ECO-WORTHY



# 400W SOLAR PANEL KIT

**SUPPORT**

If you are experiencing technical problems and cannot find a solution in this manual,please contact ECO-WORTHY for further assistance.

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# 1.General safety

*Do not disassemble the module or remove any attached nameplates and components from the module.

*Please abide with all local, regional and national statutory regulations when installing the system or mounting on vehicles. Obtain a building permit when necessary.

*Please cut off the electricity before carrying out the installation.

*Please remove all metal items such as rings, bracelets, and watches firstly and choose proper, insulated tools to install the system.

*Please make sure all wire connections are tight and secure, because loose connections may cause sparks and intermittent current.

# 2.Product Introduction




**The kit contains:**

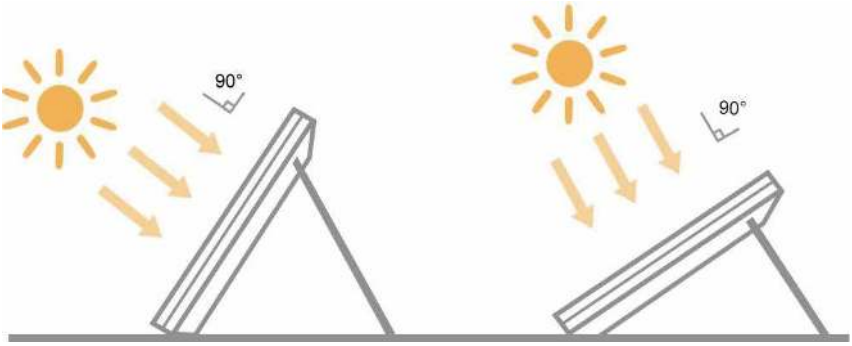
·4 PCs 100W Monocrystalline Solar Panel
·1 PC of 12V/24V 40A MPPT Solar Charge Controller
·1 Pair of 16ft 11AWG Solar-Controller Cable
·1 Pair of 4.92ft 11AWG Battery-Controller Cable
·3 Pairs of Y Branch Connector
·4 Sets of Z Bracket
·Necessary bolts and nuts designed for plane installation

# 3.Solar Panel Installation

## 3.1 Location

Determine a location for the solar panel that is in direct sunlight and clear of any shading by adjacent obstacles such as trees, roof overhangs, etc. Ideally, the panels will be positioned to minimize the wiring distance between the solar panel and the charge controller.

The mounting angle should be equal to the latitude location of where you are installing the solar panels.For example, the latitude of Miami, Florida, USA is 25 degrees. Therefore, solar panels installed in this area should ideally be facing true south at a tilt angle of 25 degrees.




## 3.2 Installation

**Step1:Attaching the Z-Bracket to a solar panel**

Solar Panels have two mounting holes on each side.Attach the Z-Brackets to the panel.



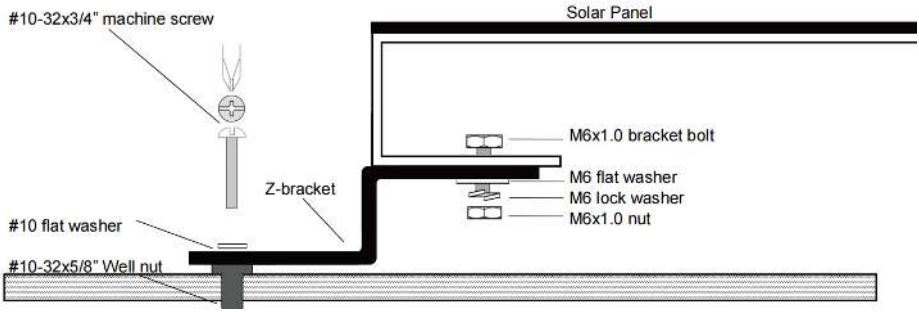
**Step2:Mark and drill holes**

Mark the holes for the well-nut.

