Installation instructions

S:FLEX GreenLight ON TOP

Frame system for existing green roofs

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

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

The S:FLEX GreenLight ON TOP system for green roofs is a solar substructure designed for energy-generating green roofs, combining solar power and greenery to add ecological value to flat roofs. In addition, greater biodiversity and water retention is achieved thanks to the green roof. The GreenLight ON TOP system can be applied to existing green roofs. A stable solar substructure made of aluminium and steel provides high resistance to wind uplift, wind shear and snow loads.

The green roof system allows for installations with an inclination angle of 10°, 15° or 20° in either south-facing or east/west-facing orientation. It is designed for upright and transverse module installation. The load distribution and spacing of the substructure must be calculated by S:FLEX GmbH in accordance with the wind zone plan.

1.1 Intended use

The S:FLEX PV fastening system for green roofs is a frame system for mounting PV modules. It is designed exclusively for the installation of PV modules.

Any other use in this regard is considered misuse of the product. In particular,
the intended use requires compliance with these installation instructions.

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

1.2 About this document

These instructions describe the installation of the S:FLEX GreenLight ON TOP system for existing green roofs. To prepare for installation, S:FLEX GmbH must calculate the ballast requirements and determine the spacing of the substructure components (Knickfix spacing, ground rails).

The existing roof surface and substructure must first be thoroughly checked for damage, stability and load-bearing capacity. The roof surface must be checked for evenness before installation (substrate with greenery or gravel surface). Uneven roof surfaces must be levelled, substrate or gravel topped up or removed as needed, and excessive plant growth cleared.

It must be ensured that a full version of the latest installation instructions is used for the installation.

1.3 Warnings

The warning texts provided in these installation instructions relay safety-related information.
These consist of the following:

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

Non-compliance may lead to property damage.

1.4 General information – standards and guidelines

Every photovoltaic system must be installed in accordance with the specifications in the respective installation instructions and 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 instructions 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-specific structural calculations. The S:FLEX mounting system must be designed and planned using 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 specialist installer or 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 (number of clamping points, module clamping area 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.

The applicable fire protection regulations must be observed during installation. Fire protection walls may not be built over, fire protection compartments must be preserved and the corresponding spacing regulations must be adhered to.

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 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 local 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.

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 properties – S:FLEX GreenLight ON TOP

Components per system unit:	1 x ground rail, 1 x Knickfix support, 1 x Knickfix brace, profile rail, small items (screws, profile connectors, ground rail connectors, mid clamps and end clamps)
Weight per unit:	9.3 kg, weight without load, without PV module
Module field length:	max. 24 m continuous module field
Ballast:	The load and distance between the substructure (Knickfix distances, ground rail) must be calculated by S:FLEX GmbH in accordance with the wind zone plan. Ballast blocks (50 x 50 cm) are not included in the scope of delivery. Ballast blocks must be made of weather-resistant material (recommendation: concrete).
Roof inclination:	An inclination of up to 5° is approved; for inclination angles above 5°, approval is subject to a technical assessment by S:FLEX
Module inclination:	10°, 15° or 20°
Roof connection:	No structural roof connection required, for installation on green roof surfaces and gravel roofs
Materials:	Magnesium-zinc-coated steel, aluminium and stainless steel
Warranty:	10 years for the durability of the metallic materials

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

For personal protection during installation, cut-resistant gloves must be worn.

Tools and materials required for assembly

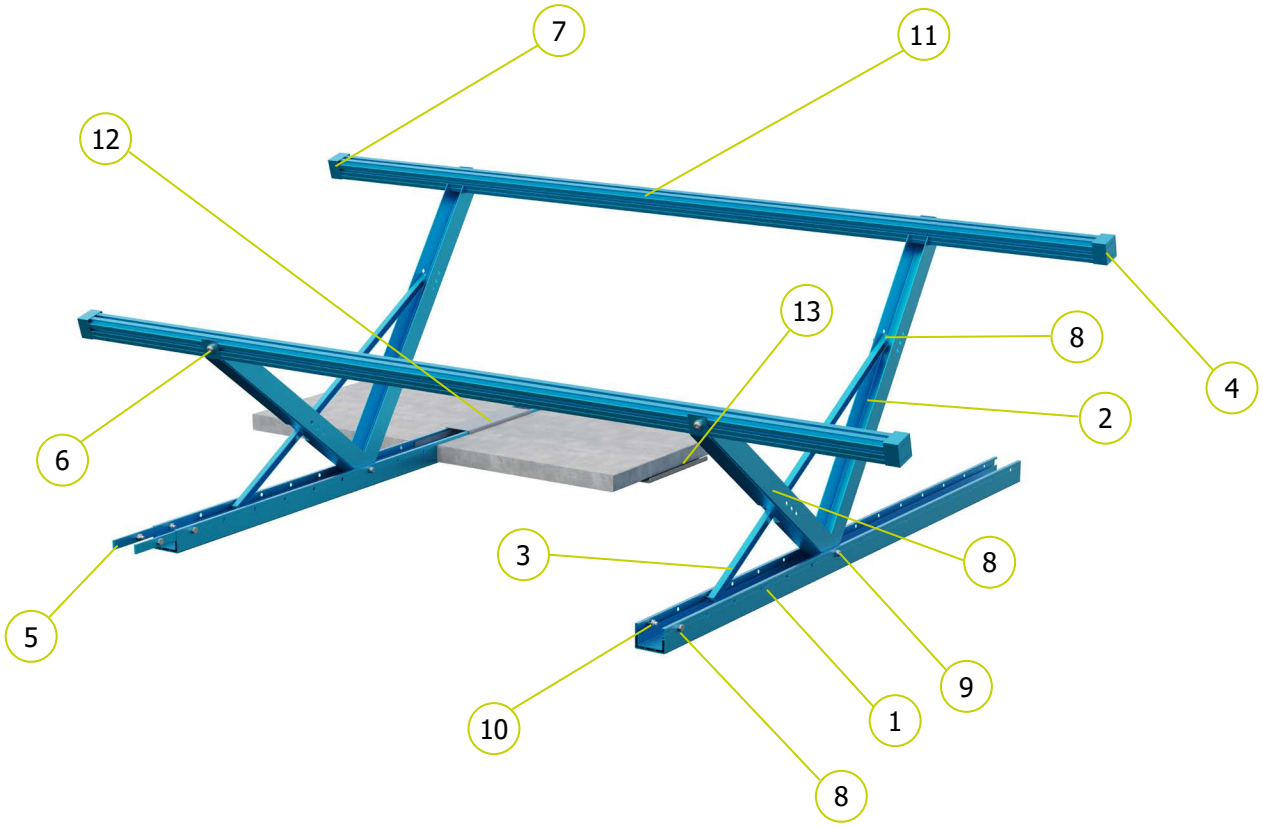
Hex key bit size: 5 mm

Torx bit size: TX40

2 pcs. Hex socket size: SW 13 mm

Torque spanner 15–20 Nm

System structure – S:FLEX GreenLight ON TOP



1 Ground rail

2 Knickfix

3 Knickfix brace

4 Profile rail

5 Ground rail connector

6 Pan head screw M8x20 (self-tapping)

7 Covering cap

8 Hexagon head screw M8 x 20 mm

9 Hexagon head screw M8 x 75 mm

10 Hexagon nut M8 (with polyamide ring)

11 Profile connector

12 Top ballast plate

13 Bottom ballast plate

2.1 System components

GreenLight OT ground rail (perforated)

