



CMPower

SEMI RIGID (WALK-ON) SOLAR MODULE OWNER'S MANUAL

1.0 Summary

This manual provides important safety instructions for the installation, maintenance, and use of semi-rigid solar modules. Users and installers must read and strictly follow these instructions. Failure to follow these safety guidelines can result in personal injury or property damage. The installation and operation of solar modules requires specialized skills and should be done by qualified professionals. Read the safety and installation instructions before using and operating the components. The installer should instruct the end customer (or consumer) of the above matters accordingly.

"Module" in this manual refers to one or more semi-rigid solar panels. Please keep this manual for future reference.

1.1 Disclaimer

Manufacturer reserves the right to change this installation manual without prior notice. We make no warranties with respect to any expressed or implied information contained herein. Failure by the customer to operate the module in accordance with the requirements listed in this manual will result in a limited warranty on the product supplied to the customer.

1.2 Limitation of Liability

The semi-rigid solar module warranty is 5 years.

Our company is not responsible for any form of injury, including but not limited to component handling, system installation, and liability for bodily injury, hurt, and property damage as directed by this manual.

2.0 Safety precautions-precautionary measures and general safety rules



WARNING: Read and understand all safety instructions before installing, wiring, operating, and/or maintaining modules. DC power is generated when the module is exposed to sunlight or other light sources. Direct contact with parts of the module when it is working, such as terminals, whether connected or not, may result in personal injury.

2.1 General safety rules

All installation work must be in full compliance with local regulations and appropriate national or international electrical standards.



Use insulated tools to reduce the risk of electric shock.

Use appropriate protective measures (slip gloves, work clothes, etc.) to avoid direct contact with personnel at 30V DC or higher.



Do not wear metal accessories during installation to avoid penalizing modules and posing a risk of electric shock.



If modules are installed or operated on rainy, strong winds or dew mornings, appropriate protective measures are required to avoid injury to modules and personnel.



Children or unauthorized personnel should not be allowed to access the installation area or module storage area.

3.0 Mechanical and electrical characteristics

Semi-rigid solar modules can be walked on, skid and corrosion resistant and are suitable for harsh environments.

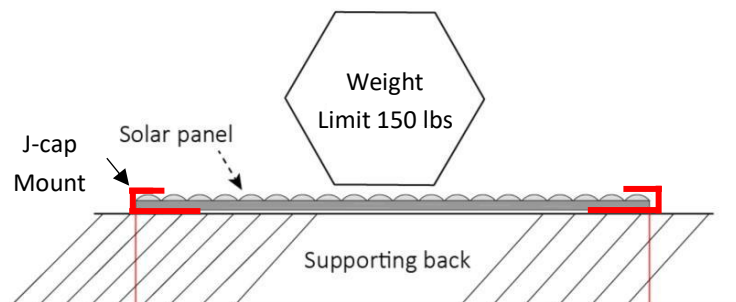
3.1 Mechanical characteristics

- ① Semi-rigid panels can be walked on with anti-slip or flat shoes.
- ② Semi-rigid panels can support weight up to 150 pounds, with a rigid backing supporting the panel (see picture 2). Placing heavy objects (such as installation tools) on the surface of the panel during or after installation of the PV module is acceptable if the objects are no more than 25 pounds. Remove all obstructions once panels are installed.
- ③ Semi-rigid panels can be mounted on surfaces with a bending angle not to exceed 3° to conform to the shape of the mounting surface.
- ④ Do not jump on the panel.
- ⑤ Do not walk on panels that are installed on uneven surfaces. (see picture 1)



↑Picture 1

- ⑥ Do not pick up or carry panels using the junction box, wires or other components. Carry the panel properly supported. Handle panels with care. Do not drop the panels.
- ⑦ **Disconnect the panel from the controller (open the panel charging circuit) when storing gear on top of the panel. Turn off the panel when partially shading the panel with gear.**



↑Picture 2

3.2 Electrical characteristics

Operating Temperature[°C]: -40/+85°C, below -40°C or over 85°C, the panel might stop working, please keep panel surface within the operating temperature. A sudden big drop or rise on the panel surface's temperature may shorten its lifespan. Please allow the module to cool off or warm up gradually.

