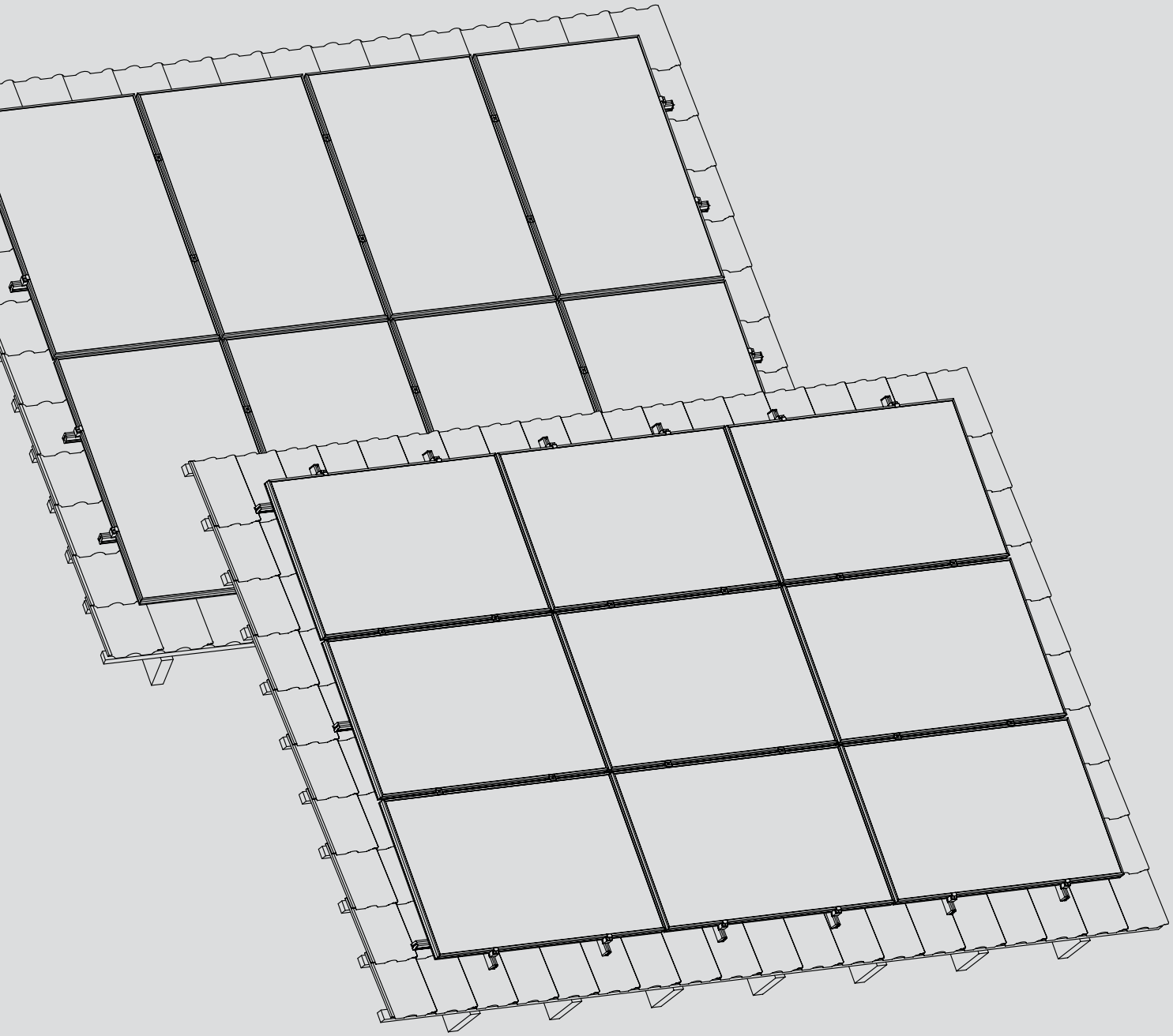
Renusol
Solar Mounting Systems

VarioSole SE

Installation instructions



Product Information

VarioSole is a universal, easy to install system for the mounting of framed PV modules on pitched roofs with a roof pitch between 5° and 60°. The connection to the roof is achieved by using the appropriate fittings for the respective roof covering, such as roof hooks or hanger bolts. The modules can be installed horizontally or vertically. (See the model overview on page 15)

Our user-friendly online configurator available at web.renusol.com simplifies project planning. The tool helps you create an optimal plan with just a few mouseclicks and allows a static draft design of your plant in accordance to country-specific standards and allows you to regulations (Eurocode9, DIN 1055) and generate an individual offer.

Installation time is reduced by pre-assembled and perfectly matched components.

The approved Renusol module clamps allow for a simple, safe and fast mounting of the modules on the rail system. All modules with a frame height ranging between 30 mm to 50 mm can be fixed using these patented module clamps. The patented snap-in system further simplifies mounting.

Warranty
All system components are made of high-grade aluminium or high-alloy stainless steel. This ensures a high durability and corrosion resistance. This is why we can grant a ten-year warranty on the entire VarioSole mounting system. However, the warranty applies only when using all original parts of the VarioSole mounting system. In order to adapt the system optimally to local conditions and to comply with all applicable regulations, we recommend that an expert assessment is carried out.The installation should be carried out by skilled and trained personnel. If you have any questions concerning training, please contact Renusol.

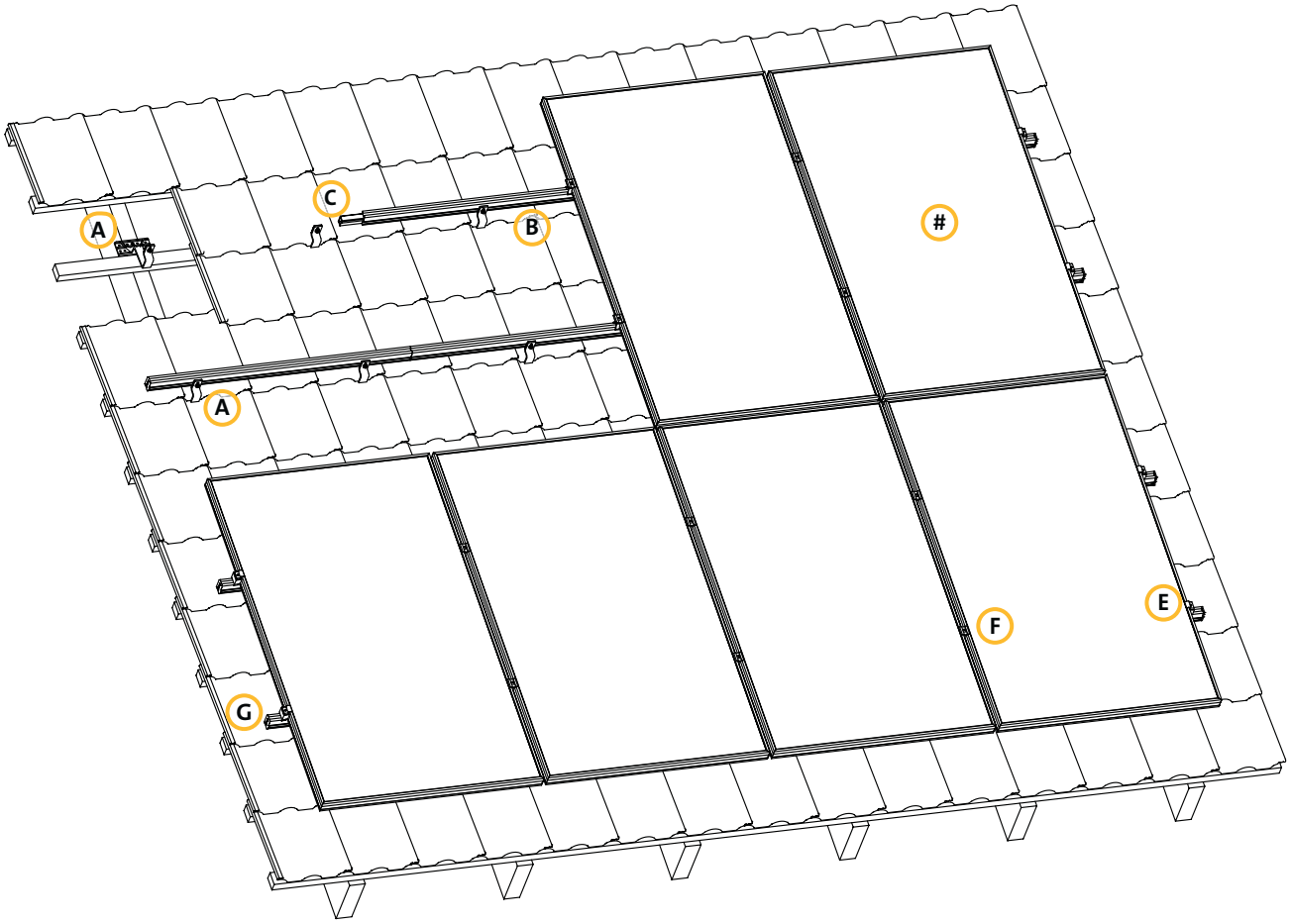
Installation note
Please read these installation instructions carefully before starting the installation. First, familiarise yourself with the system components. During the installation and in particular whilst working on the roof, be sure to observe the relevant health and safety provisions and please follow the current rules and regulations.

