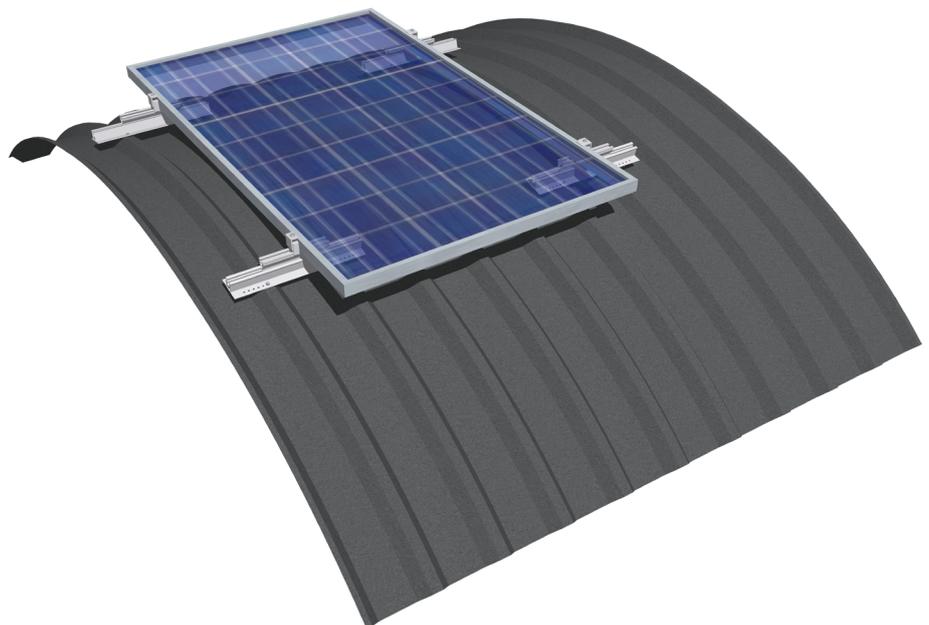
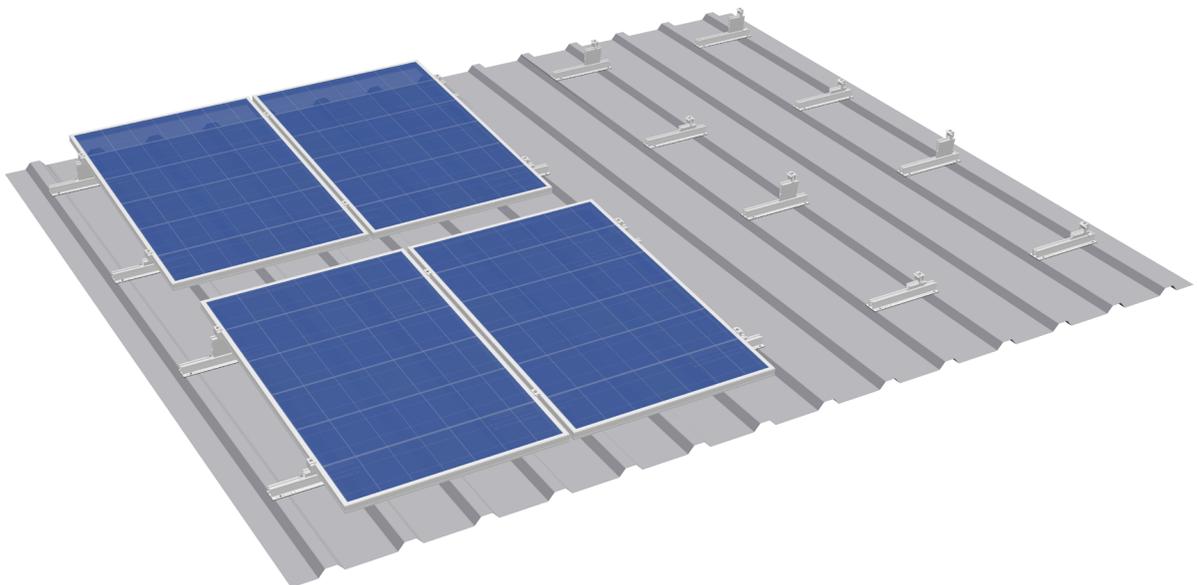




Assembly Instructions

TRAPEZOIDAL SHEET METAL RAIL **LIFT/VARIO**

for trapezoidal sheet metal roofs



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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 light, material-efficient construction and the prefabrication of the S:FLEX trapezoidal sheet metal rail Lift with 26 holes and sealing tape allow for fast installation on trapezoidal sheet metal roofs. The rails are attached directly to the crests of the trapezoidal sheeting using suitable fasteners (sheet metal screws) and are equipped with easy-to-insert adapters as module supports.

The S:FLEX trapezoidal sheet metal rail Lift offers a simple yet effective solution for PV systems installed on flat or slightly inclined roof surfaces: the different heights of the adapters allow for a pitch of approx. 5° with vertical installation and approx. 7° with horizontal installation. This ensures an optimum irradiation angle and enhanced self-cleaning properties of the modules, leading to greatly improved yields.

The Vario model allows installation on barrel roofs and roofs with roofing sheets. The trapezoidal sheet metal rail Vario with its moveable and pitch-adjustable adapters enables easy installation on curved roofs as well as on the stepped surfaces of roofs with roofing sheets.

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 trapezoidal sheet metal rail Lift is designed to accommodate PV modules. The system is intended for use on trapezoidal sheet metal roofs with a pitch of approx. 5° with vertical installation and approx. 7° with horizontal installation.

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.

An important part of this installation manual is the included site-specific project report with the structural analysis based on the project location. The S:FLEX trapezoidal sheet metal rail Lift must be designed and created with the S:FLEX software.

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

This guide describes the installation procedure for the S:FLEX trapezoidal sheet metal rail Lift on flat-angled trapezoidal sheet metal roofs.

