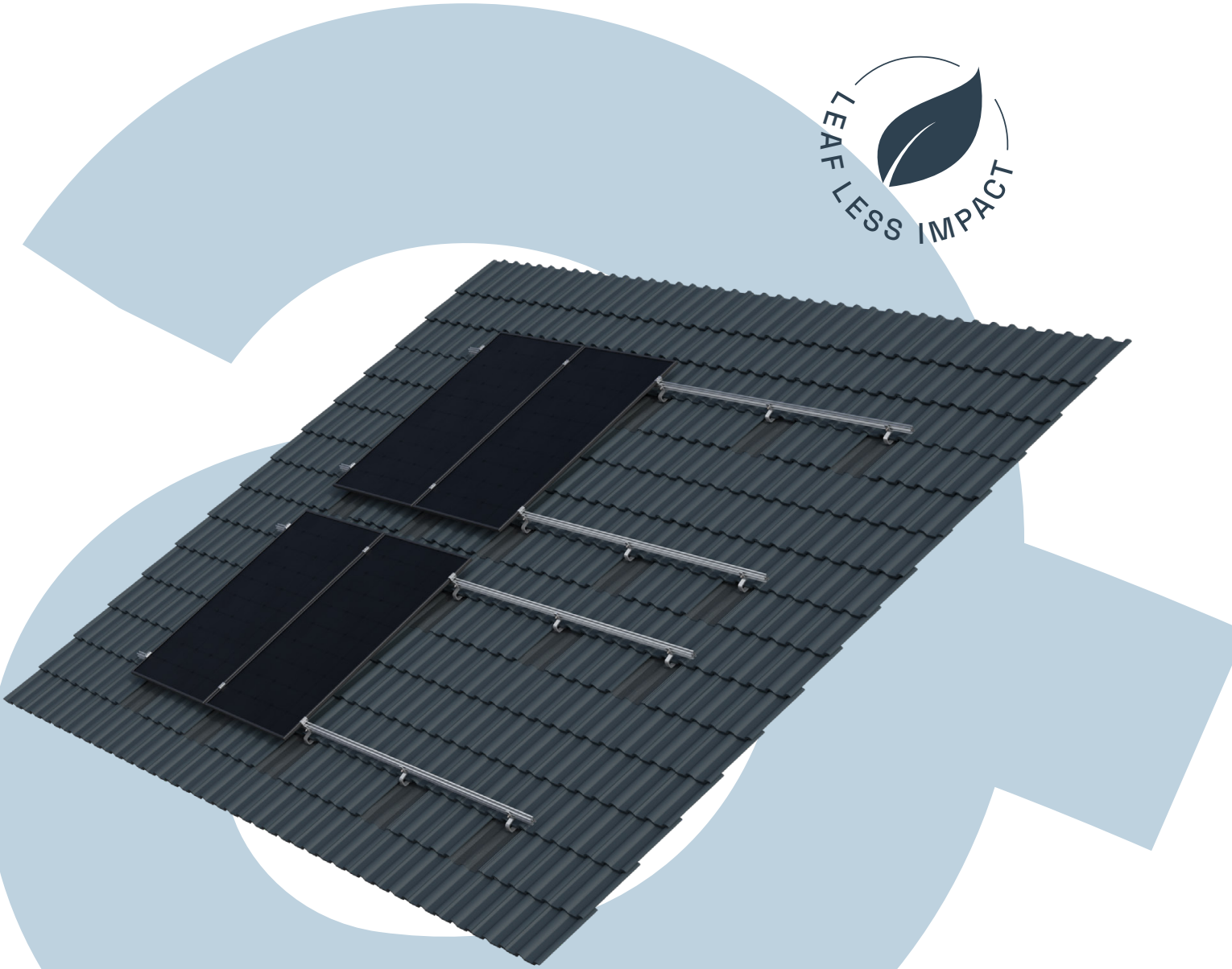
alumero



assembly manual

easyPITCH roof hooks

PV mounting systems for pitched roofs

Please read the assembly instructions carefully before you start assembling the product.

Please read the safety instructions at the end of this manual before starting the installation. Make sure you are using the latest version of the assembly manual.

The layout and planning of the mounting system should be done using the ALUMERO.PRO.TOOL software. Refer to the required materials, positions, and arrangement of individual components as detailed in the project report provided by ALUMERO.PRO.TOOL or your ALUMERO sales representative. This data has been statically calculated and are essential for the safe and proper functioning of the system.

The installer of the photovoltaic system must ensure before installation begins that the roof substructure provided is designed for the additional loads.

This manual describes the assembly processes for the according ALUMERO system, attachment in open terrain, and the installation of modules.

This ALUMERO mounting system is designed exclusively for mounting PV modules. Any other use is considered inappropriate.

Installation must only be performed by qualified personnel. Roofing work in particular should be carried out by a roofing professional.

For further questions, use ALUMERO‘s professional and comprehensive consulting service.

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Technical Data

Use	PV mounting system for pitched roofs with roof tiles and slates (tiled roof, plain tiles, slate)			
Modules	**Dimensions**	Any	**Orientation**	Vertical and horizontal
	Field size	12 meters in direction of rail	**Inclination**	Parallel to the roof
	Roof areas	All roof areas according to EN 1991-1-4	**Type**	Framed modules of all manufacturers, frameless modules with laminate clamps
Roof	**Inclination**	max. 75°	**Covering**	Tiles and pantiles
	Battening	For all permitted roof battens according to DIN 4074-1		
Fastening	Washer head screw (min. 60 mm engagement depth into rafter)			
Rafter width	Tiled roof & plain tiles: min. 60 mm | Slate: min. 50 mm			
Loads	**Wind**	Calculation according to DIN EN 1991-1-3:2010-12 using ALUMERO Solar.Pro.Tool		
	Snow	Calculation according to DIN EN 1991-1-4:2010-12 using ALUMERO Solar.Pro.Tool		
	Stability	Dimensioning and construction of aluminium structures in accordance with Eurocode 9 DIN EN 1999-1-4		
On-site requirements	The static load-bearing capacity of the roof structure or the building must be ensured on site			
Materials	Load-bearing components: Aluminium EN AW 6005 T6; EN AW 6082 T6; EN AW 6063 T66 and stainless steel 1.4301; washers, screws and threaded plates: stainless steel 1.4301 (A2-70)			
Screw mounting	M8 (A2-70)	M10 (A2-70)		
Torque	15 Nm	30 Nm		

Required tools



Cordless screwdriver
Bit inserts: Allen key **SW 6**



Allen key SW6



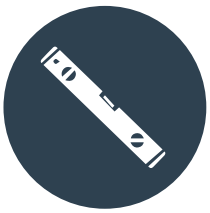
Torque wrench



Measuring tape



Impact cord



Spirit level

Components



Dachhaken EF35 | Roof hook EF35

Produktnr. | Product No.	Dachart | Roofing	H x B x L | H x W x L
802514	Ziegel | Tile	184 x 211,65 x 93 mm



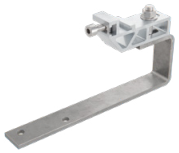
Dachhaken EF25 | Roof hook EF25

Produktnr. | Product No.	Dachart | Roofing	H x B x L | H x W x L
802509	Ziegel | Tile	184 x 211,65 x 93 mm



Biberschwanz Dachhaken mit Schnellmontage
Plain tile roof hook with quick mounting

Produktnr. | Product No.
802425



Schiefer Dachhaken mit Schnellmontage
Slate roof hook with quick mounting

Produktnr. | Product No.
802423



Montageschiene | Mounting rail

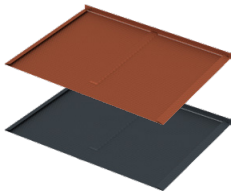
Produktnr. | Product No.	Höhe | Height	Länge | Length
802105-24	37 mm	2400 mm
802105-36	37 mm	3600 mm
802105-48	37 mm	4800 mm
802105-6	37 mm	6000 mm
802100-24	45 mm	2400 mm
802100-36	45 mm	3600 mm
802100-48	45 mm	4800 mm
802100-6	45 mm	6000 mm
802102-36	65 mm	3600 mm
802102-48	65 mm	4800 mm
802102-6	65 mm	6000 mm



Montageschiene schwarz | Mounting rail black

Produktnr. | Product No.	Höhe | Height	Länge | Length
802195-24	37 mm	2400 mm
802195-36	37 mm	3600 mm
802195-48	37 mm	4800 mm
802195-6	37 mm	6000 mm
802190-24	45 mm	2400 mm
802190-36	45 mm	3600 mm
802190-48	45 mm	4800 mm
802190-6	45 mm	6000 mm
802192-36	65 mm	3600 mm
802190-48	65 mm	4800 mm
802190-6	65 mm	6000 mm

Components



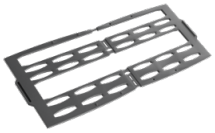
Ziegelersatzplatte 2.1 | Tile replacement plate 2.1

Produktnr. | Product No.	Farbe	Colour
802630	Kupferbraun RAL 8004	Copper brown RAL 8004
802631	Anthrazit RAL 7016	Anthracite RAL 7016



Biberschwanzplatte Galvalum | Beaver tail sheet metal tile

Produktnr. | Product No.	Variante | Variant
802620	Lang | Long
802621	Kurz | Short



Dachhaken Unterlegplatte | Roof hook spacer plate

Produktnr. | Product No.	HxBxL | HxWxL	Dachart | Roofing
803606	2,5x214x85 mm	Ziegel | Tile



Endklemme Click | End clamp click

Produktnr. | Product No.	Farbe | Colour
802304C P1 30-42	Silber | Silver



Endklemme Click schwarz | End clamp click black

Produktnr. | Product No.	Farbe | Colour
802394C P1 30-42	Schwarz | Black



Mittelklemme Click | End clamp click

Produktnr. | Product No.	Farbe | Colour	Typ | Type
802301C P1 28-42	Silber | Silver	Mit Pin | With pin
802301C 28-42	Silber | Silver	Ohne Pin | Without pin



Mittelklemme Click schwarz | End clamp click black

Produktnr. | Product No.	Farbe | Colour	Typ | Type
802391C P1 28-42	Schwarz | Black	Mit Pin | With pin
802391C 28-42	Schwarz | Black	Ohne Pin | Without pin

Components



Tellerkopfschraube | Flat head screw

Produktnr. | Product No.	Abmessungen | Dimensions
800665	8,0 × 100 mm
800664	8,0 × 120 mm



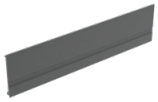
Schienenverbinder | Rail connector

Produktnr. | Product No.	Höhe | Height	
802155	37 mm	
802150	45 mm	
802152	65 mm	
802150S	45 mm	Mit Schrauben | With screws
802152S	65 mm	Mit Schrauben | With screws



Kreuzverbinder 2.1 | Cross connector 2.1

Produktnr. | Product No.	
802200	Für einen schnellen und starken Kreuzverbund der Montageschiene 37-65 For fast and strong cross-connection of mounting rails 37-65



