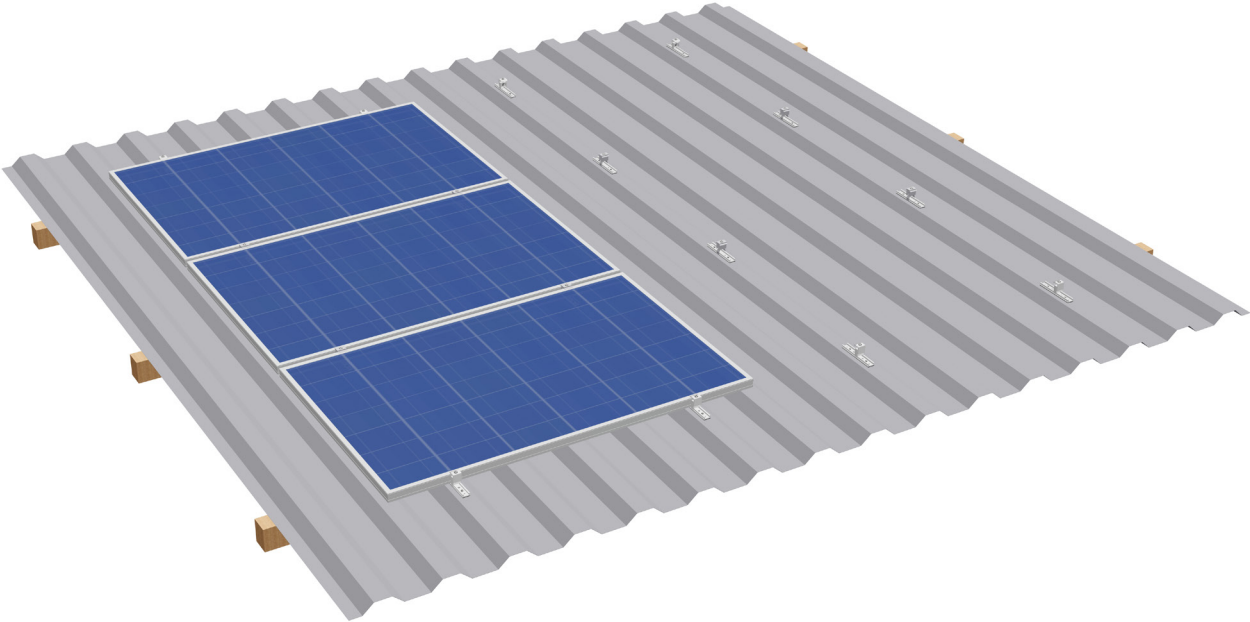




Assembly Instructions

ST-AK 1/12

Mounting system for roofing with trapezoidal sheet metal



1 Introduction

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2 Installation – ST-AK 1/12

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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)!

The S:FLEX PV mounting system for trapezoidal sheet roofs is a fastening system for the installation of PV modules. It is possible to both horizontally and vertically mount the modules using the S:FLEX mounting system. Both single layer installation and double layer installation are possible. The S:FLEX PV mounting system for trapezoidal sheet roofs is characterised by a high degree of pre-assembly. The patented and proven click technology allows a maximum reduction in fitting times.

All components are manufactured from aluminium and stainless steel. The high corrosion resistance guarantees a maximum lifespan and provides the possibility of complete recycling.

1.1 Intended use

The S:FLEX PV mounting system for trapezoidal sheet roofs is a fastening system for the installation of PV modules.

It is exclusively designed to accommodate PV modules.

Any use that deviates from this must be regarded as not the intended use. In particular, the observation of the information in these installation guidelines counts as intended use. 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

The S:FLEX PV mounting system for trapezoidal sheet metal allows the installation of PV systems parallel to the roof. These installation guidelines describe the installation of the ST-AK 1/12. This is possible for:

- Trapezoidal sheet metal
- Where applicable, sandwich profiles (if the manufacturer approves)

It is to be ensured that only the current and complete installation guidelines are used for the installation

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.



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.

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 ST-AK 1/12 offers suitable solutions for a range of different requirements:

System features of ST-AK 1/12

| | |
|----------------------|--|
| Application: | Trapezoidal sheets, 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 R _m 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.

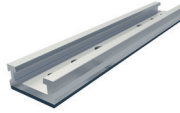


The module manufacturer's installation instructions must always be observed. All of the manufacturer's specifications relating to installation on the roofing must be observed.

2.1 System components

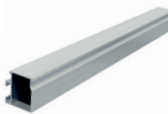
① Components for roof fastenings

ST-AK 1/12 l=180 (d=5-8,5) complete



② Mounting rails

ST-AK 5/40



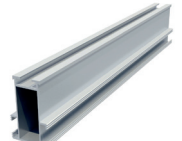
ST-AK 7/47



ST-AK 13/60



ST-AK 26/70



③ Splice

Splice 5



Splice 7



Splice 13



Splice 26



④ End clamp

EH AK II Klick 30-50



EH AK II Klick 30-50 black



⑤ Mid clamp

MH AK II Klick 30-50 A



MH AK II Klick 30-50 black



⑥ Slipping protection

Slipping protection



⑦ Slider locks

Slider lock AK



⑧ Sheet metal screws

Sheet metal screw A2 4,5x25



Sheet metal screw A2 6,0x25

⑨ Cross adapter clamp

Cross adapter clamp



⑩ Covering caps

Covering cap 5



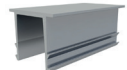
Covering cap 7



Covering cap 13



Covering cap 26



⑪ Cable clips (optional)

Cable straps edge clip KC 15



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

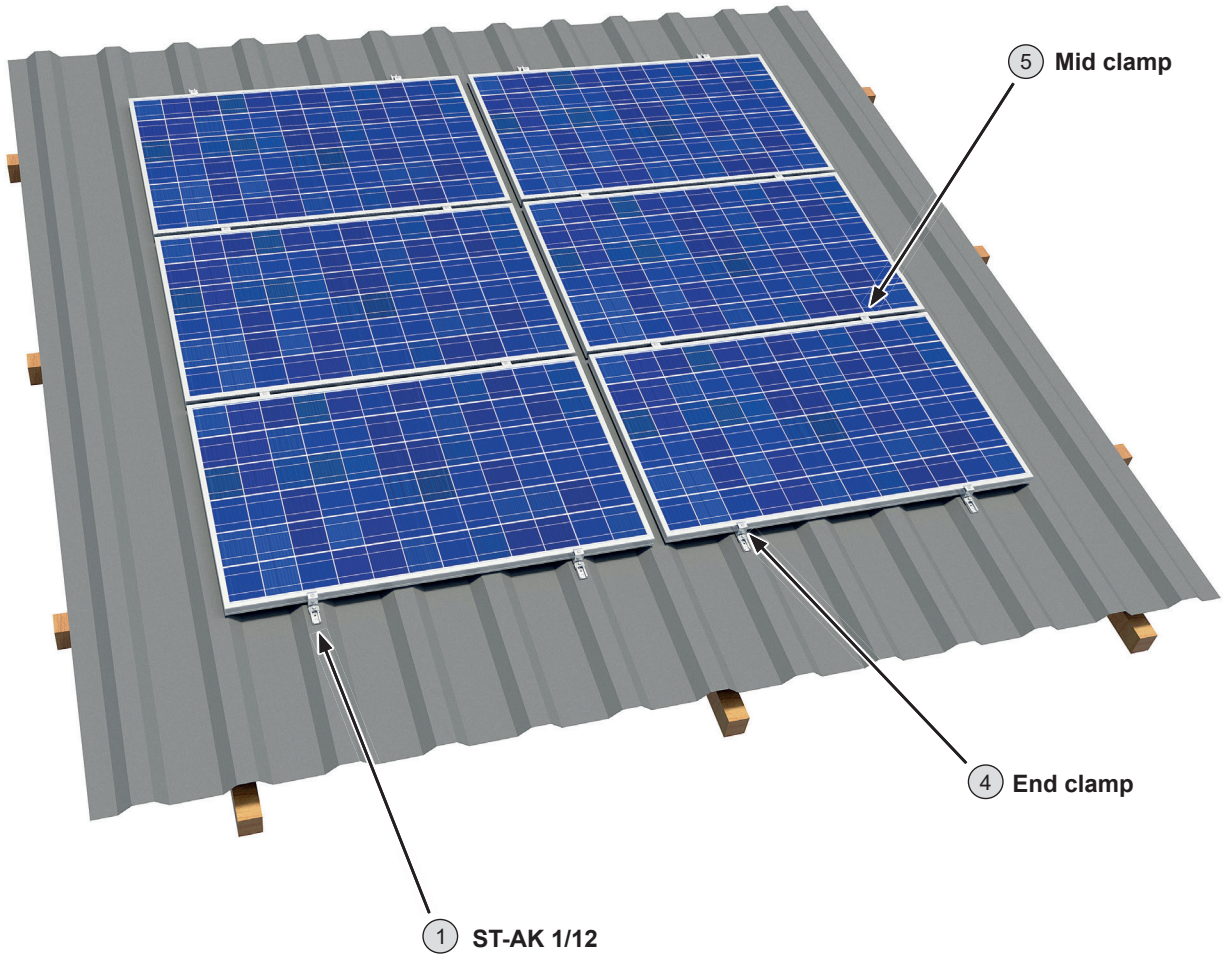
6.0 x 25 A2 / bimetal

Installation: - SW 8

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



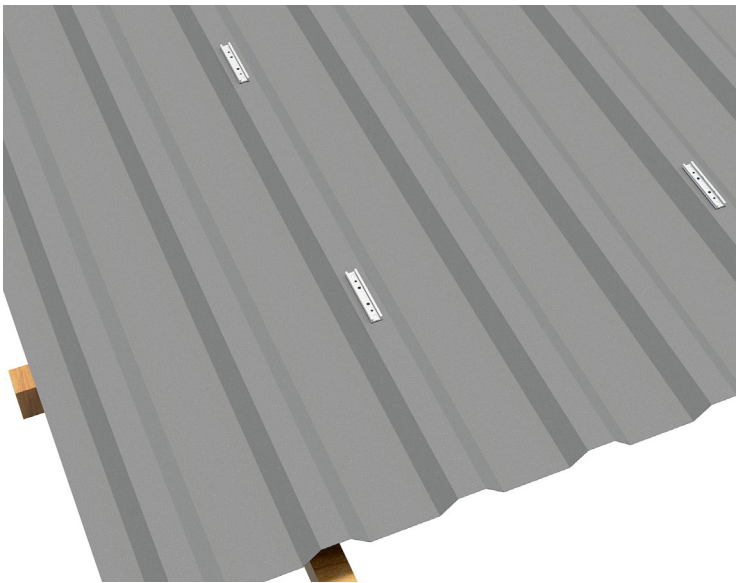
2.3 Installation – single layer substructure



Installation – 1 (positioning of the ST-AK 1/12 as lower layer of rails)

The positioning of the ST-AK 1/12 l=180 (d= 5-8.5) complete must be determined according to the structural requirements of the location and the installation situation. In doing so, it must again be checked whether the measurements taken as a basis in the planning match the actual measurements found on the roof (if necessary, adjustments must be made). For single layer substructures, the position of the ST-AK 1/12 must be checked against the module's prescribed clamping distances.