GreenLight OT Knickfix support 10° | 15° | 20°

GreenLight OT ground rail connector

GreenLight OT Knickfix brace

GreenLight Profile ST universal

GreenLight PE covering cap

End clamp

End clamp AK II Klick 30-50 A

Mid clamps

Mid clamp AK II Klick 30-50 A

Mid clamp AK II Klick 30-50 A grounding plate

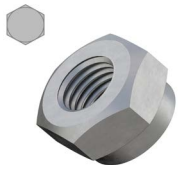
Screws

Pan head screw M8x20

Hexagon head screw M8x20

Hexagon head screw M8x75

Hexagon nut M8 (with polyamide ring)



GreenLight profile connector ST universal

GreenLight OT top ballast plate

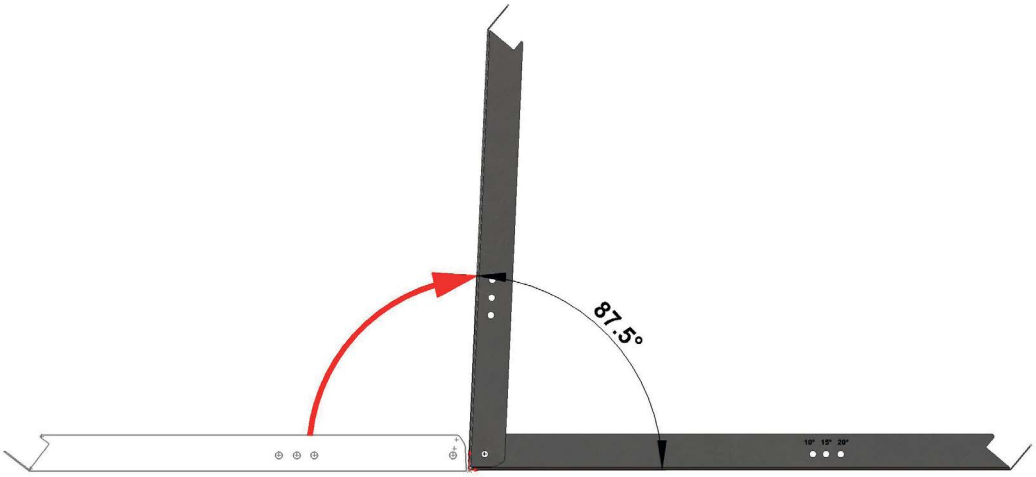
GreenLight OT ballast plate bottom

2.2 Frame assembly

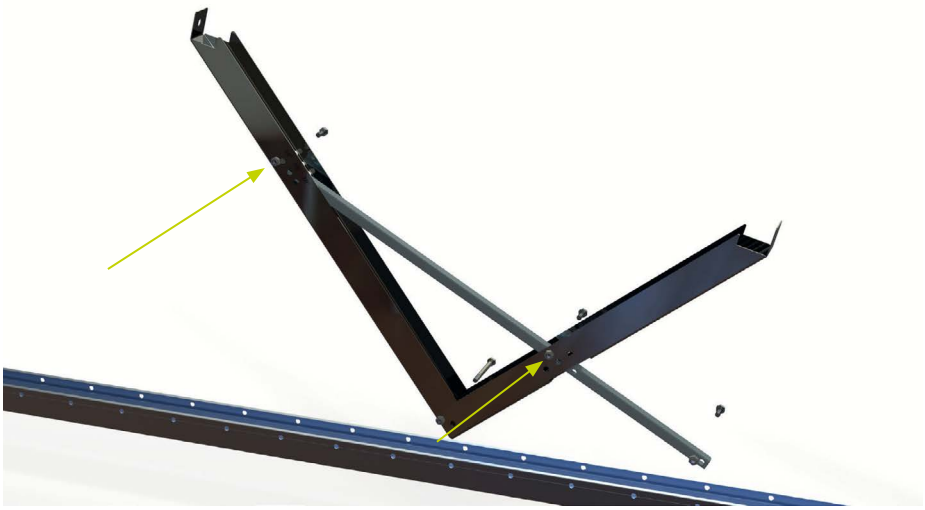
To prepare the roof, uneven roof surfaces must be levelled. Add/remove substrate/gravel. Remove dense plant growth.

A flat roof surface must be guaranteed. If the system is installed on uneven roof surfaces, there is a risk of deformation of the components. This can affect the stability of the system.

