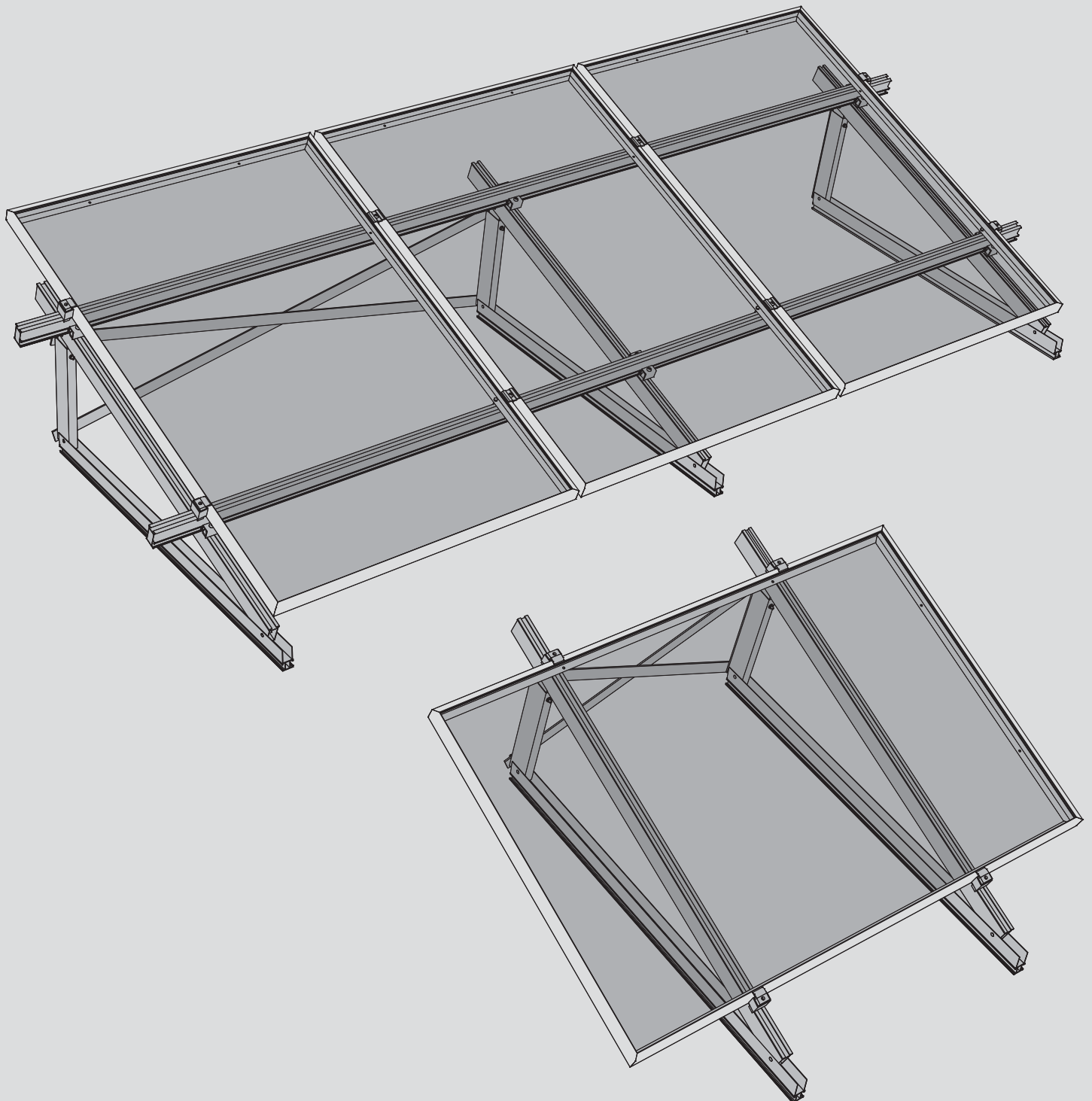


TriSole

Installation manual



Introduction

With the Renusol TriSole mounting system, framed photovoltaic modules can be mounted at different elevation angles on flat roofs of both old and new buildings. The system is fastened and/or secured with screw mounts or ballasting, depending on the local conditions. This is to be determined on-site. If in doubt, a structural engineer who is familiar with the local conditions should be consulted.

Due to the pre-assembled components, the mounting time of the system is reduced to a minimum, since all components are perfectly matched.

The proven Renusol module clamps allow an easy, safe and quick mounting of the modules on the rail system. All modules with a frame height of 31 mm and between 34 mm and 51 mm can be attached with these patented module clamps. Renusol middle clamps additionally simplify the mounting due to the patented snap-in system.

Warranty

All system components are made of high-grade aluminium or high-alloy stainless steel. This ensures high durability and corrosion resistance. This is why we can give a ten-year warranty on the entire TriSole mounting system. The warranty applies only when using all original parts of the TriSole mounting system.

In order to adjust the system optimally for the local conditions and to fulfil all applicable regulations, we recommend having an expert assessment prepared if there is any doubt. The installation should always be carried out by skilled and trained personnel. If you have any questions concerning training, please contact Renusol.

Installation note

Please read these installation instructions carefully before starting the installation. First, familiarise yourself with the system components. During the installation, in particular while working on the roof, be sure to observe the relevant health and safety regulations and follow the relevant valid regulations.

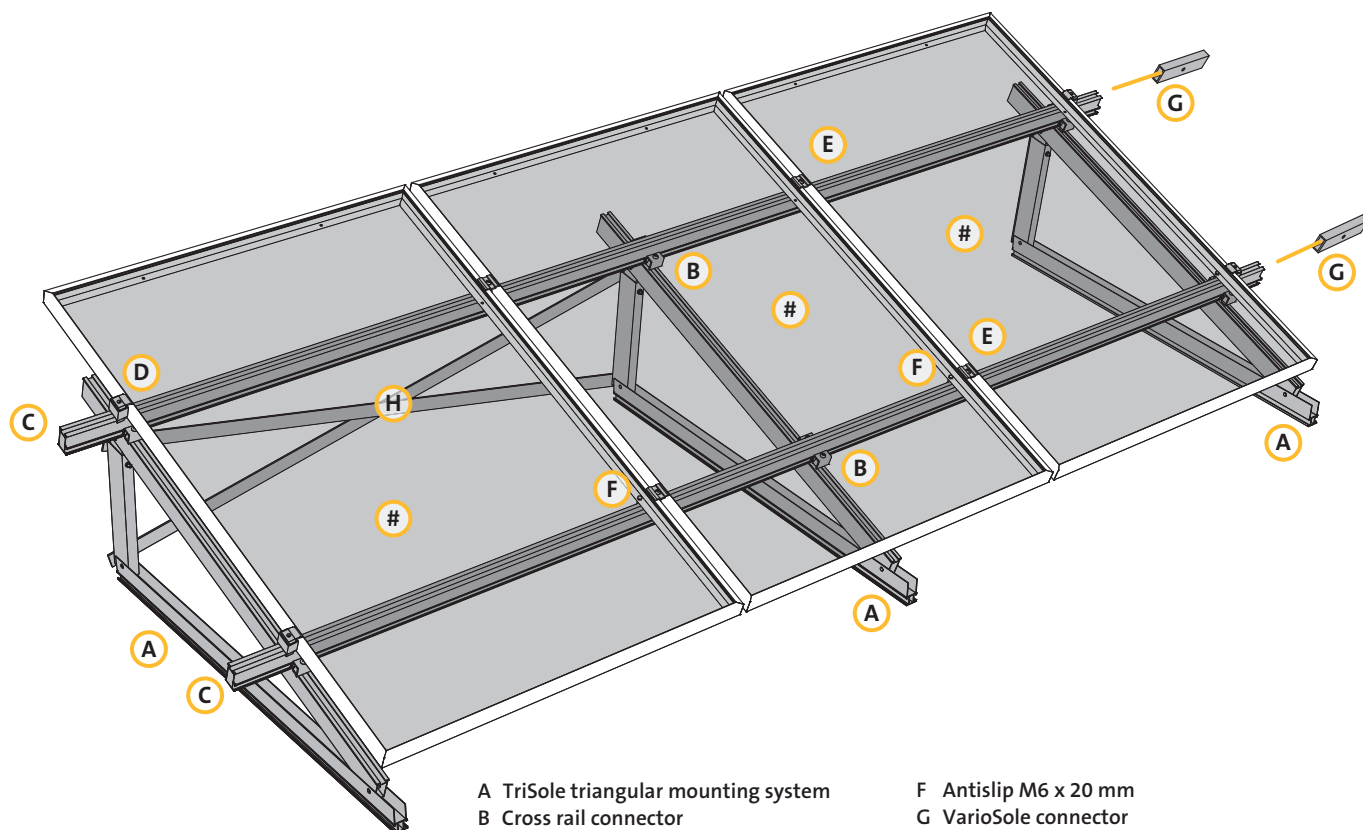
Check for the current version of our installation instructions on our website at www.renusol.com. Here, you can also find instructions in additional languages, if required.

