

FlatFix Fusion
mounting system for flat roofs
for solar panels in a single
landscape arrangement

CONTENT

	page
1. Introduction	1
2. EC declaration of conformity	1
3. General installation conditions	2
4. Product description	4
5. Components overview	4
5.1 Exploded-view	4
5.2 List of parts	5
6. Assembling preparation	6
6.1 Control tools and accessories	6
6.2 Determining position and measuring solar panels	7
6.3 Cleaning the roof	7
7. Installation	8
7.1 Mounting of roof support to base elements	8
7.2 Mounting of base profile to base elements	9
7.3 Connecting of FlatFix Fusion segments	10
7.4 Positioning of FlatFix Fusion segments	11
7.5 Mounting of ballast holders	11
7.6 Mounting of 1st solar panel	13
7.7 Mounting of other solar panels	14
7.8 Mounting of cable clips & cables	15
7.9 Placement of ballast	16
7.10 Mounting of rear side wind deflector	17
7.11 Mounting of wind deflector left/right	19
7.12 Several rows behind one another	20
7.13 Shorten base profile (option)	20
8. Annex	21

THESE INSTALLATION INSTRUCTIONS SHOULD REMAIN WELL KEPT FOR FUTURE USE!

We recommend that you contact your supplier for the duration and conditions of the guarantee.

We also refer to our General Sales and Delivery Terms and Conditions that are available on request.

The manufacturer renounces all responsibility for damage or injury caused by not carefully follow these installation instructions and the disregard of customary caution in the transport, assembling and use of the FlatFix Fusion installation system.

As a result of constantly striving to improve, it may occur that the product is different from what is described in this manual. For this reason, the instructions given serve only as a guideline for installing the product mentioned in this manual.

This manual has been compiled with the utmost care, but the manufacturer cannot assume responsibility for eventual errors in this manual or the consequences thereof.

Furthermore, all rights are reserved and no part of this manual may be reproduced in any way.

1. Introduction

This manual describes the installation of the FlatFix Fusion mounting system for flat roofs (for solar panels in landscape arrangement).

Read the instructions carefully so that you are totally familiar with the contents of the manual. Follow the instructions in the manual carefully. Always perform the operations in the correct order.

Keep the manual in a safe and dry place. Should the manual get lost, then there is the possibility to ask for a new copy from Esdec B.V.

2. EC declaration of conformity

Manufacturer: Esdec BV
Paderbornstraat 4
7418BP Deventer
The Netherlands
Tel: +31 570 624 177

Declare under our responsibility that the product; the FlatFix Fusion mounting systems is in compliance with the following norms:

NEN-EN 14437: 2004
CEN/TR 15601: 2012
NEN-EN 1991-1-3 + C1: 2011
NEN-EN 1991-1-4+NB
NEN 6707: 2011
NPR 6708: 2013
BRL 4708
NEN 7250: 2013
MIS012
MCS012

3. General installation conditions

General

The non-compliance with the requirements mentioned in this document may cause that all guarantee and product liability claims lapse.

The information, comments and advices in this document are binding and must be checked for completeness and timeliness. Esdec BV reserves the right to amend this document without further notice.

Stability and condition of the roof

The roof must be in good condition and strong enough to bear the weight of the solar panels, including the additional materials, ballast, wind and snow loads. Check the stability of the roof and adjust the roof/structure where necessary; engage a constructor when in doubt. Take care that the load reserve of the roof is not exceeded, locally or as a whole.

Insulation/roofing

The continuous pressure load (point load) of the insulation and the roofing must be checked and approved before the assembly. The suitability of the base plates combined with the roofing should be checked and found to be in order; engage a roofing contractor when in doubt.

Safety warnings

- The assembly of the FlatFix Fusion mounting system should be standard implemented by qualified technical personnel (at least two qualified people).
- Adding or removing parts may have an adverse effect on the functioning and is strictly not advised!
- The roof must be clean, dry, flat and free from algae, etc. for the placement of the solar panels.
- Avoid mounting during high winds and a slippery wet roof area.
- The assembly of the FlatFix Fusion mounting system may only take place at temperatures between 5 ° and 40 ° C, because of assembly joints of the synthetic material parts.
- Always work on the roof with fall protection and, if necessary, with safety nets and edge protection.
- Wear shoes with reinforced toes and sturdy non-slip soles.
- Always wear the appropriate protective clothing when performing the work.
- Always use a lifting aid/hoist installation when moving equipment (solar panels, etc.)
- Always place the ladder on a firm, stable surface.
- Always place the ladder at an angle of approximately 75 ° and allow it to protrude approximately 1 meter above the eaves.
- If possible, secure the ladder at the top with a rope or tie.
- Work preferably according to the manual “work safely on roofs”.

Application range FlatFix Fusion

- Wind zone (1 to 3, with the exception of the coastal area)
- Roof height (3 - 12m). If you roof is higher, you should contact your supplier.
- Type of roofing: Concrete, bitumen / EPDM / PVC / TPO
- Roof slope: Maximally 3°. Between 3° and 7° (for PVC between 2° and 7°) the base plates should be glued. Please contact your supplier if the roof slope is more than 7°.
- Arrangement: Landscape installation
- Maximum solar panel dimensions: length 1200-1306mm, 1465-1610mm, 1611-1680mm, 1900-1972mm, width 980-1008mm, thickness 25-50mm.

Edge zone

The distance from the solar panels to the edge of the roof should be approximately 1/5 of the height of the building, with a minimum distance of 30cm; this is because of strong turbulent wind flows in this zone. No solar panels may be placed in whole or in part in this zone. The edge zone that should be adhered to comes from the FlatFix Fusion calculator.

Measurement

All sizes and dimensions are in cm, unless otherwise mentioned.

Ballast

If your roof is more than 12 meters, we advise you to get in touch with your supplier; they can then determine the correct weight depending on your situation.

Use stones or gravel as ballast. The required ballast can be calculated by using the FlatFix Fusion calculator.

Standards, specifications and regulations

When installing the mounting system, it is important to follow the installation instructions and the associated standards in order to prevent accidents. Keep the following standards, specification and regulations particularly in mind:

- Building Act Construction
- PPE Personal Protective Equipment
- KEMA Inspection of Electro-technical Materials
- DIN 1055 Design loads for buildings
- DIN 18299 General rules for all construction sectors
- DIN 18451 Scaffolding
- NEN EN 1991
- NEN 7250

Removal and disassembly

Dispose of the product according to the local laws and regulations. All materials are recyclable at the end of their service life.

The aluminium base profiles are attached to the base elements by means of a click-system. Use combination pliers to disassemble the base profile.

Guarantee

Guarantee according to the guarantee conditions and general terms and conditions of Esdec BV. These can be found on the website www.clickfit.nl.

Liability

The manufacturer accepts no liability for damage or injury caused by not (strictly) adhering to the safety regulations and instructions contained in this manual, or by carelessness during installation of the product specified in this document and the eventual related accessories.

- printing errors reserved

4. Product description

The mounting system is constructed from high-quality synthetic base elements, which are connected to one another in the longitudinal direction with aluminium base profiles. In the width direction, the FlatFix Fusion segments are connected with wind deflectors. The required assembly materials are also included to mount the solar panels in a landscape arrangement on the roof. The FlatFix Fusion mounting system can be used for all types of roofing materials.

Placing ballast

You do not attach the FlatFix Fusion system to the roof; it stands loose on it. The roof supports must be glued to the roof at a roof slope of more than 3° (2° by PVC). Please check the processing instructions of the kit and the roofing for their compatibility.

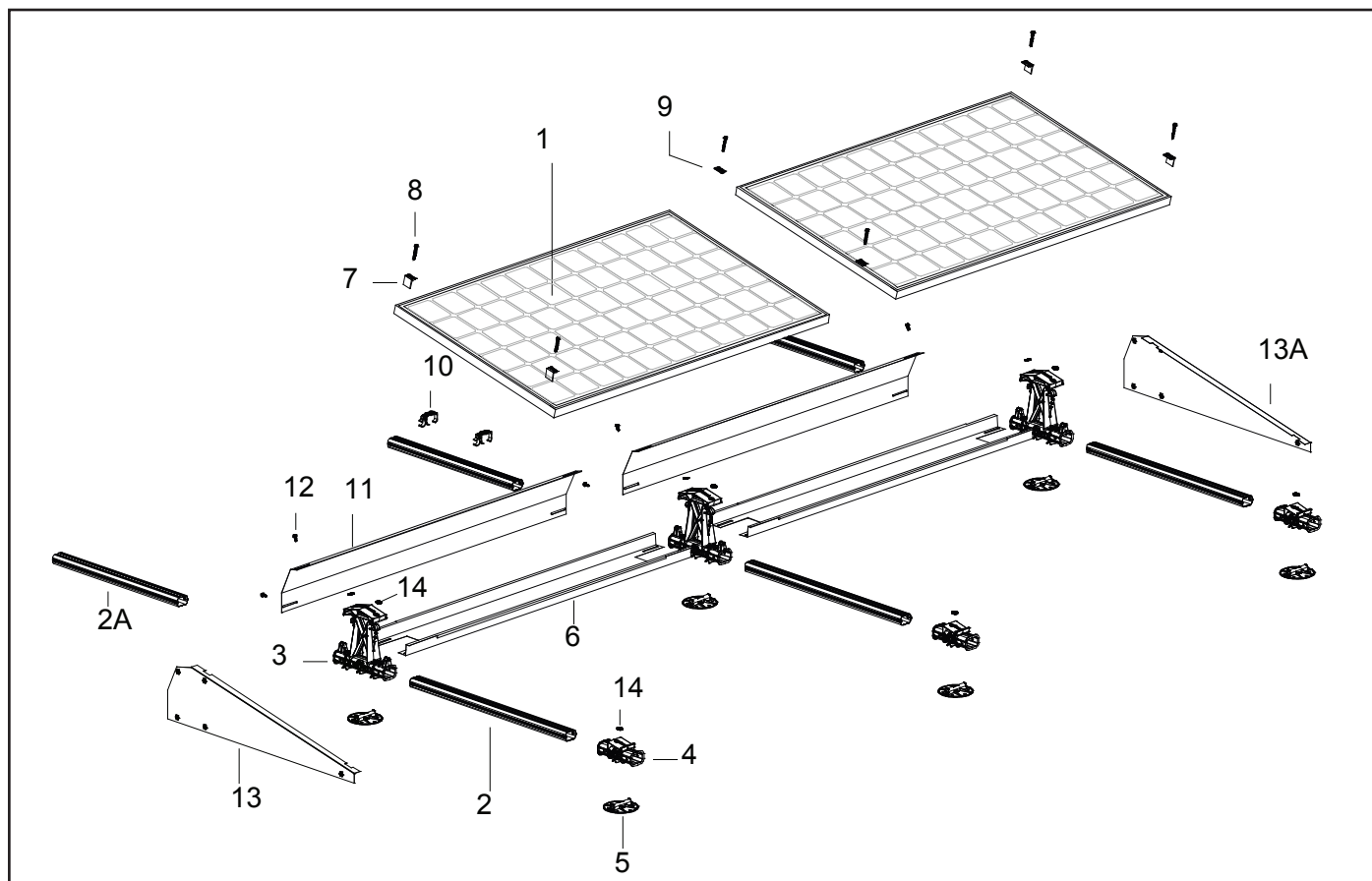
You make the system resistant to the wind by increasing the ballast. The ballast weight is partly related to the height of the building and configuration. Place the ballast in the ballast holders. Use the FlatFix Fusion calculator for the determination of the amount of ballast and where to place it.

