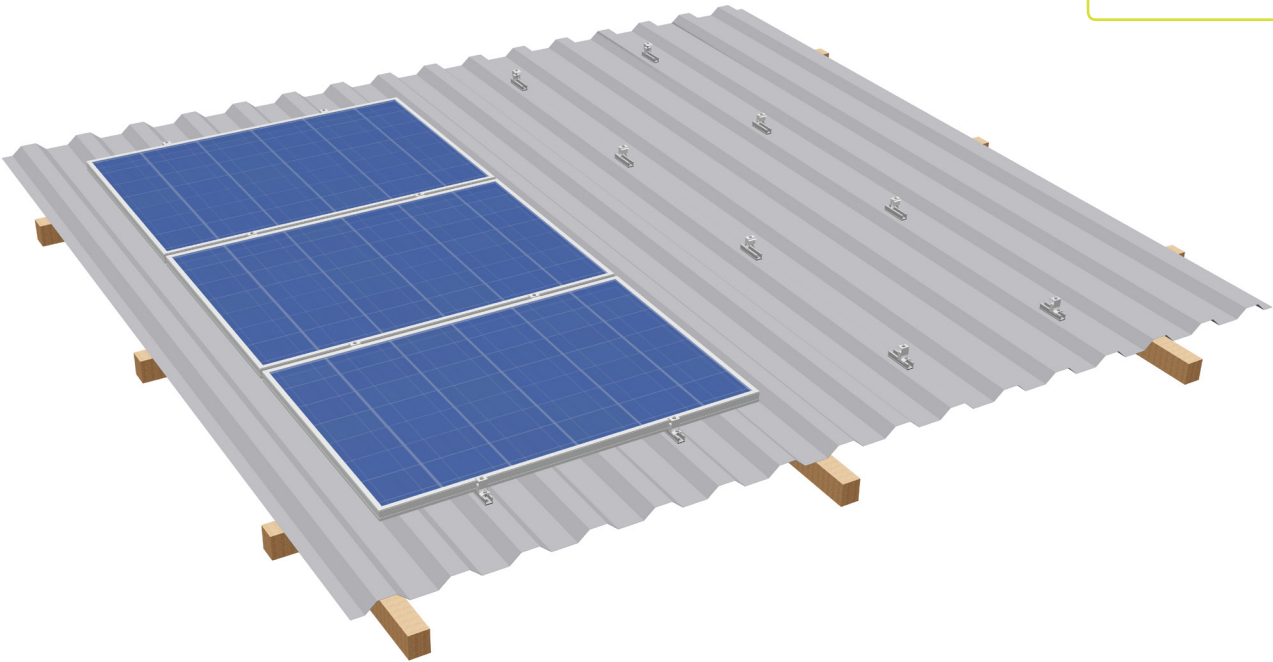
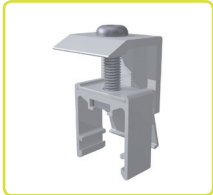




Installation Instructions

Installation on trapezoidal sheet metal with high-bead rail HK
Frame system for coverings with trapezoidal sheet metal



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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)!

These installation guidelines describe assembly of the S:FLEX PV fastening system on roofs with trapezoidal sheet metal coverings. These installation guidelines are intended for a group of people with relevant qualifications who have been instructed by the operator of the PV system. Installation of the S:FLEX PV fastening system on trapezoidal roofs requires extensive expertise on the part of the installer. We therefore recommend contacting a specialist roofing contractor for this purpose.

With the S:FLEX fastening system, horizontal installation of the modules is possible.

An outstanding feature of the S:FLEX PV fastening system for trapezoidal sheet metal roofs is the high availability of pre-assembled parts. Thanks to our innovative and patented one-click technology, the installation time can be reduced to a minimum.

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

1.1 Intended use

The S:FLEX PV fastening system for trapezoidal sheet metal roofs is a frame system for mounting PV modules.

It is designed exclusively for the installation of PV modules.

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. S:FLEX GmbH accepts no liability for damage resulting from non-observance of the installation guide or from misuse or incorrect use of the product.

1.2 About this document

The S:FLEX PV fastening system for trapezoidal sheet metal enables installation of PV systems parallel to the roof.

These installation guidelines describe the installation process with high-bead rails. This is possible with:

- Trapezoidal sheet metal
- If necessary, sandwich profiles (provided the manufacturer has approved attachment to the cover shell)

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

1.3 Warnings

The warning texts provided in these installation guidelines relay safety-related information. They are:



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



Non-compliance 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.

These installation instructions are based on state-of-the-art technology and many years of experience of installing our systems on site. It must be ensured that only the current and complete installation instructions 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.

