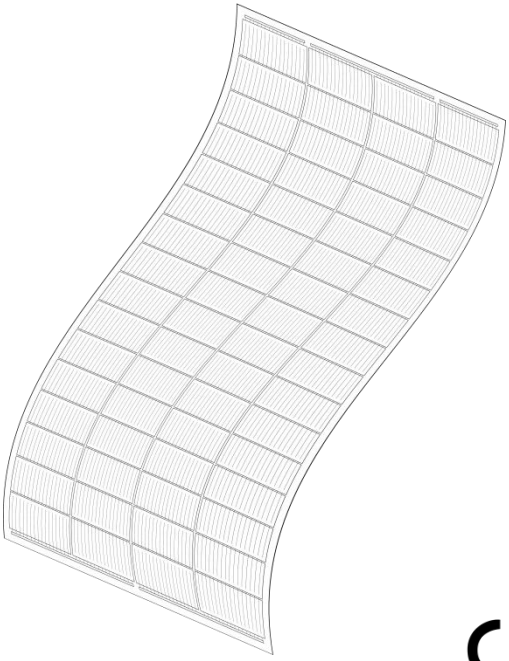
# FLEXIBLE PHOTOVOLTAIC MODULES

## Instruction Manual



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https://www.renepv.com/

Version：2024.07

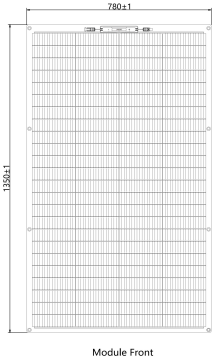
## Box contents

2 × Flexible PV Module　　18× Cable Ties　　1 × Instruction Manual

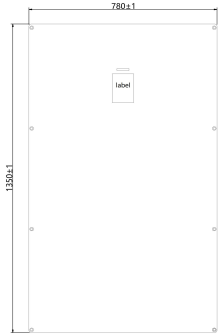
## Solar panel specifications

| | |
|---|---|
| Module Type | RFMM12NH4-225 * |
| Peak Power(Pmax)±3% | 225W |
| Power Tolerance | 0~+5W |
| Max.Power Voltage(Vmp) | 29.37V |
| Max.Power Current(Imp) | 7.66A |
| Open-circuit Voltage(Voc)±3% | 34.89V |
| Short-circuit Current(Isc)+3% | 8.11A |
| Module Efficiency | 21.4% |
| Operating Temperature | -20~+65℃ |
| Max. Series Fuse Rating | 15A |
| Max. System Voltage(DC) | 1500V(IEC) |
| Application Class | Class A |
| Safety Rate | Class II (IEC) |
| Module Dimensions | 780(±3)*1350(±3)*2.5mm |
| Module Weight | 3.7kg(±3%) |

## Product diagram




Module Front




Module Back

*This type of flexible module is suitable for balcony photovoltaic systems and small independent off-grid power generation systems.

## Warnings

Please read and follow these instructions and warnings carefully; failure to comply with instructions will void the warranty.

- Leave the photovoltaic module in the packaging until it is installed.
- Check the physical integrity of the solar panel before installation.
- Do not touch electrically active parts of the solar panel, which can generate sparks and electrical discharges at low voltage. Use it cautiously.
- The photovoltaic module produces electricity when the front part is exposed to sunlight; the voltage produced by a single module is not dangerous.
- When solar panels are connected " in series" the voltage is cumulative, whereas when connected " in parallel " the current is cumulative. A system with multiple solar panels connected to each other can produce high voltages and currents, which is dangerous and could cause serious injury or death.
- The solar panel must be handled carefully avoiding excessive bending (curvatures greater than 20% of its length may cause irreparable damage to the solar cells).
- Do not move the solar panel by the cables.
- Do not put localized pressure on the solar panel.
- Avoid shade on the solar panel for a long time.
- Do not use the solar panel for purposes other than those for which it was designed and built.
- Do not place the solar panel near the heat source.Do not install on color steel tile roofs or cement board roofs.
- Do not disassemble or modify the solar panel components ( junction box, cables and connectors).
- Do not pierce the solar panel, even in areas that are far away from the solar cells.
- Do not use paint on the front or the back of the solar panel.
- Do not step on the module .
- Do not concentrate sunlight or artificial light on the solar panel.
- Do not short-circuit the solar panel connectors (do not connect them together)

## General rules for installation

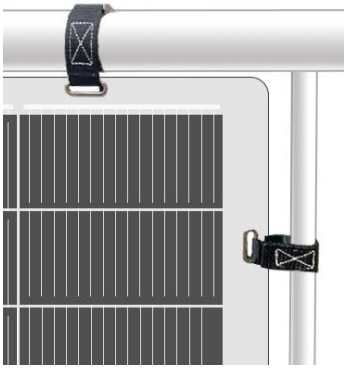
For correct installation of the photovoltaic module, it is necessary to follow these guidelines.