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

The diagrams and text in the installation instructions correspond to the latest technological developments at the time of printing. We reserve the right to make technical modifications and print errors. The individual installation instructions are merely recommendations in accordance with the current state of technology and are based on previous experiences of how Renusol systems can be installed. If any special characteristics of the roof or object need to be taken into account, then we recommend that you consult specialists such as roofers or structural engineers where necessary.

The Renusol team wishes you a successful installation.

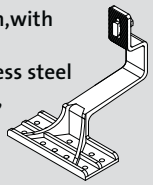
SINGLE-LAYER SYSTEM OVERVIEW – VERTICAL MODULE MOUNTING



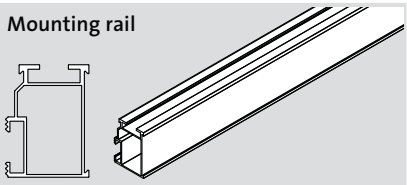
A Roof hook, aluminium
B Mounting rail
C Connector with rivet
E End clamp
F Middle clamp
G End cap
PV module

SYSTEM OVERVIEW OF COMPONENTS FOR VERTICAL AND HORIZONTAL MODULE MOUNTING

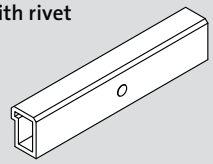
A Roof hook, aluminium,with
– hammer head bolt M8 x 25 mm, stainless steel
– Self-locking nut M8, stainless steel
(See the model overview on page 15)



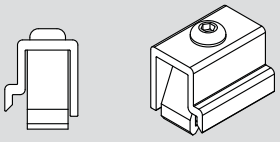
B Mounting rail



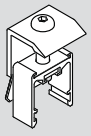
C Connector with rivet



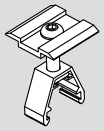
D Cross rail connector



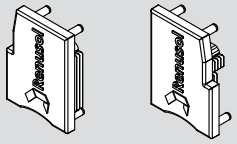
E End clamp



F Middle clamp

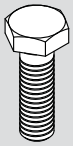


G End cap, left/right



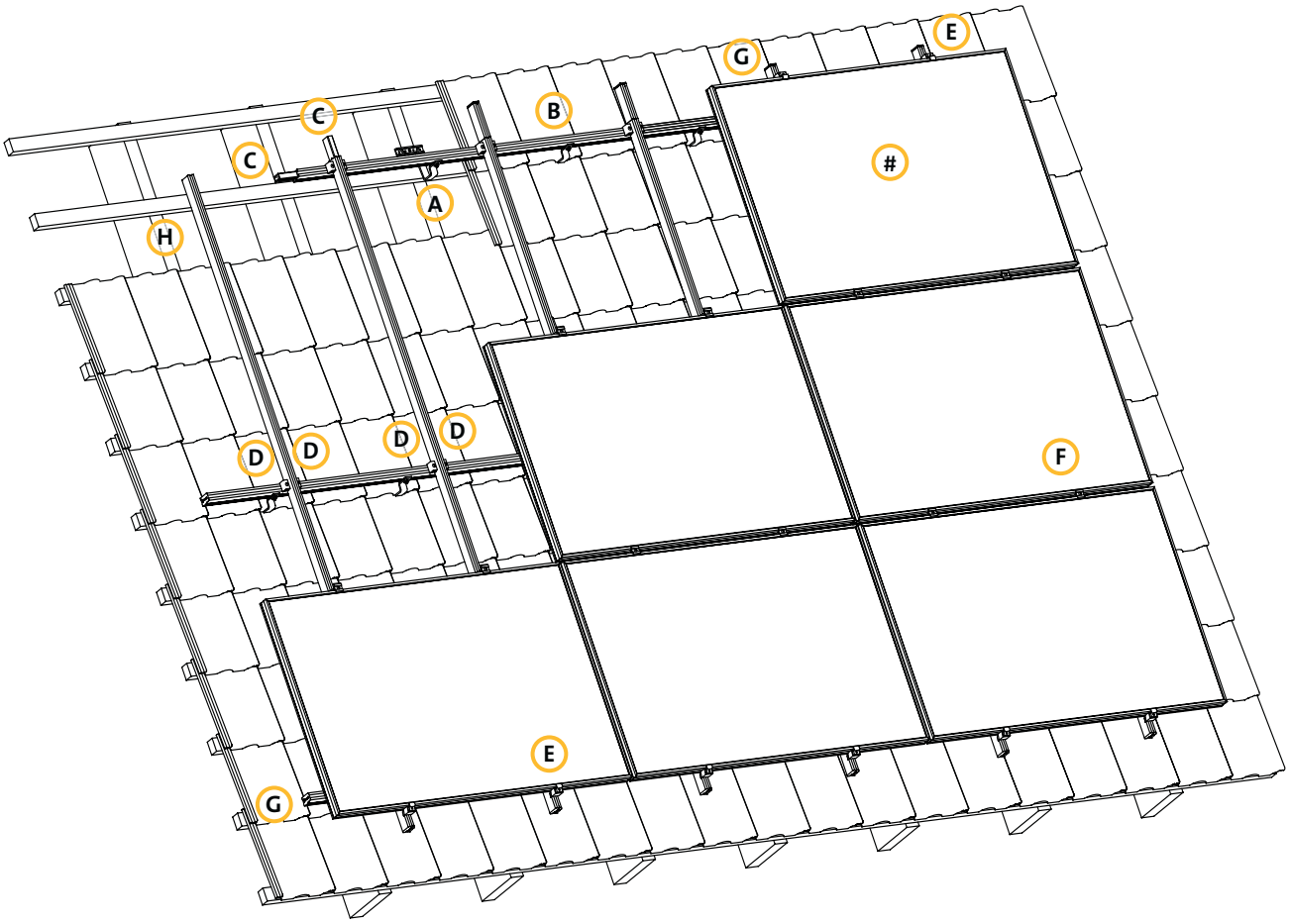
Wood screw
Raised head 6 x 80 mm

Hexagon bolt
M6 x 20 mm, stainless steel



Hexagon bolt DIN 934-M6-A2

SYSTEM OVERVIEW HORIZONTAL – MODULE MOUNTING

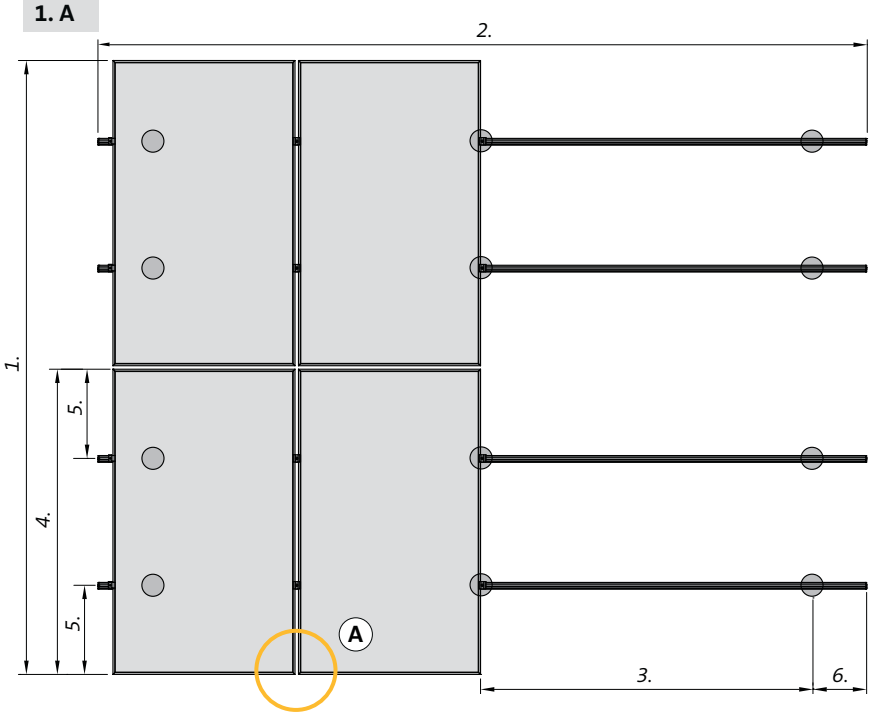


A Roof hook, aluminium
B Mounting rail (horizontal)
C Connector with rivet
D Cross rail connector
E End clamp
F Middle clamp
G End cap
H Mounting rail (vertical)
PV module

