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# Solar Module Installation and User Manual

Thank you for selecting solar panel from Einnova-Solarline, China Jiangsu International Group. In order to use the solar panels properly, please read this Installation Manual carefully and completely before any operating.

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## About solar panel

### What is solar panel?

Solar panel is a big semiconductor (PN diode) which can transfer sun energy to electrical energy without any help from mechanical energy and it is exactly quiet and clean energy generator which can create DC electricity continuously under the sunlight.

### Theory

We can supply monocrystalline solar panels. Under the sunlight, the cells in modules will produce electrons and cavities by photoemissions which are influenced by internal electrical field, the electrons will go towards and assemble at N-silicon and cavities will go towards and assemble at P-silicon. As a result, the electromotive force will occur, if they are connected with exterior load, the DC electricity will be created.

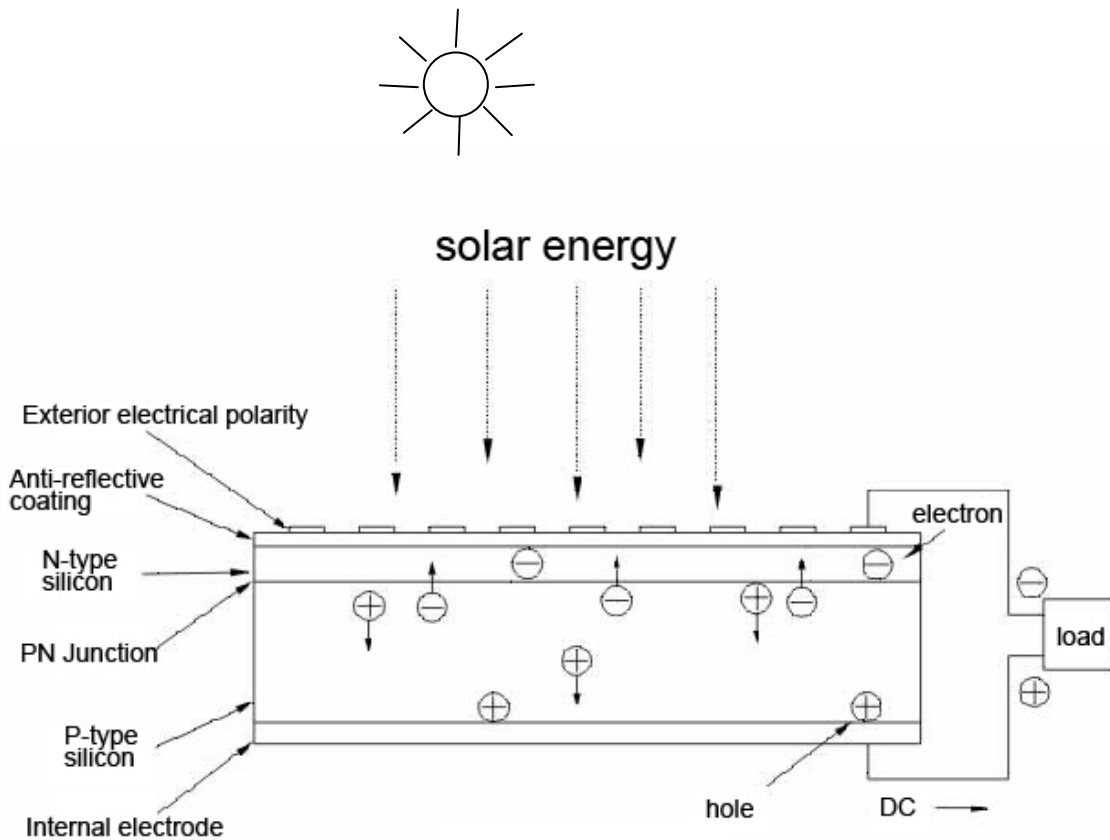


Diagram for cell function

**Characteristics**

- The module is high efficient due to adopting high-efficient cell
- The module is high reliable duo to adopting high transparent tempered glass
- The structure of module is wind-resistant.

