



INSTALLATION & MAINTENANCE MANUAL FOR PV MODULES

Customer Service

Customer Service ReneSola Jiangsu Ltd.
No.27, QingYuan Road (East), YiXing Economic Development Zone,
YiXing City, Jiangsu Province, China 21420

Customer Service hot line: +86-510-8712 9217

Fax: +86-510-8712 0623

Email: jcservices@renesola.com

Web: www.renesola.com

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1. 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 incorrect installation, handling, use or maintenance.

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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 implied. ReneSola reserves the right to update this manual, modules specifications or relevant information without prior notice.

2. Preface

This manual offers general installation and maintenance information of the Photovoltaic Modules (hereinafter referred to as the Modules) of ReneSola Jiangsu Ltd (hereinafter referred to as ReneSola).

Before installation, handling or maintenance, ensure that you have read and understand this manual and use the Modules correctly & safely.

The installation manual is only for glass-backsheet type Module, the model names covered are:

A Series Module: JC***M-24/A()
JC***S-24/A()

B Series Module: JC***M-24/B()
JC***S-24/B()

C Series Module: JC***M-18/C()
JC***S-18/C()

D Series Module: JC***M-24/D()
JC***S-24/D()

E Series Module: JC***M-18/E()
JC***S-18/E()

G Series Module: JC***M-18/G()
JC***S-18/G()

Remarks

1. The “***” stands for the module power for detailed information please refer our module TDS.

2. JC indicate ReneSola, while M indicate Multiple Crystalline, S indicate Single Crystalline.

3. The brackets stand for additional information such as “bs” refer to Modules with PV back-sheet and 4 Busbar cells, “bw” refer to Modules with PV back-sheet and 5 Busbar cells, “bps” refer to the maximum system voltage of the Modules is 1500V and the Modules with PV back-sheet 4 Busbar cells, “bpw” refer to the maximum system voltage of the Modules is 1500V and the Modules with PV back-sheet 5 Busbar cells.

3.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: irradiance of 1000W/M², AM 1.5, Module temperature 25 C .

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

Barcode: the barcode is located in the inside the glass the Module, and contains the serial number (also displayed).

Do not remove or alter any label or marking, this will void warranty.

4.Safety



ATTENTION: Danger of death from electric shock

1. Installation, trouble shooting and maintenance of solar installations present hazards associated with electrocution, electrical arcs, burns, working from heights and manual handling; therefore, this work must only be carried out by suitably trained professionals with the appropriate safety equipment and procedures in place at all times.

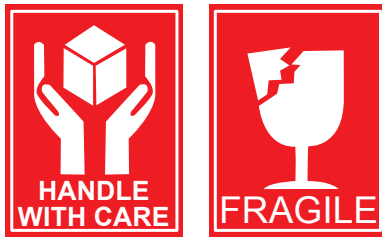
2. Electrical hazards must be taken in account at all times when working on or around solar modules. Please take necessary actions to avoid possibility of electrical injuries.

3. Mating connector pairs on Module and array leads must be the same brand and type.

4. Do not strike Modules or subject Modules to impact with tools or objects.

5. Do not install a panel that has been damaged, glass smashed or back-sheet torn.
6. Do not touch exposed parts, cables or connectors.
7. Do not dismantle, disassemble or modify any parts of the Modules and do not remove or alter in anyway the labels or markings on Modules.
8. Do not step or walk on the modules. Doing so may damage and crack parts of modules.
9. Do not expose modules to chemicals, for instance paints, solvents, adhesives.
10. Keep the Modules away from inflammable gas, hazardous chemicals or flammable explosive items.

5. Transportation and Handling



HANDLE WITH CARE – FRAGILE GLASS

Solar Modules are glass and contain very fragile Silicon wafers inside them and must be transported and handled with the utmost care. Do not strike, drop or bend a Solar module

1. Never transport other items (eg. Inverters) on top to a solar module pack.
2. Store the modules safely in cool and dry area. The packaging is not weatherproof.
3. Leave modules in their packaging until they are to be installed, the modules must avoid rain and sand erosion after unpacking.

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 (surface glass side down) without removing the cardboard edge protector.

Step 4: Remove the cardboard edge protector from the Modules before installing.