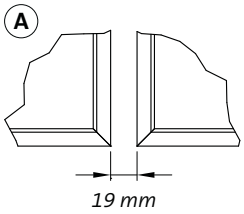
TOOLS AND ADDITIONAL ARTICLES (not included in delivery)

- Cordless screwdriver
- Allen key bit SW 5, bit AW 30 or TX 30
- Wrenches, 10 mm and 13 mm
- Torque wrench
- Angle grinder with stone disk
- Mason's line
- Where necessary, spacer plates to line the roof hooks
- Where necessary, a rubber mallet

1. A



= Position of roof hooks



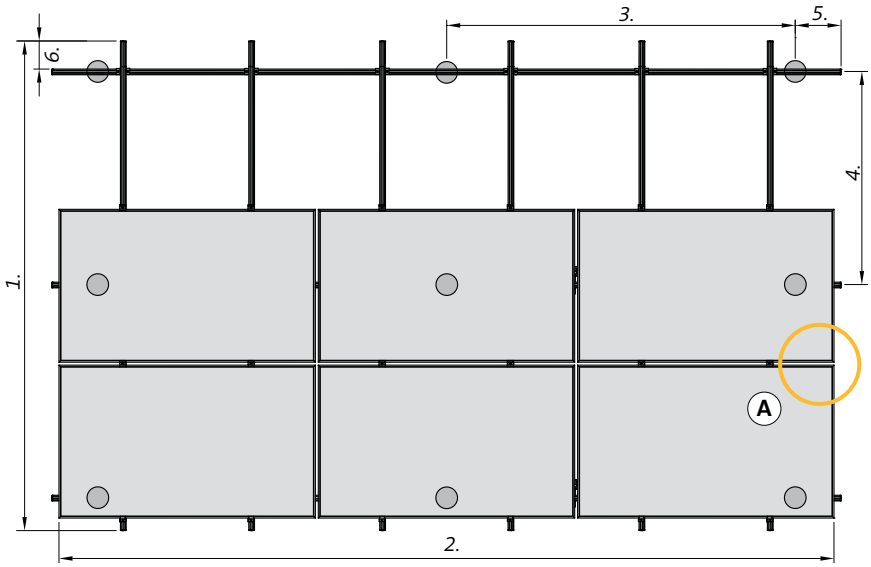
Planning the module surfaces for vertical mounting

1. Number of vertically mounted modules x module length (plus the distance between the vertical modules if necessary)
2. Number of horizontally mounted modules x (module width + 19 mm) + 31 mm
3. Clearance between horizontal Fastening points (e.g. roof hooks)
4. Module length
5. Position of Fastening points, vertical = 1/4 of module length (Also see the module manufacturer's mounting recommendations)
6. Max. Max. clearance of mounting rail from last roof hook = 200 mm

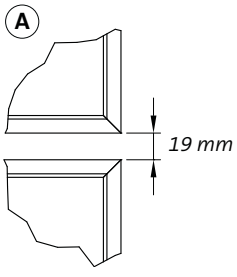
Clearance between modules = 19 mm (Fig. A)

Note
Please ensure that the roof construction is suitable for the introduction of forces at the fixing points and their subsequent transmission.

1. B



= Position of roof hooks



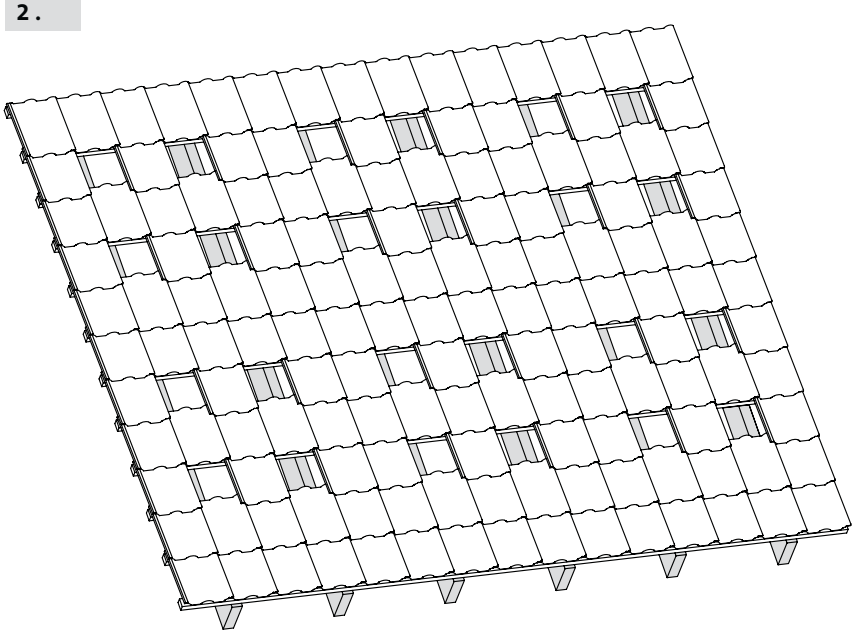
Planning the module surfaces for horizontal mounting

1. Number of vertically mounted modules x (module width = 19 mm) + 31 mm
2. Number of horizontally mounted modules x module length (plus the space between the horizontal modules if necessary)
3. Clearance between horizontal Fastening points (e.g. roof hooks)
4. Clearance between vertical Fastening points
5. Max. clearance of mounting rail from last roof hook = 200 mm
6. Max. clearance of mounting rail from last roof hook = 200 mm

Clearance between modules = 19 mm (Fig. A)

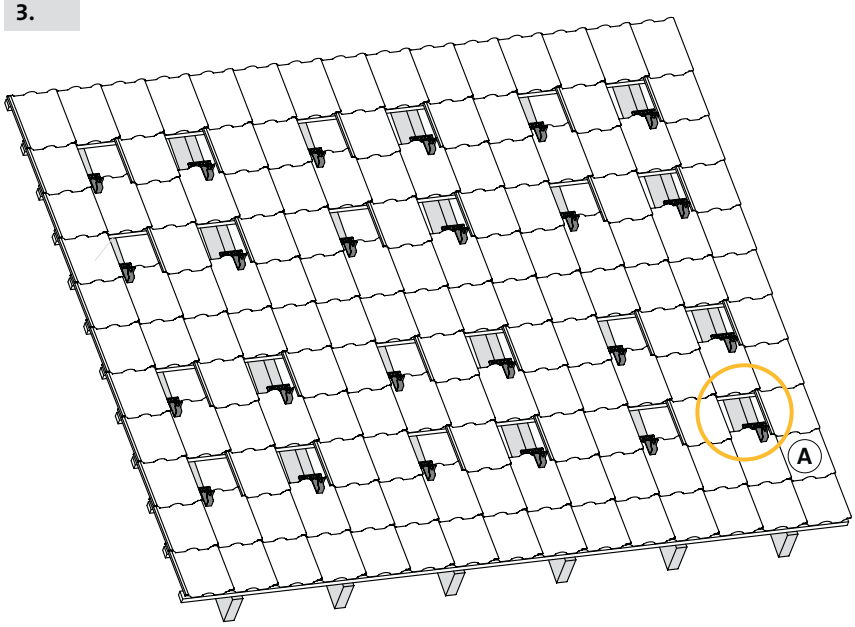
Note
Please ensure that the roof construction is suitable for the introduction of forces at the fixing points and their subsequent transmission.

2 .