The figures and texts in the installation instructions correspond to current technology at the time of printing. We reserve the right to make changes.

The installation instructions merely contain recommendations in accordance with the current state of the art and are based on the experience of how systems made by Renusol can be installed. If any special characteristics of the roof or object need to be considered, please consult specialists such as roofers or structural engineers, if necessary.

The Renusol team wishes you a successful installation.

SYSTEM OVERVIEW VERTICAL MODULE MOUNTING

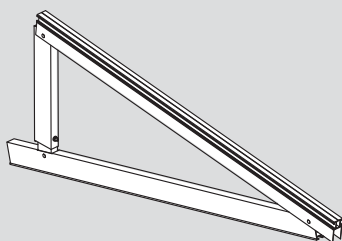


A TriSole triangular mounting system
 B Cross rail connector
 C VarioSole Mounting rail SE
 60 x 37.4 mm
 D End clamp 34–51 mm
 E Middle clamp 32–51 mm

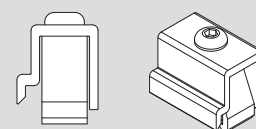
F Antislip M6 x 20 mm
 G VarioSole connector
 with rivet for rail 60 x 37.4 mm
 H TriSole cross striving profile
 # PV-module

SYSTEM OVERVIEW OF COMPONENTS FOR VERTICAL AND HORIZONTAL MODULE MOUNTING

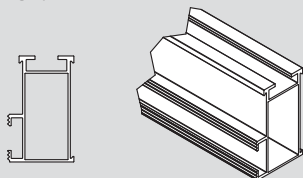
A TriSole
 triangular mounting system
 (adjustable 20°/25°/30°)



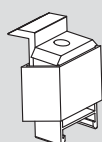
B Cross rail connector



C VarioSole mounting rail SE
 60 x 37.4 mm



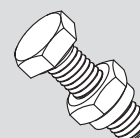
D End Clamp



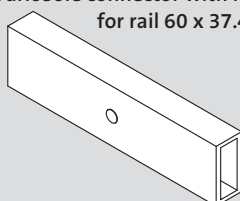
E Middle Clamp



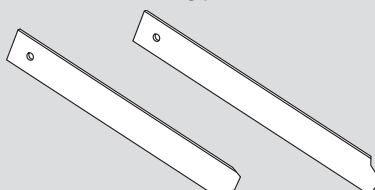
F Antislip M6 x 20 mm



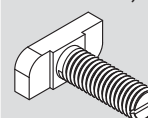
G VarioSole connector with rivet
 for rail 60 x 37.4 mm



H TriSole cross striving profile



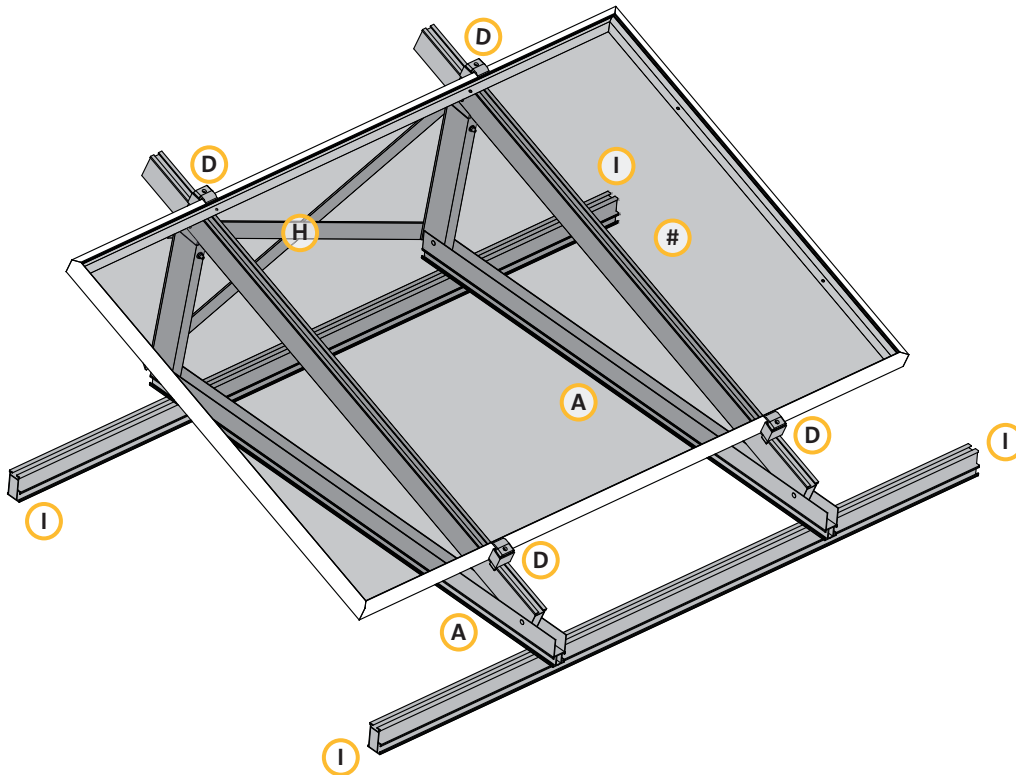
Hammerhead bolt
 M8 x 20 mm, stainless steel



Hex. Nut with serration
 M8, stainless steel



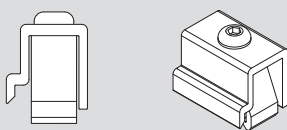
SYSTEM OVERVIEW HORIZONTAL MODULE MOUNTING



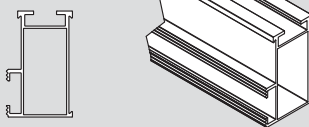
- A TriSole triangular mounting system
- D End clamp complete 34 – 51 mm
- H TriSole cross striving profile
- I Example of roof fastening
- # PV-module

EXAMPLES OF POSSIBLE COMPONENTS FOR ROOF FASTENING TYPES

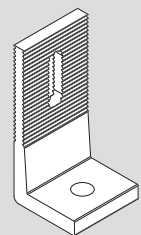
B Cross rail connector



C VarioSole mounting rail SE
60 x 37.4 mm

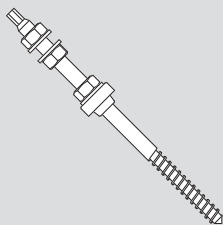


Mounting bracket
for roof fastening



Hanger bolts
for wood sub-
structure

- M10 x 200 mm
- M12 x 250 mm
- M12 x 300 mm
- M12 x 350 mm
- M12 x 400 mm

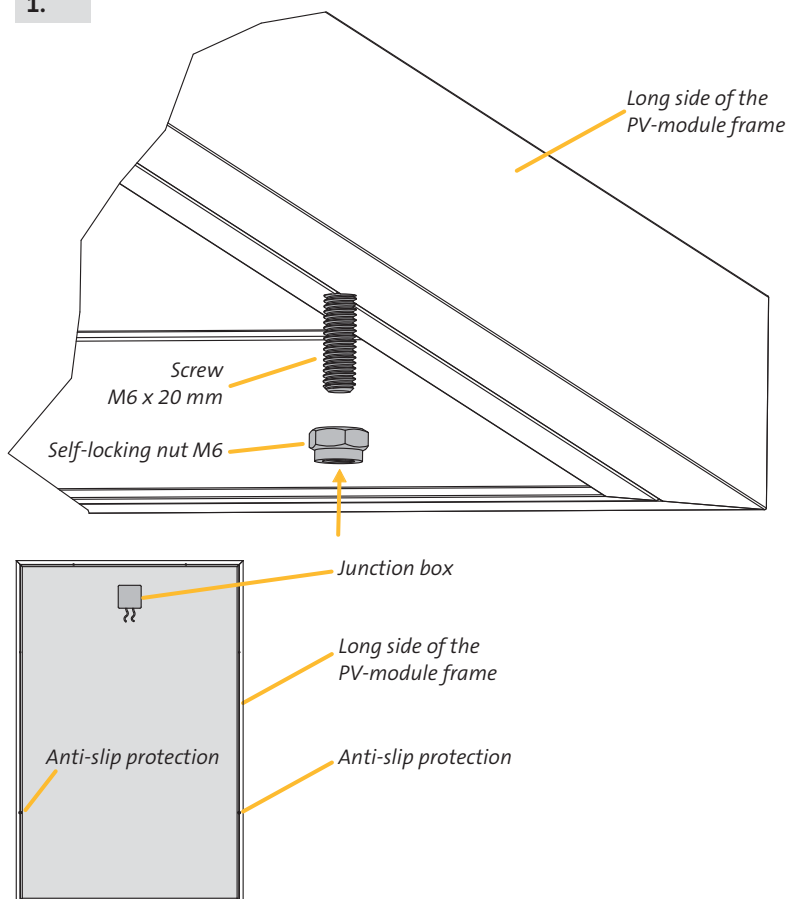


TOOLS AND MATERIALS (not included in delivery)

- Allen key 5 mm
- Nut 10 mm and 13 mm
- Drill Ø 8.5
- Cordless screwdriver
- Drill
- Plumb line
- Saw with aluminium blade
- Measuring tools

MOUNTING PREPARATION

1.



