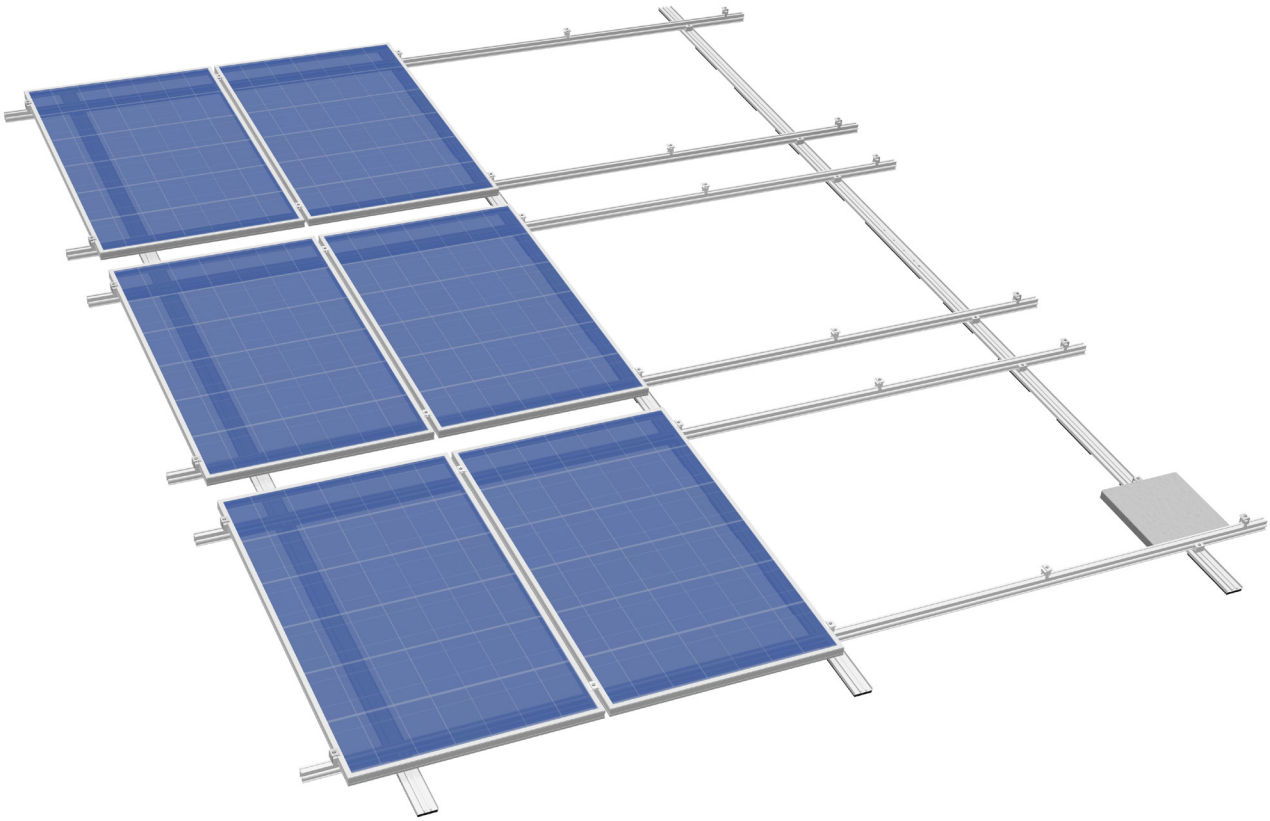
Assembly Instructions

S:FLEX FLAT DIRECT

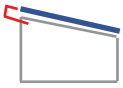
For foil, bitumen and sandwich roofs



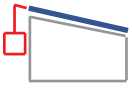
Read these installation guidelines carefully before installing the S:FLEX mounting system and retain them for future reference! These installation guidelines are only complete with the project-specific implementation plans (project report)!

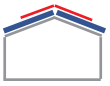
The S:FLEX FLAT DIRECT system for flat roofs and low roof pitches up to 30° is an aerodynamic frame system for the installation of PV modules without roof penetration. It includes prefabricated aluminium ground rails with glued on sponge rubber pads, which ensure maximum material compatibility and excellent friction coefficients at the same time.

S:FLEX FLAT DIRECT can be installed on almost all roof shapes with roof pitches up to 30° using commercially available modules.

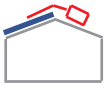

Single pitch roof with ridge connection


Butterfly roof with ridge connection /counterweight on both sides

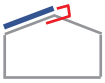

Single pitch roof with counterweight


Saddle roof with ridge connection on both sides


Butterfly roof with counterweight on the ridge side


Saddle roof with counterweight on one side


Butterfly roof with ridge connection


Saddle roof with ridge connection on one side

All components are generally made of aluminium and stainless steel. The high degree of corrosion resistance ensures a long service life and offers the possibility of complete recycling.

1.1 Intended use

The S:FLEX FLAT DIRECT system is designed to accommodate PV modules. The system is suitable for use on roofs with a pitch up to 30° and the following roofing: Foil roofs, bitumen roofs, sandwich roofs.

Any other use in this regard is considered misuse of the product. Observance of the information in these installation guidelines in particular, is a prerequisite for intended use.

The project report is part of the installation instructions and is created on a project-specific basis. All of the information contained in the project report must be strictly observed. The project report contains the location-based static calculations. The S:FLEX mounting system must be designed and created with the S:FLEX software (Solar.Pro.Tool).

S:FLEX GmbH is not liable for damages that result from not observing the installation guidelines or from the improper and not intended use of the product.

1.2 About the document

These installation guidelines describe the installation of the S:FLEX FLAT DIRECT system on roofs with a roof pitch of up to 30°.

It must be ensured that only current and complete installation guides are used for the installation process.

1.3 Warnings

The warning notices used in this installation recommendation indicate safety related information.
They are:

Unless observed, there is a major risk of injury as well as a risk of death.

Failure to observe this may lead to property damage.

1.4 General information – standards and guidelines

Every photovoltaic system must be installed in accordance with the instructions contained in the respective installation guidelines and the project report. The installation guidelines provided are based on the latest technology and many years of experience installing our mounting systems. It is to be ensured that only the current and complete installation guidelines are used for the installation and that a print-out of the installation guidelines is stored in the immediate vicinity of the system. The system and these guidelines are subject to technical changes.
Each roof has particular features that must be taken into account. This requires preliminary expert advice. Before installation, the PV system creator must ensure that the existing roofing and roof substructure are suitable for the additional loads. The condition of the roof substructure and roofing must be thoroughly checked (e.g. quality of the roofing, that the roofing is adequately secured to the substructure, maximum load-bearing capacity of the roofing). Contact an on-site structural engineer for this purpose.
When installing the PV system, always comply with the module manufacturer's installation instructions. In particular, it is necessary to check that the module manufacturer's instructions regarding the module clamping guidelines (module clamping surface and clamping range) are complied with. If this is not the case, the customer must obtain a declaration of consent from the module manufacturer before the installation, or the mounting system must be adjusted according to the module manufacturer's guidelines.
The requirements for the protection of PV mounting systems against lightning and surges must be met in accordance with the DIN and VDE regulations.
The specifications of the relevant power supply company must be observed.
During installation, the local fire regulations must be observed, e.g. firewalls must not built over and the required clearances must be maintained.
If the roofing is altered, the manufacturer's guidelines must be observed. During and after installation, the frame components may not be stepped on or be used as a climbing aid. There is a risk of falling and the roofing underneath could be damaged.
Prior to installation, the creator of the photovoltaic system must ensure that the installation is carried out while strictly adhering to national and location-specific building regulations, safety and accident prevention regulations, standards and environmental protection regulations.
Every person who installs the S:FLEX PV mounting systems is obligated to independently inform himself/herself about all rules and regulations for professionally correct planning and installation, and to comply with said rules and regulations during the installation process. This also includes compliance with the latest versions of the respective rules and regulations.
Installation of the PV system may only be carried out by trained specialists.

Please note: Installation of the S:FLEX substructure and the PV system may only be carried out by trained specialists.
System components must not be used as step ladders. The modules must not be stepped on.
When working on roofs, there is a risk of falling off and falling through roofs. A fall can result in injury or death.
Ensure that appropriate climbing aids and fall-protection equipment (e.g. scaffolding) are provided as well as protection from falling parts.

Check the building statics and construction/condition of the roof substructure and roofing before starting the installation. During installation, the instructions in the installation guidelines and project report must be strictly observed. Failure to observe the installation guidelines and the project report can result in damage to the PV system and to the building.

1.5 Description of the system

The S:FLEX Flat Direct system offers suitable solutions for different requirements:

System properties

Roof inclination:	The S:FLEX FLAT DIRECT is available for a roof pitch up to a maximum of 30°
Roof edge spacing:	Roof areas F and G can be used
Module type:	Framed modules
Building height:	max. 25 m
Wind load:	up to 2.4 kN/m²
Snow load:	up to 5.4 kN/m²
Materials:	extruded aluminium EN AW-6063 T6
Small parts:	Stainless steel X5CrNi18-10 A2-70A
Prerequisites:	Proof of static load capacity of the roof and the roof insulation must be provided by customer. General terms / warranty conditions and usage agreement apply.

The module manufacturer's installation instructions must always be observed.

Roofing

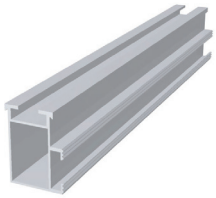
The S:FLEX FLAT DIRECT can be installed on the following flat-roof coverings:
Foil roof, bitumen roof, sandwich roof.

The S:FLEX FLAT DIRECT does not use conventional protective mats, but special material-compatible foam protective mats. The system can therefore be used on all conventional roofing materials. No plasticisers are released. The material meets the requirements of DIN EN 13501-1 with the fire classification E.

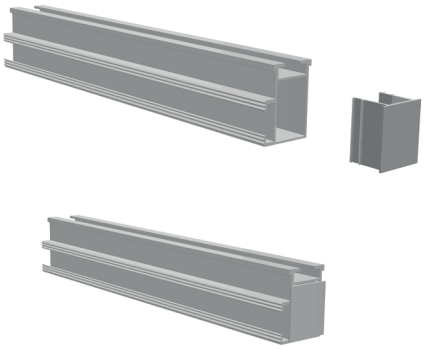
S:FLEX GmbH may provide a measuring device in order to determine the project-specific friction coefficient.

Mounting rails

The S:FLEX mounting rails ST-AK 7/47 feature a hammerhead slot on the side for connection to the fasteners.
The mid clamps and end clamps are mounted from above using one-click technology.
The covering caps are wedged in place for lateral closure of the mounting rails. The covering caps remain firmly seated without screws.



ST-AK 7/47

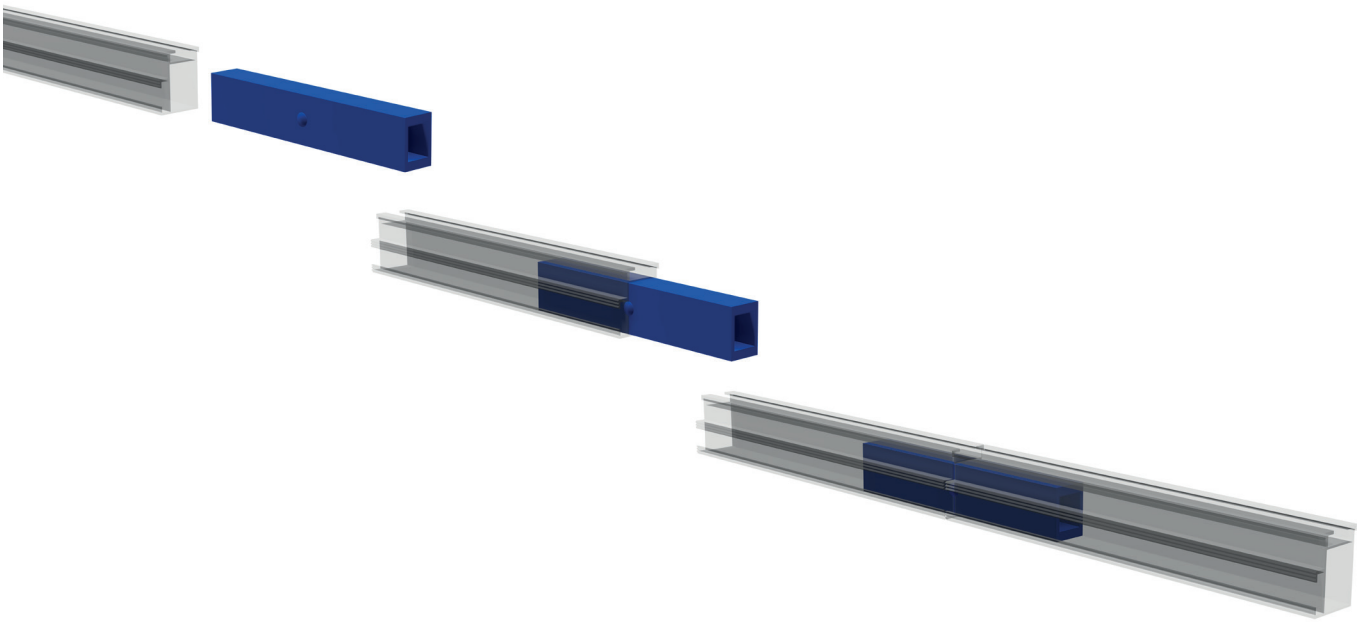


Splice technology

In addition to the simple installation, the splice technology allows a system orientation without a reduction in the load-bearing capacity in the area of the splices, since they have the same static values as the associated mounting rail.

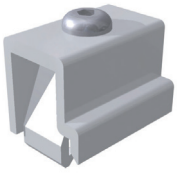
When connecting the mounting rails in succession using splices, an earthed connection is possible if the rails are pushed together flush to the splices with pressure. It is to be ensured that the earthed connection is professionally inspected on site after installation.

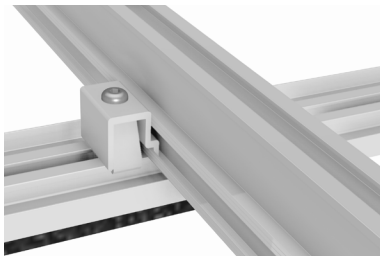
In addition, the splice technology offers the possibility to quickly and easily create expansion joints according to the conditions of the roof. In this case, no earthed connection exists. This is to be professionally established on site without restricting the effect of the expansion joint.