**Component names**

The dimension of the modules varies for different types. There are two diagrams below, which show the appearance of mono series and poly series modules.

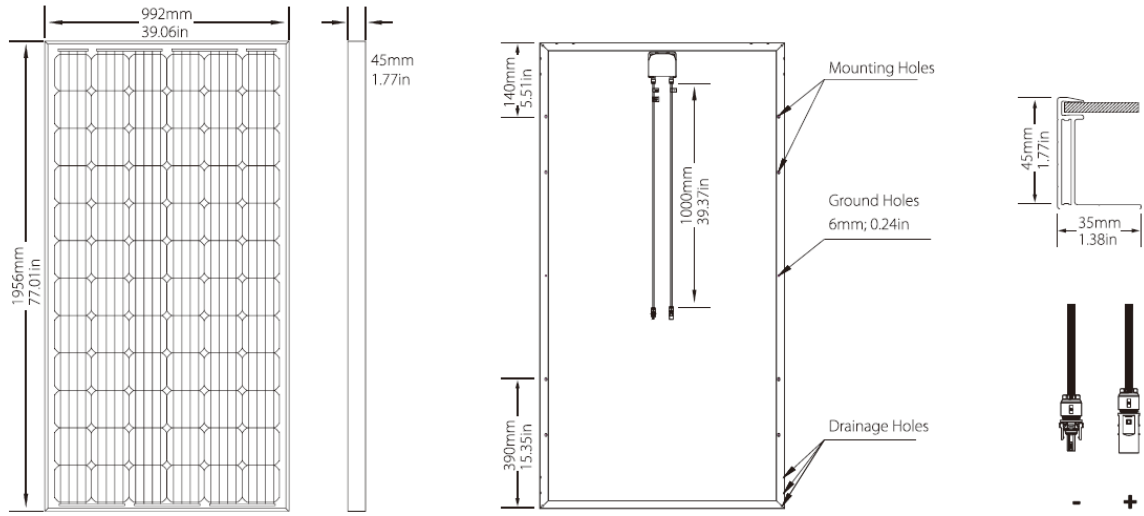


Diagram for ESM315-330 (72 pcs of cells, mono PV module)

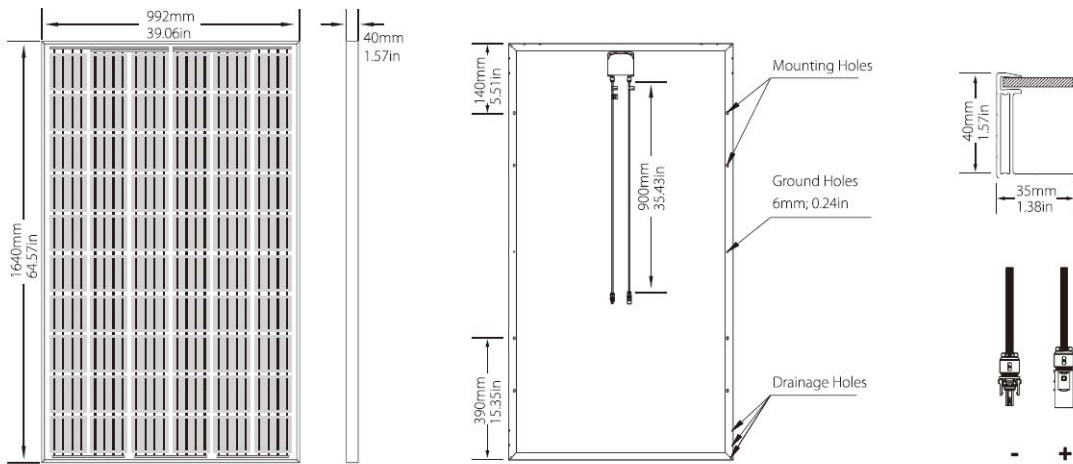




Diagram for ESP255-270 (60 pcs of cells, poly PV module)

**Safety warning**




In order to use the modules properly, avoiding property losses or injuring the operator or anyone else, warnings and some other caution signs are printed on the solar modules and manuals.