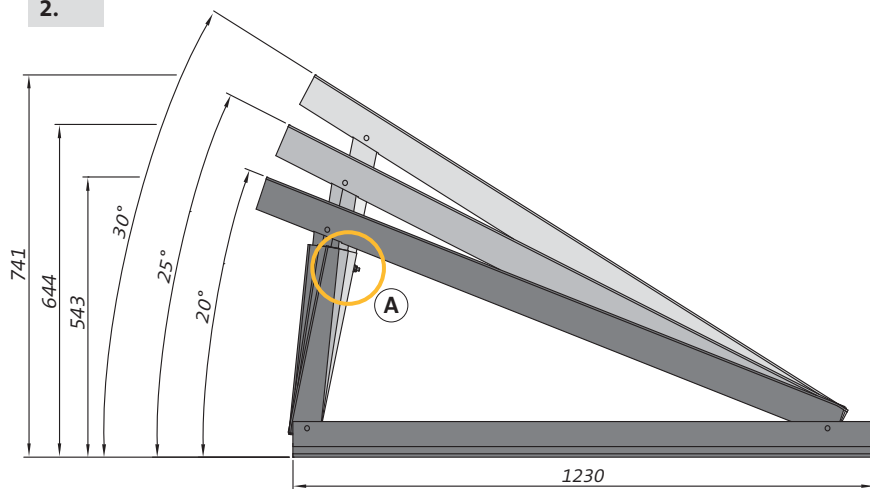
Install anti-slip protection

In preparation for the module mounting, fasten the anti-slip protection on both sides of the long side of the module frame. Insert the enclosed M6 screws into the mounting hole on the underside of the module frame and tighten the counternuts M6. (Only applies to vertical mounting of the modules.)

Note

The module length must not exceed 1,700 mm.

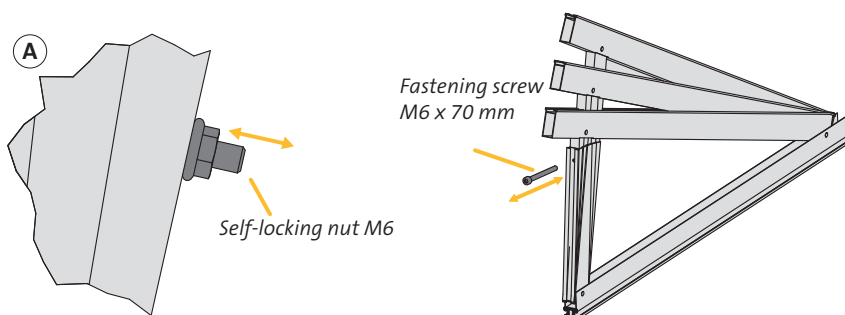
2.



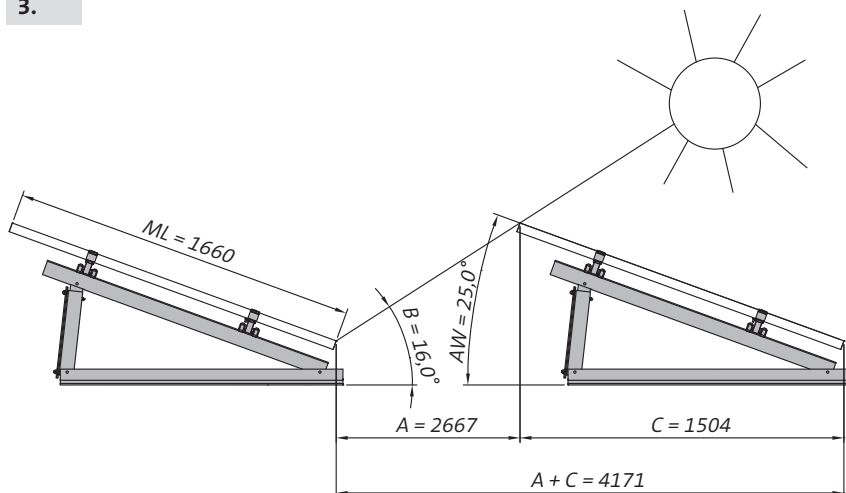
Set the angle of inclination

The basic TriSole elements have to be set to the desired angle of inclination. When delivered, this angle is set to 20°, but 25° or 30° are also possible.

To change the angle of inclination, undo the screw M6 x 70 mm and the self-locking nut with serrated bearing (Fig. A) and set the desired angle of inclination by raising the triangular mounting system. Once the hole of the desired position is visible, fasten the TriSole again with the screw M6 x 70 mm and the self-locking nut with serrated bearing.



3.



Determining row spacings

To avoid mutual shading of the individual TriSole rows, the specified minimum distance must be observed. This minimum distance depends on several factors:

- the latitude
- the module length
- the mounting angle of the TriSole system

Therefore, adjust the minimum distance to the local conditions and take them into account during planning.

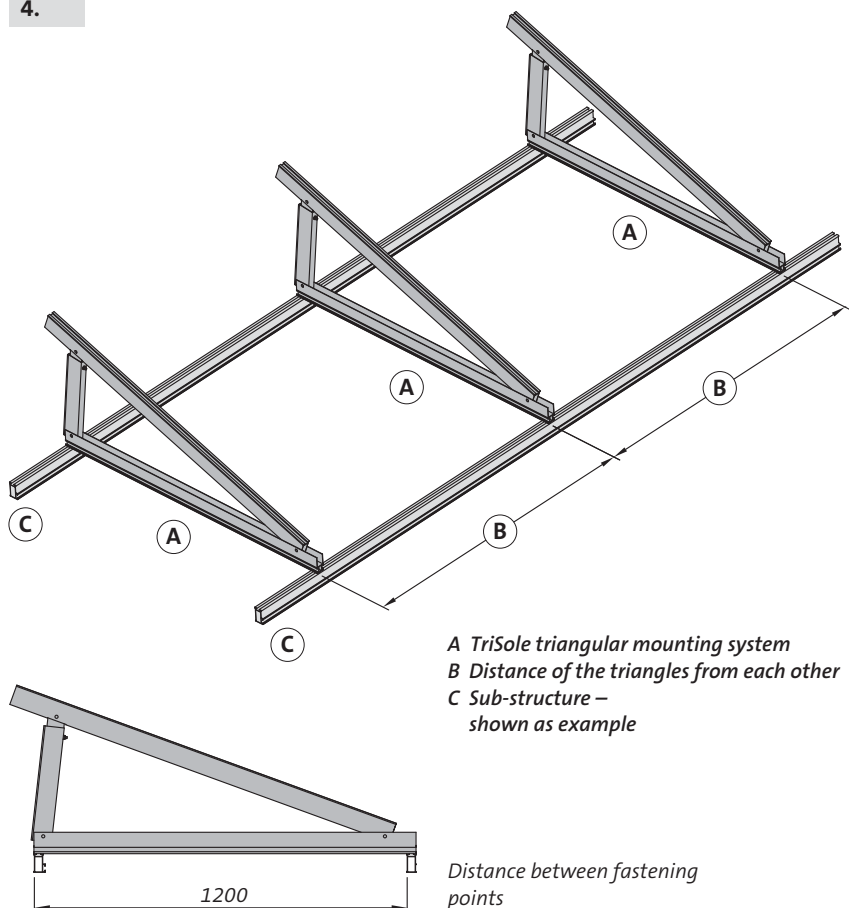
Note

If at all possible, the inclined surfaces of the TriSole rows should face in a southerly direction.

Example
(based on the month of December):

- A = Minimum distance of the rows
- AW = Mounting angle: 25°
- B = Latitude: 50° \triangleq 16°
- C = Module base line
- ML = Module length: 1660 mm

4.



