

# Installation Manual

**For Solar Series PV Modules**

## **1. INTRODUCTION FOR USER MANUAL**

This Manual applies to the installation, maintenance and use of the framed series solar modules manufactured by TILESUN AUSTRALIA PTY LTD. (hereinafter referred to as “TILESUN”). Failure to follow these safety instructions could result in personal injury or property damage.

Installation and operation of solar modules require specialized skills, and only professional personnel can engage in the work. Please read the “Safety and Installation Instructions” carefully before using and operating the modules. The installer must inform the end customer (or consumer) of the above matters accordingly

The term “Module” or “PV Module” in this Manual refers to all framed series solar modules. Please keep this Manual for future reference

TILESUN is not responsible for any form of damage, including but not limited to module operation and system installation error, and personnel injury, hurt, and property loss resulted from failure to follow the instructions in this Manual.

## **2. SAFETY PRECAUTIONS**

### **2.1 WARNING**

Before installing, wiring, operating, or maintaining TILESUN modules, you should read and understand all safety precautions. Direct current (DC) is generated when the battery surface of the module is exposed to direct sunlight or other light sources, and direct contact with the live parts of the module, such as terminals, may result in death of personnel whether connected to the module or not .

### **2.2 GENERAL SAFETY**

- All installation work must comply with the local codes and the relevant international electrical standards.
- TILESUN recommends that PV module installation is conducted by personnel with experience in PV system installation. Operation by personnel who are not familiar with the

relevant safety procedures will be very dangerous.

- Do NOT allow unauthorized persons to access the installation area or module storage area.
- Do NOT install modules with damaged glass or damaged backsheet .
- Do NOT disassemble or move any part of the module.
- Do NOT artificially focus the light on the module.
- Do NOT connect or disconnect the module when it is energized or connected with the external power supply

### **2.3 HANDLING SAFETY**

- Do NOT stand, walk on or step on the module directly.
- Do NOT damage or scratch the front or backside surfaces of the module.
- Do NOT scratch the output cable or bend it with force. The insulation of output cable can break and may result in electricity leakage or shock.
- Do NOT use water to extinguish fires of an electrical origin.
- Do NOT install or handle modules when they are wet or during periods of high wind. At the installation site, take care to keep modules and in particular their electrical contacts, clean and dry before installation. If connector cables are left in damp conditions then the contacts may corrode. Any module with corroded contacts should not be used.
- Please do NOT loosen or unscrew the PV module bolts, which may lead to the module loading drop or even fall down.
- Do NOT drop PV modules or allow objects to fall down on the PV modules.
- Do NOT touch the terminal box or the ends of the output cables (connectors) with bare hands under sunlight, regardless of whether the PV module is connected to or disconnected from the system.

### **3. TILT ANGLE**

The tilt angle measurement of the PV module refers to measuring the angle between the module and the horizontal ground surface. For different projects there are different mounting angles. TILESUN recommends that the mounting tilt angle should be NOT less than 10°, or in accordance with local regulations or follow the recommendations of experienced PV module installers. The tilt angle of the PV module is measured between the PV module and a horizontal ground surface. In the Northern Hemisphere, the PV modules should typically face south, and in the Southern Hemisphere, the PV modules should typically face north.

A clearance of at least 115mm (4.5in) (recommended) is provided between modules frame and the surface of the wall or roof. If other mounting means are employed this may affect the fire class ratings.

### **4.INSTALLATION**

#### **4.1INSTALLATION SAFETY**

- TILESUN Modules can be mounted in landscape or portrait orientation however the impact of dirt shading the solar cells can be minimized by orienting the product in landscape.
- Always wear dry insulation protection equipment: insulated tools, head gear, insulated gloves, safety belt and safety shoes (with rubber soles).
- Do NOT wear metallic jewelry which can cause electric shock during installation.
- Do NOT install modules under rain, snow or windy conditions.
- Please keep the connector dry and clean during installation to avoid the risk of electric shock. It is recommended to install it immediately after unpacking.
- Due to the risk of electrical shock, do NOT perform any work if the terminals of PV module are wet. Please install immediately after you unpacking.
- The application level of TILESUN module is Class A.