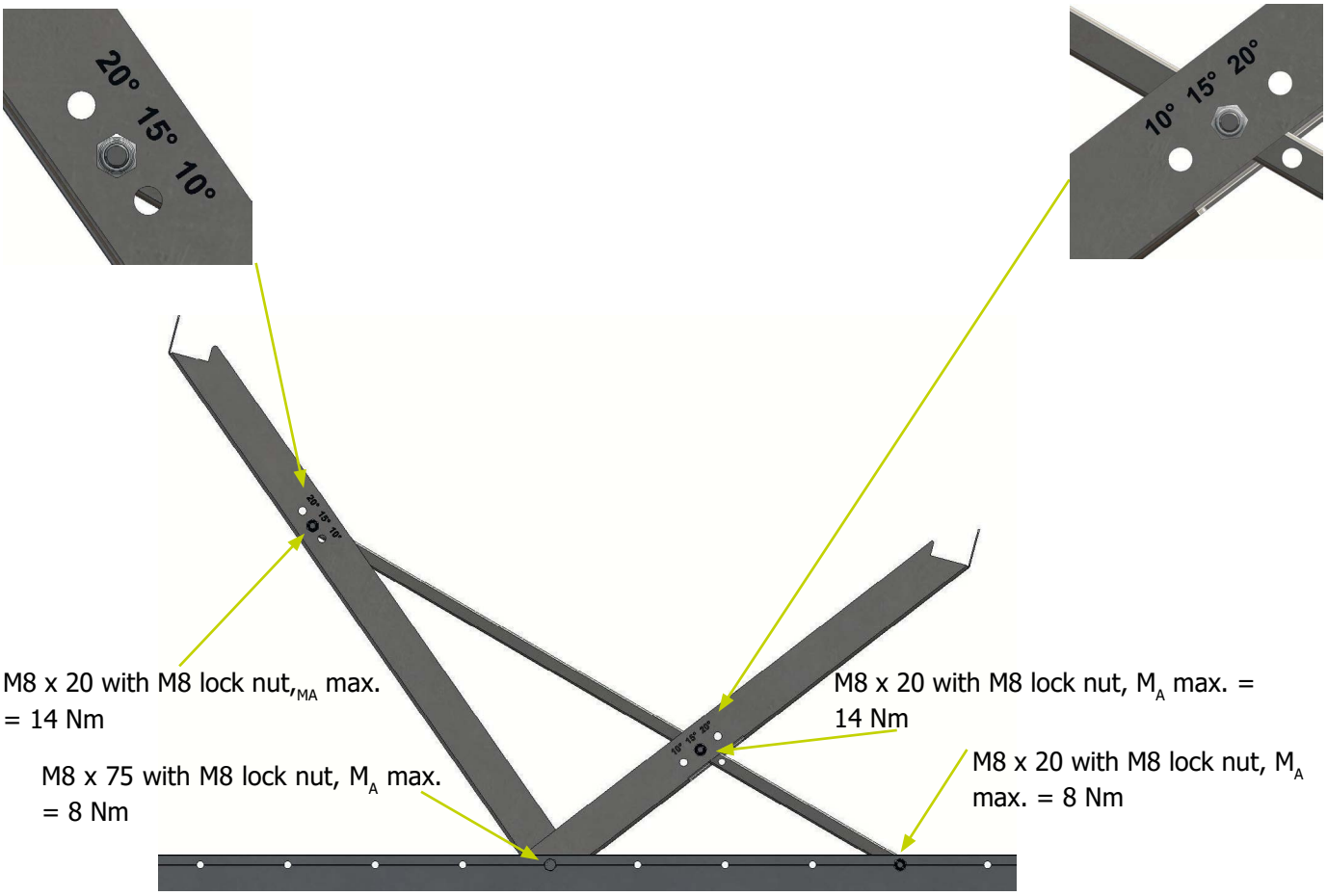
2.2.1 (Pre-)assembly of Knickfix support with Knickfix brace on ground rail



- The Knickfix is bent to 87.5° by hand
- The Knickfix is then positioned on the ground rail at the specified distance and screwed in place. Use hexagon head screw M8 x 75 with lock nut M8 for this step (M_A = max. 8 Nm)
- Install the Knickfix brace: 10°, 15° or 20° as standard -> freely adjustable
- Attach the Knickfix brace in the position for the desired angle of inclination. Fasten it with hexagon head screw M8 x 20 and lock nut M8. M_A = max. 8 Nm for connection of brace to ground rail and M_A = max. 14 Nm when connecting the brace with Knickfix.

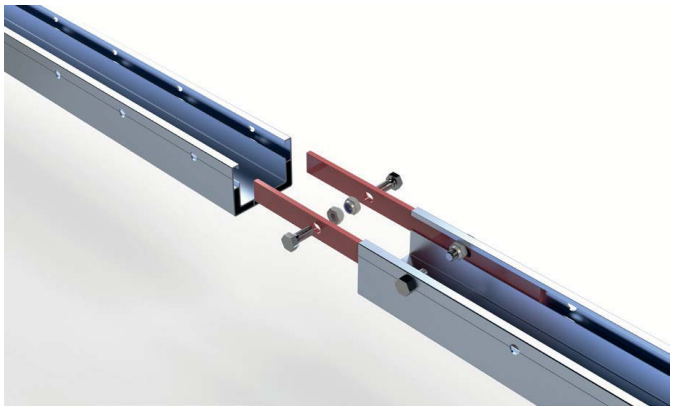


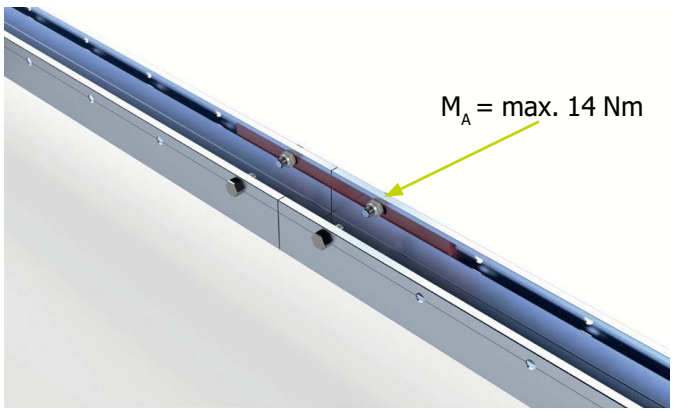
To simplify handling, fit the M8 lock nut on the outside and position the M8 x 20 hexagon bolts in the U-profile on the brace.



2.2.2 Ground rail connector

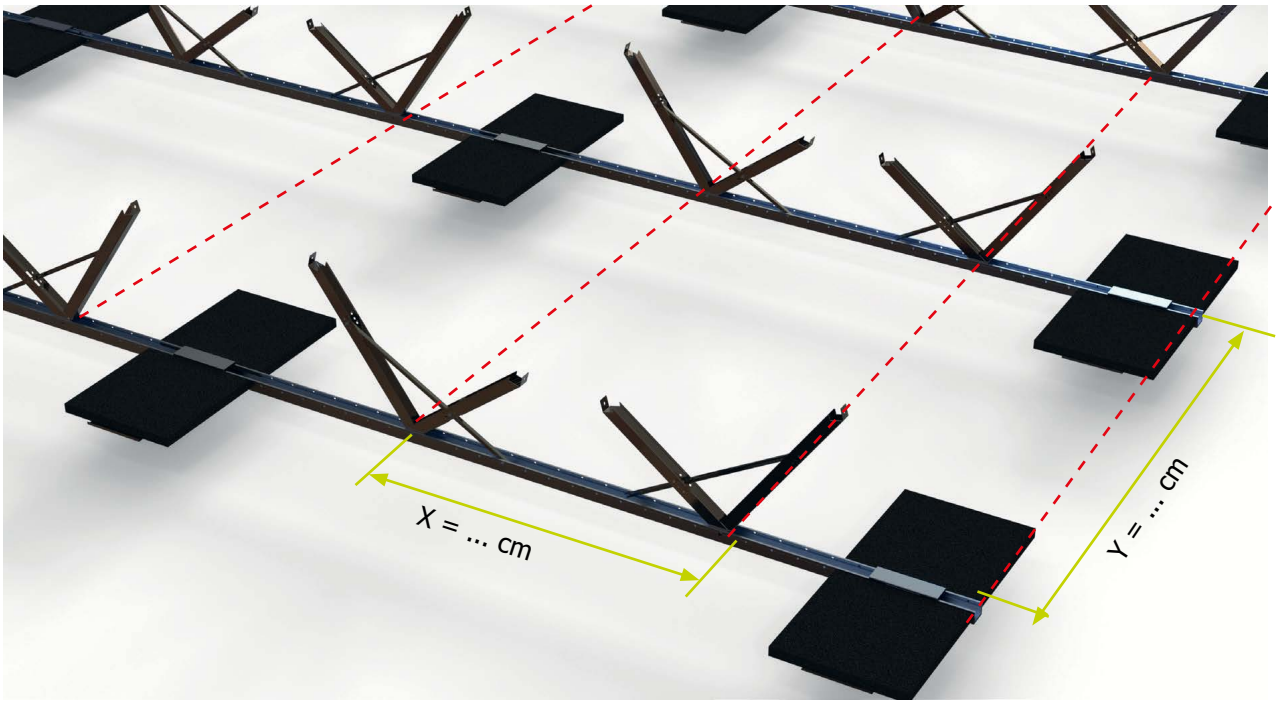
- 2 pcs. Ground rail connector per interface
- Fasten with hexagon head screw M8 x 20 mm (4 pcs.) and lock nut M8 (M_A = max. 14 Nm)