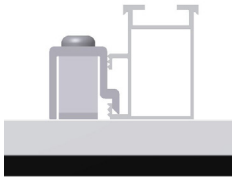


Cross adapter

Intersection points (for double-layer systems) can be quickly realised in a load-bearing manner with cross adapters with patented and proven click technology. A cross adapter must be installed on the bottom side of the module rail per intersection point.

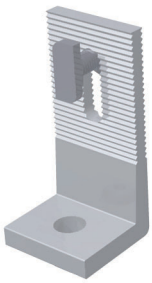


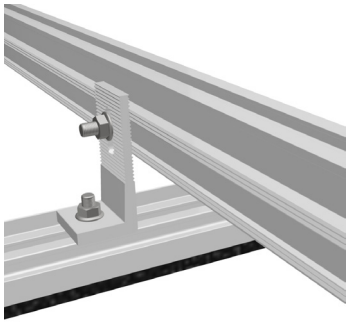


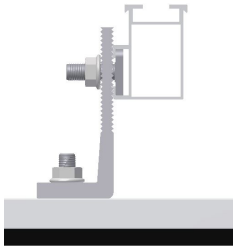


Bracket 40 mm M8

For installations on sandwich roofs, a bracket is used instead a cross connector. A bracket must be installed on the bottom side of the module rail at each crossing point.

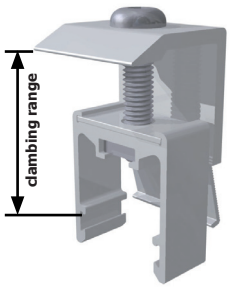




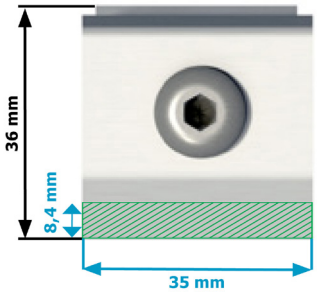


Module mid clamps and module end clamps

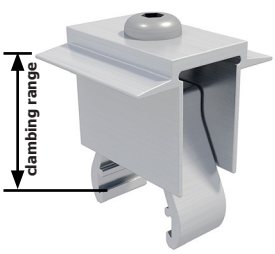
Height-adjustable module mid clamps and module end clamps with one-click technology allow for maximum flexibility when installing virtually all framed module types with a frame height of 30 – 50 mm. When installing the PV modules to the rail, always comply with the installation instructions of the module manufacturer.
When performing the fastening by means of the module mid clamp and module end clamp, ensure that these clamp onto the module frame with the respectively defined clamping surface of the module manufacturer. Every person who installs the S:FLEX PV fastening systems is obligated to ensure that the existing clamping surfaces correspond with the installation instructions of the module manufacturer. Mid clamps and end clamps are available in other lengths (e.g. 80 mm) if necessary.



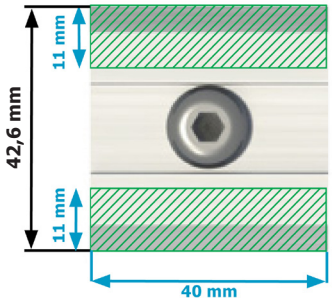
Module end clamp (EC)



Maximum clamping surface EC II: A=8.4*35=294 mm²



Module mid clamp (MC)



Maximum clamping surface MC II: A=11*40=440 mm² (per side)

Earthing

Equipotential bonding between the individual system components must be ensured according to the respective country-specific guidelines and standards. System-specific properties (see splice technology) among other things can be used for this purpose.

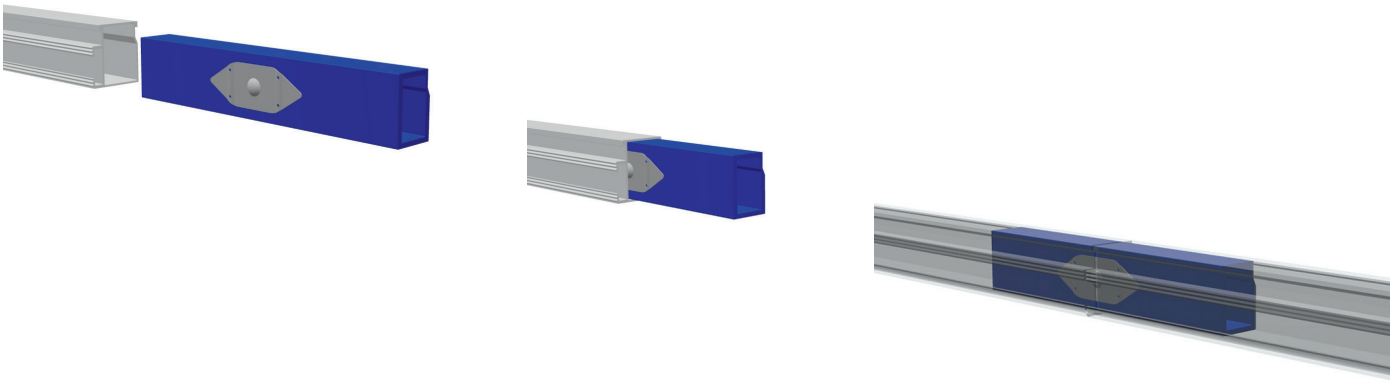
This installation recommendation does not include an earthing concept and must be calculated or compiled by the executing installer in accordance with the applicable standards and guidelines.

The planning and execution of all lightning protection work may only be carried out by appropriately qualified lightning protection specialists.

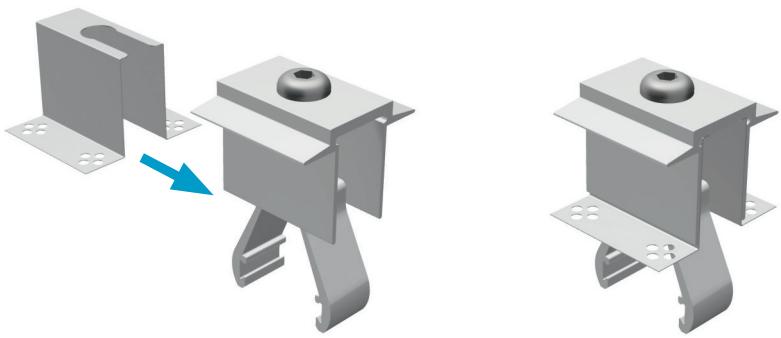
The S:FLEX Flat Direct mounting system is capable of carrying lightning current in accordance with DIN EN 62561-1: 2017-12 and can be integrated into the existing or planned lightning protection system. This may only be installed out by a company specialising in lightning protection systems.

Splice technology for earthing

When connecting the mounting rails in succession using splices, an earthed connection can be created by applying pressure to push the mounting rails together flush to the splices. It is to be ensured that the earthed connection is professionally inspected on site after installation.



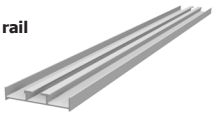
The earthed connection of the mounting rails is established by the splice. Additional earthing of the modules can be achieved via the grounding plate by mounting it under the mid clamps. Before earthing the module, the corresponding specifications issued by the module manufacturer must be observed.



2.1 System components

1 System components

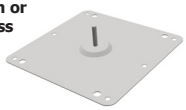
Ground rail



Splice ground rail

Ridge connector

Assembly post (PVC, bitumen or bright stainless steel)

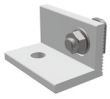


Covering (PVC or bitumen)

Bracket 40 mm, M8 complete

Bracket 60mm, M10 complete

Bracket 60mm, M12 complete



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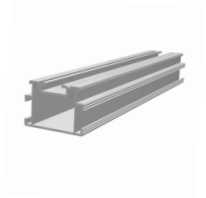


Solar fastener A 8.4 M10 x 100-50

Solar fastener A 8.4 M10 x 150-50

Solar fastener A 8.4 M10 x 200-50

Solar fastener BZ 8.0 M10 x 100-50

Solar fastener BZ 8.0 M10 x 150-50

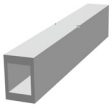
Solar fastener BZ 8.0 M10 x 200-50

2 Mounting rails

ST-AK 7/47

3 Splices

Splice 7



4 End clamp

EH AK II Klick 30-50

5 Mid clamps

MH AK II Klick 30-50 A

6 Slipping protection set

Slipping protection set

7 Covering caps

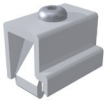
Covering cap 7

8 Cable clips

Cable clips

9 Cross adapter

Cross adapter

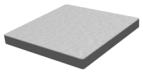


10 Screw OMG HD

Screw OMG HD

11 Ballast block (optional)

Ballast block

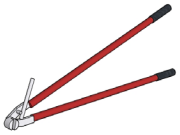


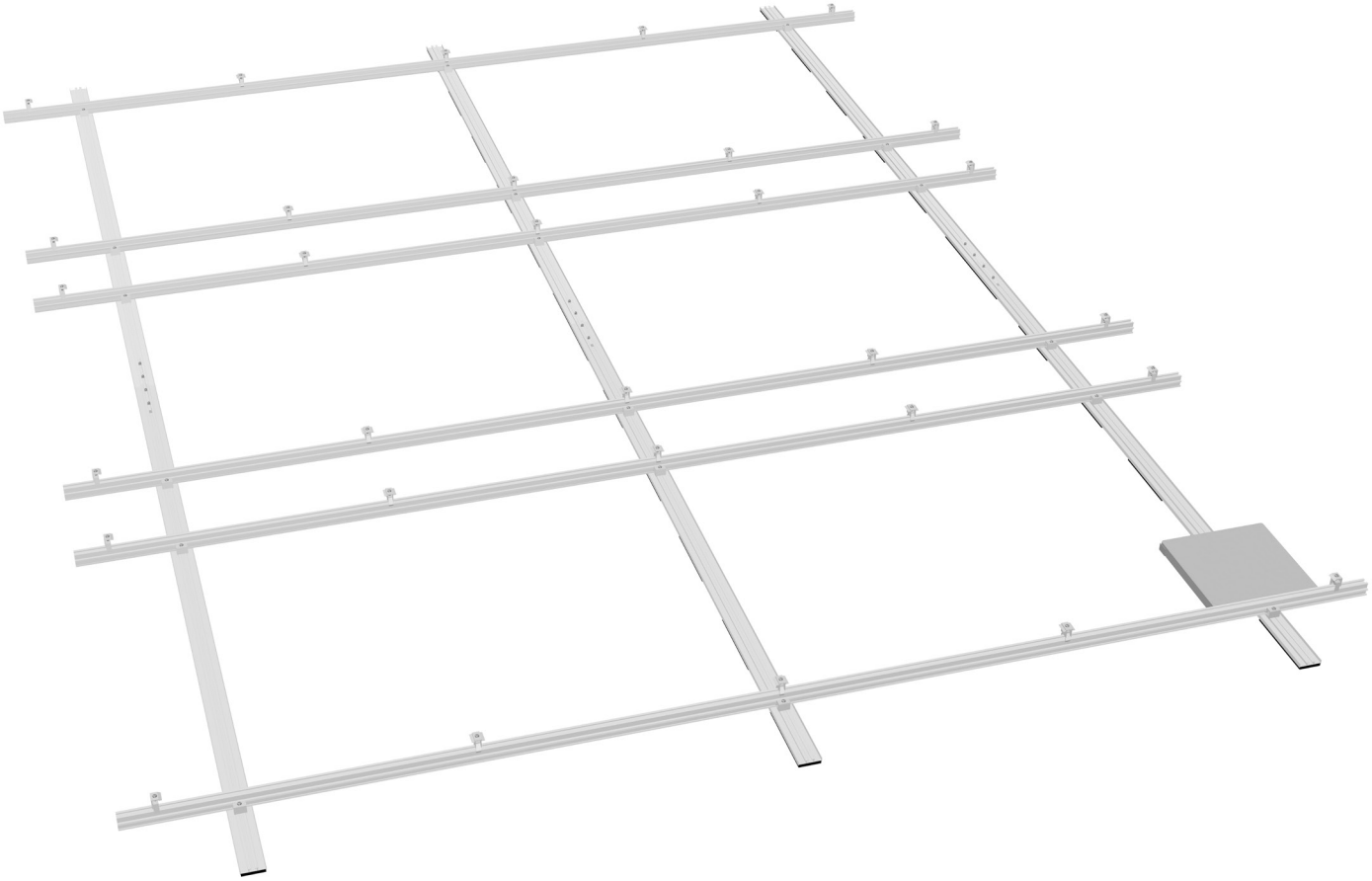
12 Covering cable duct (optional)

Covering cable duct

13 Bending tool (optional)

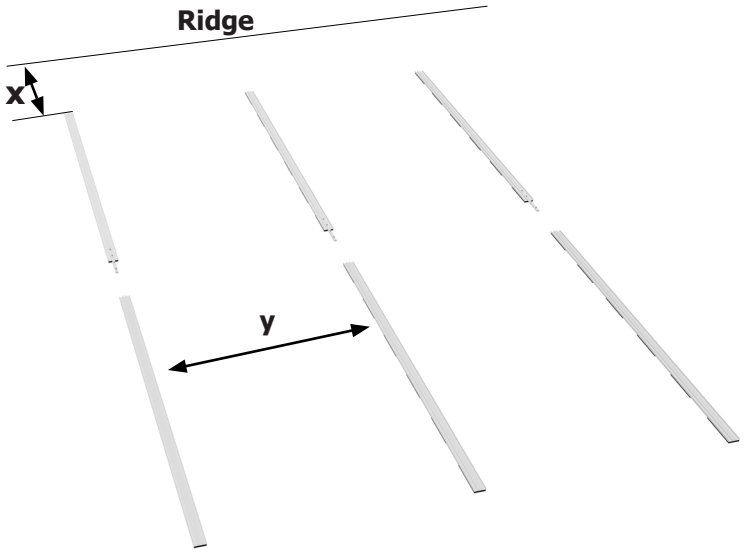
Bending tool





Decisive factors in determining the distance and layout of the rails and modules are only in the planning documents. All of the information given in the project report must be strictly observed.
- Number and position of ground rails and mounting rails
- Number and position of the ballast blocks or assembly posts
- Minimum distance between the solar modules and the edge of the roof / verge
- Minimum distance between the solar modules and the ridge / eaves
- Distance between the individual module rows
Any deviations from these specifications will falsify and invalidate the underlying static and aerodynamic calculations.
There is a risk of injury to people, damage to the PV system, the building and the surrounding area. S:FLEX GmbH is not liable for damages that result from not observing the installation guidelines and specifications in the project report.