Maximum System Voltage[V]: 200VDC ; **Flame retardancy:** UL94 VTM-0

The rated electrical characteristics for the solar modules are measured under standard test conditions (STC) of irradiance 1000w/m², AM 1.5, and cell temperature 25°C. The specific electrical characteristics of our solar modules are included in Exhibit A of this installation manual. The main electrical parameters under STC conditions are also marked on the label sticker. In some cases, the current or voltage generated by the module may be greater than the optimal operating current or voltage of its standard test conditions (STC). When determining module ratings and load values, the module open circuit voltage and short circuit current at STC should be multiplied by 1.25 or more.

4.0 Storage and Unpacking

- Store the semi-rigid solar modules in a dry and ventilated environment.
- Modules must be shipped in the box provided by manufacturer and stored in the original box prior to installation. Please protect the packaging from damage. Open the solar module package following the recommended unpacking steps. Be careful to unpack, transport and store the solar modules.
- Do not apply excessive loads on or hit corners of the module.
- Inspect all modules for damage during transportation before installation and do not install damaged PV modules. Contact manufacturer or local distributor if modules arrive damaged.
- Damaged modules may affect performance and safety and may affect warranty.
- Do not damage or scratch the surface of the module by sharp knife or tools.
- Do not disassemble or modify the module in any way.

5.0 Module installation

- Do not install solar modules near to flames or flammable objects.
- Do not immerse the panel module in water for an extended period of time.

- Ensure that the modules meet the overall technical requirements of the system.
- Arrays with modules wired in series will increase voltage. Arrays with modules wired in parallel will increase current. Do not exceed the maximum system voltage of the module. In series connection, the positive pole of the module is connected to the next negative pole. In parallel connection, the positive terminal of the module is connected to the positive terminal of the next module.
- The quantity of bypass diodes will vary depending on the module model.
- If overcurrent protection devices (fuses) are not used in series within each string of modules, maximum 2 strings of modules can be connected in parallel. If a suitable validated overcurrent protection device(fuse) is connected in series with each string of modules, 2-3 modules can be connected in parallel. If the system current in parallel is greater than the solar panels' maximum series fuse rating (this data can be found on label stickers put on back of solar panel), individual fuses (10 amp) should be placed in the positive line of each panel before the parallel connection to prevent damage from overcurrent.
- If the circuit breaker and overcurrent protection circuit breaker cannot be turned on, or controller cannot be turned off during module installation or wiring, cover the array modules with opaque material to stop the power output.
- Do not attempt to repair any part of the module. There are no reparable components.
- The cover of the junction box should remain closed at all times.
- For optimum performance and for cooling the solar panel a 4 mm twin wall polycarbonate material can be placed between the cabin or rack top and the bottom of the solar panel. This will allow some air flow under the panel resulting in a cooler operating solar panel.

5.1 Avoid shadows

- Even small shadows (such as dust, bird droppings, and branches) can cause a drop in power generation. Maximum performance will be achieved if there are no shadows. Ensure that the sun shines on it even on the shortest day of the year. When the modules are installed on the RV, avoid shadows such as buildings and trees when parking.
- Continuous obstruction of the solar cells can cause EVA aging and continuous heating of the solar cell or module unit, and could damage the unit.
- CMPower shade tolerant panels will have considerably higher performance in shading conditions (up to 40% more power generation).