Figure 1 Unpacking

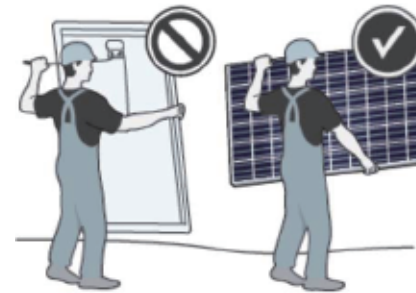


Figure 2. Carry the Modules



Figure 3. Stack the Modules

5. Check the module for damage due to transportation before the installation.
6. Use extreme caution if stacking modules for transport of less than a pallet at a time line up the modules with their edge protectors in place and wraps, strap and fasten them so that they cannot move around or rattle and fall. Care must be taken with fasteners that secure modules but do not bend or damage the modules in any way.
7. The Modules should be transported in their original packaging where possible with any free space in the box securely filled with soft packaging materials to prevent the panels from moving around.
8. Never move modules by pulling their cables.
9. Carry the modules with both hands and with their glass surface facing the operator when absolutely necessary (one operator available) (please see Figure 2). Do NOT stack the modules back-sheet side down to avoid glass scratch and electric shock risk (please see Figure 3).
10. Do not step or walk on the Modules. Doing so may damage modules (please see Figure 4).
11. Do NOT carry wet or hot Modules dropping a module from a height and the impact of falling tools may affect the electrical performance or break the module (see Figure 4).

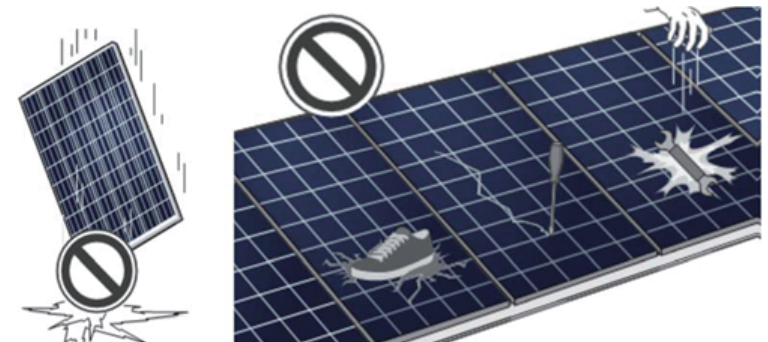


Figure 4. Handling Precautions

12. The surface oxide layer of the frame may be damaged by sharp objects, do not destroy or scratch the frame of the Modules.

13. Glass surface, back-sheet and aluminum frame are susceptible to damage that could affect the performance or integrity of the PV module; do not damage or scratch the surfaces, and do not spray any non-validated chemicals, paints, solvents or adhesive to any of the surfaces, including the frame. Doing so may degrade performance or cause irreparable damage and will void any applicable warranties.

6. Installation

1. The electrical and mechanical installation must comply with international and local standards and principles including cable connection building codes etc.

2. The mounting structures must be designed by qualified structural engineers, and installation design and procedures shall be consistent with the relevant local standards.

3. Installers must be qualified and familiar with solar and electrical principles.

4. The working ambient temperature range is -40°C to $+85^{\circ}\text{C}$ and Relative Humidity $\leq 85\%$.

5. The Modules shall be installed so as to maximize solar exposure and to minimize shading by trees, buildings or other obstacles in the surrounding area. Generally in the Northern hemisphere Modules are ideally orientated to the South and in the Southern hemisphere Modules orientated to the North.

6. Notify ReneSola of any damage to product immediately. Do not use or install damaged Modules. Damaged Modules may cause fire or electric shock, resulting in property damage, fire and or death.

7. Do not disconnect or connect any cables under load, the bending cable radius of Junction Box must be more than 45 mm.

8. Match the polarities of cables and terminals when making the connections, failure to do so may result in damage to the module. Keep the connector dry and clean and do not impact external force on the connector such as heavy snow, strong wind.

9. The maximum modules of one PV string $N = (\text{The Maximum System Voltage}) / (V_{oc})$, note the V_{oc} is the value at the lowest temperature in the project sites.

10. Suitable over current protection devices (string fuses etc.) must be installed when connecting 3 or more strings in parallel configuration.

11. Under normal conditions, a 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.

12. Select either method of fixing mentioned below depending on site conditions: Screw-fixing system (Figure 5-a) 、 Fixture-fixing system (Figure 5-b) .

