

Safety and Installation Instructions For Fluitechnik PV Modules

1.0 Introduction

This manual provides safety and installation instructions for (PV) Fluitechnik Sun Energy photovoltaic (PV) modules registered under UL1703 and the CSA International Trademark, under IEC61215 & IEC61730 and the TÜV Rheinland Trademark, the product label, which features the following logos:



Important! Please read these instructions fully prior to installing, connecting or using this product in any way. Failure to follow these instructions will render the Limited Warranty issued by Fluitechnik Sun Energy for photovoltaic modules invalid.

1.1 Disclaimer

The techniques for installation, handling and use of this product are beyond the company's control. Therefore, Fluitechnik Sun Energy assumes no liability for any loss, damage or expense deriving from improper installation, handling or use of the product.

1.2 Information regarding registration with the International Electrotechnical Commission (IEC)

This product meets the requirements set out in Part 2 of the IEC 61730 standard for PV flat-plate modules, used for application class A:

Hazardous voltage (IEC 61730: higher than 50 V DC, EN 61730: higher than 120 V), 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).

The IEC standard covers flat-plate modules and panels destined for installation in buildings and those destined for installation with separate structure. This product is not designed for use where the artificially concentrated sunlight module is planned to be fitted.

1.3 Limited warranty

The limited warranties covering the module are described in the warranty certificates issued by Fluitechnik Sun Energy and are available at www.fluitechnik.com.

2.0 Safety measures

Please read all the safety instructions contained in this manual prior to installation.

Warning! Interconnections for the module feature continuous current (DC) and are transformed into sources of voltage when the module is charged and exposed to light. **The direct current may form arcs in the gaps and cause serious injury in the case of an improper connection or disconnection, of if contact is made with conductors from the module that are either frayed or scratched.** Do not connect or disconnect the modules when there is current flowing from the modules or from an external source.

- Cover all the photovoltaic-type modules with opaque cloth or material before closing or opening the electrical connections.
- All installations must be carried out in accordance with all relevant regional and local regulations.
- There are no parts in the module that can be repaired by the user. Do not try to repair any part of the module.
- Installation must only be carried out by authorised personnel.
- Remove any metal jewellery before installing this product to reduce the risk of accident from exposure to a fully charged circuit.
- Use insulated tools to reduce the risk of exposure to electrical discharge.
- Do not stand on the modules, drop them, scratch them or allow objects to fall on them.
- If the front glass should happen to break or the rear-mounted sheet should become detached, be aware of the fact that any contact with any surface of the module or the frame of the latter may cause an electrical discharge.
- Do not install or handle the modules when they are wet or at times of heavy winds.
- Contact the supplier of the modules if they require any maintenance.
- Artificially concentrated sunlight shall not be directed on the module or panel.
- Please keep these instructions at hand at all times.

3.0 Electrical features

The nominal electrical features of the module are measured in Standard Test Conditions (STC) at 1 kW/m² irradiance with a global air spectrum mass of 1,5 (AM 1.5 G) and cell temperature of 25° C (77° F). Fluitechnik Sun Energy modules have specific electrical features which are described in the technical files of each FTS module.

The following electrical characteristics are applicable to all FTS modules:

Maximum System Operating Voltage = 1000 V (IEC) / 600 V (UL)

Maximum Series Fuse Rating = 20 A

Maximum Over-Current Protection Rating/ MCR = 15 A

Application Class IEC61730 = Class A

Protection Class II

Remarks: For detailed electrical features, please revert to the product range catalogs, available on Fluitechnik Sunenergy website.

A photovoltaic module may produce more current and/or voltage than those recorded according to STC. The production of current and output may increase with sunny or cold weather and reflections from snow or water. Therefore, the I_{sc} and V_{oc} ratings marked on the module must be multiplied by a factor of 1.25 when determining the nominal voltage ratings in the components, the capacity of the conductors, capacity of the fuses and capacity of the controls connected to the photovoltaic output. Certain regulations may require an additional factor of 1.25 for fuse and conductor capacity.

Remarks: Refer to Section 690-8 of the National Electrical Code for an additional multiplying factor of 125 percent (80 percent rating) which may be applicable.

4.0 Electrical connections

The modules may be connected in series and/or in parallel so as to produce the voltage output required, provided that certain conditions are adhered to. Only use the same type of module in a combined source circuit.

4.1 General aspects about wiring

For field connections, Fluitechnik Sun Energy recommends that all wires be equipped with double insulation, with a minimum nominal temperature of 90° C (194° F). All wires must be 12AWG type flexible copper conductors (Cu only). The minimum diameter must be determined by the relevant regulations. We recommend a diameter of no less than 4 mm². The type of insulation must be suitable for the type of installation used and meet the requirements set out in the SKII (Safety Class II) and IEC 61730 standards.