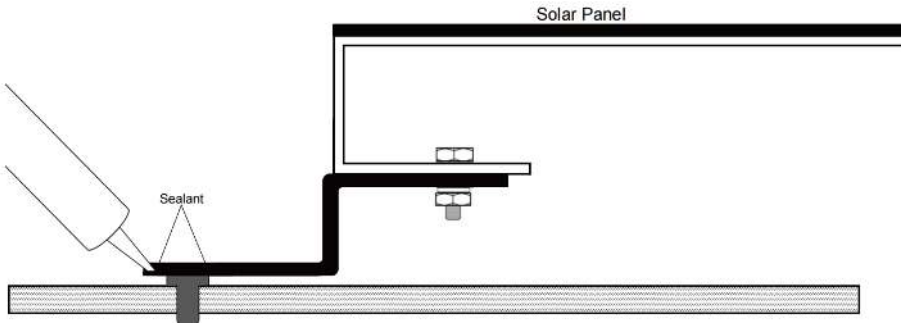


**Step 3: Attaching the panel to the roof**

Figure picture below illustrates the correct way to use the well-nut. The rubber flange has to be flush with the roofline. The Z-Bracket,along with the flat washer and lock washer, hold the well-nut in place when the screw is fastened.



Gently insert the well nut into the drill hole . Be careful not to push the well nut flange completely into the holes. Make sure the flange is flushed on the roofline.Before attaching the panel to the roof, a film of caulk can be laid between the RV roof and the Z-Bracket. Even though the well-nut provides a watertight bond, this still needs additional sealant.

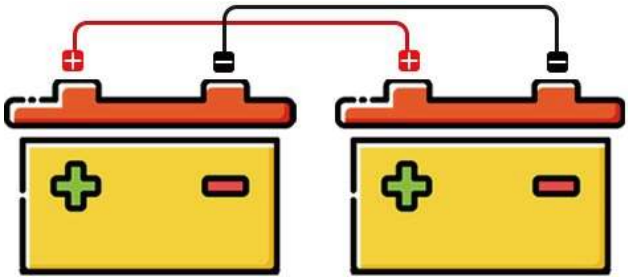



# 4.Connection Method

## 4.1 How to connect as a 12V system (Battery not included)

**1.Connect the battery pack(If you want to equip the kit with batteries).**

Firstly, use battery-to-battery cables to form the 2 batteries in parallel by connecting the positive terminal to the positive terminal, and the negative terminal to the negative terminal.

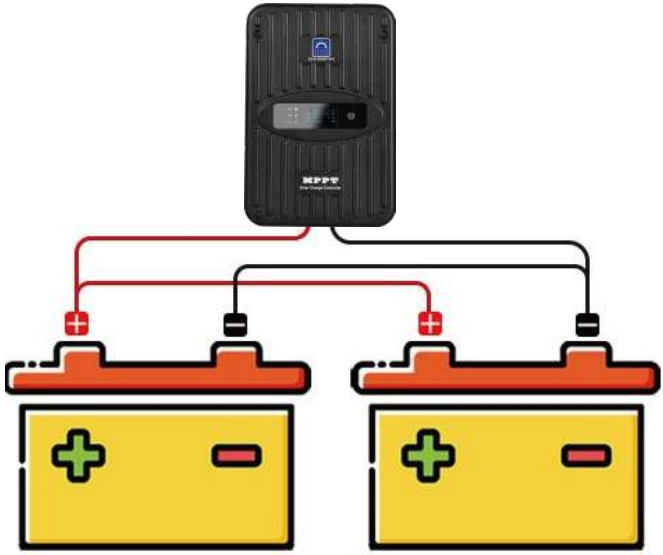


**(Battery not included)**

**2.Connect the battery to the controller.**

First, connect the negative cable to the negative (−) battery post. The best way to secure the battery cable to the battery post is by using a ring terminal. A bolt is sufficient to secure the ring terminal onto the battery post, allowing for better electrical contact. Next, connect the bare stranded portion of the cable to the negative (−) battery input terminal on the charge controller