Abdeckleiste schwarz | Cover strip black

Produktnr. | Product No.	Höhe | Height
802611	37 mm
802612	45 mm



Endkappe | End cap

Produktnr. | Product No.
802601



Kabelclip mit Hammer | Cable clip with hammer

Produktnr. | Product No.	Farbe | Colour
802640	Schwarz | Black

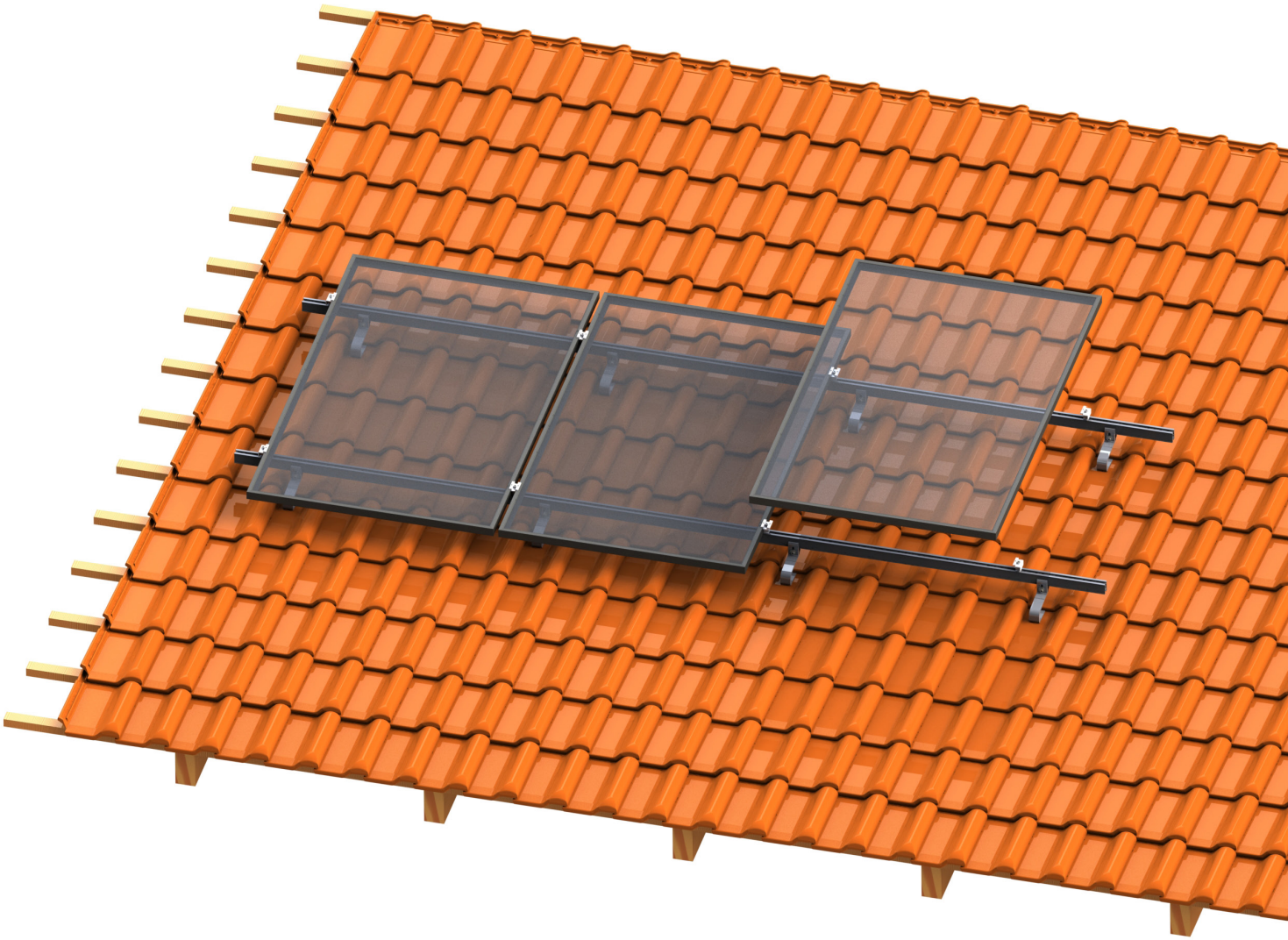


Metallklemme für Kabelclip | Metal clamp for cable clip

Produktnr. | Product No.	Farbe | Colour
802641	Silber | Silver

INSTALLATION OF ROOF HOOKS

Vertical module arrangement | Single-layer

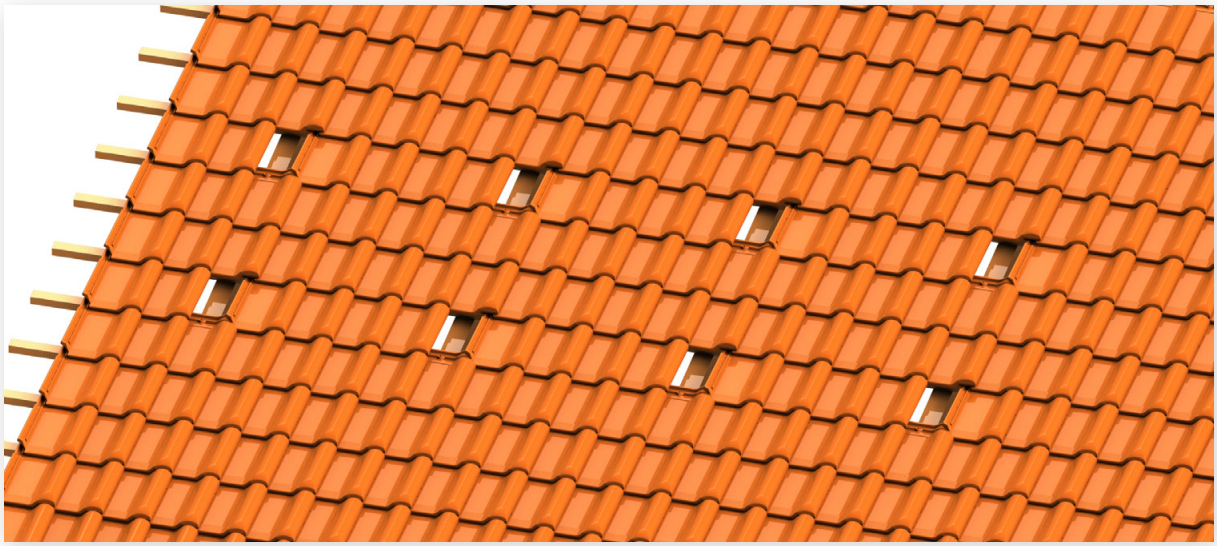


INSTALLATION OF ROOF HOOKS

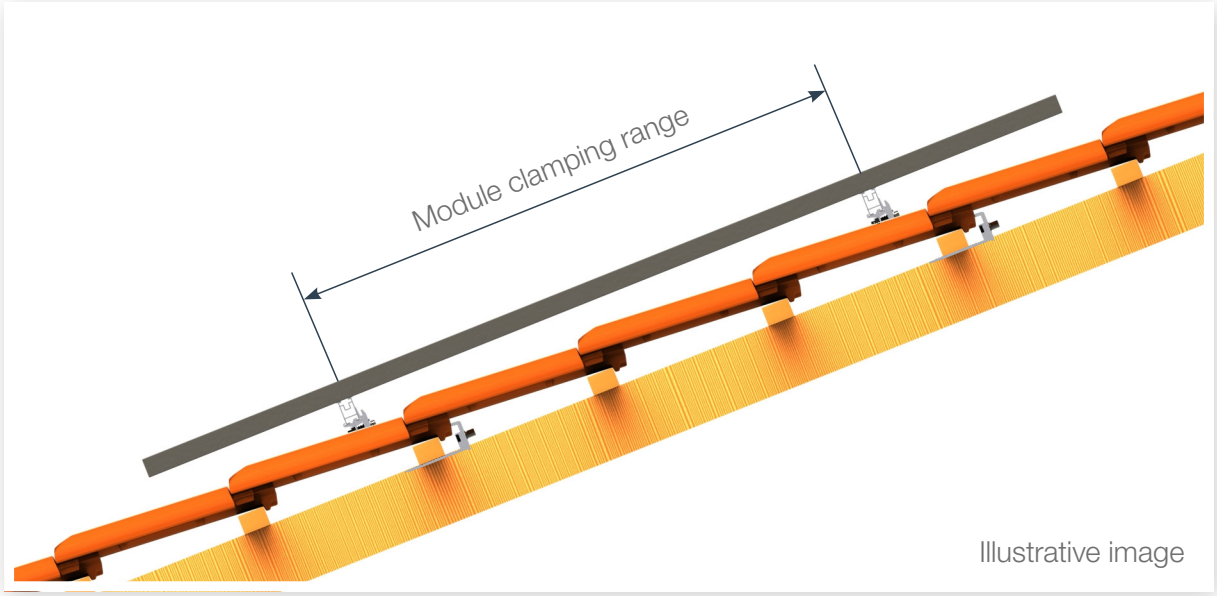
Vertical module arrangement | Single-layer

1 Measure and mark positions

Measure and mark the positions of the roof hooks on the roof according to the **Solar.Pro.Tool project report.**



Please also pay attention to the **module clamping areas**, which can be found in the installation instructions for the modules used.