In general, the rules for the trapezoidal sheet metal rail Lift also apply to installations on barrel roofs and on roofs with roofing sheets. Specific guidance is also included on the corresponding pages and must be observed.

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

1.3 Warnings

The warning information given in these installation guidelines 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 stipulated in the installation guidelines provided and the project report.

These installation guidelines 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 guidelines are used for the installation, and that a print-out of the installation guidelines is stored in the immediate vicinity of the system. 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 given in the project report must be strictly observed. The location-based static calculations are carried out in the project report. The S:FLEX FLAT mounting system must be designed and created with the S:FLEX software.

Since individual project-specific features must be considered with every roof, an expert clarification must always be carried out prior to installation. Before installation, the PV system creator must ensure that the existing roofing and roof substructure are suitable for the occurring 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, 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.

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, local fire regulations must be observed, e.g. firewalls must not be built over and a certain distance must be observed.

If the roofing is altered, the manufacturer's guidelines must be observed. During and after the 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 is to 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 of all rules and regulations for a professionally correct planning and installation and to adhere to said rules and regulations during the installation. This also includes compliance with the current state of the rules and regulations.

The 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!



The 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 safe access equipment and fall protection (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 - Trapezoidal sheet metal rail LIFT

The S:FLEX trapezoidal sheet metal rail Lift offers suitable solutions for different requirements:

System properties

Application:	Trapezoidal sheet metal
Module type:	Framed modules
Module orientation:	Vertical / horizontal
Pitch Lift:	5° with vertical installation / 7° with horizontal installation
Module inclination Lift:	Max. 20° towards horizon
Roof pitch Lift: *	Max. 15° with vertical installation / max. 13° with horizontal installation
Module field length:	Max. 12 m
Max. Snow load:	2.4 kN/m ²
Max. Gust pressure:	2.4 kN/m ²
Connection:	Sheet metal screws on crests
Material:	Aluminium EN AW-6063 T66, stainless steel, EPDM seals
Colour:	Natural, extruded finish

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 Mounting range:	hole spacing 162-333 mm; mounting in the high point of the bead

* depending on the clamping range and the distance between the rails.

** 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.

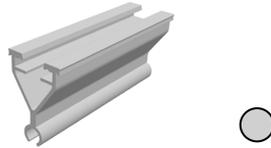
2.1 System components

① Components for roof fastenings

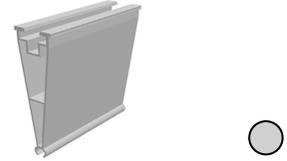
Lift Trap sheet metal Rail 375



Lift Front adapter



Lift Back adapter



② End clamp

EH AK II Klick 30-50



③ Mid clamp

MH AK II Klick 30-50 A



MH AK II Klick 30-50 with grounding plate



④ Slipping protection

Locking clip XL AK A



Anti-slip set for module in upright mounting



Anti-slip set for module in horizontal mounting



⑤ Sheet metal screws

Sheet metal screw 4,5x25
Sheet metal screw 6,0x25
Sheet metal screw 4,8x20



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. Thin sheet metal screws are to be arranged exclusively in the area of the trapezoidal sheet metal.

Sheet metal screws:

4.5 x 25 A2 / bimetal

4,8 x 20 A2 / bimetal

6,0 x 25 A2 / bimetal



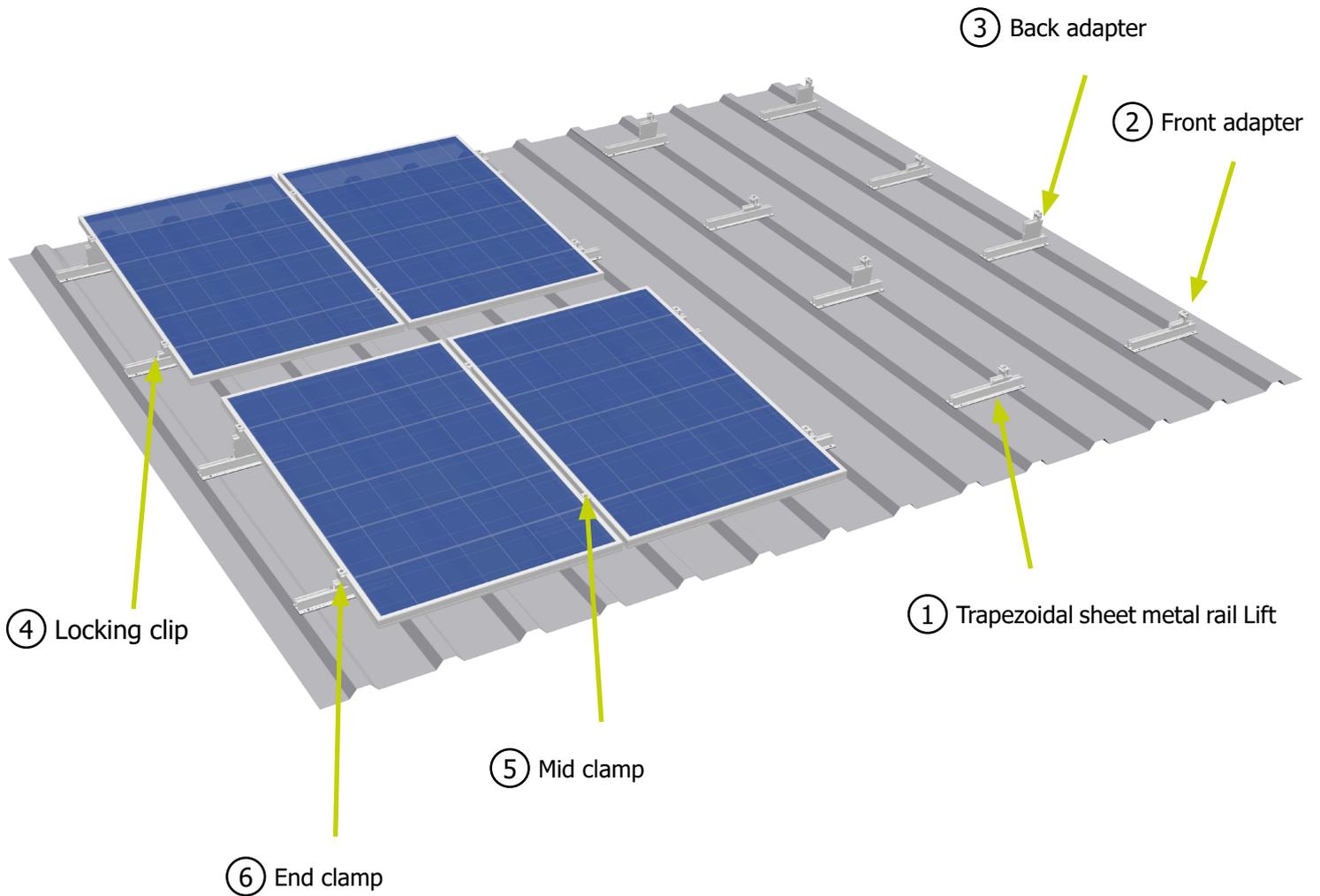
Installation:

- SW 8
- Tool external dimension (socket wrench) $\leq 15\text{mm}$

2 Installation - S:FLEX trapezoidal sheet metal rail Lift

Installation single layer with framed PV modules in vertical installation

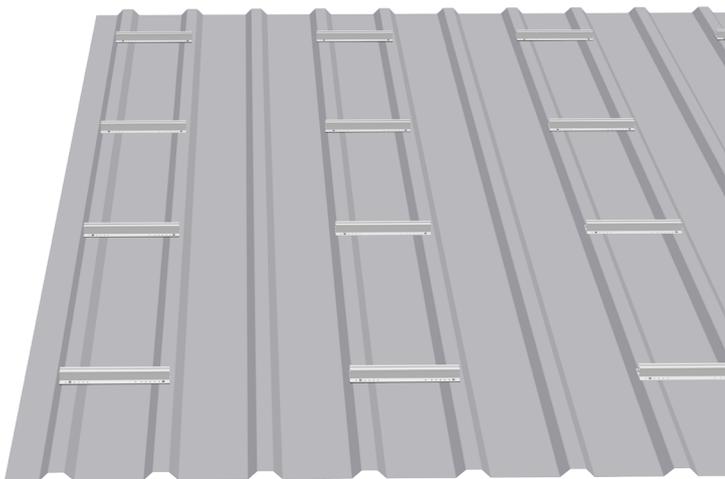
2.3 Installation - single layer substructure



Note: on the following pages, vertical module installation is shown. Horizontal module installation follows the same procedure, but requires clearance to clamp the modules on the short sides.

Installation – 1 (positioning the trapezoidal sheet metal rail Lift)

The positioning of the trapezoidal sheet metal rail Lift must be determined in accordance with the structural requirements of the location and the installation situation. The trapezoidal sheet metal rail Lift is to be positioned so that the front adapter and back adapter can later be mounted between the fixing points on the trapezoidal sheet metal. In doing so, it must again be checked whether the measurements taken as a basis during planning match the actual measurements found on the roof (if necessary, adjustments must be made). For single-layer substructures, the position of the trapezoidal sheet metal rail Lift must be checked against the module's prescribed clamping distances.



Check the basis of the plans



Position according to the structural requirements and the installation situation

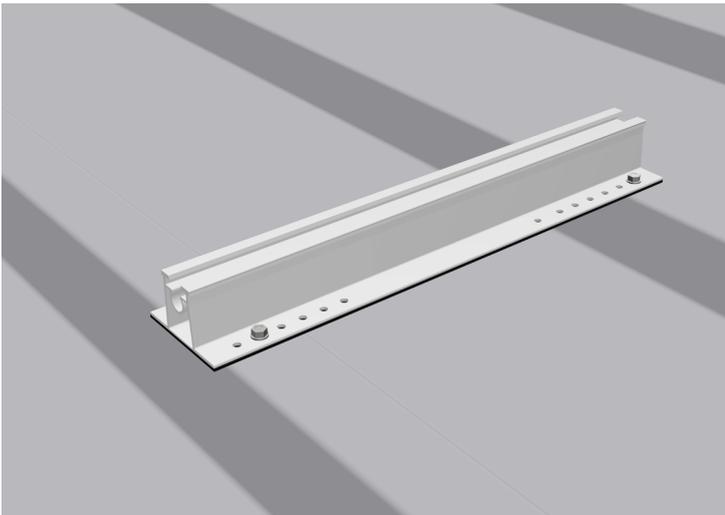


Align the trapezoidal sheet metal rails Lift using a plumb line

Installation single layer with framed PV modules in vertical installation

Mount the Lift trapezoidal sheet metal rail using the appropriate fasteners.

Use 4 thin sheet metal screws per Lift trapezoidal sheet metal rail (2 thin sheet metal screws per high bead). To ensure the tightness of the roofing, the Lift trapezoidal sheet metal rail must always be mounted on the high bead. The trapezoidal sheet metal rail Lift is pre-drilled with 5.0 mm for the common high bead distances/wave lengths from 162 mm to 333 mm and glued with EPDM sealing strips on the underside.