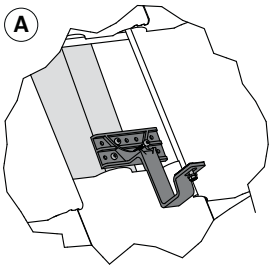


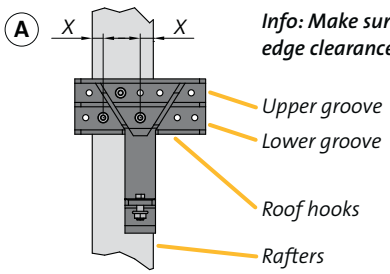
Remove roofing tiles
Determine the positions of the roof hooks according to your plans. Remove the roof tiles at the marked positions or, if possible, just lift them up slightly.

3.



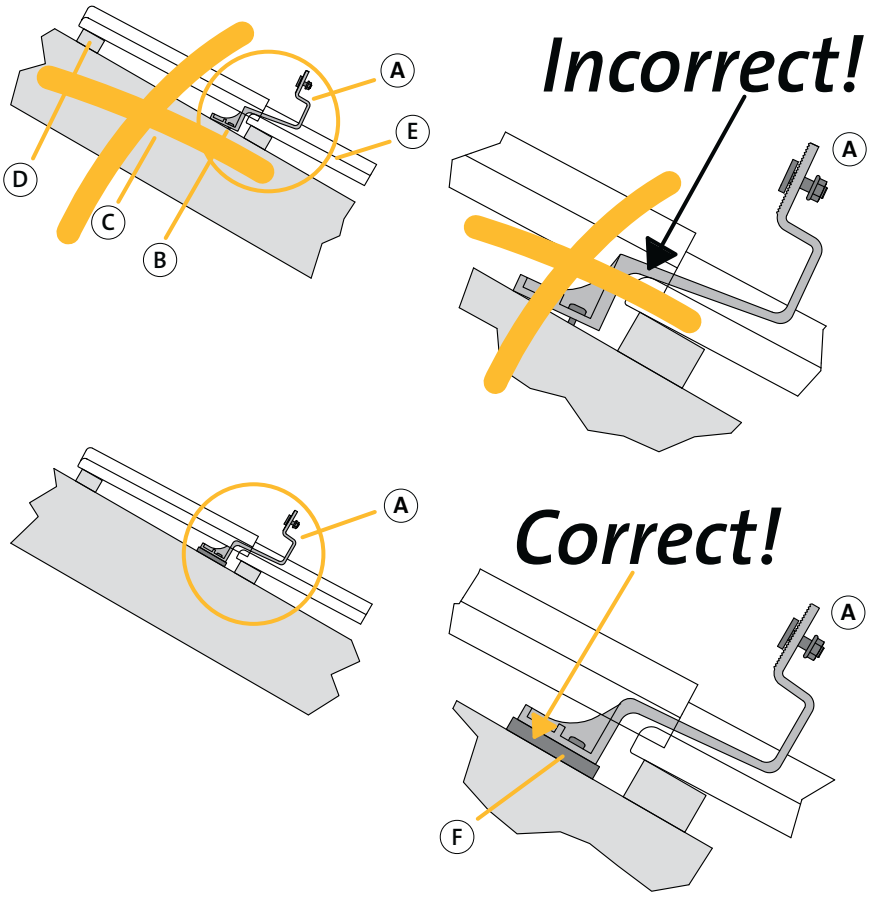
Installing the roof hooks
Fit the roof hooks to the rafters using three wood screws 6 x 80 mm per roof hook (two in the lower and one in the upper groove) (Abb. A).





Info: Make sure edge clearance (X) is identical!

4.

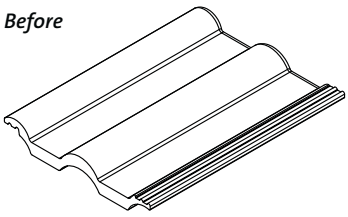


Installing the roof hooks
The roof hooks must not be pressed against the roof tiles. For this reason lines the roof hooks using spacer plates.

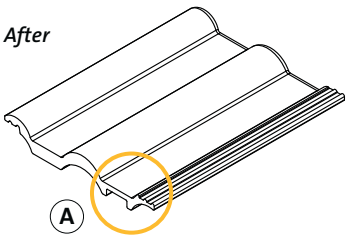
A Roof hook
B Wood screw
C Rafters
D Batten
E Roof tile
F Spacer plate

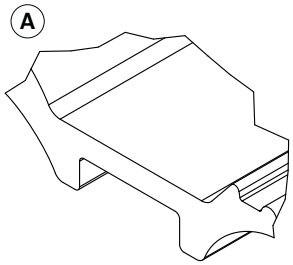
5.

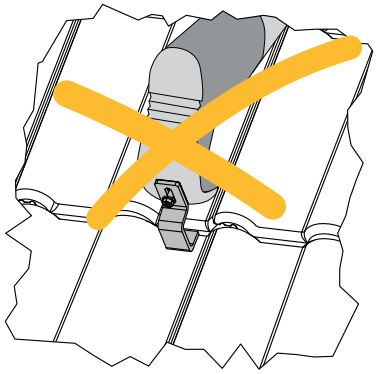
Before



After



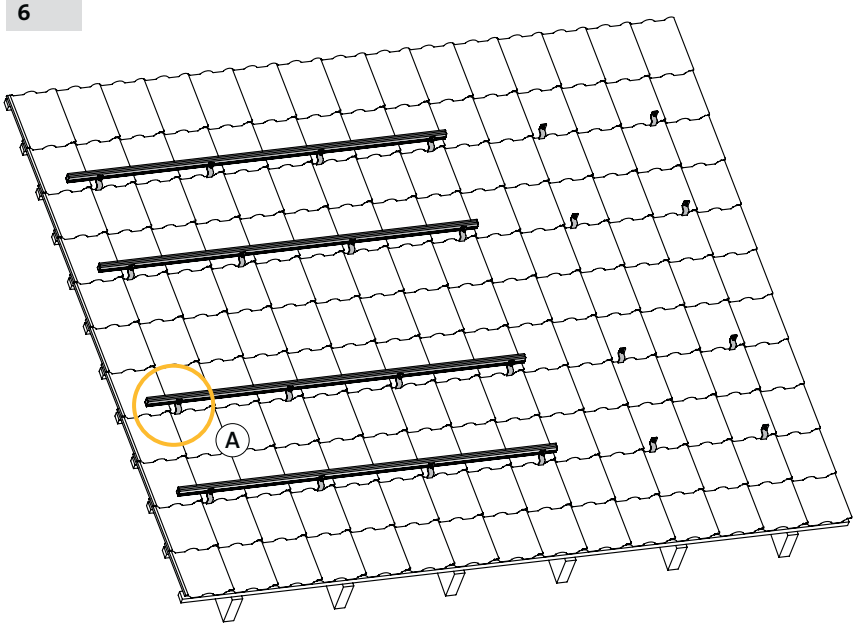




Modifying the tiles
If necessary, use an angle grinder or hammer to cut a recess in the tile covering the roof hook at the point of insertion of the roof hook so that the tile lies flat (Fig. A).
If grooved tiles are in place, it will also be necessary to cut a recess in the lower tile.

Warning!
Do not use installed roof hooks as a ladder.

6

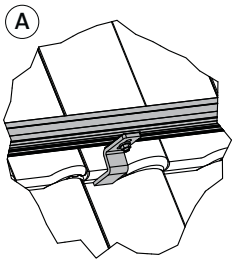


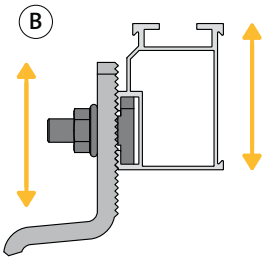
Installing the mounting rails
Fit the mounting rails to the roof hooks using the hammer head bolt and the self-locking nut (Fig. A).

Important
Please ensure that the hammerhead bolts are in a vertical position in the rail channel after tightening.