■ Sign Introduction

Sign	Introduction
 <b>Warning</b>	Means " Misoperation will cause a risk of lethal or personal serious injury "
	Means "Misoperation will cause a risk of injuring or porperty loss "

Caution

■ Graph introduction

Graph	Introduction
	Prohibited (proceeding not permitted ) The details will be described in the signs, graphs and texts
	Compulsion (proceeding is compulsory ) The details will be described in the signs ,graphs and texts
	Caution (Warning included) The details will be described in the signs or graphs and texts

General warnings



**Warning**



Solar module installation, maintenance, removal and resetting shall only be done by distributor or professionals

- If there were defects, there is a risk of electrical shock or fire.



When installing, wiring, operating, removing and maintaining modules, pay attention to the risk of electrical shock.

- If module is shined by sunlight or other illuminator, the DC electricigy will be produced.
- Artificially concentrated sunlight shall not be directed on the module.
- Under normal conditions, a photovoltaic module is likely to experience conditions that produce more current and/or voltage than reported at standard test conditions. Accordingly, the values of  $I_{SC}$  and  $V_{OC}$  marked on this module should be multiplied by a factor of 1.25 when determining component voltage ratings, conductor ampacities, fuse sizes, and size of controls connected to the PV output. please refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 percent derating) which may be applicable.
- If modules are connected in series or parallel, the voltage and current will increase, the danger will be increased tremendously accordingly.
- When installing, wiring or maitaining modules, in order to prevent producing the DC electricity, please cover the module surface with sufficiently opaque stuff.
- When installing, wiring or maitaining modules, please use protective instruments such as rubber gloves.



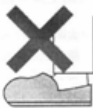











If high reliability is required (the machine is related to person life), please don't use those modules.

- Output is unstable, serious accidence such as lethal injure may occur.
- The modules are qualified for application class A: Hazardous voltage (IEC

61730: higher than 50V DC; EN 61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated (Modules qualified for safety through EN IEC 61730-1 and -2 within this application class are considered to meet the requirements for Safety Class II)






Warning for installation

 <b>Warning</b>			
	Installing, maintaining, removing and resetting modules shall only be done by distributor or professionals.		Don't stand or stamp on the solar modules. Because glass face of the module will be damaged and it is slippery which may make injure to someone.
	Don't touch the terminals. There is a risk of electrical shock.		Don't wear steel stuff like rings. There is a risk of electrical shock.
	Sharp stuff prohibited. It may puncture the back of module. There is risks of electrical shock, electricity leakage and solar module's service life may be shortened.		Don't put wires between frame and prop. The wire may be damaged and cause electrical shock and fire.
	When connecting modules with other controlling device, please entrust distributors or professionals.		Don't damage or process wiring material. It may cause a risk of electrical shock.


 <b>Warning</b>			
	Grounding		Don't install solar modules on

<p>If not connected properly, it will cause a risk of electrical shock. Please don't connect the cable with any other pipes such as gas pipe, water pipe, thunder-avoiding rod etc. Each PV module has a hole on the each side with a grounding sign. The use of the listed grounding and bonding equipment (KDER), type 1954381-1, by Tyco Electronics Corp (E69905), is order to provide a reliable grounding connection to the module frame.</p>	<p>movable objects such as doors, vehicles. The glass may be damaged and cause injury due to libration.</p>
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**Warning for operating**





 <b>Warning</b>	
 <p>Do not open cover of junction box, it may result in electric shock.</p>	 <p>Don't let children approach modules. There was risk of electric shock or injury.</p>
 <p>Do not damage or process wiring material, which may cause risk of electric shock.</p>	 <p>Do not prick back of solar module with sharp objects otherwise may result in electric shock, electricity leakage or make solar module damaged.</p>