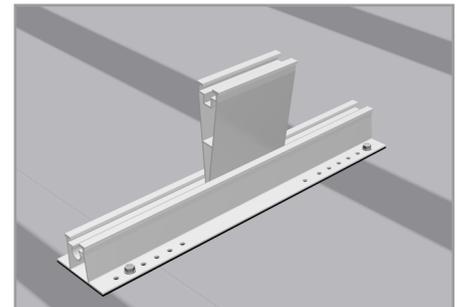
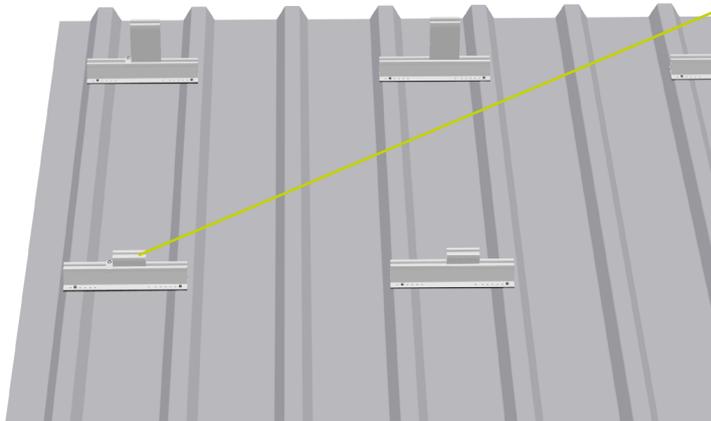


2 thin sheet metal screws per High bead (4 pcs. per trapezoidal sheet metal rail Lift)

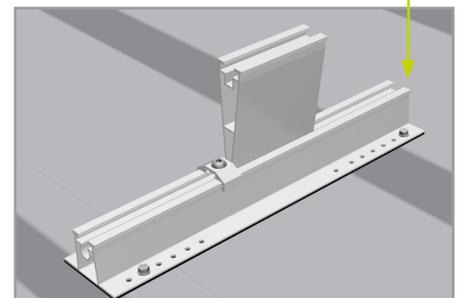
Installation single layer with framed PV modules in vertical installation

Insert the front and back adapters into the trapezoidal sheet metal rail Lift and position them so that they sit between two raised corrugations, ensuring that the modules can be mounted centrally on the adapters.

Always mount the Locking clip XL to the outside of the adapter at the end of a module field to prevent the adapter from slipping out.



Insert the adapters.



Slide in the Locking clip XL and tighten.



Mount the securing set.

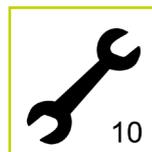
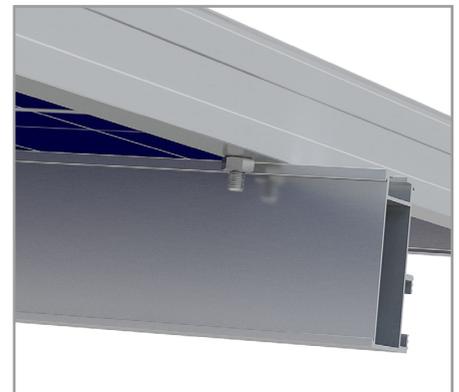
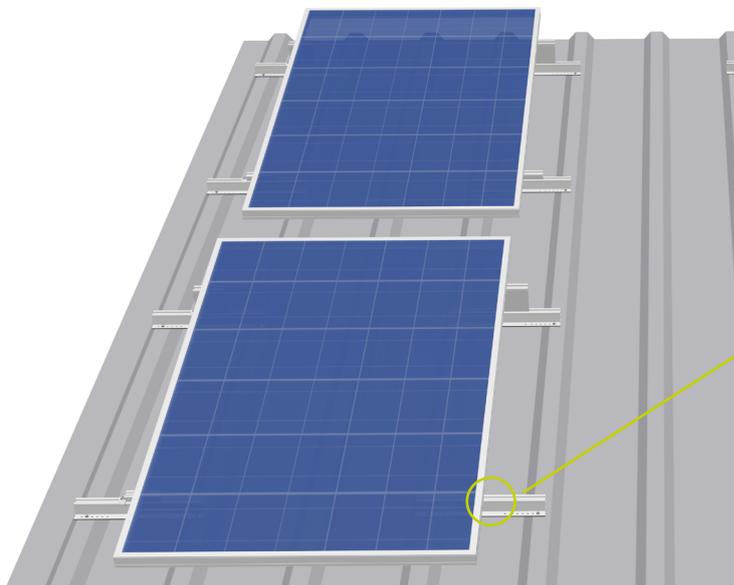


Installation – 2 (module installation, slipping protection)



Before installing the modules in the lowest row of modules, the modules generally need 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 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 mounting hole is larger than 8 mm, please use a screw appropriate for this.

