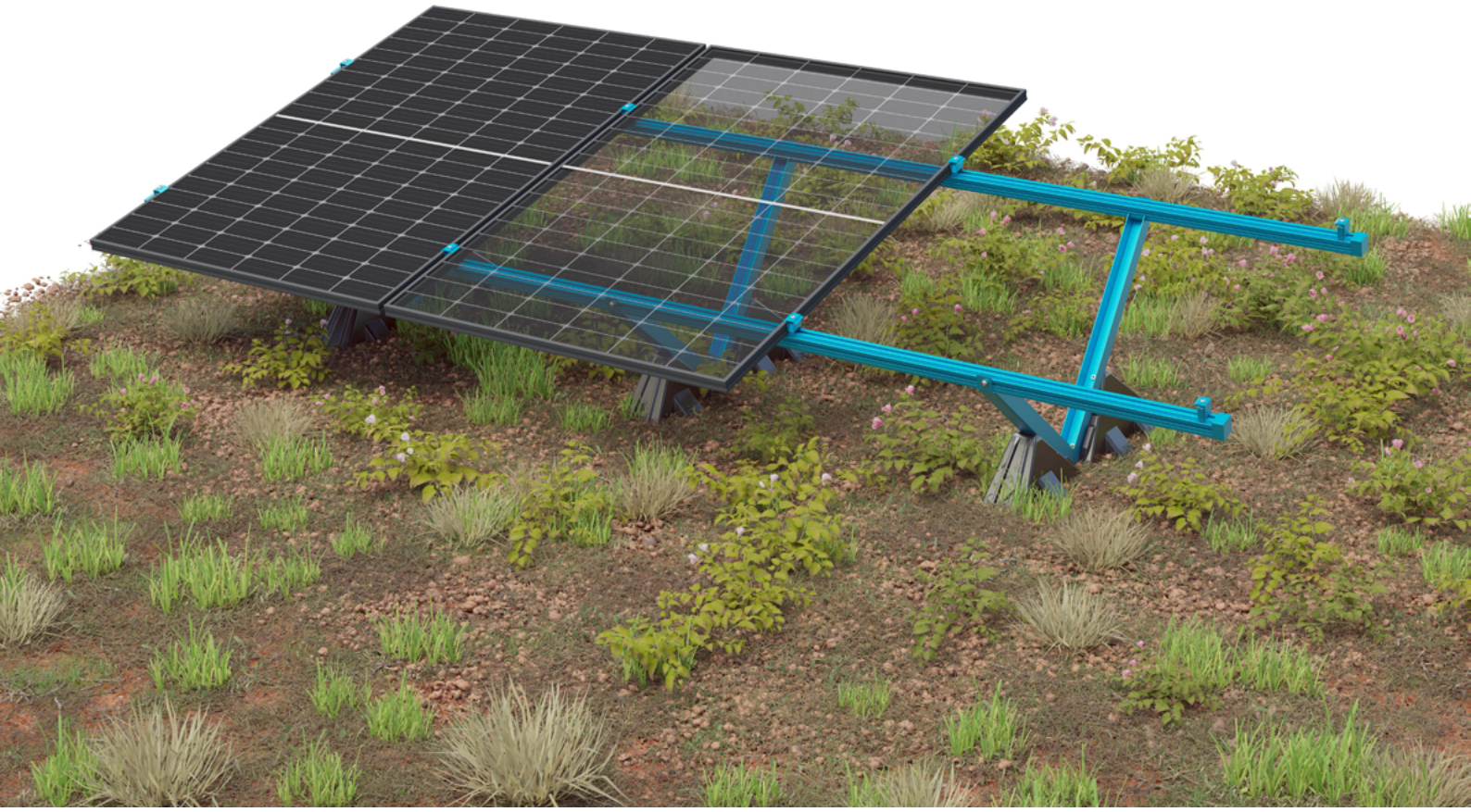
Assembly Instructions

S:FLEX GreenLight

Mounting system for green roofs



Read these installation guidelines carefully before installing the S:FLEX mounting system and retain them for future reference!

These installation guidelines are only complete with the project-specific implementation plans (project report)!

The S:FLEX System GreenLight for green roofs is a solar substructure for energy green roofs with ecological added value of the flat roof thanks to the combination of solar and greening. In addition, higher biodiversity and water retention are achieved, thanks to the green roof. The base plate serves as drainage and water storage. A sturdy steel and aluminum solar substructure provides high strength for wind suction/wind shear and snow load without additional cross braces.

With the system for green roofs, systems are installed in south and east/west orientation with an inclination angle of 10°, 15° or 20° standard (5° optional, 35° max. on request). Modules may be mounted in portrait or landscape orientation. It is compulsory that surcharge load and base plate spacing are calculated according to the wind zone plan by S:FLEX.

1.1 Intended use

The S:FLEX PV mounting system for green roofs is a rack system for mounting PV modules. It is designed exclusively to hold PV modules.

Any use that deviates from this must be considered improper.
In particular, compliance with the information in these installation instructions is part of the intended use.

S:FLEX GmbH is not liable for damages resulting from non-observance of the assembly instructions as well as from improper use, not in accordance with the regulations of the product.

1.2 About this document

These instructions describe the installation of the S:FLEX GreenLight system for green roofs. In preparation, it is compulsory, that you have S:FLEX calculate the ballast and the spacing between the base plates in accordance with the wind zone plan.

The roof surface must be broom-clean before installation, i.e. any contamination, such as moss deposits or stubborn layers of dirt must be removed.

It must be ensured that only up-to-date and complete installation instructions are used for the installation.

1.3 Warnings

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

Unless adhered to, 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

Each photovoltaic system is to be installed in compliance with the specifications of these installation instructions and the project report.
These assembly instructions are based on the state of the art and many years of experience in how our systems can be installed on site. It must be ensured that only up-to-date and complete installation instructions are used for installation and that a printout of the installation instructions is kept in the immediate vicinity of the system. We reserve the right to make technical changes.

The project report is part of the installation instructions and is prepared on a project-specific basis. All information in the project report must be adhered to. In the project report, the static calculations are carried out on a site-specific basis. The design and planning of the S:FLEX mounting systems must be carried out using the S:FLEX software.

Since individual project-related special features must be taken into account for each roof, expert clarification must always be provided prior to installation. Before installation, the PV system designer must ensure that the existing roof covering and roof substructure are designed for the additional loads that will occur. The installer must check the condition of the roof substructure, the quality of the roof covering and the maximum load-bearing capacity of the roof structure.
For this purpose, contact a specialist tradesman or structural engineer directly on site.