The ST-AK 1/12 l=180 (d= 5-8.5) are to be positioned so that the end clamps and mid clamps can later be fixed exactly in the centre of the two fixing points (sheet metal screws). This guarantees equal load on both fixing points.



Check the basis of the plans



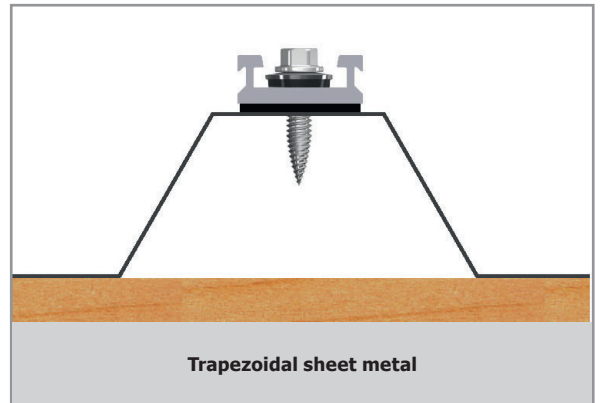
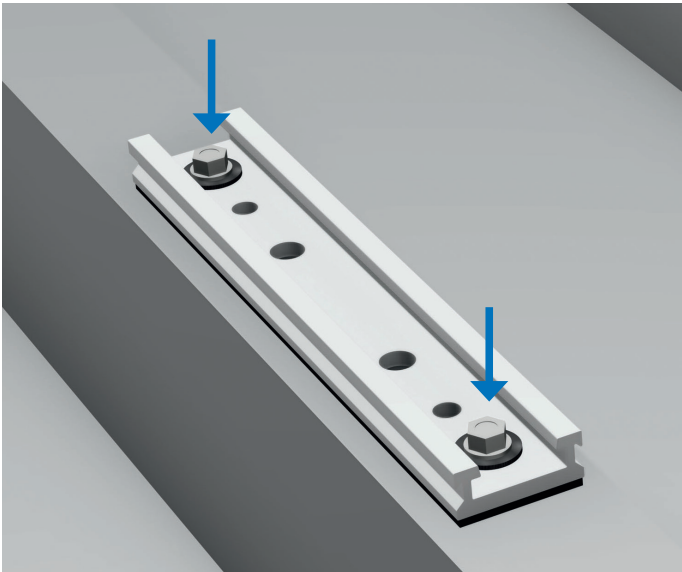
Positioning according to the structural requirements and the installation situation



Align the ST-AK 1/12 l=180 (d=5-8.5) complete using plumb line

Mount the ST-AK 1/12 l=180 (d=5-8.5) complete with the correct fasteners (sheet metal screws). Use 2 sheet metal screws per ST-AK 1/12. To avoid water penetration between the ST-AK 1/12 and the roofing, the ST-AK 1/12 must always be mounted on the raised corrugation/ridge. The underside of the ST-AK 1/12 is extensively bonded with EPDM sealing tape.

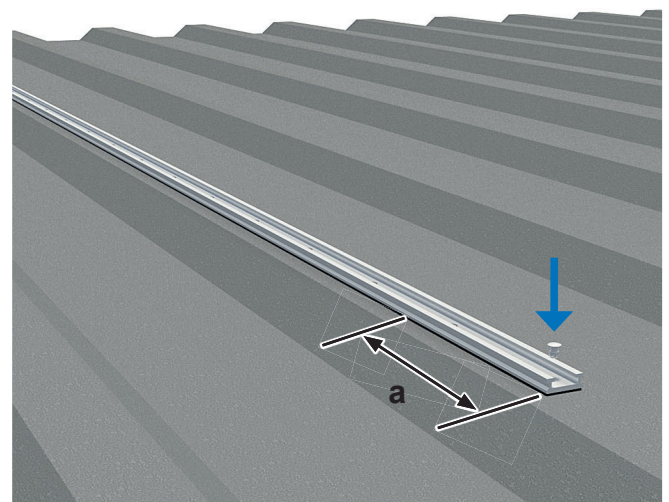
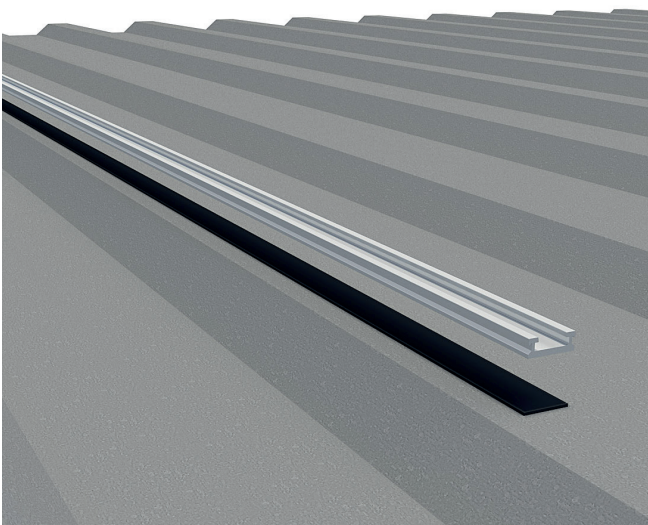
Single layer installation with framed PV modules, horizontally mounted



2 sheet metal screws per ST-AK 1/12 l=180 (d=5-8.5) complete



If the ST-AK 1/12 is ordered without EPDM, an EPDM sealing tape (Tape Tec moll 7202) must be affixed to the raised corrugations or under the ST-AK 1/12 before installation in order to protect the roof from penetrating water. The distance a between the fasteners must be structurally verified before installation. In this case, the ST-AK 1/12 must be cut and drilled by the customer.



Single layer installation with framed PV modules, horizontally mounted



For single layer substructures, if the module array vertical to the eaves is longer than 7.00 m, it is to be separated by placing an ST-AK 1/12|l=180 (d=5-8.5) complete with end clamps.

If the ST-AK 1/12 is not used in prefabricated rail sections l=180, but is used as a continuous rail, then the module array is to be separated by placing two end clamps. The ST-AK 1/12 is to be separated in the zone between the end clamps (expansion joint).

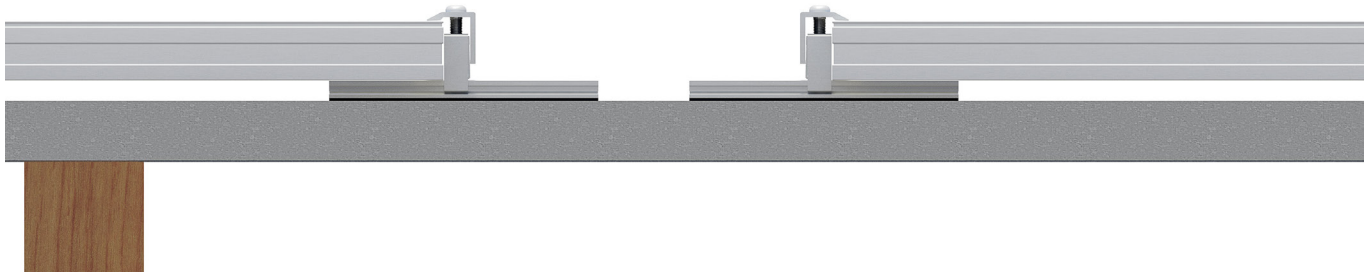
The alignment of the expansion joints is to be adjusted according to the structural conditions of the roof and the different expansion properties of the materials. Observe the instructions in Section "Installation – 2" in these installation guidelines when placing the end clamps.



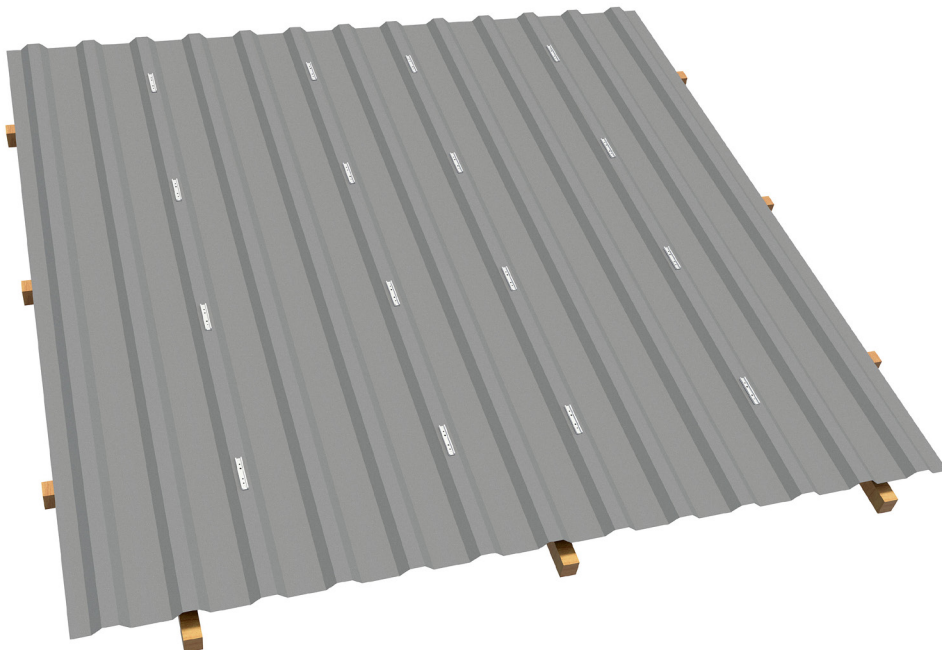
Modules may not be built over expansion joints.

There is no connection to earth.

