Installation & Maintenance Manual

PREFACE

1. This manual offers general information regarding installation and maintenance of Photovoltaic modules made by Boviet Solar, which hereafter referred to as “modules”.
2. This manual instructions should be read and understood before installation, handling or maintenance. To ensure the correct & safe use of the Photovoltaic modules, the installer should be familiar with the mechanical and electrical requirements for photovoltaic systems.

DISCLAIMER OF LIABILITY

1. The installation, handling and use of modules are beyond Boviet’s control, and Boviet Solar does not assume responsibility for loss, damage, injury or expense resulting from the improper installation, handling, use or maintenance.
2. Boviet Solar assumes no responsibility for any infringement of patents or other rights of the third parties that may result from use of the module. No license is granted by implication or under any patents or patent rights.
3. Boviet Solar reserves the right to update this manual, module specifications or relevant information without prior notice.

UNPACKING AND STORAGE

1. At the time of receipt, verify that the product delivered is the very product ordered. The product name, subname and serial number of each module are clearly marked on the outside of each packing box.
2. Store packing boxes in a dry and ventilated room.
3. Leave the product in its original packing box until it is ready for installation.
4. If pallets are stored outside temporarily, a protective covering over the pallet should be placed to protect products from direct weathering and do not stack more than one pallet high.
5. At the installation site, keep modules and electrical contacts clean and dry before installation.
6. Do not stack more than the maximum amount of allowable pallets on top of each other.
7. Do not place modules directly on top of each other.
8. Do not place excessive loads on the module or twist the module frame.

9. Do not stand, step, walk and/or jump on the module.
10. Do not carry a module by its wires or junction box but by its frame with both hands by two or more persons.
11. Do not mark the module with sharp instrument.

SAFETY PRECAUTIONS

1. Before installing system, contact appropriate authorities for site, installation, inspection permission and requirement.
2. Operators shall foresee the injury risk during the processes of installation, debugging and maintenances of modules. Therefore, only authorized and trained personnel should have access or perform work on the modules or system.
3. Ensure that modules meet the technical requirements of the system as a whole.
4. During electrical connections, remove all metallic jewelry, use properly insulated tools or wear appropriate personal protective equipment to reduce the risk of electric shock.
5. Do not disassemble the modules or remove any part of the module.
6. Do not stand or step on, damage or scratch surfaces of the module
7. Do not install or handle wet modules.
8. Do not touch the exposed cables or connectors.
9. Do not artificially concentrate sunlight on these solar modules.

ENVIRONMENTAL CONDITIONS

Install the PV modules as following conditions:

1. Ambient temperature : -40 ℃ to 40℃.
2. Operating temperature: -40 ℃ to 85℃.
3. Storage temperature: -30 ℃ to 50℃.
4. Humidity: ＜85RH%
5. Mechanical Load Pressure: Maximum 5400Pa (snow) on the front side, 2400Pa (wind) from the rear.
6. Keep modules away from inflammable gas, hazardous chemicals or fire source.

INSTALLATION SITE

1. To ensure the modules to be installed in the position of the full sun exposures, position the modules to minimize chances of shading by trees, buildings or something others surrounding at any time of the day.

2. Solar modules should normally be mounted facing the equator at an angle to the horizontal plane

equivalent to the latitude of the installation for optimum energy generation. The module tilt angle is measured between the solar modules and the horizontal (Figure 1).

3. Do not install modules in the location where they will be immersed in water or continually exposed to water from a sprinkler or fountain, etc.

4. Please leave a safe working area between the edge of the roof and the external edge of the solar array when installing modules on a roof.

5. Avoid the mounting method that will block the drainage holes in the module frame.

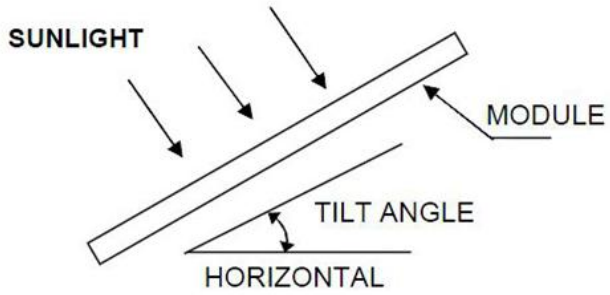


Figure 1. PV Module Tilt Angle

MOUNTING

PV modules can be mounted to substructure with either corrosion-proof M8 bolts placed through mounting holes on the module frame or specially designed module clamps.

Regardless of the fixing method, the final installation of the modules should ensure,

- A clearance of at least 115mm is provided between module frame and the surface of the wall or roof.
- Minimum distance between two modules should be 10mm.
- The mounting method should not block the drainage holes.