4.2 Connecting the equipment to ground

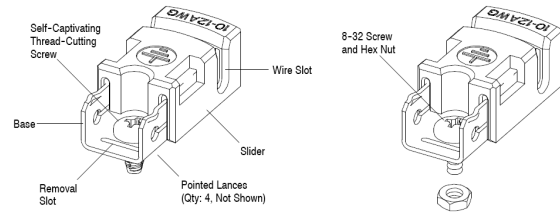
Check the relevant local and regional regulations governing the connection of photovoltaic-type modules and assembly structures to ground with regard to specific

requirements (e.g. protection against lightning), mostly for markets under UL regulations.

4.2.1 Grounding Clip Assembly

The application of SolKlip Grounding Clip Assembly used with metal-framed photovoltaic (PV) modules (or solar panels) is shown in the following instruction:

SolKlip Grounding System PN 1954381-1 from Tyco Electronics, UL approved acc. to File E69905. The ground wire must be 4mm (AWG12) rigid and bare copper wire.



Use the one of the ground holes Ø4mm (on the module metal frame) to fix the grounding clip.

A. Mounting Grounding Clip to Frame

The grounding clip must be placed onto the frame so that the screw straddles a pre-drilled 4.09—mm [.161—in.] diameter hole. It is recommended that the screw be tightened to a torque of 2.3 +0.05/—0.2 Nm [19 +4.4/—1.7 in.—lbs]. The head of the screw must be flush with the base and the base must be flush with the frame. For the grounding clip with the 8--32 screw and hex nut, the hex nut must be tight. Refer to Figure 1.

B. Wire Placement

The wire must be bottomed in the wire slot (the wire slot will cause the wire to form a slight curve). Refer to Figure 1.

C. Terminating the Wire

The slider must be engaged (slider covers the base). Refer to Figure 1.

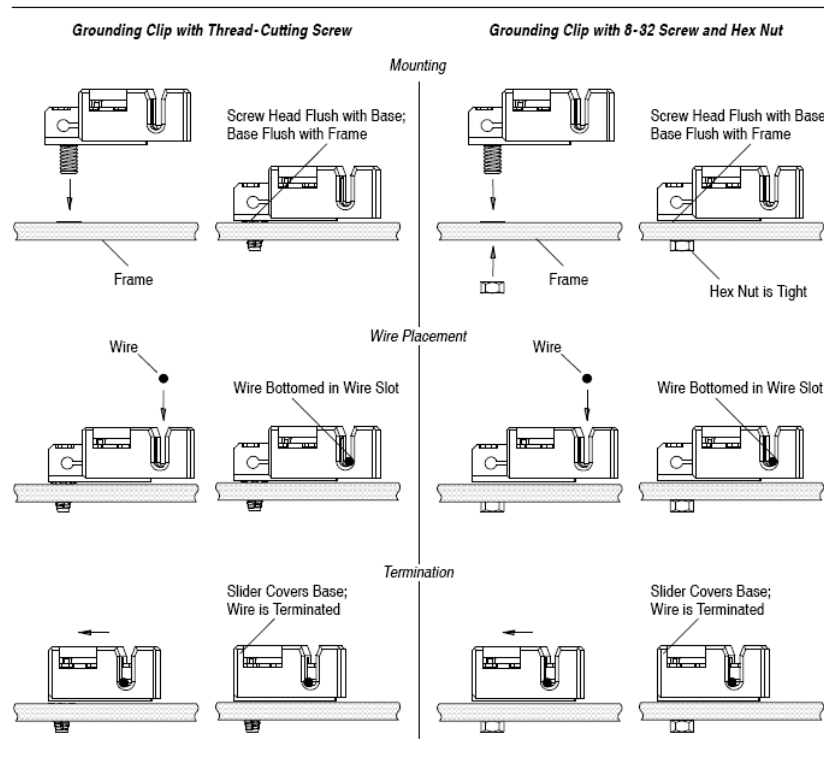


Figure 1: – Grounding clip assembly and wire connection

4.3 Connection in series

The modules may be connected in series so as to produce the output voltage required. Do not exceed the maximum voltage for the system, as mentioned in the topic 3 “Electrical features”.

4.4 Connection in parallel

The modules may be connected in parallel in order to produce the current output required. Each string or module in series may be equipped with a fuse prior to being connected to other string. Table 1 shows the maximum permitted fuse capacity. The derivation diodes are fitted on the modules before leaving the factory. For all matters related to additional requirements regarding fuses and restrictions regarding the maximum number of modules in parallel, please check with the relevant regional and local regulations.

5.0 Module assembly

The Fluitechnik Sun Energy Limited Warranty for PV modules depends on which ones are to be fitted in accordance with the requirements described in this section.