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.

Since individual project-specific features must be considered with every roof, expert advice must always be sought prior to installation. 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, the quality of the roof covering and the maximum load-bearing capacity of the roof construction must be checked by the system creator.

Contact a local 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; alternatively, the mounting system must be adapted in accordance with the module manufacturer's specifications.

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.

Care must be taken that the PV system to be installed does not impair the functioning of the existing lightning protection system. It is also important to ensure that the PV system is designed so that it can be included in the protection zone of the building's lightning protection system. The separation distances between the PV system and the lightning protection system specified in the relevant regulations must be adhered to. During installation, the local fire regulations must be observed, e.g. firewalls must not be 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.



All system components must be checked for damage before installation. Damaged components must not be used!



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 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 may result in damage to the PV system and to the building.

1.5 Description of the system

The S:FLEX high-bead rail HK offers suitable solutions for a range of different requirements:

System features of the high-bead rail HK

Application:	Trapezoidal sheet metal, possibly sandwich profiles
Module type:	Framed modules
Module orientation:	Horizontal
Roof inclination:	max. 20°
Module field length:	max. 7.00 m connected module array (Larger module fields are also possible depending on the project. Precondition: suitable conditions and appropriate project planning)
Max. load:	5.4 kN/m ²
Connection:	Sheet metal screws
Material:	Aluminium EN AW-6063 / T6, stainless steel
Colour:	Natural aluminium

Requirements for the roof covering

Sheet thickness min:	steel sheet 0.5 mm; aluminium sheet 0.5 mm *
Tensile strength Rm min:	sheet steel 235 N/mm ² ; sheet aluminium 165 N/mm ² *
High bead width min:	25 mm, of which min 20 mm flat bearing surface around the drill hole

* Calculation basis S:FLEX. Nationally or regionally applicable standards may prescribe deviating values (DIN EN 1090-04 2020-06) and must be observed accordingly.



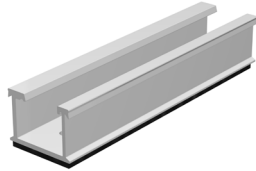
The module manufacturer's installation instructions must always be observed. All of the manufacturer's specifications relating to installation on the roofing must be observed.

Single-layer assembly with framed PV modules in horizontal installation

2.1 System components

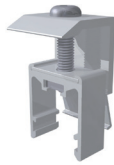
1 Components for roof fastenings

HS rail HK I=125



2 End clamp AK

EH AK II Klick 30-50



EH AK II Klick 35-55

EH AK II Klick 30-50 black



EH AK II Klick 35-55 black

MH AK II Klick 30-50

MH AK II Klick 35-55

MH AK II Klick 30-50 black

MH AK II Klick 35-55 black

3 Mid clamp AK

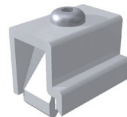


Grounding kit MH



4 Slipping protection

Cross adapter as slipping protection



5 Sheet metal screws

Sheet metal screw 4.5x25



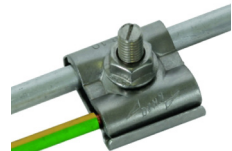
6 Cable clips

Cable clip edge clip KC 15



7 Grounding clamp

Grounding clamp DEH uni HK



Single-layer assembly with framed PV modules in horizontal installation

2.2 Direct roof fastening using sheet metal screws

When attaching the sheet metal screws, the regulations stated in the approvals from the building authorities regarding the sheet metal screws must be observed (e.g. area of application, pre-drill diameter, minimum strength of the materials to be connected, hole diameter for existing holes).

The required sheet metal screws are included with your order. Selecting the fasteners depends on the roofing and the occurring forces. Sheet metal screws must only be positioned in the raised corrugations/crests.

Sheet metal screws:

4.5 x 25 A2 / bimetal

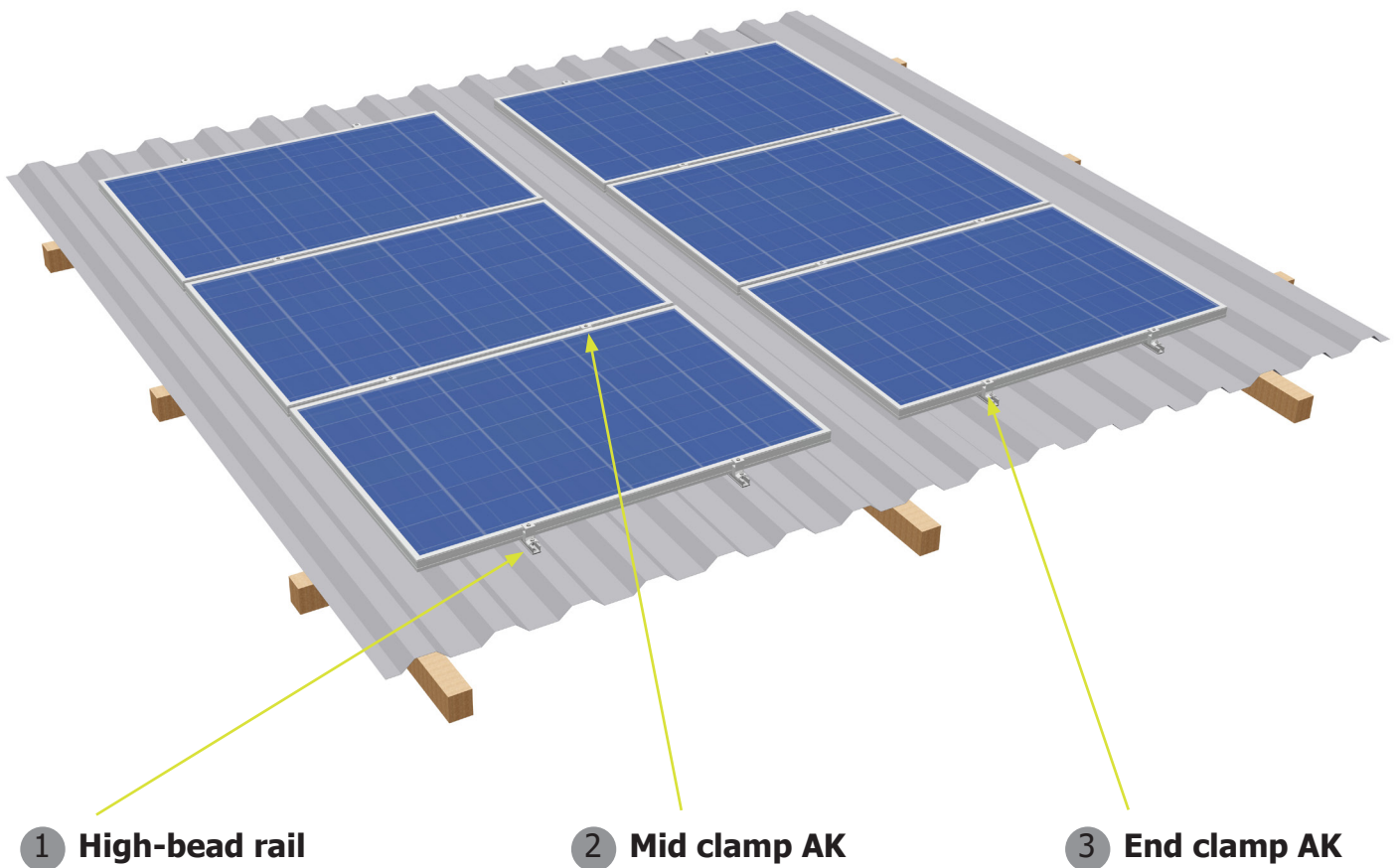
Installation: - SW 8

- Tool external dimension (socket wrench) \leq 15mm



Single-layer assembly with framed PV modules in horizontal installation

2.3 Single-layer assembly with framed PV modules in horizontal installation



Single-layer assembly with framed PV modules in horizontal installation

Installation – 1 (positioning the high-bead rail HK)

The positioning of the high-bead rails (HS rail HK l=125) must be determined in accordance with the structural requirements of the location and the installation situation. When doing so, it must again be checked whether the measurements used during planning match the actual measurements found on the roof (if necessary, adjustments must be made). For single-layer substructures, the position of the high-bead rails must be checked against the module's prescribed clamping distances.

The high-bead rails must be positioned so that the end clamps and mid clamps can subsequently be mounted between the two attachment points (sheet metal screws). This ensures uniform loading of both attachment points.



Check the basis of the plans



Position according to structural requirements and respective installation situation