This must be established without limiting the expansion joint's mode of operation.



Completion of the installation of the lower rail layer.



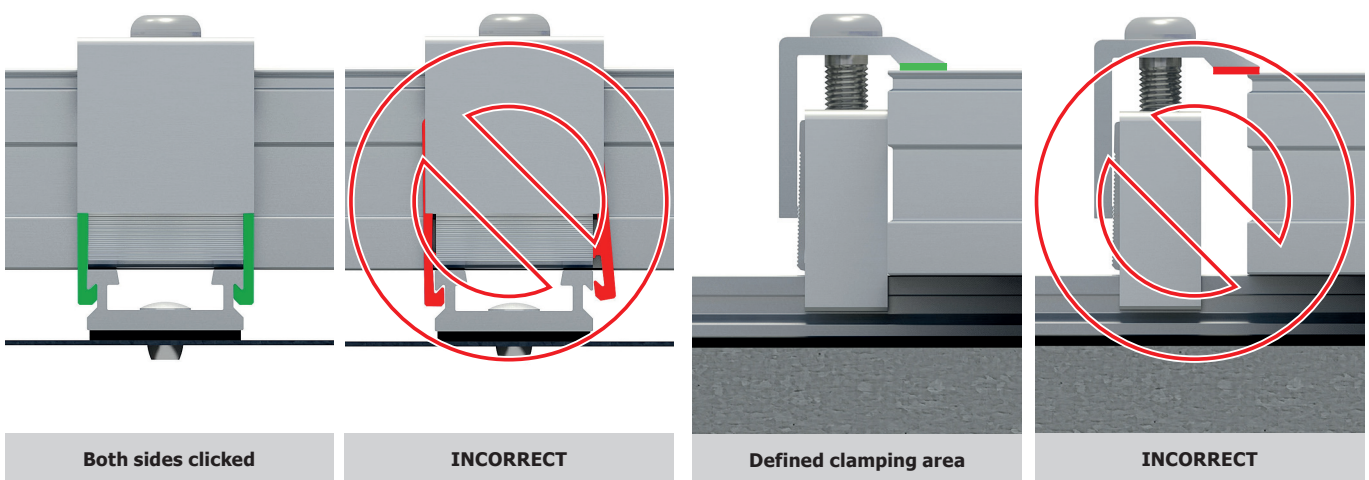
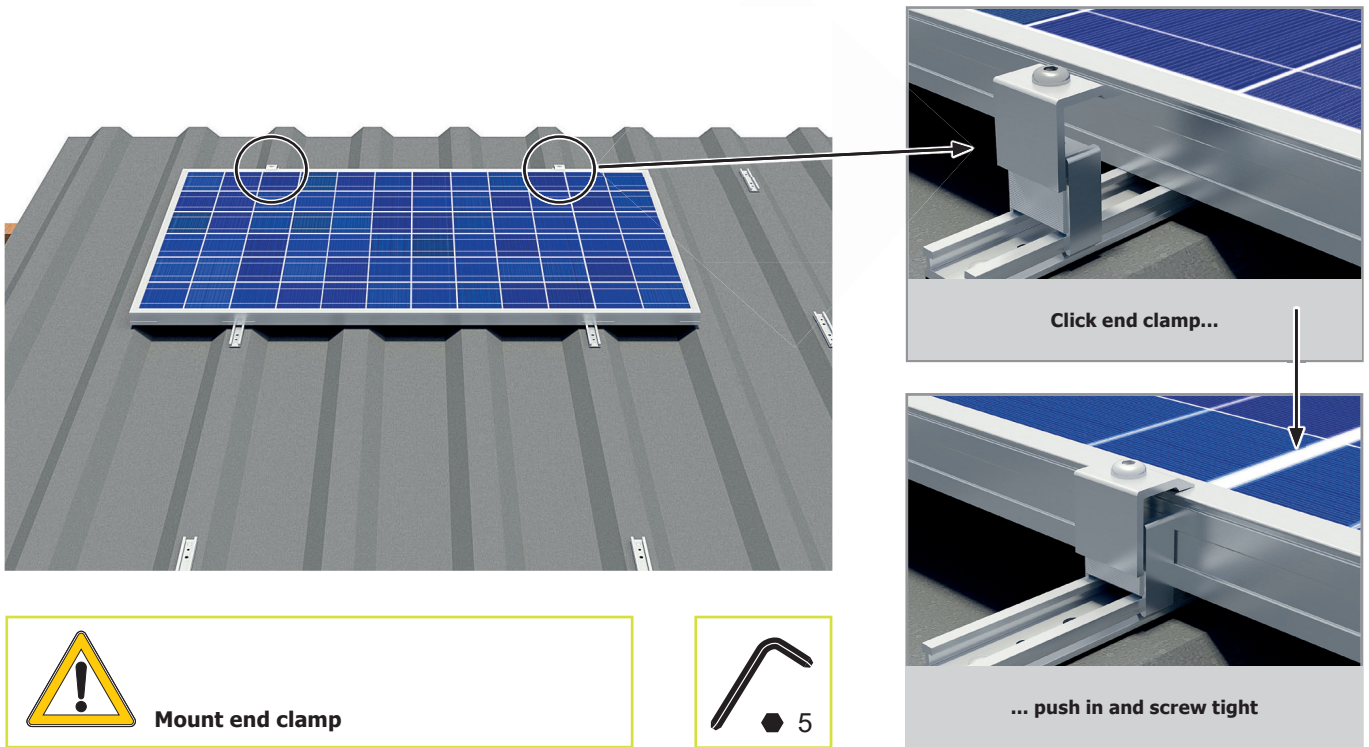
In the following, the column for column installation of the modules from top to bottom is described.

The installation can also be carried out from bottom to top if the location requires it and the installation situation allows for it. In the case of installation from bottom to top, a slider lock is to be pushed on to each lower mounting rail and tightened (torque 8-10 Nm) before the module installation. Ensure that all slider locks are fixed in a horizontal line. The end clamps are then clicked on to the mounting rails and pushed on to the slider locks.

Single layer installation with framed PV modules, horizontally mounted

Installation – 2 (module installation, end clamp)

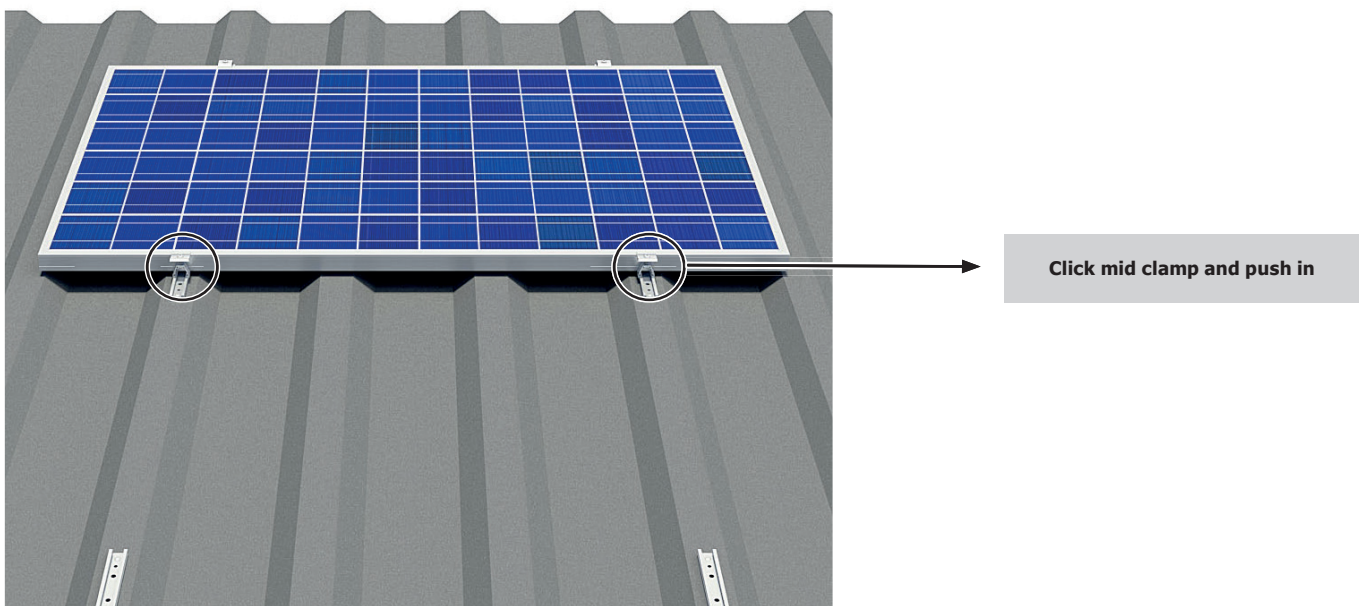
Place the module on the ST-AK 1/12. Install the end clamps. To do this, click the end clamp on to the ST-AK 1/12 and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the ST-AK 1/12. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm). Ensure that the end clamp clamps the module frame at the clamping area defined by the module manufacturer. The end clamps must be mounted exactly in the centre of ST-AK 1/12 so that the load is spread equally between the sheet metal screws.



