



Installation instructions for flexible solar modules. Version: 1.0

# INSTALLATION INSTRUCTIONS

Power rating 110W-335W

## I. GENERAL INFORMATION

Thank you for purchasing this TESUP® product. Our photovoltaic modules are built using innovative technology and superior quality materials.

The following guidelines apply exclusively to flexible modules only. Please read the following instructions carefully and pay attention to all safety recommendations.

**Warning!** Any work on solar modules including wiring should follow general safety standards, alongside these installation instructions. Works should always be carried out by an appropriately qualified person. TESUP® is not responsible for any problems arising from inappropriate installation or use of the product.

In addition to these installation instructions, we recommend following the guidelines of IEC/TS 62548.

TESUP® reserves the right to modify its products, technical specifications and these installation instructions without prior notice.

### ELECTRICAL SHOCK WARNING

This product generates electrical current when the front side is exposed to light.

Even if voltage and current from a single module are low, touching the terminals or wiring may cause an electric shock or burns. These risks increase when many modules are installed together – generating higher voltages and currents which are dangerous and could be lethal. TESUP® will not be held responsible in any way for accidents, damage and injury, including electric shock, caused by incorrect use or installation.



Installation instructions for flexible solar modules. Version: 1.0

To avoid any risk, turn the front of the module away from the Sun or any intense source of light when wiring (alternatively cover the front side during the installation).

- Do not use different types or models of solar modules in the same system.
- Do not modify the electrical connections of the modules, in particular do not open or remove the junction box.
- Do not cut or pierce the module, this might cause live components to be exposed and/or damage the module.
- Do not bend or apply excessive force to the cables.
- Installation, maintenance and removal of photovoltaic modules must take place on dry surfaces.
- Use tools with insulated grips only.
- Do not use photovoltaic modules near flammable or explosive substances.
- Keep the modules in their original packaging until the moment of their installation. Do not use damaged photovoltaic modules (damaged during transport or installation).
- Do not apply any protections, paint or varnish to the modules.
- Do not drop heavy or sharp items onto the modules.
- Do not concentrate sunlight (e.g. mirrors or lenses) or other sources of artificial light on the modules.
- Do not dismantle or remove any part or label affixed by the manufacturer.
- Do not install modules in locations where they may be submerged in water for lengthy periods.

## II. HANDLING

Although this product has been designed to be robust, it must be handled with care:

- Do NOT bend or kink the module unnecessarily (note: the modules are flexible but should only be curved when mounted).
- Do NOT stand the module on its corners.
- Do NOT apply unnecessary force to the module (e.g. do not throw the module).
- Do NOT puncture the module.
- Do NOT step on the module before the installation.
- Do NOT lean the module on sharp or spiky objects.
- Do NOT use the junction box or the connection cable as a handle.

# TESUP

Installation instructions for flexible solar modules. Version: 1.0

- Do NOT stack the modules (the sharp edges of the junction box might damage the front surface of another module).
- Store the modules securely in a cool and dry place. The packaging is not weather-proof.

Follow the above points to ensure that single PV cells do not break inside the module, and prevent damage to the protective layer of the composite.

## **MAXIMUM BENDING**

TESUP® modules of flexible series are flexible, but they cannot be rolled-up or folded. The maximum curvature allowed is up to the maximum bending radius 2000 mm.

Excessive or multiple bending must be avoided when handling the modules. The maximum bending radius, mentioned above, is only in order to mount permanently on a curved surface. The modules are not designed to withstand such maximum bending radius for applications where this bending occurs periodically. Bending should also be uniformly spread; bending concentrated in one area might cause permanent damage to solar cells in this area.

The module may be handled by the edge, but only if it is held vertically and without exerting excessive pressure to the edges of the cells. The modules should not be held by the short ends or corners as this may cause excessive bending under their own weight.

## **STEPPING ON MODULES**

TESUP® flexible modules may be stepped on, but only when they are firmly mounted on a smooth, rigid surface, with no bumps, hollows or irregularities. Barefoot or soft-soled shoes are advised when walking on these panels - heels and shoes with a rigid sole should be avoided.

Uninstalled modules or modules in removable installations must not be stepped on.



Installation instructions for flexible solar modules. Version: 1.0

### III. MECHANICAL INSTALLATION

While installing the modules, the installer must always follow general rules for safety at work, rules for electrical installation and devices, construction rules and all other regional and national rules and regulations.