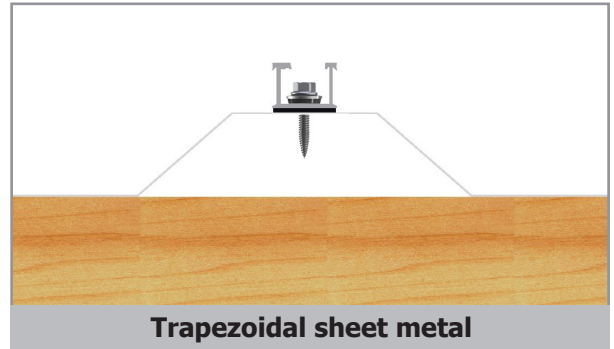
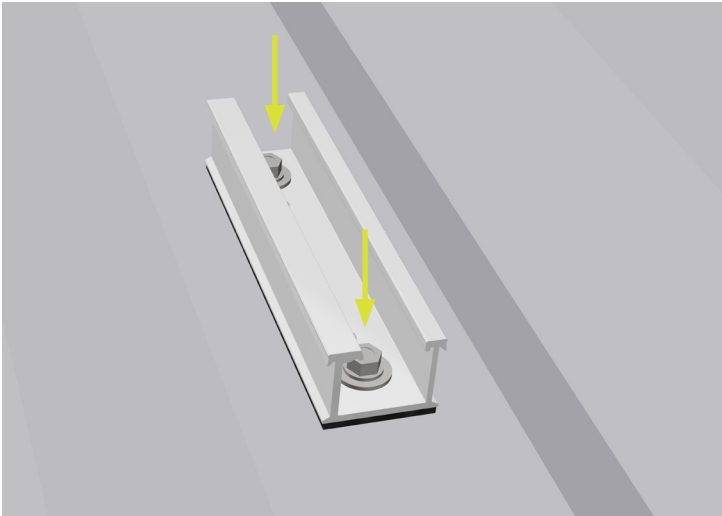
Align the high-bead rails using a plumb line

Attach the high-bead rail with the sheet metal screws. Use 2 sheet metal screws per high-bead rail. To prevent water from penetrating between the high-bead rail and the roofing, the high-bead rail must always be mounted on a raised corrugation/crest. The base of the high-bead rail is covered with EPDM sealing strips.



When installing on trapezoidal roofing, the thin sheet metal screws may only be screwed in on the high bead. Screwing in the side area of the trapezoid endangers the system statics and the roof tightness.

Single-layer assembly with framed PV modules in horizontal installation



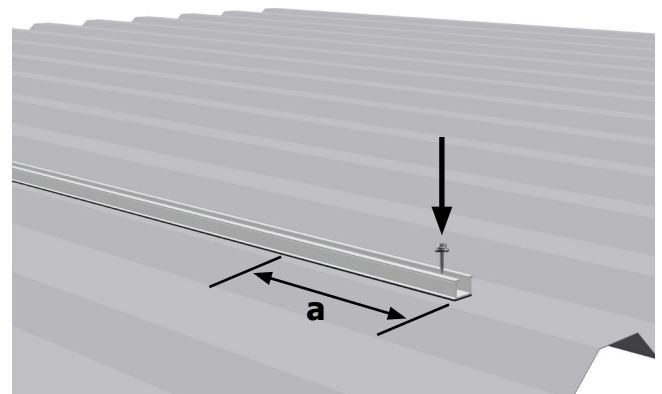
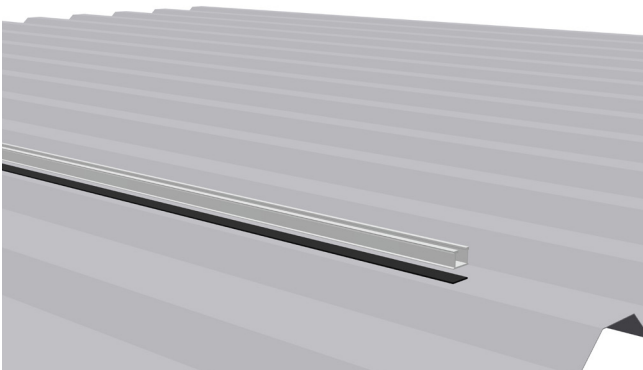
SW 8, tool external dimension
 $\leq 15\text{mm}$



2 per high-bead rail HK



If the trapezoidal sheet metal rails HK are ordered without EPDM, in order to protect the roof from penetrating water an EPDM sealing strip is applied to the raised beads or under the trapezoidal sheet metal rail prior to installation. The distance between the fasteners must be statically verified before installation. In this case, the trapezoidal sheet metal rail must be cut to size and drilled on site.