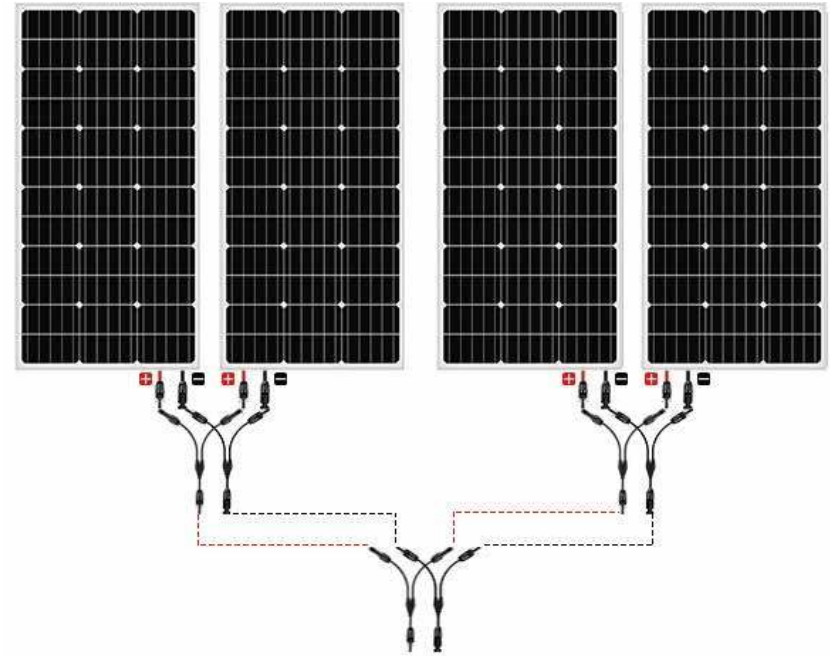
Similarly to the instructions described above, connect the positive cable to the positive (+) battery post. An in-line fuse can be added to this cable for better protection, a fuse holder would be commonly recommended. This is usually done with a fuse holder.



**(Battery not included)**

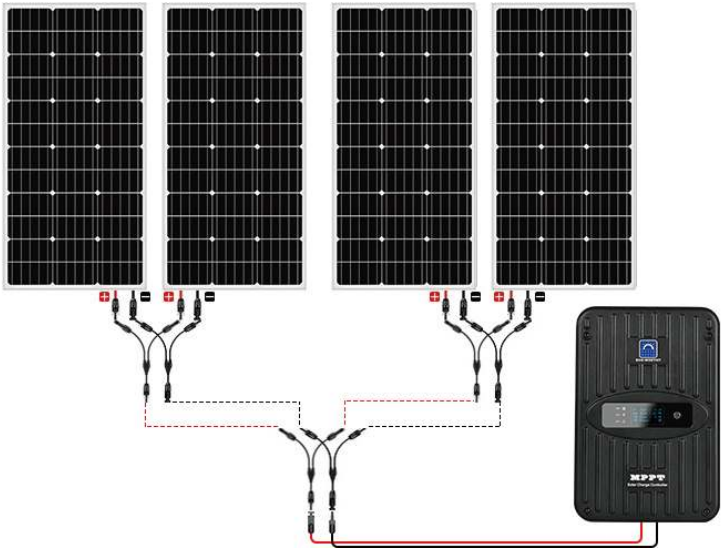
**3.Connect every 2 solar panels in parallel**

To build a 12v DC solar panel kit with 4 panels, wire them in parallel with the Y branch connectors.



**4.Connect solar panels to controller**

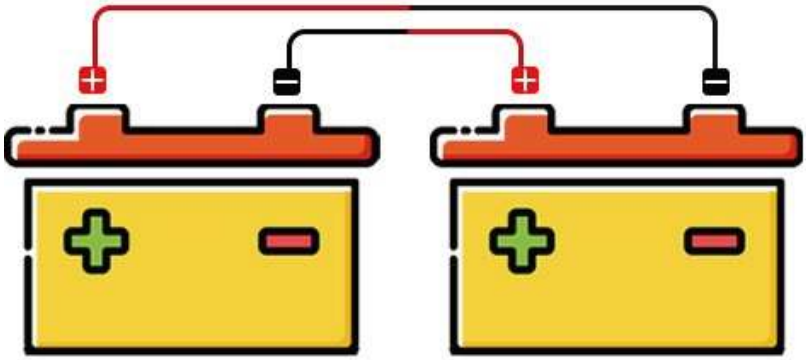
Finally, With 1 pair of solar-controller cable to connect solar panel and controller.



## 4.2 How to connect as a 24V system (Battery not included)

**4.21.Connect the battery pack(If you want to equip the kit with batteries).**

Firstly, use battery-to-battery cables to form the 2 batteries in series by connecting the positive terminal to the negative terminal, and the negative terminal to the positive terminal.