When installing the PV systems, always ensure that the module manufacturer‘s installation instructions are followed. In particular, it must be checked whether the module manufacturer‘s specifications regarding the module clamping specifications (number of clamping points, clamping surface and clamping area on the module) are adhered to. If this is not the case, the customer must obtain the module manufacturer‘s declaration of consent before installation or the rack must be adapted to the module manufacturer‘s specifications.

The requirements for lightning and overvoltage protection of mounting systems for PV systems must be established in accordance with DIN and VDE regulations. The specifications of the responsible power supply company must be complied with.

Care must be taken to ensure that the PV system to be installed does not impair the effect of the existing lightning protection system. It must also be ensured that the PV system is designed in such a way that it can be included in the protective area of the building lightning protection system. Separation distances between the PV system and the lightning protection system must be taken from the relevant regulations and complied with.

The applicable fire protection regulations must be observed during installation. Fire protection walls must not be built over, fire protection sections must be observed and corresponding spacing regulations must be complied with.

If changes are made to the roof covering, the manufacturer's regulations must be observed. During and after installation, the frame parts must not be walked on or used as climbing aids. There is a risk of falling and the roof covering underneath could be damaged.

It must be ensured by the installer of the photovoltaic system prior to installation that the installation is carried out strictly in accordance with national and site-specific building regulations, occupational safety and accident prevention regulations, standards and environmental protection regulations.

Every person who installs S:FLEX PV mounting systems is obliged to independently inform themselves about all rules and regulations for professionally correct planning and installation and also to comply with them during installation. This also includes obtaining the current status of rules and regulations.
The installation of the PV system may only be carried out by appropriately 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.

Before installation, check the building statics and the structure/condition of the roof substructure. The specifications in the installation instructions and the project report must be observed during installation. Failure to observe the specifications in the installation instructions and the project report may result in damage to the PV system and the building.

1.5 Description of the system

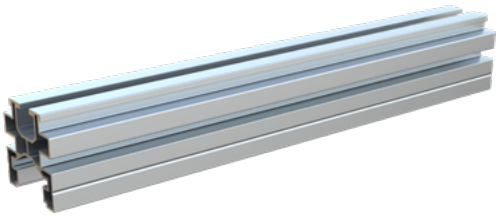
System features of the S:FLEX GreenLight

Included in delivery:	GreenLight base plate pro (1980 x 980 x 60 mm), 1x Knickfix angle bracket, mounting rail (3300 mm und 6100 mm), small material (screws, rail connectors, clamps)
Weight per unit:	12 kg, weight without ballast, without PV module
Module field length:	max. 24 m continuous module field
Ballasting:	Surcharge load and distance base plate must be calculated by S:FLEX according to the wind zone plan.
Roof pitch:	Inclination up to 5° permitted, above 5° permitted only with technical clarification by S:FLEX
Module tilt:	10°, 15° or 20° standard
Roof connection:	No structural roof connection necessary
Compressive strength:	Compressive strength unfilled: > 25 kN/m² Compressive strength backfilled (flush backfilled): > 70 kN/m²
Water storage volume:	39,5 liters, unfilled
Water drainage capacity:	i = 0,01 (= 1 % gradient) 0,4 l/(m*s) i = 0,02 (= 2 % gradient) 0,6 l/(m*s) i = 0,05 (= 5 % gradient) 1,0 l/(m*s)
Material:	HDPE, magnesium-zinc-coated steel, aluminum and stainless steel
Warranty:	10 years on the durability of the materials

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

Mounting rails

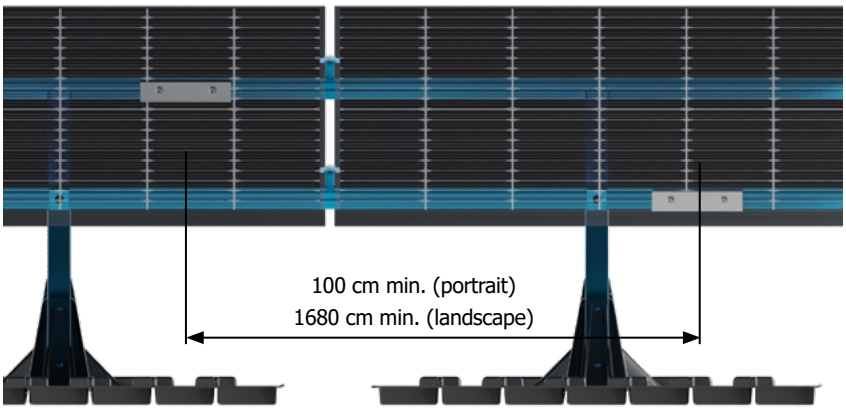
The mounting rail „GreenLight Profile ST universal" offers channels for thread-forming screws. The mid clamps and end clamps are mounted from above by means of click technology.



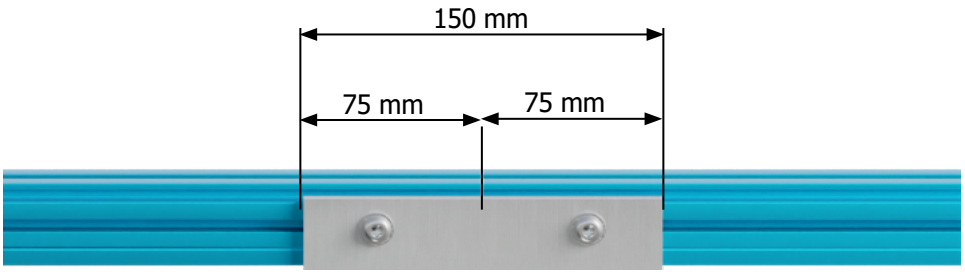
GreenLight Profile ST universal

Rail splices

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



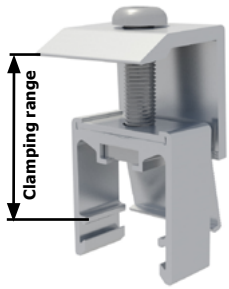
The individual ST profiles are screwed together using the ST connector and two M8x20 thread-forming screws each. To simplify installation, the profile rail is pre-drilled with a 5.5 mm drill bit.