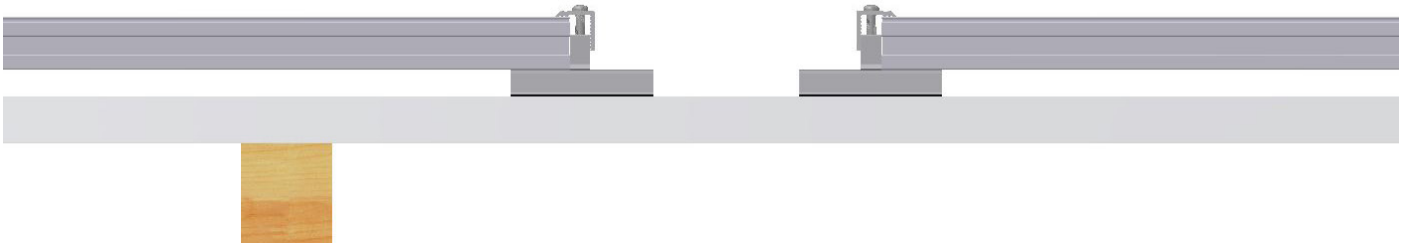
Single-layer assembly with framed PV modules in horizontal installation



If the module array is longer than 7m vertical to the eaves with single-layer substructure, it must be separated by fitting an additional high-bead rail (HS rail HK l=125) with end clamp. If the high-bead rail is not installed as pre-assembled rail sections (l = 125mm), but instead as a continuous rail, the module field must be separated by fitting two end clamps. The high-bead rail must be separated in the area between the end clamps (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 must be established without restricting the effect of the expansion joint.



Completed installation of the rail layer.

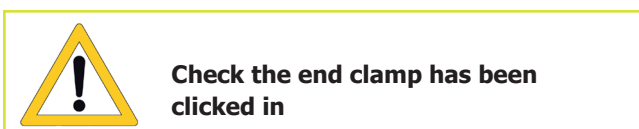
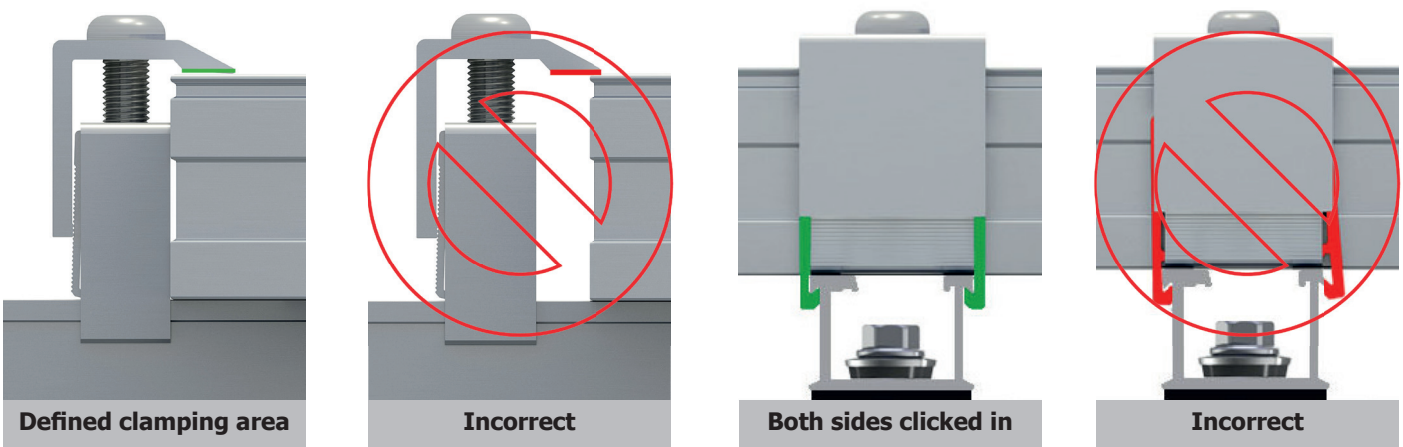
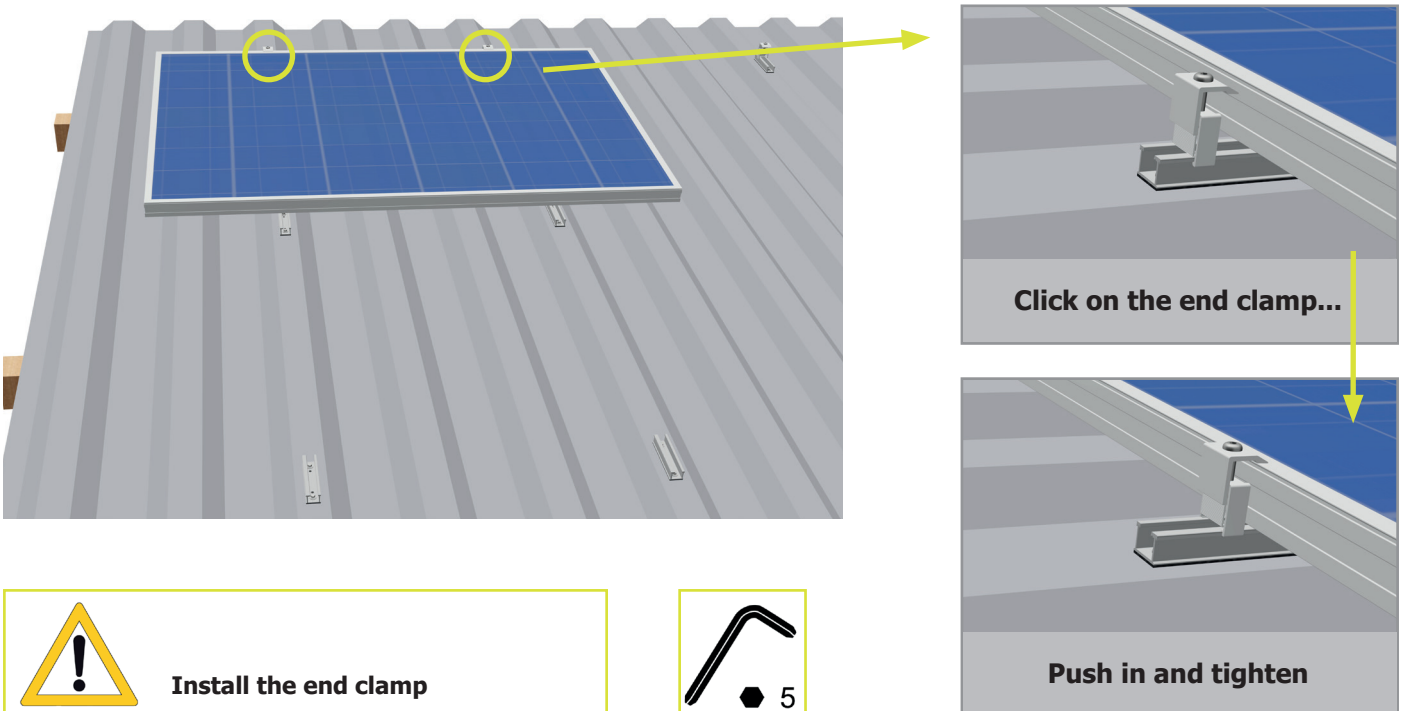