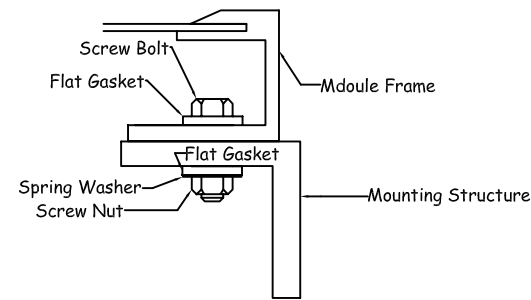


Figure 5-a Installed by nut and bolt

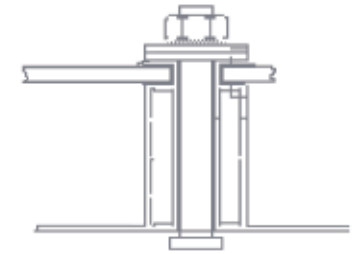


Figure 5-b Installed by fixture

13. Installation method and location

1) Screw-fixing :

Fix the modules on the bracket at 8 border prefabricated installation holes (Figure 6) . All the fastening pieces are made of stainless steel. The inside installing holes must be fixed with bolts in all the cases and the outside installing holes would be also used in the case of strong wind and/or heavy snow. Applied torque is recommended as 7-11 N•m for M6(diameter is 6mm)screw.

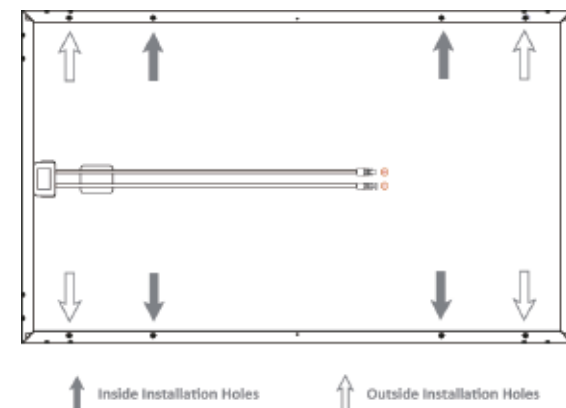


Figure 6 Screw-fixing

2) Fixture-fixing :

Fix the module safely and securely on the mounting structure. The length of clamp should be 40mm minimum. Applied torque is recommended as 7-11 Nm for M6(diameter is

6mm)screw. The clamp are made of aluminum alloy.

For A Series (156-72 cell JC***M-24/A**) modules, six clamps must be used:

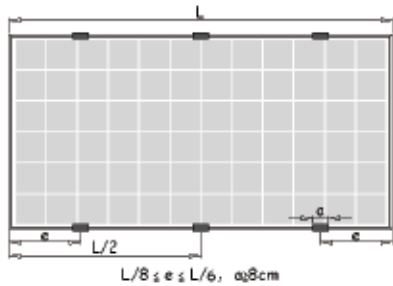


Figure 7-1 On long frame

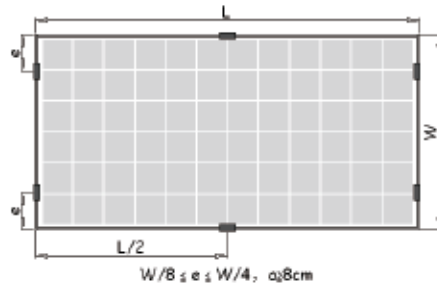


Figure 7-2 On short frame

For other series module, fix the module with the long sides (Figure 8-1) or short sides (Figure 8-2) according to the bracket locations specified below and mechanical load requirements.