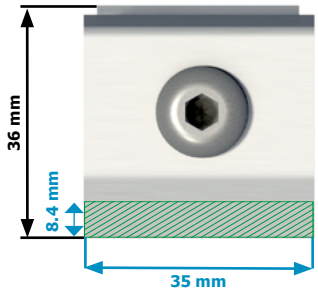


Mid clamps and end clamps

Height-adjustable mid clamps and end clamps with click technology allow for maximum flexibility when installing virtually all framed module types with a frame height of 30 – 50 mm. When fastening the PV modules to the mounting rails, always comply with the installation instructions of the module manufacturer.

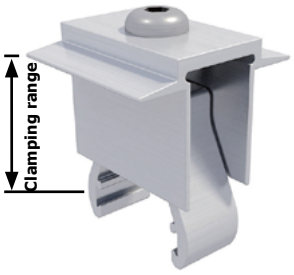
When performing the fastening by means of the mid clamp and end clamp, ensure that these clamp onto the module frame on the clamping area defined by the module manufacturer. Every person who installs the S:FLEX PV fastening systems is obligated to ensure that the existing clamping areas correspond with the module manufacturer's installation instructions. If the maximum clamping area of the mid clamps and end clamps are insufficient, it is also possible to obtain the components in different lengths.

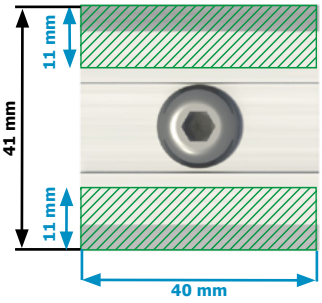




End clamp (EC)

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





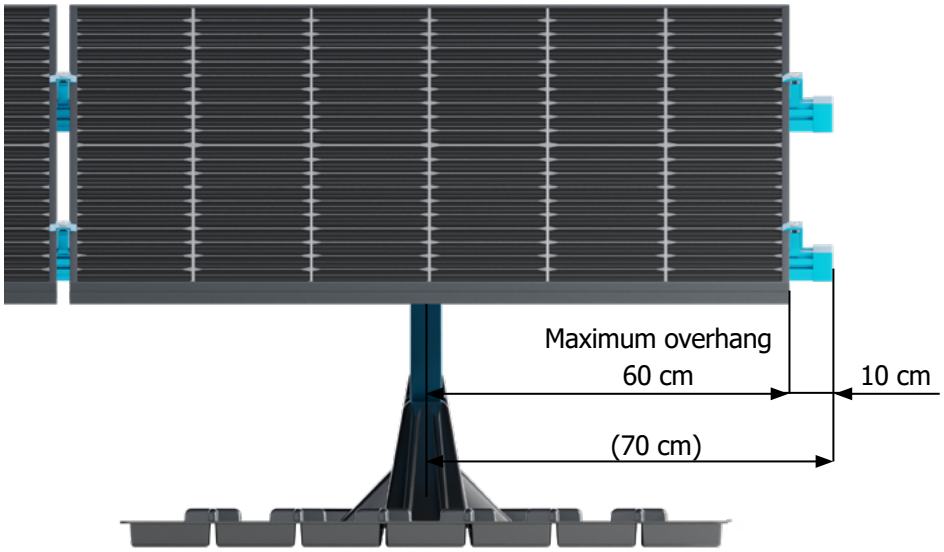
Mid clamp (MC)

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

If the mounting rail is longer than 24.0 m, the module array must be separated by placing two end clamps.
The mounting rail is to be separated in the area between the end clamps, so that a length compensation of 3 -5 cm is possible (expansion joint).

Laying base plates - module placement

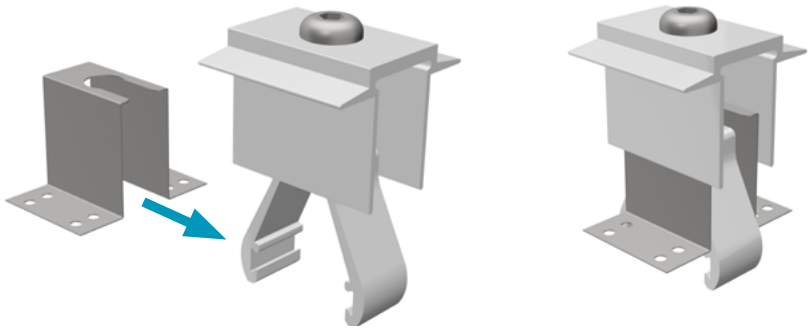
A maximum overhang of the modules of 60 cm at the beginning and end of the row is permitted.
Module installation according to the manufacturer‘s regulations.



Earthing

Equipotential bonding between the individual system components must be ensured in accordance with the respective country-specific guidelines and standards. System-specific properties (see splice technology) among other things can be used for this purpose.
An earthing concept is not part of this assembly instruction and must be calculated or compiled by the installer in accordance with the applicable standards and guidelines.

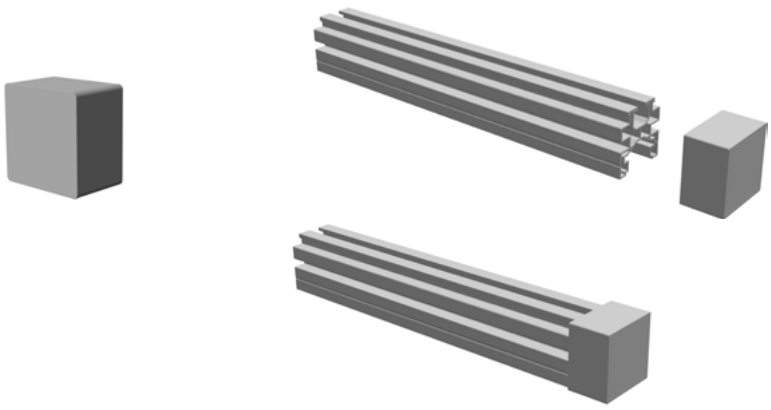
The earthing system is not a lightning protection system! When installing a lightning protection system, a specialist company must be consulted and a project-specific lightning protection plan drawn up. The module manufacturer's installation instructions must always be observed.



Optional items

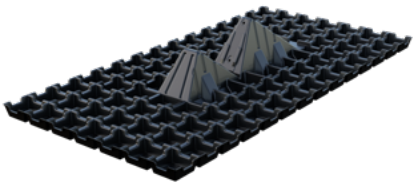
Covering caps

The S:FLEX PV mounting system includes matching covering caps for the mounting rails.