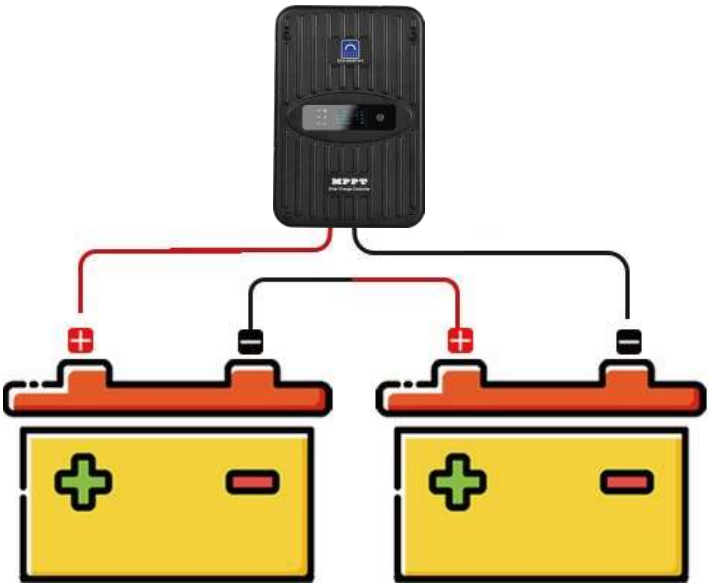


**(Battery not included)**

**2.Connect the battery to the controller.**

First, connect the negative cable to the negative (−) battery post of one of the battery. The best way to secure the battery cable to the battery post is by using a ring terminal. A bolt is sufficient to secure the ring terminal onto the battery post, allowing for better electrical contact. Next, connect the bare stranded portion of the cable to the negative (−) battery input terminal on the charge controller

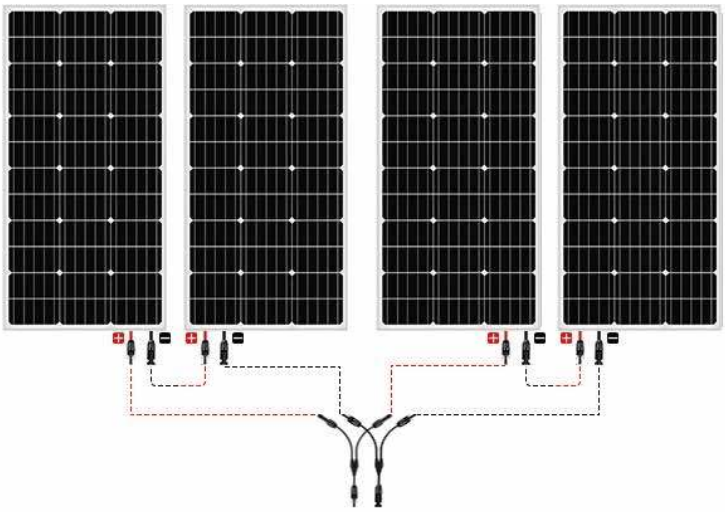
Similarly to the instructions described above, connect the positive cable to the positive (+) battery post of other battery. An in-line fuse can be added to this cable for better protection, a fuse holder would be commonly recommended. This is usually done with a fuse holder.

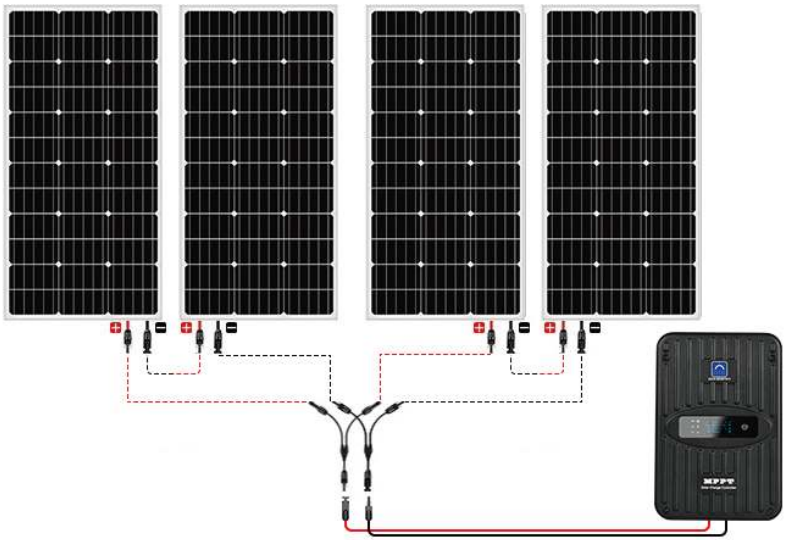


**(Battery not included)**

### 3.Connect panels in 2S2P

To build a 24v DC solar panel kit with 4 panels, wire each two in series first, then use the Y branch for parallel connection.