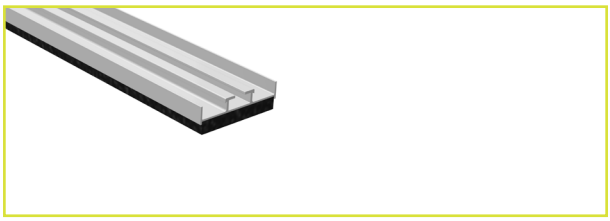
2.2 Installing the ground rail

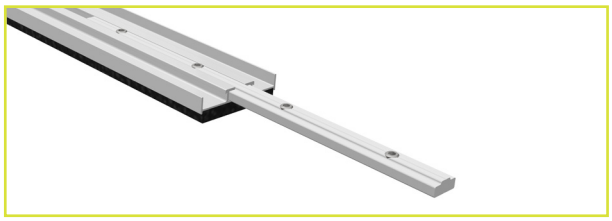


x = Spacing according to planning documents

y = ground rail type, sequence and spacing according to the planning documents

All ground rails are provided with an 11 mm thick high-tech protective foam mat. This ensures a free water drainage and prevents damage to the roof covering due to mechanical impacts and long-term damage from plasticiser migration.

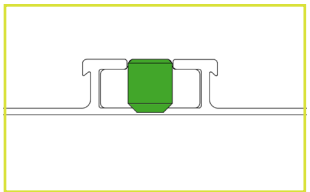




Preparatory work:
Clean the roof surface and clear it of obstructive objects. Measure the roof surface and compare it with planning documents. Draw the system dimensions.

Procedure:
The ground rails and the splice ground rails must be arranged one after the other in accordance with the planning documents. The sequence here is from the ridge to the eave. Insert the splice halfway into the ground rail and tighten the two grub screws. Then insert the ground rails in accordance with the planning documents and tighten both grub screws. All ground rails are now to be connected to each other according to the planning documents and set up with the correct spacing.
The grub screws must be screwed in completely (flush with the upper edge of the splice ground rails, countersunk by a maximum of 1mm). (Please note the MAINTENANCE information).

Correct



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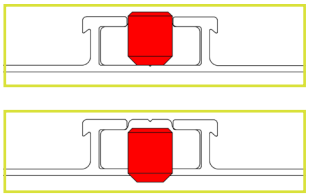
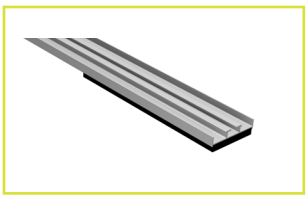


Cutting of ground rail:
Please note the following when processing self-cut ground rail:
- Cutting according to planning documents
- the ground rails must be aligned so that the cut edges are always on the inside of the individual rows are arranged
- the ground rail rows must end at the top and bottom with an original glued rail end (no cutting edge on the outer sides)
- the distance between the PE protective mats must not exceed 300mm; if additional PE protective mats are required paste in

Correct



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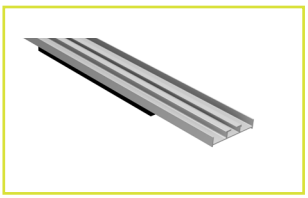
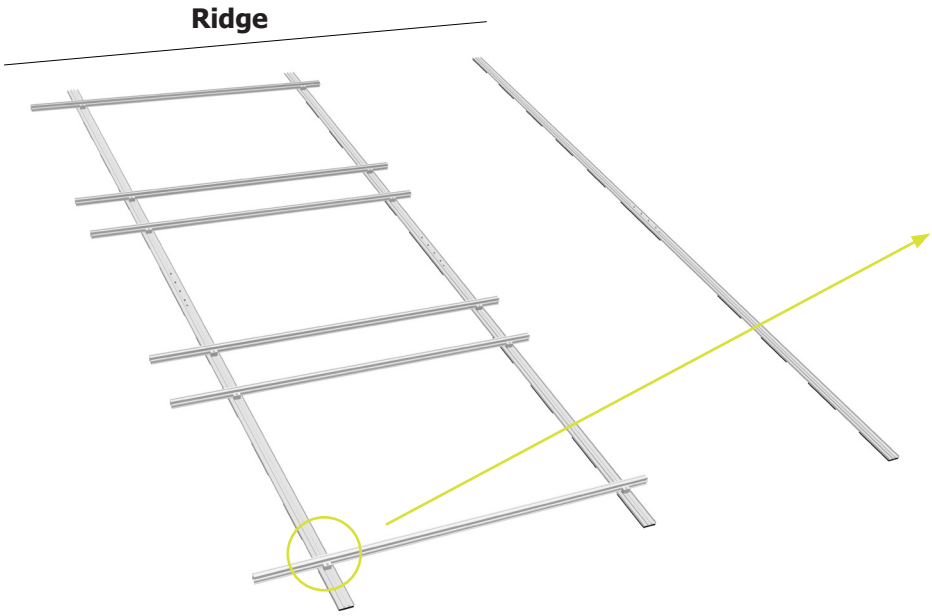
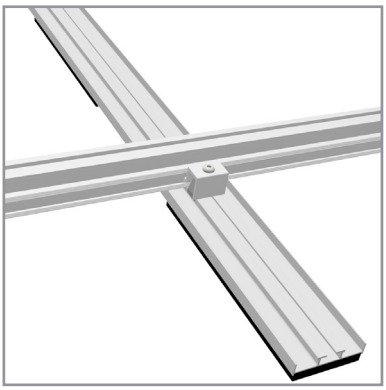


2.3 Installing the mounting rail ST-AK 7/47

2.3.1 Install mounting rails using cross adapters (for foil and bitumen roofs)

Install the mounting rails for each module row using cross adapters crossways on the ground rails. To do this, click the cross adapter onto the ground rail and use it to secure the mounting rail. Check that the spacing between the mounting rails is in line with the specified clamping distances for the module.
Ensure that the cross adapter is clicked in on both sides of the ground rail and fasten the screws tightly (torque 8-10 Nm).
The cross adapter must always be attached to lowest point of the roof on the side facing the mounting rail! To do this, position the mounting rail on the roof surface accordingly!





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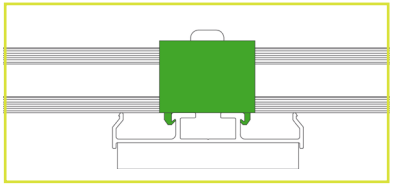

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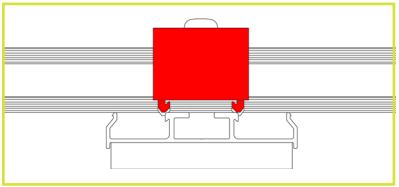
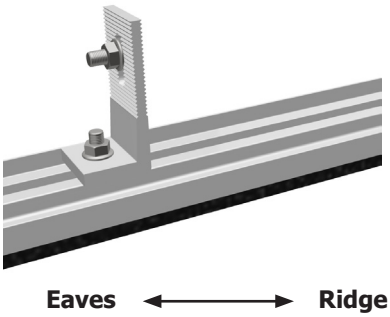
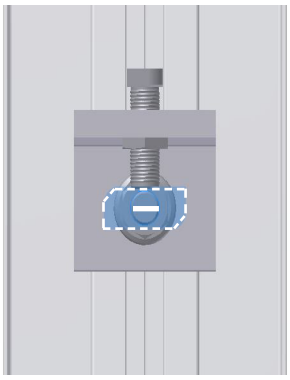


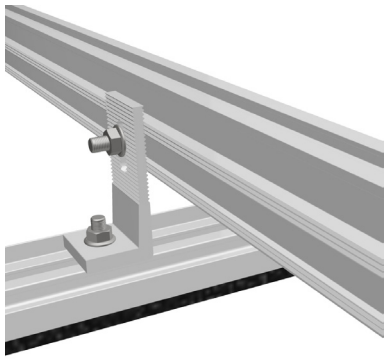
2.3.2 Rail ST-AK 7/47 using bracket 40 mm M8 (for sandwich roofs)

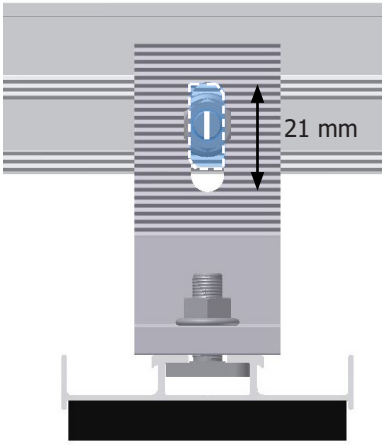
Mount the bracket 40 mm M8 onto the ground rail using a hammerhead bolt M8x25 and a self-locking nut. Ensure that the hammerhead bolt is correctly aligned in the ground rail channel (torque 12-15 Nm).



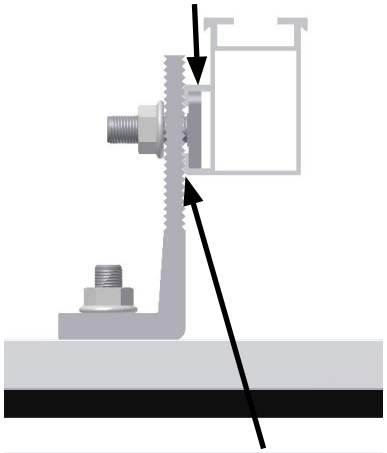


Attach the mounting rail to the bracket using a hammerhead bolt M8x25 and a self-locking nut. Ensure that the hammerhead bolts are correctly aligned in the mounting rail channel (torque 12-15 Nm) and that the mounting rails are installed stress-free. To do this, use the adjustability that is created by the corrugation of the components and the elongated hole. Ensure that a force-fit and form-fit connection is created by interlocking the corrugations. The bracket must always be attached to the lowest point of the roof on the side facing the mounting rail! To do this, position the mounting rail on the roof surface accordingly. Select the height of the mounting rails so that they span the upper flange of the sandwich panels without touching. The maximum possible height of the mounting rail above the roofing = 82 mm.





Alignment of hammerhead bolt



Force and form fit

Create force-fit and form-fit connection

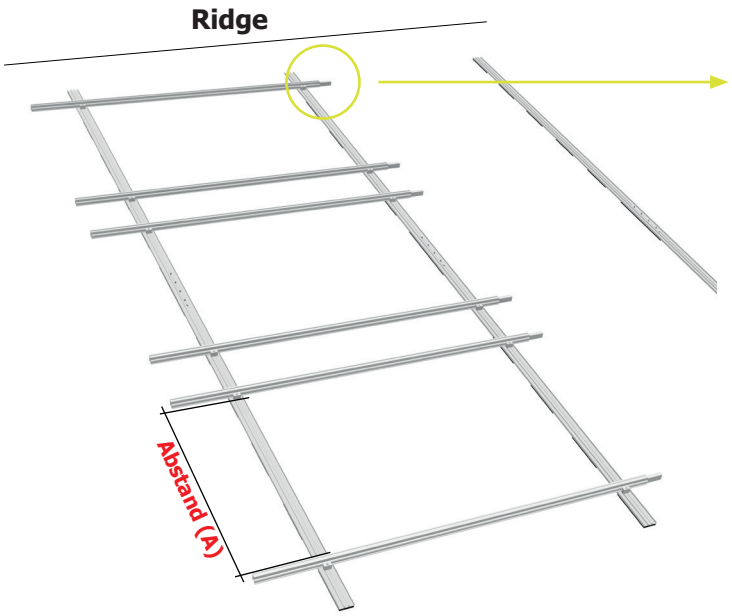
Check the alignment of the hammerhead bolts

Use the adjustability due to corrugation and elongated hole

It is important to ensure that the groove in the hammerhead bolt is perpendicular (at right angles to the rail) after installing the clamp. Only then is the head of the hammerhead bolt correctly inserted in the rail and the bracket is correctly attached.

2.4 Installing the splice

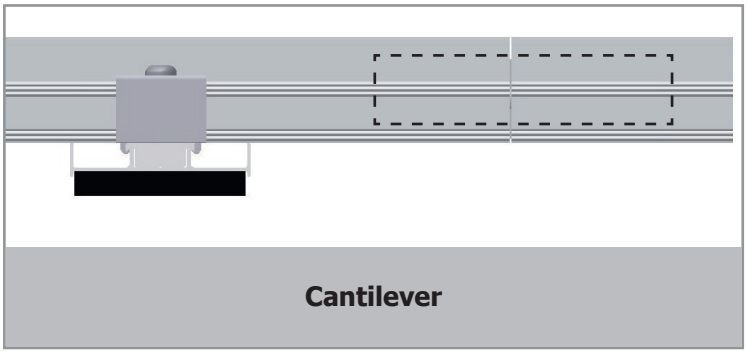
To join several rails together, the splice with identical static values to the mounting rail is pushed half-way into the previously installed mounting rail. Then push the next mounting rail onto the splice. Apply enough pressure to push the mounting rails flush together and ensure that connection to earth is established. The connection is complete. When positioning the splices, make sure that the mounting rails always rest on at least two ground rails.
Fix the joined mounting rails to the ground rails as described using a cross adapter or bracket 40 mm M8.

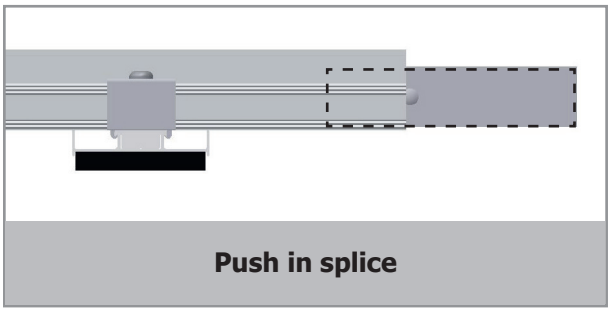


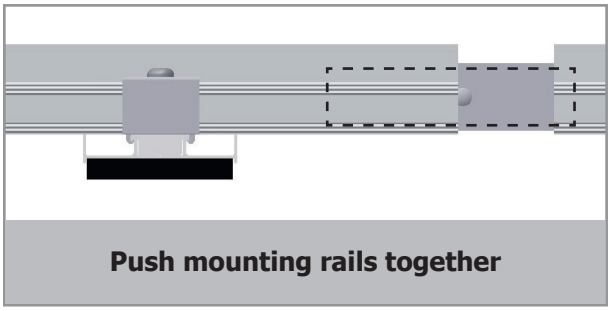
If 3 ballast stones are to be placed next to each other on the ground rail, the distance (A) between cross adapter and mounting rails must be at least 1,280mm.