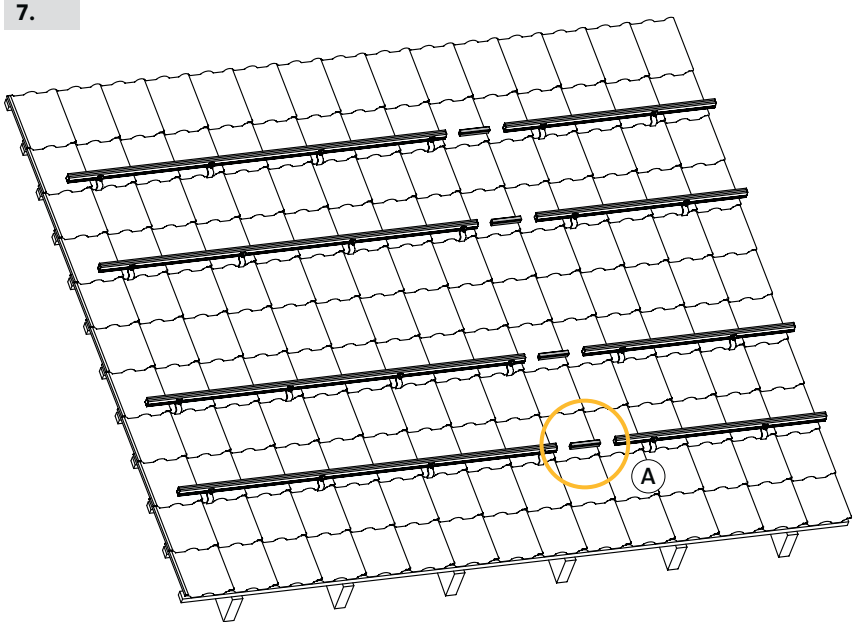
The slotted hole in the roof hook allows optimal adjustment of the rail height (Fig. B).

Aligning the mounting rails
Align the first mounting rails in a row with each other and with the roof covering using a plumb line. Then tighten the nut to secure the mounting rail to the roof hooks. Tightening torque 12–15 Nm.





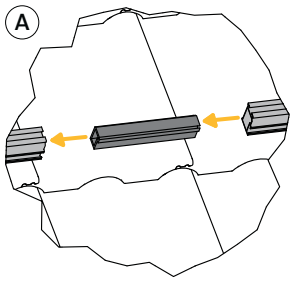
7.

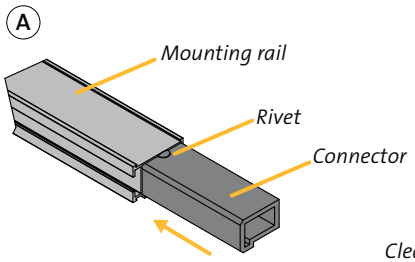


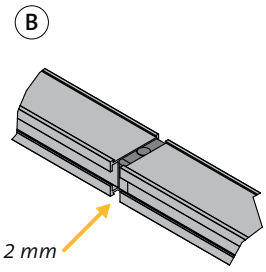
Join the mounting rails
Push the connector with the rivet into the mounting rail until clamping is achieved with the rivet.
Now push the next rail onto the connector until it is also clamped by the rivet.
In order to compensate for the linear expansion, leave a gap of 2 mm between the mounting rails.

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

Information
For horizontal module mounting,
see step 8. B, page 12 "Horizontal Module Mounting".

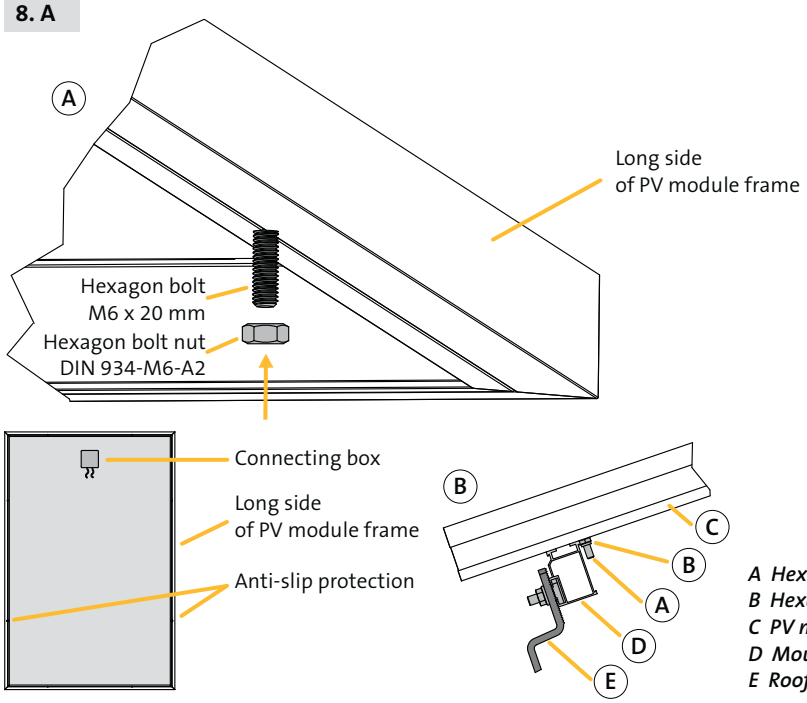






INSTALLING SINGLE-LAYER SYSTEM – VERTICAL MODULE MOUNTING

8. A

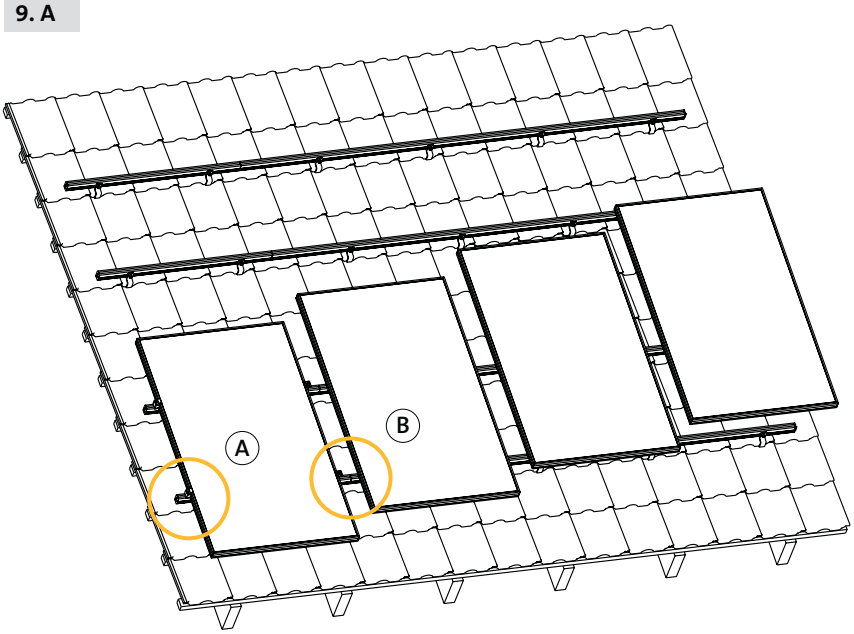


Installing the anti-slip protection for the first module series
Prior to installation, the modules in the lowest row should be fitted with anti-slip protection (only on a horizontal rail assembly).
For this purpose, tighten the M6 x 20 mm screws (with the shaft pointing downwards) using M6 nuts in the module mounting points.
Lie the modules in the lowest row so that the anti-slip protection abuts the edge of the lowest mounting rail (Fig. B).

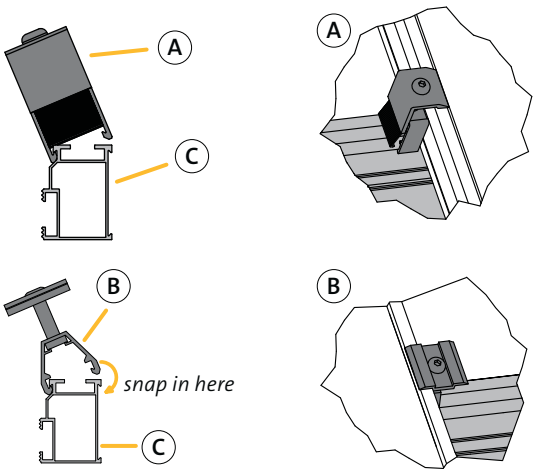
Note
The anti-slip protection can only be used with modules with the corresponding mounting points.

