

solinso

Product manual

Solar roof tiles



General guide applies to all Solinso products:

Series Mystiek, TerraCotta & Spectrum:
1500 / 900 / 600 / 1498 / 748 / 1567 / 1572 /
1540 / 1547 / 1555 / 1570



Attention: Each model has corresponding detailed installation instructions that supplement the general information in this guide.

Solinso solar modules

This manual provides clear, step-by-step instructions for the correct installation of Solinso solar modules. Our solar modules combine an aesthetic roof design with sustainable energy generation and are designed for optimal integration into the roof surface.

Please read this manual thoroughly before installation. Installation must be carried out in accordance with the instructions in this document in order to be eligible for the product warranty.



In case of deviations from the standard structure or in case of doubt about specific situations, please contact Solinso's technical department in advance.

Installation details:

Please complete the information below

Once the installation has been completed, this guide should be passed to the Electrical team who will be responsible for commissioning the system.

Installation Address:

String voltage checks taken at:

Date: ____/____/____ Time: ____

String A

String B

Checks taken by

Company: _____

Last name: _____

First name: _____

Contact number: _____

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1. Disclaimers

Solinso solar roof tiles have been particularly designed for new build, re-roofing and/or renovation projects. This document describes in text accompanying the video animations on the Solinso channel.

Solinso cannot be held liable for damage as a result of maltreatment of installation methodology that differs from the description in this manual. If you foresee a special situation, please seek advice from Solinso.

Install all components as specified in this manual to ensure electrical performance and waterproofing.

Please handle Solinso roof tiles with care. This implies:



Do not walk over the Solinso panels, even when they are installed.

This may lead to damage of the solar cells leading to reduced power generation.



Dropping modules may lead to invisible damage like broken solar cells.

This does not necessarily show any visible signs of damage, but could lead to reduction of power generation.



Do not lift the Solinso module by their electrical wires. This may lead to damage to the electrical connections inside the junction box at the risk of losing all power completely.



The solar glass protects the solar cells from frontal impact, but **the rear side of the modules is fragile.**

The frame elements have been deliberately designed as an open structure to enhance ventilation of the solar module. These open spaces are vulnerable to mechanical impact. Any impact onto the rear side may lead to invisible damage to the solar cells. This may reduce the system performance.



2. Building health & safety

It is important to work safely. Therefore, always make use of safety measures and safety equipment, for example:

- European directives 92/57/EEC on temporary construction sites must be followed.
- The installation team handling the photovoltaic (PV) modules should be trained in the correct manual handling practice.
- All appropriate Health and Safety regulations should be followed correctly.
- The tiles should be laid according to 'European code for roof construction EN 1991-1' unless advised otherwise.
- Install all components as specified with this installation guide to ensure weather tightness.

The Solinso solar roof tile is a light-weight, easy to handle solar roof tile. Nonetheless, avoid installing the solar roof system in poor weather conditions, e.g. with strong winds, when it rains, when there are icy conditions or when there is snowfall.

3. Fire safety

The Mystiek product family has been tested for Broof(t1) and (t4) in accordance with EN 13501-5:2016: Fire classification of construction products and building elements. To achieve a high level of fire safety from the PV installation itself, the following guidelines apply:

- String inverters must be equipped with Arc-Fault Circuit Interrupt functionality according to UL1699B:2018 or IEC 63027:2023
- String inverters must be mounted on a fire-resistant wall in a well-ventilated area.
- The PV system can be designed with micro-inverters or power optimizers. In such cases, the generated DC voltage levels remain well below 80V DC. Such systems are intrinsically fire-safe, as no arc fault can occur in the event of electrical disconnection.
- DC cabling routed through the roof requires separation by voltage level. At least two PVC conduits are therefore required to separate the (black) negative DC cables from the (red) positive DC cables. Both conduits must be sealed with fire-resistant silicone sealant.
- DC cabling must be classified as fire class Cca-s1,d1,a1 or better.
- Vapor-open, water-resistant roof membranes must be classified as fire class B-s1,d0 or better.
- The roof, including insulation material, must be classified as fire class B-s1,d0 or better (end-use conditions).
- The need to use non-combustible A1 fire-resistant materials, such as combined insulation foils, fire-resistant shields, etc., is the responsibility of the construction company and must be assessed by a fire safety expert and/or insurance company prior to installation.