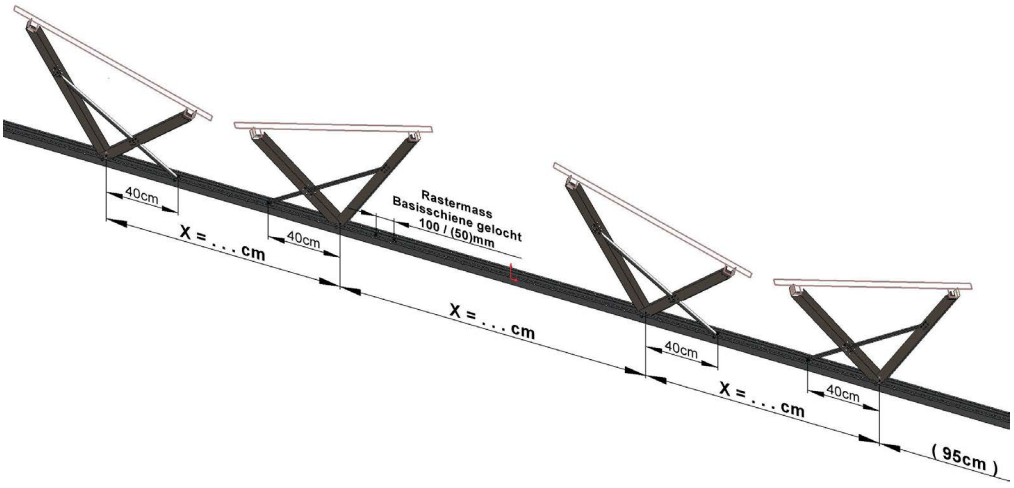




2.2.3 Setting up/positioning the ground rail with Knickfix

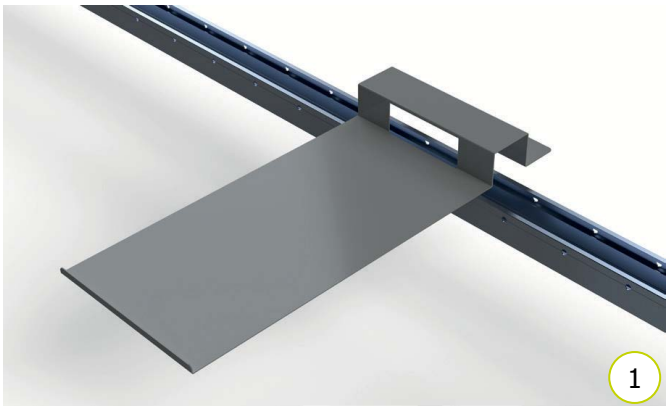
- Place the pre-assembled ground rail on the roof surface. The edge distances, Knickfix X spacing and ground rail grid dimension Y can be found in the planning documents (installation plan).
- Ensure that the ground rails are parallel to each other and that the Knickfix is in the correct position.
- Check the alignment spacing of the Knickfix (base position of hex bolt M8 x 75 mm).
- Check that the ground rails are parallel to each other.

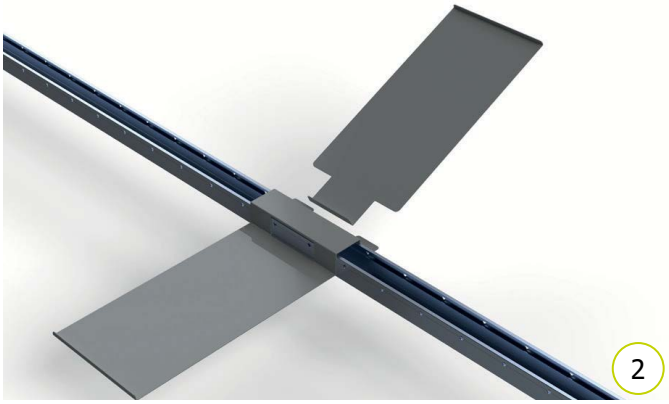


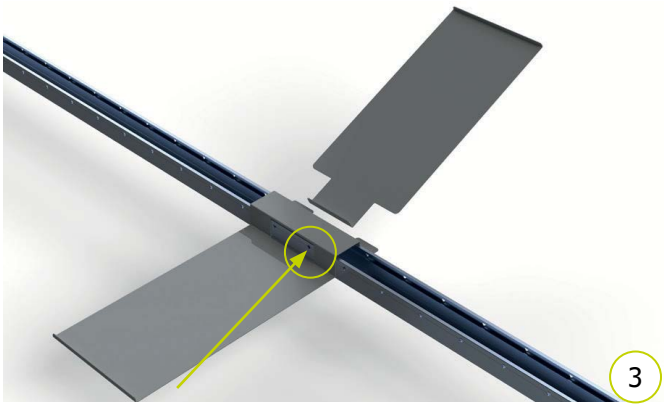


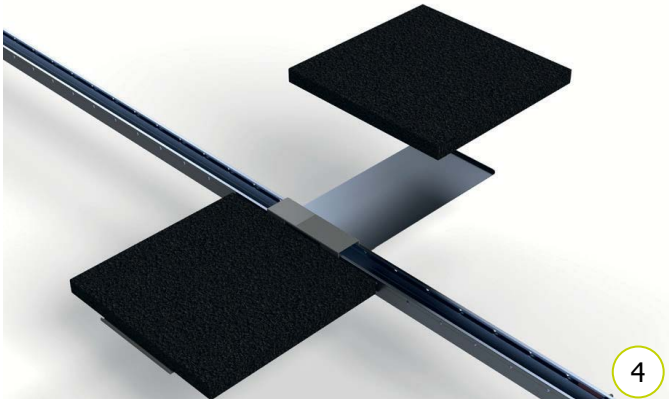
2.2.4 Ballast plates and ballast blocks

- Fit the ballast plates at the top and bottom.
- To secure the ballast units against displacement, secure the ballast plates with an M8 x 20 screw (see detailed image 3).
- Weigh down ballast plates with ballast blocks 1x 2 pcs. = ≥ 42 kg / 2x 2 pcs. = ≥ 84 kg.
- The prescribed spacing for the ballast units (consisting of ballast plates at the top and bottom and ballast blocks) can be found in the planning documents (installation plan).