Mounting of the solar panels

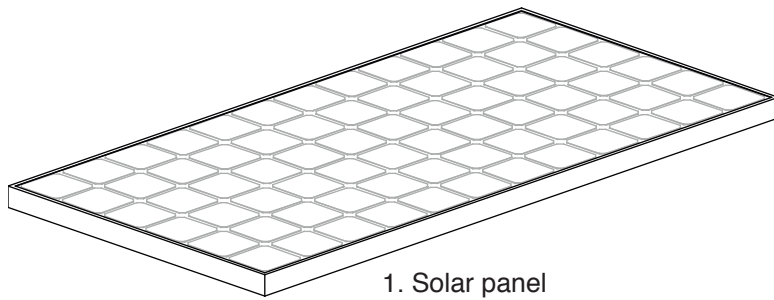
The solar panels are positioned on topside of the base elements and are affixed by means of universal module clamps, end clamps and mounting screws. The mounting screws are screwed directly into the mounting holes of the base elements.

5. Components overview

5.1 Exploded-view



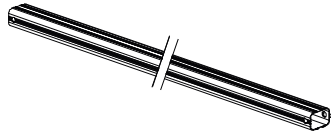
5.2 List of parts



1. Solar panel



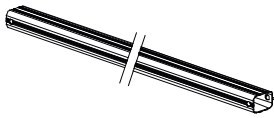
7. End clamp
Article nr: 100-41__
For type see annex chpt. 8



2. Base profile 940 mm
Article nr: 100-7194



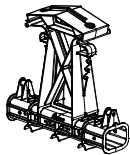
8. Mounting screw 6,5 x __
Article nr: 100-65__
For type see annex chpt. 8



2A. Base profile
Article nr: 100-71__
For length see annex chpt. 8



9. Module clamp
Article nr: 100-3020



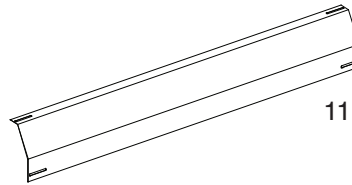
3. Base element high
Article nr: 100-7030



10. Cable clip
Article nr: 100-7040



4. Base element low
Article nr: 100-7020



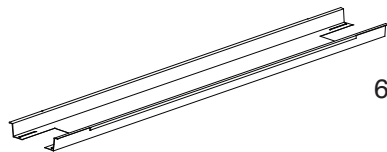
11. Wind deflector rear
Article nr: 100-705__
For length see annex chpt. 8



5. Roof support
Article nr: 100-7010



12. Mounting screw 6,5 x 19
Article nr: 100-6519



6. Ballast holder
Article nr: 100-706__
For length see annex chpt. 8



13. Wind deflector left
Article nr: 100-7055



13A. Wind deflector right
Article nr: 100-7056



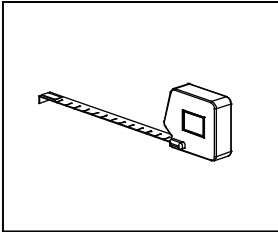
14. Grounding ring
Article nr: 100-7501
*optional

6. Assembling preparation

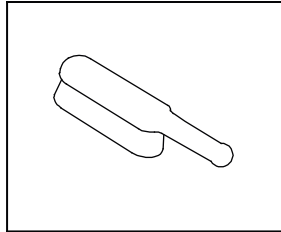
6.1 Control tools and accessories

The following is a list of the required tools/accessories:

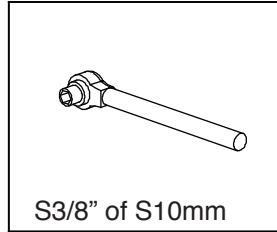
Tape measure



Brush

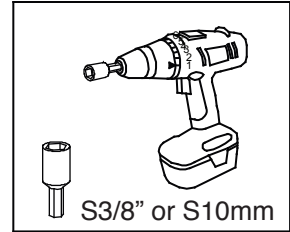


Ratchet with hexagon

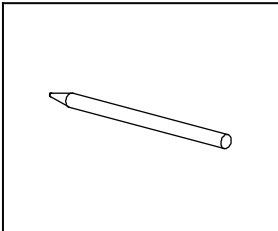


or

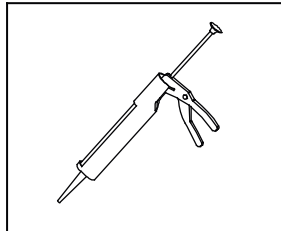
Drill battery



Marker/chalk



Mastic gun optional
At roof slope $> 2^\circ / 3^\circ$



Scaffold or stable
safe ladder

6.2 Determining position and measuring solar panels

In determining the location of the solar panels on the flat roof, it is very important to pay attention to the incoming sunlight throughout the day and throughout the year. Place the solar panels on a roof that has no shadow.

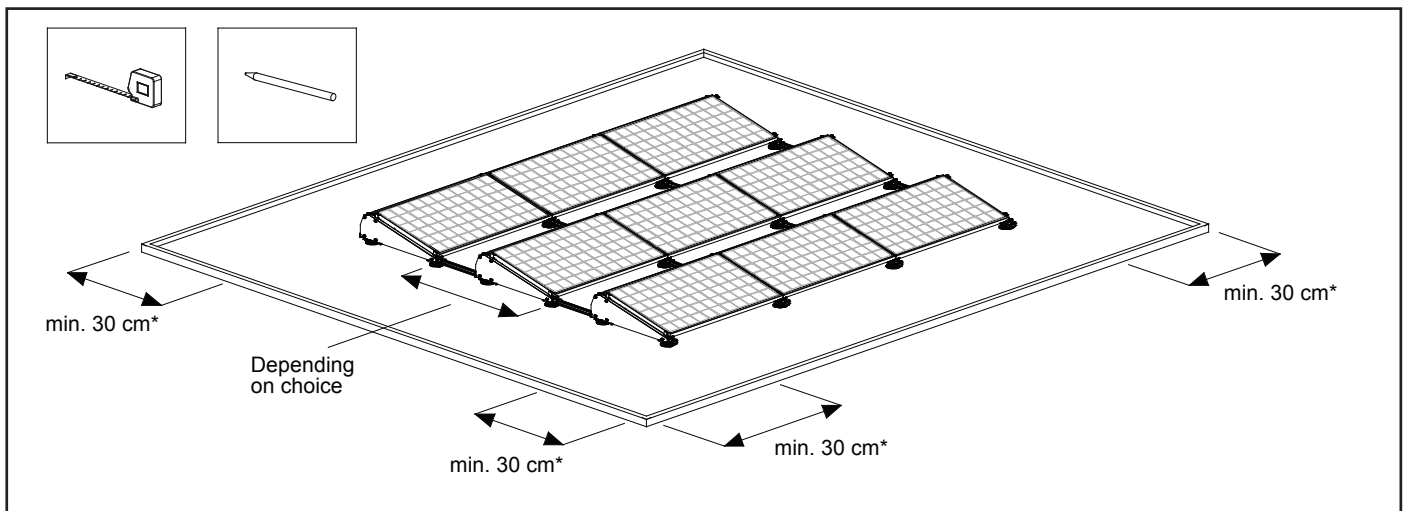
The shadow of a chimney, trees and nearby buildings have a detrimental effect on the yield of the solar panels.

Measuring and outlining

To place the solar panel (in a landscape arrangement), you need an area of approximately 160x100 cm per panel (depending on type of solar panel).

If there are multiple rows of solar panels in succession, there should be a distance between rows of solar panels come because of the shadow. The distance from the solar panels to the edge of the roof should be approximately 1/5 of the height of the building with a minimum distance of 30 cm; this is because of the strong turbulent wind flows in this zone * (See calculator for distance).