4. Electric hazards

Solar panels produce a DC voltage, even in lowlight conditions. This voltage cannot be switched off.

When the light intensity increases, the capability of current production of solar panels increase. Hence, the potential danger increases accordingly.

The Solinso product has been designed according to electrical safety class A as defined in IEC 61730-1:2018 standard. Solinso panels may be applied in string connections where the string voltage exceeds 50V DC and the string may exceed 240 Watt of power generation. Although our panels have been successfully tested to withstand 1500V DC isolation, it is recommended to limit strings to 50 elements (600V or 4 kW) maximum. Exceeding the string length may invoke system degradation effects that may degrade the system performance on the longer term. In such cases it is recommended to cluster strings in parallel.

Solinso solar roof tiles are equipped with 50-95 cm long cables and touch-proof connectors.



Warning: PV modules produce a DC voltage whenever exposed to light. This voltage can not be switched off.

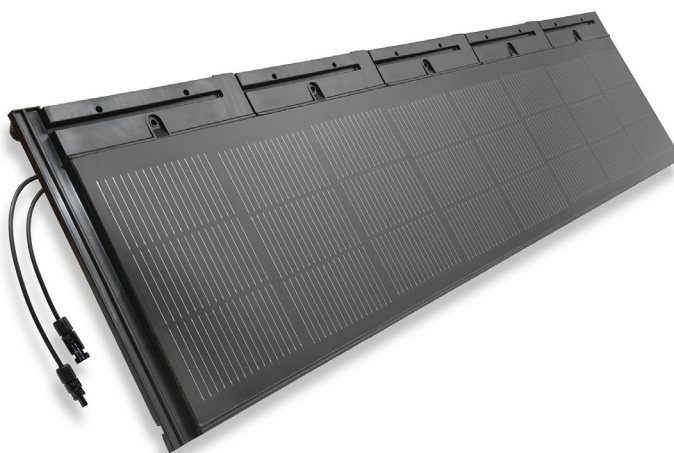


Warning: Care must be taken not to cut or damage cable insulation or expose bare wire.

Solar panels occasionally produce more power when compared to its STC measurement rating¹. The selection of DC and AC electric wiring, fuses and circuit breakers should be selected on the basis of 125% overrating of the current flow at maximum power point conditions.

You must be aware of the following:

- PV modules do not present a risk as long as appropriate safety practices are followed at all times during installation.
- All work must be carried out with the Solinso solar system disconnected from the main supply.



¹ Standard Test Conditions, abbreviated with STC is defined as the power output of a solar module when exposed to a light intensity of 1000 W/m², AM 1.5 light spectrum and a solar cell temperature of 25°C.