5.1 Considerations with regard to location

Fluitechnik Sun Energy modules must be fitted in places that meet the following requirements:

Operational temperature:

All Fluitechnik Sun Energy modules must be fitted in environments in which they are able to function safely within maximum and minimum operational temperatures:

Max. operational temperature: +90° C, +194° F

Min. operational temperature. -40° C, -40° F

Care must be taken to ensure proper ventilation behind the modules, especially in warm environments.

Projected resistance: Fluitechnik Sun Energy modules are manufactured to withstand a maximum positive load (i.e. upwards, e.g. wind) and a negative one (i.e. downwards, e.g. a static one) of 2400 Pa (Pascal; 240 kg/m²) when fitted in one of the assembly configurations specified in section 5.2.

When fitting the modules in environments that are prone to snowfalls or strong winds, special care must be taken to ensure they are fitted in such a way that sufficient projected resistance is provided and that this complies with the requirements set out in local regulations.

Excluded environments: it is inadvisable to install Fluitechnik Sun Energy modules in certain environments which are excluded from the Limited Warranty issued by Fluitechnik Sun Energy for such modules.

No Fluitechnik Sun Energy module should be fitted in a place where there is a risk of it being exposed to direct contact with salt water.

Fluitechnik Sun Energy modules with anti-reflective coating on the glass should not be fitted in alkaline environments (those which have a pH rating equal to or greater than 7). Alkaline environments damage the coating, reduce the energy gain made by modules and may give rise to a non-uniform appearance.

This does not constitute any problem in most parts due to the fact that in nearly all of them the external environment is acidic and therefore causes no problem.

However, Fluitechnik Sun Energy recommends examining the place where the modules are to be fitted prior to assembly, especially in coastal areas.

Important! It is recommended that the modules be connected to each other as soon as they have been fitted to prevent any dirt, water or dust, etc. from entering inside the module connectors. Those modules that may remain at the end of strings should be protected – if possible, by a separate connector.

Important! When fitting a non-integral module on the roof, the assembly has to be mounted over fire resistant roof covering rated for the application

5.2 Assembly configurations

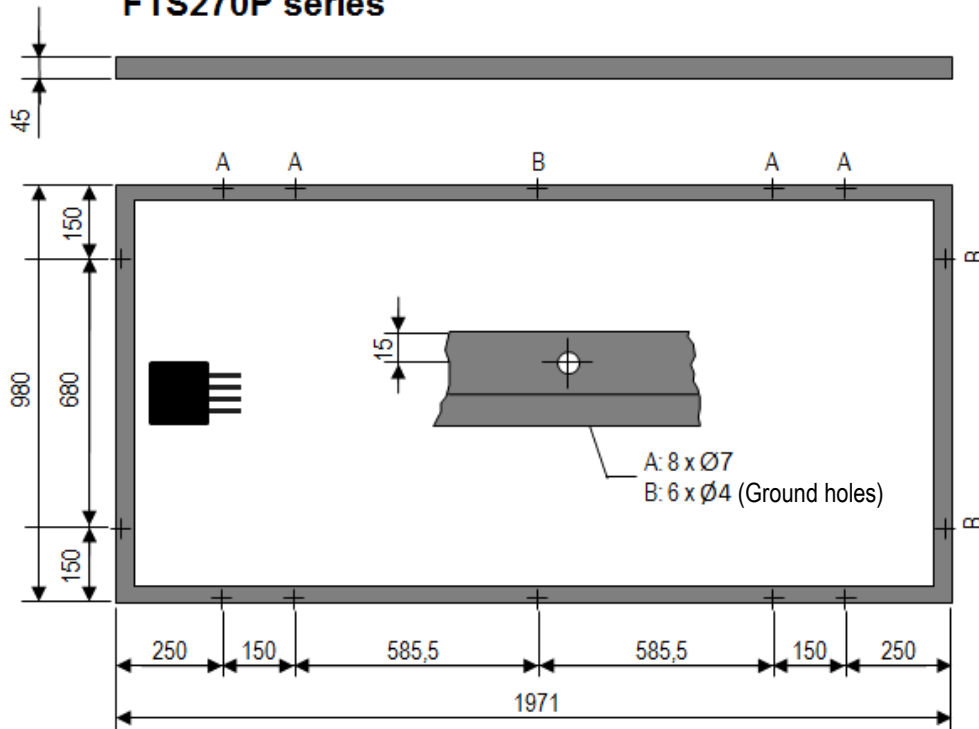
Modules may be fitted at any angle, from horizontal to vertical position. Select the appropriate direction to maximize exposure to sunlight. Specific information is provided in figures 2 and 3 about the dimensions of the modules and the location of the holes for fixing points and connection to ground.