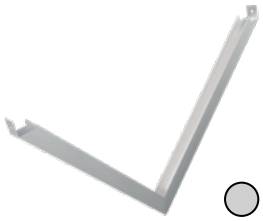


2.1 System components

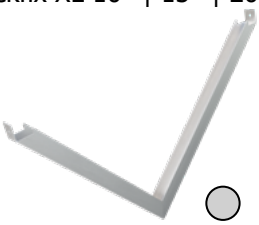
GreenLight base plate pro
1980mm x 980mm x 60mm



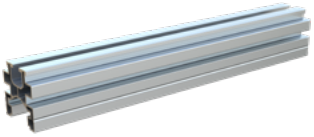
GreenLight angle bracket
Knickfix 10° | 15° | 20°



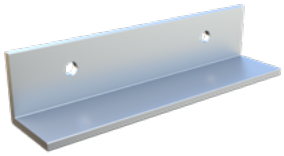
GreenLight angle bracket
Knickfix XL 10° | 15° | 20°



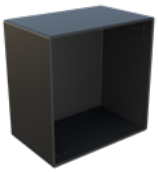
GreenLight Profile ST
universal l=3.300 mm |
l=6.100 mm



GreenLight rail splices ST
universal



GreenLight cover cap PE
grey



End clamp

EH AK II Klick 30-50

Mid clamp

MH AK II Klick 30-50

MH AK II Klick 30-50
with grounding plate

Screws

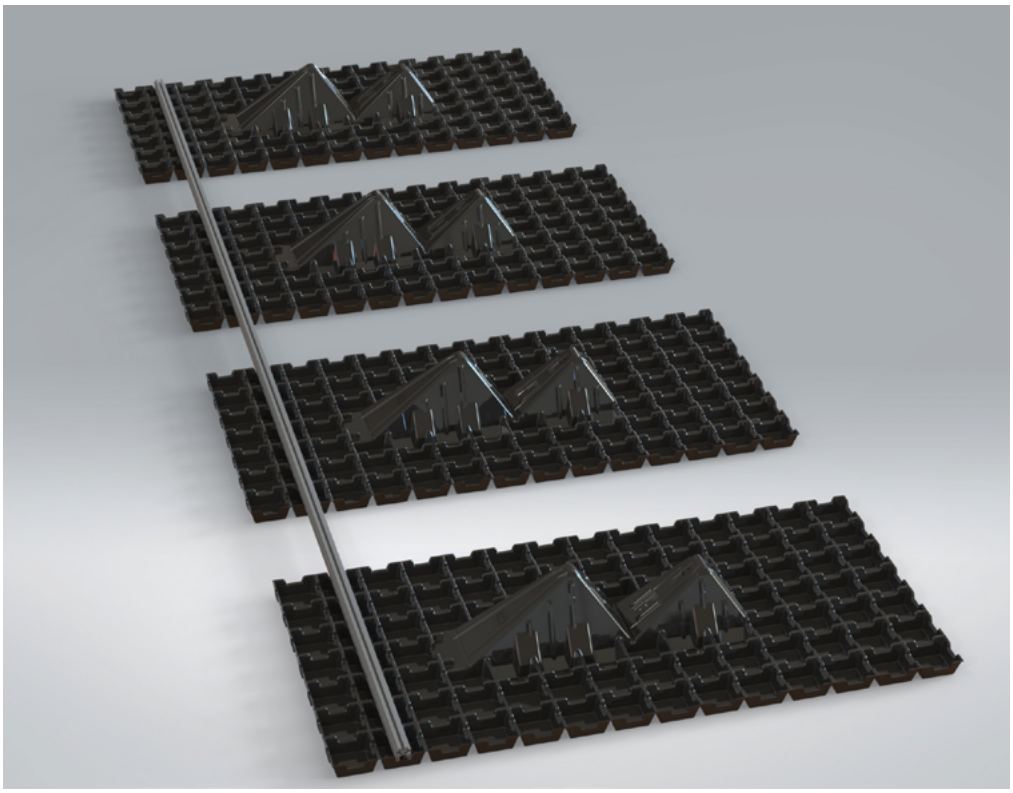
Pan head screw
5/16”10 ACME 8x20

Oval head screw M8x20 A2
thread-forming

2.2 System assembly

2.2.1 Setting up the GreenLight base plate

Clean the roof surface and make sure that there are no stones or other objects under the GreenLight base plate and that the underside of the base plate is free of dirt.
Protect layer according to the instructions of the roof waterproofing manufacturer.
Large unevennesses must be leveled with appropriate structural protection mats or taken into account later during rail installation (cut open rails).
Distribute the base plates on the roof surface according to the planning. The edge distances must be observed.
The distance between the base plates can be found in the planning documents. The module overhang at the beginning and end of a module row must not exceed 60 cm.
Align the base plates with the help of a cord. This ensures that the rails later run in one line.
In addition, insert a profile rail in the spaces between the base plates to align them.



The number and distribution of base plates according to the project report must be strictly adhered to. A deviating number and positioning of the base plates can jeopardise the stability of the system. The edge distance must be observed.

2.2.2 Ballasting of the GreenLight base plate

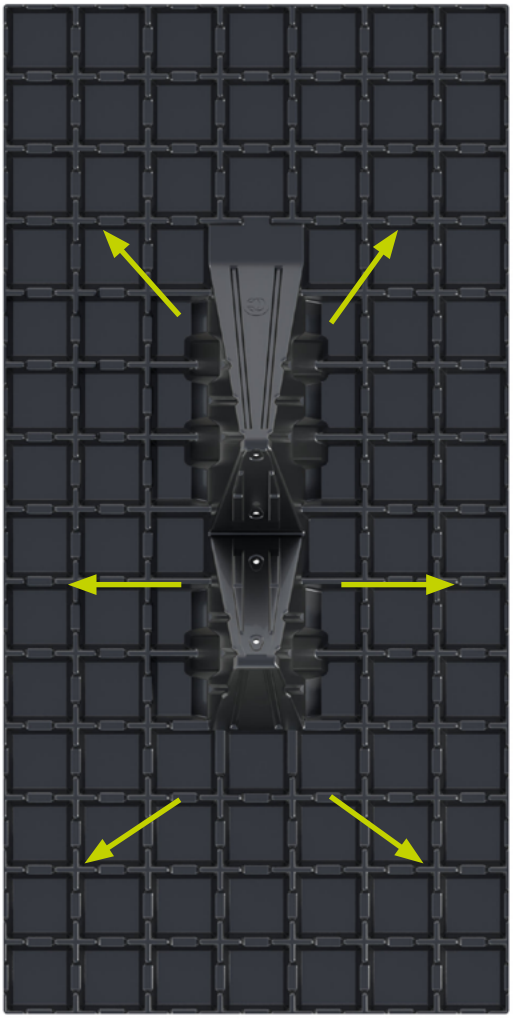
Now the GreenLight base plates can be filled with greening substrate. The exact nature and density of the ballasting as well as the planned filling height must be communicated to the planner of the photovoltaic system already in the planning stage. This information has a direct impact on the base plate spacing and the filling weight.