5.2 Solar module wiring

5.2.1 Correct electrical wiring

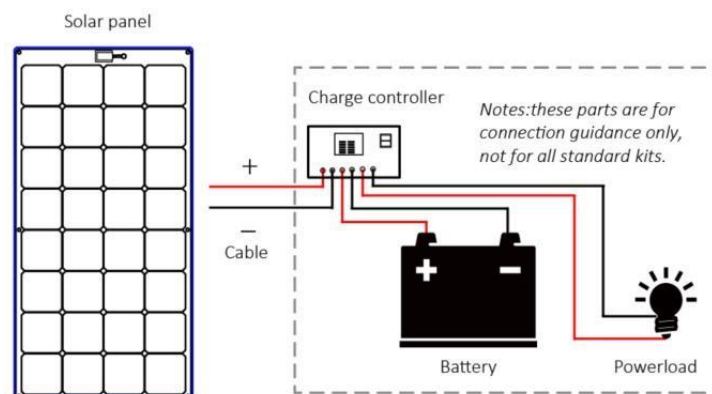
- Check that the wiring is correct before starting the system. If the measured open circuit voltage (Voc) and short circuit current (Isc) are not close to the specifications provided on the label on the back of the panel, there may be a wiring fault.

5.2.2 Correct connection of the electrical plug

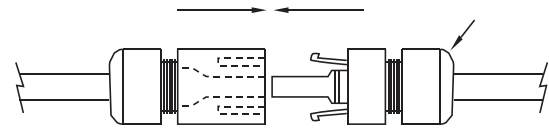
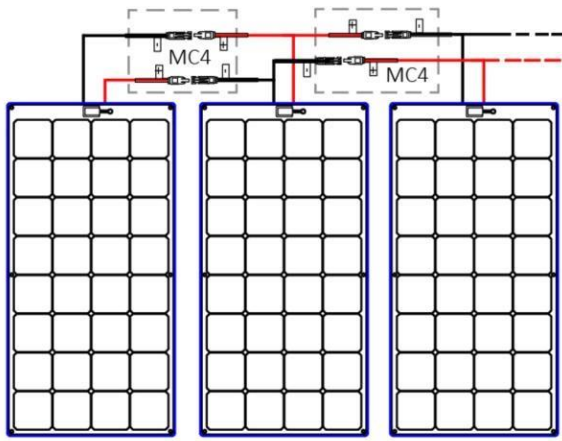
- Make sure the connectors are tightly, properly connected.
- The connector should only be used for circuit connection, not for turning the circuit on and off. Connector connections should be kept dry and clean to prevent corrosion from moisture. Avoid direct sunlight on the connectors. Electric conducting grease may be used inside the connectors to prevent corrosion.

5.2.3 Different connectors for wiring

For a single panel system, the cables should connect directly to the charge controller or portable generator. MC4, SAE or other quality waterproof connectors should be used for both series or parallel configurations.



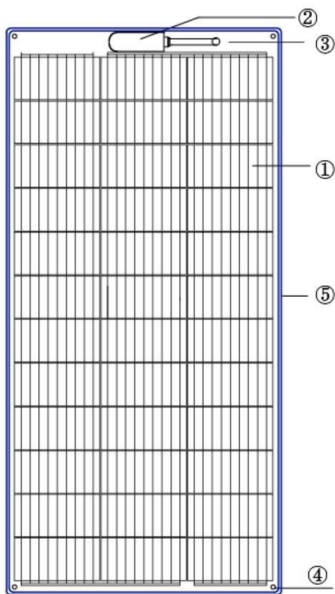
↑ **Picture 3:** 1 panel cable system wiring, connector may not be necessary



Notes: Series connection, "Y" shape connector is recommended

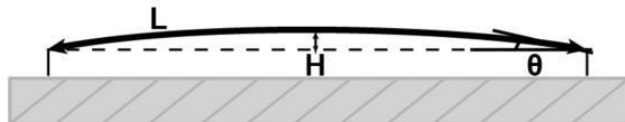
↑ **Picture 4:** multi-panel wiring using MC4 male and female connectors

6.0 Installation guide



- ① Solar cell
- ② Junction box
- ③ 2m Cable and connector(factory standard kit does not include connectors)
- ④ Marked hole locations to secure panel with screws
- ⑤ Transparent layer to protect solar panel edge

← **Picture 5**



↑ **Picture 6**

L: solar panel length

H: height from horizontal line to center of panel; θ : max bend angle

Note: $\theta \leq 10^\circ$, bending angle less than 10° , if installed on curved surface, the angle should be less than 10° . The semi-rigid panel is designed for flat or slightly curved surfaces.