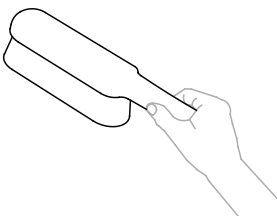
Mark the outline of the panel field on the roof with chalk or a marker.



6.3 Cleaning the roof

Clean the roof with a brush.

Make sure that the place where the solar panels are to be placed on the roof is clean, dry and flat. The presence of gravel, sand, stones, algae, dust, etc. can lead to instability of the system and/or can cause damage to the roof.



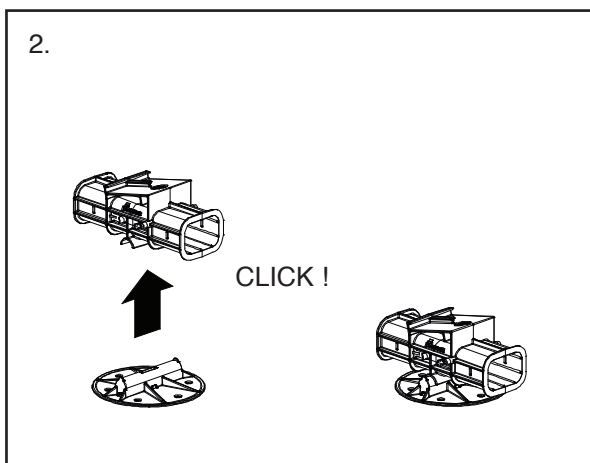
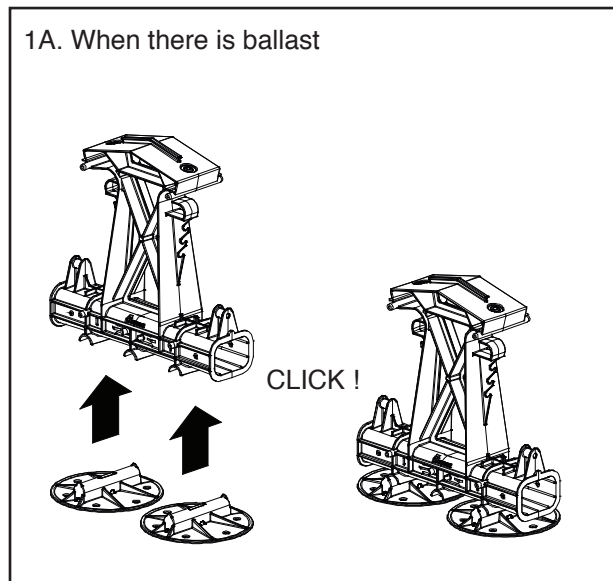
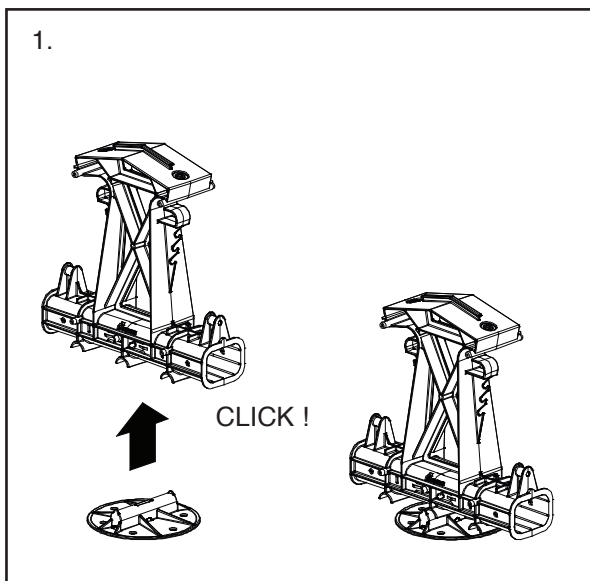
7. Installation

7.1 Mounting of roof support to base elements

The high base element is placed on one roof support by default.

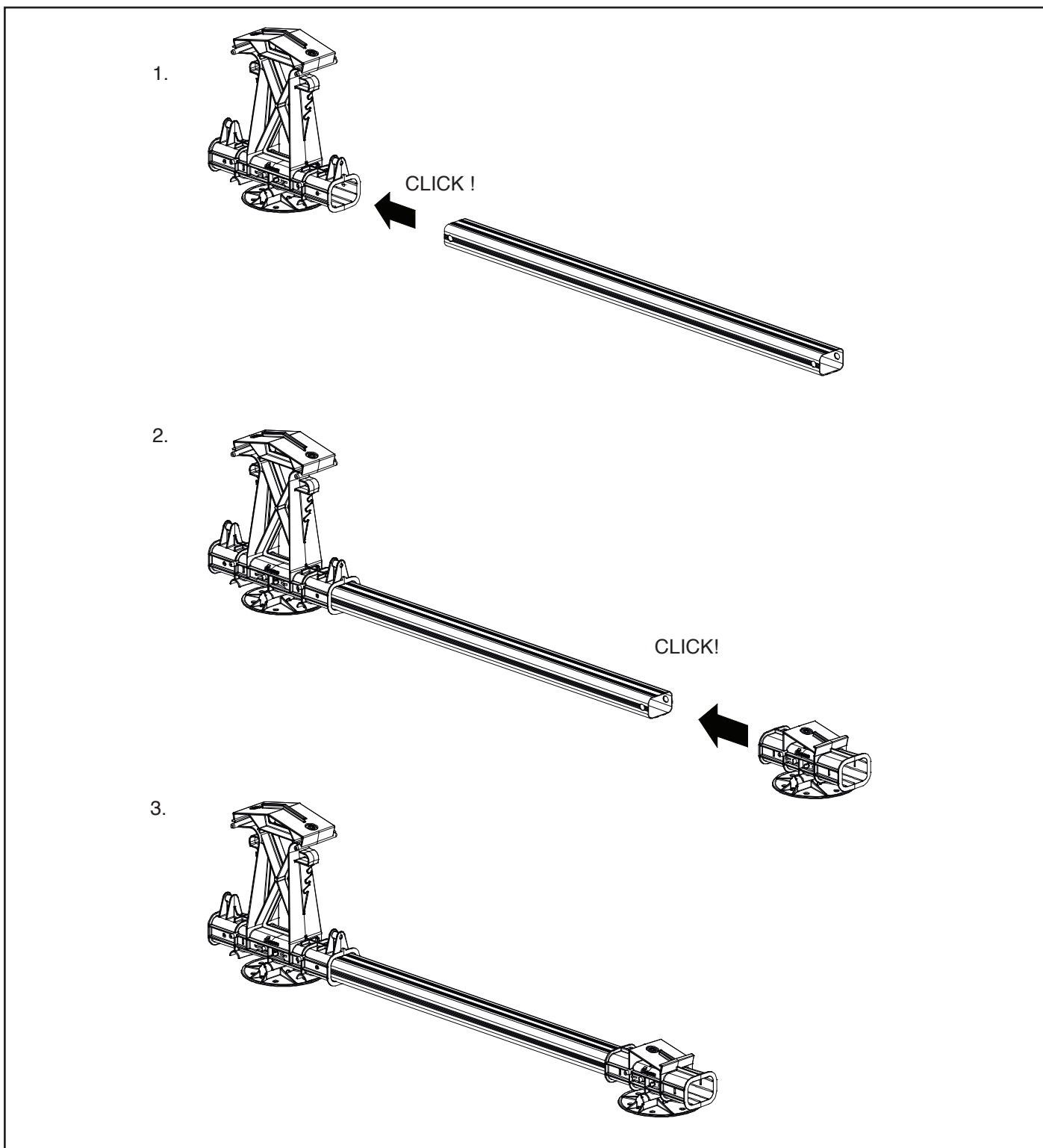
1. Attach the roof support to the high base element by means of a click connection. Use the middle click connection at the bottom of the high base element for this. Optional: In situations where ballast is placed, two roof supports are attached under the high base element. Use the two click connections from the middle for this (1A).