Column by column installation of the modules from the top down is described below. Installation may also be carried out from the bottom up should this be required for the respective installation site, and if permissible for the installation situation. When mounting from bottom to top, one cross adapter per module must be attached and affixed on the bottom row of the high-bead rail HK (tightening torque 8–10 Nm) before mounting the modules. It should be ensured here that all cross adapters are attached in a horizontal line. The end clamps are then clicked on the high-bead rail HK and pushed to the cross adapters.

Single-layer assembly with framed PV modules in horizontal installation

Installation – 2 (module installation, end clamp)

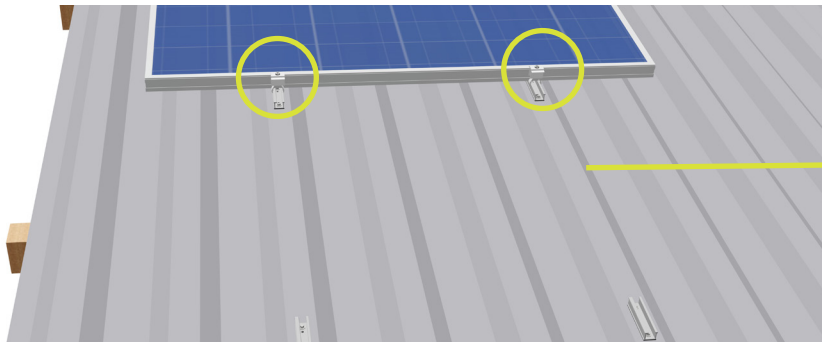
Place the module on the high-bead rails. Install the end clamps. To do this, click the end clamp onto the high-bead rail and push it onto the module. Ensure that the end clamp is properly engaged on the high-bead rail. Now adjust the end clamp to match the height of the module and tighten the screw (tightening torque 8-10 Nm). Ensure that the end bracket clamps the module's frame on the clamping surface defined by the module's manufacturer. The end clamps must be mounted exactly in the middle of the high-bead rails to ensure an even load on the sheet metal screws.



