

Installation guide for Plurawatt PV Modules

Manufacturer General Information	
Manufacturing name (Company name)	Sunlego Enerji Sistemleri San. Ve Tic. A.Ş.
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Model Name	Module Technology	Number Of Cells	Maximum Power (Pmax) [W] Tolerance ± 5%	Open Circuit Voltage (Voc) [V] Tolerance ± 5%	Maximum Power Voltage (Vmp) [V]	Short Circuit Current (Isc) [A] Tolerance ± 5%	Maximum Power Current (Imp) [A]	Maximum Over Current Protection [A]
PW DC 460 M72	Mono crystalline	144	460	50.25	42.67	11.41	10.78	20 A
PW DC 455 M72	Mono crystalline	144	455	50.10	42.41	11.37	10.73	20 A
PW DC 450 M72	Mono crystalline	144	450	49.83	42.10	11.34	10.69	20 A
PW DC 445 M72	Mono crystalline	144	445	49.55	41.75	11.31	10.66	20 A
PW DC 440 M72	Mono crystalline	144	440	49.25	41.40	11.28	10.63	20 A
PW DC 435 M72	Mono crystalline	144	435	48.99	41.08	11.25	10.59	20 A
PW DC 430 M72	Mono crystalline	144	430	48.69	40.72	11.22	10.56	20 A
PW DC 425 M72	Mono crystalline	144	425	48.39	40.36	11.18	10.53	20 A
PW DC 420 M72	Mono crystalline	144	420	48.11	40.01	11.15	10.50	20 A
PW DC 380 M60	Mono crystalline	120	380	41.70	34.50	11.56	11.02	20 A
PW DC 375 M60	Mono crystalline	120	375	41.50	34.30	11.48	10.93	20 A
PW DC 370 M60	Mono crystalline	120	370	41.30	34.10	11.37	10.86	20 A
PW DC 365 M60	Mono crystalline	120	365	41.10	33.90	11.28	10.77	20 A
PW DC 360 M60	Mono crystalline	120	360	40.90	33.70	11.20	10.69	20 A
PW DC 355 M60	Mono crystalline	120	355	40.70	33.50	11.10	10.60	20 A
PW DC 350 M60	Mono crystalline	120	350	40.50	33.30	11.02	10.52	20 A

Purpose of this guide

This guide contains information regarding the installation and safe handling of photovoltaic modules made by Sunlego Enerji Sistemleri San ve Tic AŞ.

Sunlego Enerji Sistemleri San ve Tic AŞ modules are hereafter is referred to as “**Plurawatt**” modules.

All instructions should be read and understood before installing the modules. The installation of modules should conform to all the safety precautions in this guide when installing the modules. The local standards should also be followed in such installations. If there are any questions, please contact our facility for further assistance.

Before installing a photovoltaic system, the installer should be familiar with the mechanical and electrical requirements for such a system. Keep this guide in a safe place for future reference (maintenance).

The mechanical and electrical installation of modules should consult the corresponding laws and regulations, such as electrical method, building law.

Scope

PV modules are ideal for charging storage batteries used to power remote homes, recreational vehicles, boats, telecommunication systems and other electrical applications.

This manual contains important installation, maintenance and safety information. The word “module” as used in this manual refers to one or more PV modules.

“**Plurawatt**” modules are designed to fulfill the criteria of protection class II requirements according to IEC61730-part1.

The modules are qualified for protection class II: Hazardous voltage (IEC61730: higher than 50V DC; EN61730: higher than 120V), hazardous power applications (higher than 240W) where general contact access is anticipated (Modules qualified for safety through EN IEC61730-1 and -2).

Disclaimer of liability:

The installation techniques, handling and use of this product are beyond company control. Therefore, **Plurawatt** does not assume responsibility for loss, damage or expense resulting from improper installation, handling or misuse.

General Safety Information

Ensure that the module is used only in applications for which it is suitable (see “Installing Modules”). All work on a PV system (installation, setup, maintenance) must be carried out only by appropriately qualified and authorized engineers.

The appropriate DIN standards, construction rules and safety instructions must be followed during installation.

Warning!

PV modules generate electricity as soon as they are exposed to the sunlight. One module generates the safety extra low volt level, but multiple modules connected in series (summing the voltage) or in parallel (summing the current) represent a danger. The following points must be noticed when handling the solar modules to avoid the risk of fire, sparking and fatal electric shock.

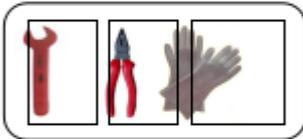
Do not use mirrors or other magnifiers to artificially concentrate sunlight on the modules.