2. Attach the roof support to the lower base element by means of a click connection.



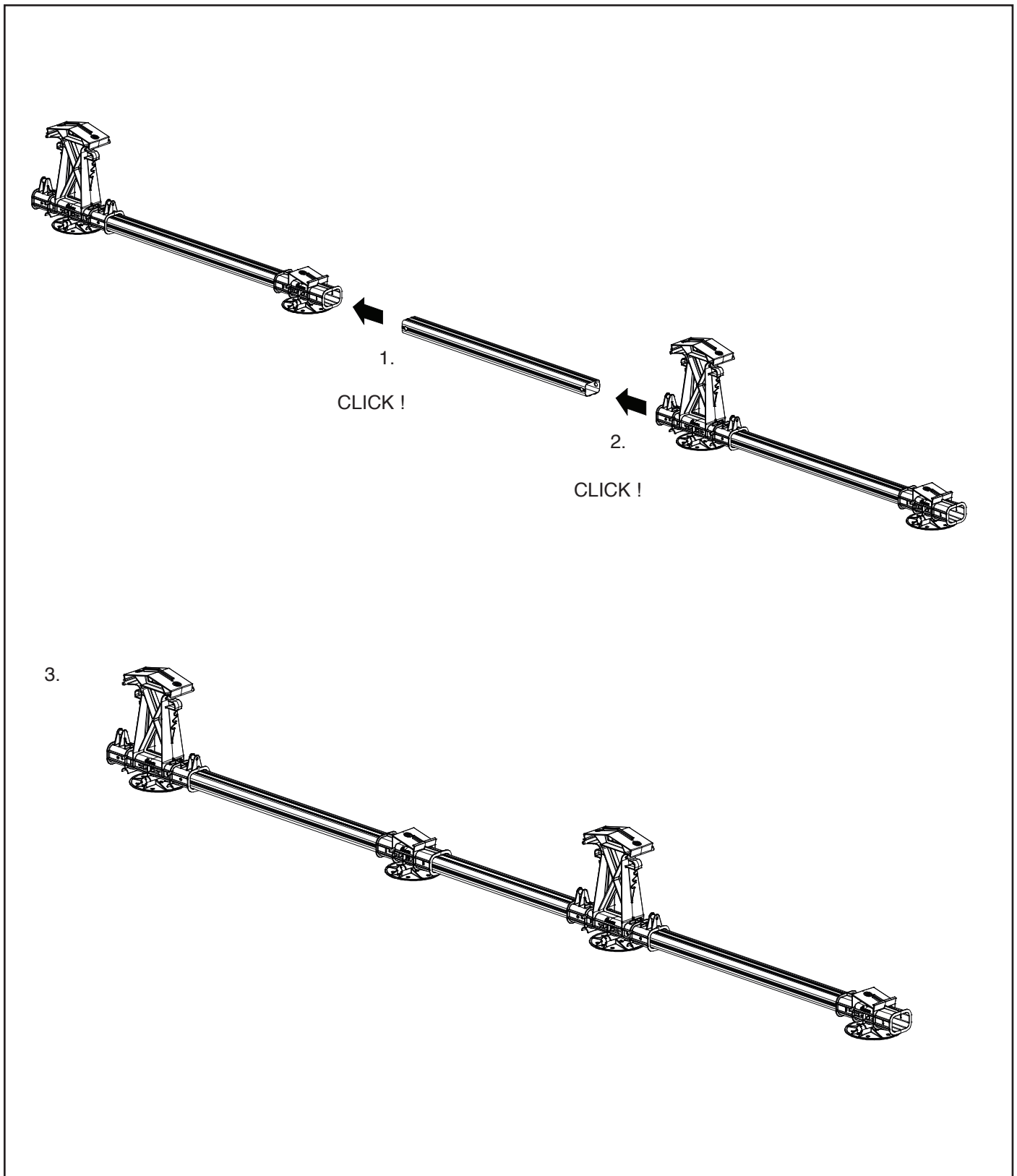
7.2 Mounting of base profile to base elements

1. Put the high base element (incl. roof support) upright and slide the end of the base profile (length 94 cm) into the opening of the high base element until it clicks.
2. Slide the low base element (incl. roof support) on the other end of the base profile until it clicks.
3. The first FlatFix Fusion segment is ready. Repeat the abovementioned steps until you have enough FlatFix Fusion segments to place the first two rows of solar panels.



7.3 Connecting of FlatFix Fusion segments

1. Put two FlatFix Fusion segments upright and place them at a distance behind each other so that the base profile can be mounted in between them. Slide the end of the base profile into the opening on the lower side of the first FlatFix Fusion segment until it clicks.
2. Slide the second FlatFix Fusion segment with the opening of the high side over the end of the base profile until it clicks.
3. The first connected FlatFix Fusion segments are ready. Repeat the abovementioned steps until you have connected enough FlatFix Fusion segments to lay down the first two rows of solar panels.

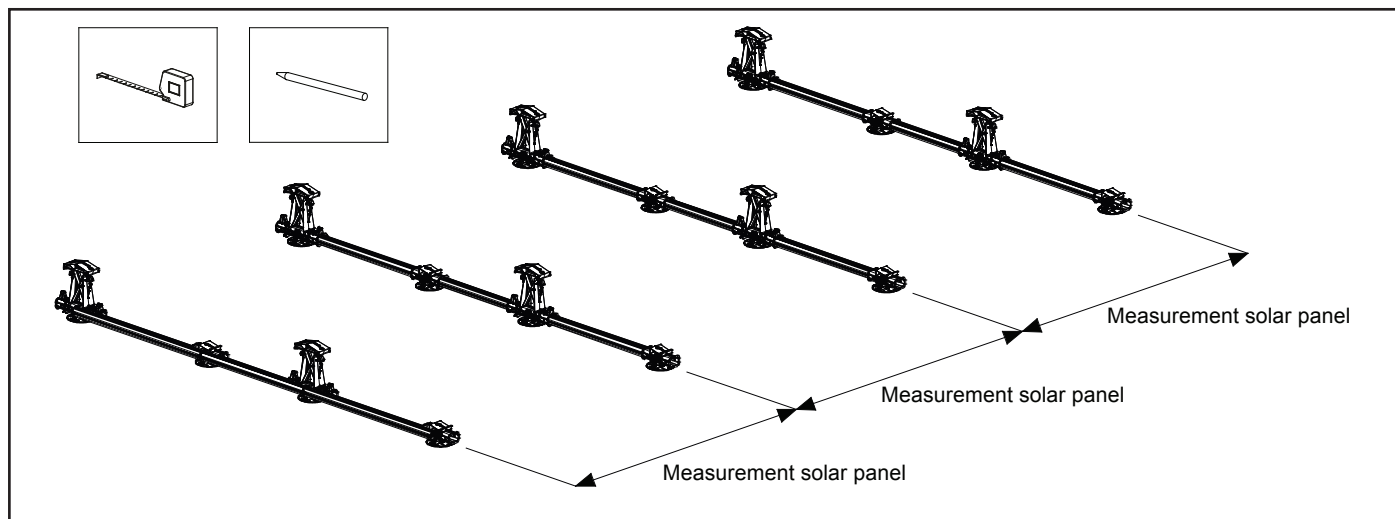


7.4 Positioning of FlatFix Fusion segments

You determine the position of the FlatFix Fusion segments based on the position of the solar panels on the roof. Divide the FlatFix Fusion segments proportionally in the line where the solar panels go. The FlatFix Fusion segments may be placed maximally 2 m apart from centre to centre (see calculator for distance).

Draw with chalk or a marker on the roof where the FlatFix Fusion segments should come.

Make sure the FlatFix Fusion segments are mutually aligned.