Single-layer assembly with framed PV modules in horizontal installation

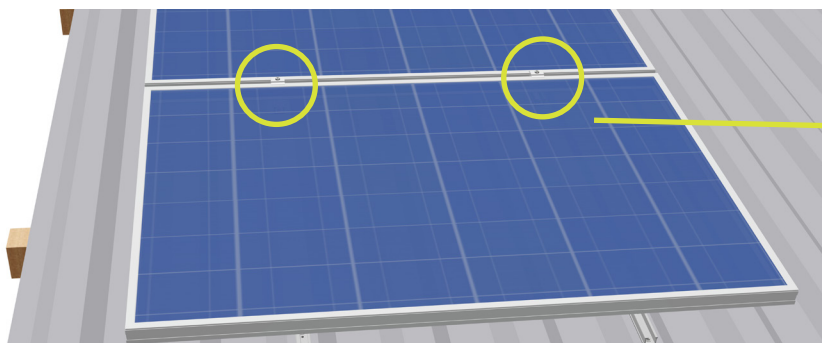
Installation – 3 (module installation, mid clamp)

Now install the mid clamps. To do this, click the mid clamp onto the high-bead rails and push it onto the module. Ensure that the mid clamp is properly engaged on the high-bead rail. The mid clamps must be mounted exactly in the middle of the high-bead rails to ensure an even load on the sheet metal screws.



Click mid clamp and push in

Now slide the next module underneath the mid clamp, adjust the mid clamp to the height of the module's frame and tighten the screws (tightening torque 8–10 Nm).



Slide module underneath and tighten mid clamp

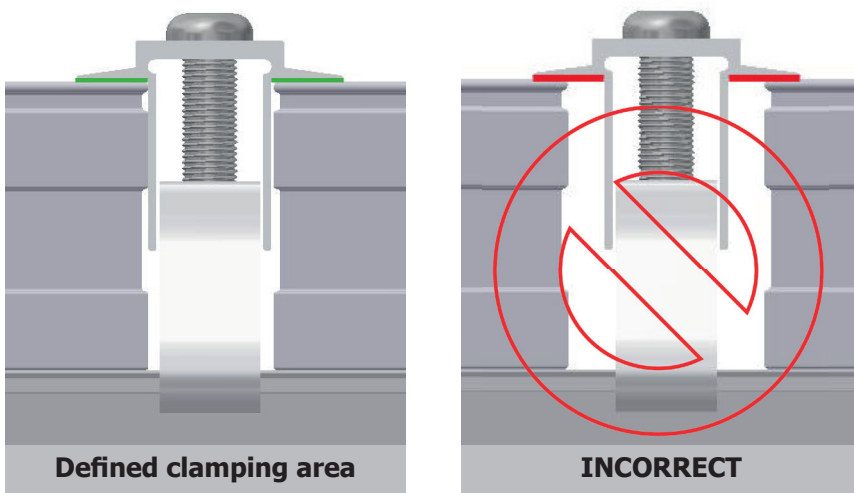
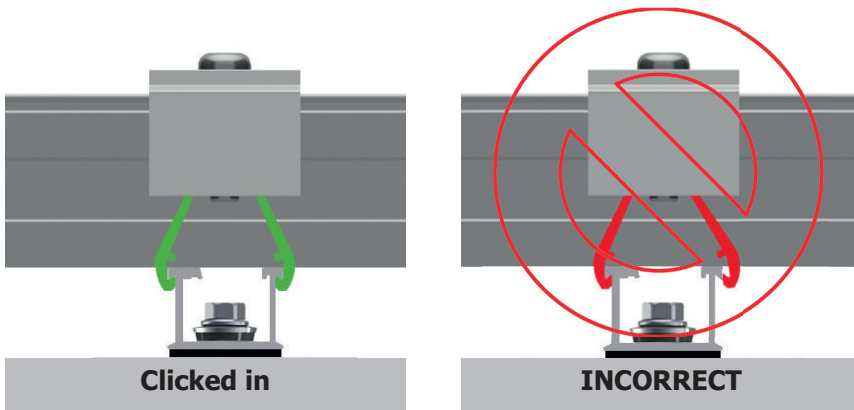