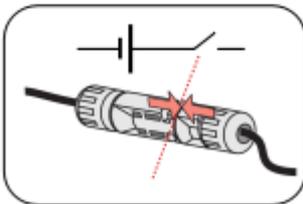
Do not insert any electrically conducting materials into the plugs or sockets.



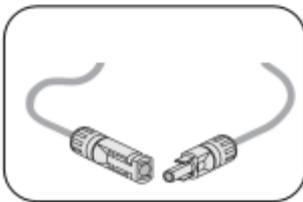
Do not insert any electrically conducting materials into the plugs or sockets.



Make sure to use safety equipment (insulated tools, insulated gloves, etc.) when wiring.



Make sure that we do the connection when the circuitry is cut off. Do not disconnect under load.



Guarantees the clean connectors has not been polluted, and the electrical connection and the mechanical joint is good, to avoid the generation of electric arc effectively.



Meaning of crossed –out wheeled dustbin: Do not dispose of electrical appliances as unsorted municipal waste, use separate collection facilities. Contact your local government for information regarding the collection systems available. If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into

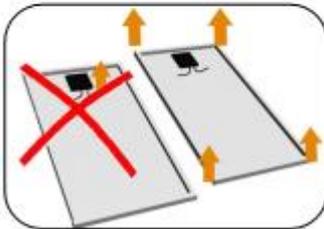
the food chain, damaging your health and wellbeing. When replacing old appliances with new ones, the retailer is legally obligated to take back your old appliance for disposals at least free of charge.

Unpacking and Storing Modules:

Utmost attention is required when handling the modules. Below marks will be used for some caution items when unpacking, transporting, and storing the modules:



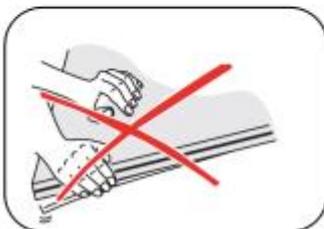
Do not strike and destroy the module.



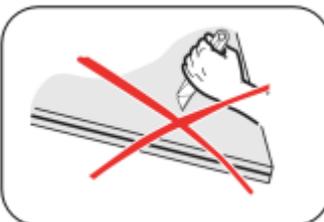
Carry modules with both hands. Do not use the connection socket as a handle; Don't damage the frame during handling installing.



Do not stand on the module.



Do not twist the module. Do not twist the module.



Do not mark on the rear of the module using sharp objects.

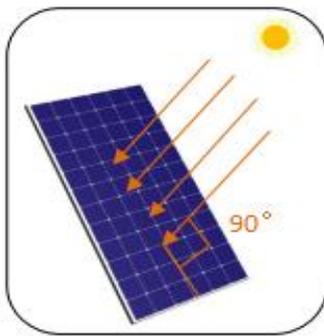
The accessible PV module surface shall be smooth and free from sharp edges, burrs, etc.,

Installing Modules:

Please consult local laws and regulations before installing modules and abide by requirements on building fire protection.

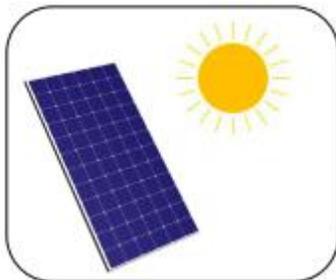
System should be installed by qualified personnel only. The system involves electricity, and can be dangerous if the personnel are not familiar with the appropriate safety procedures.

The PV modules should be mounted in a location where they will receive maximum sunlight throughout the year. In the Northern Hemisphere, the modules should face south. And in the Southern Hemisphere, the modules should face north.

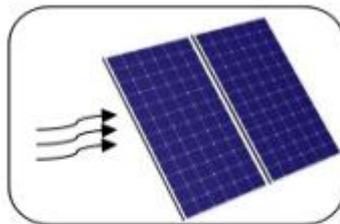


In order to achieve maximum annual yield, optimum orientation and tilt of PV modules is necessary. Sunlight shining vertically onto the PV module is the best condition to generate maximum power.

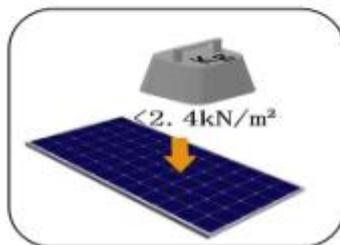
Artificially concentrated sunlight shall not be directed on the module.