Position TriSole

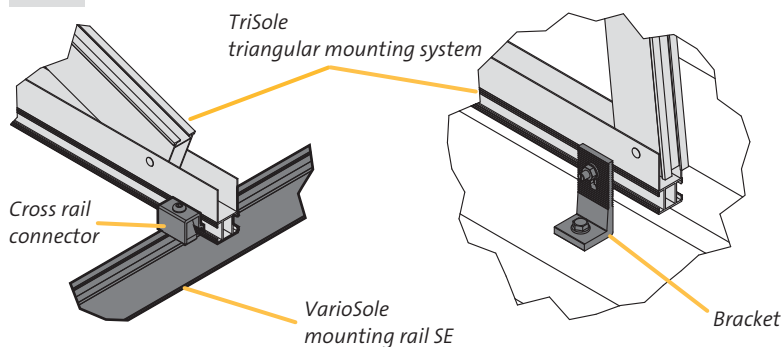
Now fasten the TriSole to the selected sub-structure. Carefully and precisely align the TriSole on the sub-structure using a plumb line. The distances of the triangular mounting system can be seen from the included documentation or from the specifications by the contracted structural engineer.

Note

In order to absorb the thermal expansion, include a break every 12 metres when planning the PV-system.

VERTICAL MODULE MOUNTING

5.



Mounting with cross rail connectors

Mounting with bracket

Determine the type of roof fastening

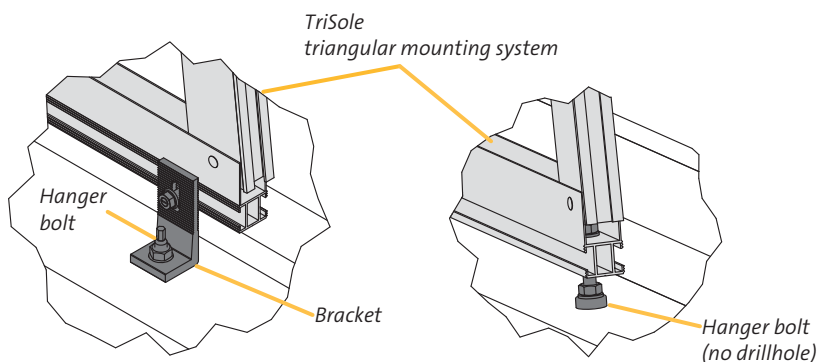
The TriSole systems can be mounted on the roof with four different sub-structures:

- with cross rail connectors
- with brackets
- with hanger bolts and brackets
- only with hanger bolts

Now mount the first row of the TriSole triangular mounting system according to the selected sub-structure. Statically check all fastening methods in advance and on-site.

Note

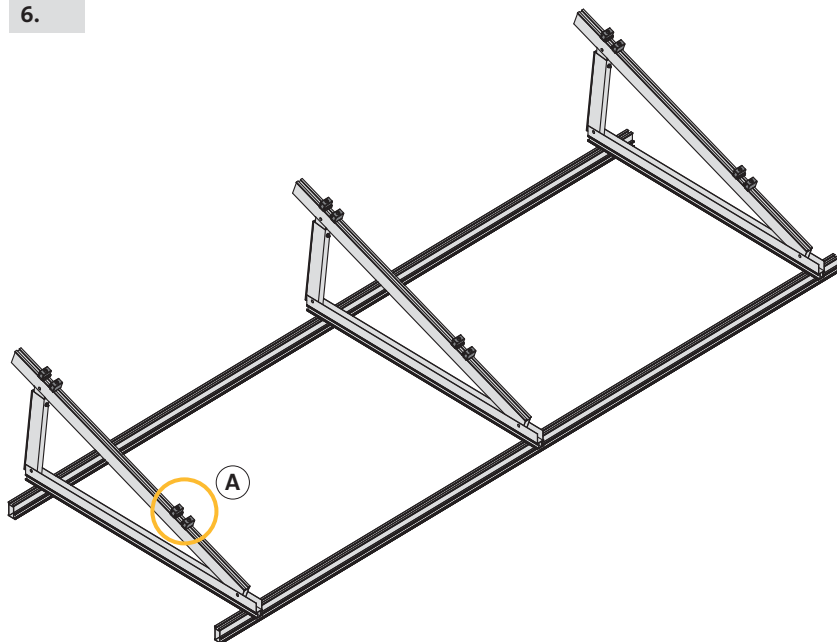
The load suspension through the sub-structure and the load capacity of the roof must be ensured.



Mounting with hanger bolt and bracket

Mounting with hanger bolt

6.



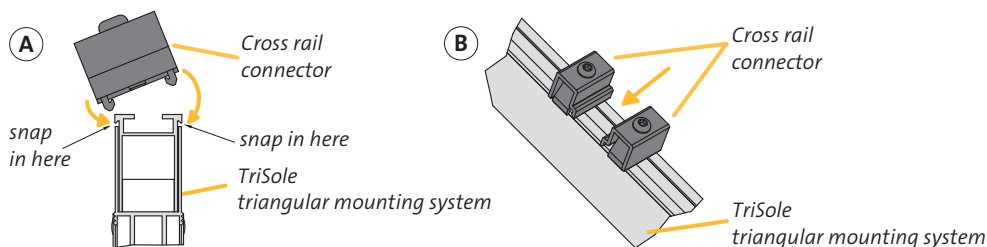
Snap in the cross rail connector

Snap the cross rail connector into the TriSole triangular mounting system (Fig. A). You need four cross rail connectors per TriSole for vertical mounting.

Align and position the cross rail connectors in the top and bottom areas of each TriSole triangular mounting system in pairs. Then place the VarioSole mounting rail in between (Fig. B).

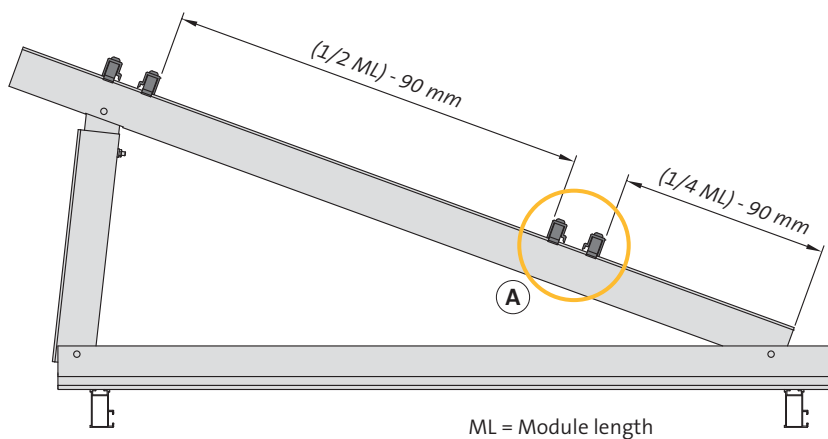
Note

The position of the VarioSole mounting rails results from step 7, page 9.



VERTICAL MODULE MOUNTING

7.