A Hexagon bolt M6 x 20 mm
B Hexagon nut
C PV module
D Mounting rail
E Roof hook

9. A

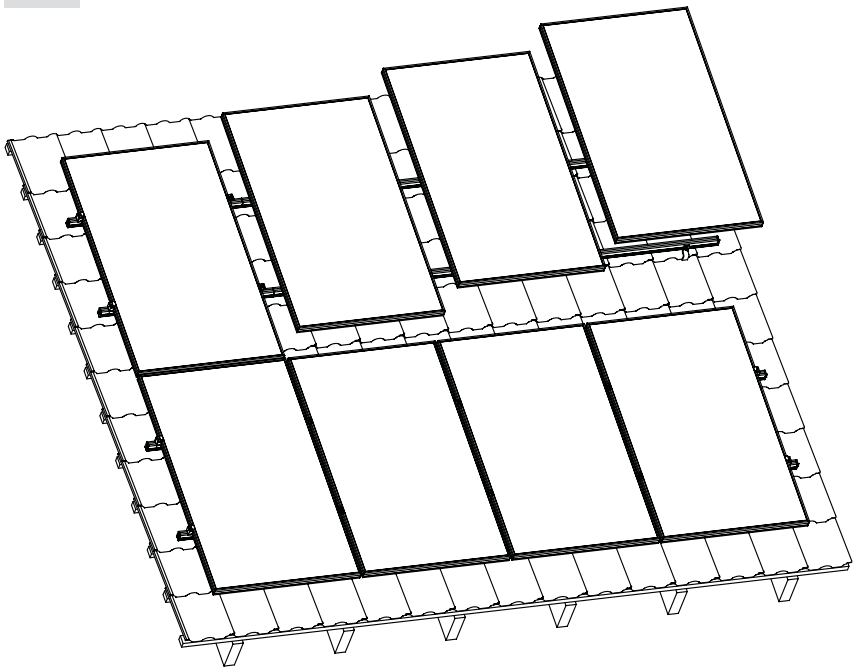


Installing the first row of modules
1. Position the first module on the mounting rail
2. Snap the end clamp into the mounting rail (Distance of the end clamp to the end of the mounting rail at least 5mm, Fig. A)
3. Secure the module using the end clamp bolt (tightening torque 8 Nm)
4. Snap in the right middle clamp on the module into the mounting rail (Fig. B) and slide towards the module and wire
5. Position the second module on the mounting rail and slide towards the middle clamp
6. Tighten the middle clamp (tightening torque 12–15 Nm)
7. Install further modules as described in Point 4 to 6
8. After positioning and cabling the final module in this series, side the end clamp from the right into the mounting rail
9. Secure the module using the end clamp bolt (tightening torque 9–10 Nm)



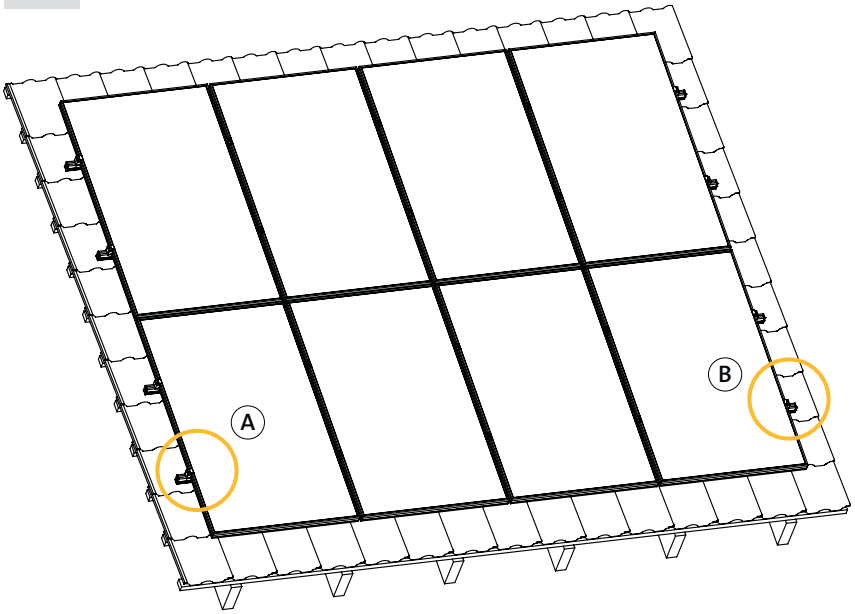
A End clamp
B Middle clamp
C Mounting rail (vertical)

10. A



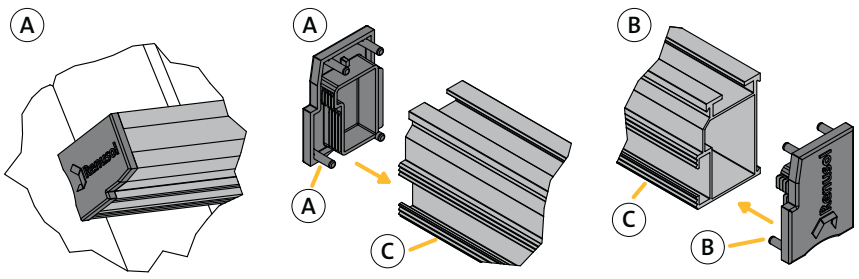
Installing the modules
Same procedure as per Step 9. A, Page 10.

11. A



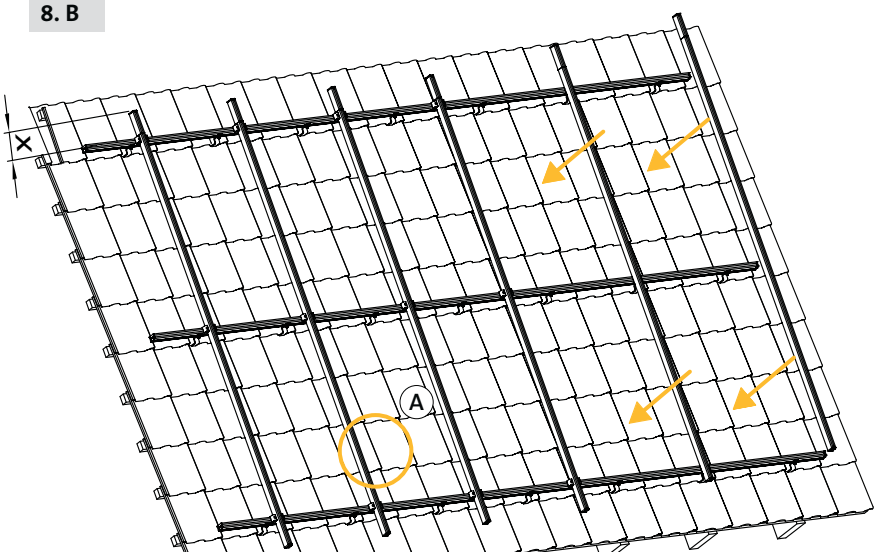
Install end caps (optional)
At each end of the mounting rail, fit a **right** end cap (Fig. A) and a **left** end cap Fig. B).

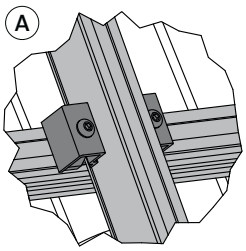
Assembly completed.
Installation result Step 12. A, Page 14.

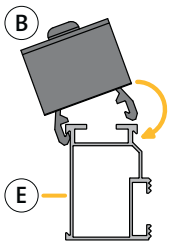


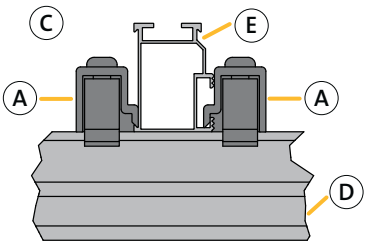
A End cap, right
B End cap, left
C Mounting rail

8. B









Positioning and installing the vertical mounting rails

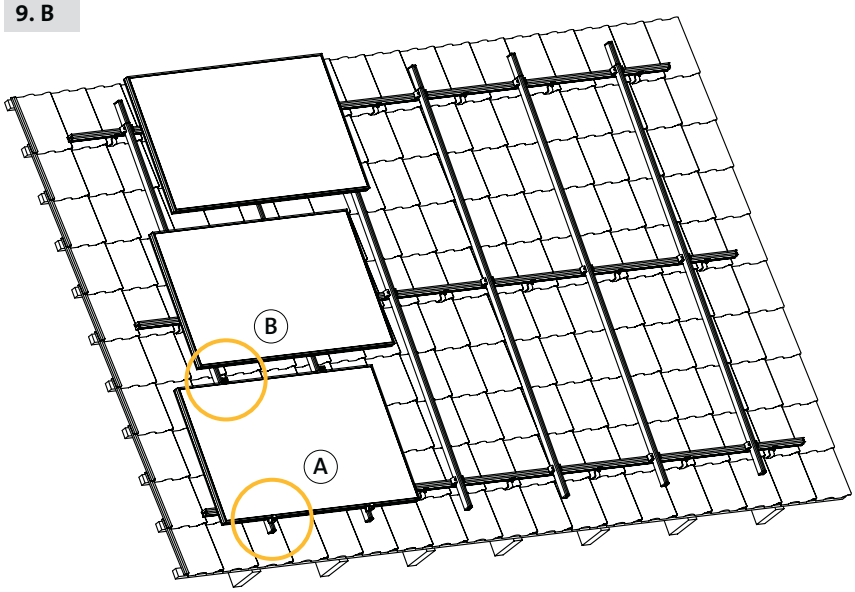
Positioning the vertical mounting rails
The correct position of the vertical mounting rails is calculated using the module 1/4 points.
To calculate this position, also refer to the module manufacturer's installation recommendation.