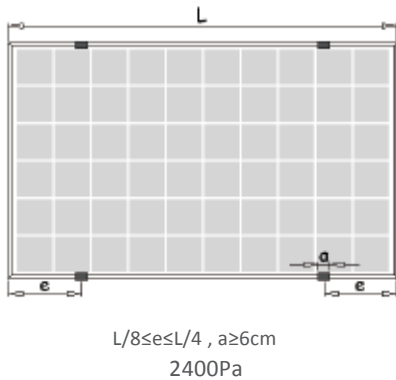


Figure 8-1 Fixing on the long sides for the other module series

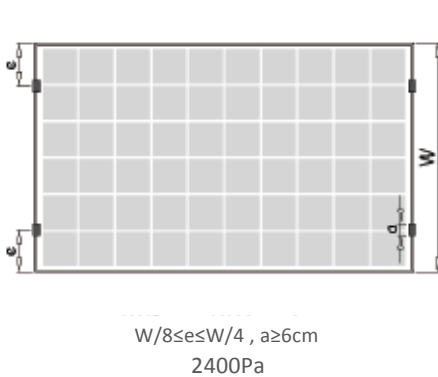
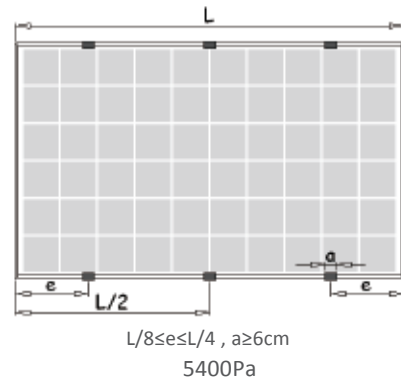
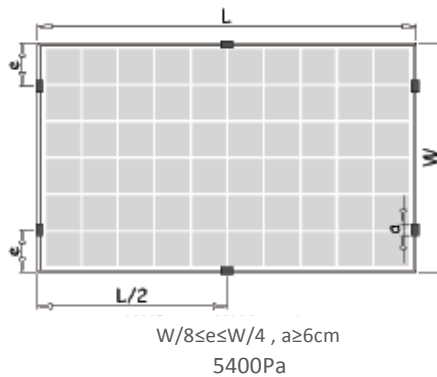


Figure 8-2 Fixing on the short sides for the other module series



3) Inserting System :

Fix the module with U type groove or flange beam.

All available installation methods for A series modules (156-72 cell)(Figure 9)

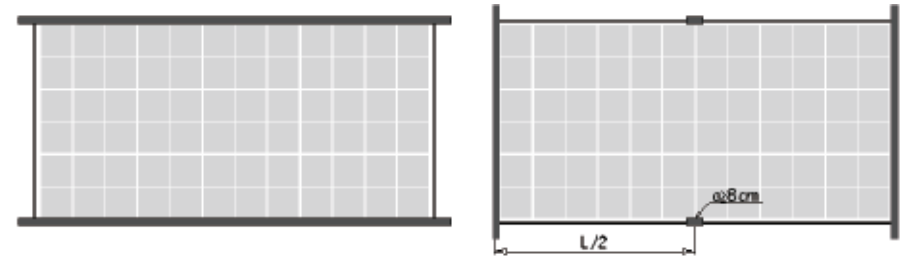


Figure 9 Fixing with sideway for A series modules

For other series module, fix the module with the long sides or short sides according to the bracket design and mechanical load requirement.(Figure 10)

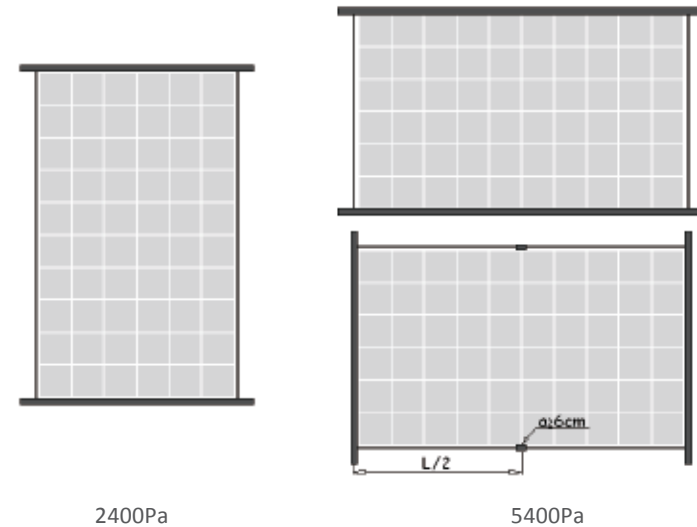


Figure 10 Fixing with sideway for the other module series

Fixing eight installation holes simultaneously is recommended according to the Security Considerations. When installed correctly, the Modules can withstand a maximum snow pressure of 5400 Pa or wind pressure of 2400 Pa.