Install mid clamp




Single-layer assembly with framed PV modules in horizontal installation

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



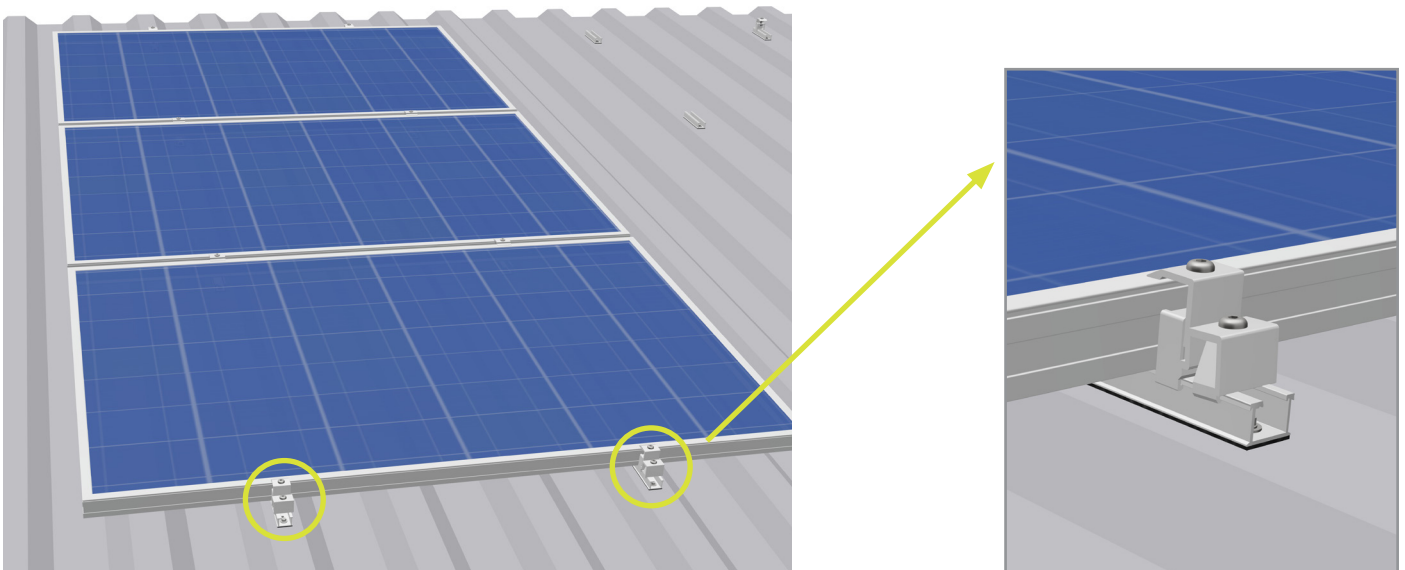
 **Check the mid clamp has been clicked in**

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

Single-layer assembly with framed PV modules in horizontal installation

Installation – 4 (module installation, end clamp on last section of row)

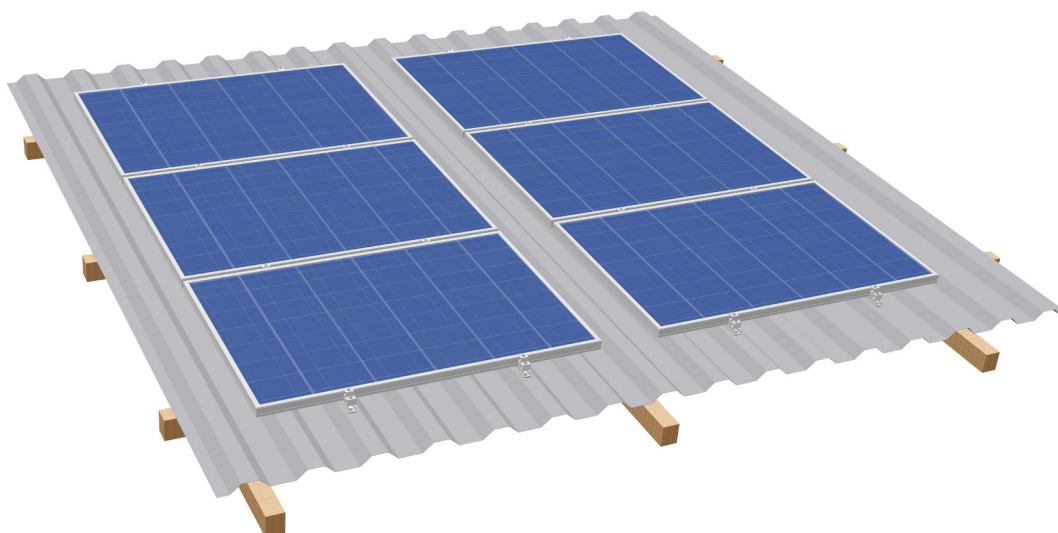
End clamps and locking clips must be installed on the last module in each row (if applicable, on expansion joints). To do this, click the end clamp onto the high-bead rail and push it onto the module. Ensure that the end clamp is engaged on both sides of the high-bead rail. Now adjust the end clamp to match the height of the module and tighten the screw (tightening torque 8-10 Nm). Ensure that the end clamp clamps the module frame over the clamping area defined by the module manufacturer (refer to Installation-2).



Install an end clamp on the last module and if the roof inclination is greater than 5°, also install cross adapters as slipping protection.



Proceed as described for the following rows.



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 use of the high-bead rail HK

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. 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. 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.

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 the installation company, you are responsible for the mechanical durability of the installed interface connections on the building envelope, in particular also for their watertightness. 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.