X = protrusion:
max. according to static calculations.

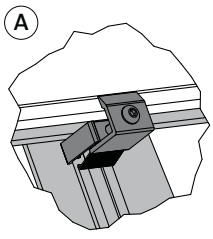
Installing and aligning the vertical mounting rails
Snap the cross rail connectors into the mounting rails (horizontal) (Fig. B).
Then position the mounting rail (vertical) on the mounting rail (horizontal)
Lightly tighten the screws of the cross rail connectors(Fig. C).
Align the first mounting rails in one row with each other using a plumb line.
Then tighten the cross rail connectors (recommended torque 12 - 15 Nm)

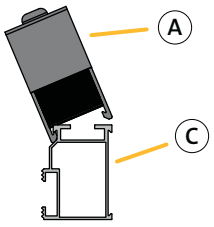
A Cross rail connector
D Mounting rail (horizontal)
E Mounting rail (vertical)
X max. clearance

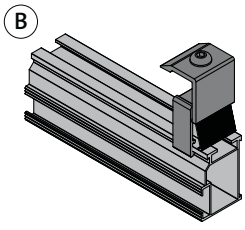
9. B

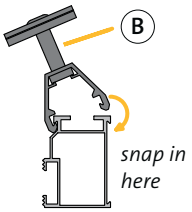


A End clamp B Middle clamp
C Mounting rail (vertical)





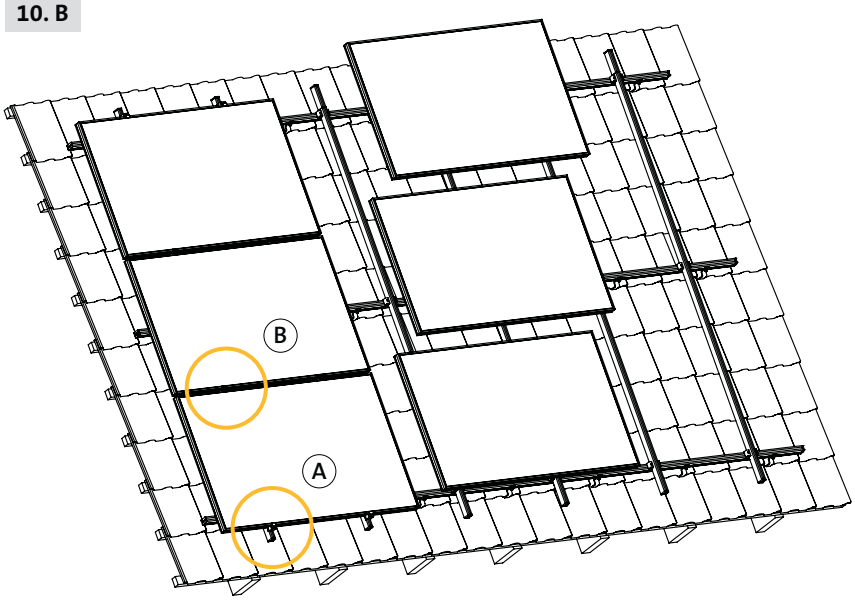




Installing the first module row, horizontal mounting

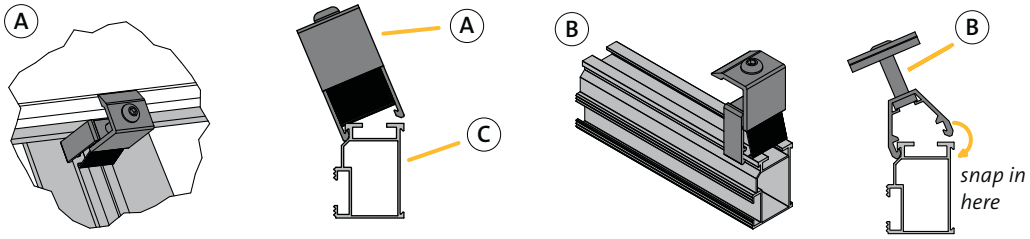
1. Snap the end clamps into the mounting rail at the bottom edge. (Distance of the end clamp to the end of the mounting rail at least 5mm, Fig. A).
2. Position the first module on the mounting rails
3. Secure the module using the end clamp bolt (max. 9–10 Nm)
4. Snap in the middle clamps above the module (Fig. B) and slide towards the module
5 Position the second module on the mounting rails and slide towards the middle clamps
6. Tighten the middle clamp (max. 12–15 Nm)
7. Additional modules: as per Points 4 to 6
8. Position the highest module on the mounting rails
9. Snap the end clamps into the mounting rail at the top edge and slide them against the modules (Fig. A) Distance of the end clamp to the end of the mounting rail at least 5mm
10. Secure the module using the end clamp bolt (max. 9–10 Nm)

10. B

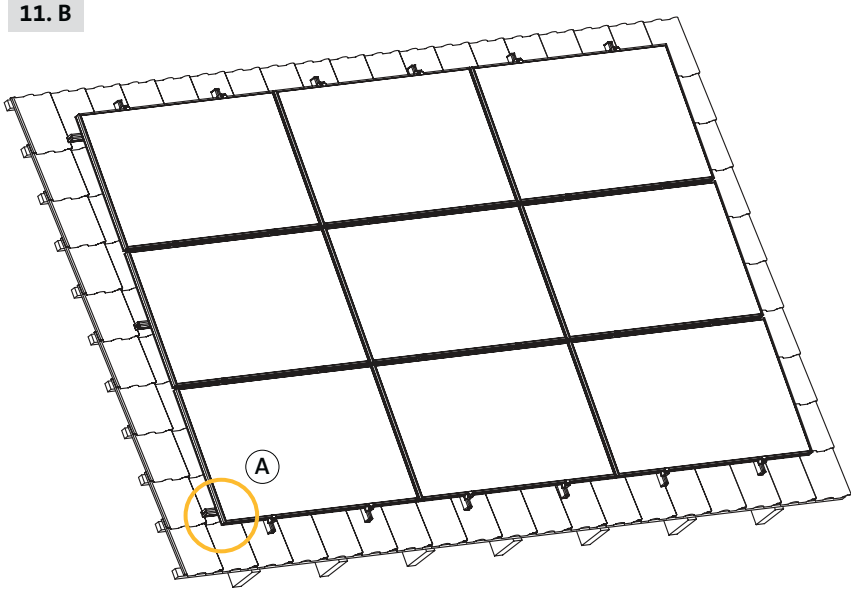


Installing the next module row
Now slide the first module from the next row from the right towards the respective module in the adjacent row. Clearance may also be maintained from the lower module for aesthetic reasons. For this purpose, use a middle clamp as a spacer so that the vertical and horizontal clearances between the modules are identical.
Continue with the installation of additional modules in accordance with Points 1–10 (see page 12), until all modules are installed.