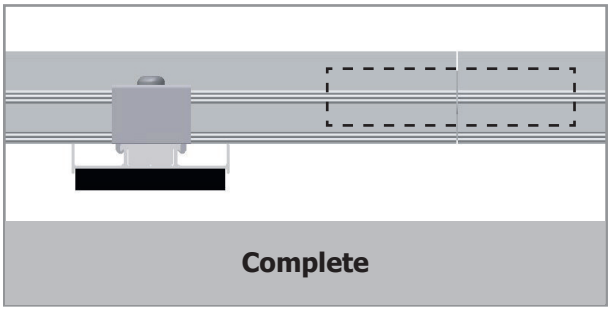
Check connection to earth

**No cantilevers with splices.
Position the splices so that they lie between 2 fastening points.**





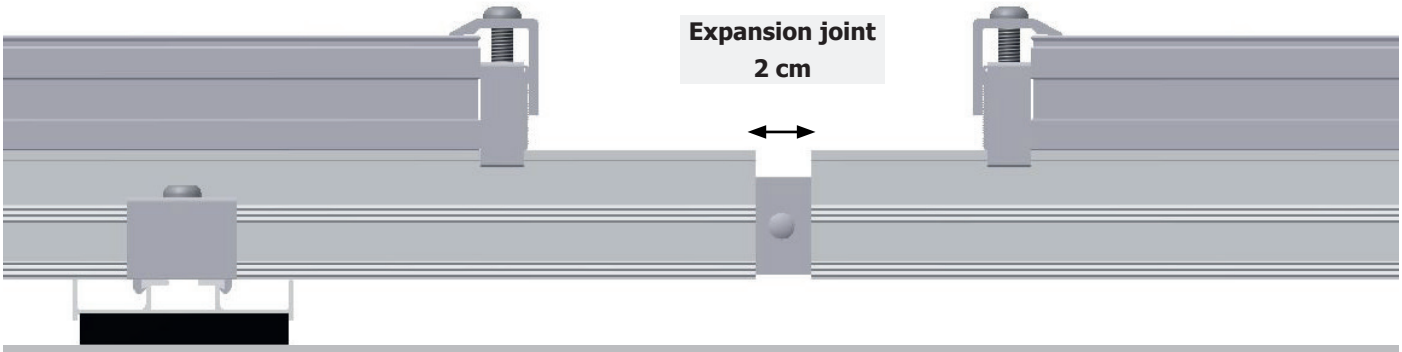




When positioning the splices, make sure that the mounting rails always rest on at least two ground rails.

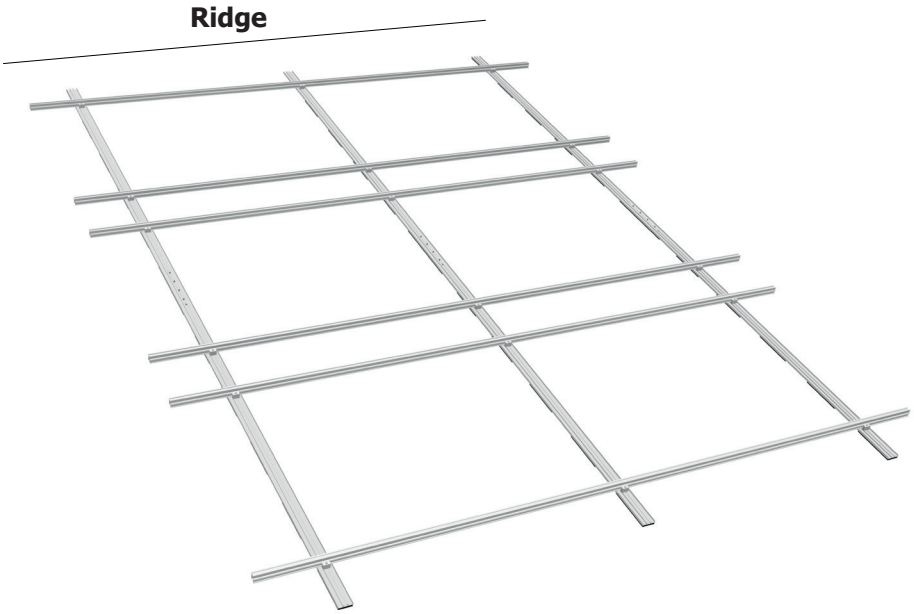
If the mounting rail is longer than 13.00 m, the module array is to be separated by placing two end clamps. The rail is to be separated in the area between the end clamps and connected with a splice to ensure a 2 cm compensation in length (expansion joint). The arrangement of the expansion joints must be adapted in accordance with the structural conditions of the roof and the expansion properties of the respective materials.

Modules must not be built over expansion joints.
There is no connection to earth. This is to be established without restricting the effect of the expansion joint.



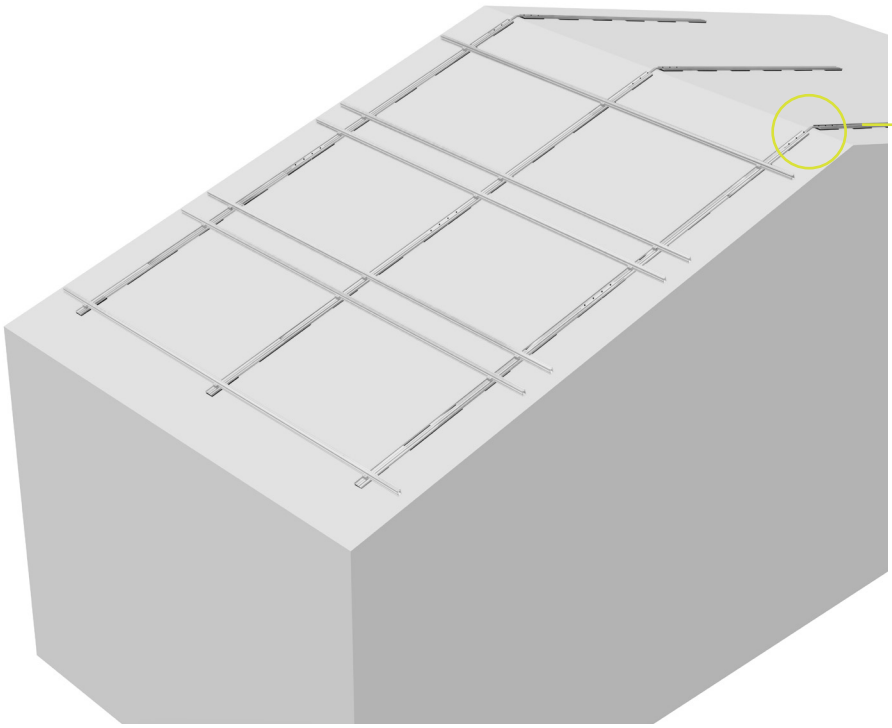
Expansion joint upper layer

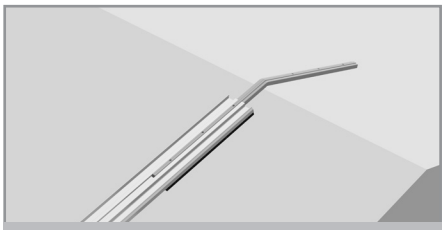
Completed installation of the upper rail layer



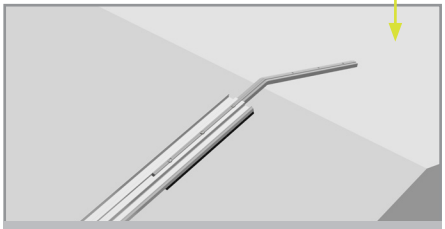
2.5 Ridge connector

Before the ridge connector is mounted, it must be adjusted to the pitch of the roof using the bending tool. The bending tool is available separately.

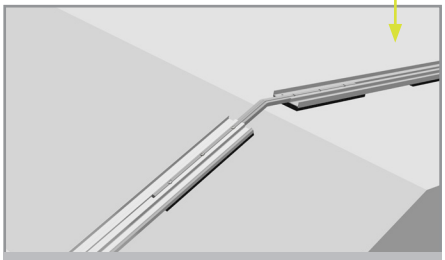




Push the pitch-adjusted ridge connector into the ground rail.



On the already installed side of the roof, connect the ridge connector using 3 grub screws and washers.

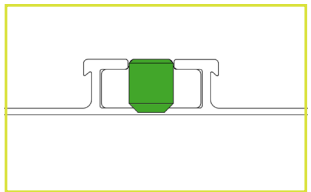


Install ground rails for additional system components / ballast with 3 grub screws.

The ridge connector is a stability-relevant component and must be installed in every pair of ground rails! Ignoring this requirement will lead to the exclusion of the liability and constitute a considerable threat to the system safety!

The roof ridge line is to be checked for an even consistent course. Contact of the ridge connector with the roofing must be avoided. If necessary, additional protective mats are to be added.
Using the supplied bending tool, bend the ridge connector to the inclination angle determined on the roof. Insert the ridge connection into the first ground rail assembly and tighten. Insert the ground rail on the opposite roof side into the ridge connection as well and screw together.
The grub screws must be screwed in completely (flush with the upper edge of the splice ground rails, countersunk by a maximum of 1mm). (Please note the MAINTENANCE information).

Correct



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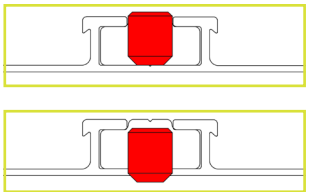
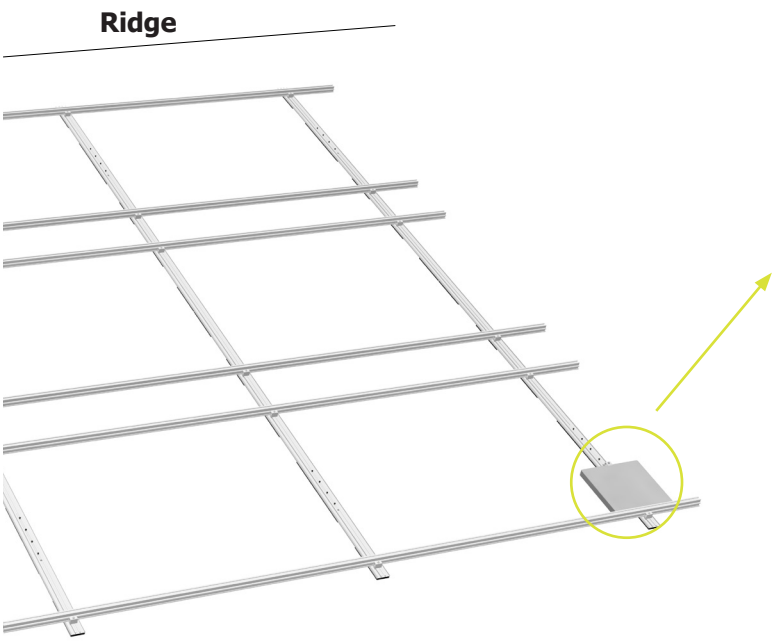
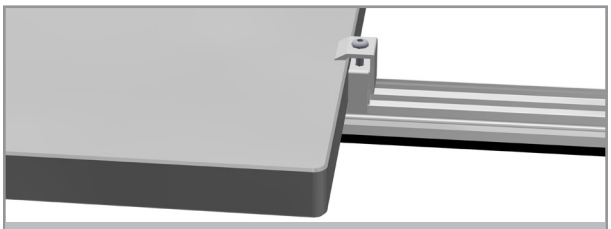


2.6 Ballast blocks

In general, additional ballast is required to prevent the PV system from lifting, moving or slipping. The quantity and distribution of the ballast depend on parameters such as location, building height, building surroundings, roofing type and roof pitch. This information is included in the planning documents.

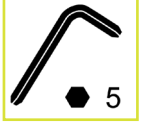


Snap in the end clamp...



Push in and tighten

Install the end clamp



Install the ballast onto the ground rails according to the planning documents.
Stone slabs with bevelled edges need to be positioned so that the bevelled edges face downwards and the right-angled edges face upwards. Fix the ballast with end clamps or end and mid clamps accordingly to prevent slipping and moving. When installing several ballast blocks on top of each other, mid clamps are to be used between the blocks and end clamps on the upper block (torque mid clamp and end clamp 8-10 Nm). Precise installation details for installing mid clamps and end clamps are provided in section 2.8 (module assembly).
- Recommended block size for foil and bitumen roofs: 400x400x40mm; max. block height 40 mm
- Recommended block size for sandwich roofs: 500x200/ 250x50 mm; max. block height 50 mm

The ballast must not be clamped in the area directly under the module frame. This has already been taken into account in the planning documents (ground rail arrangement).

The position of the ballasting must always be carried out in strict adherence to the planning documents. A different distribution or omission of ballast elements endangers the stability of the entire plant and represents an enormous risk.
The position of the ballasting elements must be chosen so that slipping down, tipping or wobbling are prevented. The ballast must lie completely flat. It is insufficient to merely lean the ballast.