- Keep the PV module packed in the carton until installation.
- Please use an opaque material to completely cover the PV module surface during PV module installation and wiring.
- Do NOT unplug the connector if the system circuit is connected to a load.
- Do NOT stand on the module glass while installing. There is a risk of injury or electric shock if glass is broken.
- Do NOT work alone (always work as a team of 2 or more people).
- Do NOT damage the back sheet of PV modules when fastening the PV modules to a support with bolts.
- Do NOT damage the surrounding PV modules or mounting structure when replacing a PV module.
- Cables shall be located and secured so that they will not be exposed to direct sunlight after installation to prevent degradation of cables. Low drooping of cables from the terminal box must be avoided. Low hanging cables could cause various problems such as animal biting, electricity leakage in water, and fire.

## **4.2 INSTALLATION METHOD**

### **4.2.1 WARNING**

The connection of the module to the racking system can be created through the mounting holes . The modules must be installed according to the following examples and recommendations. If a different installation method is desired, please contact TILESUN customer service or technical support team for consultation. Improperly mounted modules maybe damaged. If alternative mounting method is used and not approved by TILESUN, the modules will not continue to have a valid warranty.

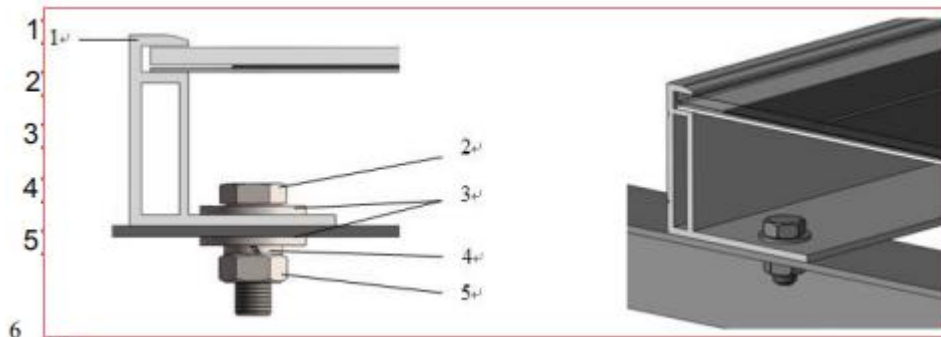
The minimum distance between two modules is 10mm (0.4in).

### **.Mounting with Bolts**

Modules can be attached through the mounting holes on the back frame of the module, by fixing the module to the support rails with bolts. The mounting details are shown in the following figures.

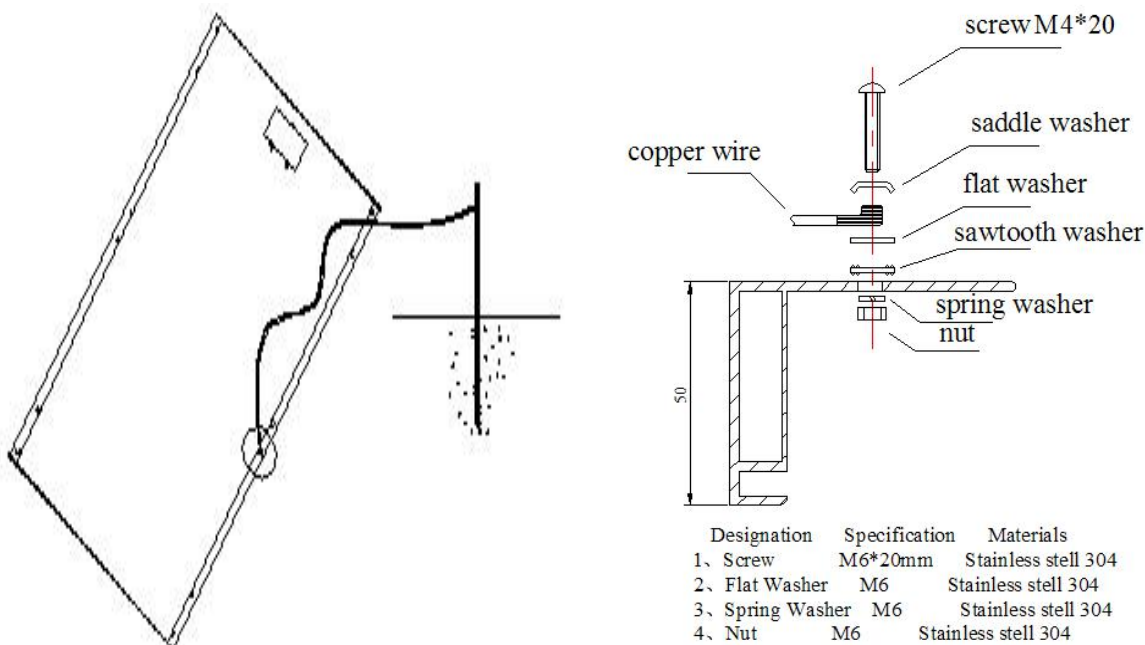
The frame of each module has 4- $\phi 7 \times 11$ mm mounting holes, ideally placed to optimize the load handling capability, to secure the modules to supporting structure.