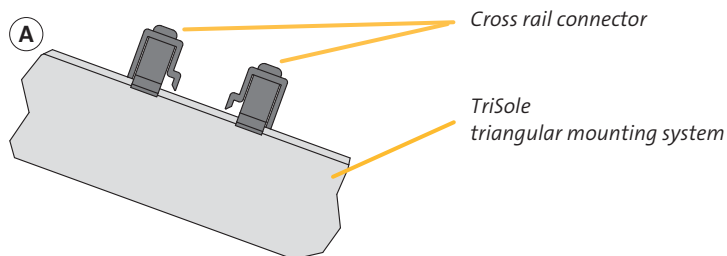


Positioning the cross rail connectors

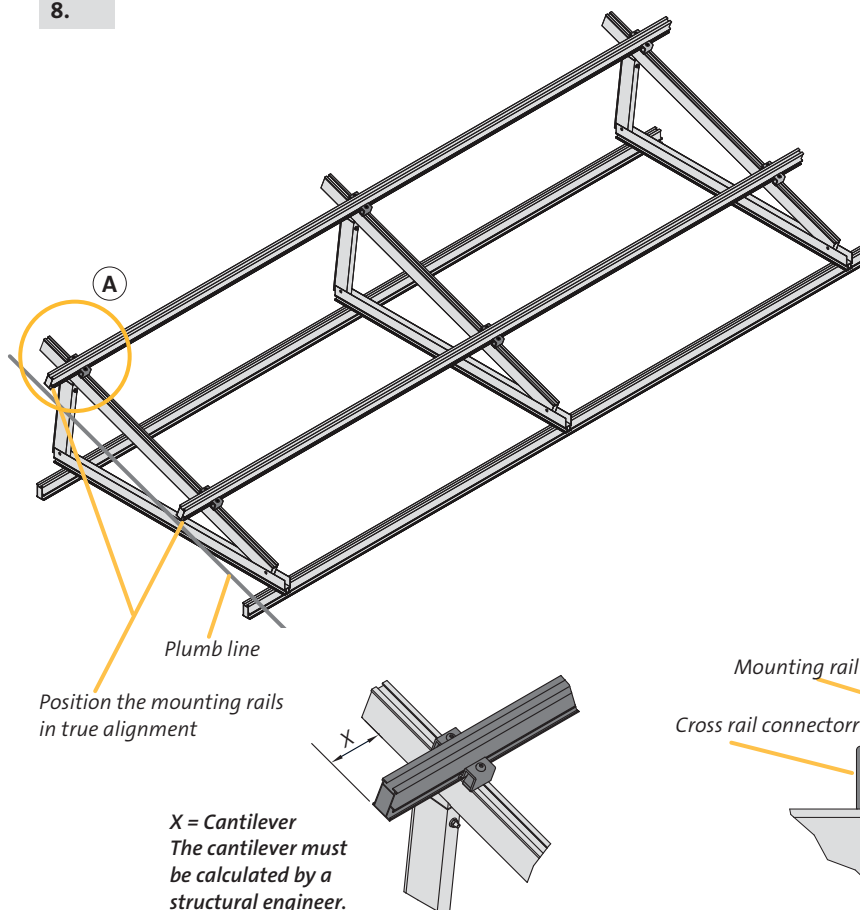
As a rule, the mounting rails run in the 1/4 points of the modules. Always observe the instructions of the module manufacturer in this process! Then position the cross rail connectors according to the calculations like in Fig. A.

Cross rail connectors are aligned in pairs (Fig. A).

Cross rail connectors are aligned in pairs



8.



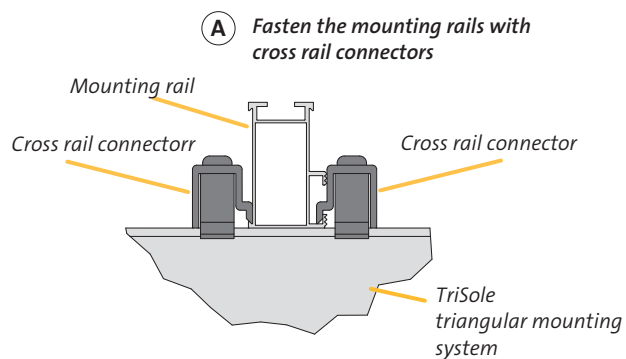
Align and fasten mounting rails

Insert the VarioSole mounting rails between the cross rail connectors and hook the cross rail connector into the groove of the VarioSole mounting rail (Fig. A). Mounting rails must be in true alignment at their ends and run parallel to each other. Therefore, align the mounting rails using a plumb line. Then fasten the mounting rail with the screws on the cross rail connector.

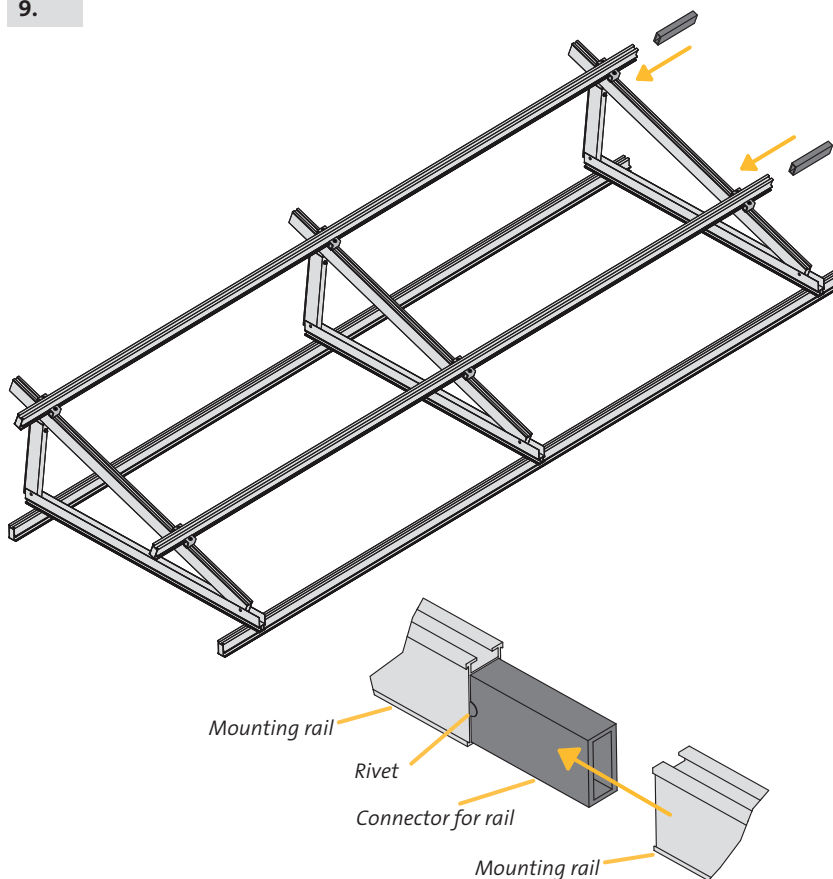
Tightening torque 12–15 Nm.

Important

X = Cantilever. The cantilever must be calculated by a structural engineer.



9.



Join the mounting rails

Push the connector with rivet into the mounting rail until clamping is achieved with the rivet.

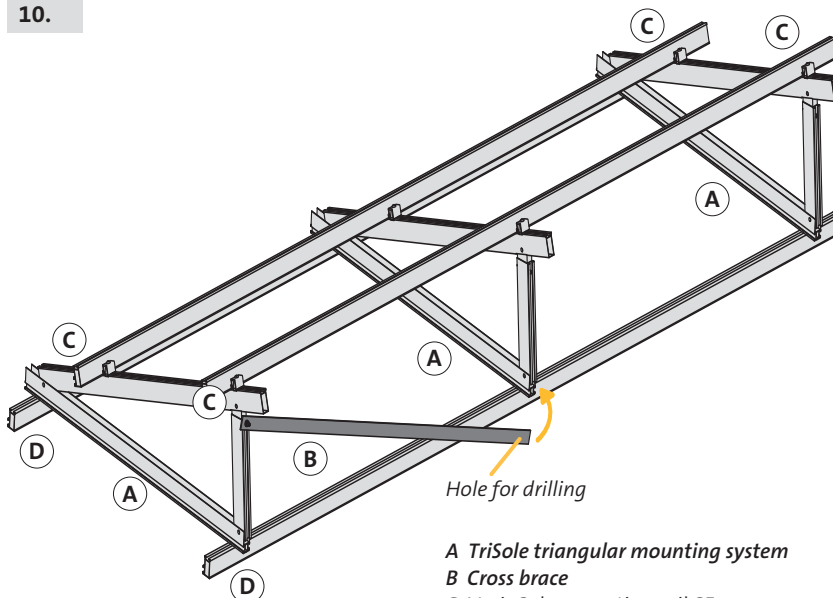
Push the next rail onto the connector until it is also clamped by the rivet.

In order to compensate for the linear expansion, leave a gap of 2 mm between the mounting rails.

Important

In order to absorb the thermal expansion, include a break every 12 metres when planning the PV-system.

10.



Prepare the mounting of the cross brace

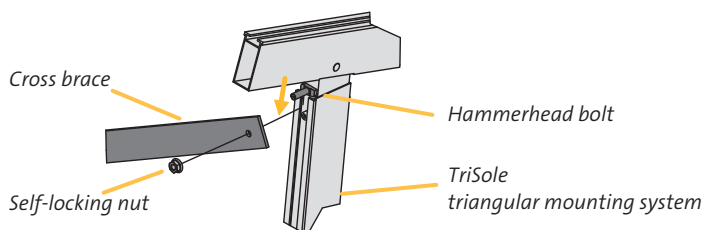
First fasten the stabilising cross bar on one side without tightening it. To do this, insert the hammer head bolt into the channel of the TriSole, push on the cross brace and fasten with the self-locking nut with serrated bearing.

Then mark the position for the required borehole.