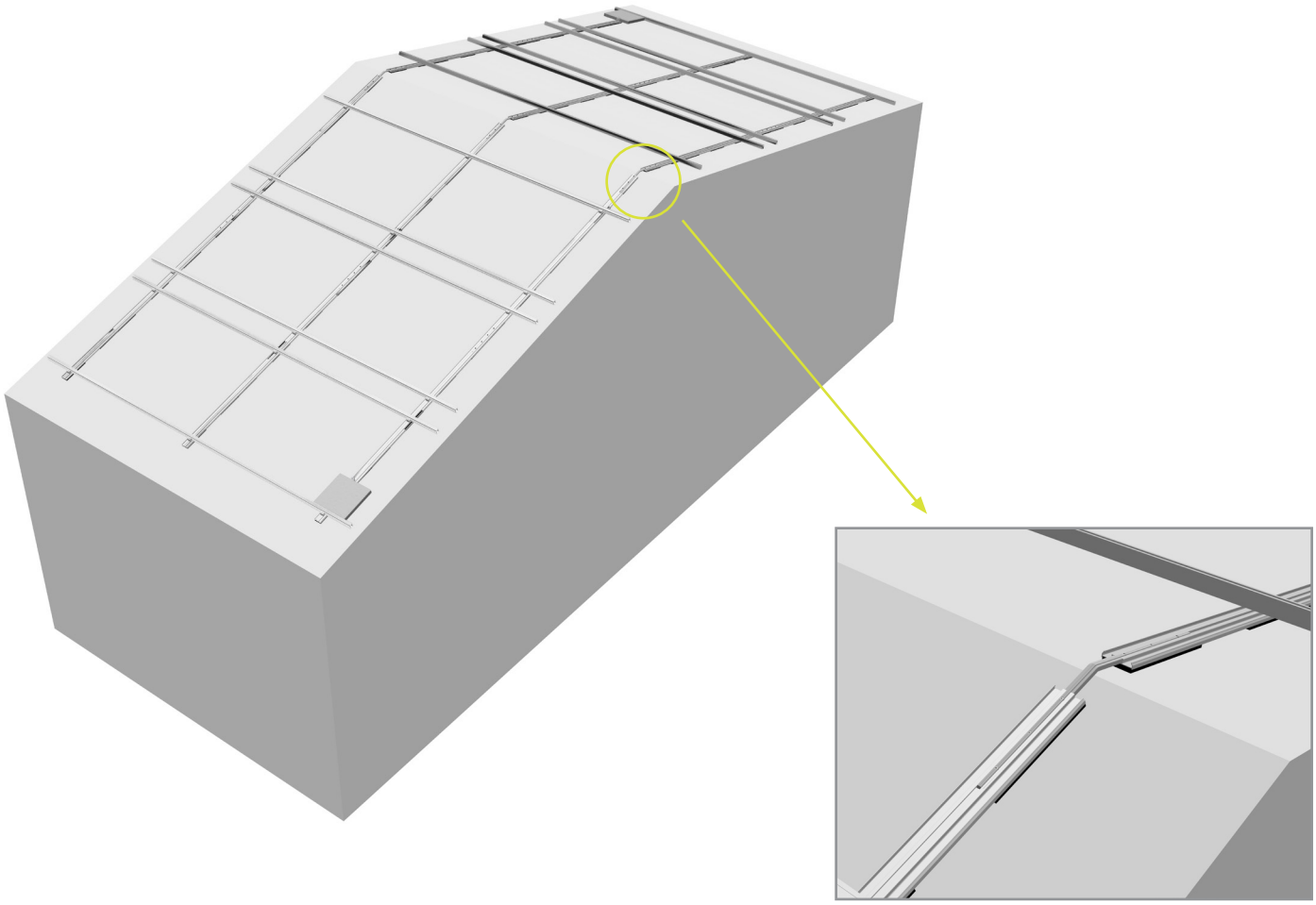
2.7 Option 1: Counterweight

The module array must be secured to prevent slippage by means of a suitable counterweight or roof fastening. The type of counterweight depends on the roof shape and the intended module layout. The most common options are the double-sided module layout with ridge connection (saddle roof), the counterweight with ridge connection (saddle roof) and the fastening to the roof substructure or ridge connector (saddle roof, single pitch roof, butterfly roof). Another special option is fastening to the rafter ends (single pitch roof, butterfly roof) with specially made metal brackets.
The required counterweight and number of fastening points are included in the project report.

The module array must always be secured with a counterweight or roof fastening to prevent slippage.

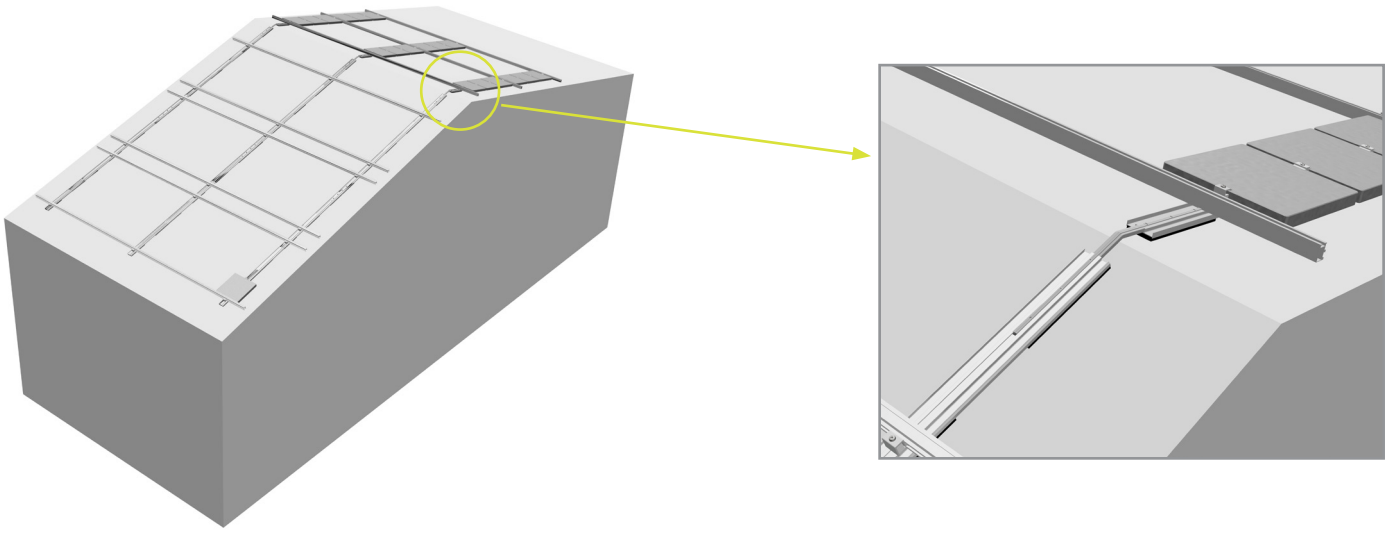
2.7.1 Counterweight with double-sided module layout and ridge connection

The substructure is installed on both sides of the roof as described in the previous sections. The module array is connected using the ridge connector and the ground rails.



2.7.2 Counterweight with ballast and ridge connection

The module array is connected to the ground rails on the other side of the roof (D2) using ridge connectors, as described in section 2.4. One or more rows of mounting rails are installed on the ground rails (D2), according to the instructions in the project report. The ballast is applied as described in section 2.5.



2.8 Option 2: Roof fastening

2.8.1 Assembly post

The assembly post offers the possibility of an additional optional connection of the PV system to the roof substructure. The use of assembly posts extends the mounting possibilities in cases where counter-ballasting is not possible (e.g. skylight dome on the ridge), or for buildings with low load reserves or high wind loads.
The number and position of the assembly posts can be found in the project report.
The connection to the roof substructure requires roof penetration with up to 6 screws per assembly post. The installation of the assembly posts and the professional sealing of the roof cladding must be carried out by an appropriate specialist (roofing) company.
The assembly posts must be installed as the first step before installing the Flat Direct mounting system!

Prerequisite:
The thickness of the insulation boards / insulation layer must not exceed 120mm.
For trapezoidal steel roofs (UK), the trapezoidal profiles must have a nominal thickness of at least 0.75 mm.
For concrete roofs, the concrete thickness must be at least 100mm.

The assembly post is available in 3 variants:

- With bitumen primer and bitumen covering for flaming (for bitumen roofs)
- With PVC primer and PVC covering for hot-air bonding (for PVC roofs)
- Pure stainless steel, e.g. for processing with liquid plastic (for other roof coverings)

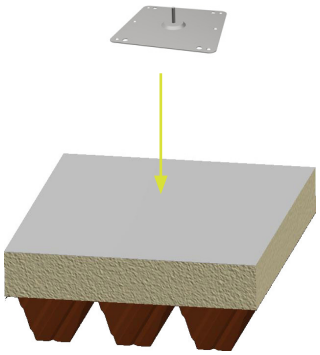
The assembly post is supplied without cleaner, adhesive or liquid plastic for processing. The selection of the processing materials and the compatibility tests with the roof covering are the responsibility of the installer.

The quantity and position of the assembly posts must always be determined in strict adherence to the planning documents. A different distribution or omission of assembly posts endangers the stability of the entire plant and represents an enormous risk.

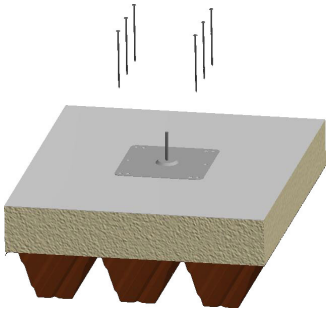
The installation must be carried out by a specialist company.
Improper installation of the assembly posts may lead to damage to the roof covering, moisture entering the roof and permanent damage.

Installation diagram for assembly post on trapezoidal sheet metal (also applies for foil/PVC roof)

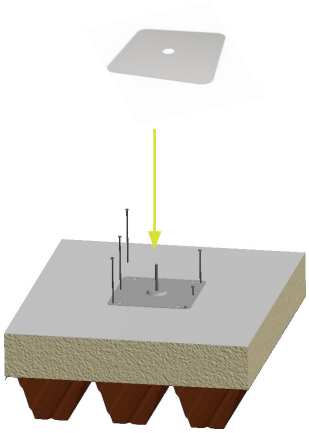
Select and mark the position of the assembly post in accordance with the project report.
Clean the mounting surface, approx. 60x60 cm (assembly post: 30x30 cm; covering: 50x50 cm).

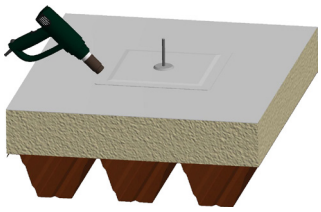


Position the assembly post and screw it into the roof substructure with the appropriate screws OMG HD. The screw connection is established in the raised corrugations of the trapezoidal substructure.



Then place the covering on top and glue it flat to the assembly post and to the roof cladding on all sides.



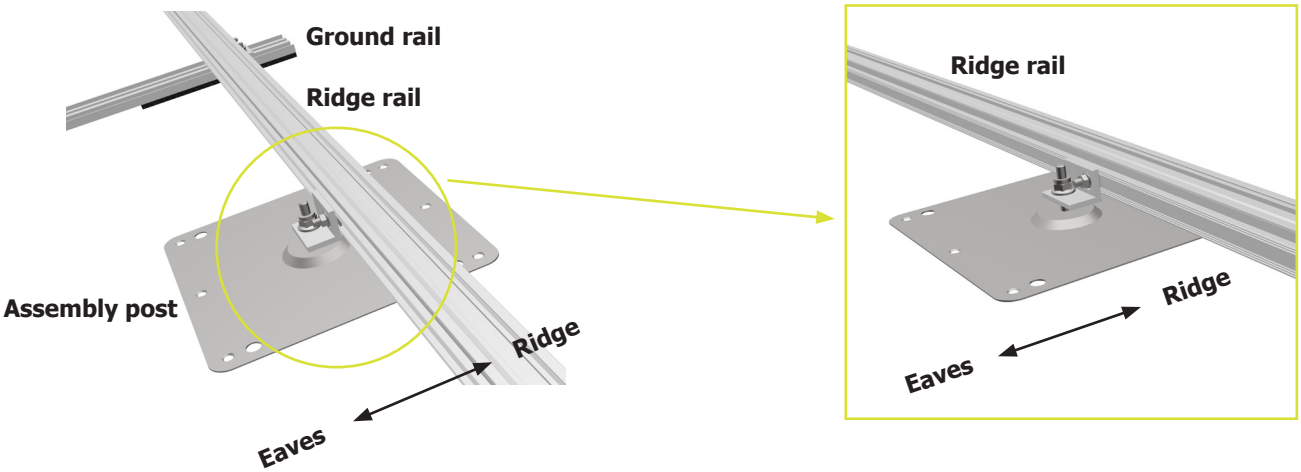


For mounting on trapezoidal sheet metal, 6 OMG HD roofing screws (6.7x150mm) are required per mounting foot. The thickness of the insulation layer must not exceed 120mm. The trapezoidal steel profiles must have a nominal sheet thickness of at least 0.75 mm.

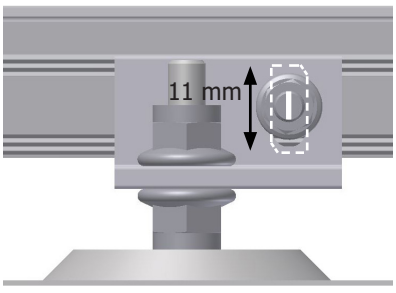
For mounting on concrete roofs, 6 OMG HD (6.3 mm) roof screws are required per mounting foot. The concrete must be at least 100 mm thick. Installation diagram as shown.

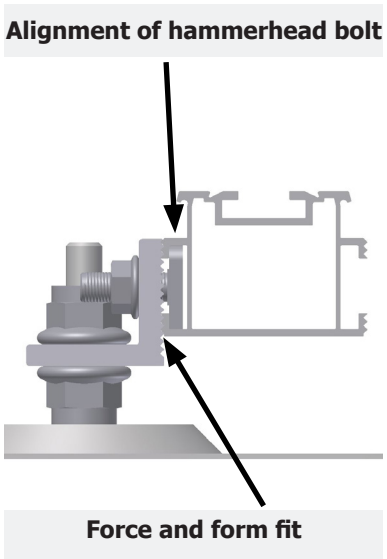
The Flat Direct mounting system and roof connection points are connected via horizontally running ridge rails. These are attached with brackets to the vertical ground rails and the roof connection points.

Attachment to the assembly post:



Screw the first M12 locking nut with the flange facing upwards onto the thread of the assembly post and rotate the nut loosely downwards. Place the 60mm M12 bracket with the round hole on the thread. Screw the second M12 locking nut with the flange facing downwards onto the thread of the assembly post and rotate the nut loosely downwards. Repeat the procedure for all assembly posts.
Fix the ridge rail with the M8x25 hammerhead bolts and the locking nuts in the slotted holes on the brackets. Make sure that the hammerhead bolts are correctly aligned. Tightening torque for the hammerhead bolts 12–15 Nm.
When all brackets are attached to the ridge rail, the ridge rail is aligned in the correct height and the M12 locking nuts are tightened (tightening torque 25–30 Nm). The lower edge of the ridge rail should run approx. 23–33mm above the roof surface. The bracket must always be attached to the bottom of the ridge rail.