- To maximize mounting longevity, TILESUN strongly recommends the use of corrosion proof (stainless steel) attachment hardware.
- Secure the module in each mounting location with an M8 bolt and a flat washer, spring washer and nut as shown in Figure 1 and tighten to a torque of 16~20N.m(140-180lbf.in.).
- All parts in contact with the frame should use flat stainless steel washers of minimum 1.8mm thickness with an outer diameter of 20-24mm (0.79-0.94in).



#### 4.2.2 GROUNDING

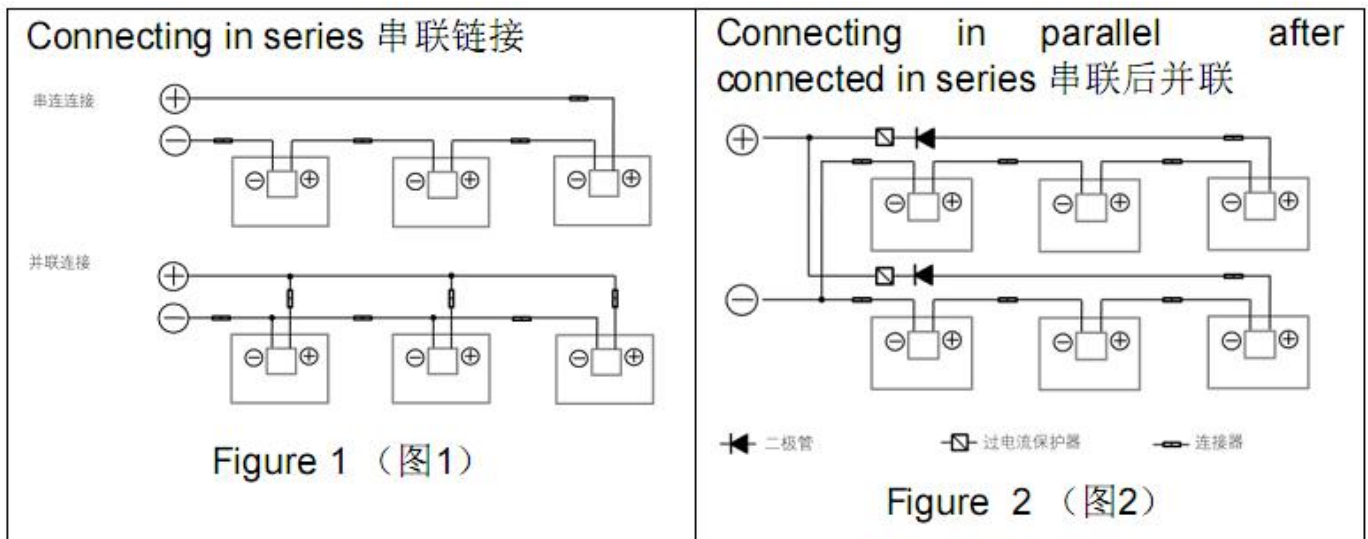
- The grounding structures, shows in picture 1.
- Grounding hole: 2 in all, each side with 1.
- The terminal intended to accommodate an equipment grounding conductor identified by being marked "⊕". Attach a copper wire to grounding holes on modules frame with a saddle washer and a flat washer. Module frame is provided with grounding holes.
- Mounting grounding structure should not contact between dissimilar metals in the section, such as copper and aluminum, which will cause Galvanic corrosion to occur.
- The amount of torque specified to make attachment between the frame and the grounding hardware is 1.5 N·m.
- The grounding wire must be properly connected to the module frame to ensure good electrical contact. The materials and types of the grounding fixture specify with picture 1. The grounding wire is 14 AWG gauge copper wire.