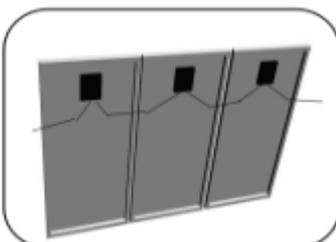
Make sure the module absorb sunlight without any shelter to produce the maximum output.



Keeping good ventilation conditions prevents the modules from getting hot which would reduce the output performance.



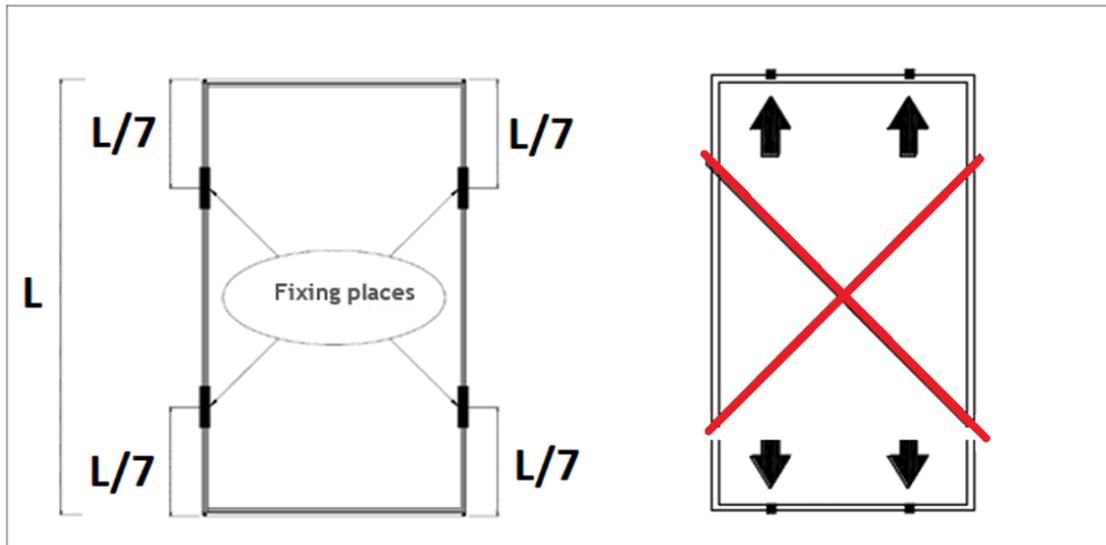
The maximum load on module must not exceed 2.4 kN/m^2 . Site-specific environment loads such as wind and snow should be taken into account to avoid exceeding the maximum.



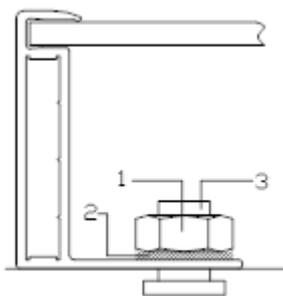
The voltage in series should not exceed the system voltage.



The module must not be installed close to fire or Flammable materials.



Each module should be fixed at least 4 points on long frame. The modules are supported parallel to the surface of the building wall or roof. And the assembly is to be mounted over a fire resistant roof covering rated for module's application. Fixing places should be min. $L/7$ (from long side) to max. $L/4$. Plurawatt modules are not designed for fixing from short side of the frame.



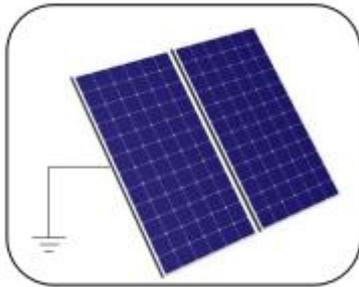
Use the existing installation holes instead of drilling additional holes for installation (Drilling holes shall against the reliability and warranty of the modules). The installation and attachment materials (nuts, bolts, etc) must be corrosion-resistant. Moment of force is 5N-m for module mounting.

- 1 Stainless steel M8 nut
- 2 Stainless steel spring washer
- 3 Stainless steel M8 t-head bolt

It is suggested to confirm according to the voltage and current actually used in the power station.

Grounding:

Although the modules are certified to Safety qualification, grounding is nevertheless to be concerned. The ground connection must be made by a qualified electrician. The module frame must be grounded according to local, regional and state safety and electrical standards. By this definition, frames must be fixed onto the mounting structure and the grounding measurement is to be done from the structure.



- Should provide appropriate engagement through the anodized layer.
- PV system should work with a reliable lightning protection system.