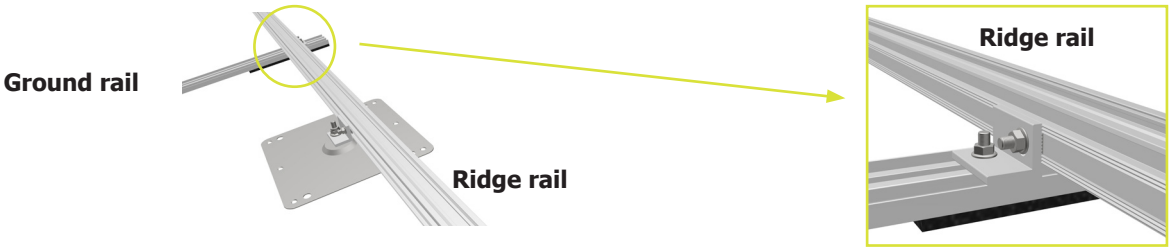
Create force-fit and form-fit connection

Use the adjustability due to corrugation and elongated hole

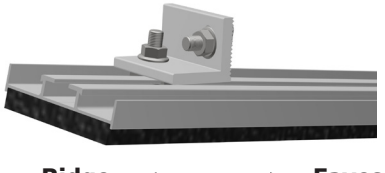
The ridge rail must always be mounted above the assembly post/bracket.

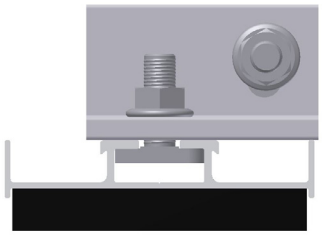
It is important to ensure that the groove in the hammerhead bolt is perpendicular (at right angles to the rail) after installing the clamp. Only then is the head of the hammerhead bolt correctly inserted in the rail and the bracket is correctly attached.

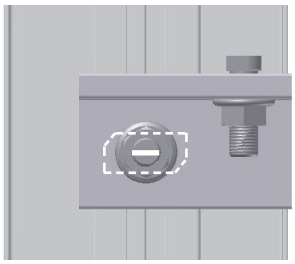
Attachment to the ground rail:

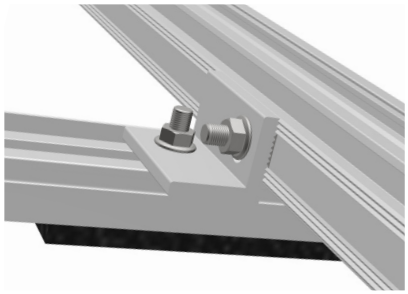


Mount the bracket 60 mm M10 onto the ground rail using a hammerhead bolt M8x25 and a self-locking nut. Ensure that the hammerhead bolt is correctly aligned in the ground rail channel (torque 12-15 Nm).

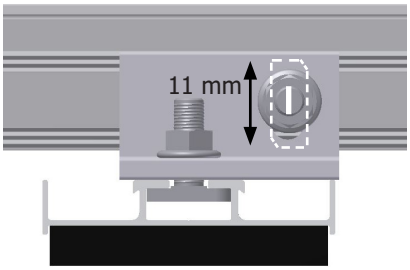




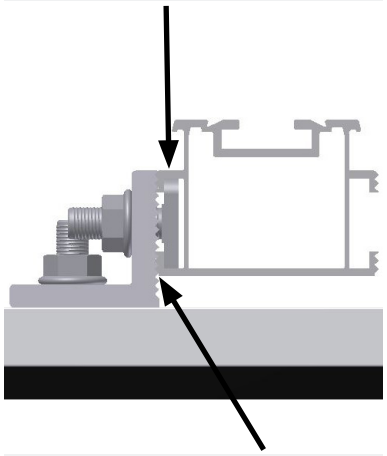




Mount the ridge rail to the brackets using the M8x25 hammerhead bolt and the locking nut. Make sure that the hammerhead bolts are correctly aligned in the channel of the ridge rail (tightening torque 12–15 Nm) and that the ridge rail is not under tension. To do this, use the adjustability that is created by the corrugation of the components and the elongated hole. Ensure that a force-fit and form-fit connection is created by interlocking the corrugations. The bracket must always be attached to the upper side of the ridge rail.



Alignment of hammerhead bolt



Force and form fit

Create force-fit and form-fit connection

Use the adjustability due to corrugation and elongated hole

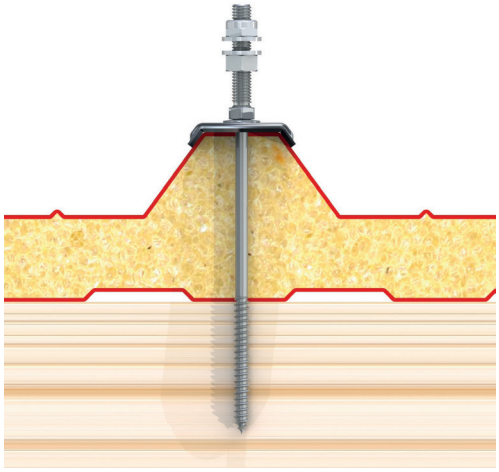
The ridge rail must always be mounted below the bracket.

It is important to ensure that the groove in the hammerhead bolt is perpendicular (at right angles to the rail) after installing the clamp. Only then is the head of the hammerhead bolt correctly inserted in the rail and the bracket is correctly attached.

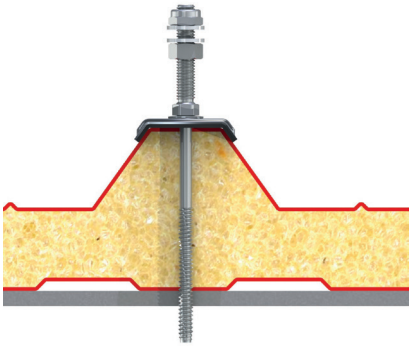
2.8.2 Solar fasteners

When mounting on sandwich roofs, the use of assembly posts is not possible. Solar fasteners are used for additional fastening to the roof substructure.
The number and position of the solar fasteners can be found in the project report.
The solar fasteners are mounted with suitable calottes in the area of the raised corrugations and screwed into the purlins.

Sandwich profiles: Solar fastener Type A
(suitable calotte for wooden purlins)



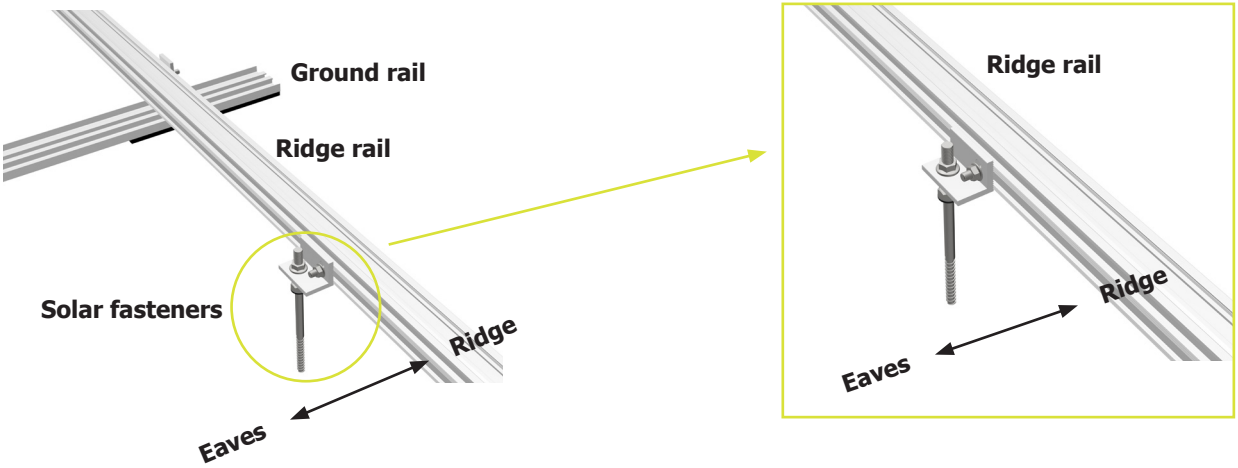
Sandwich profiles: Solar fastener Type BZ
(suitable calotte for metal purlins)



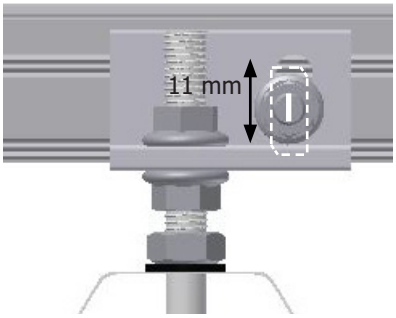
The quantity and position of the solar fasteners must always be determined in strict adherence to the planning documents. A different distribution or omission of solar fasteners endangers the stability of the entire plant and represents an enormous risk.

The precise steps for installation of the solar fasteners is described in the S:FLEX installation instructions for hanger bolts / solar fasteners. The S:FLEX installation instructions for hanger bolts / solar fasteners must be read before installing the solar fasteners.

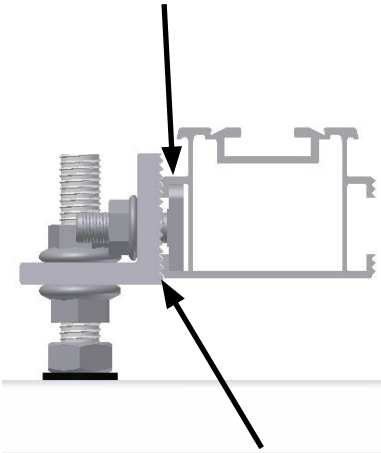
Attachment to solar fasteners on sandwich roofs:



Screw the first M10 locking nut with the flange facing upwards onto the thread of the solar fastener and rotate the nut loosely downwards. Place the 60mm M10 bracket with the round hole on the thread. Screw the second M10 locking nut with the flange facing downwards onto the thread of the solar fastener and rotate the nut loosely downwards. For corrugation heights > 50mm the bracket must be mounted upside down on the solar fastener. This means that the lateral limb must point downwards (not shown).
Repeat the procedure for all solar fasteners.
Fix the ridge rail with the M8x25 hammerhead bolts and the locking nuts in the slotted holes on the brackets. Make sure that the hammerhead bolts are correctly aligned. Tightening torque for hammerhead bolts: 12-15 Nm.
When all brackets are attached to the ridge rail, the ridge rail is aligned in the correct height and the M10 locking nuts are tightened (tightening torque 20-25 Nm). The ridge rail must have a gap of at least 5 mm to the upper edge of the raised corrugations. The bracket must always be attached to the bottom of the ridge rail.



Alignment of hammerhead bolt



Force and form fit

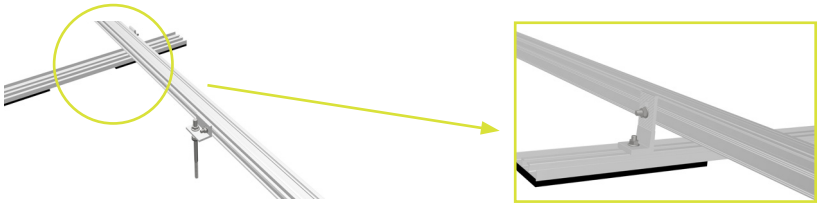
Create force-fit and form-fit connection

Use the adjustability due to corrugation and elongated hole

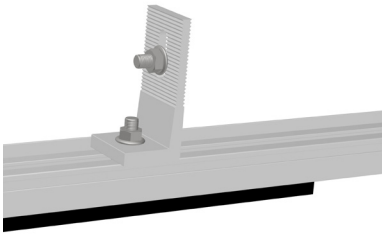
The ridge rail must always be mounted above the assembly post/bracket.

It is important to ensure that the groove in the hammerhead bolt is perpendicular (at right angles to the rail) after installing the clamp. Only then is the head of the hammerhead bolt correctly inserted in the rail and the bracket is correctly attached.

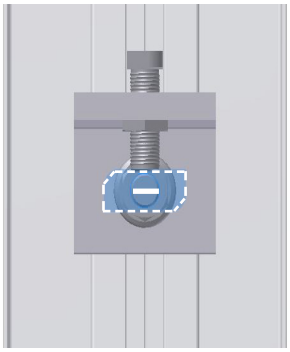
Attachment to the ground rail:

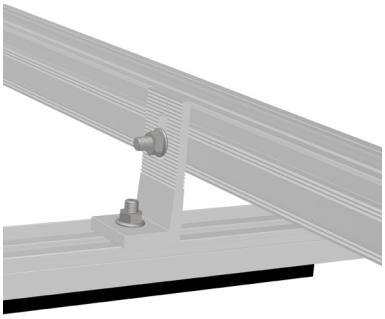


Mount the bracket 40 mm M8 onto the ground rail using a hammerhead bolt M8x25 and a self-locking nut. Ensure that the hammerhead bolt is correctly aligned in the ground rail channel (torque 12-15 Nm).

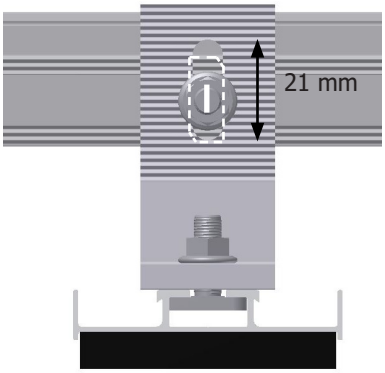


Ridge ⟷ **Eaves**

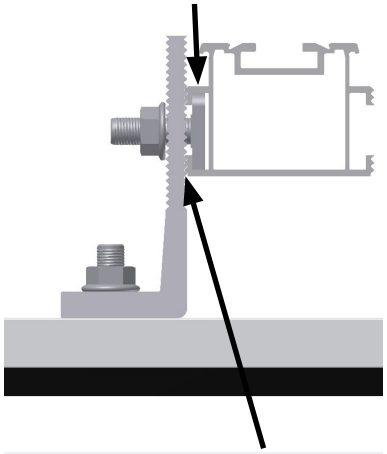




Mount the ridge rail to the brackets using the M8x25 hammerhead bolt and the locking nut. Make sure that the hammerhead bolts are correctly aligned in the channel of the ridge rail (tightening torque 12–15 Nm) and that the ridge rail is not under tension. To do this, use the adjustability that is created by the corrugation of the components and the elongated hole. Ensure that a force-fit and form-fit connection is created by interlocking the corrugations. The bracket must always be attached to the upper side of the ridge rail. Select the height of the ridge rails so that they span the upper flange of the sandwich panels without touching.