- A solar panel generates electricity when exposed to sunlight; fully cover the surface of solar panel with a dark opaque material to block sunlight during installation or removal.
- The module tends to heat up under operation (because of the effect of solar radiation and the physical phenomenon of photovoltaic action). It is important to disperse the heat for the performance of the solar panel. One solution is to mount the module on a metal surface, because of whose high thermal conductivity, facilitates the dispersal of heat.It is not recommended fastening the module to thermally insulating materials because it would impede the dispersal of heat.
- If the mounting is metallic that conducts electricity, you need to avoid any contact between the metallic material and the electrical terminals of the solar panel when installing.
- Comply with safety regulations and instructions.
- Keeping the solar panel and all tools dry and insulated.
- Do not install the solar panel near to flammable gases or vapors.
- Install solar panels where there is exposed to sunlight ; avoid shaded areas.
- In the event that the cables need to be extended (e.g., to connect the module to a charge regulator), the electrical conductor of the extension cord should be large enough to avoid voltage drops with loss of power. If length of extension cables is more than 4 m, the cross section of the conductor must be at least 4 $mm^2$.

## Mounting

The photovoltaic module can be mounted in the following ways:

- mechanically with eyelets
- bond it using double sided tape
- past it with glue

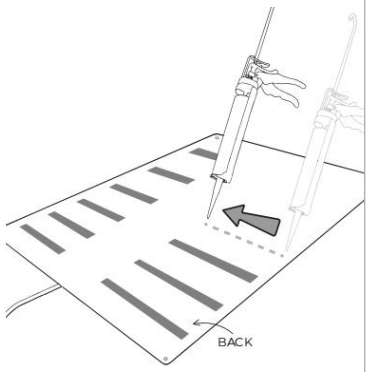


**Mounting the panel by eyelets**

Mounting by eyelets is performed using plastic or metal bushing connectors.
Eyelets are also suitable for mounting panels to non-rigid surfaces (house awnings, camper awnings,tents, etc.), even using elastic bands or ropes.


**Bond the panel by double sided tape**

Bonding the panel by double sided tape when the material of the panel (PC) and the surface which the panel has to be fixed on, have different thermal expansion coefficients (for example, PC and steel or PC and aluminum).




**Past the panel with glue**

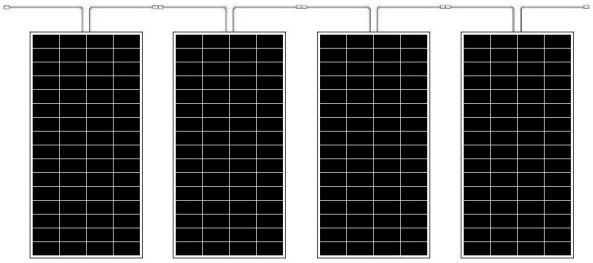
When the module and the surface on which you paste it have the same expansion coefficients (for example if you join PC and plastic or PC and rubber), you can past the panel with glue.

Installation with more complex applications should be instructed by a qualified technician.

# Electrical connections

## Connection of several photovoltaic modules in series

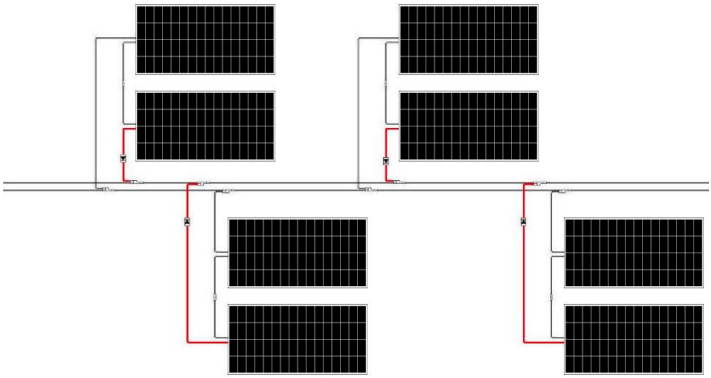
When connecting panels in-series, the positive connector ( +) of panel must be connected to the negative one (-)next to it. Therefore, there will exist a voltage corresponding to the sum of the electrical voltages of every panel between the connector of the first panel and that of the last one.