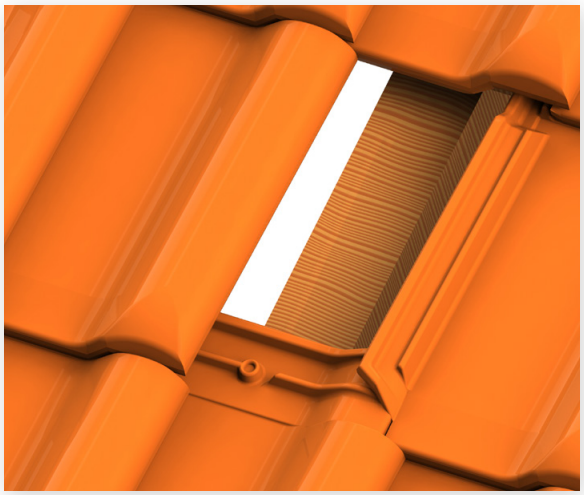


INSTALLATION OF ROOF HOOKS

Vertical module arrangement | Single-layer

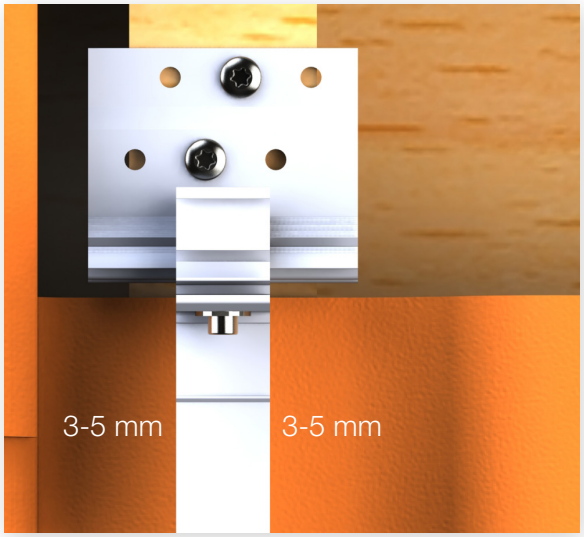
2 Installing the roof hooks

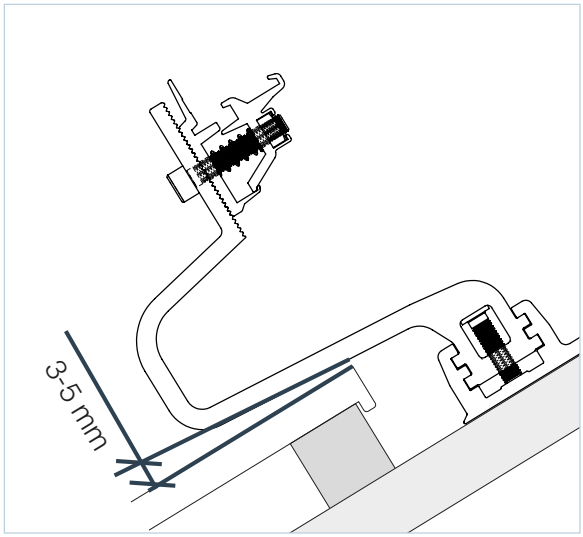
Remove the marked roof tiles above the rafters. Position the roof hook on the rafter so that it lies in the corrugated valley of the tile below.





The roof hook bracket must not rest directly on the tile below. Maintain a distance of 3-5 mm. A distance of 3-5 mm must also be maintained horizontally to the roof tile.





INSTALLATION OF ROOF HOOKS

Vertical module arrangement | Single-layer

If necessary, remove parts of the lip of the **underlying** roof tile using an angle grinder (diamond blade).



Optionally, the tile under the roof hook can be replaced with a tile replacement plate. If necessary, **remove the lip of the roof tile above** using an angle grinder (diamond blade).

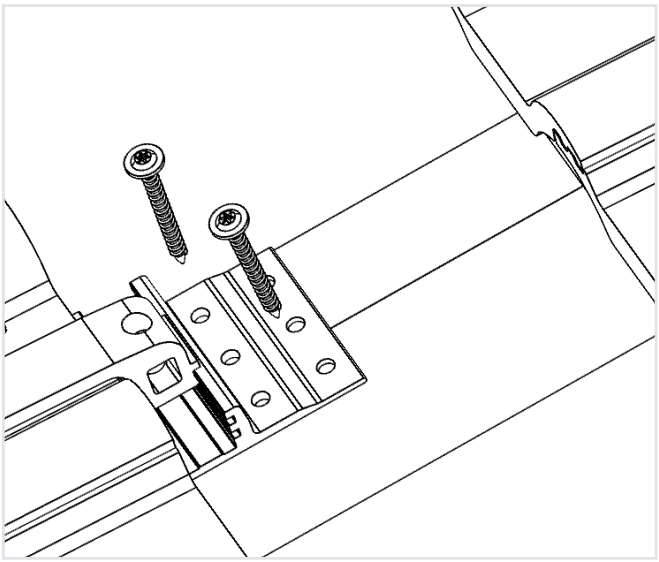


PLEASE NOTE:
In accordance with country-specific regulations, it must be ensured that the tile may be sanded down.

INSTALLATION OF ROOF HOOKS

Vertical module arrangement | Single-layer

Align the roof hooks horizontally using a cord and fasten them to the rafters **using 2 pan head screws**. Make sure that there is a screw in each row of holes.



+ The roof hook can be **adjusted in 3 directions** so that the required minimum distances can be easily set. Then tighten the fixing screws to **15 Nm**.
+ It is necessary to pre-drill the wooden substructure withg approximately 0.7 × screw diameter. This is only necessary if a flat-head screw without a cutting groove is used. This is not necessary when using the alumero flat-head screw (800665 / 800664).
+ Make sure that you only grind away parts of the lip of the tile and do not cut the tile itself.
+ To install the sheet metal tiles, use the corresponding installation instructions provided by the respective manufacturer.

PLEASE NOTE:
Mounted roof hooks must not be used as stepladders!

INSTALLATION OF ROOF HOOKS

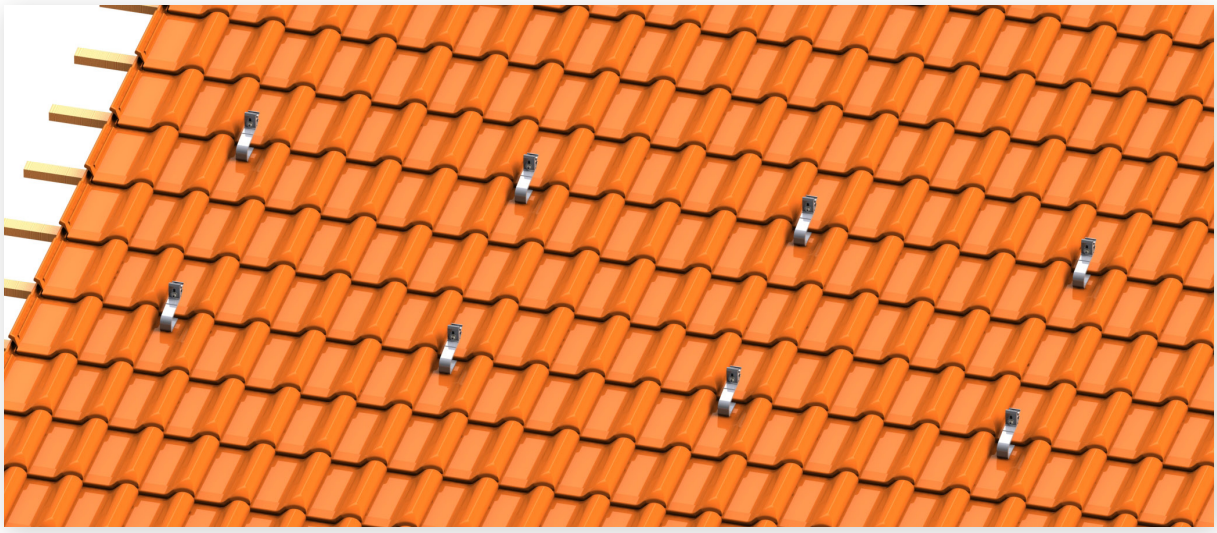
Vertical module arrangement | Single-layer

Ensure that the roof hook base plate is **supported over the entire surface**. You can level out any unevenness with various shims.

Use additional rafters or counter battens to **ensure full-surface support** of the roof hook base plate.



Cover the roof again professionally with the removed tiles. If necessary, notch out parts of the lip of the removed roof tile using an angle grinder (diamond blade). Ensure that the roof is watertight.

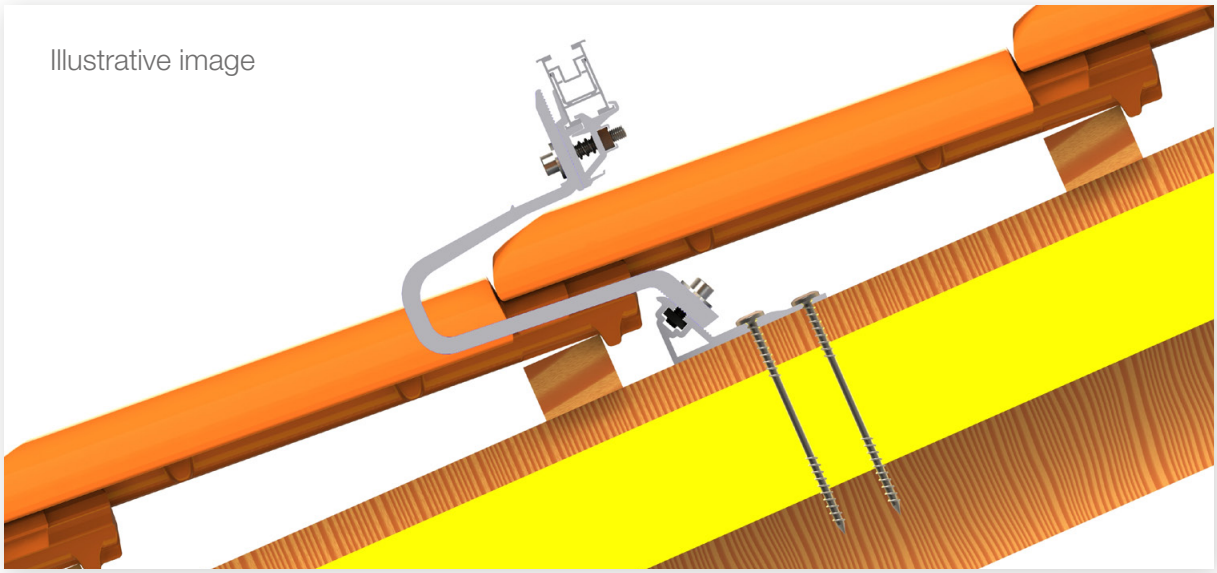


INSTALLATION OF ROOF HOOKS

Vertical module arrangement | Single-layer

For above-rafter insulation, the roof hook must be fastened to the rafters with **2 wood screws with fixing thread**. The wood screws must be anchored **at least 60 mm into the rafters**.

The wood screws with fixing thread must be provided by the customer.



- The **edge distance** of the disc head screw to the end of the rafter must be **at least 24 mm**.
- The screw-in depth of the pan head screws should be **at least 60 mm**.
- The recommended rafter width is **80 mm** and the minimum rafter width is **60 mm**.
- If wood screws are used, the wooden substructure must be pre-drilled.
- We recommend that work on the roof covering should only be carried out by specialists (roofers).

INSTALLATION OF ROOF HOOKS

Adjusting the roof hook

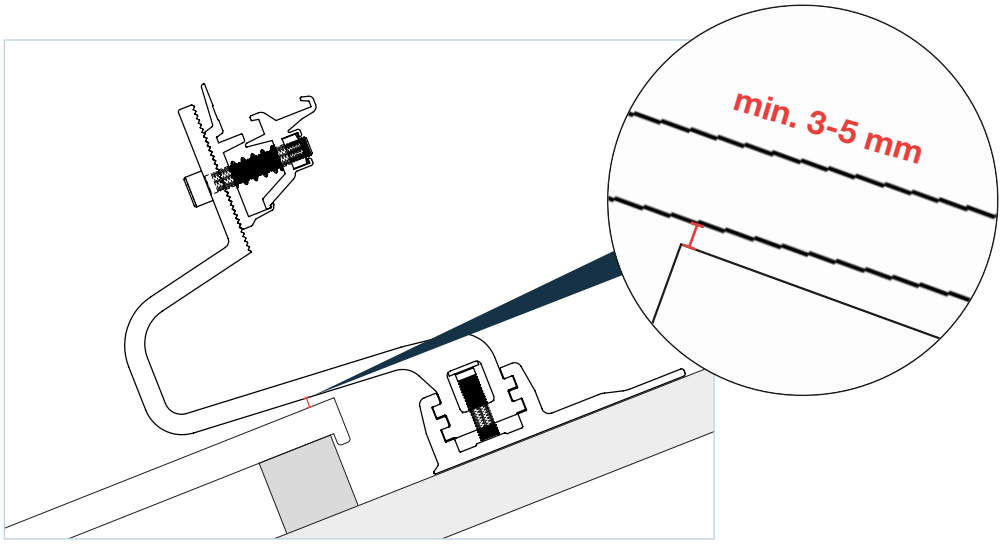
Adjust each roof hook individually to suit the local roof build-up. Use the available height adjustment to position the roof-hook arm without contact with the roof covering.