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

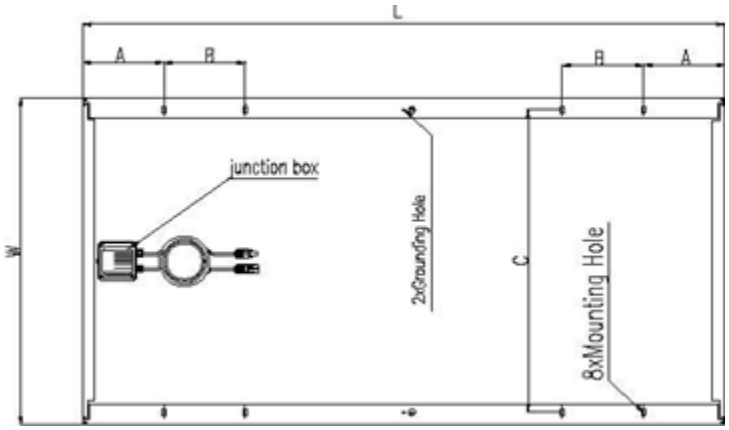


Figure 2. PV module Mechanical drawing

Boviet Solar modules can be mounted with following methods:

(Note: All installation methods herein are only for reference, and Boviet Solar will not provide related BOS 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).

- Use corrosion-proof screws (M8) in the existing mounting holes on the module frame.
- Use suitable module clamps on the long side of the module frame to mount the modules ('portrait orientation')

Mounting with Bolts: There are 4 mounting holes (Length* Width: 14mm*9mm) on the each panel frame to mount the modules on supporting structure. The module frame must be mounted on the mounting rail using M8 corrosion-proof screws together with spring washers and flat washers in four symmetrical locations on the module. The applied torque should be approximately 5 Newton-meters. Please find detailed mounting information as following figure 3.

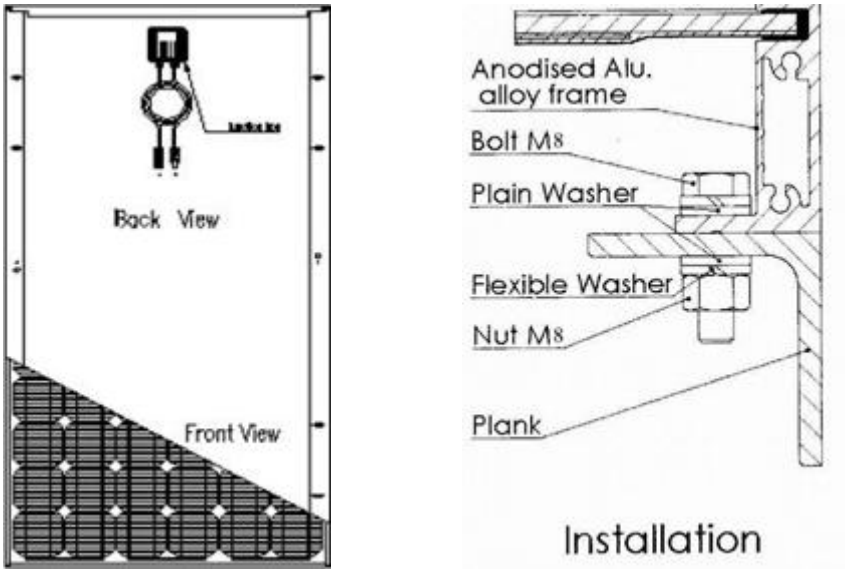
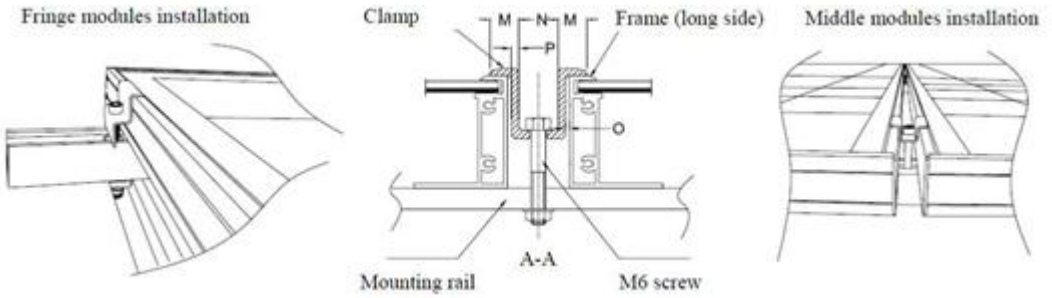


Figure 3. PV module installed with Screw fitting method

Mounting with Clamps: Use a certain number of clamps to fix the modules on the mounting rail. The module clamps should not come into contact with the front glass and deform the frame.