All ferrous metal in the conductive connection should specially treated, such as by anodization, spray-painting, galvanization. Stainless steel does not need to be treated. This protection has been punctured by the grounding device to achieve sufficient connection.

Wiring

To ensure proper wiring, pay close attention to:

·Correct wiring scheme

When designing the system, avoid forming close loop to minimize risk of an indirect lightning strike. Check that wiring is correct before starting the generator. If the measured open circuit voltage (Voc) and short-circuit current (Isc) differ from the specifications, then there may be a wiring fault.

·Correct connection

The cross section area of cable and the capacity of connector must be selected to suit the maximum system short circuit current (The area of the cable mated with the connector is recommended to be 4~6 mm²), otherwise the cable and connector will be overheated under large current. Please note that the upper limit temperature of cable is 120°C and the connector is 100°C. The ambient temperature range of cable and connector is -40°C / +90°C. The plug connector has its own polarity. Make sure that the connection is safe and tight. The plug connector should not receive outer stress. Connectors should only be used to connect the circuit, but never used to turn the circuit on or off.

·Use of suitable materials

Use cable extensions and plugs that are designed for outdoor applications. Ensure that they are in perfect electrical and mechanical condition. Only the cables with one conductor are used.

Ensure that all materials meet the requirements of the system maximum voltage, current, moisture, and temperature when they expose to sunlight.

Under normal conditions, a photovoltaic module is likely to produce more current and/or

voltage than that reported under standard test conditions.

Accordingly, the values of Isc and Voc marked on this module should be multiplied by a factor of 1.25 when selecting electricity components voltage ratings, conductor capacities, fuse type, and type of control components connected to the PV output.

The maximum series Fuse rating is 20A. And the maximum reverse current is known as series Fuse rating multiplied by a factor of 1.35.

·**Bypass Diodes**

When modules in series are shaded partially, it may cause reverse voltage across cells or modules, this may cause undesirable heating to occur. The use of a diode to bypass the shaded area can minimize both heating and array current reduction.

All Plurawatt modules are equipped with factory installed bypass diodes. The factory installed diodes provide proper circuit protection for the system. Rating of bypass diodes: Current 20A; Voltage 50V

·**Others**

During installation, be sure to tie the cable from the junction box to the mounting substructure with nylon line, etc. to avoid direct contact of the cable with the back surface of the module.

Module mounting

Plurawatt's Limited Warranty for modules is based upon modules being mounted in accordance with following conditions.

1) Operating conditions

Install **Plurawatt** Solar Crystalline series modules in the following conditions:

. Operating temperature:	-40°C to +85°C
. Storage temperature:	-20°C to +50°C
. Humidity:	below 85RH%
. Altitude:	≤2000m
. Mechanical Load Pressure:	2400Pa (245 Kg/m2)

*Mechanical load bearing specifications of the module is based on **Plurawatt** Solar mounting methods. A professional system installer must be responsible for the mechanical load calculations based on the specific system design.

*The modules have been evaluated by TUV according to IEC 61215 for a maximum positive design loading of below 2400Pa, and negative design loading 1600Pa, with 1.5 times safety factor.

2) Limited conditions

Installation environment with following conditions should be avoided.

- The installation area with extreme sand and dust damage.
- The installation position with extreme air pollution, chemical vapors, acid rain, and/or soot, etc.
- The installation place with extreme hail and snow damage.
- The installation location with extreme salt damage.

Checklists:

- All fastenings are tight, secure and free of corrosion.
- All cable connections are secure, tight, clean and free of corrosion.
- Cables are not damaged in any way.
- Verification of the grounding resistivity of metals.

Maintenance and Cleaning

Do not change the PV components (diode, junction box, plug connectors) that can be serviced by “**Plurawatt**” authorized distributor or dealer without voiding the warranty.

Given the module a sufficient tilt (at least 15°) to keep one self-clean effect in normal conditions (rainfall will have a self-cleaning effect). When heavy soiling happened on the module (which will result in output reductions), we use a gentle cleaning implement (such as a sponge) and water (from a hose) without clean agents to rinse the modules. Dried dirt must never be scraped or rubbed, scraping and rubbing module surface will cause micro-scratching. Periodic inspection must be done for the system. In the event of a problem, consult with a licensed/qualified person. Accumulation of obstacles, such as the leaves from the trees nearby, between the panel and the roof or panel and the ground will hamper the airflow and this can cause the module temperature to rise. The performance of the solar cells are affected by the temperature such as the higher temperature causes lower energy production and so, lower power output. Therefore it is recommended to check underneath of the modules periodically and do not let the airflow restricted.