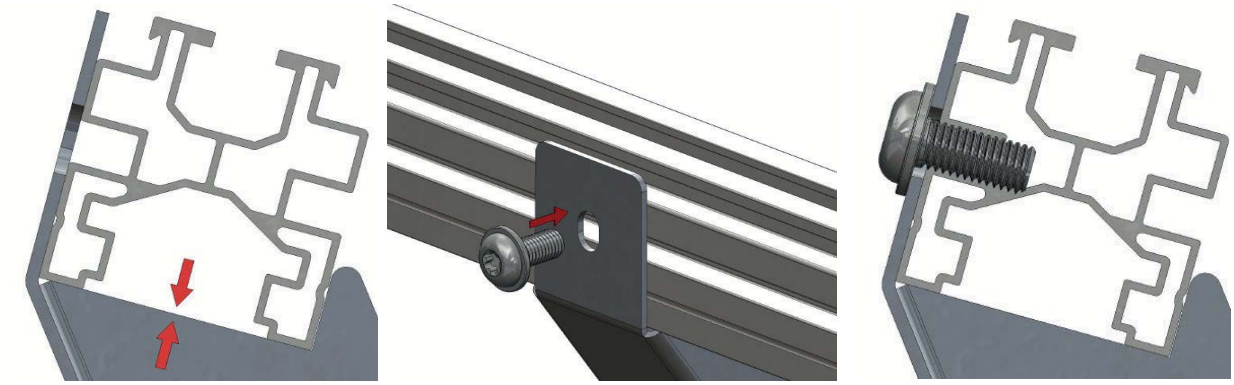


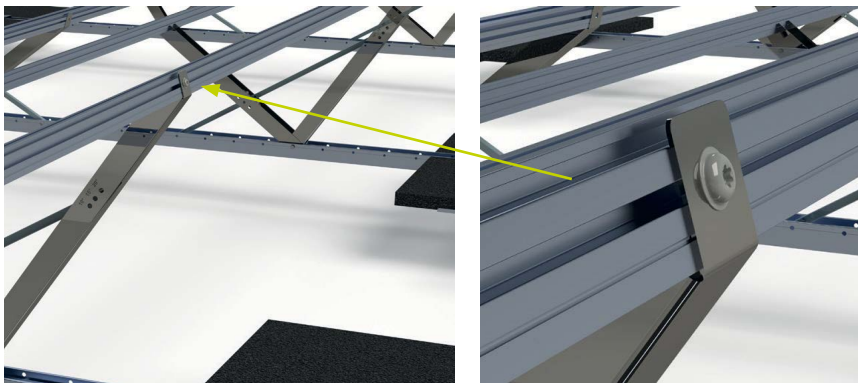



M8x20

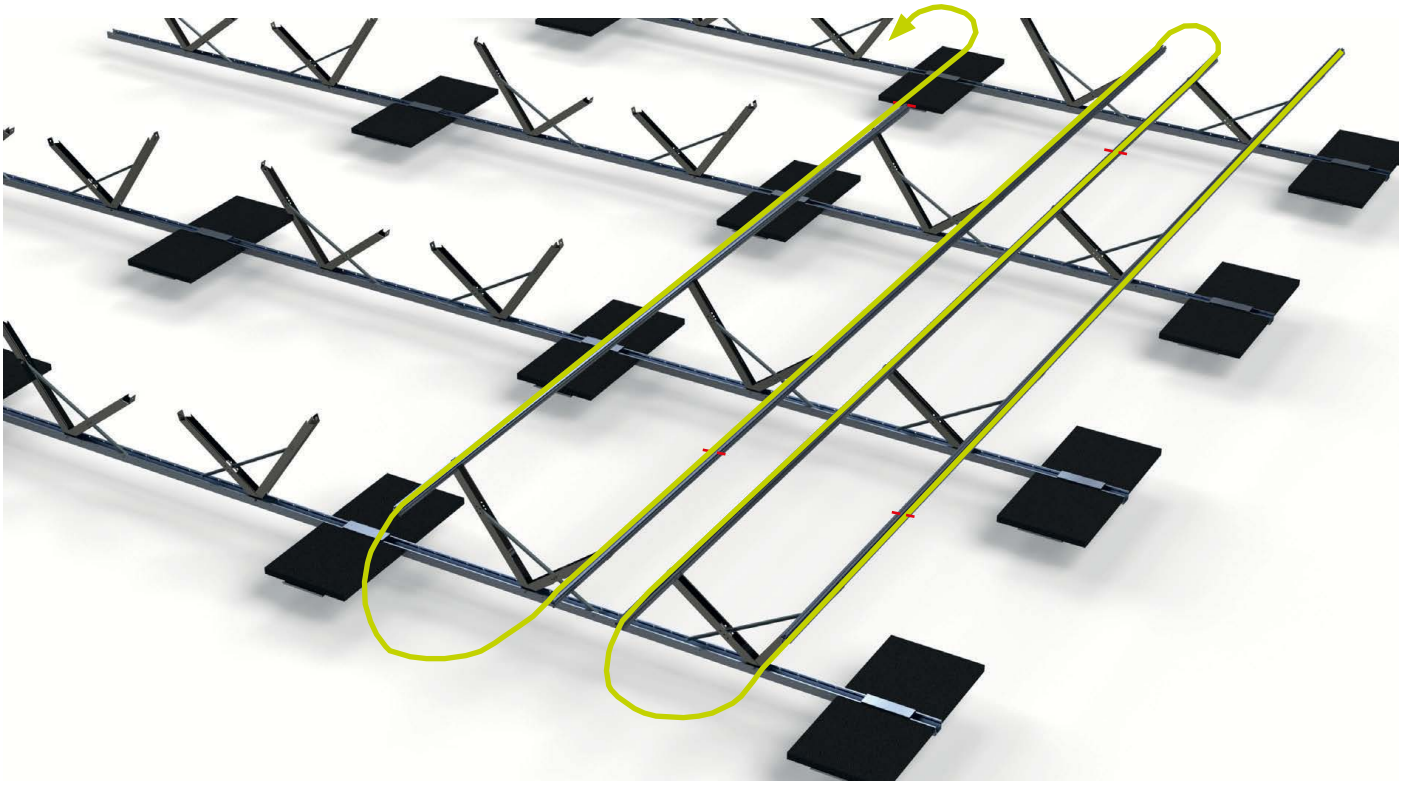
2.2.5 Installing the profile rails

The individual profile rails can now be screwed onto the Knickfix brackets using the M8 x 20 pan-head screws with thread groove. To do this, pre-drill the holes with a 5.5 mm drill bit and then penetrate the profile wall with the pan-head screws (M_A = max. 10 Nm).