5. General practice

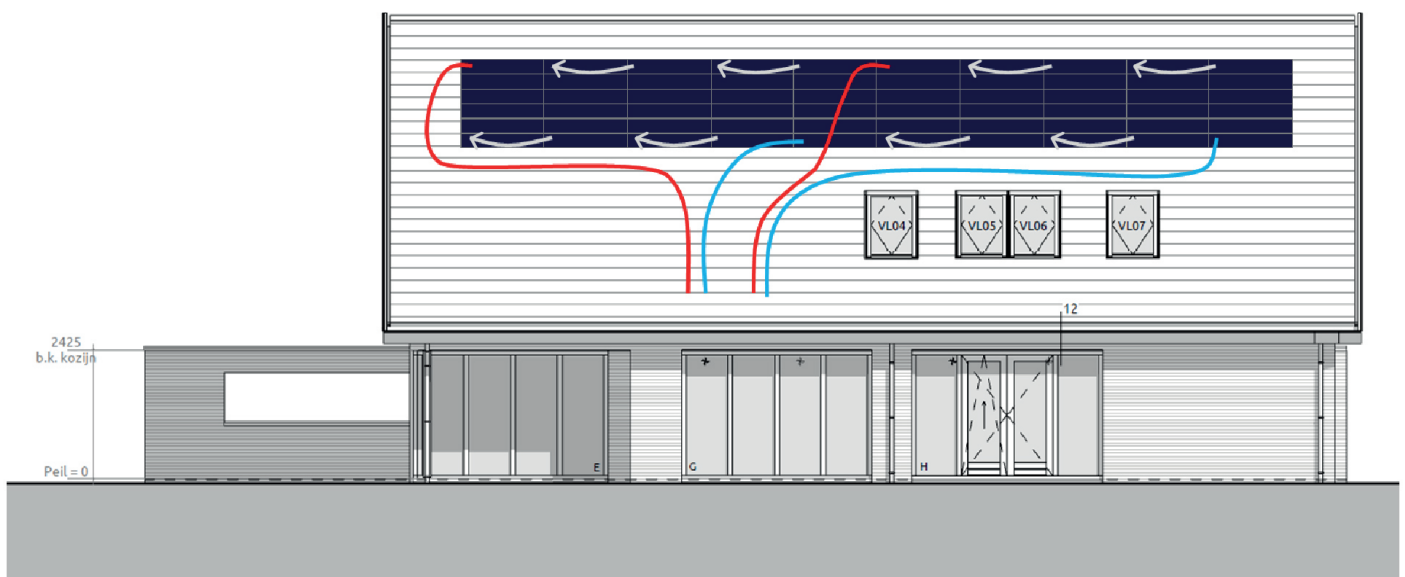
This installation manual must be used in combination with the roof design, the specific roof tile work plan and the electrical wiring (or string) plan.

The roof design and string plan contain the following project-specific information:

- The batten-to-batten distance.
- The location of the Solinso panels on the roof considering edge distance and roof dimensions.
- The layout on the roof, for example 10 horizontal neighboring Solinso panels and 6 roof tiles in height as shown in the figure below.
- The electrical layout also shows the cross connections (white arrows) and string cables as shown in the example below.

The energy collection of a solar panel varies per day and depends on season, climate and place of installation. It is important to mount solar panels facing towards the sun as much as possible. In north-western Europe, the best situation implies an installation onto a south facing roof at a tilt angle of 35 degrees.

Any shade from trees, poles, chimneys, etc. will lead to a reduction of the power generation of solar panels. The design of the solar system should be designed such that the power generation will not be impaired.



6. Project preparation & design

Solinso modules have been designed to interlock with a range of flat roof tiles. If interlocking is not feasible, a concealed gutter behind the Solinso side connections is needed to ensure waterproofing. To fit Solinso modules with roof tiles, the following steps should be followed:

- Check the combination of Solinso products and roof tile brand and type. Solinso has been designed to fit with various roof tiles. Check the interlocking capabilities of the roof tile with Solinso, both left and right. (see model specific mounting instructions)
- Check the gauge or batten distance. Be aware that the tile gauge may be restricted in combination with Solinso products. (see product datasheet)
- A counter batten height of 22mm is the absolute minimum to allow vertical interconnections (cabling and connectors) to be made.
- Ventilation on a roof is very important for the performance of the solar system. Therefore, design the roof such that cold air can flow underneath the tiles from the gutter region, and hot air can flow out at the roof top.

No roof is perfectly level. The Solinso modules are capable of absorbing unevenness in the roof plane. Nonetheless, it is suggested to lay down an array of roof tiles to determine their exact sizing to obtain full alignment with Solinso modules. Marking the Solinso module area with a marker is recommended.

Follow the guidance below to ensure the Solinso modules are installed and handled correctly.

- Ensure all cable connectors are dry and free from dirt before making interconnections.
- Ensure no cable ends are left exposed to the weather during work breaks or after completion of works.
- Keep the modules in a weatherproof environment before installation.
- Carry and handle the modules with both hands by the frame and avoid scratching the glass.
- Only bring the required amount of modules onto the roof you are expecting to install during a work session and secure or remove any units before leaving the roof.
- Do not leave tools or unsecured materials above the solar modules to avoid potential damage to the units

7. Components needed for installation & fixing

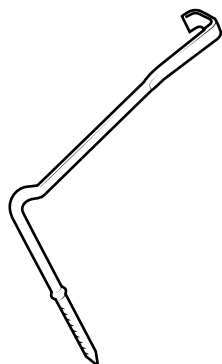
The following components are compulsory in addition to Solinso modules:

Solinso supplies sufficient stainless steel storm clips and screws with every Solinso order.