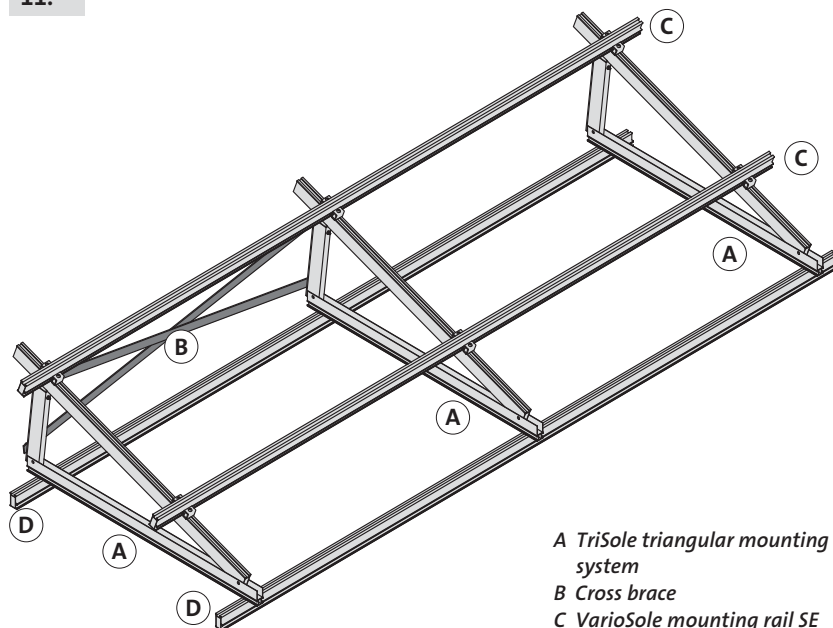
Remove the cross brace and drill through the cross brace at the marked position with an 8.5 mm twist drill bit. Cut off the protruding material with a saw with aluminium blade.

Then fasten the cross brace again.

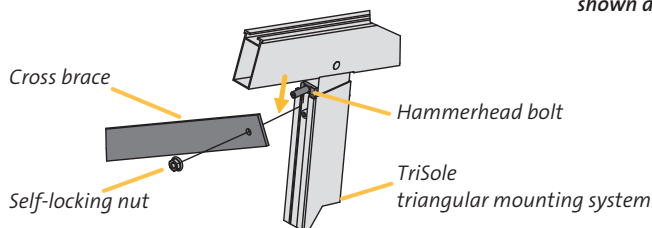
- A TriSole triangular mounting system
- B Cross brace
- C VarioSole mounting rail SE
- D Sub-structure – shown as example



11.



A TriSole triangular mounting system
B Cross brace
C VarioSole mounting rail SE
D Sub-structure – shown as example



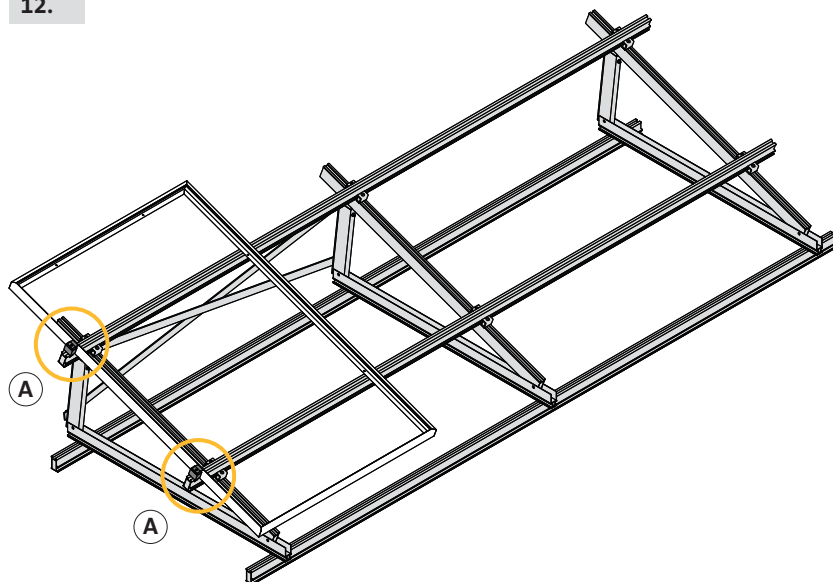
Mount the cross brace

Insert the hammer head bolt into the channel of the TriSole, push on the cross brace and fasten with the self-locking nut with serrated bearing. Tightening torque 12–15 Nm.

Note

Always mount cross braces crosswise. The number of cross braces may vary depending on the roof type and the local conditions. Renusol only recommends crosswise mounting; it should be calculated by a structural engineer on-site.

12.



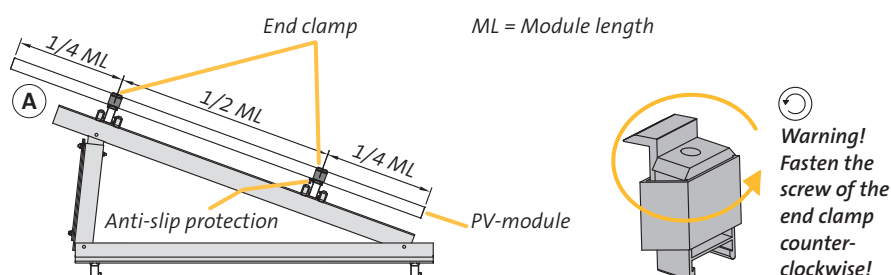
Mount the first module

Place the module onto the VarioSole mounting rail. The anti-slip protection keeps the module from slipping. Push the end clamp onto the rail until it touches the module frame. Align the modules so that the clamping points specified by the module manufacturer are met, usually in the 1/4 points (Fig. A). Fasten the module by turning the screw of the end clamp to the left.

Tightening torque 9–10 Nm.

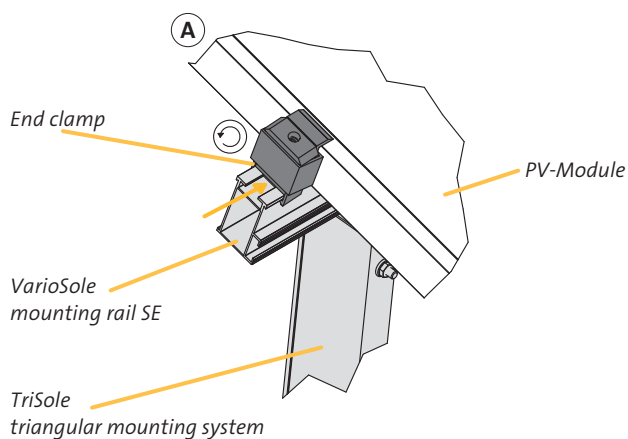
Important

Make sure that the electrical connection is maintained. If necessary, wire the module beforehand.



VERTICAL MODULE MOUNTING

13.



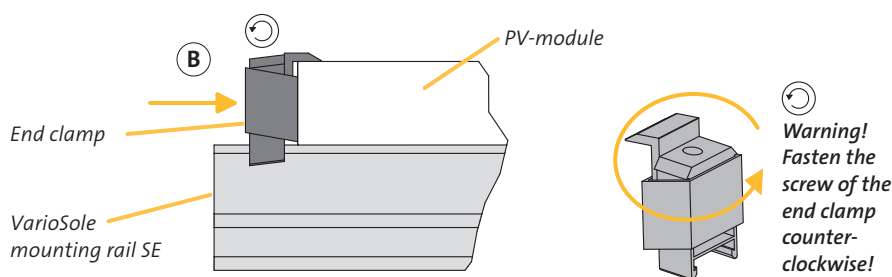
Detailed module mounting process

Push the end clamp onto the rail until it touches the module frame (Fig. A).

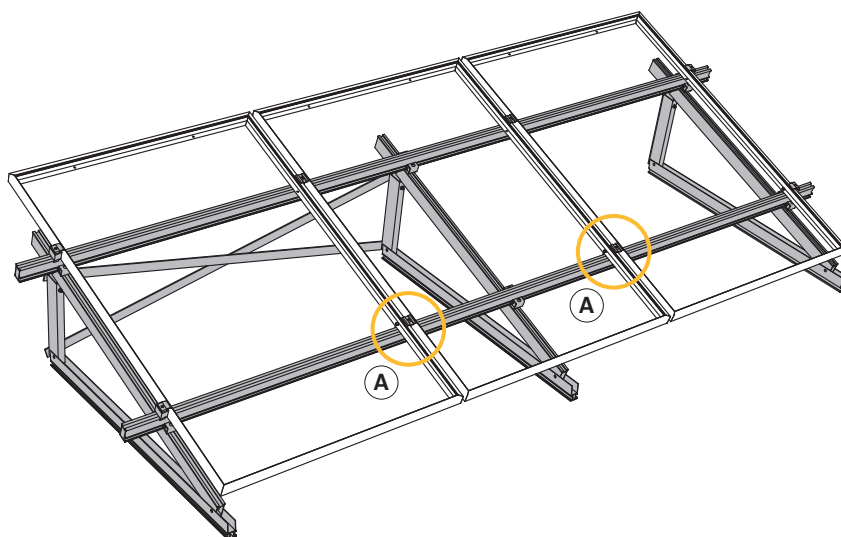
Align the modules so that the clamping points specified by the module manufacturer are met, usually in the 1/4 points (see point 12, page 11).