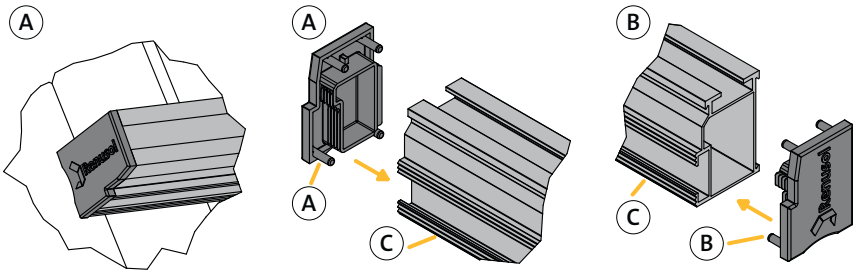
A End clamp
B Middle clamp
C Mounting rail (vertical)



11. B

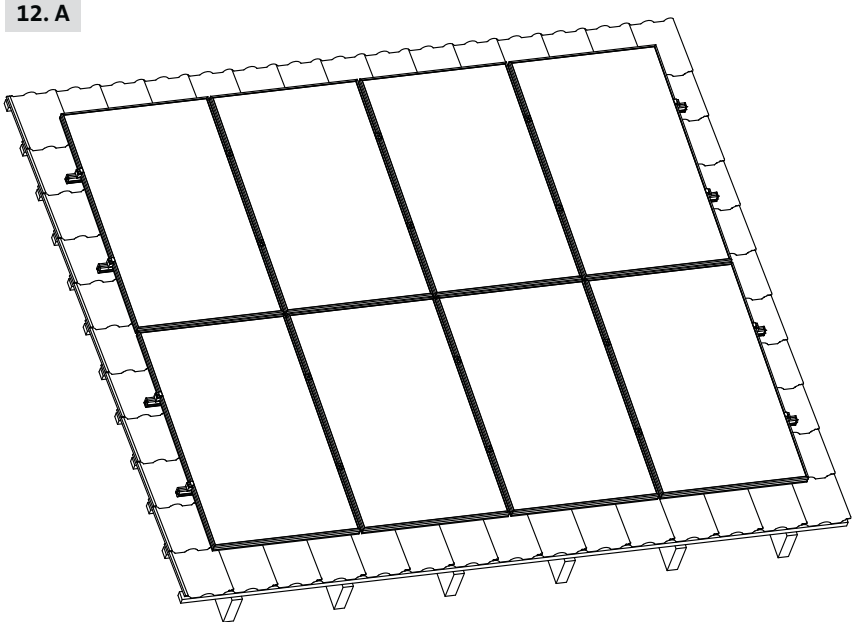


Install end caps
At each end of the mounting rail, fit a **right** end cap (Fig. A) and a **left** end cap (Fig. B).



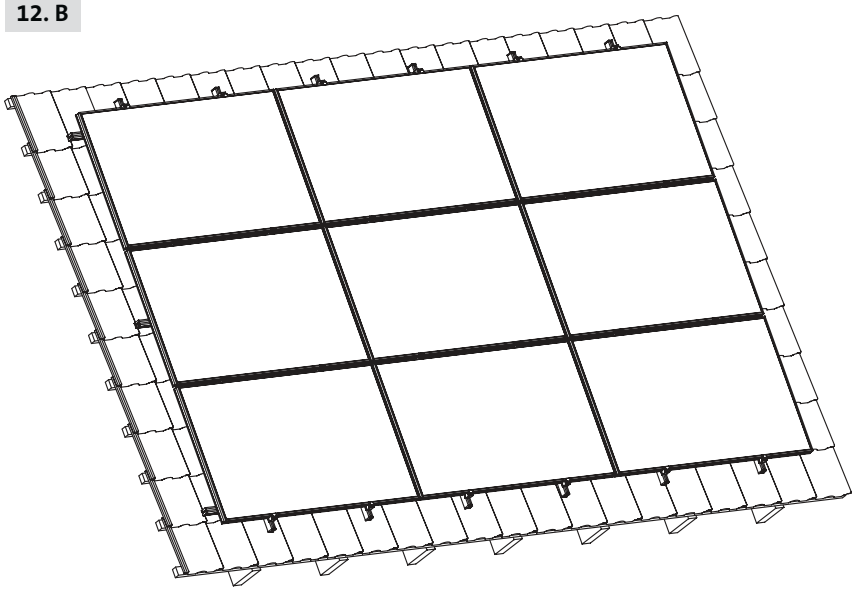
A End cap, right
B End cap, left
C Mounting rail

12. A



Assembly completed – single layer
Installation result: Vertical PV module with pre-mounted VarioSole SE.

12. B



Assembly completed – two-layer
Installation result: Horizontal PV module with pre-mounted VarioSole SE.

Congratulations.
You have just installed VarioSole SE, the perfect aesthetic solution for the fast and easy installation of PV modules on pitched roofs.

We are glad that you have fitted an attractive reference installation. If you have already taken photographs of the installation and the result, please send us the digital reference images, the object data and the object address by email to: info@renusol.com.

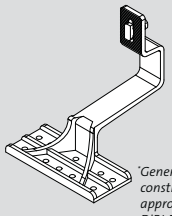
We regularly award prizes for the best reference photos and present them together with the company logo of the respective specialist company on our website.

Thank you for choosing Renusol.

13. A

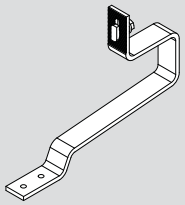
Tile roofing with wood sub-structures

*Roof hooks, aluminium**

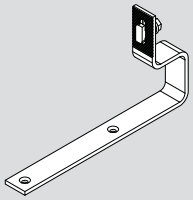


*'General construction approval DiBt Z-14.4-515

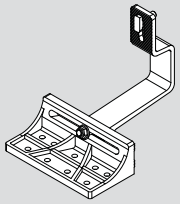
Plain tile roof hook



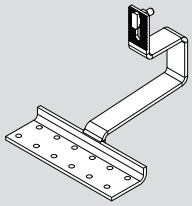
Slate roof hook



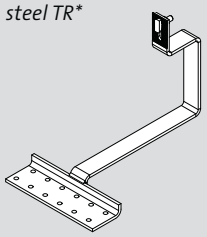
Roof hook, aluminium, adjustable



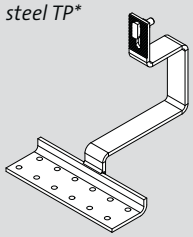
*Roof hook, Stainless steel TM**



*Roof hook, Stainless steel TR**



*Roof hook, Stainless steel TP**



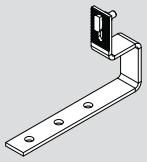
Country-specific roof hooks for Italy, Spain, and France

Types of roof tiles
TM = Tegola Marsigliese
TR = Tegola Romana
TP = Tegola Portoghese
DC = Doppio Coppo

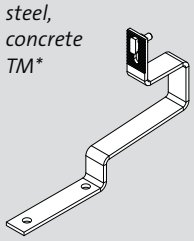
13. B

Tile roofing with concrete sub-structures

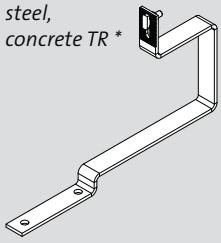
Roof hook, stainless steel, concrete basic



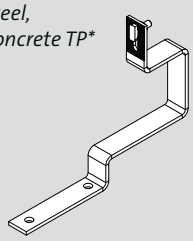
*Roof hook, stainless steel, concrete TM**



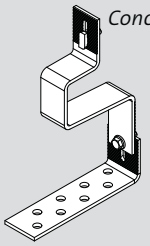
*Roof hook, stainless steel, concrete TR **



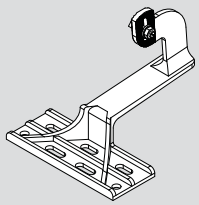
*Roof hook, stainless steel, concrete TP**



*Stainless steel roof hook Concrete DC**



Roof hook, aluminium, concrete, 90°



Types of roofing tiles
TM = Tegola Marsigliese
TR = Tegola Romana
TP = Tegola Portoghese
DC = Doppio Coppo

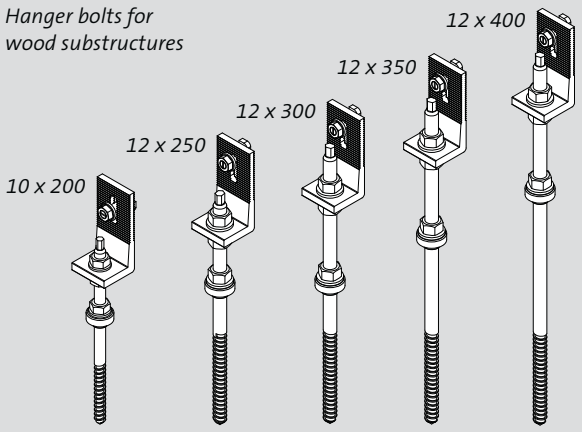
Country-specific roof hooks for Italy, Spain, and France

Types of roof tiles
TM = Tegola Marsigliese
TR = Tegola Romana
TP = Tegola Portoghese
DC = Doppio Coppo

13. C

Trapezoidal and corrugated sheet roofs

Hanger bolts for wood substructures



Solar fasteners for metal substructures with calottes or mushroom seals

8 x 64/50
8 x 80/50
8 x 100/50
8 x 125/50
8 x 150/50
8 x 160/50
8 x 200/50
8 x 240/50
8 x 280/50