Each module needs to be fastened by at least 4 points on the two long sides unless the CMP J Cap mounting system is used..

Note: $\theta < 30^\circ$, instantaneous bending angle less than 30° , if install on curved surface, the angle should be less than 20° .

6.1 3 ways to install flexible solar module

① Corrosion resistant fasteners - Drill holes in the panel at the marked transparent hole locations at each corner of the panel and along the edges of the panel. All fastening hardware (such as bolts, spring washers, flat washers, nuts, etc.) should be stainless steel. Each module should be fastened at each transparent hole location.

② Adhesive - Apply PV professional silicone gel or equivalent on the back of panel or edge to adhere the module on surface. Apply weight to the panel as necessary until adhesive cures. ③

CMP J-cap mounting kit - The CMP J-cap mounting kit consists of two J shape extrusions to be placed on the two long sides of the panel. The J-cap extrusions can be adhered to the deck surface with VHB (Very High Bond) double sided tape. Allow a small space between J-caps and the panel for panel expansion.

- Note - When mounting on a curved surface, the angle of bending of the module should not exceed 10° . The semi-rigid panel is designed for mounting on a flat or slightly curved rigid surface.

7.0 Maintenance

- Do not replace components (diodes, junction boxes, connectors, etc.) without authorization.
- Routine maintenance measures should be taken to keep the solar module free of sun blocking obstacles such as snow, bird droppings, seeds, pollen, leaves, branches, dust, stains, etc.
- If the assembly has sufficient tilt angle (at least 15°), it is usually not necessary to clean the surface (ETFE surface can clean itself under rain). If there is significant dirt on the surface, flush the solar module array with water (do not use detergent) and a mild cleaning tool (sponge) during the day when it is cool. Do not scratch or wipe the dust in a dry condition as it may cause minor scratches.
- If there is snow or dust, use a soft brush to clean the surface of the unit.

- The system should be inspected regularly to ensure that the wiring and support structure are intact.
- If you need inspection or maintenance of electrical or mechanical performance, it is recommended that you have a certificated and approved professional inspect or maintain the module array to avoid electric shock or personal injury.

8.0 Troubleshooting

Below are some things to consider to determine if your system is performing properly.

1. The batteries need to be hungry and able to accept the power the solar panels are capable of producing. If you are on shore power or if your batteries are nearly full, the controller will back off so as to not overcharge the batteries. This will result in you seeing lower output from the panels.
2. The panels lose efficiency when hot. In full sun on an 86 degree day the panels are probably 150 degrees. The panels decrease in performance 10% for every 25 degrees over 75 degrees F. So the panel performance could be reduced by 30% because of their heat.
3. If the panels are reasonably cool and you have full sun you should see within 15% of the panel rated voltage and amperage using a meter with a shunt to measure amps.

You need a meter with wires, not a meter with the clamp around the wire.

4. Sun angle. temperature of the panel, state of charge of the batteries are all factors related to panel performance.
5. If you are not achieving the expected panel performance, check the wiring from your controller to your batteries and check the breaker/fuse. This should be a #6 wire or possibly a #8 if the run is short. If the power can't get to the batteries, the controller will back off the power received from the panels.

And in addition:

To troubleshoot a low producing array, do the following:

1. Disconnect the array from the controller and put a meter on the wires to measure both the Voltage and Amperage.
2. If the values are low or zero in full sun, move to the connection at the T-branch and check the V and A there.

3. If the values are low in full sun, move to the solar panel pigtails and measure the V and A there.
4. If a panel is low in full sun without shading, the panel may need to be repaired or replaced.
5. If the measurements show full performance of the solar array (within 70% of specification), the problem is likely with the wiring from the controller to the battery bank.
6. Check the fuse between the battery bank and the controller. Check all wire connections for good connections.
7. If the meter indicates the panels are performing properly and the controller wires are secure, the issue could be with the controller. Try disconnecting all wires from the controller, let it sit for 20 minutes, reconnect the controller to the battery and then reconnect the controller to the solar array.

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