Fasten the module by turning the screw of the end clamp to the left (Fig. B).

Tightening torque 9–10 Nm.



14.

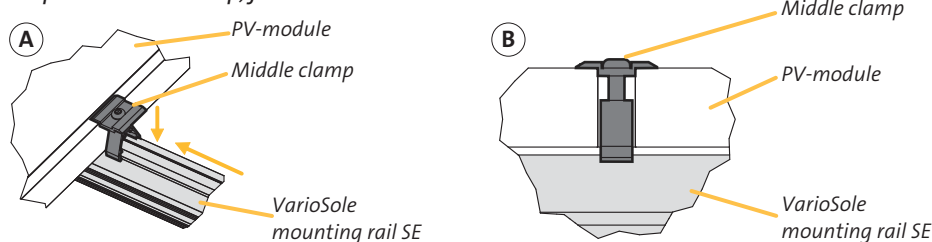


Mount the next modules

To mount additional modules, snap the middle clamp into the VarioSole mounting rail and push against the already fastened module (Fig. A).

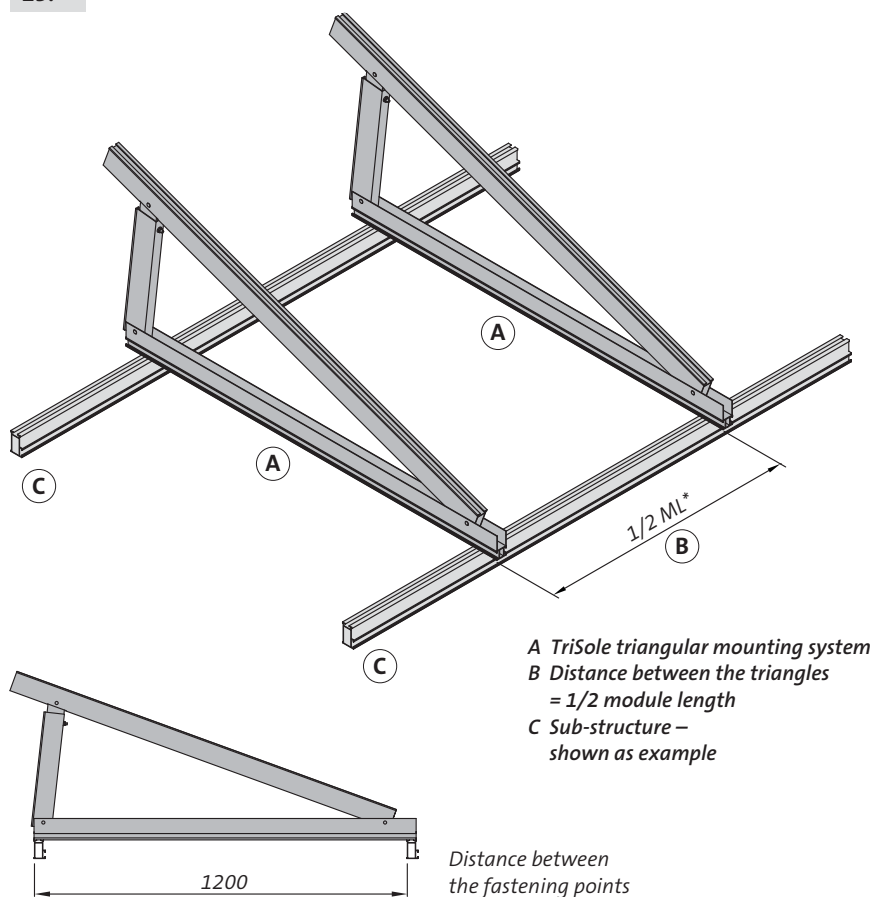
Push the next module against the middle clamp and tighten with 12–15 Nm (Fig. B). Fasten the last module of the row with end clamps.

Snap in the middle clamp; fasten the PV-module



HORIZONTAL MODULE MOUNTING

15.



Fasten the triangular mounting system

Fasten the TriSole triangular mounting system on the sub-structure. You always need two triangles per module. Carefully and precisely align the TriSole on the sub-structure using a plumb line.

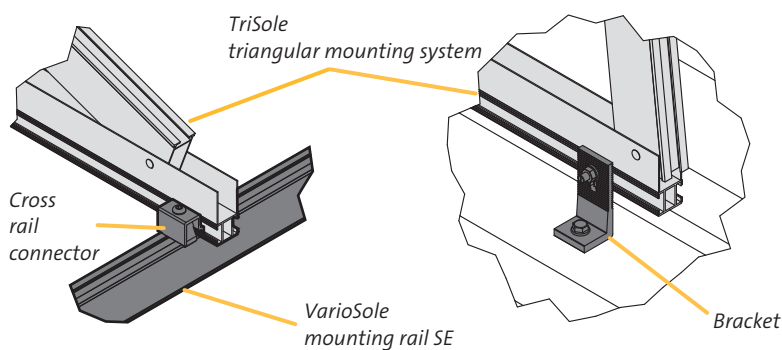
The distances of the TriSole triangles from each other can be seen from the included documentation or from the specifications by the contracted structural engineer.

Note

The distance between the TriSole triangles is half a module length (B).

* ML = Module length

16.



Mounting with cross rail connectors

Mounting with bracket

Determine the type of roof fastening

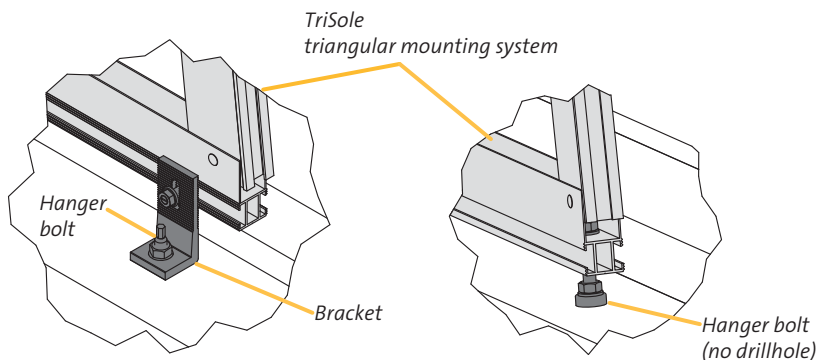
The TriSole systems can be mounted on the roof with four different sub-structures:

- with cross rail connectors
- with brackets
- with hanger bolts and brackets
- only with hanger bolts

Now mount the first row of the TriSole triangular mounting system according to the selected sub-structure. Statically check all fastening methods in advance and on-site.

Note

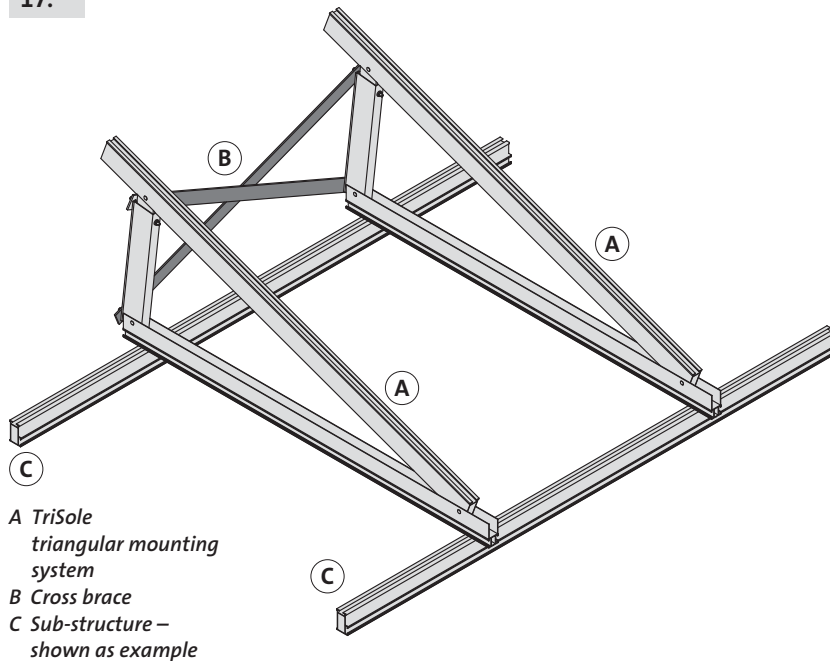
The load suspension through the sub-structure and the load capacity of the roof must be ensured.