Picture 1: Groundin

### 4.2.3 WIRING

- To ensure proper system operation the correct cable connection polarity (Figures 1 & 2) should be observed when connecting the modules to each other or to a load, such as inverter, a battery etc. If modules were not connected correctly, the bypass diode could be destroyed. PV modules can be wired in series to increase voltage. A series connection is made when the wire from the positive terminal of one module is connected to the negative terminal of the next module. Figure 1 shows modules connected in series. PV modules can be connected in parallel to increase current (Figure 2). A parallel connection is made when the wire from the positive terminal of one module is connected to the positive terminal on the next module.
- The number of modules in series and in parallel shall be designed reasonably according to the system configuration
- All instructions above have to be obeyed to maintain TILESUN's limited Warranty





## 5. MODULE MAINTENANCE FOR PV MODULE PV

### 5.1 PANEL VISUAL INSPECTION AND REPLACEMENT

•The modules in a PV array should be regularly checked for damage. Factors such as glass breakage, cable breakage, and junction box damage may lead to function and safety problems. In the case of a damaged module, replace it with the same type of module. Refer to the *Product Installation Manual* for installation and dis-assembly of module.

•It is recommended to perform a preventive inspection every six months without changing the components of the module. If electrical or mechanical properties are required for inspection or maintenance, qualified professionals should be advised to avoid any electric shock or loss of life

•Trim any vegetation which may shade the solar array, thus impacting performance.

•Check that mounting hardware is properly tightened.

•Check that all string fuses in each non/earthed pole are operating.

•Replacement modules must be of same type. Do NOT touch live parts of cables and connectors. Use appropriate safety equipment (insulated tools, insulating gloves, etc.) when handling modules.

•Cover the front surface of modules by an opaque material when repairing. Modules when exposed to sunlight generate high voltage and are dangerous.

•Do NOT open the junction box to change the diodes even if they malfunction.

•In the event that a module is damaged (broken glass or a scratch on back sheet)and needs to be replaced

Observe the safety precautions listed earlier in the Manual

•Wear cut resistant gloves and other personal protective equipment required for the particular installation.

- Isolate the impacted array string to prevent current flow before attempting to remove the module.
- Disconnect the connectors of the affected module using the related disconnect tool provided by suppliers.
- Replace the damaged module with a new module of the same type.
- Check the open circuit voltage of the array string and verify that this is within 10V of the other strings to be connected in parallel.
- Turn the breaker back on.

## **5.2 CONNECTOR AND CABLE INSPECTION**

Inspect all cables to verify that connections are tight; the cables are protected from direct sunlight and sited away from areas of water collection.

It is recommended to check the torque of terminal bolts and the general condition of wiring at least once a year. Also, check that mounting hardware is properly torqued. Loose connections will result in damage to the array.

## **5.3 CLEANING**

- The amount of electricity generated by a solar module is proportional to the amount of light falling on it. A module with shaded cells will produce less energy and therefore it is important to keep modules clean.
- Clean PV modules when the irradiance is below 200W/m<sup>2</sup>; liquid with a large temperature difference from the modules shall not be used for cleaning the modules;
- It is forbidden to clean PV modules under the weather conditions of wind more than 4 grades, heavy rain or heavy snow;
- When cleaning PV modules, do NOT step on the modules; do NOT spray water on the backside of the module or the cables; do NOT clean the backside of the modules; keep the connectors clean and dry; prevent fire and electrical shock from occurring; do NOT use as steam cleaner;

●When cleaning the modules, use a soft cloth together with a mild detergent and clean water. Take care to avoid severe thermal shocks which might damage the module by cleaning modules with water which has a similar temperature to the modules being cleaned.

●Use dry or wet soft clean cloth to clean the PV modules; non-corrosive solvents or hard objects are strictly prohibited;

●If there are greasy dirt and other substances on the surface of the PV module which are difficult to clean, conventional household glass cleaning agents can be used; Do NOT use the alkaline and strong acid solvents.

## 6.Electrical Parameters for modules

### 6.1 Parameters for different modules

under standard test conditions(irradiance of 1000W/m<sup>2</sup>.AM 1.5 spectrum,and a cell temperature of 25°C).Refer to module datasheets for specific power output tolerances.