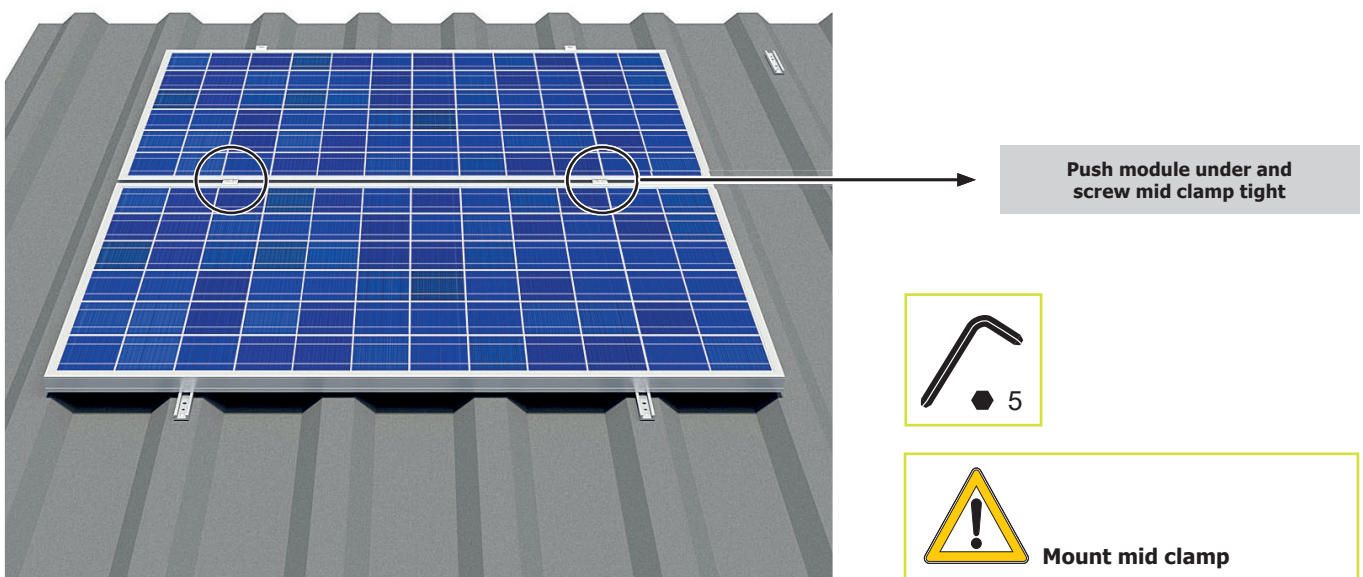
Single layer installation with framed PV modules, horizontally mounted

Installation – 3 (module installation, mid clamp)

Now mount the mid clamps. To do this, click the mid clamp on to the ST-AK 1/12 and push it on to the module. It must be ensured that the mid clamp is clicked into both sides of the ST-AK 1/12. The end clamps must be mounted exactly in the centre of ST-AK 1/12 so that the load is spread equally between the sheet metal screws.

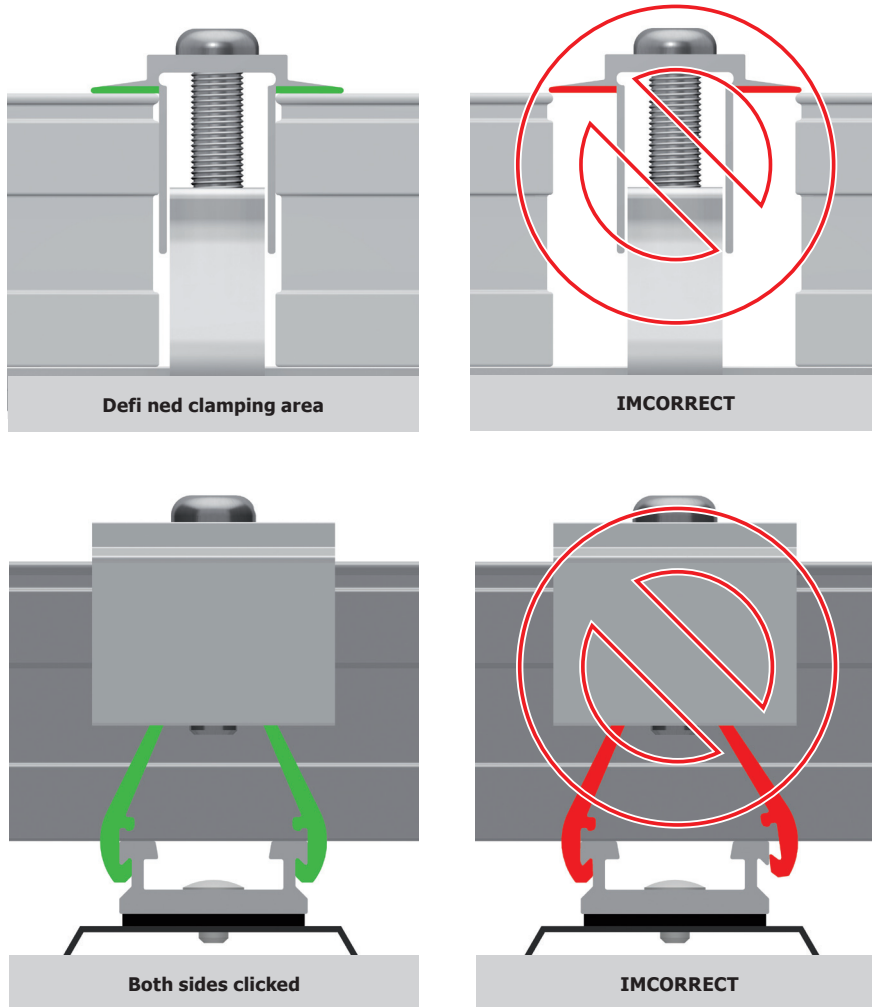


Now push the next module under the mid clamp, adjust the mid clamp to the height of the module frame and tighten the screw (torque 8–10 Nm).




Single layer installation with framed PV modules, horizontally mounted

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



 Check that the mid clamp has been clicked in

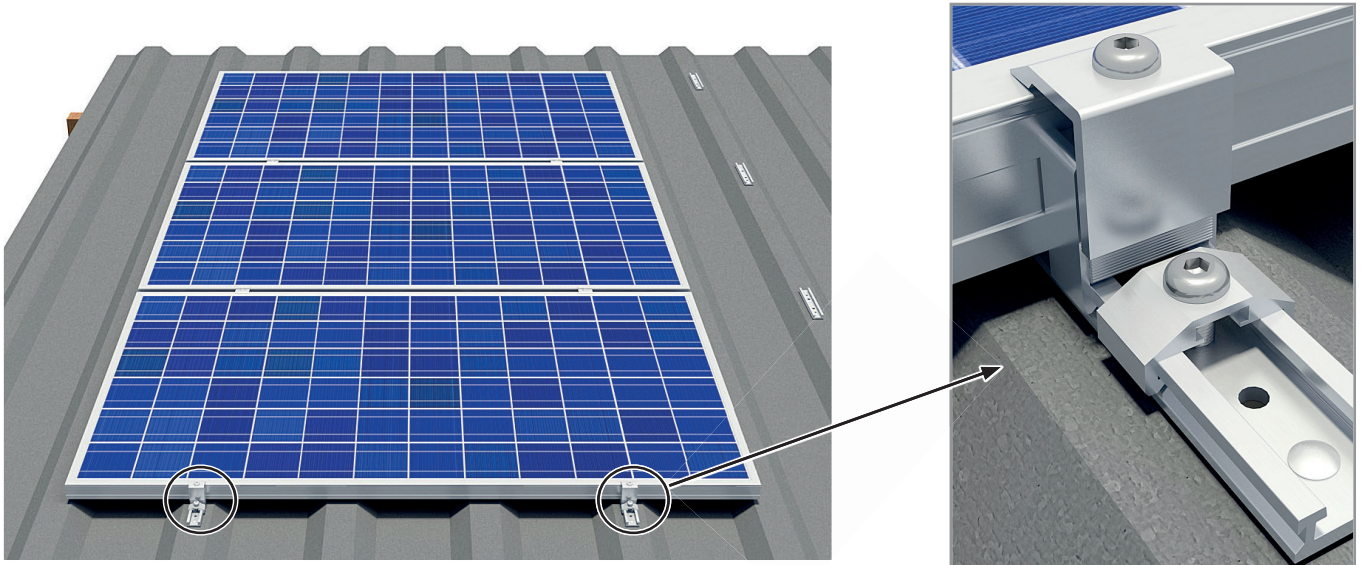
 Check the defined clamping area and observe the module manufacturer's specifications

Single layer installation with framed PV modules, horizontally mounted

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

On the last module in the row (if applicable, on expansion joints), end clamps and slider locks are again to be mounted. To do this, click the end clamp on to the ST-AK 1/12 and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the ST-AK 1/12. Now adjust the end clamp to 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 (see Installation – 2).

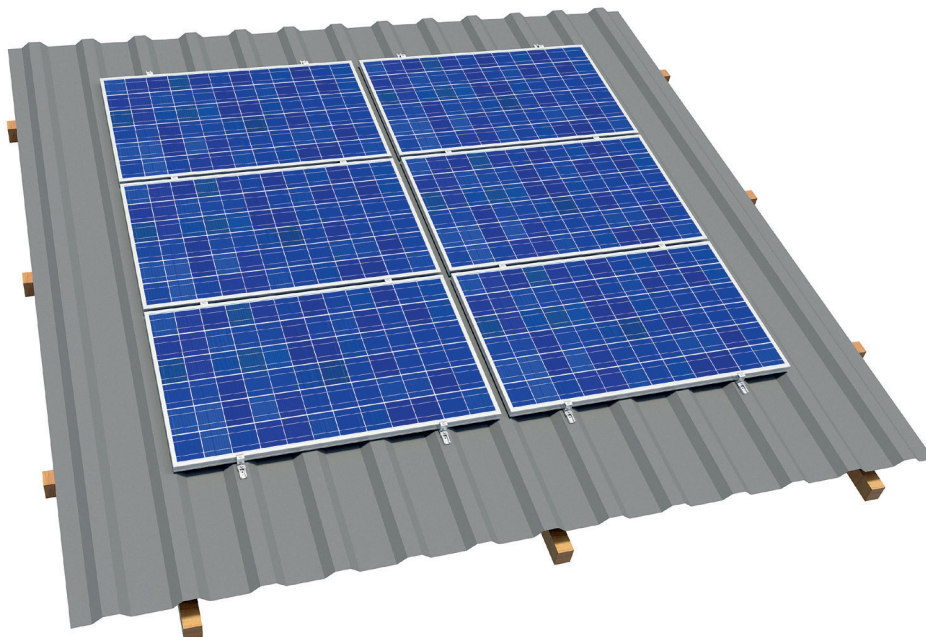
Push the slider lock from below on to the ST-AK 1/12 up to the end clamp and fasten it (torque 8-10 Nm).