Storm clip (H version)

(Stainless steel)

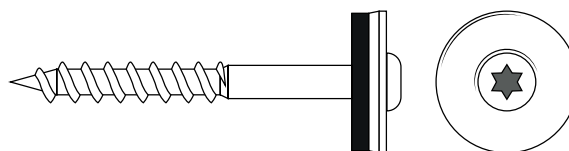
1 per panel



Example: 45/52H as shown. The number 52 is the length in mm and depends on the selected roof tile. The number 45 is the length of the nail. The nail must be driven at least 25mm into the batten. The extension H stands for "Horizontal flat" which may provide a better fit than a rounded one.

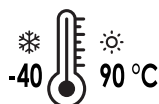
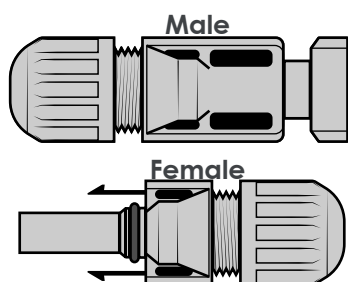
Roof tile screw with EPDM washer

(Stainless steel)



Example: 4.5 x 45 mm or 4.5 x 60 mm, depending on roof tile. Each module must be secured with 3 screws (two at the ends and one in the middle). Smaller models (numbers < 900) only need 2 screws. Each Solinso module has been constructed with interlocking side connections. Each section has a notch to guide the screw connection. Stainless steel screws are recommended to prevent trails of rust on top of the glass sheets.

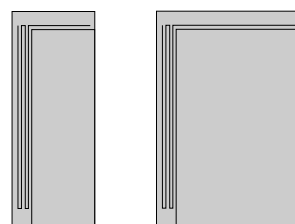
MC4 Staubi cable



Sometimes extension cables are needed to overcome free spacing around dormers, windows etc. When Solinso is involved in the design phase, Solinso will supply the correct amount of extension cables with every Solinso order. Each extension cable will be equipped with a male (M) and female (F) connector, see picture.

Half sized roof tiles

may be required to maintain the tile pattern continuity



This is the responsibility of the roofer and/or contractor. The visual appearance of a solar system is best when all Solinso panels are positioned in a rectangular area. In some situations, standard roof tiles will be placed in broken bond. Solinso panels have been tested for waterproofing and can be flush positioned.

8. Installation

We assume that the roof has been prepared to place Solinso modules in alignment with roof tiles. Electrical string cables are in place and ready to be connected to the first and last module of the string. These string cables run from inverter location through the roof to the solar roof location. String cables run freely underneath the batten structure.