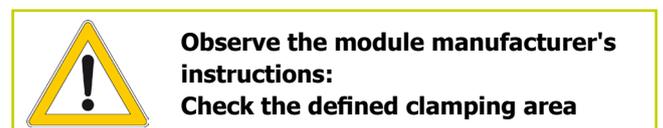
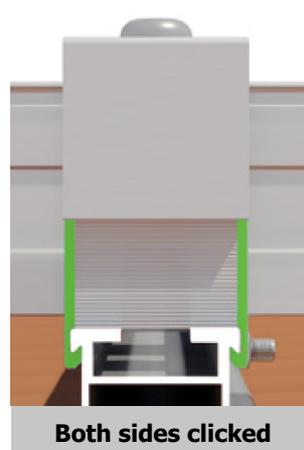
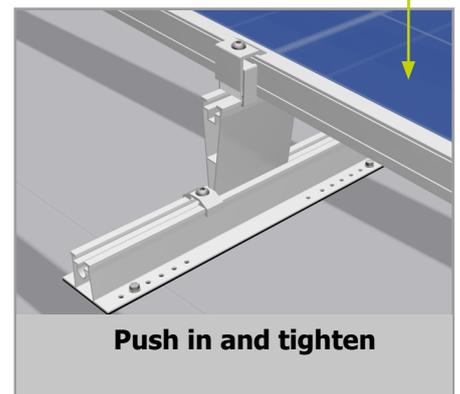
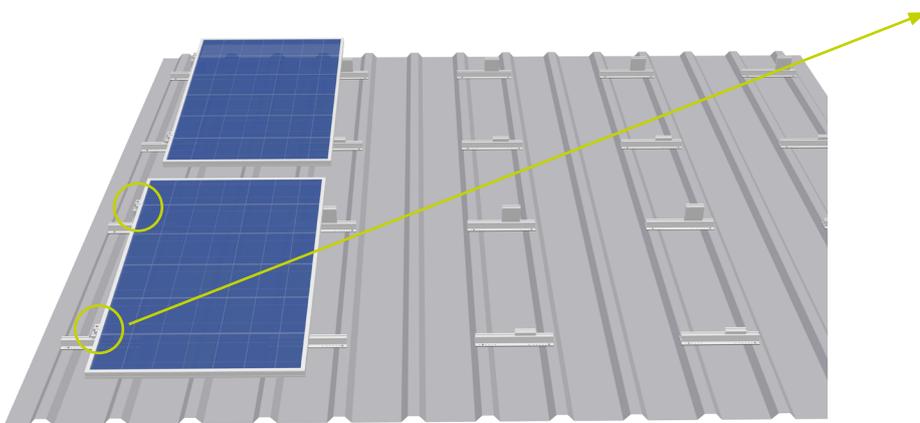


If installing the panels in landscape position on barrel roofs or pantile sheet roofs, please note advises on page 18/19.

Module installation (end clamps)

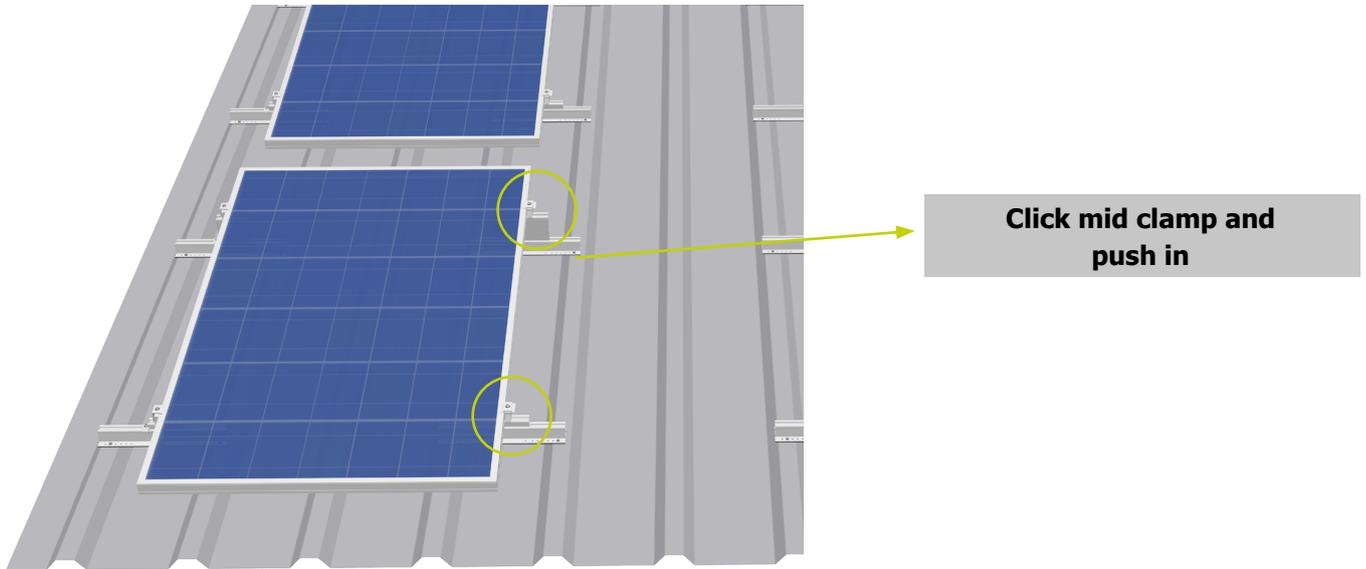
Place the module on the adapter. Install the end clamps. To do this, click the end clamp onto the adapter and push it flush onto the module. Ensure that the end clamp is clicked onto both sides of the adapter.

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 at the clamping area defined by the module manufacturer.