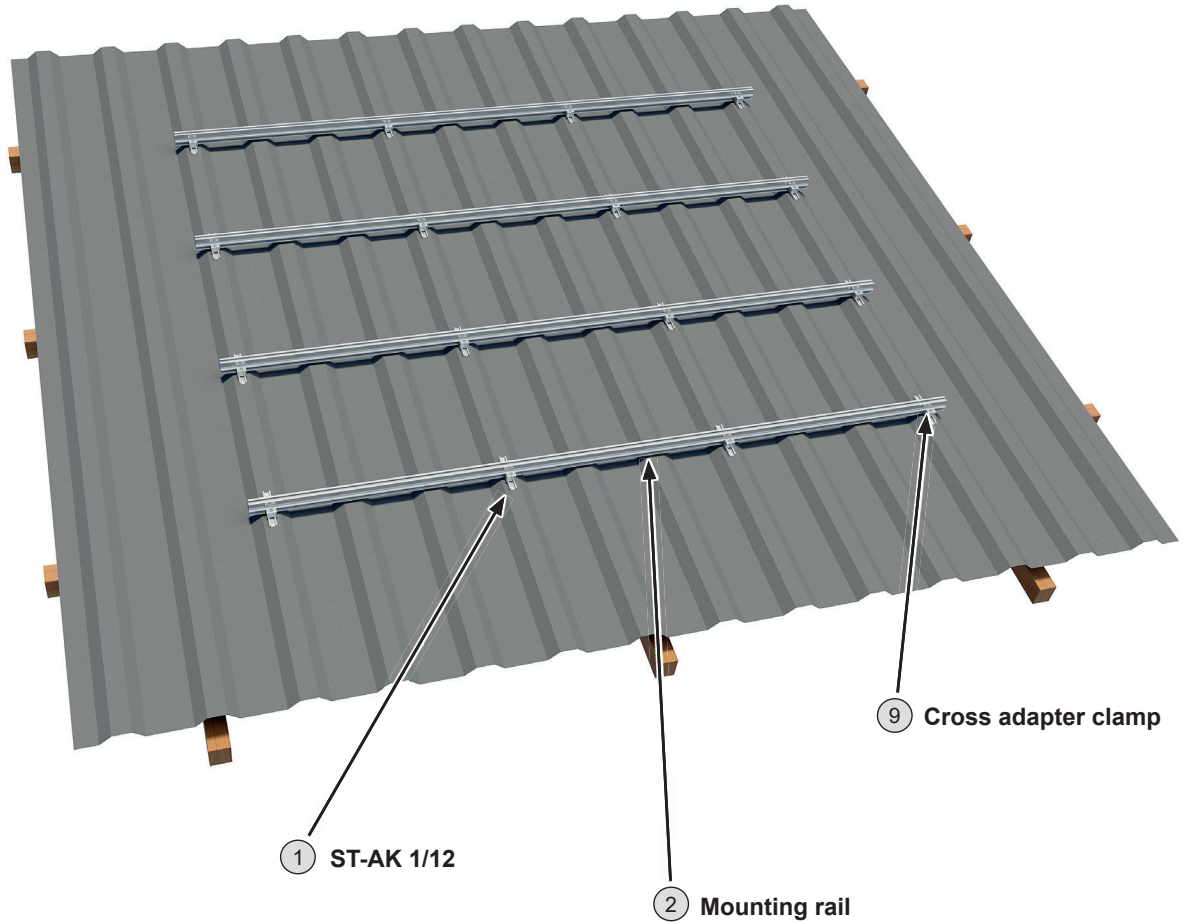
Mount end clamp and slider lock on the last module.



Proceed as described for the following rows.
Ensure that all end clamps are fixed in a horizontal line.



2.4 Installation – double layer substructure



① ST-AK 1/12

② Mounting rail

⑨ Cross adapter clamp

④ End clamp

⑤ Mid clamp

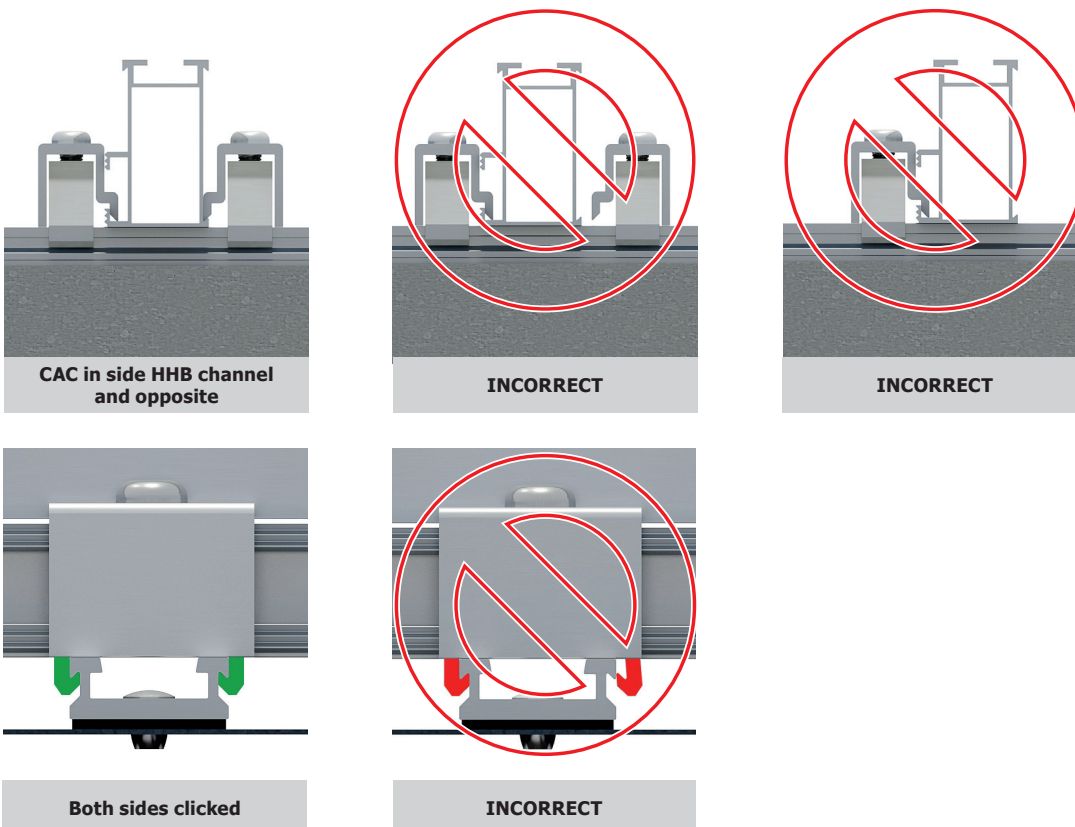
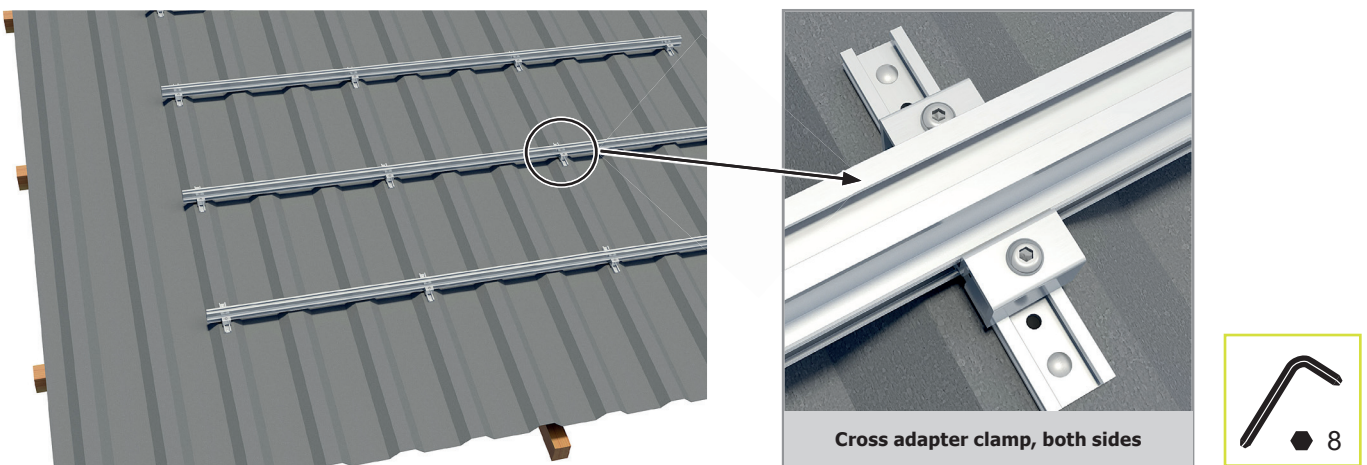
Double layer installation with framed PV modules, vertically mounted

Installation – 1 (positioning of the ST-AK 1/12 as lower layer of rails)

The installation of the ST-AK 1/12 for double layer substructures is carried out as is described in Section 2.3 (Installation – 1) for single layer systems.

Installation – 2 (installation of upper layer of rails)

Mount the horizontal mounting rails on to the vertical ST-AK 1/12 for each row of modules using the cross adapter clamps. To do this, click the cross adapter clamp on to the ST-AK 1/12 and fix the horizontal mounting rail with it. Check the distance of the horizontal mounting rails against the module’s prescribed clamping distances. Ensure that the cross adapter clamp is clicked in on both sides of the mounting rail and tighten the screw (torque 8-10 Nm). The horizontal mounting rails must be mounted exactly in the centre of ST-AK 1/12 so that the load is spread equally between the sheet metal screws.

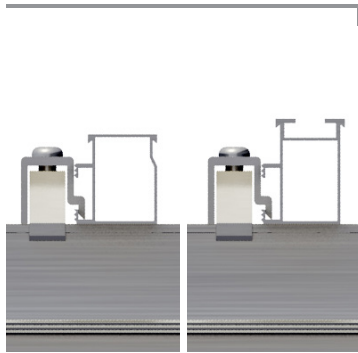


Double layer installation with framed PV modules, vertically mounted

Depending on the structural requirements of the location and the installation situation, several cross adapter clamps may be required per crossing point. If a second cross adapter clamp is required, it is fixed to the opposite side, as described above (torque 8-10 Nm).