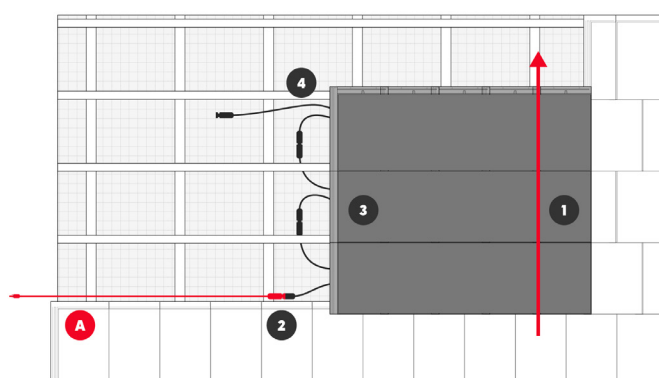
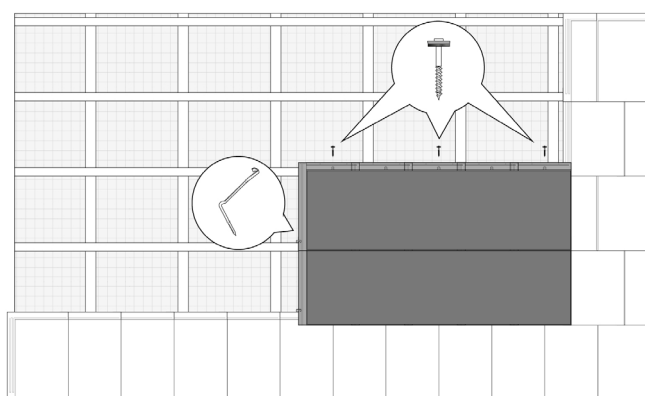
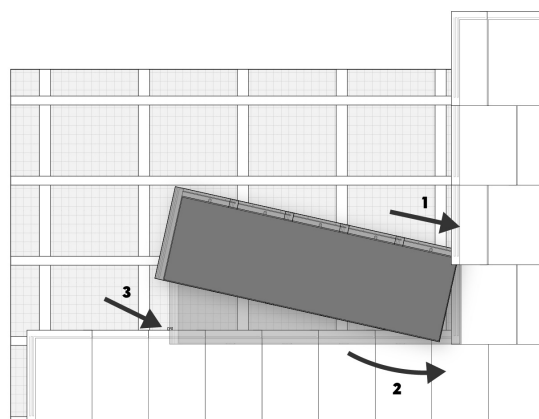
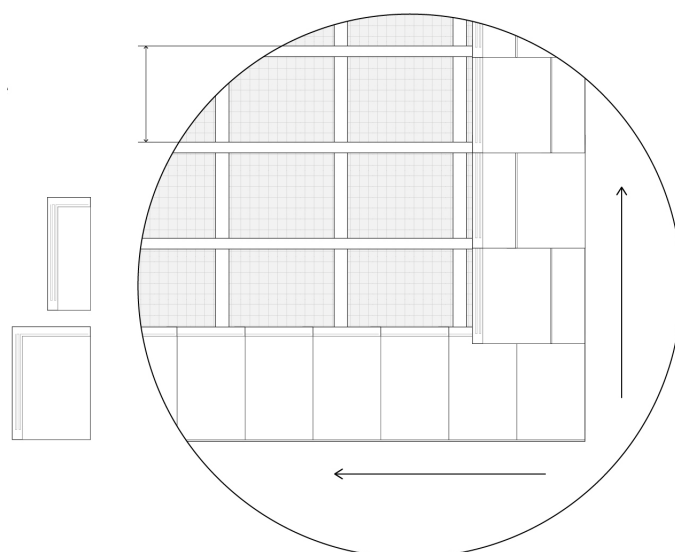
Solinso modules will be installed per column from bottom to top.

The first Solinso module is connected to the string cable. There is only one possibility that fits. We assume here that the plus (+) cable with female connector of the Solinso panel is connected to ("clicked into") the red string cable. Make sure there is no cable running over the battens. Next, the first Solinso panel is fixed to the batten with 3 roof tile screws. At the lower-left, a storm clip is driven into the batten to prevent wind uplift during high winds.

Next, the freely available minus (-) cable or male connector of the first Solinso module will be connected to the plus (+) cable or female connector of the second Solinso module. The MC4 connectors are snapped together. Then this second Solinso module is screwed onto the batten. A storm clip will be driven into the batten in the bottom left.

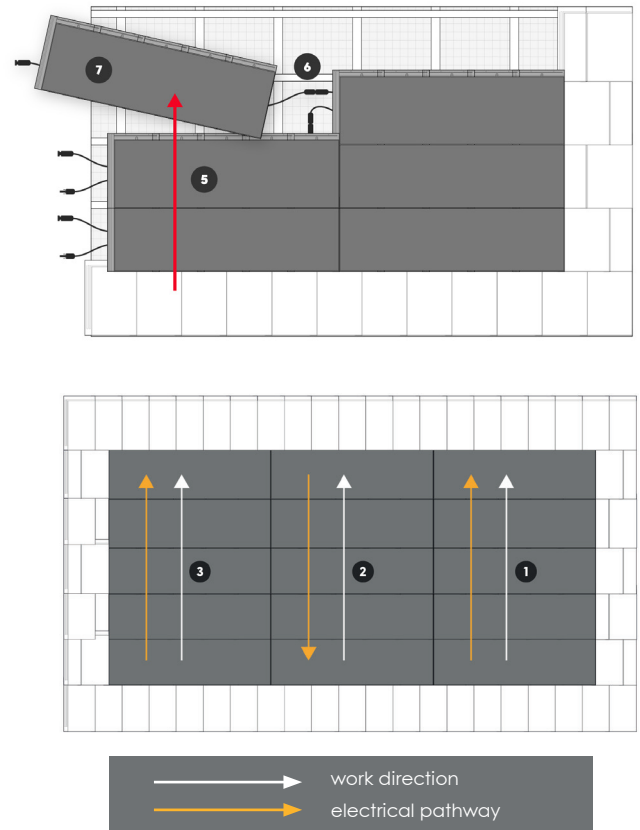
This operation continues all the way up. If the cable length of a Solinso module is too short, extension cables will be supplied to cross-connect to the next module.