Adjust the installation height

The roof hook is height-adjustable to suit the local roof-build-up.



Check the position and clearances



- Adjust the roof hook using the available height adjustment range.
- Position the roof hook arm in the trough of the roof tile. Maintain a clearance of at least 3-5 mm below the roof hook arm and 3-5 mm to the adjacent roof tile.
- After adjustment tighten the applicable adjustment screw(s) to the specified target torque of 15 Nm.

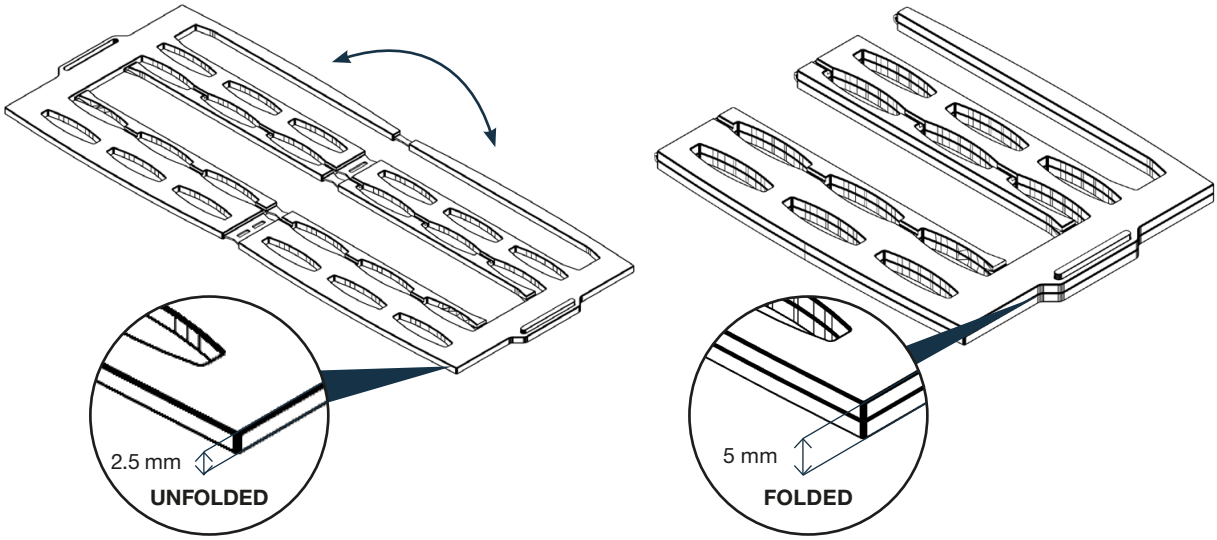
Ensure that the roof-hook base plate has load-bearing, level and full-surface support on the rafter.

INSTALLATION OF ROOF HOOKS

Adjusting the roof hook

Use spacer plates (if required)

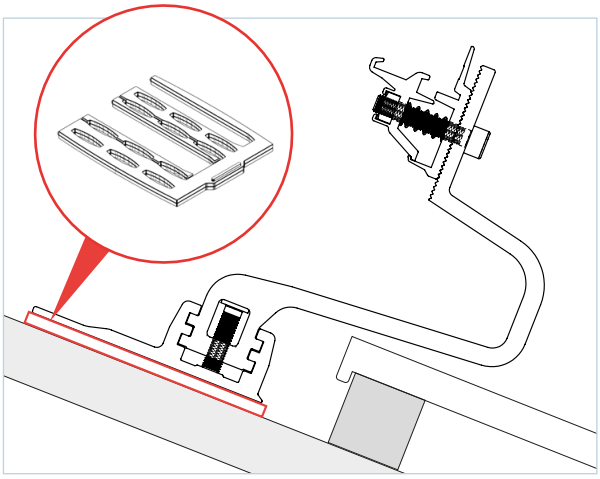
ⓘ If the required roof-hook position and clearances cannot be achieved using the available roof-hook height adjustment, install a suitable pressure-resistant spacer plate below the roof-hook base plate.



> rh spacer plate uni has a thickness of 2.5 mm in the unfolded configuration and provides 5 mm compensation when folded. Spacer plates may be combined only up to a maximum total height compensation of 10 mm per roof hook.

> Place the spacer plate Uni directly below the roof hook base plate where additional height compensation is required.

> Select the wood-screw length so that a minimum engagement depth of 60 mm into the load-bearing rafter is maintained after all spacer plates and roof-build-up layers have been taken into account.

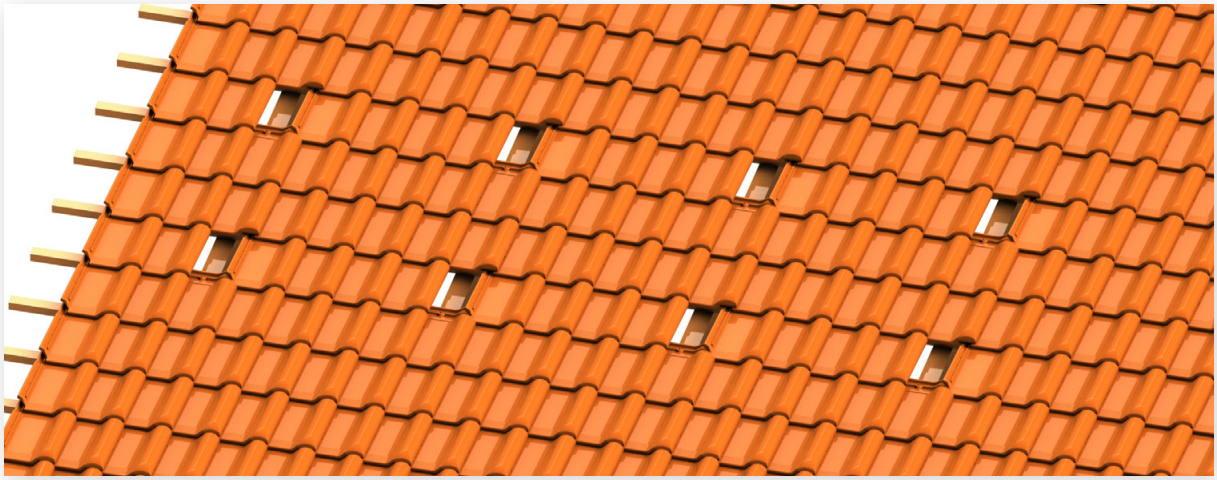


ⓘ After installing the spacer plate(s), re-check the roof-hook position and verify the required **minimum of 3–5 mm clearances** to the roof covering before fastening the roof hook.

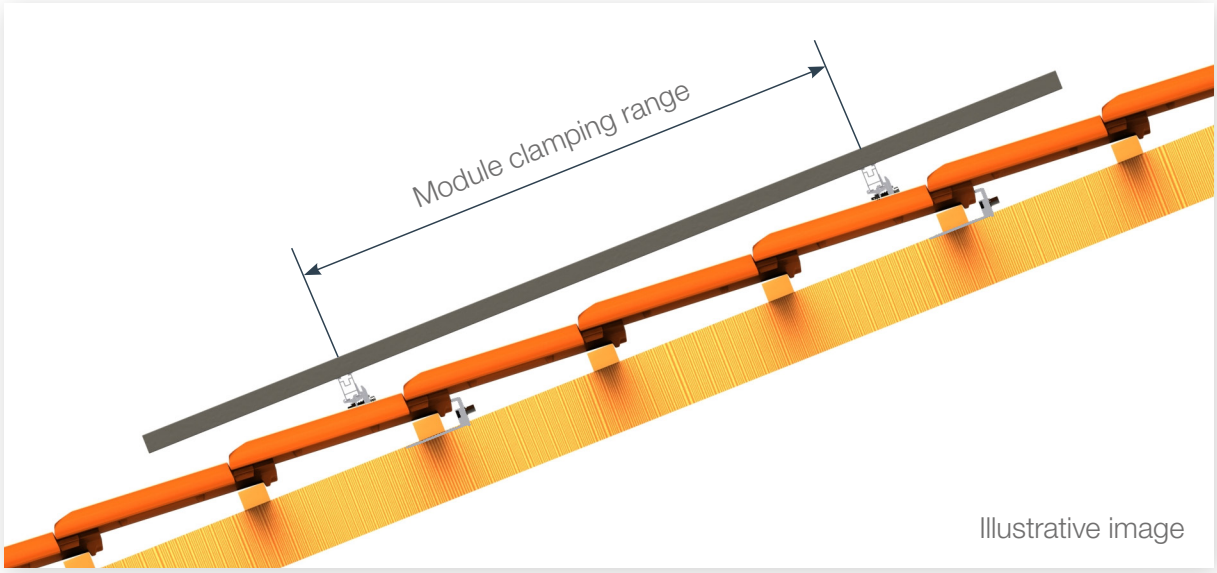
INSTALLATION BEAVERTAIL ROOF HOOKS

1 Measure and mark positions

Measure the positions of the roof hooks on the roofing according to the Solar.Pro.Tool project report and remove the roof tiles above the rafters.



Please also pay attention to the module clamping areas, which can be found in the installation instructions for the modules used.