The minimum required fill weight is to be taken from the planning.

Mark the position of the GreenLight base plate on the substrate.

The fill should always be applied from the center outward to avoid fill between the GreenLight Base Plate and the substrate.

During the pouring process, check the alignment of the mounting rails and adjust the GreenLight base plate if necessary, as the modules will not be aligned later due to crooked profile rails.



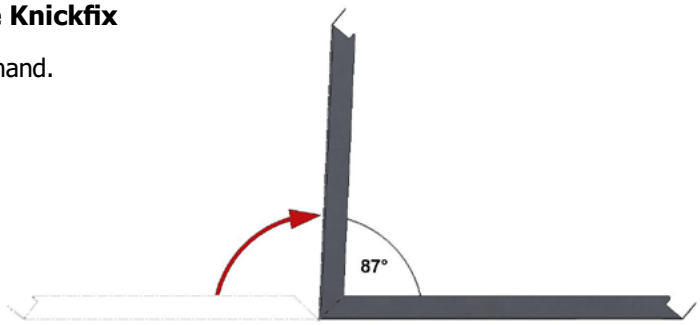
During the pouring process, make sure that no gravel/granulate gets under the GreenLight base plate; this must be removed if necessary. The threaded sleeves must be kept clean.

The pouring height of each individual row must be adequately documented. This is the only way to assert a possible warranty claim.

The pouring weight and ballast distribution specified in the project report must be strictly adhered to. Any deviation from this may jeopardise the stability of the system.

2.2.3 Installation of the Knickfix

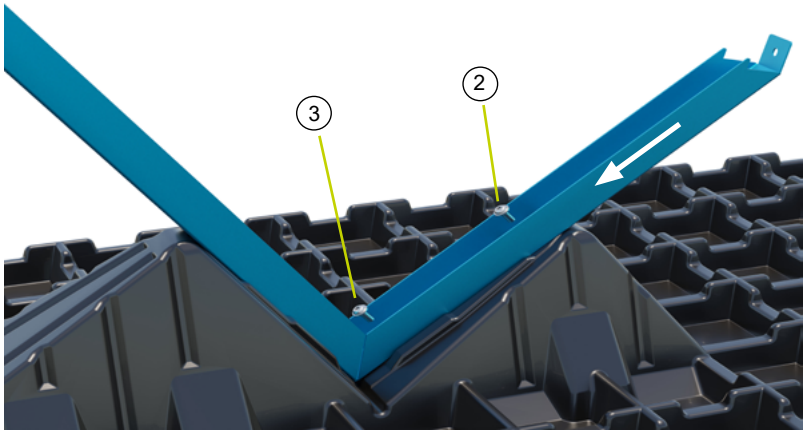
The Knickfix is bent to 87° by hand.



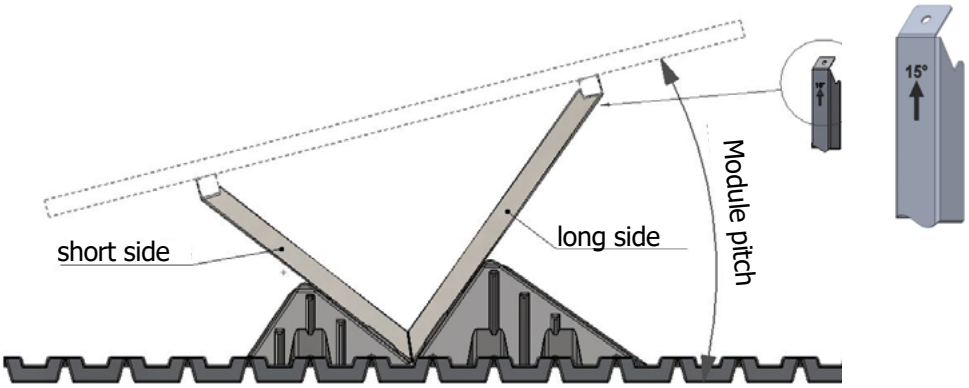
The Knickfix is then placed on the GreenLight base plate and fastened with 4 pan head screws 5/16" - 10 ACME. Position the pan head screws straight and centred to the internal thread of the clamping nut and tighten with the cordless screwdriver. (Tightening torque max. 15 Nm)

The clamping nuts sit loosely in the base plate, so they can be easily aligned.

1. Tighten one upper screw until a small collar forms between the screw and the profile. Press the bracket in the direction of the GreenLight base plate to ensure that the Knickfix angle bracket is fully seated.
2. Then tighten the lower screw on the same side.
3. Repeat the same procedure on the other side until all screws (4 pieces) are tightened.