Solar modules obtain a better energy yield when they are well ventilated. If preparation is done well in advance, we suggest to construct a well ventilated substructure behind the modules which allows air to flow from the gutter to the rooftop.



After completion of the string it is advised to test its performance before continuing to the next string. The simplest measurement is a voltage measurement across the string. Each Solinso module produces a voltage that is close to the open circuit voltage mentioned on its label. The string cables running from the solar roof into the loft must be capped and remain out of reach of people until they are connected to the inverter. If possible, we suggest also to measure the short-circuit current. This current is directly related to the sunlight intensity and can reach values in excess of 10 Amperes on sunny days.

Disconnecting the short-circuit cable is potentially dangerous because the current flow will generate an arc at disconnection. Therefore, this measurement can only be carried out by an expert.



9. International notice



This installation guide is intended for use in multiple countries.

Local regulations and requirements may vary, and it is the responsibility of the installer to ensure compliance with the applicable standards in their country.

- **For installations in the United Kingdom:** Please refer to the MCS version of this guide for all UK-specific requirements, certification, and commissioning procedures..
- **For installations in the Netherlands:** Refer to the Dutch version of this guide, which includes compliance with local standards such as NEN 1010-7-712 and other relevant regulations.

9. MCS solar installation & commissioning

1. Safety Precautions: Ensure that all personnel involved are wearing appropriate personal protective equipment. Make sure that the system is properly grounded. Verify that all electrical connections are secure and properly insulated.

2. Pre-Commissioning Checks: Inspect the solar panels for any visible damage or defects. Check for loose connections and tighten them if necessary. Confirm that all electrical connections are properly tightened and insulated. Ensure that the solar panels are oriented correctly (facing the sun) and are not shaded by any obstructions.

3. Voltage Verification: Measure the voltage output from the solar panels and confirm that they are within the specified range provided by the manufacturer.

4. Insulation Resistance Testing: Measure the insulation resistance between the solar panel strings and ground. Ensure that the resistance is within acceptable limits.

5. Functional System Testing: Verify that the inverter is properly connected to the solar panels and the electrical grid. Power up the inverter and verify that it is functioning properly. Check for any error messages or indicators. Verify that the inverter is receiving the correct input voltage and current from the solar panels. Monitor the system for any unusual noises or behavior. Verify that the inverter is synchronized with the grid and feeding power into the grid. Check for any issues with grid interaction, such as voltage or frequency fluctuations.

6. Ground Fault Detection: Test the ground fault detection system to ensure that it is functioning properly.

7. Documentation and Record-keeping: Document all measurements, settings, and test results. Keep a record of the commissioning process for future reference and certification purposes.

8. Final Verification: Conduct a final check to ensure that all components are properly installed, connected, and functioning as expected.

9. Maintenance: The solar tiles are silent in operation and have no moving parts, so no maintenance is required. The design of the tiles means that any dust or dirt that accumulates on the tiles is washed off during normal rainfall. Regular checking of the inverter functionality is recommended. Explanation of the checking method to the end-user takes place upon consignment.

10. MCS Certification: Complete any necessary paperwork and submit the documentation to the MCS for certification. Remember to consult the specific manuals provided by the manufacturer of your MCS-compliant solar installation for any unique procedures or requirements. Additionally, if you are not experienced in electrical work or solar installations, it is recommended to hire a certified professional for commissioning.



[illegible]

to watch our short instruction video on YouTube
(2 minute 29 seconds)



warringtonfire



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Exquisitely crafted solar roof tiles

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