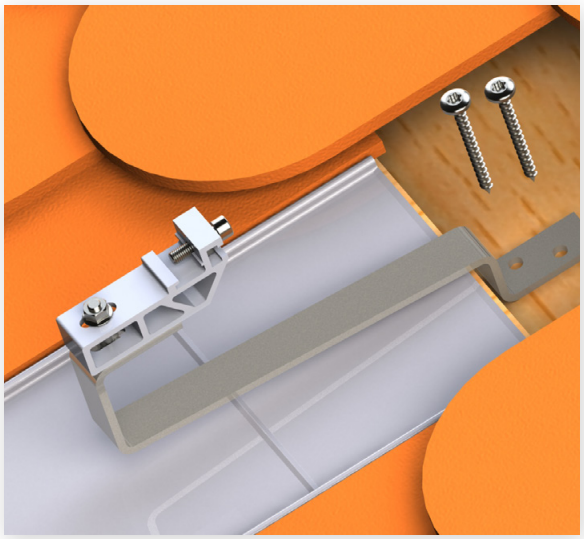


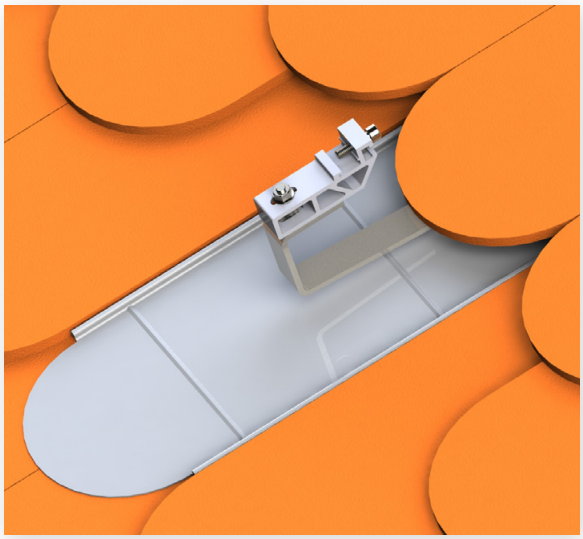
INSTALLATION BEAVERTAIL ROOF HOOKS

2 Installing beavertail roof hooks

Replace the roof tile under the roof hook with a sheet metal tile. Screw the roof hook into the rafter with **2 pan head screws.**

Cover the roof again professionally with the removed tiles, ensuring that the roof is watertight.



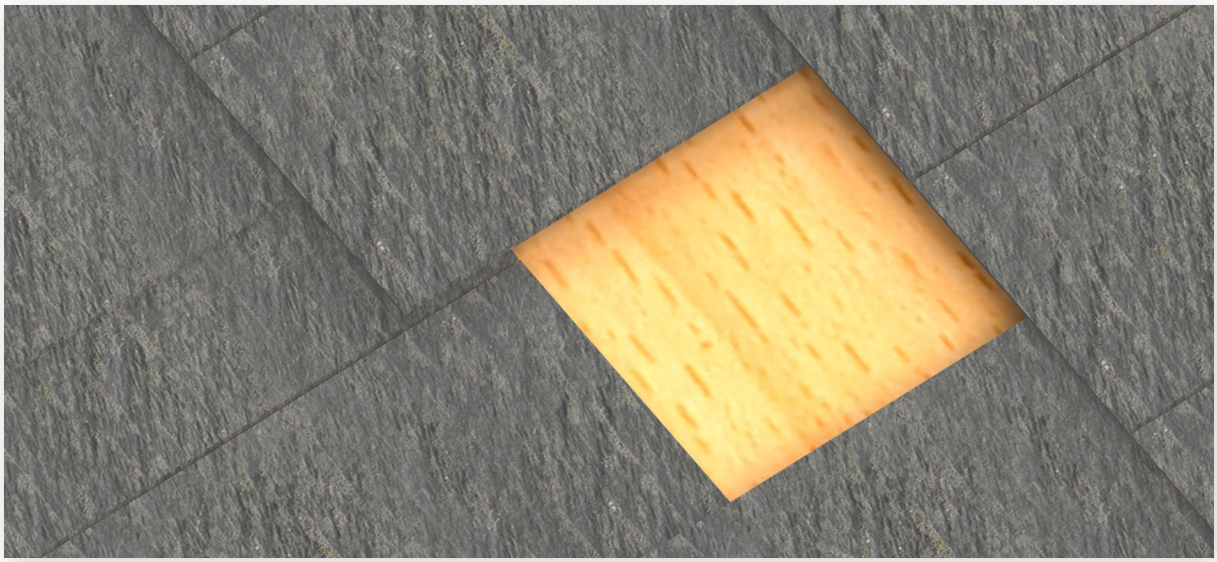


- The **edge distance** of the disc head screw to the end of the rafter must be **at least 24 mm**.
- The screw-in depth of the pan head screws should be **at least 60 mm**.
- The recommended rafter width is **80 mm** and the minimum rafter width is **60 mm.**
- If wood screws are used, the wooden substructure must be pre-drilled.
- We recommend that work on the roof covering should only be carried out by specialists (roofers).

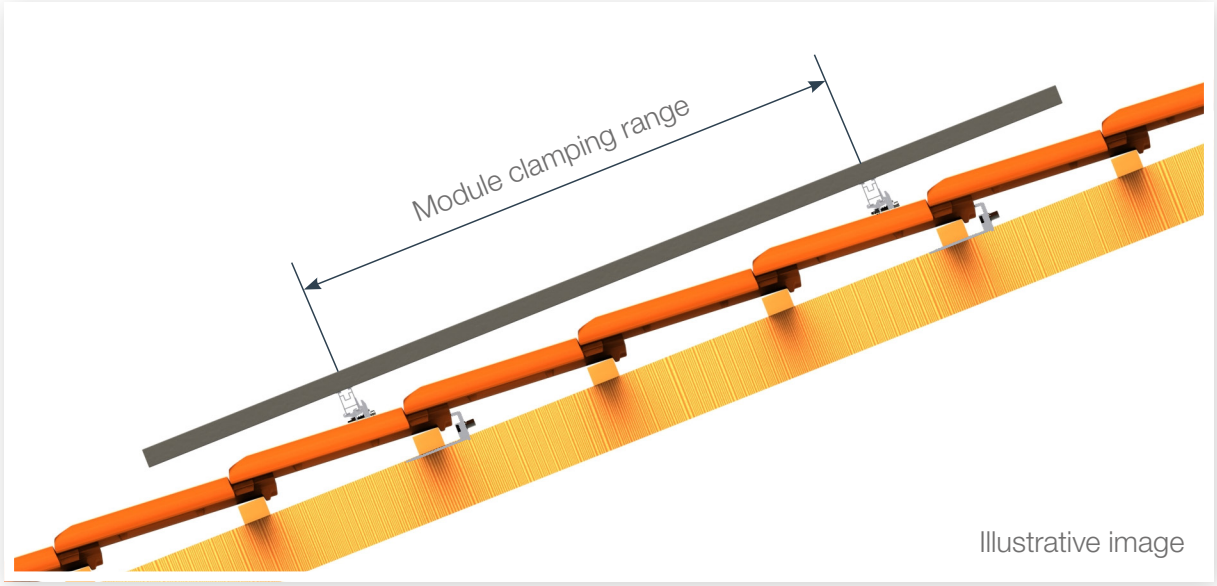
INSTALLATION SLATE ROOF HOOKS

1 Measure and mark positions

Measure the positions of the roof hooks on the roof according to the Solar.Pro.Tool project report and remove the roof tiles above the rafters.



Please also pay attention to the **module clamping areas**, which can be found in the installation instructions for the modules used.

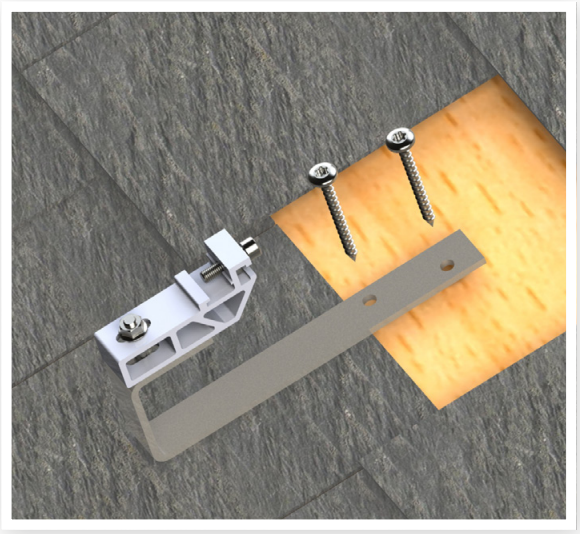


INSTALLATION SLATE ROOF HOOKS

2 Installation of the slate roof hooks

If necessary, cut out the slate roof tiles and use the titanium zinc sheets provided to ensure that the adjacent slate roof tiles are sealed. Screw the roof hook into the rafters using **2 pan head screws.**

Cover the roof professionally and observe the regulations of the German roofing trade.





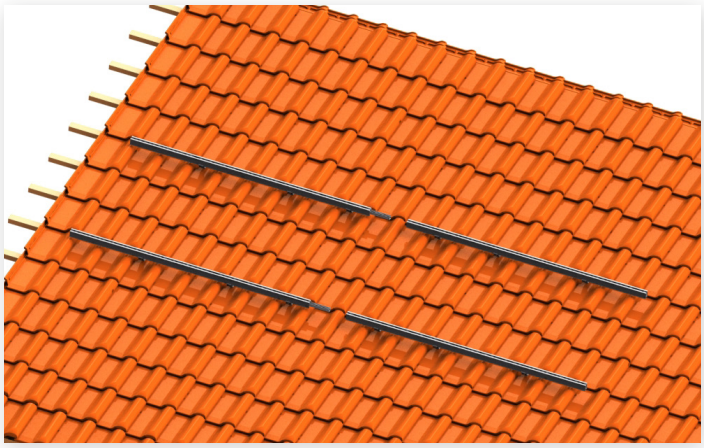
+ The **edge distance** of the disc head screw to the end of the rafter must be **at least 24 mm**.
+ The screw-in depth of the pan head screws should be **at least 60 mm.**
+ The recommended rafter width is **80 mm** and the minimum rafter width is **60 mm.**
+ If wood screws are used, the wooden substructure must be pre-drilled.
+ We recommend that work on the roof covering should only be carried out by specialists (roofers).

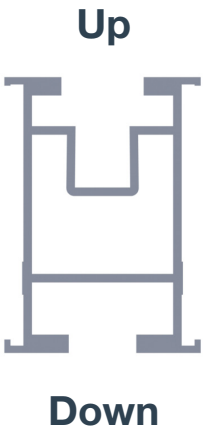
INSTALLATION OF CARRIER PROFILES

Single-layered

1 Installing carrier profiles

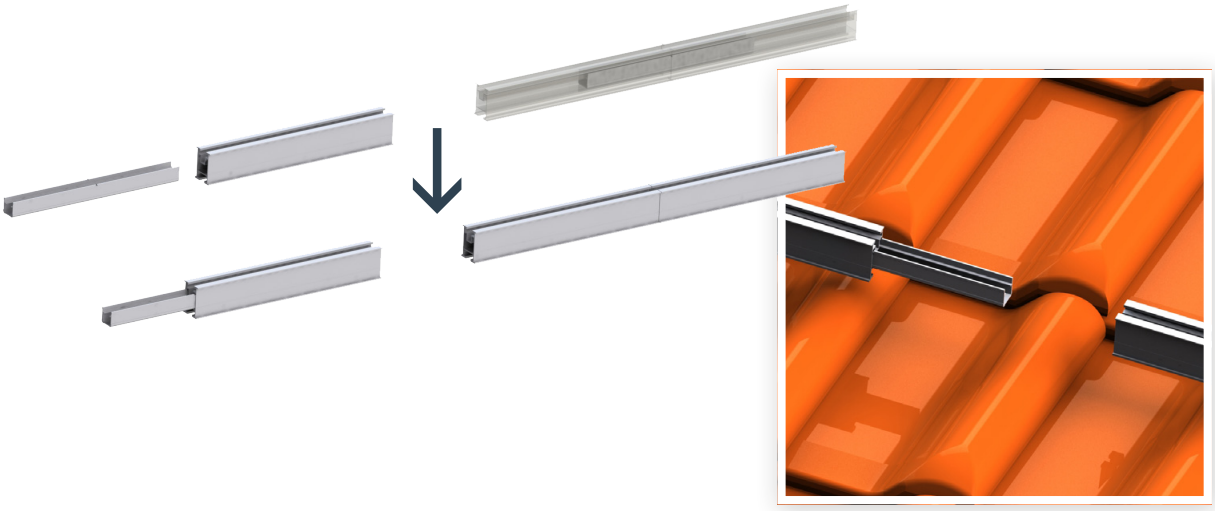
Mount the support profiles horizontally, parallel to the ridge with the correct side facing upwards on the roof hooks and tighten to a **torque of 15 Nm.**





2 Connecting carrier profiles

Required if the width of the module field is greater than the length of the support profile.
Insert the profile connector halfway into the first support profile and then slide the second support profile onto the profile connector.