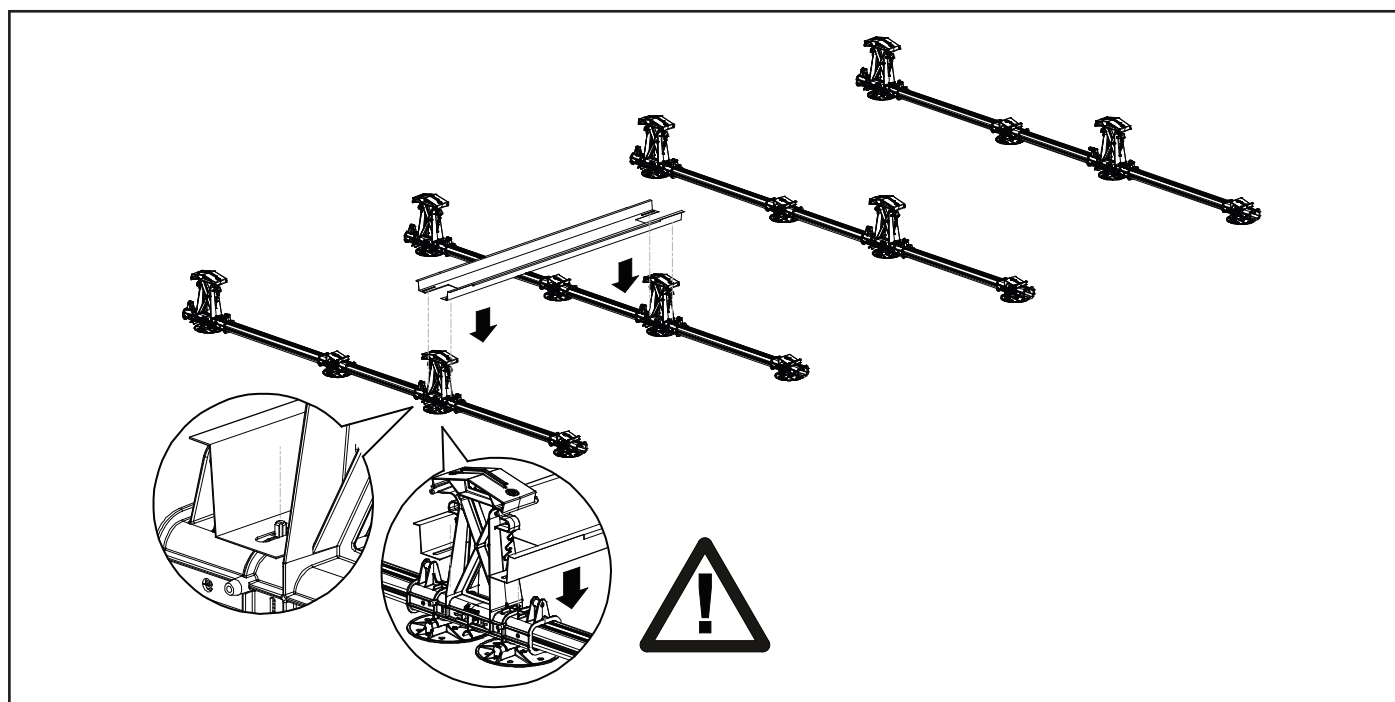


7.5 Mounting of ballast holders

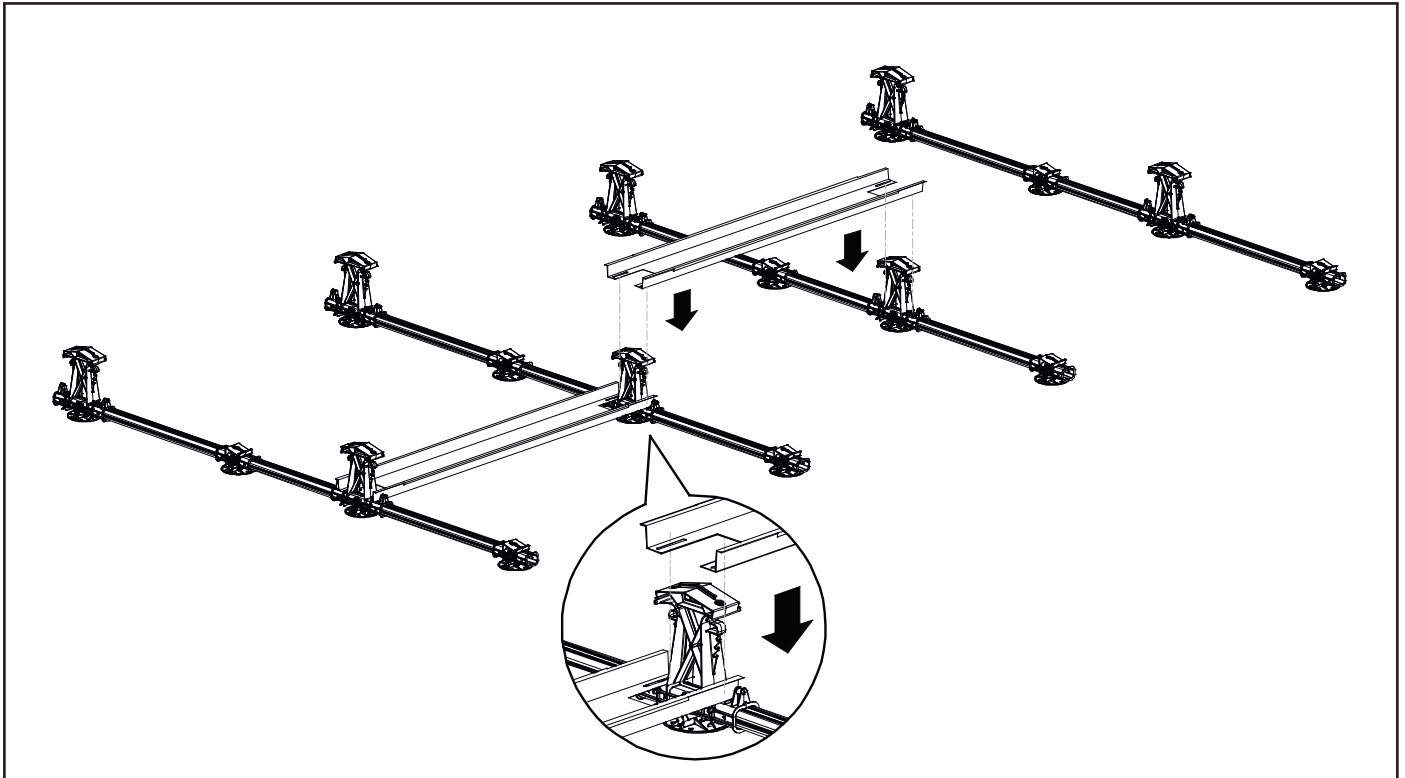
The ballast positions are determined by means of the calculator. Place the ballast holders on the locations indicated by the calculator. Take note: make sure the high base elements at the location of the ballast holders always provided with two roof supports!

Insert the first ballast container diagonally and place it between the FlatFix Fusion segments in such a way that the elongated holes of the ballast holder are positioned over the upright notches of the high base element.

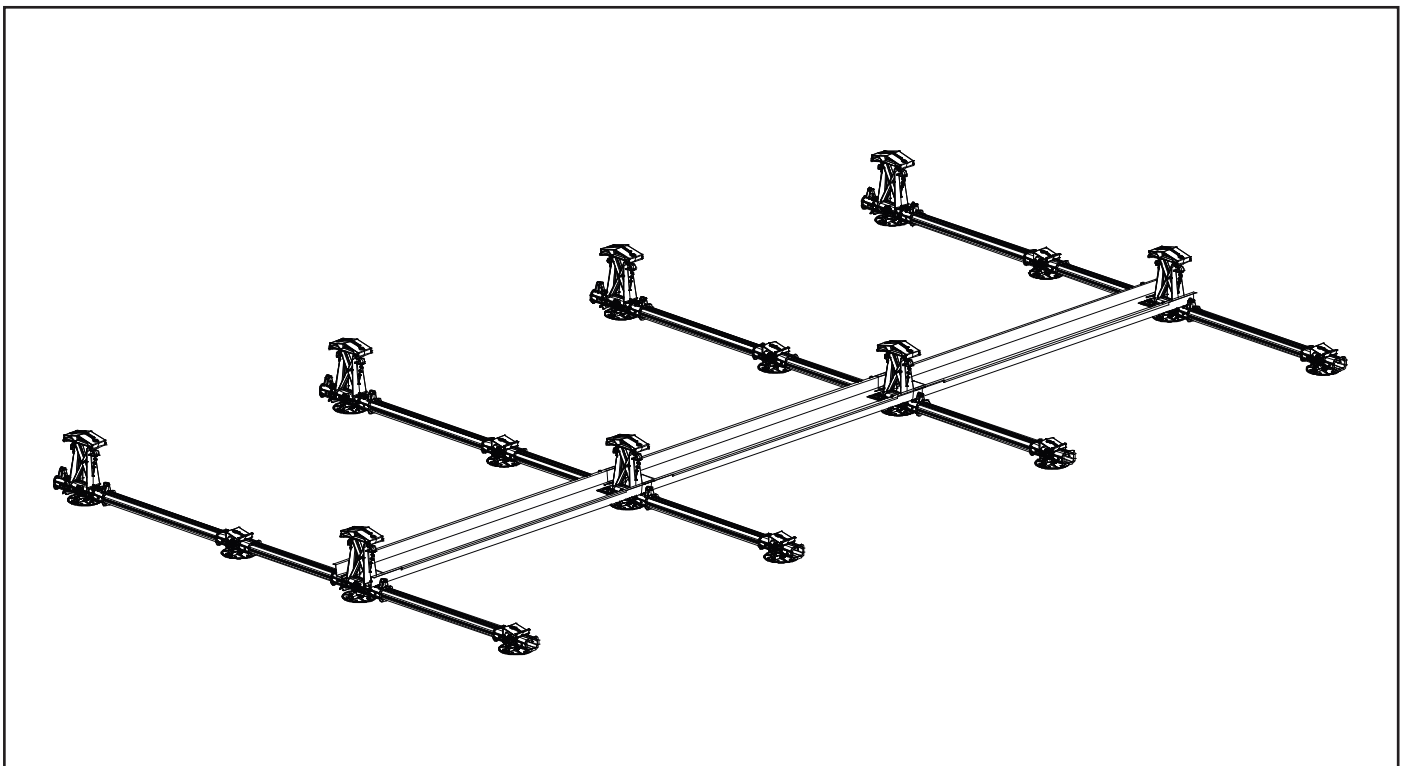
Check that the FlatFix Fusion segments are next to one another with regards to the alignment of the solar panels!



Place the second ballast holder between the FlatFix Fusion segments and in such a way that it overlaps the first ballast holder and that the elongated holes of the ballast holder are positioned over the upright notches of the high base element.

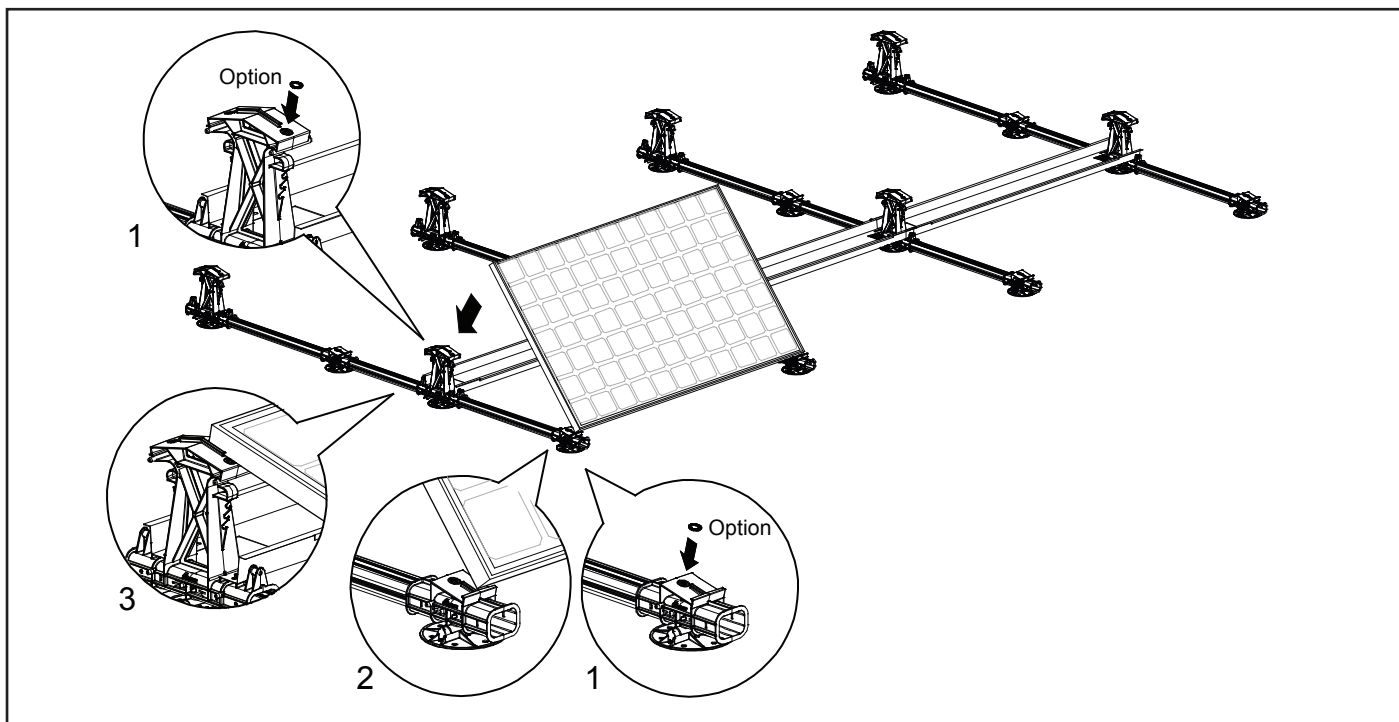


Place the third ballast holder between the FlatFix Fusion segments and in such a way that it overlaps the second ballast holder and that the elongated holes of the ballast holder are positioned over the upright notches of the high base element. Repeat these steps until all ballast holders are placed.