Alignment of hammerhead bolt



Force and form fit

Create force-fit and form-fit connection

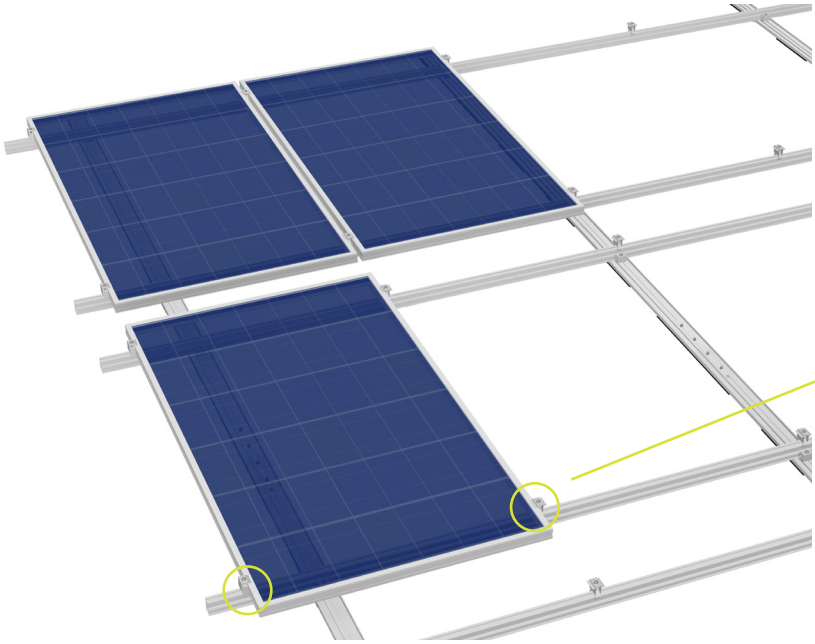
Check the alignment of the hammerhead bolts

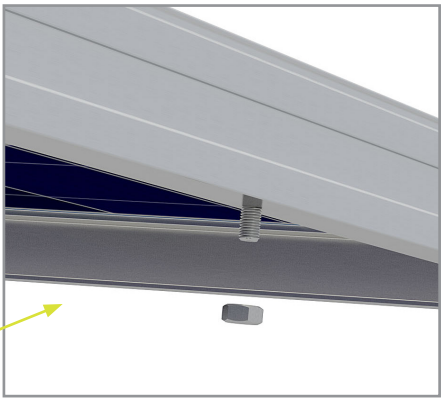
Use the adjustability due to corrugation and elongated hole

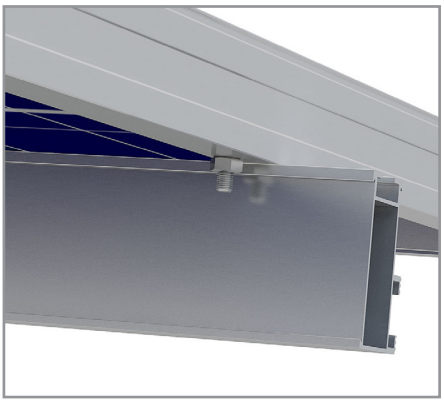
It is important to ensure that the groove in the hammerhead bolt is perpendicular (at right angles to the rail) after installing the clamp. Only then is the head of the hammerhead bolt correctly inserted in the rail and the bracket is correctly attached.

2.9 Module assembly (slipping protection (for roof pitches greater than 5°))

For roof pitches greater than 5°, before the installation of the modules in the lowest row of modules, the modules are to be equipped with slipping protection. The same applies to modules which do not have any modules directly below them (modules above obstructions such as windows, chimneys, etc.).
Attach two M6 x 20 screws (with the shank downward) with M6 nuts into two of the module's frame holes (8 mm) so that the screws are at the same level and when installed they are above at least one horizontal mounting rail layer,and if necessary ensure that the screws on the underside of the module frame touch the horizontal mounting rails from above. If the lower mounting hole is larger than 8 mm, please use an appropriately sized screw.

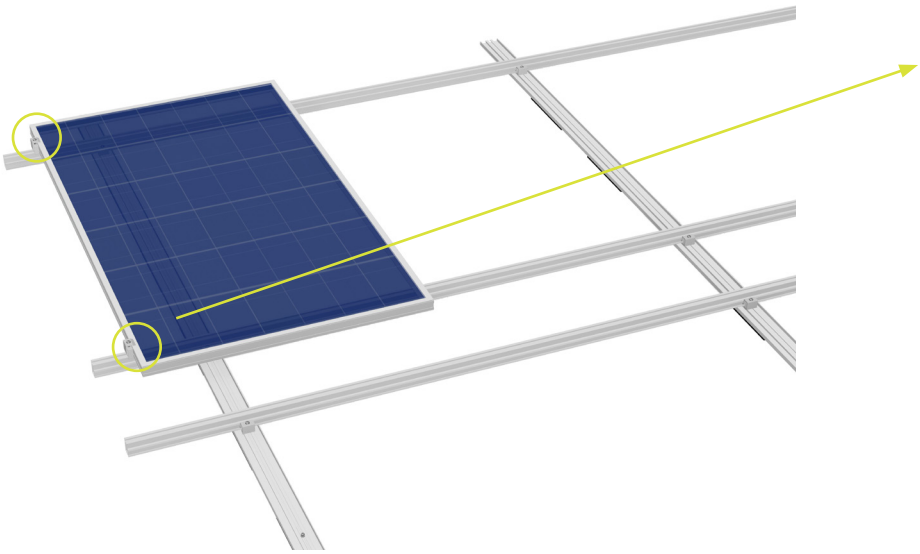


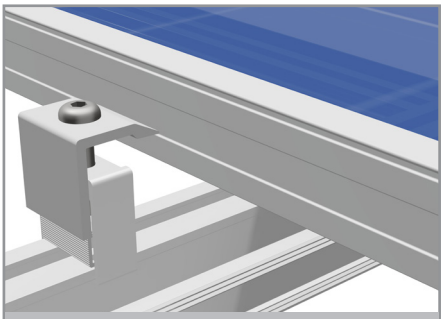




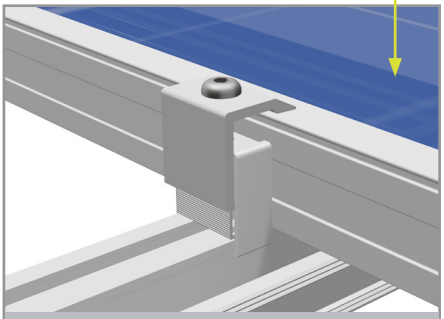
Module installation (end clamps)

Place the module on the mounting rails. Install the end clamps. Click each end clamp on to the mounting rail and push them on to the module. Ensure that the end clamp is clicked in to both sides of the mounting rail.
Now adjust the end clamp to match the height of the module and tighten the screw (torque 8-10 Nm). Ensure that the end clamp clamps the module frame at the clamping area defined by the module manufacturer.





Snap in the end clamp...

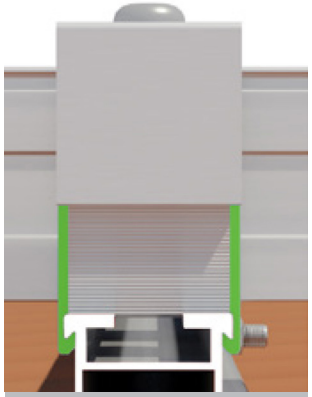


Push in and tighten

Install the end clamp

Defined clamping area

Incorrect



Both sides clicked in

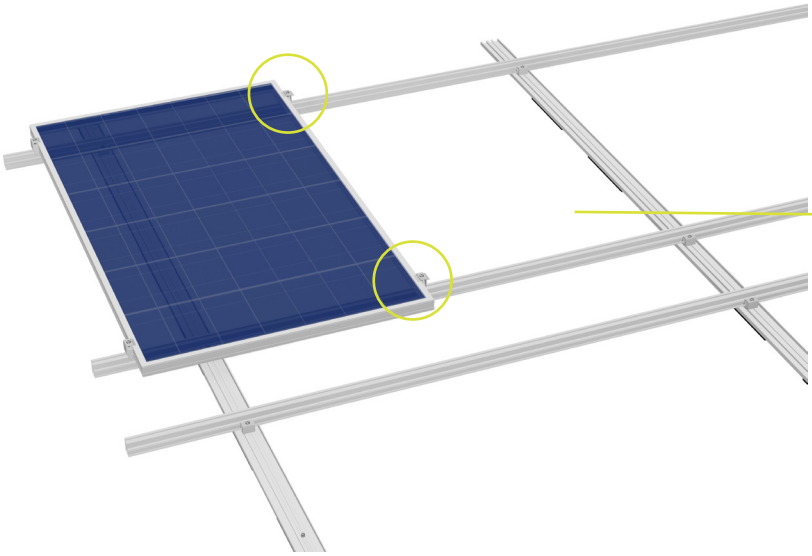
Incorrect

Check that the end clamp has been clicked in

Observe the module manufacturer's instructions: Check the defined clamping area

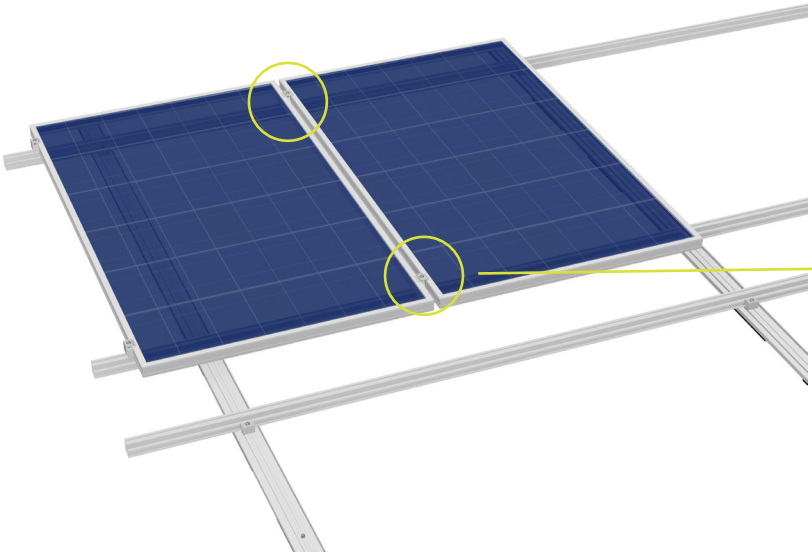
Module installation (mid clamps)

Now install the mid clamps. Click each mid clamp onto the mounting rail and push them on to the module. Ensure that the mid clamp is clicked in to both sides of the mounting rail.



Click mid clamp and push in

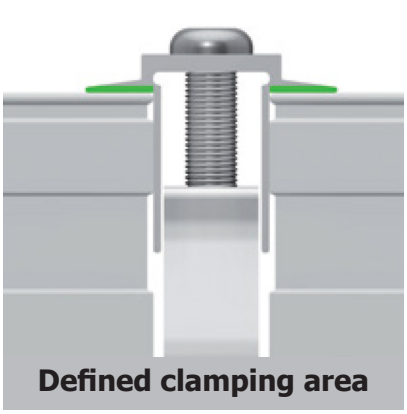
Now push the next module under the mid clamp, adjust the mid clamp to the height of the module frame and tighten the screw (torque 8-10 Nm).



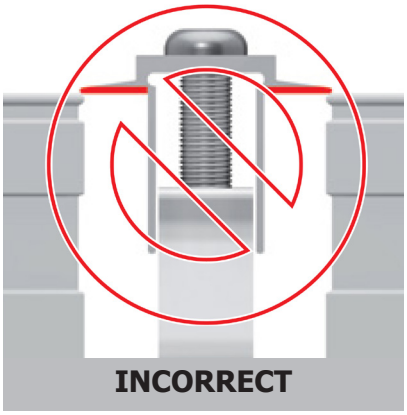
Slide module underneath and tighten mid clamp

Install mid clamp

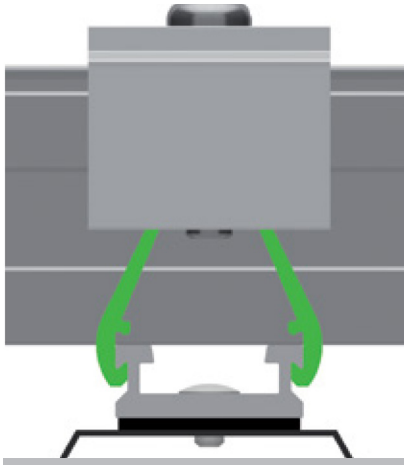
Ensure that the mid clamp clamps both of the module frames on the clamping area defined by the module manufacturer.