Crossing points:

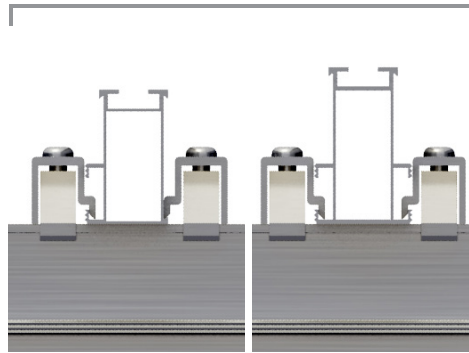
1 CAC in side HHB channel



ST-AK 5/40

ST-AK 7/47

1 CAC in side HHB channel and 1 CAC opposite



ST-AK 13/60

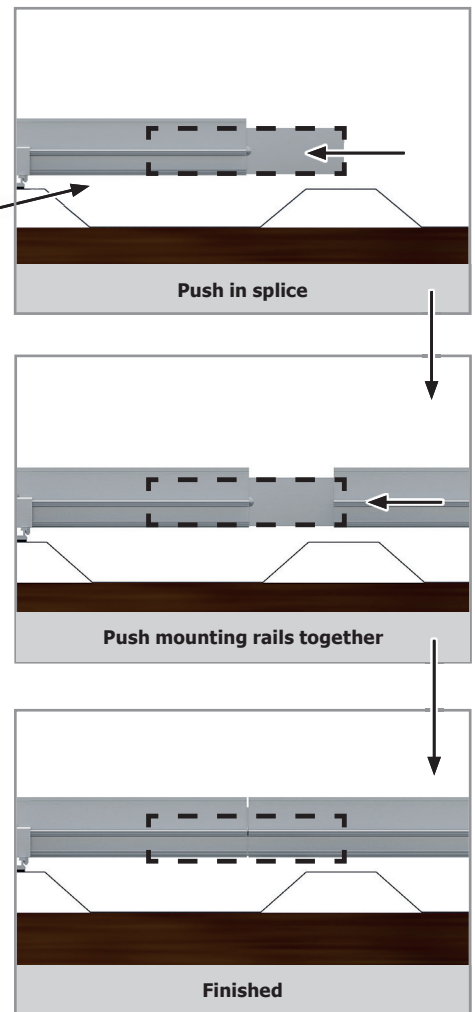
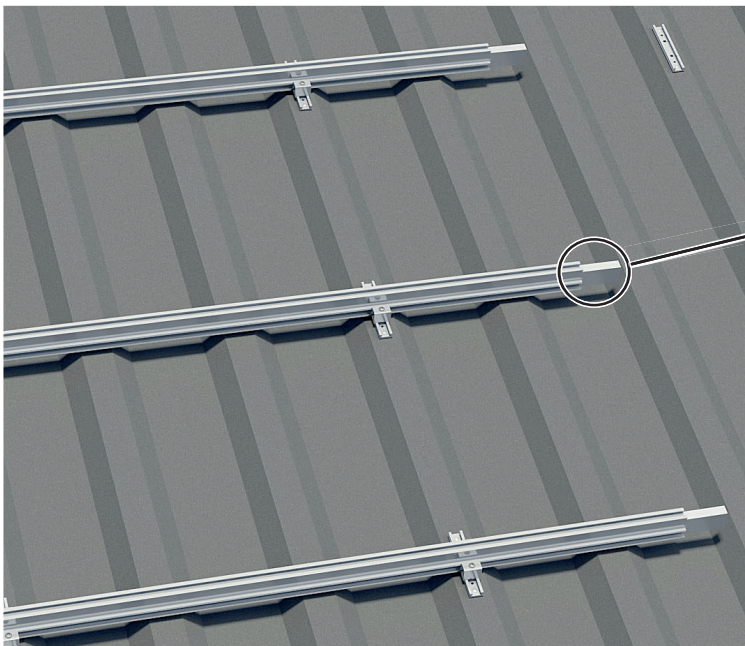
ST-AK 26/70


Observe the module's installation instructions for the distance between the horizontal mounting rails.


Double layer installation with framed PV modules, vertically mounted

Installation – 3 (splice)

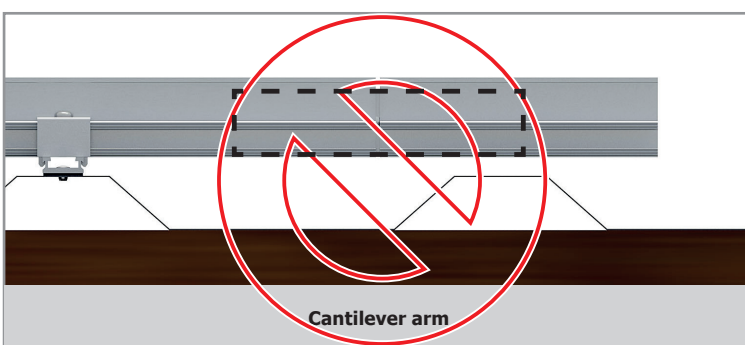
In order to link several mounting rails, half of the splice, which has the same structural values as the mounting rails, is pushed into the already installed mounting rail. Then push the other mounting rail on to the splice. Use pressure to push the mounting rails flush together and check if a connection to earth has been created. The connection is finished. Fix the joined mounting rail on to the ST-AK 1/12 using the cross adapter clamp, as described in Installation – 2.



 **Push in splice**

 **Check connection to earth**

 **No cantilever arms with splices. Position the splices so that they lie between two ST-AK 1/12.**



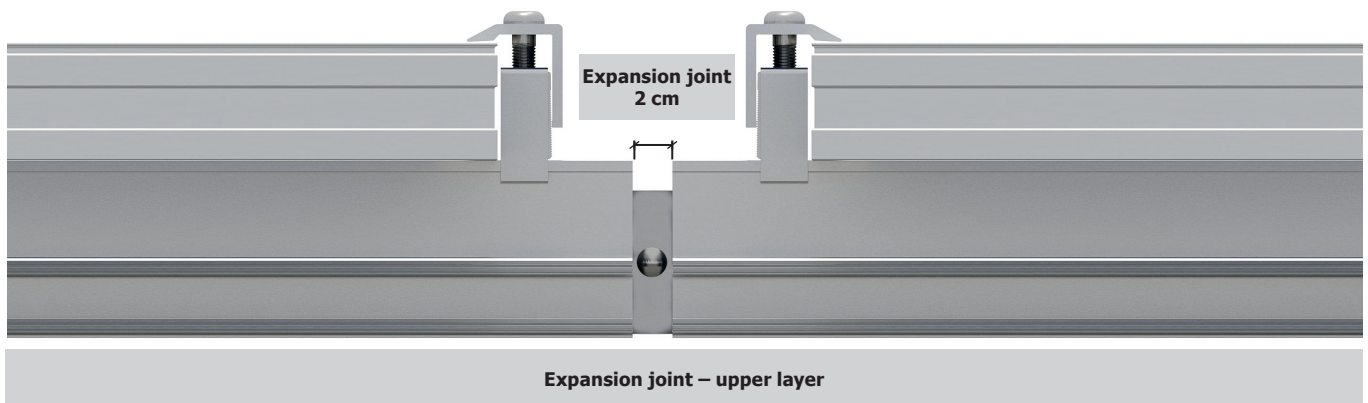
Double layer installation with framed PV modules, vertically mounted



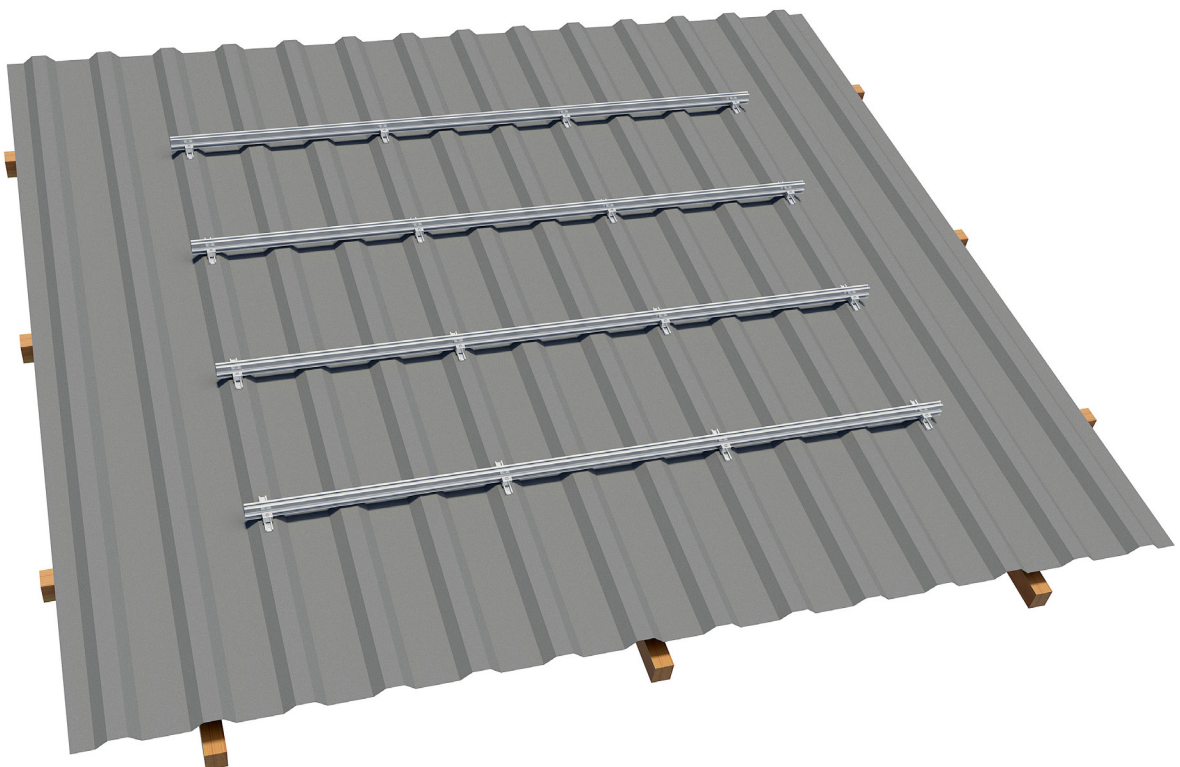
If the mounting rail is longer than 7.00 m, the module array is to be separated by placing two end clamps. In the zone between the end clamps, the mounting rail is to be separated and connected using a splice to allow the rail to move by 2 cm (expansion joint). The alignment of the expansion joints is to be adjusted according to the structural conditions of the roof and the different expansion properties of the materials. Observe the instructions in Installation – 5 in these installation guidelines when placing the end clamps.



Modules may not be built over expansion joints. There is no connection to earth. This must be established without limiting the expansion joint's mode of operation.



Completion of the installation of the upper rail layer.