Mounting with hanger bolt and bracket

Mounting with hanger bolt

17.

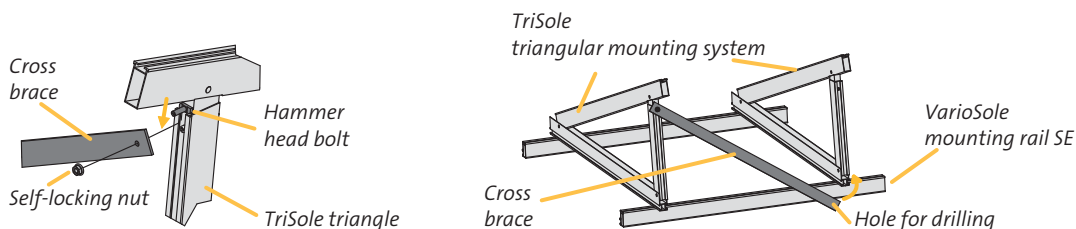


Mount the cross brace

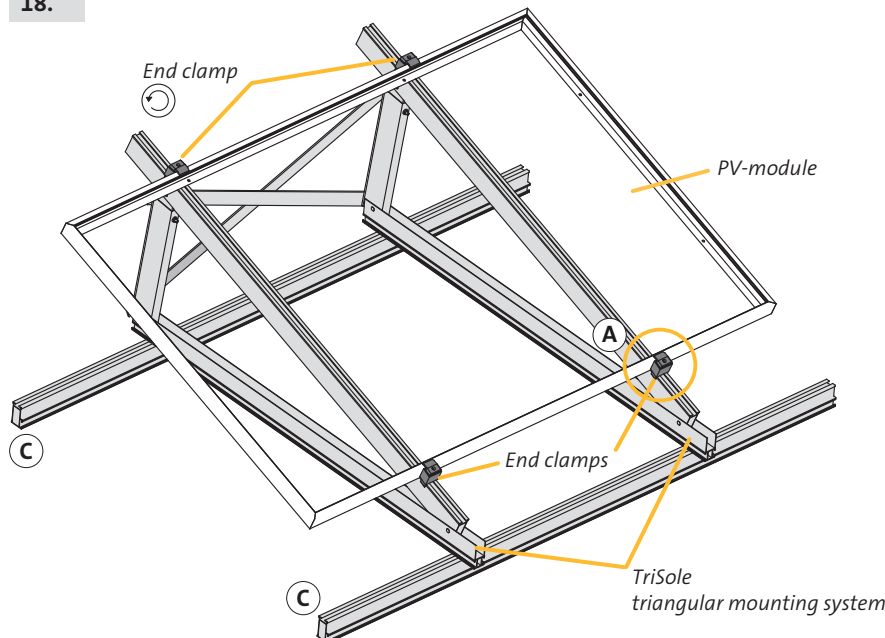
First fasten the stabilising cross bar on one side without tightening it. To do this, insert the hammer head bolt into the channel of the TriSole, push on the cross brace and fasten with the self-locking nut with serrated bearing. Then mark the position for the required borehole. Remove the cross brace and drill through the cross brace at the marked position with an 8.5 mm twist drill bit. Cut off the protruding material with a saw with aluminium blade. Then fasten the cross brace again. Tightening torque 12–15 Nm.

Note

Always mount cross braces crosswise. You need two cross braces per module. Only TriSole triangles bearing the same module may be connected. A connection of triangles with different modules is not permissible..



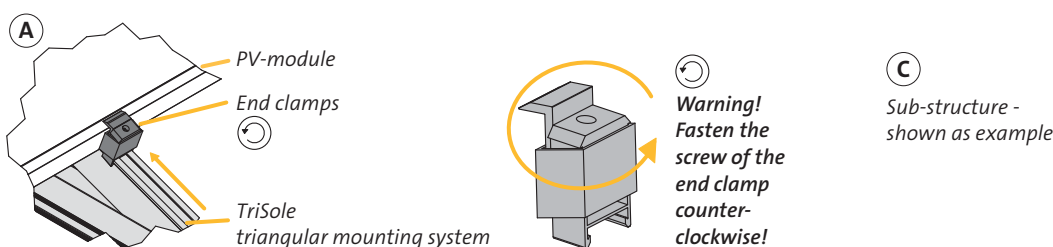
18.

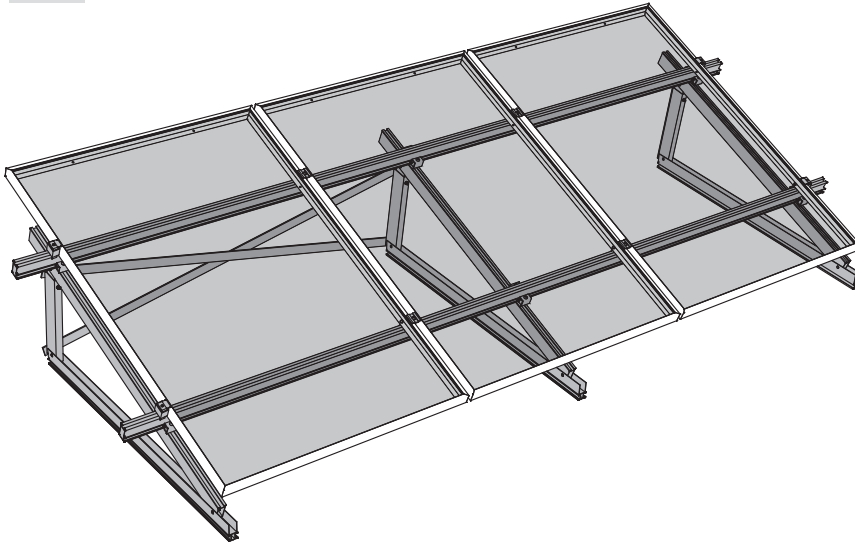


Mount the module

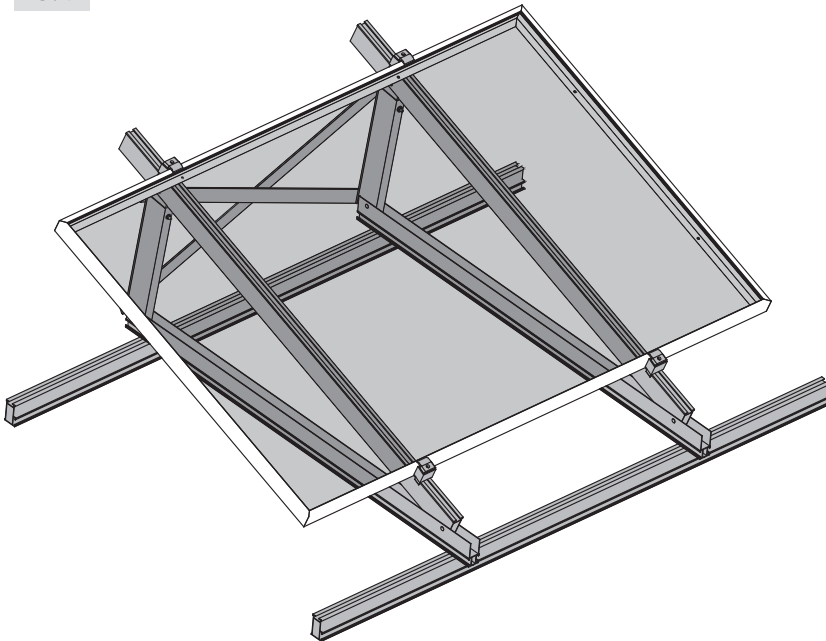
Push the end clamps onto the TriSole triangular mounting system on the top and the bottom (Fig. A). Then place module down and align in the centre. Push the end clamps until they touch the module and fasten by turning the screw of the end clamp to the left (Fig. A).

Tightening torque 9–10 Nm.



19. A

Assembly completed
Installation result: PV-module mounted vertically on TriSole triangular mounting system.

19. B

Assembly completed
Installation result: PV-module mounted horizontally on TriSole triangular mounting system.

Congratulations.

You have successfully completed the installation of the high quality and aesthetically demanding TriSole triangular mounting system as an ideal solution for the quick and easy installation of PV-modules with additional elevation.

We are glad about this nice reference object you have built. If you have any photographs of the assembly and the result, please send us the digital reference photographs, the object data, and the address of the property by e-mail to: info@renusol.com.

We regularly award prizes for the most beautiful reference photos and present them together with the company logo of the respective specialised company on our website.

Thank you very much for your trust in Renusol.