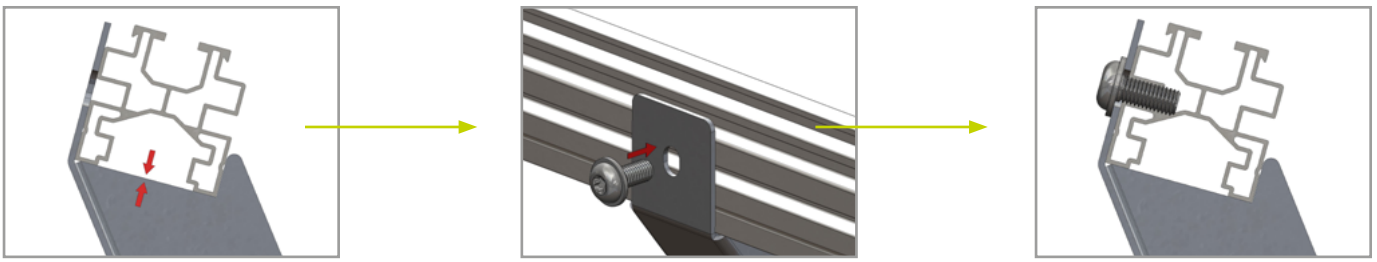


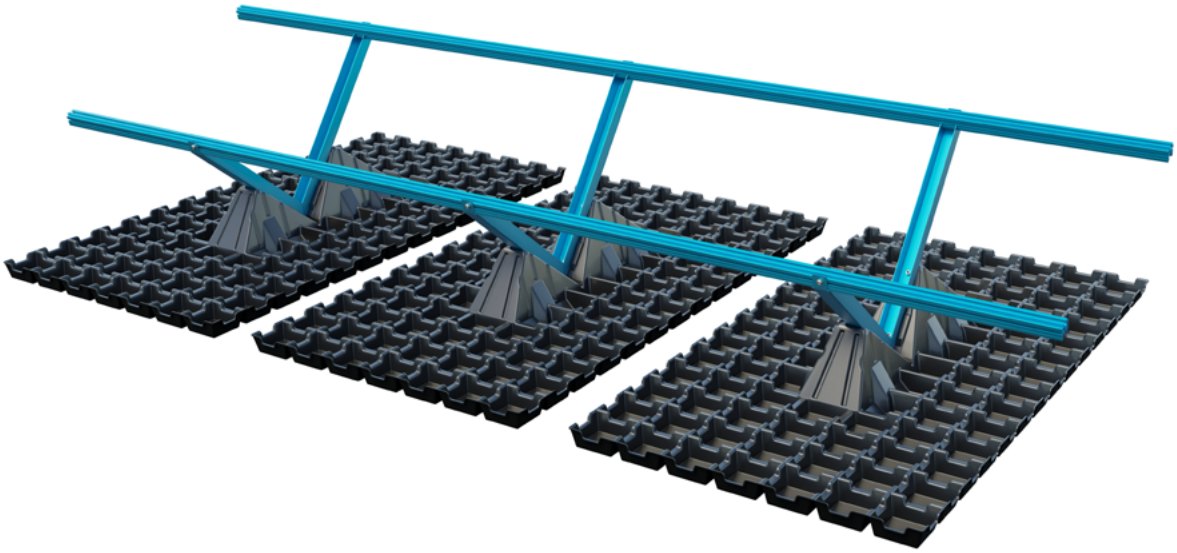
Make sure that the Knickfix angle bracket has the correct orientation.



2.2.4 Fastening the Profile ST

Now the individual ST profiles are screwed onto the Knickfix with the M8x20 thread-forming screws. To simplify installation, the profile rail is pre-drilled with a 5.5 mm drill bit. Then fasten the thread-forming pan-head screws with a tightening torque of max. 10 Nm.



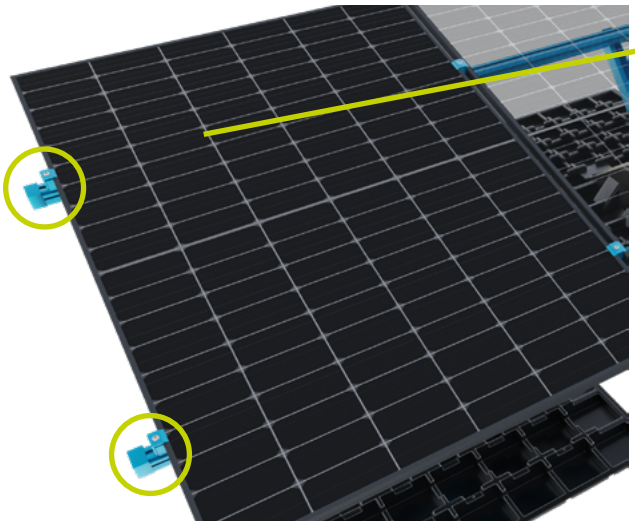


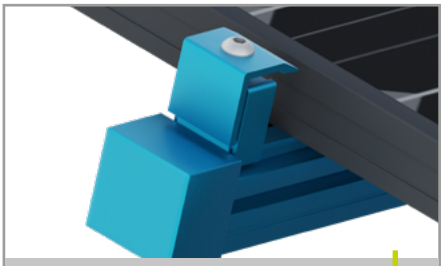
Completed installation of the mounting-rail layer

2.3 Module installation

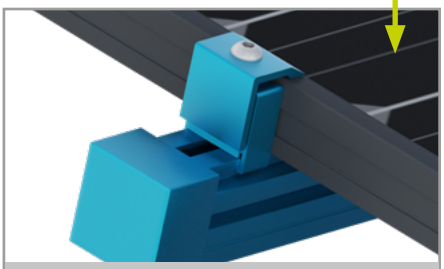
Module installation – (end clamps)

Make sure that the correct mid or end clamp with the corresponding cut length is used so that the defined clamping area of the module manufacturer is ensured. Place the module on the mounting rails. Mount the end clamps. Make sure that the end clamp is clicked in on both sides of the mounting rails and is flush with the module. Now adjust the end clamp to the module height and tighten the screw (tightening torque 8-10 Nm). Make sure that the specified clamping areas and clamping zones are observed. The distance between the module frame and the end of the rail must be at least 35 mm.



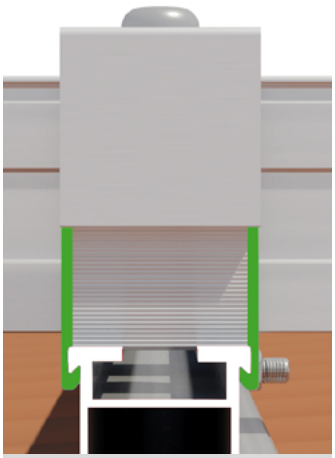


Click on the end clamp...



push flush and tighten

Mount end clamp.



Clicked on both sides

INCORRECT

End clamps are approved for one-time installation. Check that the end clamp has been clicked in.

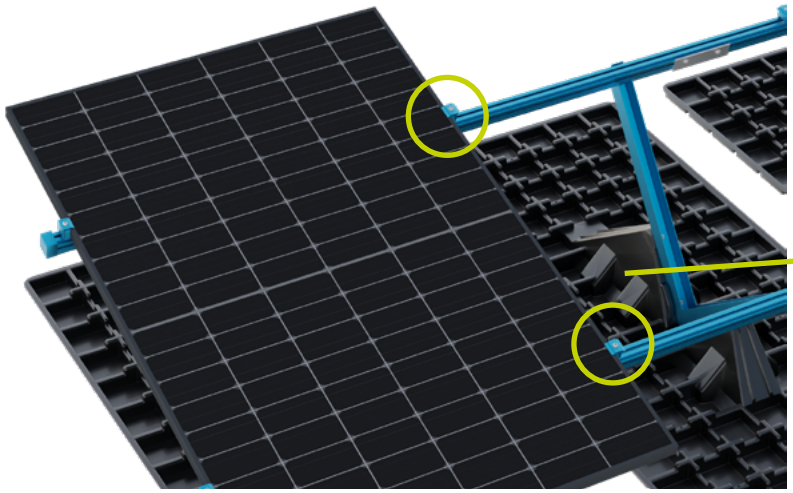
Defined clamping area

INCORRECT

Check the clamping area defined by the module manufacturer. (Observe the module manufacturer's specifications).