14. When installing the Modules on the roof, ensure there is an appropriate mounting structure.

15. The minimum separation between two Modules shall be more than 10 mm; when installing on the roof, the recommended separation between the Modules and the roof surface is 100 mm to allow for air flow around the modules. When installing on ground mounts keep ground clearances to more than 450 mm.

16. Grounding

1) Grounding method shall be consistent with the local standard 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.

2) In order to prevent electrochemical corrosion, materials in contact with module frames, should be properly selected and galvanic isolation provided where necessary

3) 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, floating designs. Except for equipment grounding, negative system grounding is strongly recommended as the basic solution for PID phenomenon.

4) Grounding wire shall be the bare copper wire with simple surface treatment and no insulation sleeve. Wire cable with cross-sectional area of 4mm^2 (10~12 AWG) and ground clamp (such as Tyco, identification of product: 1954381-2) are recommended (diagrammatic sketches are as follows).

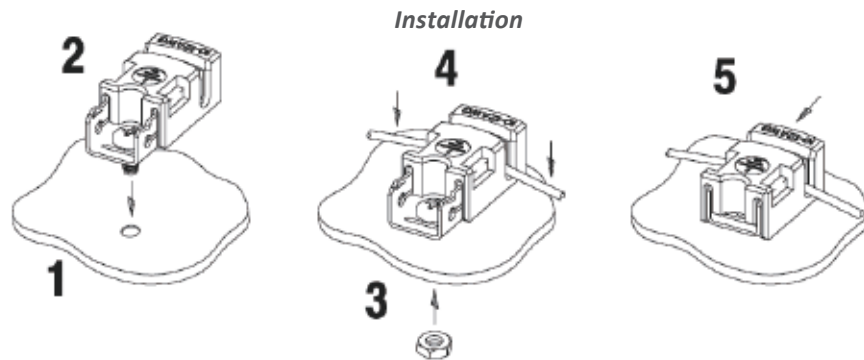


Figure 11 Grounded with Ground clamp

17. When the connecting wires of the Modules do not meet length requirements, a correctly rated electrical cable that is designed and certified for long term outdoor use along with the correct connectors can be used to extend the connections. Match the same brand and type of Module connectors to extend the connection. The cross-sectional area

for PV array wire must be no less than 4mm^2 , and the connection system is IP 65 rated.

18. It is better to use the Modules with same specifications same colour when connected in series.

19. Artificially concentrated sunlight shall not be directed on the module.

20. Our modules have passed the salt mist and ammonia test (Please refer the test report for detailed information) and can be installed in some corrosive environments, e.g. sea side.

21. 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.

7. Maintenance

1. Do not touch any live parts of the array wires, uninsulated cable and the connector. Use the safety equipment when working on solar equipment (insulating tool, insulating gloves etc.).

2. An opaque cloth or other non-abrasive material can be used to cover the front of the modules to eliminate sunlight exposure and reduce the chance of electrocution during maintenance when required.

3. Cleaning instructions

Periodic cleaning is recommended for solar modules. The cleaning process should be done by suitably trained professionals with the appropriate safety equipment and procedures in place at all times. When cleaning the module surface.

a) The following rules apply:

✓ To reduce cold and hot shock clean panels at low irradiance time.

✓ Only use soft cloths or sponges to clean the glass surface.

✓ Only use clean water as the cleaning solvent.

✓ The difference between water temperature and module temperature should be in the range of $-5\text{ }^{\circ}\text{C}$ to $+10\text{ }^{\circ}\text{C}$.

✓ Water pressure should be less than 1000 Pa.

b) following notes should be taken into account:

✓ No other chemical should be used in cleaning process.

✓ No aggressive tools or coarse cleaning materials are permitted.

✓ Do not step or walk on the Modules.

✓ Do not strike Modules or subject Modules to impact with tools or objects

- √ Isolate modules during cleaning and maintenance, the modules must not be under load.
- √ Do not touch exposed cables or connectors.
- √ Do not remove dust in dry way (without water).

8. Annual Inspection

1. Check if nuts, bolts of mounting structure are secure and not loose. Tighten the loose components again, if required.
2. Check the connecting cables, grounding cables and connectors and the performance of the ground resistance.
3. Check all electrical and mechanical connections for freedom from 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 “**Installation & 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 “**Installation & 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 “**Installation & Maintenance for PV Modules**” is attached, the terms and conditions of the sales contract shall prevail

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