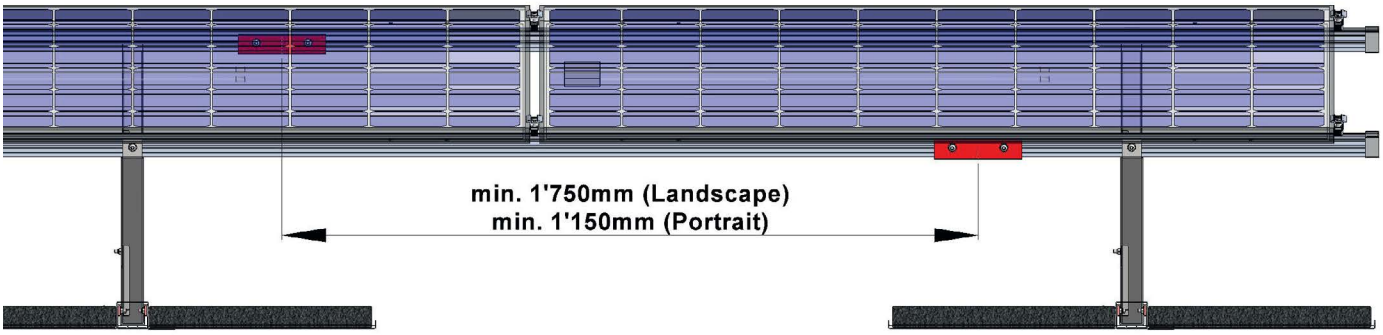


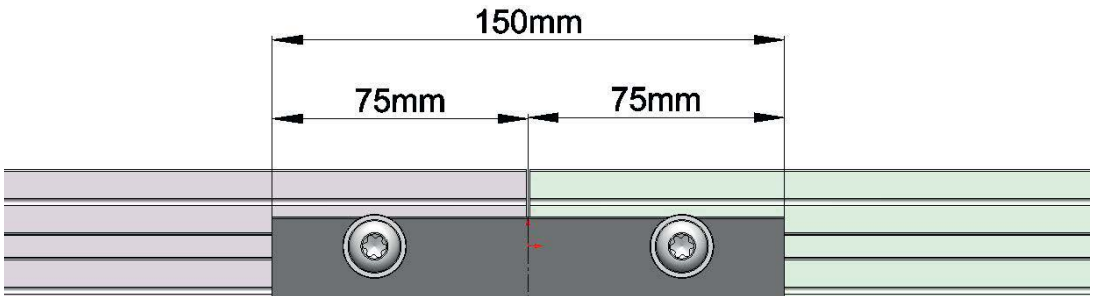


- Installation is carried out in a 'serpentine' pattern.
- If the remaining length of the profile rail at the end of a row is less than 1000 mm, it is considered waste. If the remaining length is more than 1000 mm, it will be used in the next row.



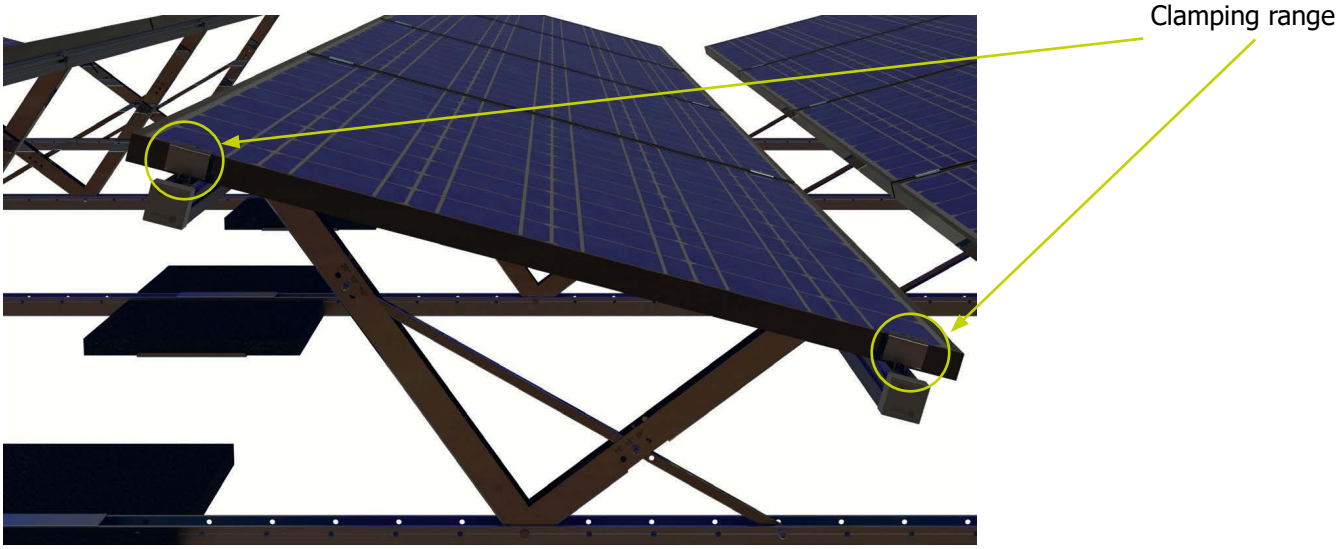
The individual profile rails are connected using the profile connector and two M8 x 20 mm thread-forming pan-head screws each. The minimum distance between two profile connectors (centre component to centre component) is 1750 mm in the landscape version and 1150 mm in the portrait version.