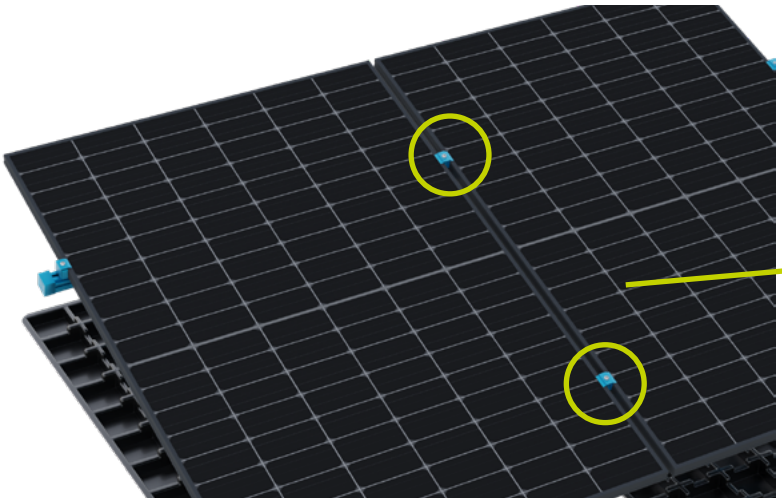
Module installation – (mid clamps)

Now mount the mid clamps. The earthing plate must be mounted (if required) before mounting the mid clamps. To do this, insert the earthing plate laterally between the "bracket" and the "upper part" in the mid clamp (Section 1.5). Then click the mid clamp onto the mounting rail and push it onto the module. Make sure that the mid clamp is clicked in on both sides of the mounting rail.
Make sure that the specified clamping areas and clamping zones are observed. When using the earthing plate, the module must be positioned between the plate and the "upper part" of the mid clamp. The earthing plate is then pressed against the mounting rail from the underside of the module frame.



Click on mid clamp and push flush

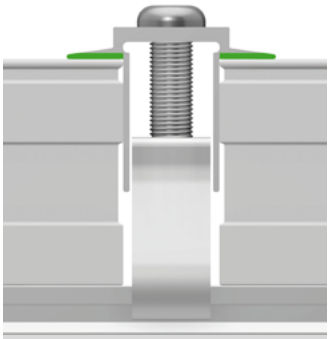
Align the upper row of modules with the aid of a guide or levelling instrument.
Now slide the next module underneath the mid clamp, adjust the mid clamp to the height of the module's frame and tighten the screw (tightening torque 8–10 Nm).



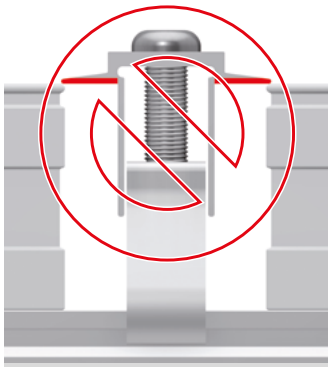
Slide module underneath and tighten mid clamp

Install mid clamp.

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

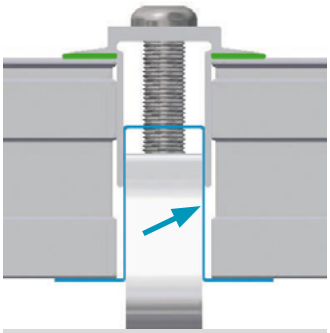


CORRECT
- defined clamping area -

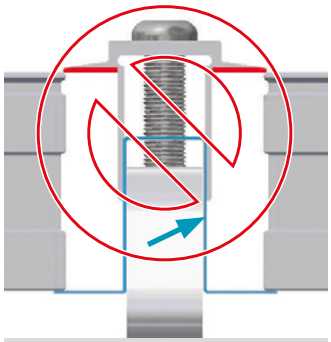


INCORRECT

Mounting with grounding plate:

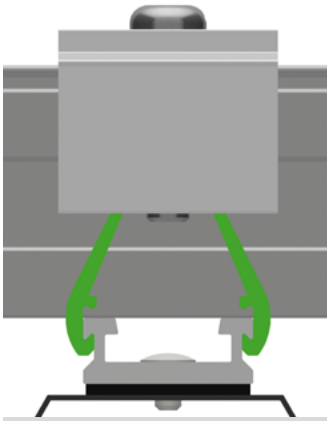


CORRECT
- defined clamping area -

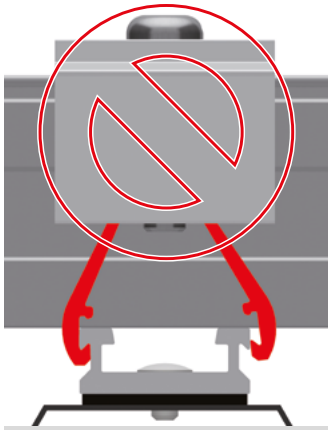


INCORRECT

Check the clamping area defined by the module manufacturer, follow the instructions in section 1.5 (observe the module manufacturer's specifications).