Figure 2: – Module Dimensions (mm)

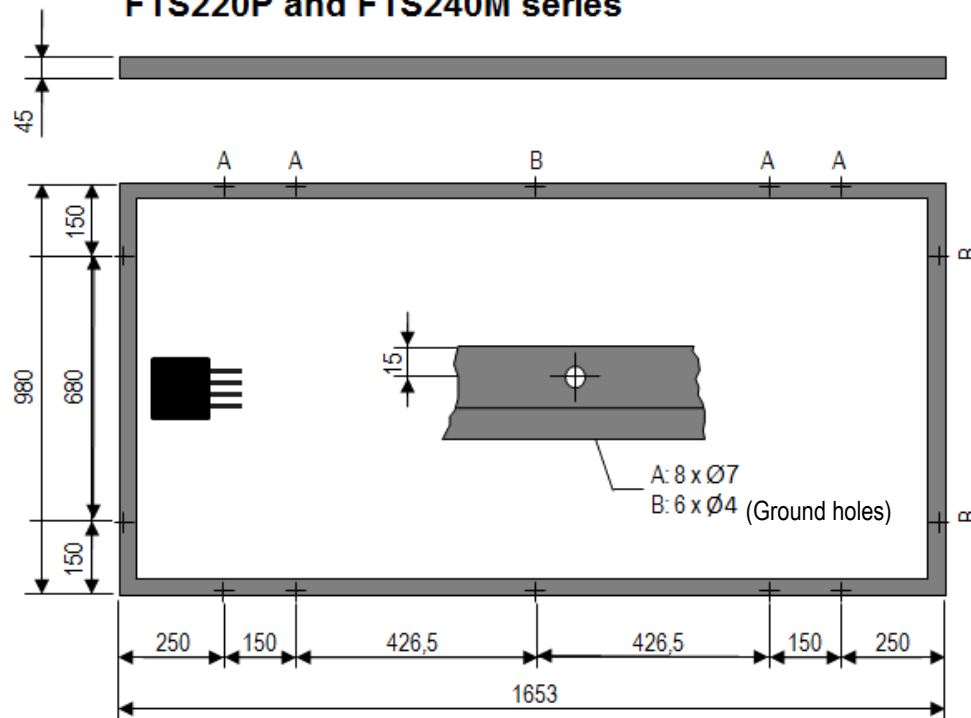
	Length (mm)	Width (mm)	Thickness (mm)	Weight (kg)
FTS220P	1,653	980	45	21.5
FTS240M	1,653	980	45	21.5
FTS270P	1,971	980	45	25.5

Figure 3 – Module dimensions (mm) and location of holes/fixing points

FTS270P series



FTS220P and FTS240M series



To ensure that water does not enter the connections box – which would entail a risk to the modules – they should not be fitted in such a way that the front or upper glass faces downwards (e.g. on a solar tracking structure that places the module with connections box facing skywards when idle).

A space should be kept empty between the frames of the modules and the structure or the ground to prevent the wires being damaged and allow air to flow behind the modules.

When installing the module on the roof, it needs to be fitted onto a fireproof roof covering with the specifications required for such application.

The module only has IEC registration for use when its factory frame is completely intact. Do not remove or alter the frame of the module. If additional assembly holes are drilled in it, this may result in damage to the module and may reduce the frame's resistance.

The modules may only be assembled using the following methods:

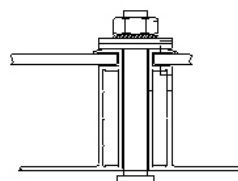
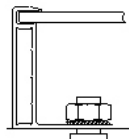
1) **Holes in the frame:** Fasten the module to the structure using factory assembly holes. Four M6 stainless steel ($\frac{1}{4}$ ") bolts are recommended together with safety nuts and washers, per module. Refer to figure 3, which shows the dimensions of the modules and the location of the assembly holes.

2) **Clamps or grips:** Fit the module on its side frames using grips. The side frames are joined to the long sides of the module. The central axis of the grips should be from 160 mm to 380 mm from the end of the module. Fitters must ensure that clamps have sufficient resistance to enable the maximum pressure projected from the module to be obtained. Fluitechnik Sun Energy does not supply either clamps or grips.

3) **Assembling the end:** Assembling the end involves fitting the long section of the frame on the end of the module to a support rail. The frames of the ends are on the short sides of the module. The assembly rail of the end and the grips or clamps must have sufficient resistance to enable the maximum pressure projected from the module to be obtained. Check this capacity with the supplier of the assembly system prior to installation.

Examples:

Bolting →



← Clamping On

6.0 Maintenance

Inspect the modules on an annual basis to ensure the electrical connections are safe, the mechanical connections are in good condition, and that there is no corrosion. Periodically clean the surface of the module with water and a cloth or soft sponge. Any marks may be removed by normal cleaning for glass. To clean the glass surface of the module, do not use rough cleaning materials such as scouring powder, steel wool, scrapers, knives or any other sharp instruments. The use of such materials may render the product warranty invalid.