 **Caution**


 <p>Don't touch solar modules. The module will become high temperature under sunshine, and may cause a risk of scalding.</p>
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**Warning for maintenance**

 <b>Warning</b>	

 <p>Don't open cover of junction box and clean inside with liquid, it may result in electrical shock.</p>	 <p>Don't immerse the solar modules in liquid, it may result in electrical shock.</p>
 <p>Do not use damaged, abnormal solar module which may cause risk of an electric shock. If so please contact distributor or professionals.</p>	 <p>Don't deform, mend solar Module, it may result in electric shock or be wounded.</p>

**Installation**

 <p><b>Warning</b></p>
<p>Installing, repairing, removing and resetting solar modules shall only be done by distributor and professionals</p>

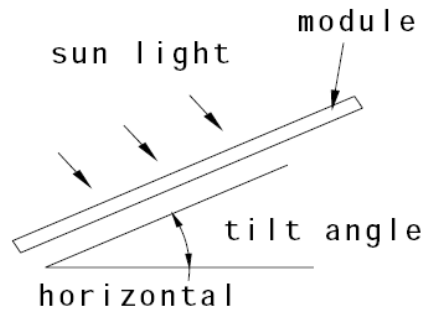
<p>Caution:</p>	<p>Don't put heavy objects on solar module          Don't let optical lens and other spotlight objects to shine the modules directly.          Don't toss or drop the solar modules</p>
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Installation shall be in accordance with CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, and Part 1.

Attention for installation.

The modules shall be mounted so that the junction box shall be in the uppermost position to minimize the ingress of water.

**Site selection**



RECOMMENDED TILT ANGLES FOR A FIXED SYSTEM			
SITE DEGREES	LATITUDE	IN	FIXED TILT ANGLE
0° TO	15°		15°
15° TO	25°		SAME AS LATITUDE
25° TO	30°		LATITUDE + 5°
30° TO	35°		LATITUDE + 10°
35° TO	40°		LATITUDE + 15°
40° +			LATITUDE + 20°

Please select the site without shadows from trees or buildings, enabling the module to be shined by sun frequently. Especially in very hot weather, please pay attention the modules can't be shadowed partly. Furthermore, in different season, the dimension of shadow caused by plant or any other objects will be changed and may shadow some portions of solar modules, resulting in power generation reducing.

- If you want to know the design for tilt angle of support structure in heavy snow area or littoral area please contact distributor

**Installation direction:** the module should face south to get sufficient sunlight to optimize the output of the power generation.

**Tilt angle:** irradiation each day will be different according to different latitudes all over the country. The optimum angle is equal to latitude but also subject to the design conditions such as site and design angle etc.

- PV module will get maximum output of power generation when sunlight irradiates on their surfaces vertically. But if operating time and operating purpose are limited, the above-mentioned design may not be optimum, you also can contact distributor about this.

## Support structure

In order to make PV modules have a long service life outside, please pay attention the following items:

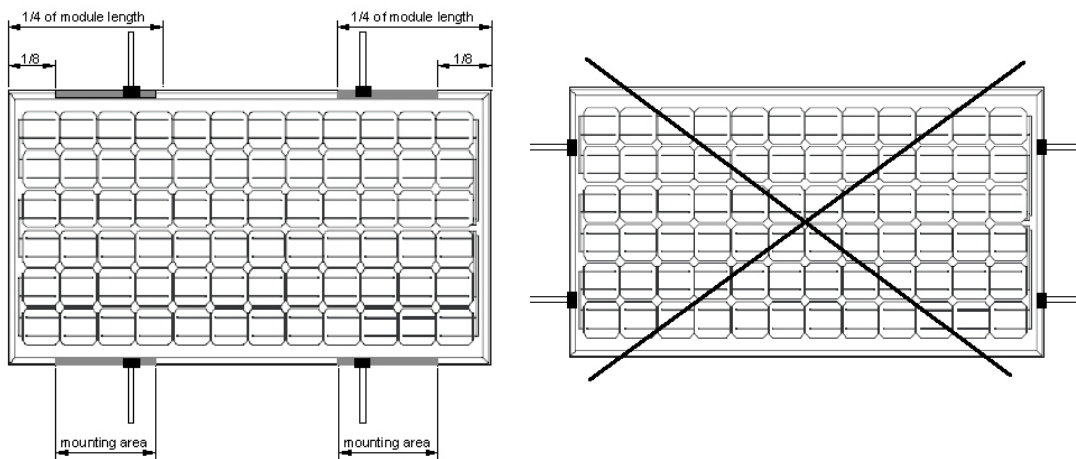
- Adopting strong and safety structure
- Choosing appropriate materiel for solar modules
- Adopting appropriate method for anticorrosion
- Following all kinds of regulations concerned
- Don't damage any parts of modules for power generation



- The site shall be in compliance with ambient and climate
- Be easy to maintenance
- The foundation shall be done by professional designer or construction company

## Installation

### Mounting methods



#### 1. Mounting with Bolts

- The module must be attached and supported by at least four bolts through the indicated mounting holes.
- Most installations will use the four inner mounting holes on the module frame.
- Depending on the local wind and snow loads, additional mounting points may be required.
- Applying M6 or M8 stainless steel screws with power about 5~8N·M

#### 2. Mounting with Clamping Hardware

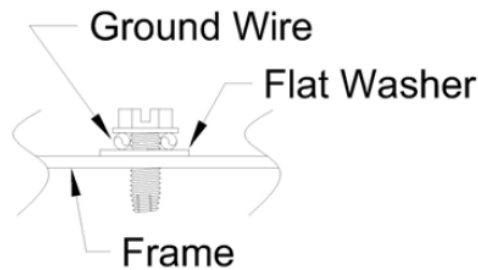
- If module clamps are used to secure the module, the torque on the clamp bolt should be around 8–10 Nm.
- A minimum of four module clamps should be used, two on each long frame side, in the general clamping areas denoted by the wide arrows on the drawing.
- Depending on the local wind and snow loads, additional module clamps may be required.

#### 3. Other

- Other mounting methods are acceptable as long as the minimum requirement as described under 2. Mounting with clamping hardware are met.

## Electrical Installation

### Grounding



Size and earth the equipment grounding conductor in accordance with local requirements. Attach the equipment grounding conductor to the module frame using the grounding hole and hardware provided. Note that a stainless steel flat washer is used between the ground wire and the module frame (see picture above). This washer is used to avoid corrosion due to dissimilar metals. Applying M4x6 stainless steel bolt.

**Tips:**

- Observe all local electric codes and regulations.
- A bonding or toothed washer is required to make proper and reliable electrical grounding connection with the anodized aluminum frame.
- Consider using a lay-in lug, rated for outdoor use, if the module grounding conductor is to be larger than #10 AWG.

**General electrical installation**

- The cable and connector operating temperature: -40°C ~ +85 °C
- Do not use modules of different configurations in the same system.
- This module is supplied with standardized connectors for electrical connections.
- Refer to local code to determine appropriate types and temperature ratings of conductors. Wiring should be #12 AWG, 4 mm<sup>2</sup> (minimum), the maximum over-current rating is 13A.
- Completely cover system modules with an opaque material to prevent electricity from being generated while disconnecting conductors.
- Refer to local code to determine over current, conductor capacity and size requirements.
- Installation shall be in accordance with local code.
- For best performance, ensure that positive and negative DC wires run closely together avoiding loops.
- Module should be mounted over a fire resistant roof covering rated for the application

**Caution**

- Use the long side of module frame as top, bottom side with 4 installation holes to install modules. The modules shall be mounted so that the junction box shall be in the uppermost position to minimize the ingress of water. If PV modules were blow away, it will be very dangerous.
- In salty area please take appropriate methods to prevent solar modules from corrosion.
- If solar modules were connected with other solar modules, the output of power generation will

be deteriorated and may cause bad effect to solar modules. So please avoid this.