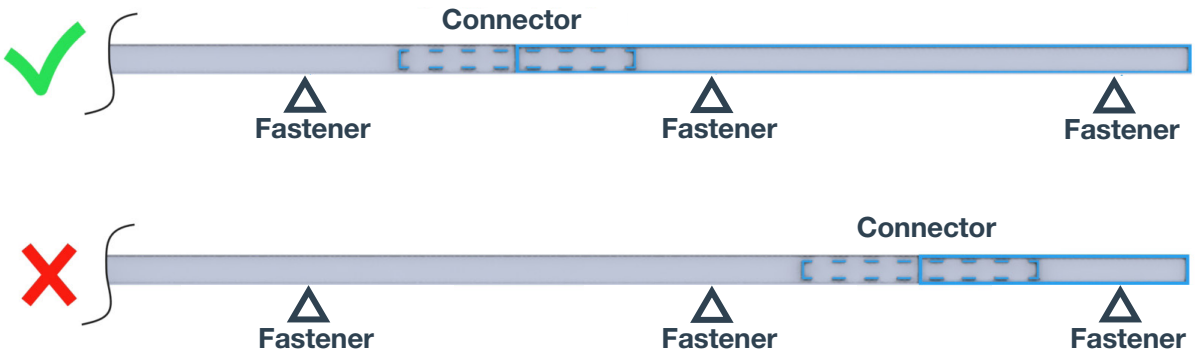


INSTALLATION OF CARRIER PROFILES

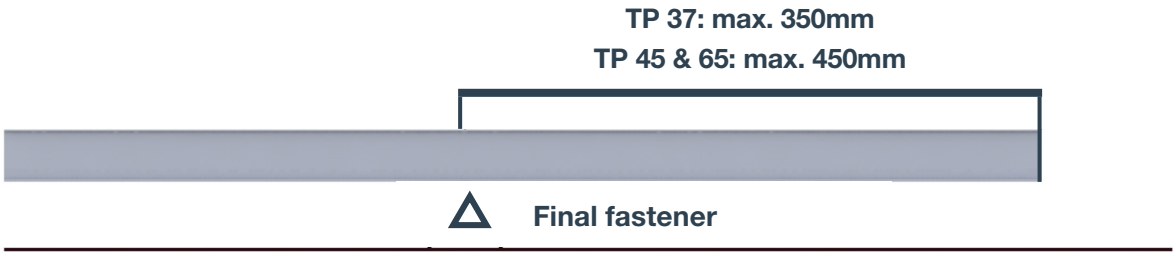
Single-layered

PLEASE NOTE

+ Secure each support profile at a minimum of two fixing points!
+ Beam profile joints must not be located in the area of fixing points.



+ Beam profile length: **max. 12 m!**
+ Form an expansion joint of **at least 5 cm after max. 12 m!**
+ Overhang of the support profiles over the last fastening: **as per sketch!**
+ Overhang should be the same on both sides.



+ Measure the positions of the profile connectors on the roof according to the Solar.Pro.Tool project report and optionally **screw the profile connectors together.**



INSTALLATION OF CARRIER PROFILES

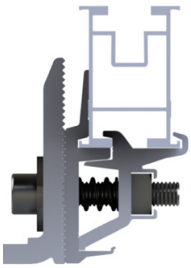
Single-layered

3 Mounting end caps

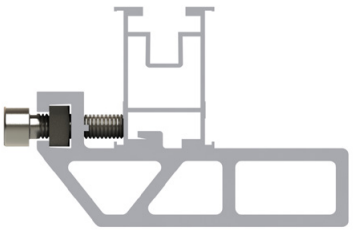
Press the end caps into the beam end by hand.



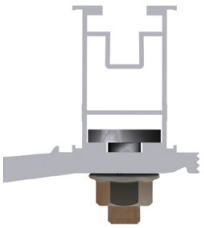
! Connection cariants of the carrier profiles on roof hooks



Height-adjustable connection with quick-fit adapter



Connection with quick-fit adapter

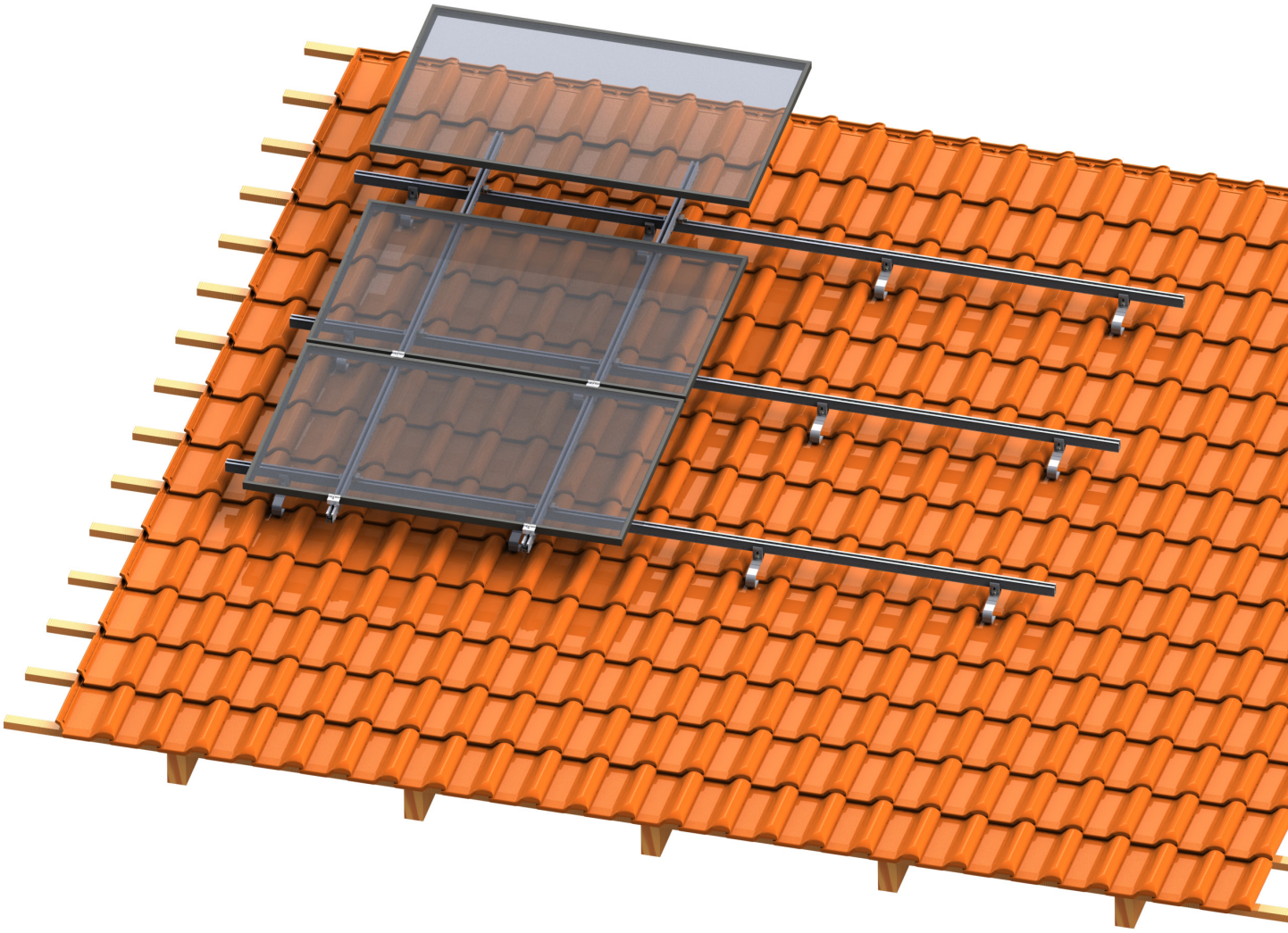


Connection with hammer-head bolt and hexagon nut

PLEASE NOTE:
Ensure that the support profiles are mounted straight and stress-free. Tightening torque of the fixing screws: M8 15 Nm / M10 30 Nm.

INSTALLATION OF CARRIER PROFILES

Horizontal module alignment | Cross-connection

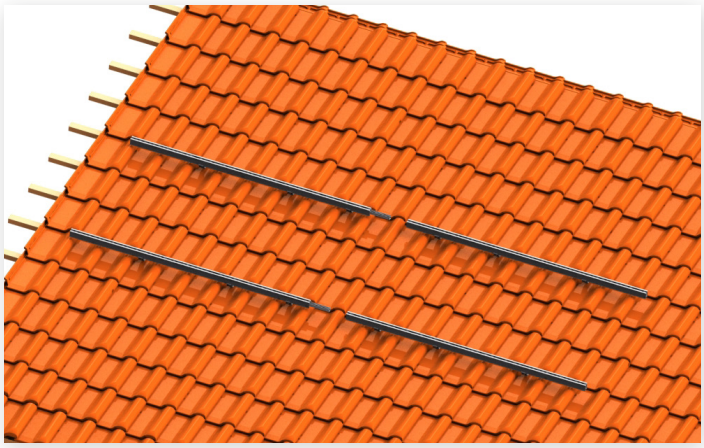


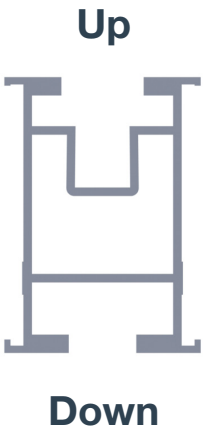
INSTALLATION OF CARRIER PROFILES

Horizontal module alignment | Cross-connection

1 Installing the base rail carrier profiles

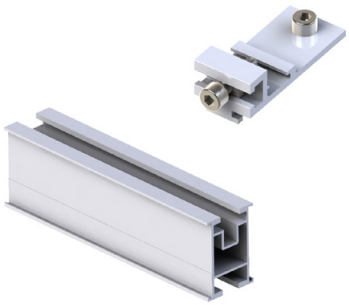
Mount the base rail carrier profile horizontally, parallel to the ridge with the correct side facing upwards and tighten with a torque of **15 Nm.**