Warning! The connection is indicated when all panels are exposed to the sun. If more than 4 modules are to be connected, only a qualified technician can conduct the installation.

## Connection of several modules in parallel

In parallel connection, the electrical current is a sum of the electrical current generated by the individual panel. The parallel connection requires the additional connector (parallel connector) which can be ordered from our accessory range.

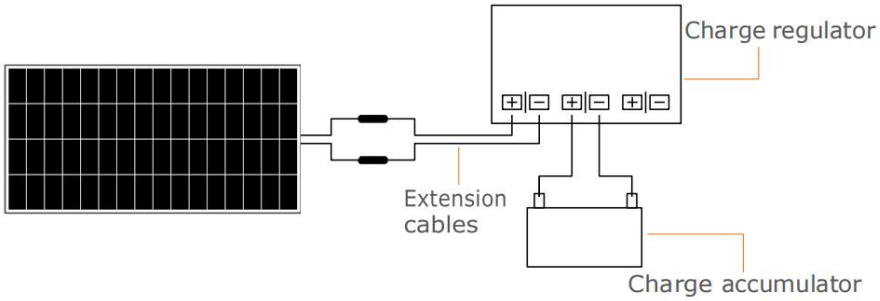


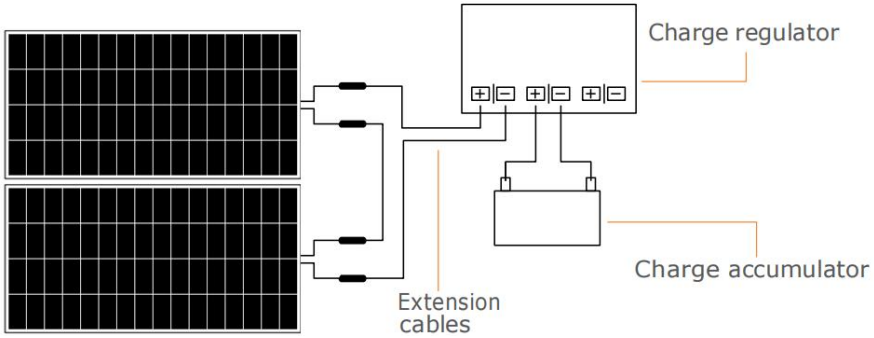
Warning! All the panels connected in parallel must be identical with the same current and voltage. It is necessary to protect the panels by placing a blocking diode on the positive cable of each panel group.

## Connecting to an accumulator (battery)

The connection of one or more panels to an accumulator must be achieved by a charge regulator.

The panel (or the string of panels) must be connected to the charge regulat or and the accumulator by two extension cables.




## Direct connection to usage devices

Direct connection is possible only with usage devices that have a built-in battery and charge regulator.

## Connecting to the power grid

The connection of one or more panels to the power grid is not described in this manual. It must be performed by a qualified technician because small electrical systems are subject to specific regulatory constraints and safety regulations.

## Maintenance

Photovoltaic modules hardly require maintenance. Maintenance includes the following:

- regular cleaning of the solar panel
- periodic inspection
- electrical performance checks

### Cleaning the module

Dirt on the upper surface reduces performance and can cause adverse effects similar to those caused by shade. The phenomenon is seen more in areas with high smog levels or the presence of birds or trees. The intensity of the effect depends on the opacity of the accumulations (grime, soot, leaves, bird droppings, etc.). Rain may reduce or eliminate the accumulation of impurities on the panels.

Cleaning involves washing the module with water and non-abrasive sponges. Do not use pressurized water jets.

### Inspection

Inspect the photovoltaic system periodically in order to check the condition of the mechanical and electrical connections between the devices.

### Electrical performance checks

Periodic electrical performance checks help to ensure the functioning of the photovoltaic module. A reduction of the electrical power generated may indicate an isolated shady area on one or more cells, which can be rectified to obtain optimal performance.

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