YSUN-XXXXP (XXX=30-315W)

MODULE TYPE/S	YSUN-30P	YSUN-35P	YSUN-45P	YSUN-50P	YSUN-65P
Voc (with tolerance) [V]..... :	23.75 ±5%	23.94±5%	21.6±5%	22.14±5%	27.50±5%
Isc (with tolerance) [A]..... :	1.75 ±3%	1.89±3%	2.7±3%	2.92±3%	3.06±3%
VPmax [V]..... :	20.10	20.14	18	18.54	23.10
IPmax [A]..... :	1.49	1.74	2.5	2.7	2.81
Pmax (with tolerance) [W]..... :	30W±3%	35W±3%	45W±3%	50W±3%	65W±3%
Maximum series fuse rating [A]	3	3	12	12	12
Maximum system voltage[V]	1000	1000	1000	1000	1000
Temperature coefficients of Voc	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K
Temperature coefficients of Isc	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K
Temperature coefficients of Pmax	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K
nmot	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C
Type of Connector	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4
Type of Diode	PS4520	PS4520	PS4520	PS4520	PS4520

MODULE TYPE/S	YSUN-75P	YSUN-80P	YSUN-90P	YSUN-95P	YSUN-105P
Voc (with tolerance) [V]..... :	22.14±5%	22.5±5%	22.14±5%	22.5±5%	22.5±5%
Isc (with tolerance) [A]..... :	4.38±3%	4.6±3%	5.26±3%	5.46±3%	6.04±3%
VPmax [V]..... :	18.54	18.90	18.54	18.90	18.90
IPmax [A]..... :	4.05	4.23	4.85	5.03	5.56
Pmax (with tolerance) [W]..... :	75W±3%	80W±3%	90W±3%	95W±3%	105W±3%
Maximum series fuse rating [A]	12	12	12	12	12
Maximum system voltage[V]	1000	1000	1000	1000	1000
Temperature coefficients of Voc	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K
Temperature coefficients of Isc	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K
Temperature coefficients of Pmax	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K
nmot	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C
Type of Connector	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4
Type of Diode	PS4520	PS4520	PS4520	PS4520	PS4520

MODULE TYPE/S	YSUN -115P	YSUN-120P	YSUN-130P	YSUN-155P	YSUN-210P
Voc (with tolerance) [V]..... :	21.9±5%	22.14±5%	22.5±5%	22.32±5%	30.14±5%
Isc (with tolerance) [A]..... :	6.81±3%	7.01±3%	7.47±3%	8.98±3%	9.01±3%
VPmax [V]..... :	18.25	18.54	18.9	18.72	25.34
IPmax [A]..... :	6.30	6.47	6.88	8.28	8.29
Pmax (with tolerance) [W]..... :	115W±3%	120W±3%	130W±3%	155W±3%	210W±3%
Maximum series fuse rating [A]	12	12	12	15	15
Maximum system voltage[V]	1000	1000	1000	1000	1000
Temperature coefficients of Voc	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K
Temperature coefficients of Isc	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K
Temperature coefficients of Pmax	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K
nmot	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C
Type of Connector	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4
Type of Diode	PS4520	PS4520	PS4520	PST4530/T	PST4530/T

MODULE TYPE/S	YSUN-235P	YSUN-260P	YSUN-275P	YSUN-280P	YSUN-315P
Voc (with tolerance) [V]..... :	33.48±5%	36.90±5%	37.2±5%	37.5±5%	44.50±5%
Isc (with tolerance) [A]..... :	9.08±3%	9.12±3%	9.55±3%	9.65±3%	9.16±3%
V <sub>Pmax</sub> [V]..... :	28.08	30.90	31.2	31.5	37.3
I <sub>Pmax</sub> [A]..... :	8.37	8.41	8.81	8.89	8.45
P <sub>max</sub> (with tolerance) [W]..... :	235W±3%	260W±3%	275W±3%	280W±3%	315W±3%
Maximum series fuse rating [A]	15	15	15	15	15
Maximum system voltage[V]	1000	1000	1000	1000	1000
Temperature coefficients of Voc	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K	-0.310%/K
Temperature coefficients of Isc	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K	+0.049%/K
Temperature coefficients of Pmax	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K	-0.407%/K
nmot	47±2°C	47±2°C	47±2°C	47±2°C	47±2°C
Type of Connector	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4	05-6 , H4
Type of Diode	PST4530/T	PST4530/T	PST4530/T	PST4530/T	PST4530/T

**It is the great honor to provide you with our PV modules.**

**For further information,please contact.**

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