CORRECT
- clicked on both sides -

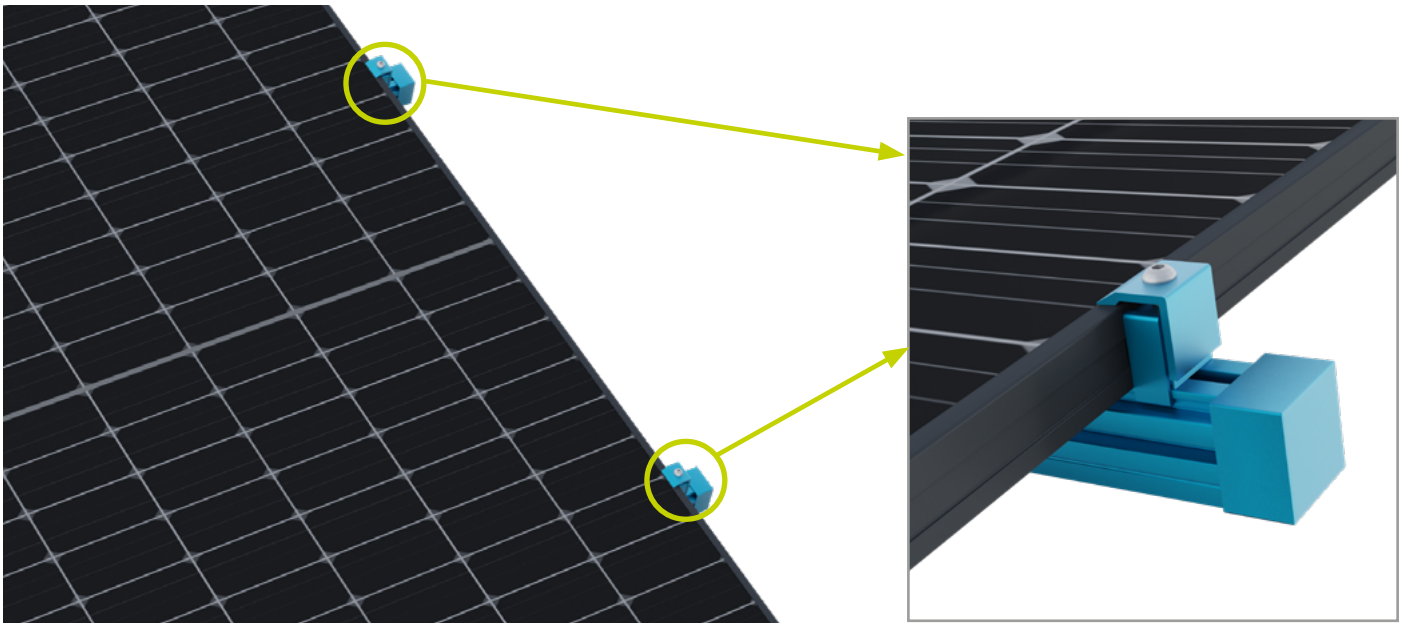


INCORRECT

Mid clamps are approved for one-time installation. Check that the mid clamp has been clicked in.

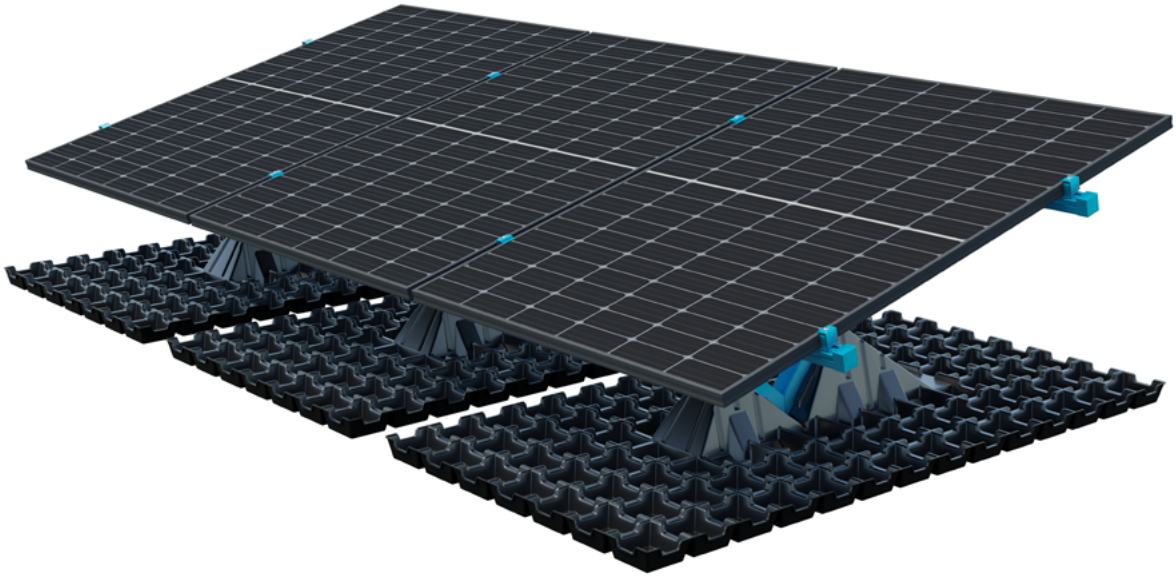
Module installation – (end clamps at the end of the row)

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 mounting rail and push it flush against the module. Ensure that the end clamp is clicked in to both sides of the mounting rail. Now adjust the end clamp to match the height of the module and tighten the screw (tightening torque 8–10 Nm).
Pay attention to the defined clamping areas and clamping zones. Shorten projecting rails parallel to the module frame. The distance between the module frame and rail end must be at least 35 mm.



Install end clamp on the last module.

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 mounting system.

Improper disassembly may cause damage to the modules.

Remove the modules and store them safely.
Disassemble mounting system and safely store all of the parts.
Check the roof surface and roof covering for damage. Any damage must be repaired professionally to prevent water ingress and consequential damage. Any damaged tiles must be replaced, any drill holes in the sheet metal sealed, and any openings in the roof cladding closed.

Disassemble mounting 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 mounting system must only be disposed of by a specialist waste management company. Adhere to the applicable national standards and guidelines.

4.1 User agreement

We point out that the mounting system is sold within the framework of a purchase contract.
The assembly / processing or the purchase by third parties is not carried out in the name of or for S:FLEX GmbH.
It must be carried out by qualified personnel strictly in accordance with the specifications of the assembly instructions.

The design and planning of the system must be carried out with the S:FLEX planning software. S:FLEX GmbH is not responsible for the project-related statics of the roof structure, the obtaining and documentation of the roof manufacturer's approval for the installation of the corresponding fasteners on the respective roof (in terms of warranties) as well as for the professional execution.

Defects and damages as well as a limited or lack of functionality of the system due to faulty installation and/or installation deviating from the installation instructions and/or the project report shall exclude a material defect for which S:FLEX GmbH is responsible. In the event of improper processing, the rights of the purchaser due to a material defect shall expire.

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

4.2 Warranty / disclaimer

The information regarding dimensioning provided in these instructions are merely suggestions based on prior experience. Binding installation frame structural analyses can be create 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, 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.