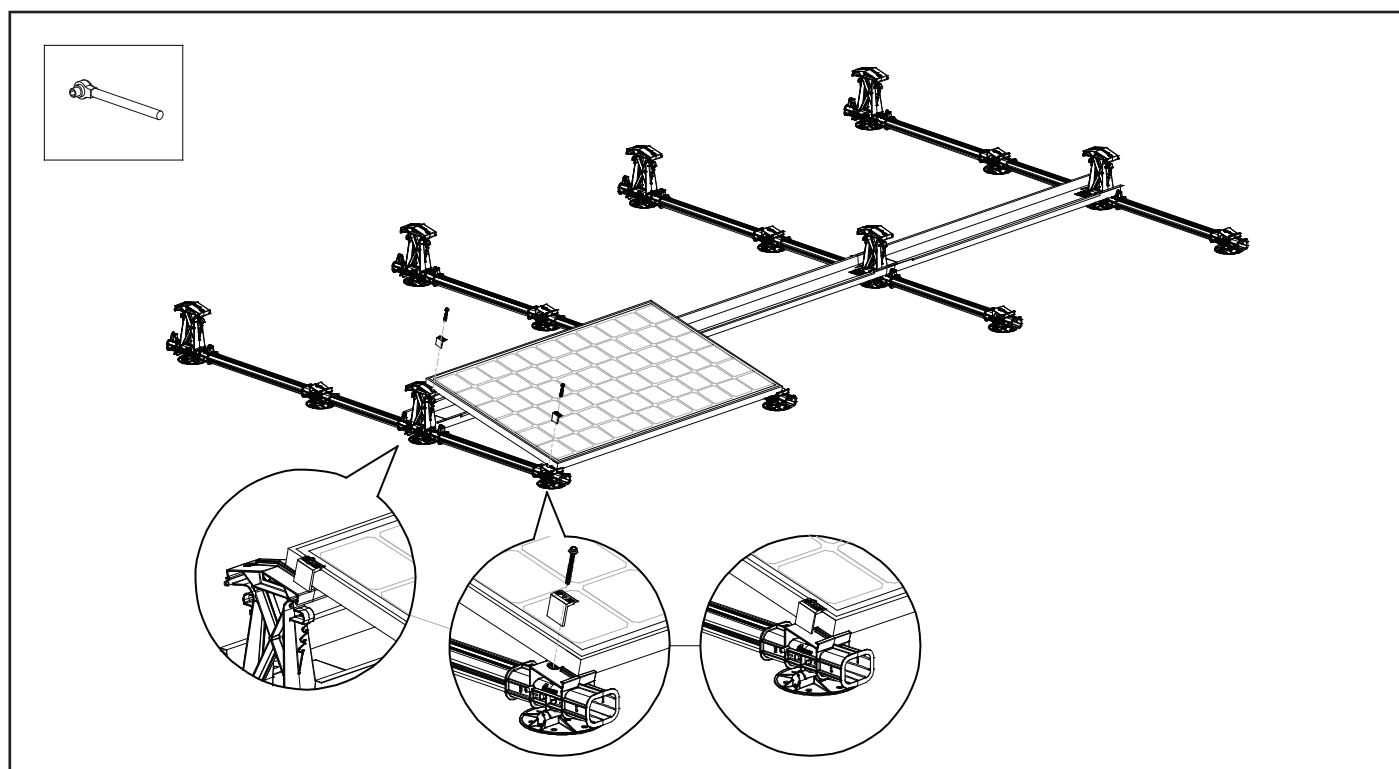


7.6 Mounting of 1st solar panel

1. Before placing the solar panels, it is optional to ground the FlatFix Fusion system per row. Place a grounding ring on both the Base element high and low.
2. Place the 1st solar panel between the upright notches of the low base element.
3. Carefully tilt the solar panel so that it comes to rest between the upright notches of the base elements.



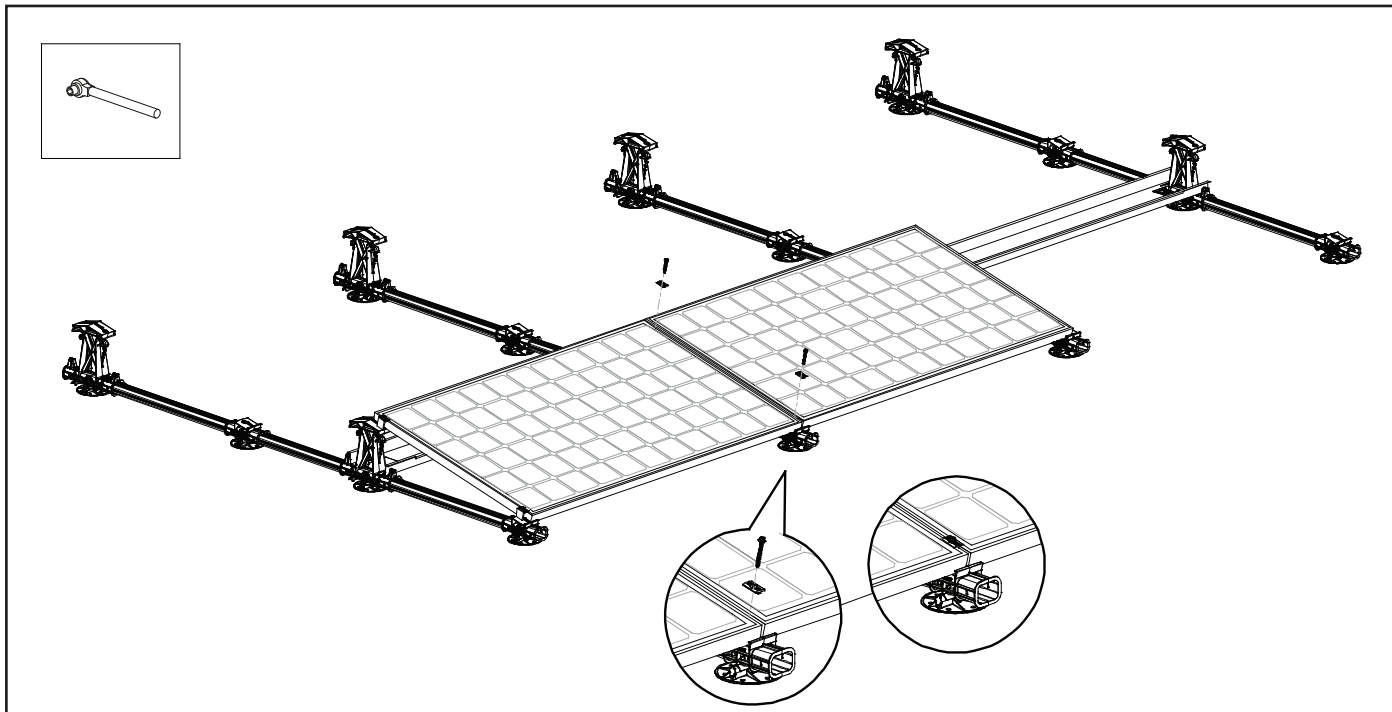
4. Place the end clamps on the edge of the solar panel and position them at the location of the mounting holes in the high and low base elements. Screw in the end clamp with the mounting screw into the mounting hole. The tightening torque of the screw connections is 4.5 Nm. Check that the mounting screws are not over-tightened in the base element.



7.7 Mounting of other solar panels

Place the second solar panel on the base elements so that it comes to rest between the upright notches. Then screw in the mounting screw with a module clamp in the mounting holes of the base elements. Check that the solar panels are aligned before tightening the screw!