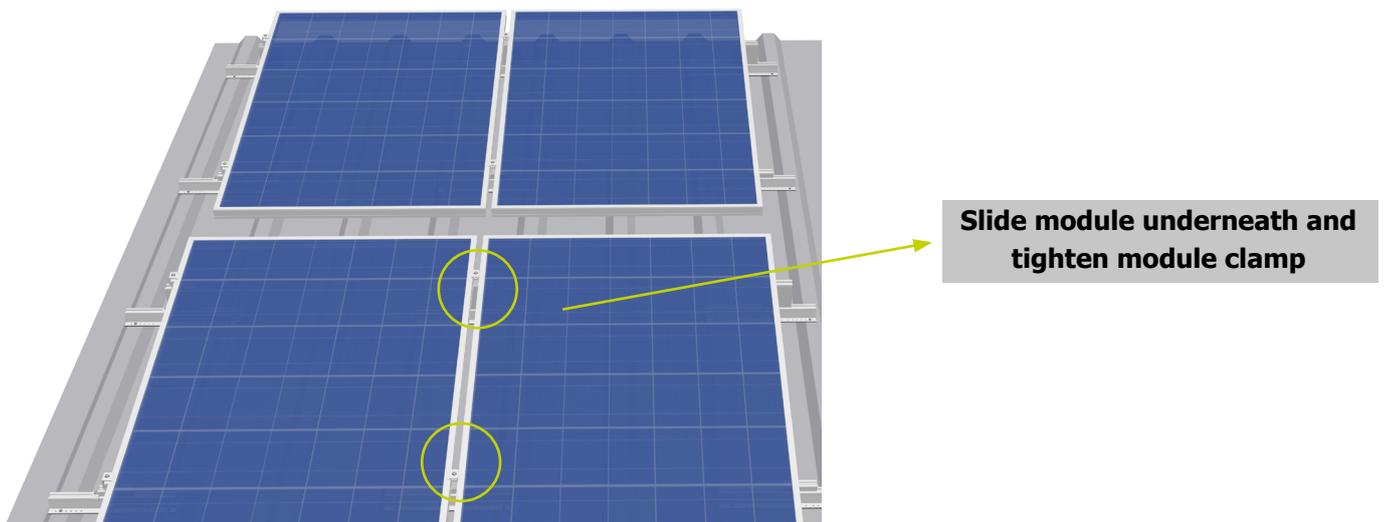


Module installation (mid clamps)

Now install the mid clamps. To do this, click the mid clamp onto the adapter and push in onto the module. Ensure that the mid clamp is clicked onto both sides of the adapter.

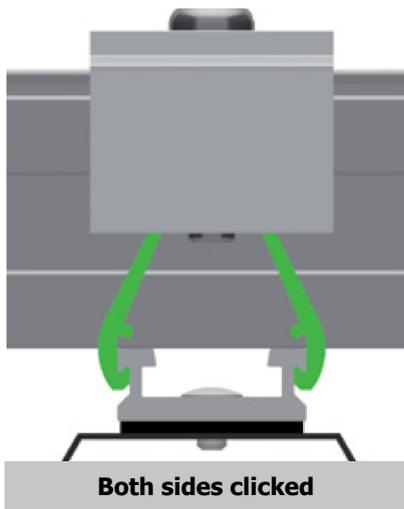
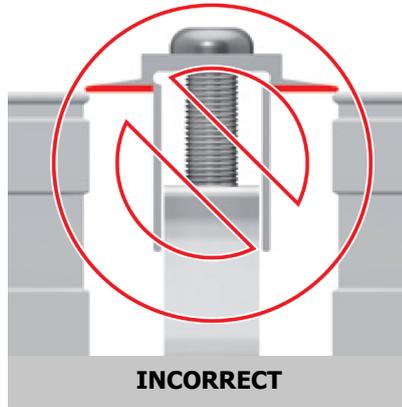
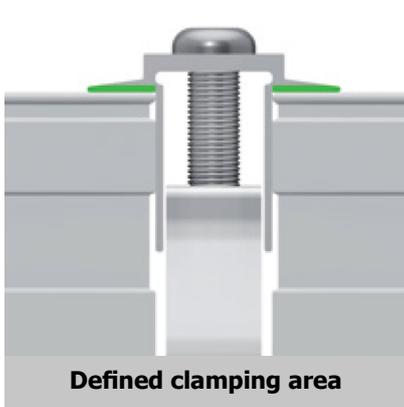


Then slide the next module underneath the module mid clamp, adjust the module clamp to the height of the module's frame and tighten the screw (tightening torque 8–10 Nm).