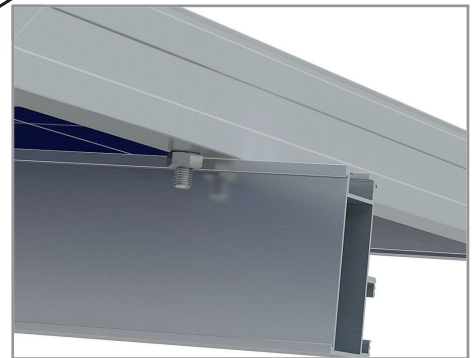
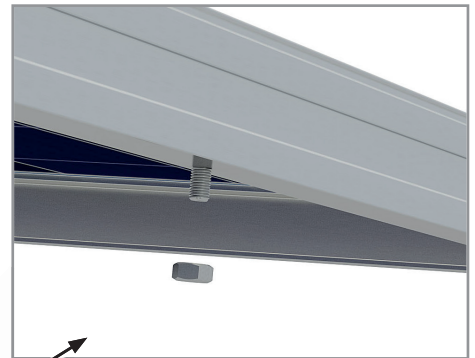
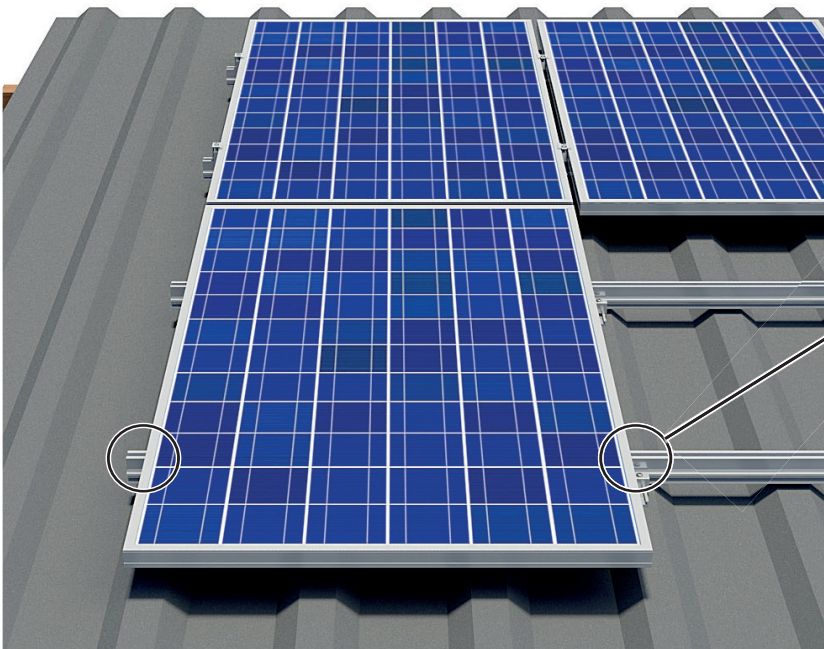


Installation – 4 (module installation, slipping protection)



Before the installation of the modules in the lowest row of modules, the modules are generally to be furnished with the slipping protection. The same applies for modules under which no further module directly adjoins (modules above obstructions, e.g. windows, chimneys etc.).

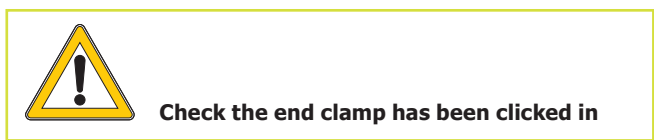
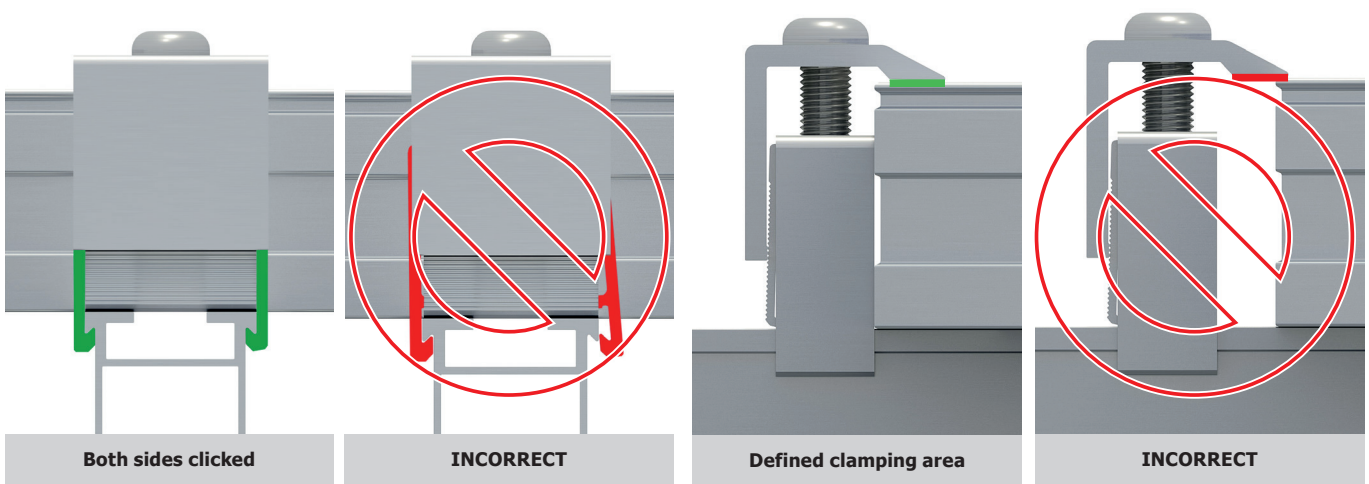
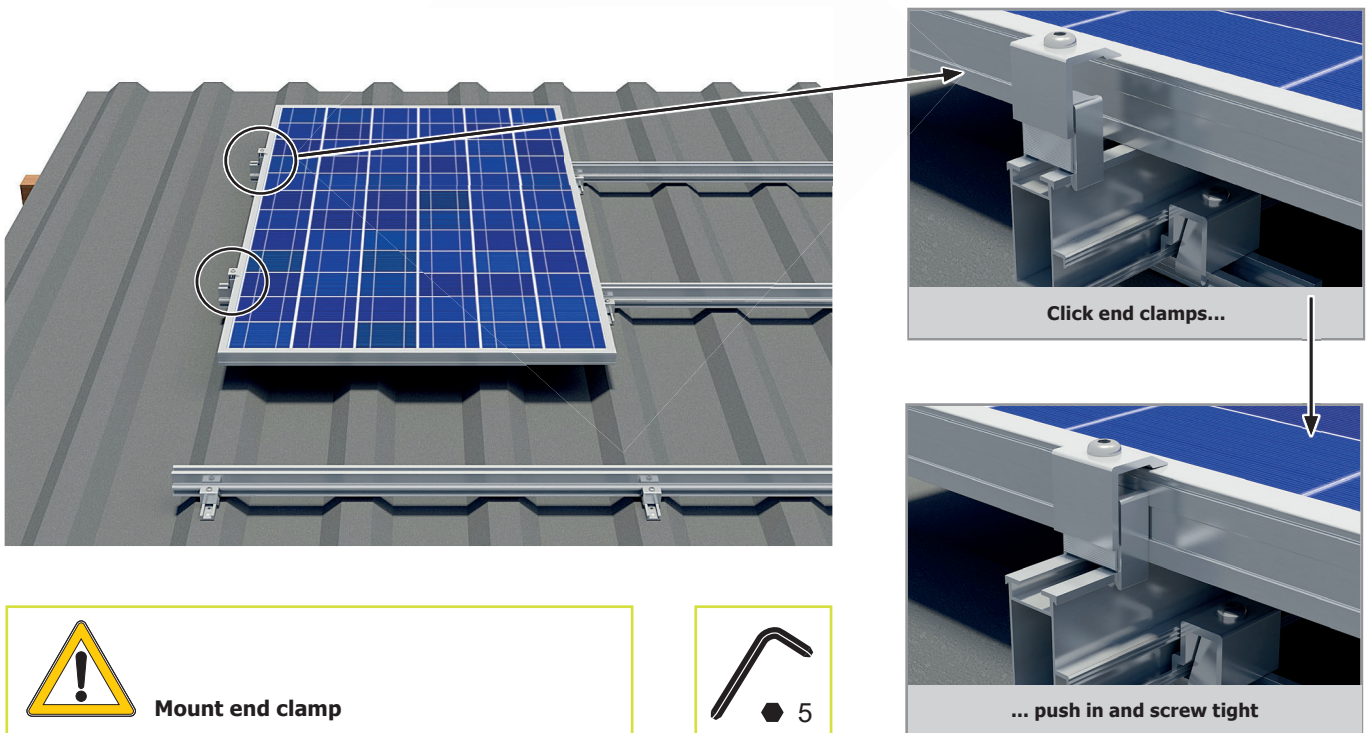
Fix 2 screws M6 x 20 (with the shank downward) with nuts M6 in 2 of the module's frame holes (8 mm) so that the screws are at the same level and that when installed they are above at least one horizontal mounting rail layer, if necessary so that the screws on the underside of the module frame touch the horizontal mounting rails from above. If the lower fastening borehole is larger than 8 mm, please use a screw appropriate for this.



Double layer installation with framed PV modules, vertically mounted

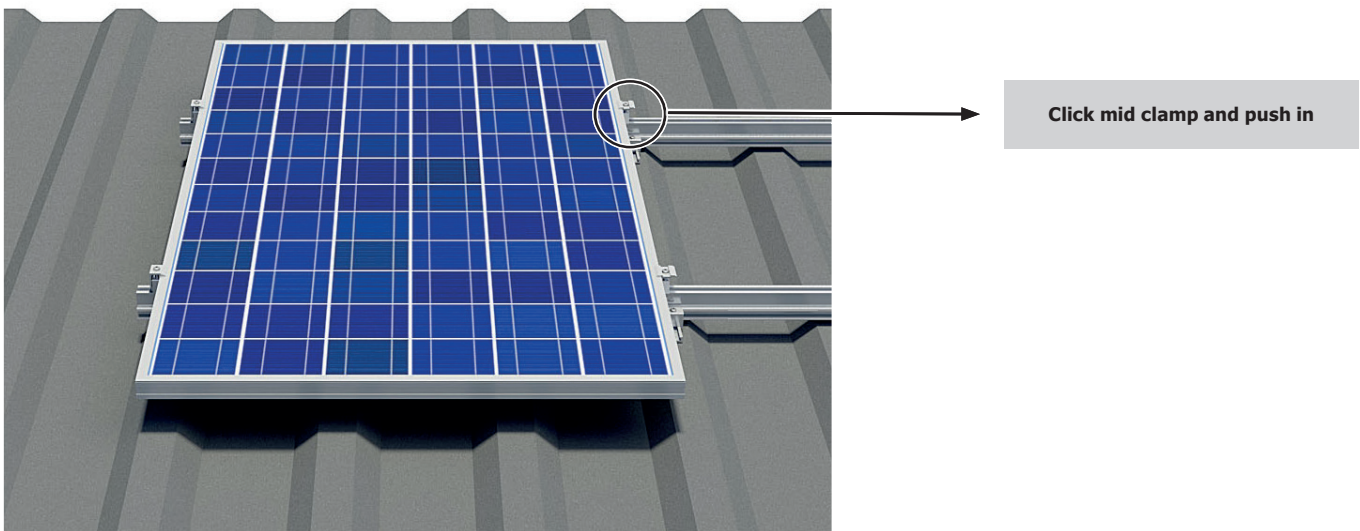
Installation – 5 (module installation, end clamp)

Place the module on the mounting rails. Mount the end clamps. To do this, click the end clamp on to the mounting rail and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the mounting rail. Now adjust the end clamp to 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.