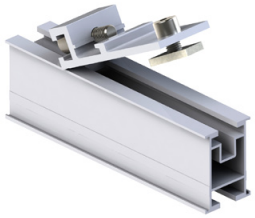


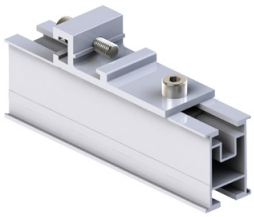


2 Installing the cross connectors

Screw the cross connector into the **base rail** and tighten to a torque of **15 Nm.**







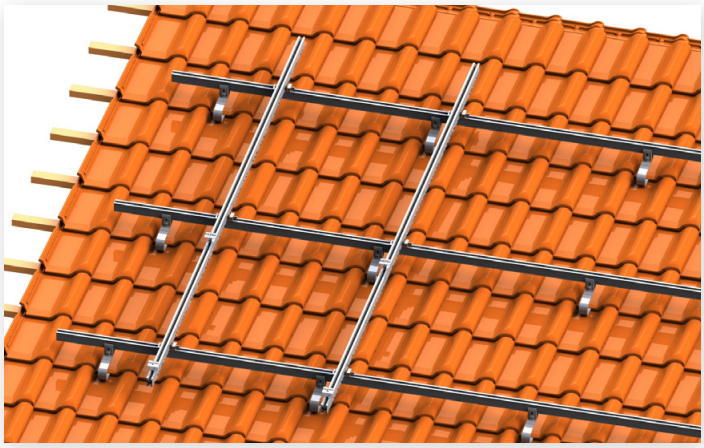
PLEASE NOTE:
If the base rail carrier profiles are mounted vertically, parallel to the cerge, the carrier profile fixing screw of the cross connector must always be aligned upwards the ridge.

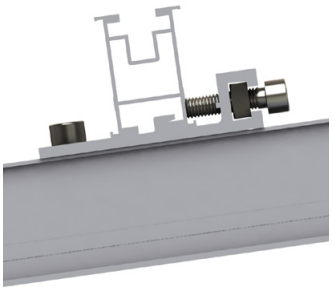
INSTALLATION OF CARRIER PROFILES

Horizontal module alignment | Cross-connection

3 Mounting the carrier profiles of the horizontal rail

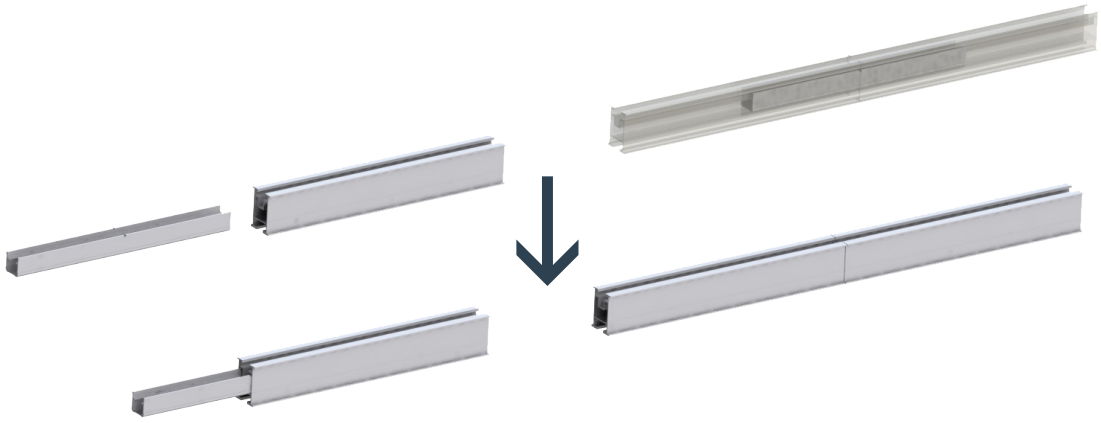
Mount the **module carrier profile** horizontal rail vertically, parallel to the verge with the correct side facing upwards on the cross connector and tighten with a **torque of 15 Nm.**





4 Connecting the carrier profile

Required if the width of the module field is greater than the length of the support profile.
Insert the profile connector halfway into the first support profile and then slide the second support profile onto the profile connector.



INSTALLATION OF CARRIER PROFILES

Horizontal module alignment | Cross-connection

5 Mounting end caps

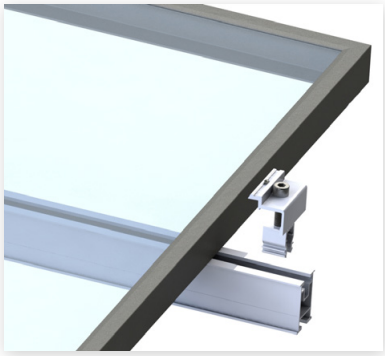
Press the end caps into the beam end by hand.

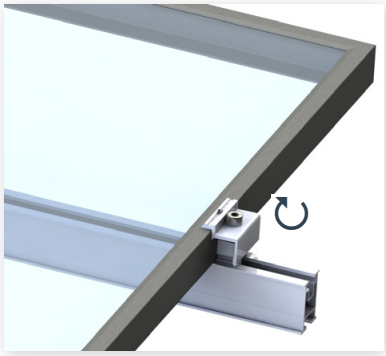


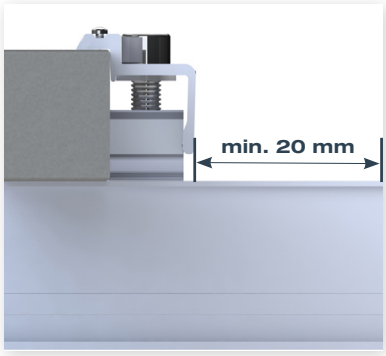
MODULE INSTALLATION

1 Installing end clamps

Start with the bottom row of modules. Place the first module on the support profiles and align it.
Click in the Click end clamp at a slight angle and slide it towards the module frame.
Tighten the Allen screw to a torque of **15 Nm.**







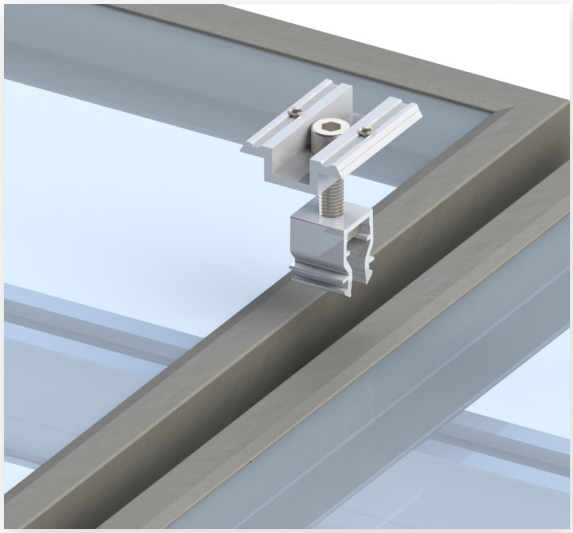
PLEASE NOTE:
The end clamps must be fitted at least 20 mm from the end of the respective mounting profile.

ATTENTION:
When using end clamps with threaded plates, attention must be paid to the alignment. The threaded plate must be at right angles to the profile channel.

MODULE INSTALLATION

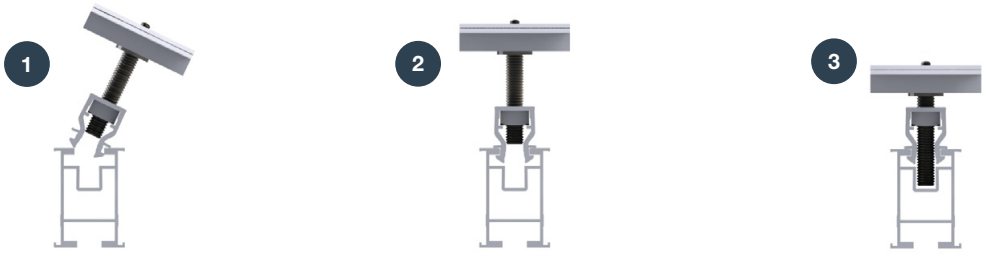
2 Installing middle clamps

Place the Click centre clamp on the frame of the previous module and click in at a slight angle. Push the module in so that both modules are firmly in place. ighten the Allen screw with a **torque of 15 Nm.**





Install the last module of each module row with end clamps as described above. Install the remaining module rows in the same way.



PLEASE NOTE:

+ Distance between the clamp and the ends of the carrier profile: **at least 20 mm!**
+ Only clamp the modules in the specified fastening areas! These can be found in the module manufacturer's module data sheet.
+ Distance (horizontal and vertical) between modules: **approx. 20 mm!**

INSTALLING MODULE CABLES

Module cables should not hang down or rest on the roof covering. They can be fastened for this either with the cable clip or the cable tie with clip.

1 Securing cable- and/or connector with the cable clip on the rail

+ Insert the hammer head of the cable clip into the rail channel of the mounting rail.
+ Press and rotate the clip by 45° to turn the hammer head and lock the clip in place.
+ The cable clip can now be rotated to the desired position.
+ Cables can be clipped in and connectors can be inserted.
+ **Removal of the clip:** Press and rotate the cable clip by 45°, then remove it from the rail.









INSTALLING MODULE CABLES

2 Securing cables and/or connectors with a cable clip and metal clamp

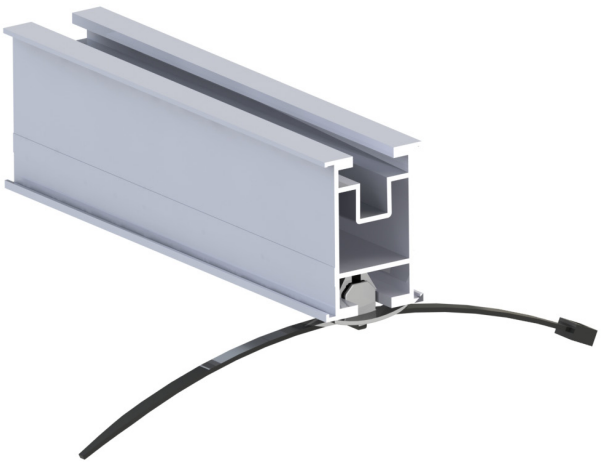
+ Slide the hammer head of the cable clip into the metal clamp.
+ Attach the clamp to the module frame.
+ The cable clip can now be rotated to the desired position.
+ Cables can be clipped in and connectors can be inserted.
+ **Removal of the clip:** Open (bend apart) the metal clamp, pull it off, and rotate the clip out.