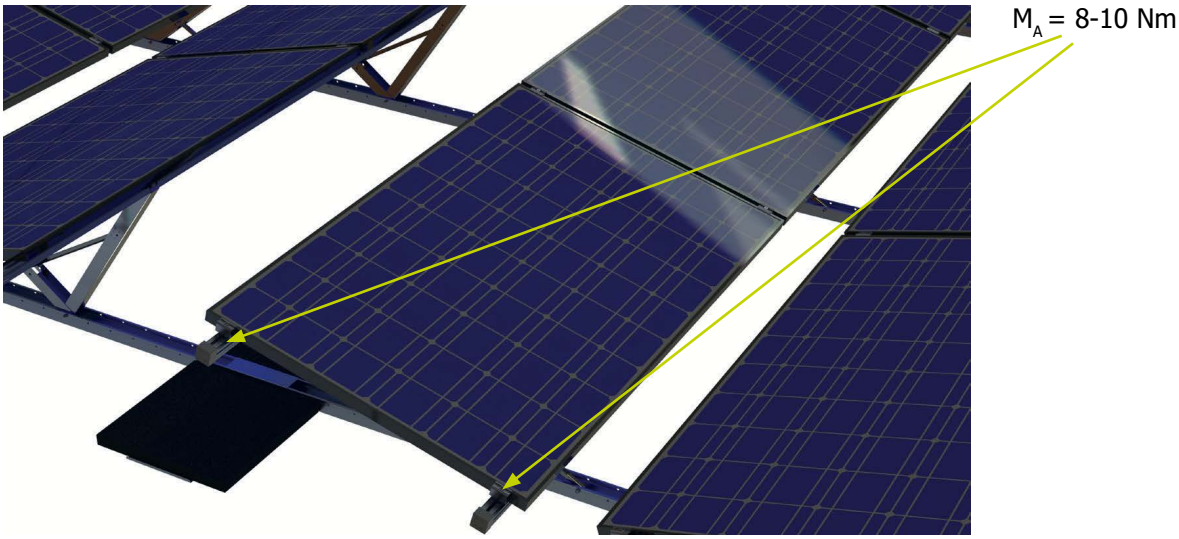


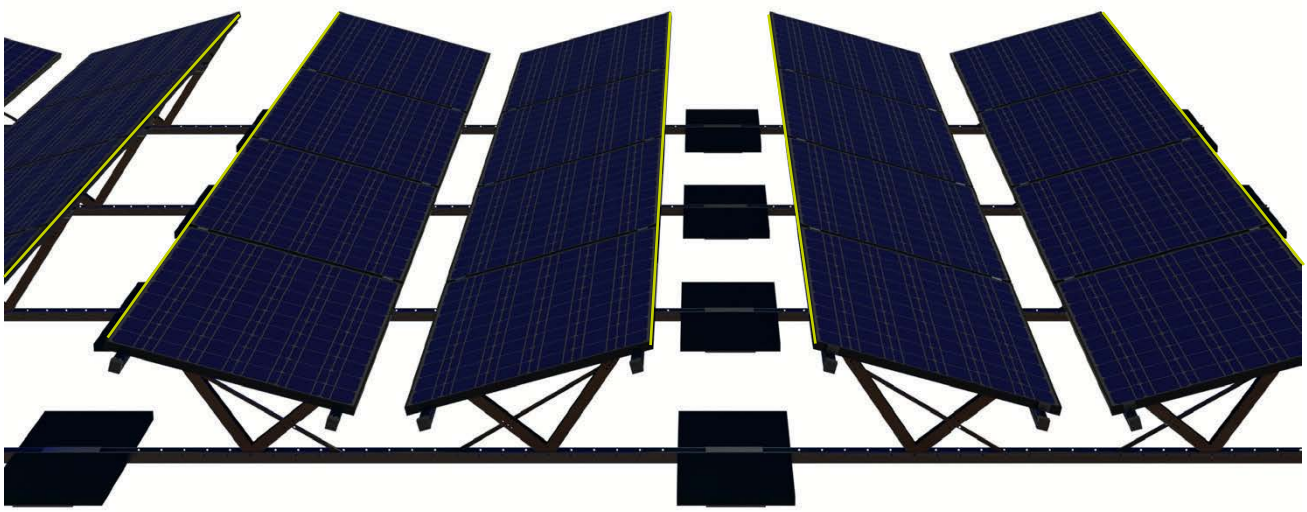


2.3 Module installation

- Module installation must be carried out in accordance with the manufacturer's instructions.
- Comply with the prescribed clamping ranges
- Max. the maximum tightening torque for the module clamp: M_A = 8–10 Nm





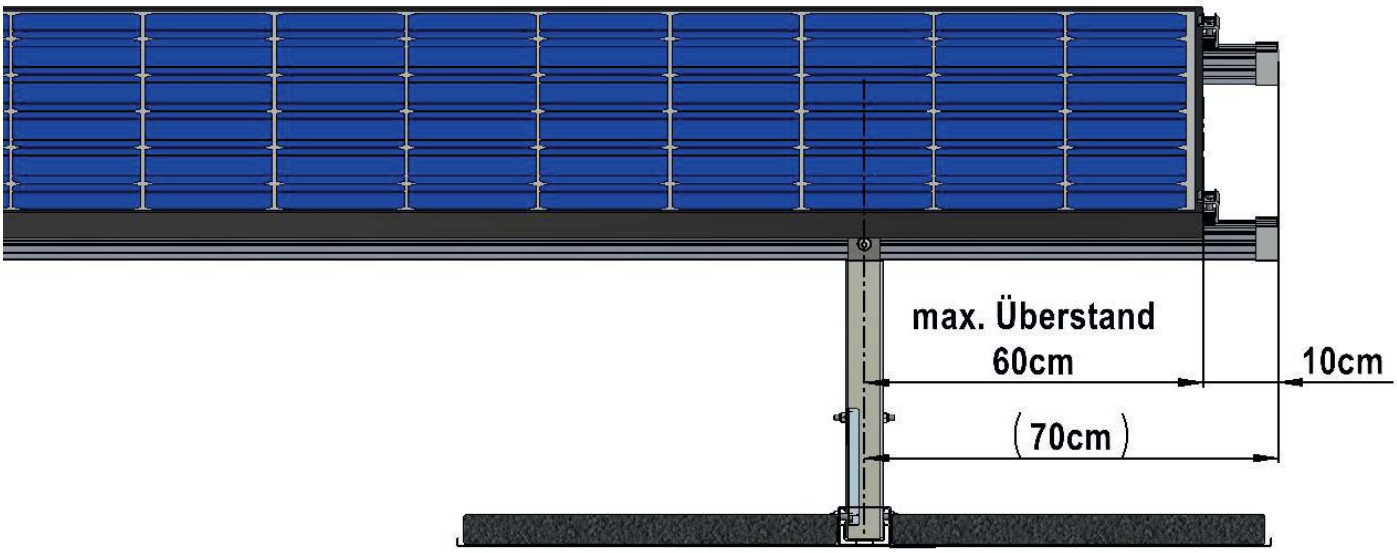


The following points must be observed when installing the modules:

- The tightening torque ($_{MA}$) for the module clamps is 8–10 Nm.
- A suitable torque spanner or a cordless screwdriver with torque limiter should be used for this purpose. Applying lower tightening torques may result in system failure.
- Any deviation from the module layout planned by S:FLEX GmbH is only permitted with prior coordination and written approval from the manufacturer.
- The customer is responsible for obtaining structural approval for the area to be used.