Installation single layer with framed PV modules in vertical installation

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



Check the end clamp has been clicked in

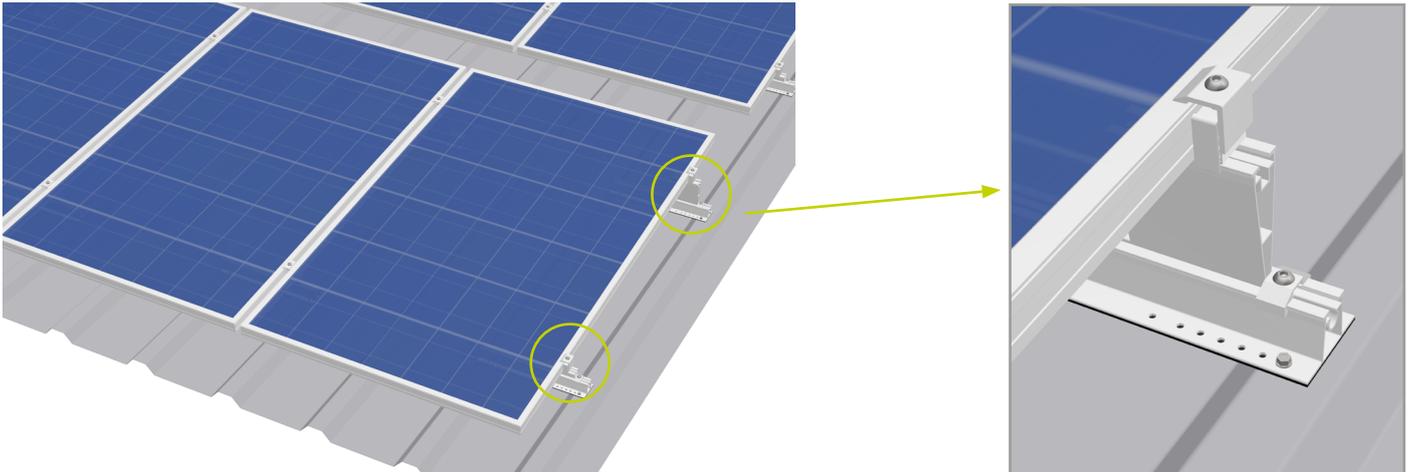


Observe the module manufacturer's instructions:
Check the defined clamping area

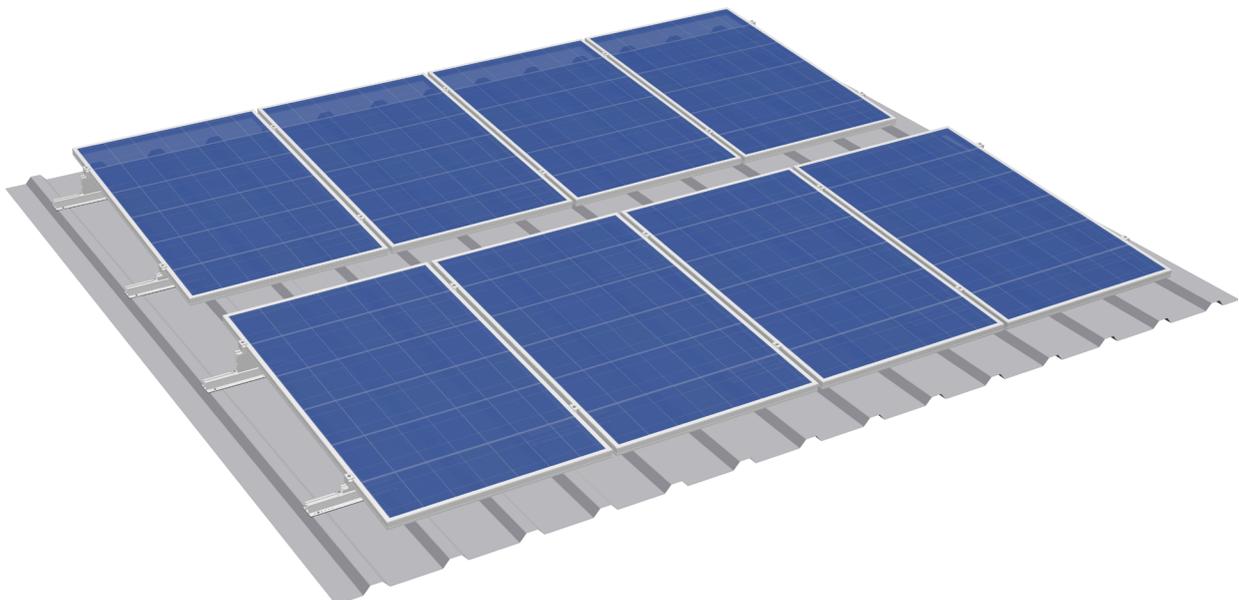
Installation single layer with framed PV modules in vertical installation

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). To do this, click the end clamp onto the adapter and push it onto the module. Ensure that the end clamp is clicked onto both sides of the adapter. 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 at the clamping area defined by the module manufacturer.



Proceed as described for the following rows.

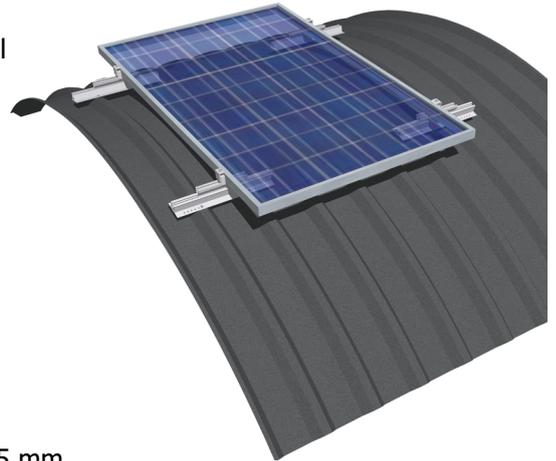


2.3.1 System description - barrel roof with trapezoidal sheet metal rail Vario

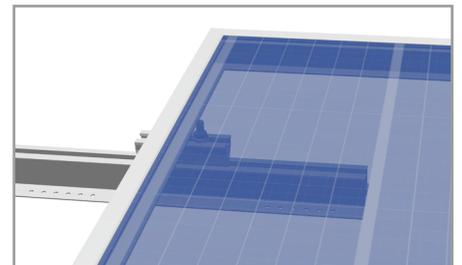
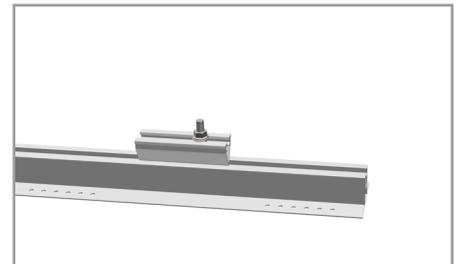
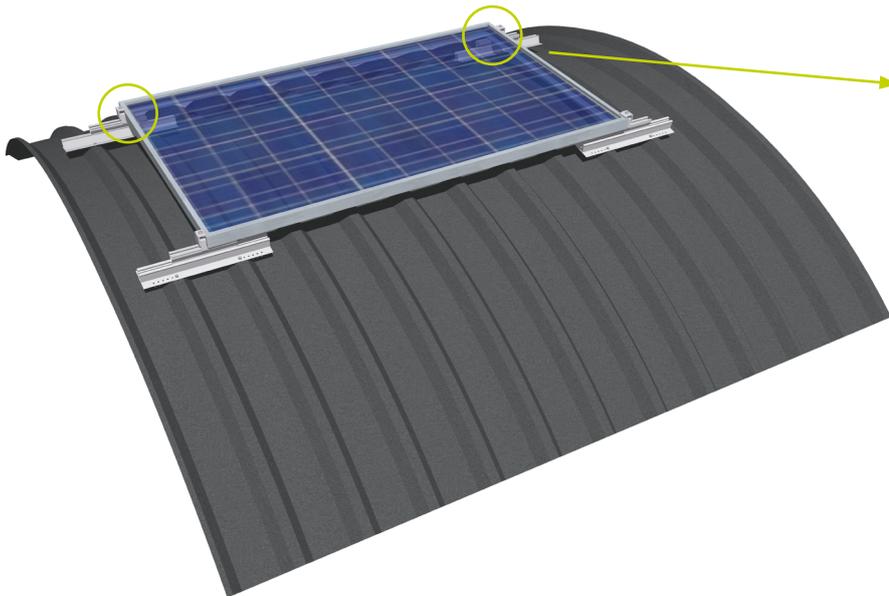
Trapezoidal sheet metal rail Vario for installation on convex (curved) trapezoidal sheet metal roofs. To compensate for the curve of the roof, adjustable S:FLEX Lift Front adapters are used on all trapezoidal sheet bridges.