## 5.Testing and Troubleshooting

**Testing**

Test all electrical and electronic components of your system before commissioning it. Follow the instructions in the guides supplied with the components and equipment.

·Test modules connected in series before they are connected to the system.

·To determine Voc and Isc in the following tests, the module(s) must be exposed to the sun and not connected to a load. Observe personal safety when making these measurements.

·Check the open-circuit voltage (Voc) of every series module using a digital multimeter. The measured system Voc should correspond to the sum of the Vocs of the individual module. You will find the rated voltage in the technical specifications of the specific module. If the measured value is significantly lower than the expected value, proceed as described under “Troubleshooting an low voltage”.

·Determine the short-circuit current (Isc) of every series circuit. It can be measured directly by connecting the digital multimeter to the two terminals of the series circuit or module. Attention, the rated scale of the ammeter or the rated current of load should be more than 1.25 times of the rated short-circuit current of the series module. You will find the rated current data in the technical specifications sheet. The measured value can vary significantly, depending on weather conditions, the time of day, and the shading of the module.

**Troubleshooting a low voltage**

To identify the commonly low voltage and excessively low voltage, the commonly low voltage mentioned here is the decrease of open-circuit voltage of the module, which is caused by the temperature rising of solar cells or lower irradiance. Excessively low voltage is typically caused by improper connections of the terminals or defective bypass diodes.

·First, check all wiring connections to see if it is not open-circuit or is not connected well.

·Check the open-circuit voltage of each module

·Disconnect the wiring at both terminals of the modules.

·If the measured voltage is only half of the rate, this indicates a defective bypass diode. By replacing or remove the diode, the issue may be sorted. Removing the bypass diodes should only be done by a competent PV technician and the module has to be disconnected from the system.

In the case of fine irradiance, if the voltage across the terminals differs from the rated value by more than 15%, this indicates a bad electrical connection.

# 6.QA

**Q1. Why doesn't my photovoltaic panel display charging after it is connected?**

A1. Check whether the photovoltaic panel wiring is correct, whether there is reverse connection, whether the photovoltaic panel voltage is higher than the battery voltage, whether the photovoltaic panel has obstructions that cause the voltage to drop, under normal circumstances, please use a photovoltaic panel with a rated voltage of 18V for a 12V battery.

**Q2. Why is my charging current low?**

A2. The greater the power of the photovoltaic panel, the stronger the sun, and the greater the charging current. On the contrary, incorrect photovoltaic panel voltage, foreign object blocking, shadow blocking, etc. will cause the current to decrease. In addition, when the battery voltage is high, it will enter the floating charge. State, the charging current will also become smaller and smaller at this time.

**Q3. Why doesn't my load light up?**

A3. The reasons for the load not turning on may include incorrect setting of the load working mode, such as setting the light control but asking why the load is not turned on during the day, the controller cuts off the load due to insufficient battery power, or the load wire is not connected and disconnected , The load burns out, etc.

**Q4. What should I do if my electricity time is not long enough?**

A4. If the daily power generation of the photovoltaic panel is less than the power consumption of the load, it will cause a situation of making ends meet. It is recommended to increase the photovoltaic panel to cope with the extreme rainy weather. In addition, the battery capacity can be increased, or the load wattage can be reduced or Work time to balance the entire system.

## 7.Maintenance

The following maintenance suggestions can better ensure the optimum performance and longevity of the solar system:

*Inspect the solar panels and make sure the surfaces are free from dust, dirt, and other debris. Clean the glass surface when necessary.

*Always use water and a soft sponge or cloth for cleaning. A mild, non-abrasive cleaning agent can be used to remove dirt.

*Check the electrical and mechanical connections every six months to verify that they are tight, secure and undamaged.

*Check to make sure all structural components and mechanical fasteners are clean, secure, and corrosion-free. Replace the damaged components if necessary.

## 8.Support

For the use of this manual and the conditions or methods of installation, operation, use, and maintenance of photovoltaic (PV) product are beyond ECO-WORTHY's control, **ECO-WORTHY** does not accept responsibility and expressly disclaims liability for any loss, damage, or expense arising out of or in any way connected with such installation, operation, use or maintenance.

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This product is covered by a 1 year warranty provided by **ECO-WORTHY** Ltd. We will refund or partial refund or replace any products with defects due to our imprudence.

If you are experiencing technical problems and cannot find a solution in this manual, please contact **ECO-WORTHY** for further assistance.

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