Note on installing the GreenLight ON TOP substructure – module placement

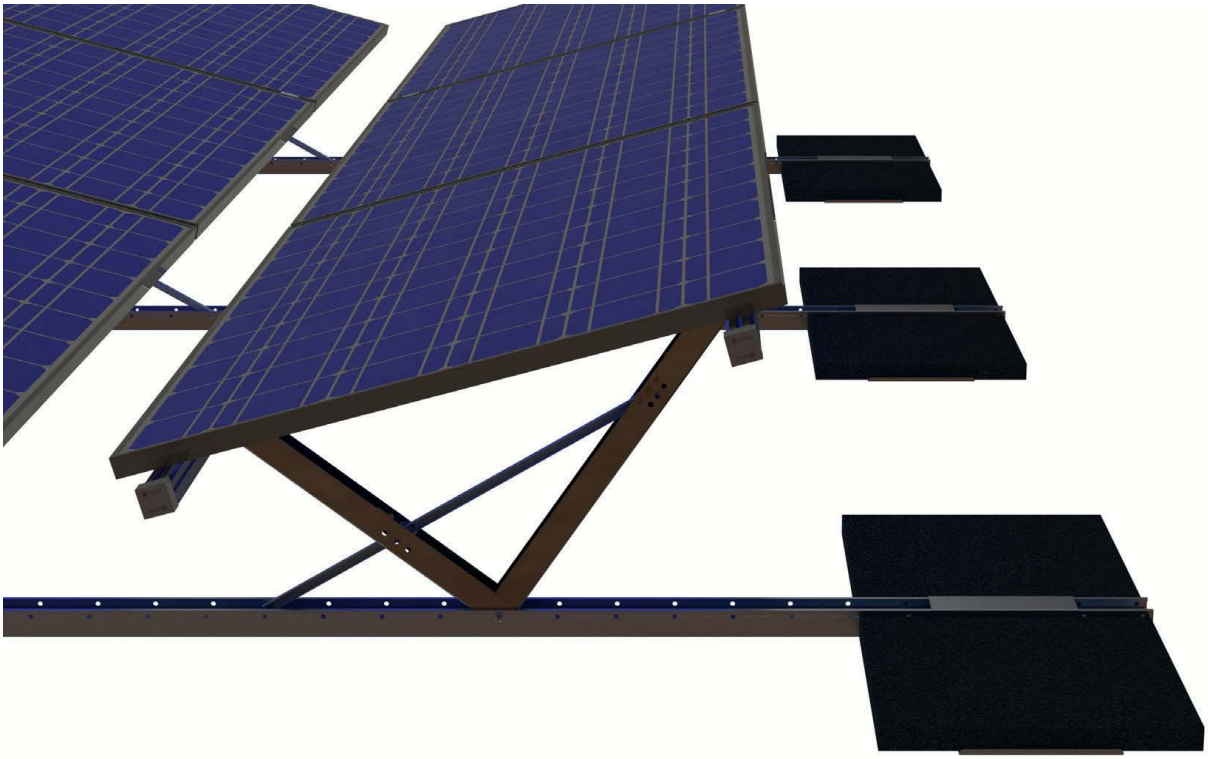
- A maximum module overhang of 60 cm is permitted at the beginning and end of the row
- Follow the manufacturer's instructions for module installation



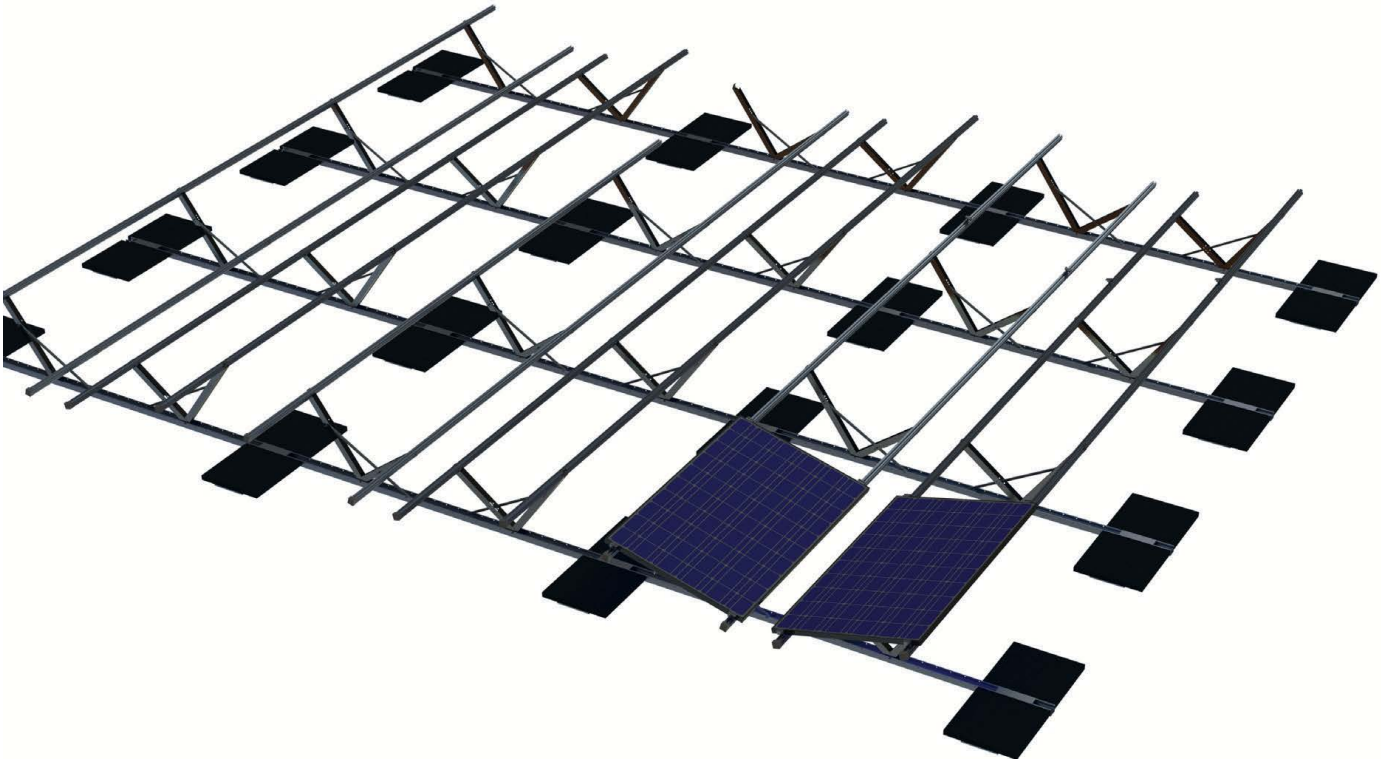
Lightning protection

- The conductivity of the mounting profile is 34–38 MS/m.

Load: weigh down the ballast unit with ballast blocks measuring 50 cm x 50 cm x 4 cm (≥ 21 kg)*.



- The surface weight, number of ballast units including the number of ballast blocks, and their positions/spacing can be found in the planning documents.
- Weight per ballast unit 1x 2 pcs. = ≥ 42 kg / 2x 2 pcs. = ≥ 84 kg



* The type of ballast can be customised for specific projects. It must be ensured that the required load is met.

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.

Improper disassembly can lead to damage to the modules.

Remove the modules and store them safely.
Disassemble frame 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 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

We expressly point out that the mounting system is sold under 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 carried out 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 systems 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 carried out 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.