Modules can be installed in a landscape or portrait orientation, and fixed in place by gluing, screwing or riveting.

#### GLUING

If your module does not come with an adhesive layer, gluing can be arranged by using an appropriate sealant / adhesive or double-sided tape. If adhesive is used, make sure it is suitable for outdoor applications (with a wide temperature range, UV protection etc).

The surfaces onto which the modules are to be glued must be very clean and dry. The installation must be carried out carefully and with precision, as this permanent method does not allow repositioning. The surfaces chosen for the installation do not have to be smooth, however in such cases the modules cannot be walked on, and the resistance against hail might be affected.

If using a sealant / adhesive for gluing, make sure not to use the module until the glue is dry (typically 24h).

Before proceeding with permanent installation we recommend checking the performance of the module by measuring the open circuit voltage (Voc) and short circuit current (Isc) in bright direct sunlight with no obstructions, and comparing to the specifications. To achieve readings close to specifications, the sun should be high in the clear sky, and the module should be facing the sun directly.

**Warning!** Double-sided adhesive tape makes a very strong immediate bond with the support material and does not allow repositioning. Trying to remove a module, even if it is only partially attached, can seriously damage the solar cells.



Installation instructions for flexible solar modules. Version: 1.0

If your module comes with the adhesive layer, follow the steps below:

1. Recommended application temperature for gluing is 18°C to 35°C. Make sure all materials have roughly the same temperature prior to bonding.
2. The installation surface must be free from dust, grease and oil. If required, clean the surface with a degreasing agent. Loose paint or protective coatings must be removed or stabilized.
3. Lift the module and remove the protective film from the back, exposing a sticky surface. Do not allow contact with skin.
4. Attach the module to the surface. It is recommended to use two people, and a hand-roller in order to evenly spread the compacting pressure.

Note: to achieve full adhesive strength, leave at least 24 hours at normal temperature.

Avoid any unnecessary loads. Bonds must be made in such a way that no lever action (cleavage stress) can arise. Any shearing or tensile stress must be able to spread across the entire adhesive surface. Continuous peeling stresses impair the permanent elasticity of the bond.

## **DRILLING / SCREWING / RIVETING**

It is possible to drill through the module or alter its size by sawing. However, it is important to allow a minimum of 12 mm distance to the nearest solar cell or electrical conductor.

The edges after cutting or drilling have to be sealed afterwards, in order to avoid moisture entering the fibre reinforced composite material. A suitable sealant for outdoor applications can be used. Note that inadequately sealed cut or drilled surfaces will void the warranty.

If your modules come with factory-installed eyelets, they can be used with appropriate quick-release fasteners or screws.



Installation instructions for flexible solar modules. Version: 1.0

## IV. ELECTRICAL INSTALLATION

A photovoltaic module behaves like a current generator (such as a battery) and therefore has a positive and a negative contact.

If several modules are connected together, the total voltage / current of the PV array must be below the maximum voltage / current of the inverter, solar charge controller or the maximum system voltage / current of other connected devices, cables and connectors. Please also note:

- The maximum module overcurrent protection rating of 20A needs to be taken into account when modules are connected in parallel.
- Do not connect modules with different orientation or angles of inclination in the same string.

The cables must have sufficient cross-section to avoid significant voltage drop. Always use specific cables for photovoltaic installations, resistant to atmospheric agents.

**Warning!** The modules have MC4-type connectors. You should never open the MC4 connectors while the wires are active. Connectors are only designed to be opened without any load.

Ensure that the cabling is not under stress. We recommend placing cables in cable ducts in order to have additional UV protection and prevention of cable pitch.

## V. CLEANING AND CARE

Due to the special surface of TESUP® flexible modules, dirt and grime are usually washed away by rain. Nevertheless if the modules are fully or partially shaded by dirt or debris they need to be cleaned to prevent a loss of performance.

Clean the front side of the module using a soft cloth (dry or moist with lukewarm water). Do not use tensides, scrapers, or any high pressure water tools (never use any greasy substance or metal tool).

In areas with low winter temperatures, remove snow and ice without force (e.g. with a very soft broom) in order to not damage the protective layer of the photovoltaic module.



Installation instructions for flexible solar modules. Version: 1.0

Inspect the modules at least once a year to ascertain that all connections and fixings are tight and corrosion free.



Installation instructions for flexible solar modules. Version: 1.0