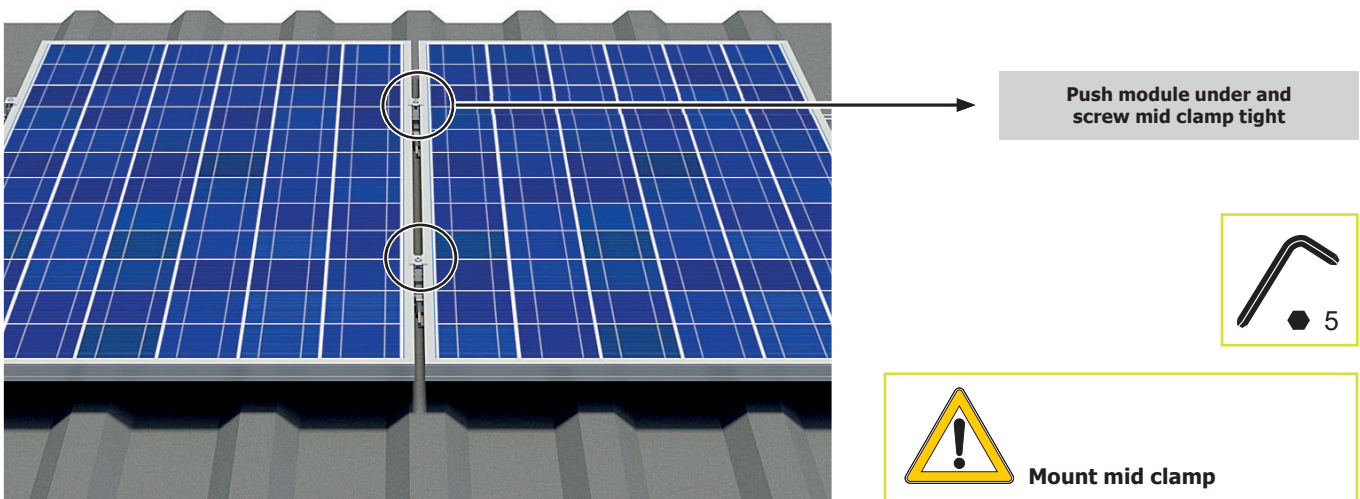


Double layer installation with framed PV modules, vertically mounted

Installation – 6 (module installation, mid clamp)



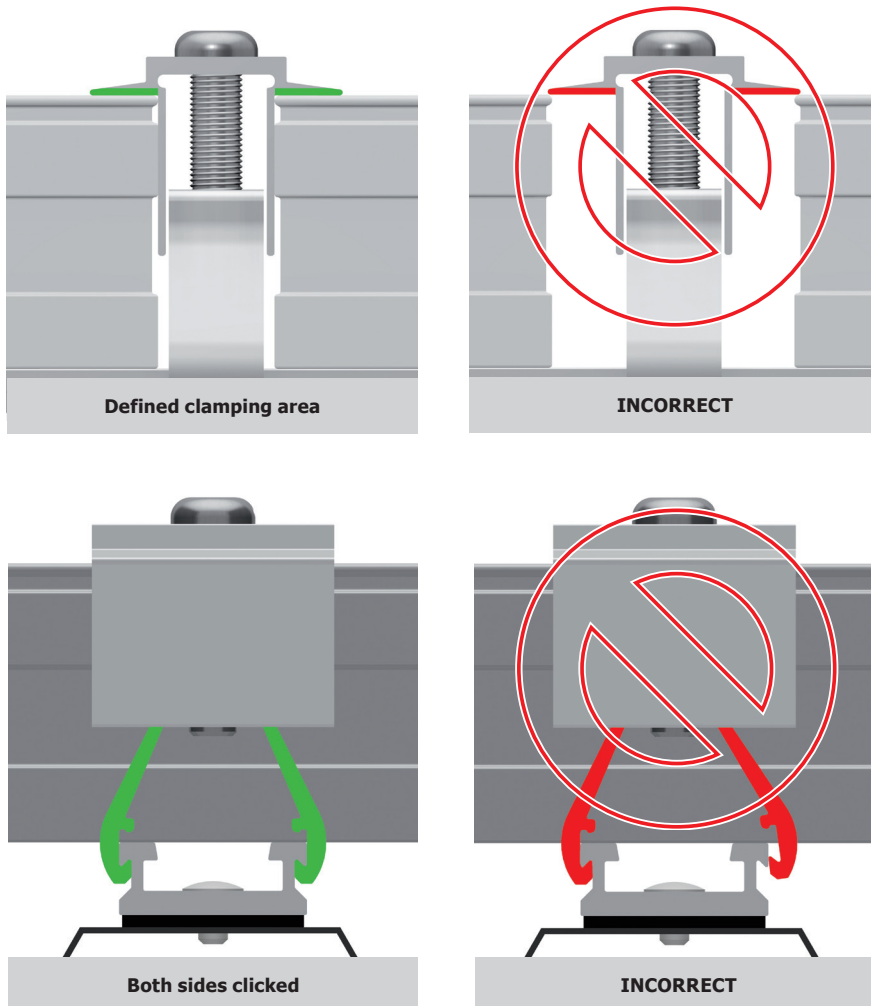
Now push the next module under the mid clamp, adjust the mid clamp to the height of the module frame and tighten the screw (torque 8-10 Nm).



Double layer installation with framed PV modules, vertically mounted

Installation – 6 (module installation, mid clamp)

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



Check that the mid clamp has been clicked in



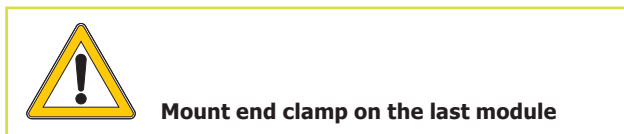
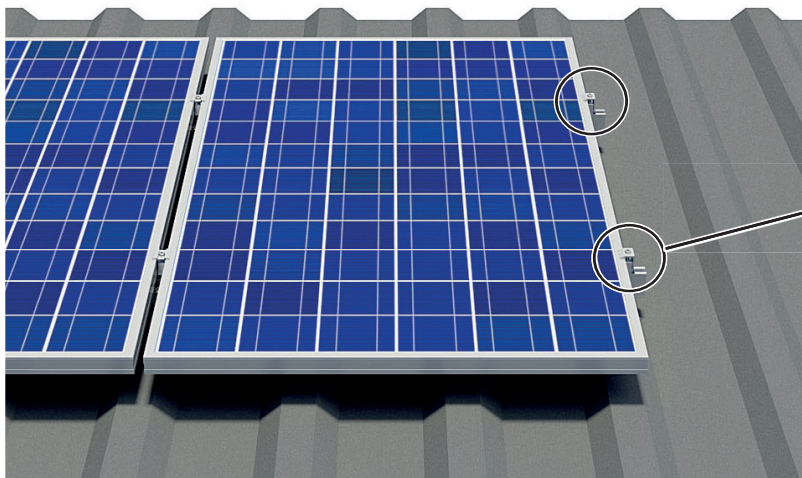
Check the clamping area defined by the module manufacturer and observe the module manufacturer's specifications

Double layer installation with framed PV modules, vertically mounted

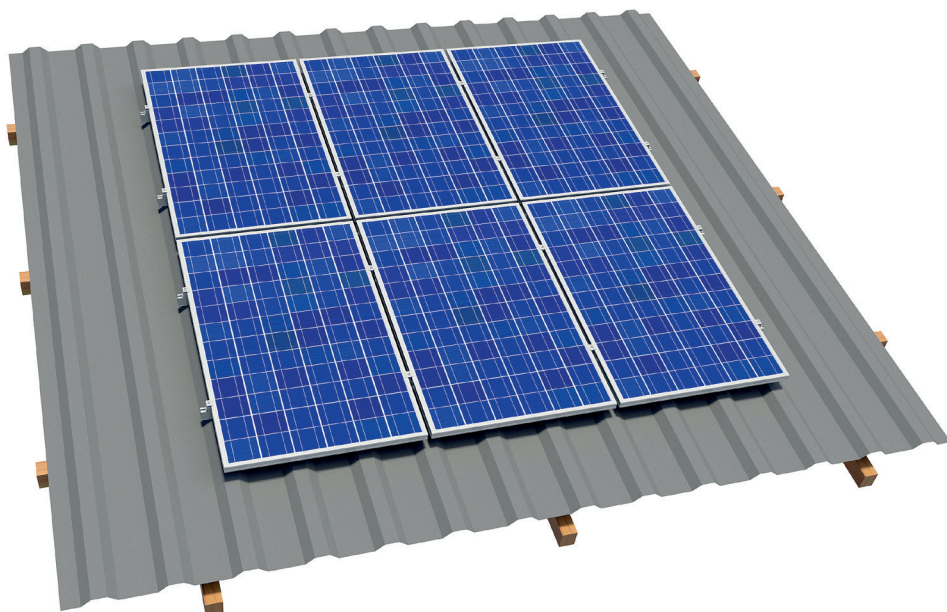
Installation – 7 (module installation, end clamp on row end)

On the last module in the row (if applicable, on expansion joints), end clamps are again to be mounted. To do this, click the end clamp on to the mounting rail and push it on to the module. It must be ensured that the end clamp is clicked into both sides of the mounting rail. Now adjust the end clamp to the height of the module and tighten the screw (torque 8-10 Nm).

Ensure that the end clamp clamps at the clamping area defined by the module manufacturer (see Installation – 5).



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 ST-AK 1/12

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.