500V
	JC***S-24/Bgs(255-265)	Mono	

Remark

1. The "***" in the table above stands for the nominal power of module. The nominal power range of each module model is shown in the bracket. For detailed information, please download corresponding datasheet below each module product on our website.



Installation & Maintenance Manual

This document constitutes part of the contract and valid automatically when the contract is signed.

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