Be sure to avoid shadowing effects from the module clamps. The module frame is not to be modified under any circumstances. When choosing this type of clamp mounting method, please be sure to use at least four clamps on each module, two clamps should be attached on the long sides of the module. Depending on the local wind and snow loads, additional clamps may be required to ensure that the module can bear the loads. The applied torque should be about 8 Newton-meters.

Newton-meters



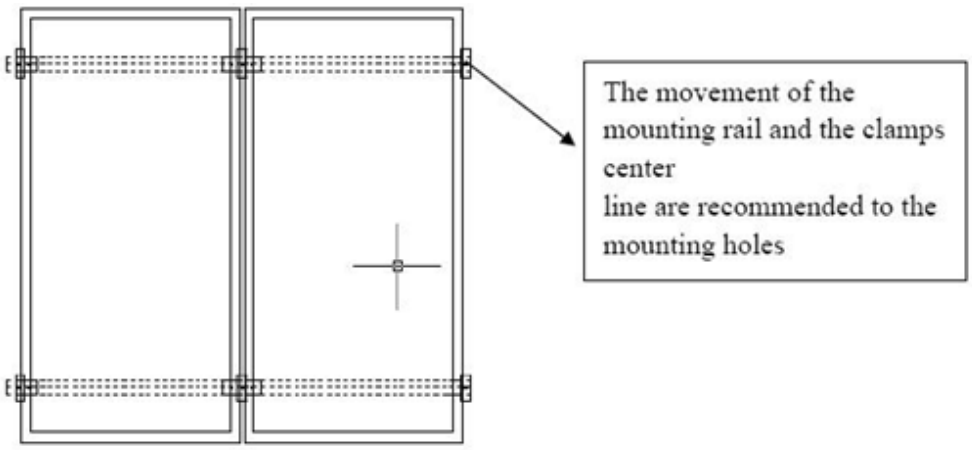


Figure 4 PV module installed at portrait orientation with Clamp fitting method

To ensure the safety of buildings, the recommended standoff height is 20cm. For rooftop installation, a minimum slope of 5cm/12 cm is required.

GROUNDING:

1. All module frames and mounting racks must be properly grounded in accordance with the appropriate respective National Electrical Code.
2. Proper grounding is achieved by bounding the module frame and all metallic structural members together continuously using a suitable grounding conductor. The grounding conductor or strap may be copper, copper alloy or other material acceptable for use as an electrical conductor per respective National Electrical Codes. The grounding conductor must make a connection to earth using a suitable earth ground electrode.

Figure 5 Schematic drawing for PV module grounding

WIRING AND NOTES:

All wiring should be performed by qualified installers according to the local codes and regulations.

1. To minimize the risk of indirect lighting strike and avoid forming closed loops, check of correct wiring before starting the system is necessary. If the measured data of open circuit voltage and short-circuit current differ from the specifications, please check wiring before connection.
2. Before connecting modules always ensure that the contacts are corrosion free, clean and dry.
3. 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 reversed polarity and a difference of more than 10V between 10V strings are measured please check the string configuration before making the connection.
4. The maximum voltage of the system should be less than the maximum certified voltage (1000V typically) and the maximum input voltage of the inverter and of the other electrical devices installed in the system. To ensure this, the open circuit voltage of the array needs to be calculated at the lowest ambient temperature for the location.
5. The minimum and maximum outer cable diameters are 5 to 7mm².

MAINTENANCE:

A well designed system needs minimum maintenance.

1. Maintenance should be carried out at least once a year by well trained personnel.
2. Check that the mounting hardware is properly tightened. Check if cables, nuts, bolts are secure and not loose. Tighten the loose component if necessary.
3. Check ground resistance performance and water resistance of connecting cables, grounding cables, connectors.
4. Check electrical and mechanical connections from free of corrosion.
5. Do not touch the live part of the wire, cable and connector directly but with safety equipment (insulating tools) when necessary.
6. Use opaque cloth or other materials to cover the front side of the modules while maintaining. The module may produce high voltage which is a potential danger when exposed in sunlight.
7. In the event that modules need to be cleaned, clean modules with a soft cloth together with a mild detergent and clean water. To avoid severe thermal shocks which might damage the module by cleaning modules with water of which the temperature is similar to the modules being cleaned.

WARNING

Contact your installer immediately if you suspect your system is not working properly.

- Contact your installer
- Contact Boviet Solar after sales service team at service@boviet.com or your sales contact.

WARNING: The PV system must be shut down first if it needs any electrical maintenance. Improper maintenance may cause lethal electric shock and/or burns.