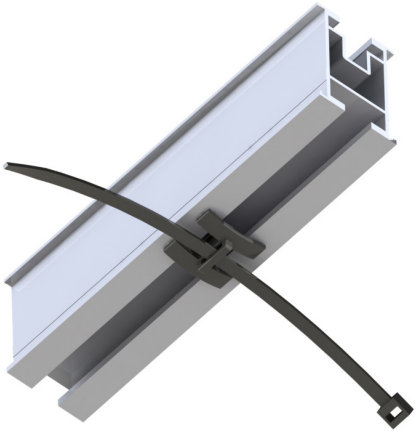




3 Cable securing with cable tie incl. clip

+ Clip the clip, which is attached to the cable tie, onto the mounting rail.
+ Tie the cable together with the cable tie.
+ **Removal of the clip:** Slide it sideways.





POTENTIAL EQUALISATION | GROUNDING

The potential equalisation between the individual system components must be carried out in accordance with the respective country-specific regulations. One way of earthing the ALUMERO system is shown below. Cable cross-sections and the overall earthing concept are not included in these instructions and must be calculated or created by the installer in accordance with the applicable standards and guidelines.

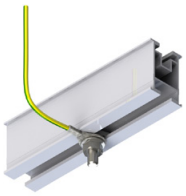
Other professional earthing methods than those listed here are also possible.

1 Grounding the carrier profile rows

+ Insert a wire clamp into the lower profile channel of the support profile in each row of carrier profiles.
+ Insert the aluminium wire into the wire clamp and secure it by tightening the screw.
+ Connect all rows of modules together in this way.



Fastening the aluminium wire using a wire clamp



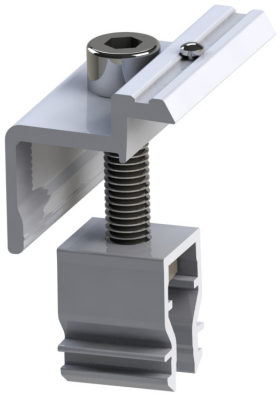
Fastening the earthing wire using a hammer-head screw

POTENTIAL EQUALISATION | GROUNDING

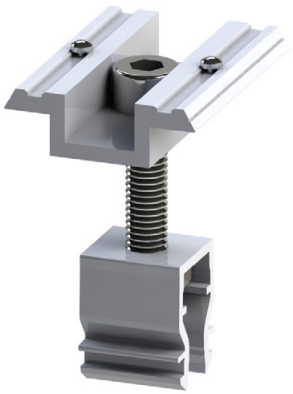
2 Grounding the modules

Whether the modules must be earthed is specified by the module manufacturer in the respective module data sheet. If so, the potential equalisation of the modules can be created in the following way recommended by ALUMERO.

To integrate the modules into the potential equalisation, you can use ALUMERO end and centre terminals with pins. The pins are located in the terminals, pierce the anodised layer of the module frames and thus connect all module rows with each other.

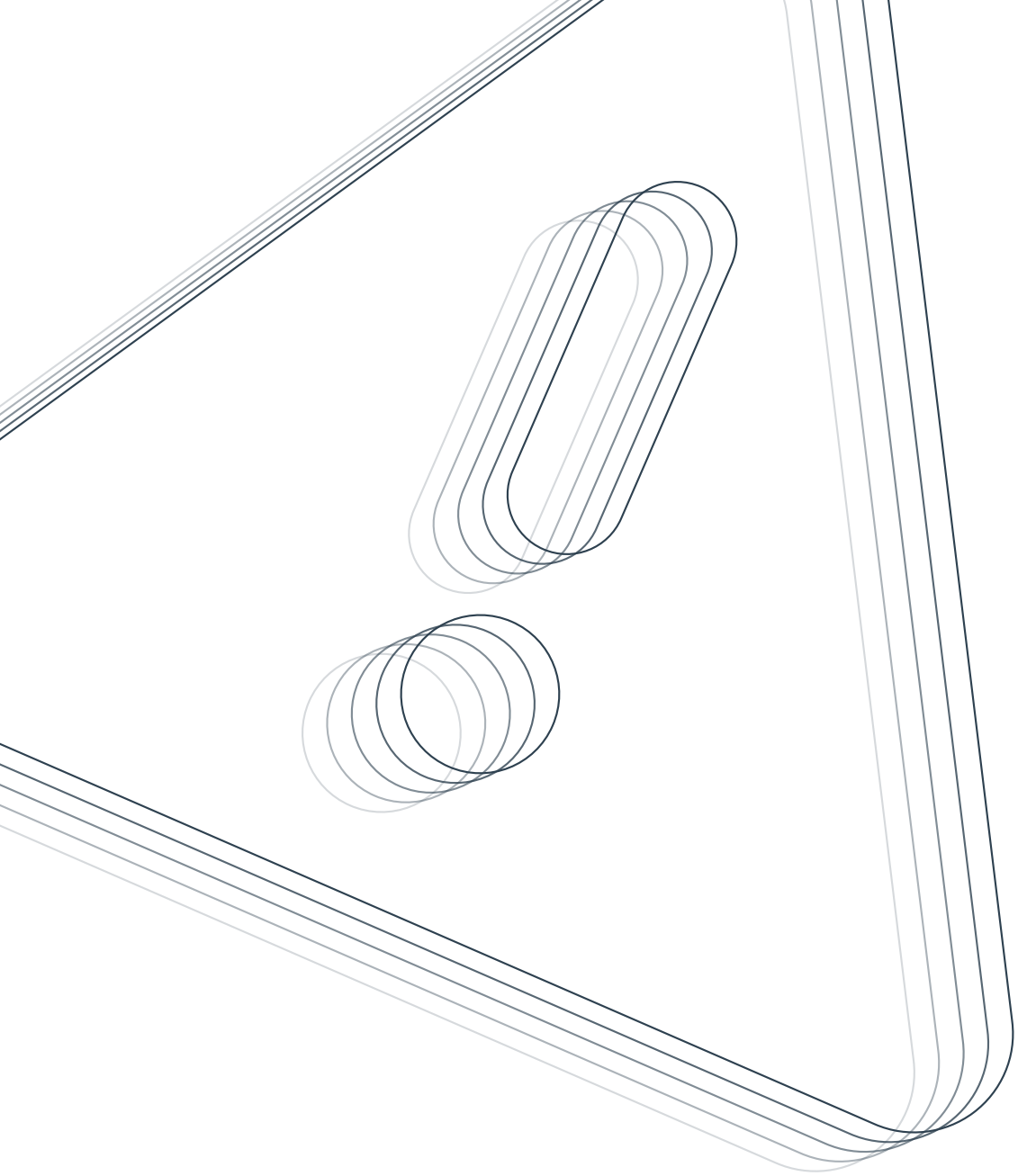


End clamp with pin



Middle clamp with pin

All product illustrations contained in these installation instructions are for illustrative purposes only and are not true to scale. Changes and errors excepted!



PLEASE NOTE THE FOLLOWING ADDITIONAL DOCUMENTS

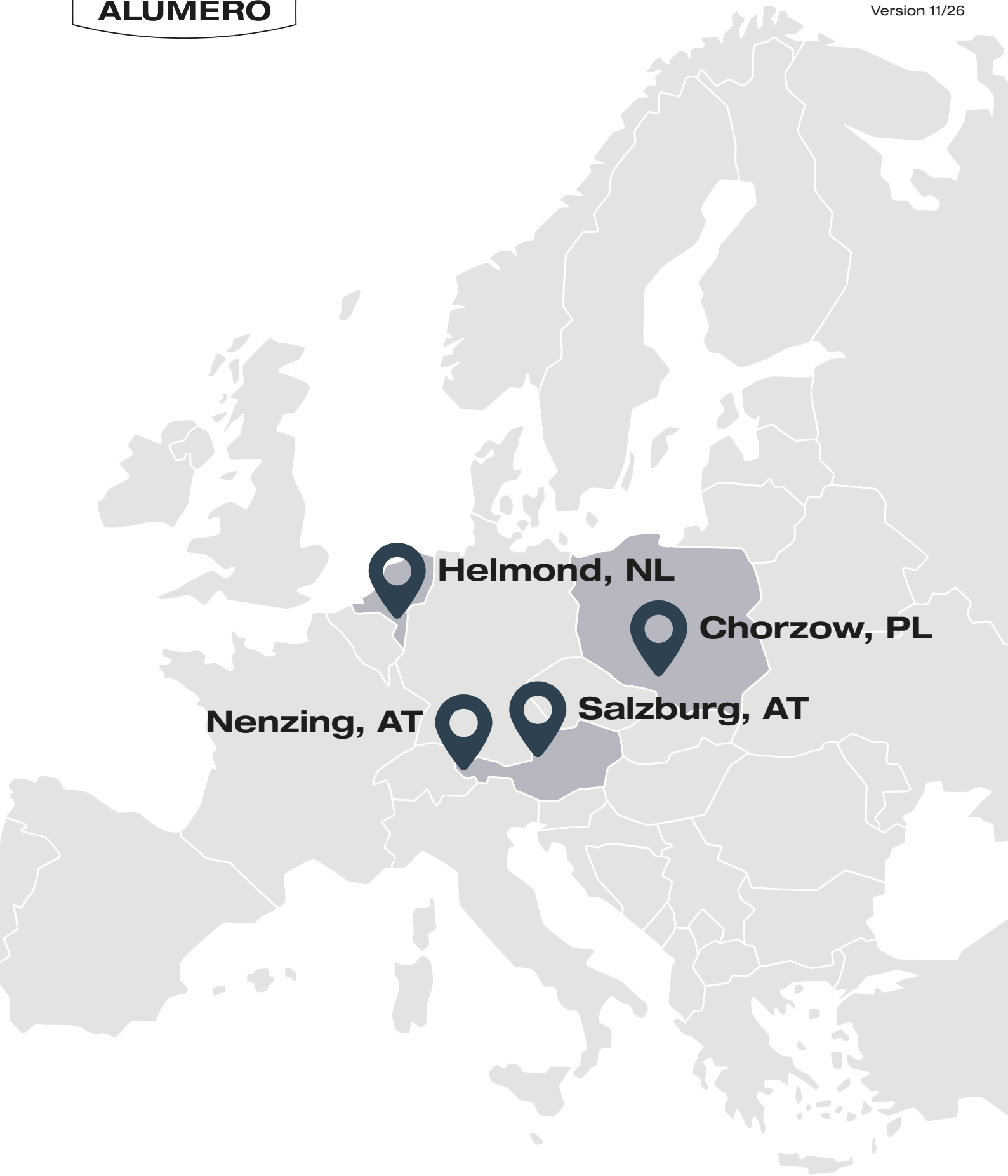
The following documents are required in addition to the installation instructions and for correct installation of the system:

+ Projekt-Report from ALUMERO.PRO.TOOL
+ Planning documents and drawings
+ The generally applicable document “Installation instructions” at https://www.alumerogroup.eu/service under “General” -> “Other”

Please also inform yourself about the safety regulations of the other system components.

ALUMERO

Version 11/26



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