System properties

Application:	Convex / curved trapezoidal sheet metal
Module type:	Framed modules
Module orientation:	Vertical / horizontal
Pitch:	Parallel to roof
Roof pitch:	Max. 60° towards
Roof radius:	>3,500 mm
Module field length:	max. 12.00 m
Max. load:	5.4 kN/m ² with vertical installation / 2.4 kN/m ² with horizontal installation
Connection:	Sheet metal screws on crests
Distance between crests:	162 - 333 mm
Sheet thickness:	steel sheet 0.5 mm; aluminum sheet 0.5 mm
Material:	Aluminium EN AW-6063 T66, stainless steel, EPDM seals
Colour:	Natural, extruded finish



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



Before installing the panels in landscape orientation you have to attach a sliding protection kit on the upper LIFT adaptors. You have to fix a T-bolt M8x25 with a locking washer M8 and a serrated nut M8 on the T-bolt channel on top of the LIFT adaptor.

2.3.2 System description - roofing sheet with trapezoidal sheet metal rail Vario

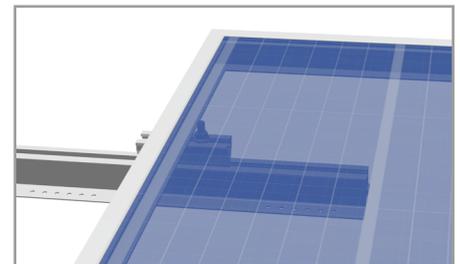
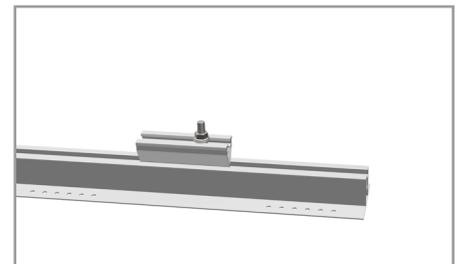
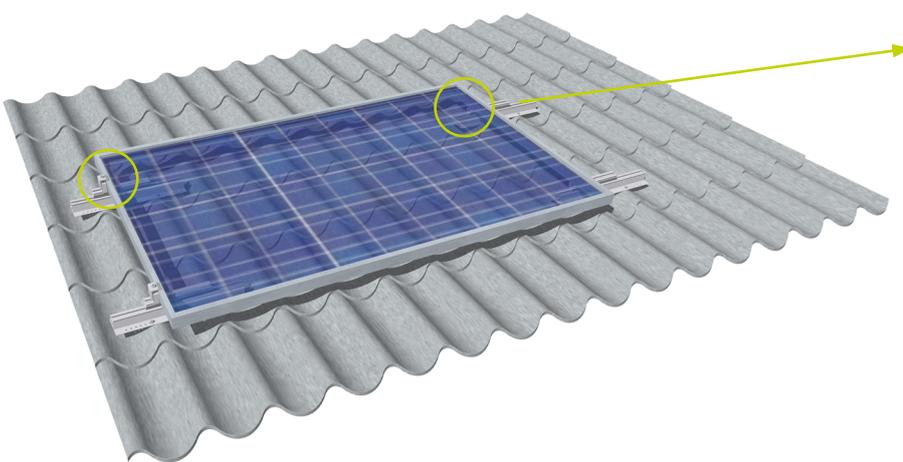
Trapezoidal sheet metal rail Vario for installation on roofs with roofing sheets. To compensate for the difference in levels, adjustable S:FLEX Lift Front adapters are used on all trapezoidal sheet bridges.

System properties

Application:	Trapezoidal sheet metal / roofing sheets
Module type:	Framed modules
Module orientation:	Vertical / horizontal
Pitch:	Parallel to roof
Roof pitch:	Max.
Module field length:	Max. 12 m
Max. load:	5.4 kN/m ² with vertical installation / 2.4 kN/m ² with horizontal installation
Connection:	Sheet metal screws on crests
Distance between crests:	162 - 333 mm
Sheet thickness:	steel sheet 0.5 mm; aluminum sheet 0.5 mm
Material:	Aluminium EN AW-6063 T66, stainless steel, EPDM seals
Colour:	Natural aluminium



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



Before installing the panels in landscape orientation you have to attach a sliding protection kit on the upper LIFT adaptors. You have to fix a T-bolt M8x25 with a locking washer M8 and a serrated nut M8 on the T-bolt channel on top of the LIFT adaptor.

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 procedure.



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 consists of 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 Trapezoidal sheet metal rail Lift/Vario user agreement

We wish to point out that the mounting system is sold under a purchase contract.

Installation/processing or its acquisition by a third party is not carried out in the name of, or on behalf of, S:FLEX GmbH. It must be undertaken 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 consent of the roof manufacturer in respect of being able to use the relevant mounting system on the roof in question (in the terms of the warranty), nor for the correct installation of the mounting system.

S:FLEX GmbH will not be liable for faults and damage and/or a restricted or limited operational capability of the system which has resulted from defective installation and/or installation which was not undertaken in accordance with the installation instructions and/or the project report. In the case of improper installation, the buyer's right to assert claims for material defects shall expire.

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

The system requires approval for the modules to also be mounted in the indicated manner (i.e. clamped on the modules' shorter side). This approval can either be given generally as part of the module certification or, as the case may be, issued by the module manufacturer on a project-specific basis.

4.2 Warranty / product liability (exclusion)

The information regarding dimensioning provided in these instructions are merely suggestions based on prior experience. Binding installation frame structural analyses 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 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 technology currently available. 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 generally prevalent weather and environmental conditions.