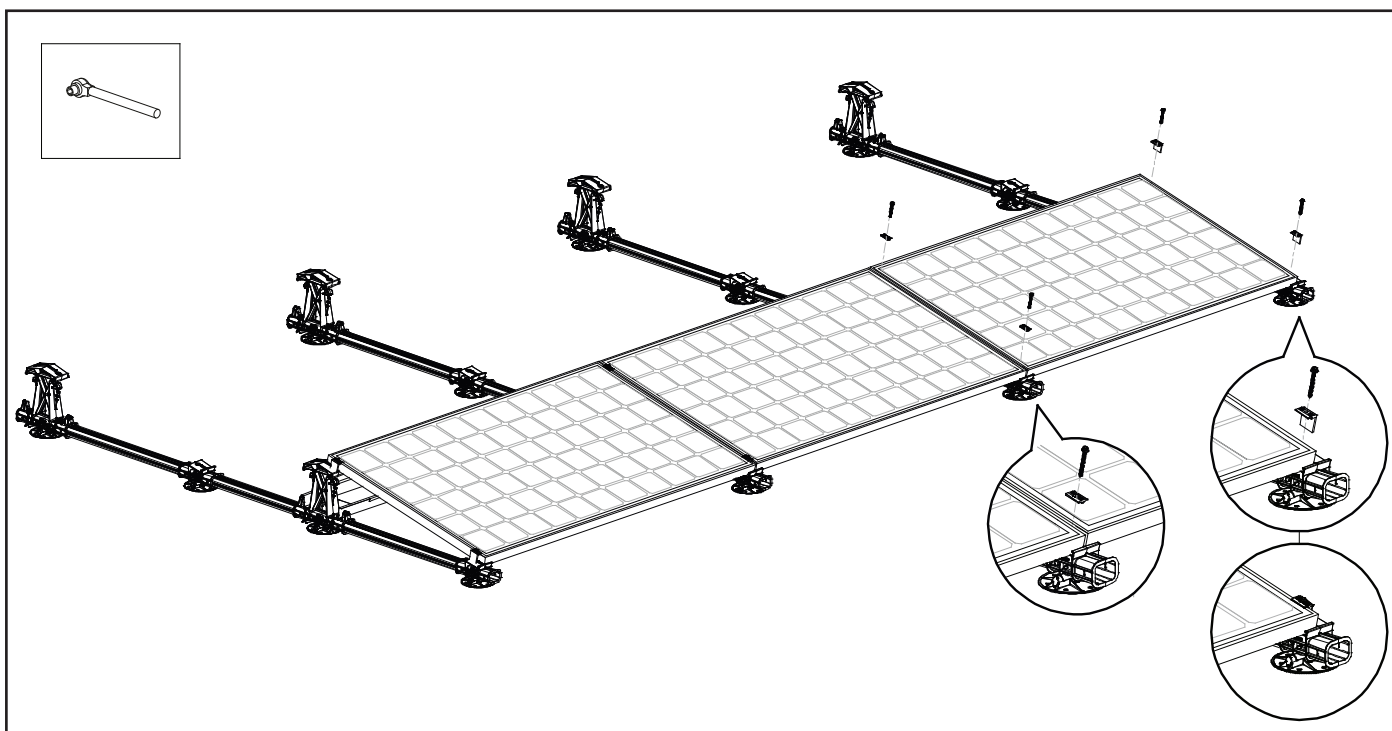
The tightening torque of the screw connections is 4.5 Nm. Check that the mounting screws are not over-tightened in the base element. Repeat the above steps for the other intermediate panels.



Place the last solar panel of the row on the base elements so that it comes to rest between the upright notches. Then screw in the mounting screw with a module clamp in the mounting holes of the base elements.

Then screw in the two end clamps with the mounting screw in the mounting hole. Check that the solar panels are aligned before tightening the screw!

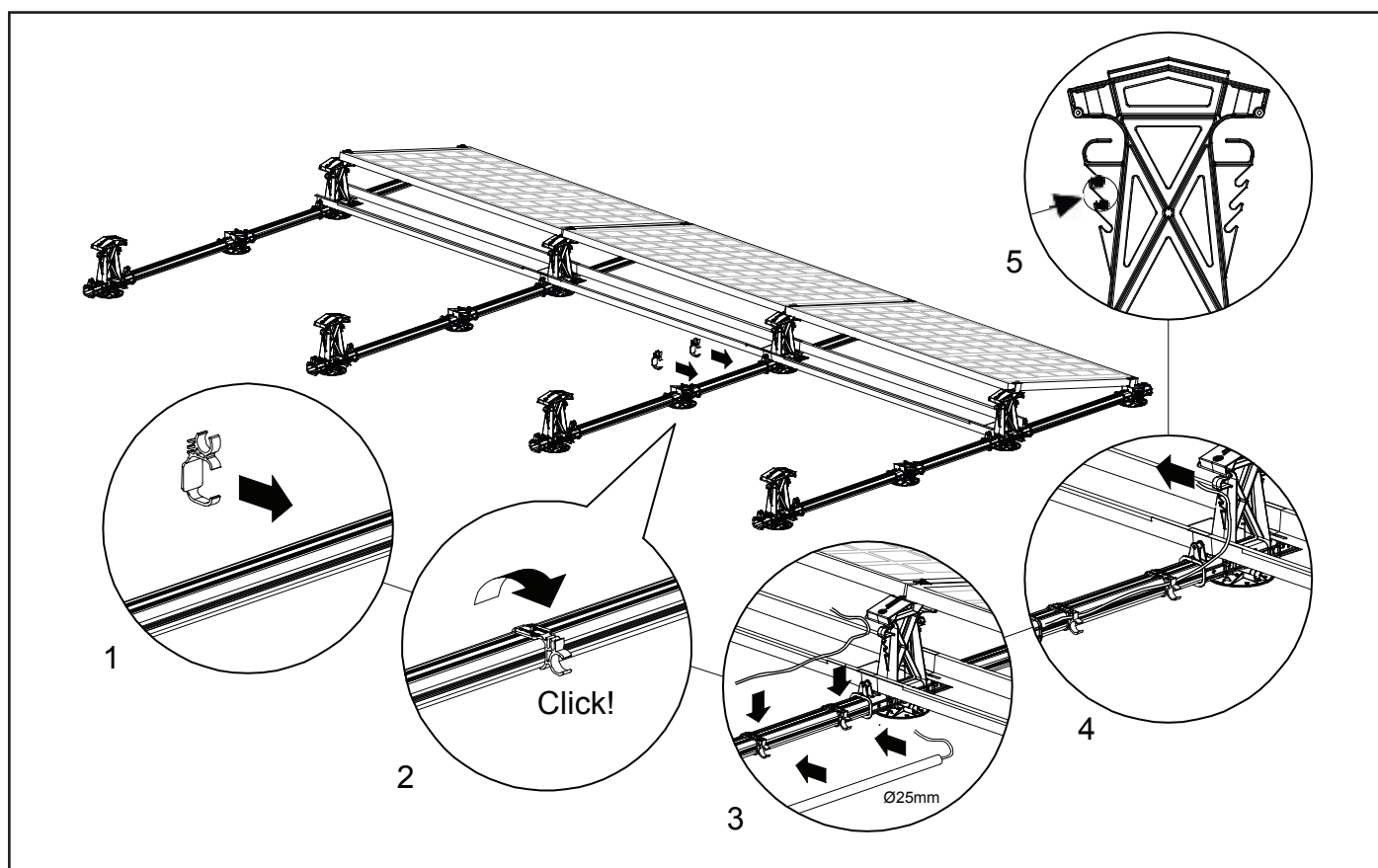
The tightening torque of the screw connections is 4.5 Nm. Check that the mounting screws are not over-tightened in the base element.



7.8 Mounting of cable clips & cables

There are cable clips supplied so that the cables of the solar panels can be guided well. There are also cut-outs present in the high base elements available feed the cables through. This will prevent that the cables end up lying on the (wet) roof. For the installation, follow the steps below:

1. Place the cable clips over the narrow side of the base profiles.
2. Turn the cable clips so that they are clamped on the broad side of the base profiles.
3. Place the cables in the cable clips. The cable clip also provides an accommodation for a tube of Ø25 mm.
4. Feed the end through one of the cable conductors of the high base element.
5. The plugs of the solar panel can be mounted to the high base element in the cable conductor.