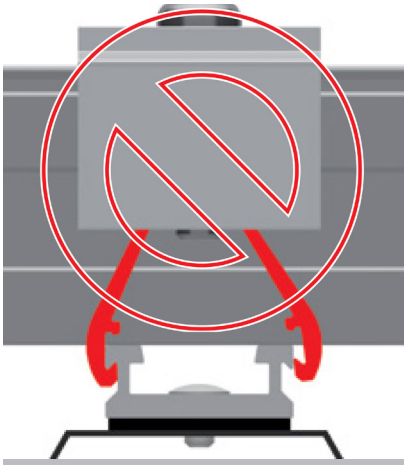
Defined clamping area



INCORRECT



Both sides clicked in



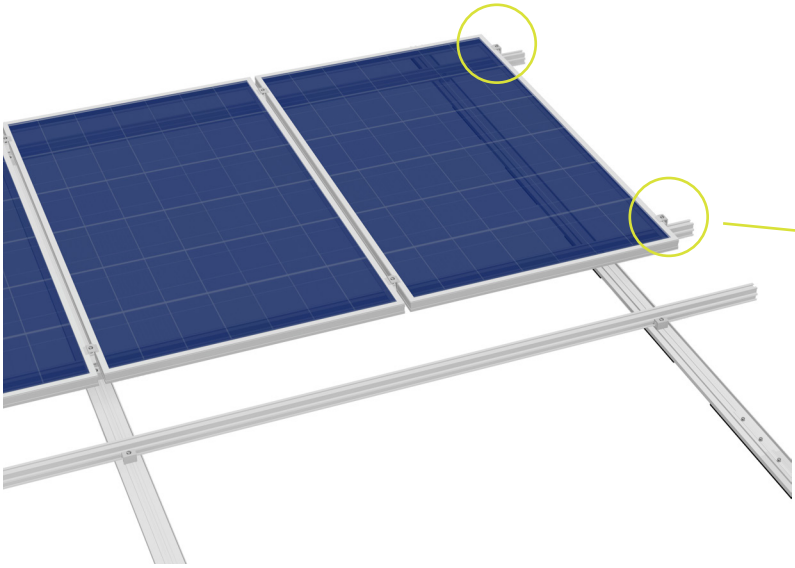
INCORRECT

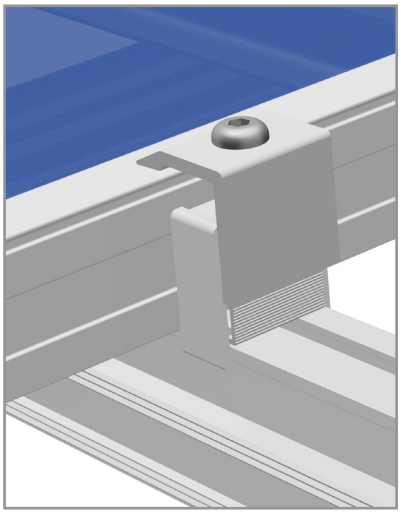
Check the module mid clamp has been clicked in

Observe the module manufacturer's instructions: Check the defined clamping area

Module assembly (end clamps at the end of the row)

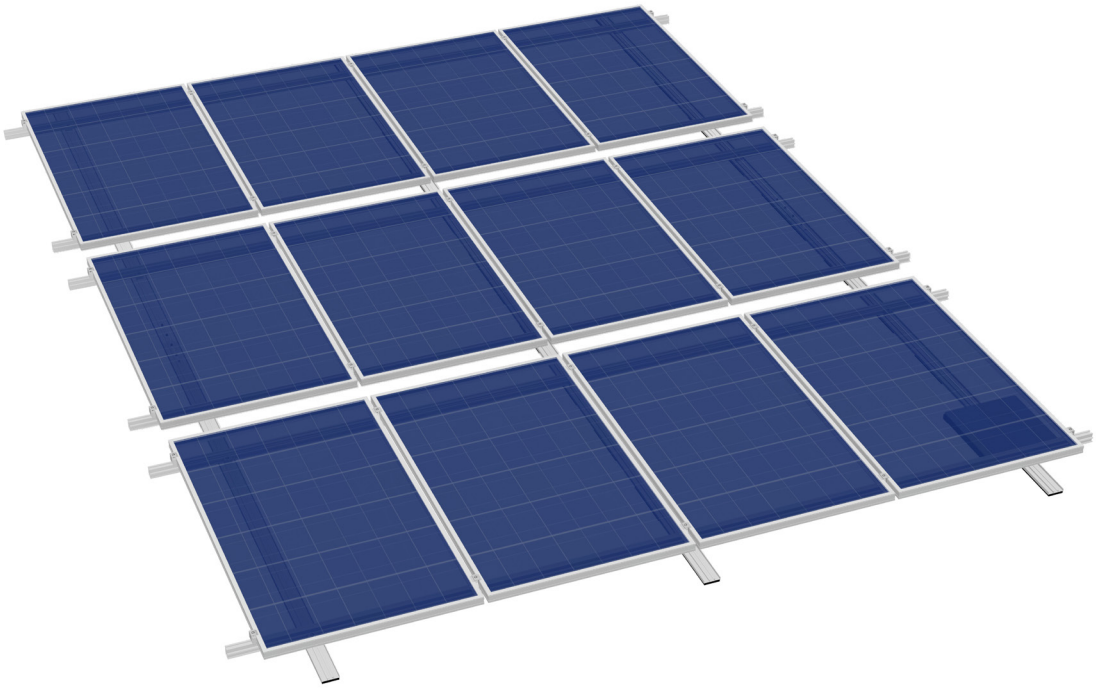
End clamps must be installed on the last module in each row (if applicable, on expansion joints). Click each end clamp on to the mounting rail and push them on to the module. Ensure that the end clamp is clicked in to both sides of the mounting rail. Now adjust the end clamp to match the height of the module and tighten the screw (torque 8-10 Nm). Ensure that the end clamp clamps the module frame at the clamping area defined by the module manufacturer.



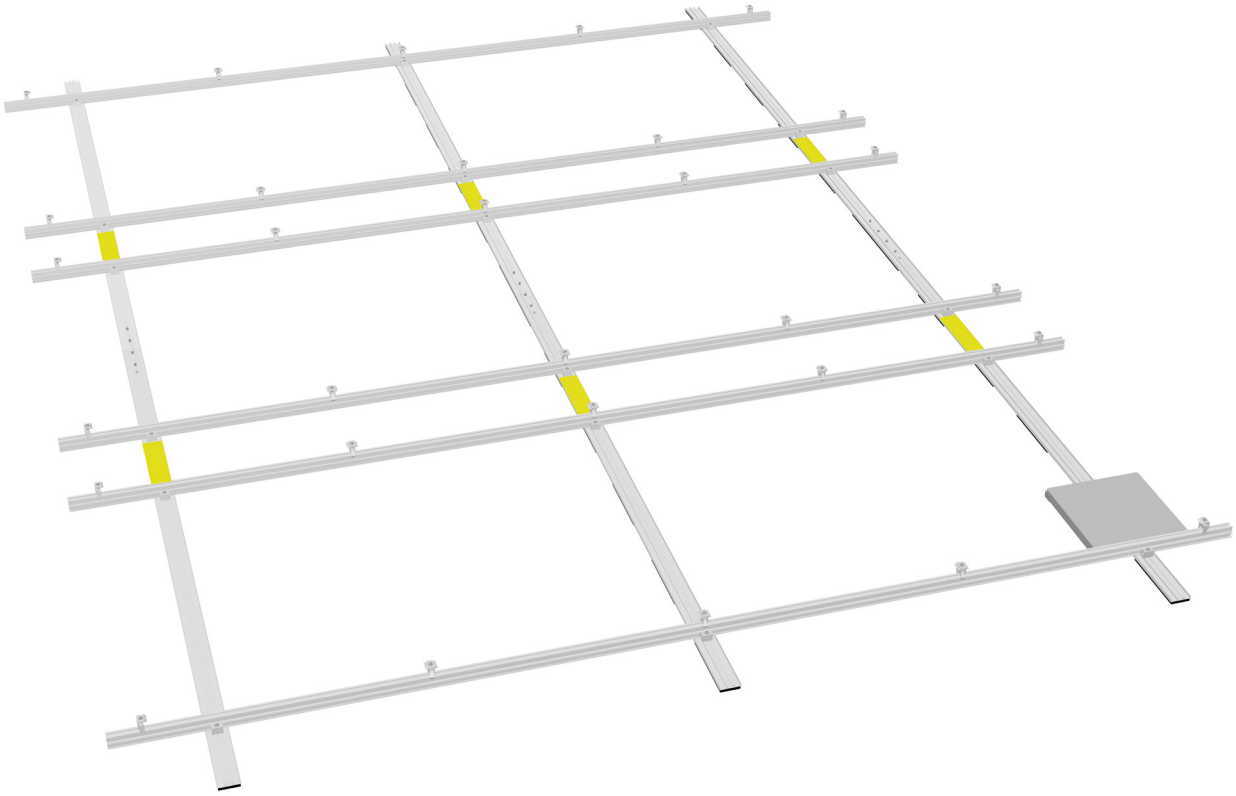


Install end clamp on the last module

Proceed as described for the following rows.



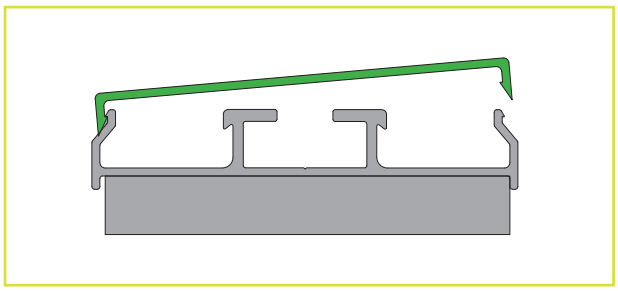
2.10 OPTIONAL STEP – covering cable duct

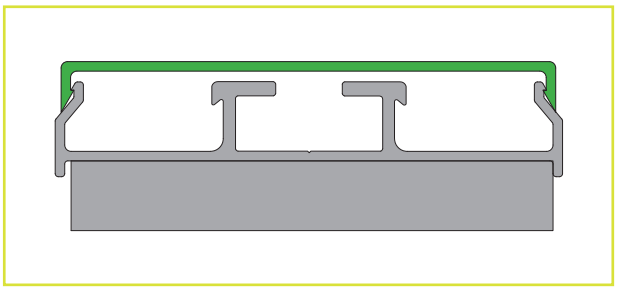


All ground rails have covering cable duct receptacles to protect the string lines from permanent and harmful environmental influences, in particular UV radiation. Installation of the covering cable ducts is possible after every work step of the system installation. The covering cable duct is installed after the cable routing.

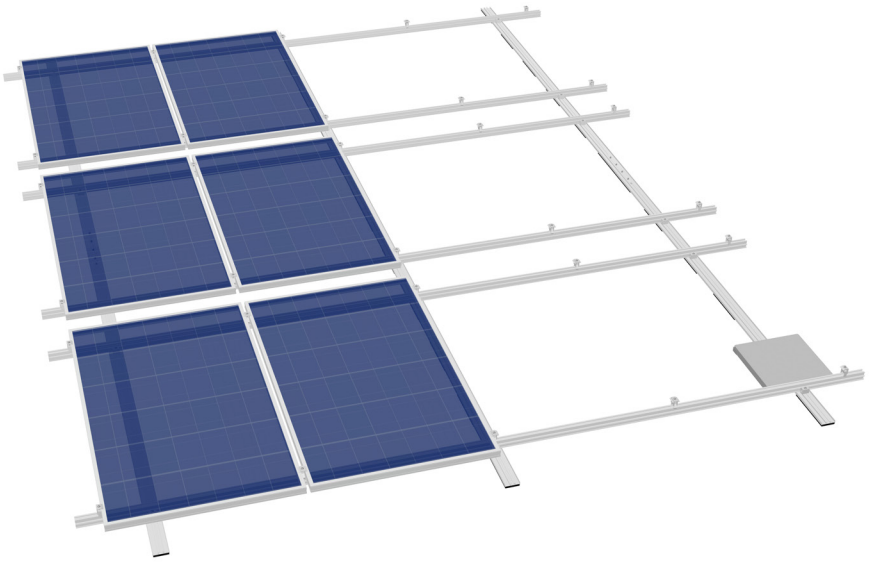
Preparatory work:
Check the clean position of the string lines. Check the permanent and secure fastening of the string lines in order to avoid damage to the lines from movement (wind).

Procedure:
Place the covering cable duct on the ground rail between the modules and load it centrally until the click latch audibly engages.





2.11 Final inspection



- Check whether the entire system and ALL components have been installed according to the planning documents and there are no deviations.

- Check whether ALL hexagon socket head screws have been installed at the positions provided (crossbars and ballast bars, splice ground rails, ridge connectors).

- Check whether ALL screws have been tightened with the torque specified in the installation instructions (mid clamps, end clamps, cross adapters, roof fastenings).

- Check whether ALL ballasts have been attached with sufficient weight according to the planning documents and their condition is durable and secure.

CAUTION! This is important for safety reasons and can lead to considerable damage if not observed!

3.1 Disassembly

Disassembly of the S:FLEX mounting system may only be carried out by trained specialist personnel. Observe the same safety instructions, standards and guidelines as provided for the installation. In general, disassembly is carried out in reverse order to the described installation.

Before disassembly, disconnect the PV modules from the mains network. Disconnect all of the PV modules' electrical cables (string lines and plug connectors) and remove them from the frame system.

Then remove the modules and store them safely. Improper disassembly can lead to damage to the modules.

Disassemble frame system and safely store all of the parts.
Any holes in the roof must be sealed by a specialist.

3.2 Disposal

The S:FLEX mounting system is made from aluminium, stainless steel and steel components. These materials can be recycled after disassembly. The frame system must only be disposed of by a specialist waste management company. Observe the applicable national standards and guidelines.

4.1 User agreement for the S:FLEX FLAT Direct

We point out that the assembly system is sold as part of a purchase agreement.
Its installation/processing or acquisition by a third party is not carried out in the name of, or on behalf of, S:FLEX GmbH. Installation/processing of the system must be carried out by appropriately qualified personnel and strictly in accordance with the installation instructions.

The design and planning of the system must be undertaken using the S:FLEX Planning Software (Solar.Pro.Tool). S:FLEX GmbH is neither responsible for the project-specific structural analysis of the roof structure, nor for obtaining and documenting the approval of the roof manufacturer for use of the respective fastening system on the roof in question (in the terms of the warranty), nor for correct installation of the fastening system.

S:FLEX GmbH accepts no liability for faults and damage and/or a restricted or limited operational capability of the system which has resulted from incorrect installation and/or installation which was not undertaken in accordance with the installation instructions and/or the project report (Solar.Pro.Tool). In the case of incorrect installation, the buyer's right to assert claims for material defects shall expire.

The system warranty is only valid if all system components were acquired from S:FLEX GmbH.

4.2 Warranty / disclaimer

The information regarding dimensioning provided in these instructions is merely suggested values based on prior experience. Binding structural analyses for installation frames can be created using the S:FLEX planning software (Solar. Pro.Tool).

As an installation company, you are responsible for the correct execution of the installation. S:FLEX GmbH is not liable for the dimensional information contained in commercial system quotations.

As an installation company, you are responsible for the mechanical durability of the interface connections mounted on the building‘s structure. In particular, this includes ensuring that these are leak-tight. The components supplied by the company S:FLEX GmbH are designed for the expected loads and in accordance with the currently available technology. In this context, you must provide the company S:FLEX GmbH with information about all general technical conditions in writing via the project data collection sheet (information about the supporting structure, snow load zone, building heights, wind loads, etc.).

S:FLEX GmbH is not liable if the installed components are not properly handled. Any use close to the sea needs to be clarified with S:FLEX GmbH directly on a case-by-case basis due to the increased risk of corrosion. Provided that the system is handled properly and dimensioned according to the structural conditions and normal environmental and ambient conditions, the company S:FLEX GmbH provides a warranty from transfer of risk to the warranty holder, which guarantees that the metallic components of the racks will remain free from defects with regard to material and workmanship for a period of 10 years. This warranty does not apply to wear parts. For additional information, please refer to the separate warranty provisions.

This applies within the context of the generally prevalent weather and environmental conditions.