- When PV modules are generating DC electricity please use the diodes or other applicable methods to prevent reversed current. Diodes are not subsidiary components of the solar modules.

## Wiring



Junction Box (Tongling 007) Cable (LAPP 4mm2) Connector (Multi-contact 4) Bypass Diode (10SQ050)

Please observe the correct cable connection polarity when installing the modules. If not connected properly, the bypass diode could be destroyed. Series fuse: 13A.

PV modules can be wired in series to increase voltage as shown in figure 1. In this case, the maximum quantity in series is 22 pieces of modules. The voltage is proportional to the number of series.

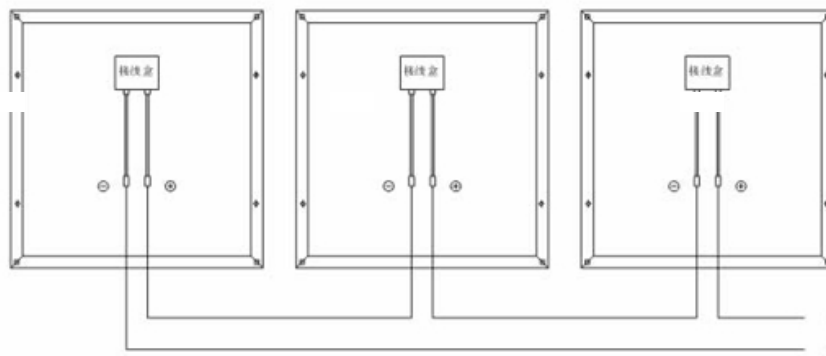


figure 1

PV modules can be wired in parallel to increase the current as shown in figure 2. In case of parallel connection, please take proper measure to block the reverse current flow. The current may easily flow in a reverse direction. The maximum PV modules in parallel are three groups of maximum PV modules in series.

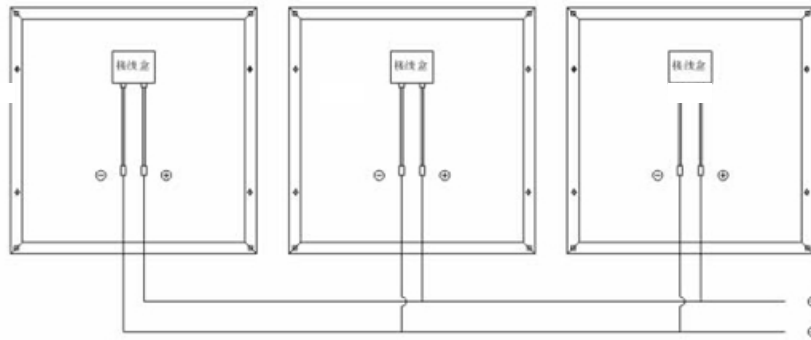


figure 2

## Removal

Only professionals can disassemble or reinstall the solar modules.

## Maintenance & inspection

### Routine inspection

- It is unnecessary to do inspection everyday; our suggestion is one time for one year.
- If the dirt were built-up please clean the surface with soft sponge with water.

### Inspection for wind and rain hazard or earthquake

When wind and rain hazard or earthquake happens, please check whether something dropped on the PV modules and made some damages to them.

### Inspection for salt or snow hazard

- Please make a schedule to inspect whether PV modules were corroded
- After heavy snow, please check the condition of solar modules.

## After-sale service

### Warranty

After filling the form, please contact the concerned distributor.

Model/ series number (printed in label)      Address:  
Date of buying:                                      Name:  
Telephone Number:  
Description of abnormal module:

Please contact distributor for more information. We reserve the right to revise the models/contents without notice.