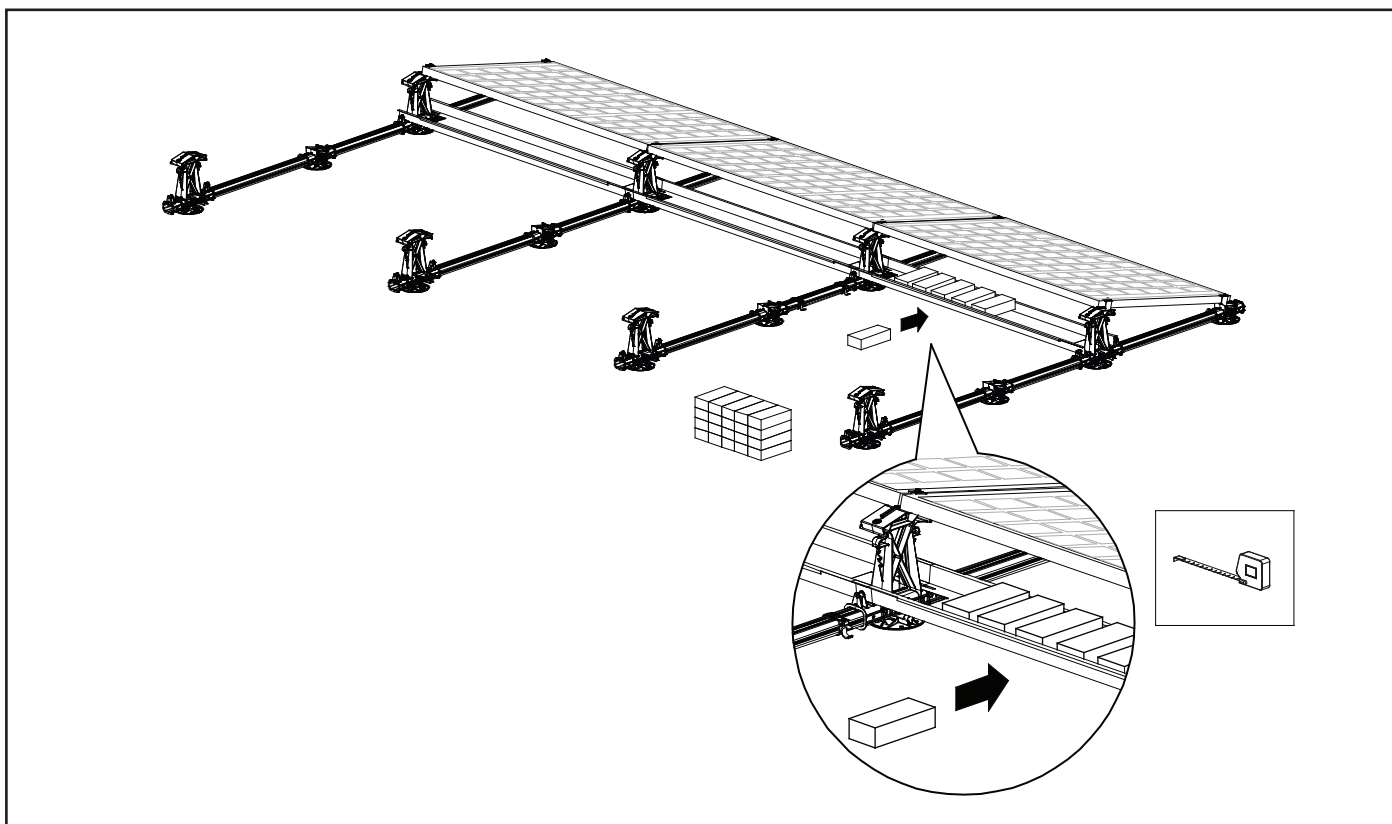


7.9 Placement of ballast

To keep the solar panels in place, you need to put ballast in the ballast holders. By default, you can use concrete paving blocks of 21x10,5x8 cm as ballast. They weigh approximately 4 kg/piece and fit well into the ballast holders with regards to their size. Alternatively, you can also use pavement tiles of maximally 21x21 cm, curb stones of 20x100 cm, or gravel. When using gravel, place a concrete paving block left and right in the ballast holder. Carefully adhere to the ballast weights from the calculator!

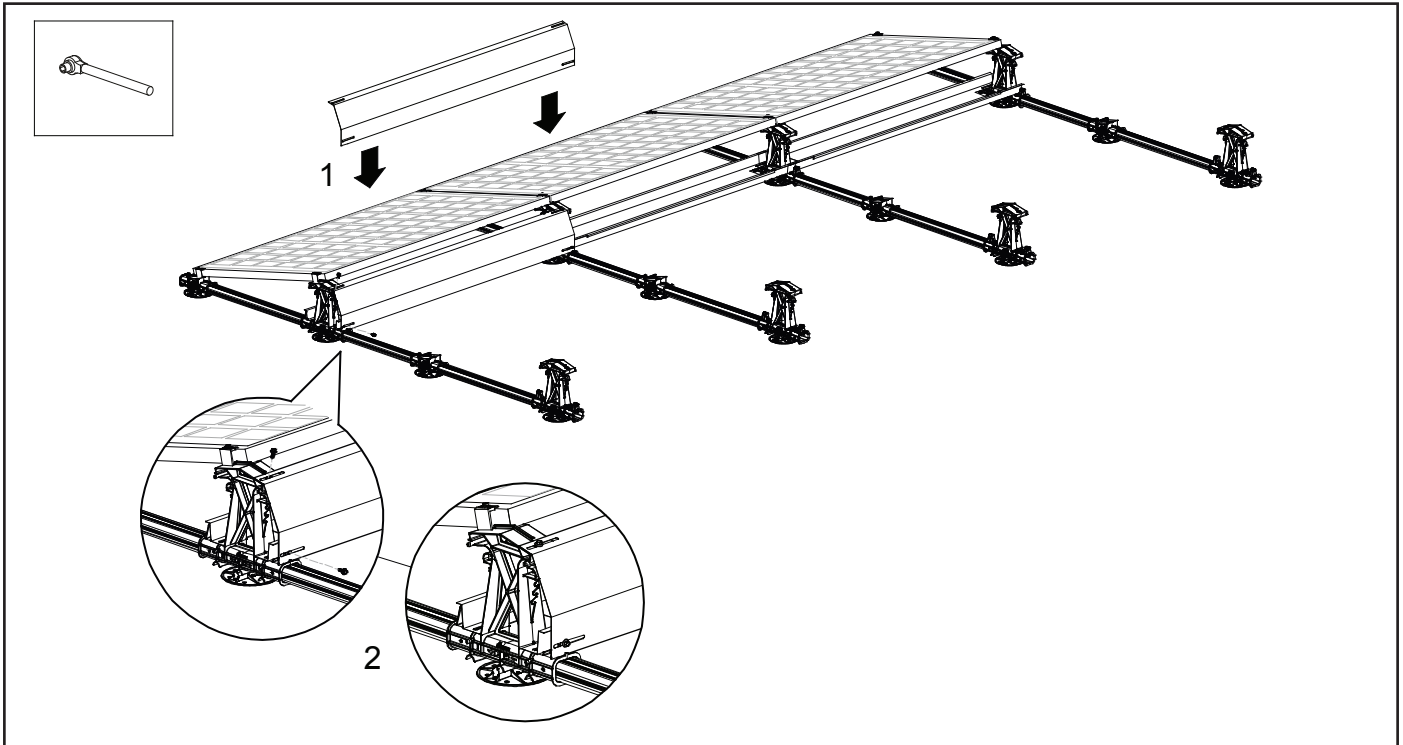
Take note: Before placing the ballast, you should check whether the solar panel field is in the correct position and that it is properly aligned with respect to the eaves. You can still adjust the panel field a little bit at this stage. Once the ballast has been placed, correction is not possible anymore!

If your roof is higher than 12 meters, we advise you to get in touch with your supplier; they can then determine the correct weight, depending on your situation.

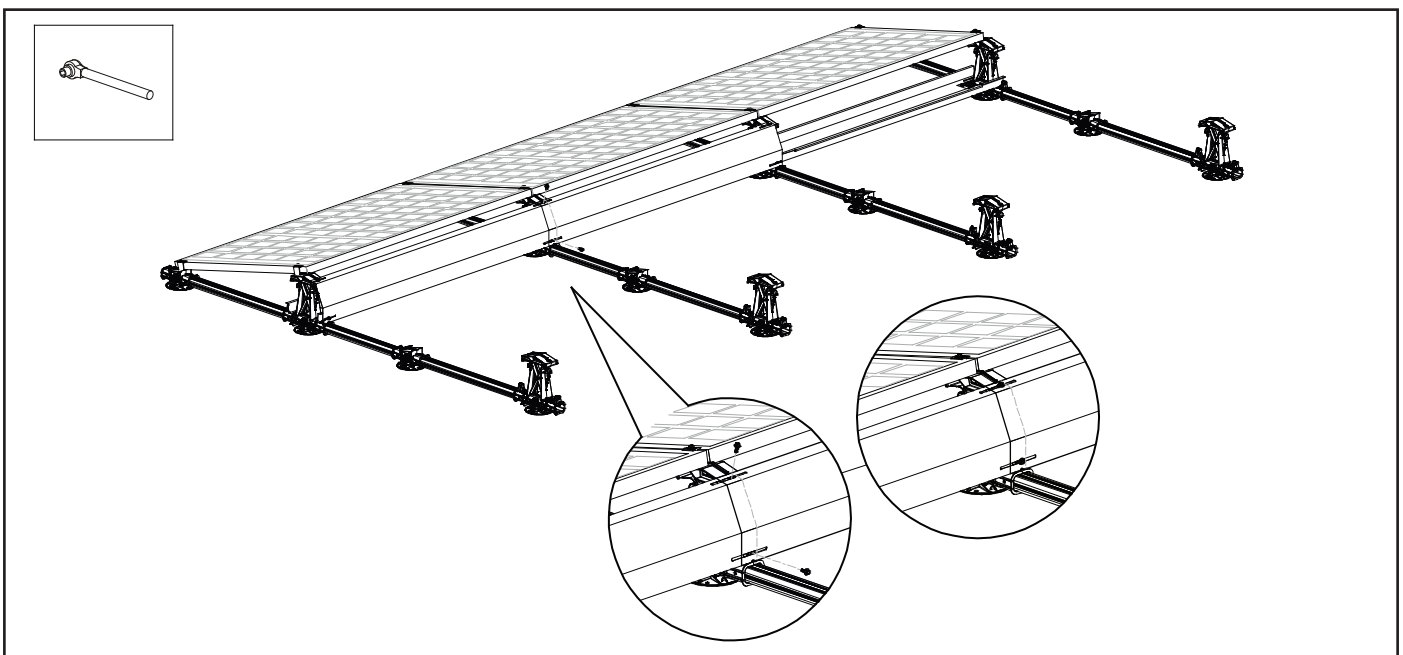


7.10 Mounting of rear side wind deflector

1. Place the 1st wind deflector on the rear side of the solar panels so that it falls between the upright notches of the high base elements.
2. Mount only one side of the wind deflector (at the location of the panel field's edge) to the high base element by placing the mounting screw 6.5 x 19 in the two slotted holes of the wind deflector and screw it into the mounting holes of the high base element. The tightening torque of the screw connections is 4.5 Nm
Check that the mounting screws are not over-tightened in the base element.



Place the 2nd wind deflector on the rear side of the solar panels so that they fall between the upright notches of the high base elements and that there is a small overlap with the 1st wind deflector.
Mount only one side of the wind deflector (at the location of the overlap) to the high base element by placing the mounting screw 6.5 x 19 in the two slotted holes of the 2 wind deflectors and screw it into the mounting holes of the high base element. The tightening torque of the screw connections is 4.5 Nm
Check that the mounting screws are not over-tightened in the base element. Repeat the previous step for the other intermediate wind deflectors.

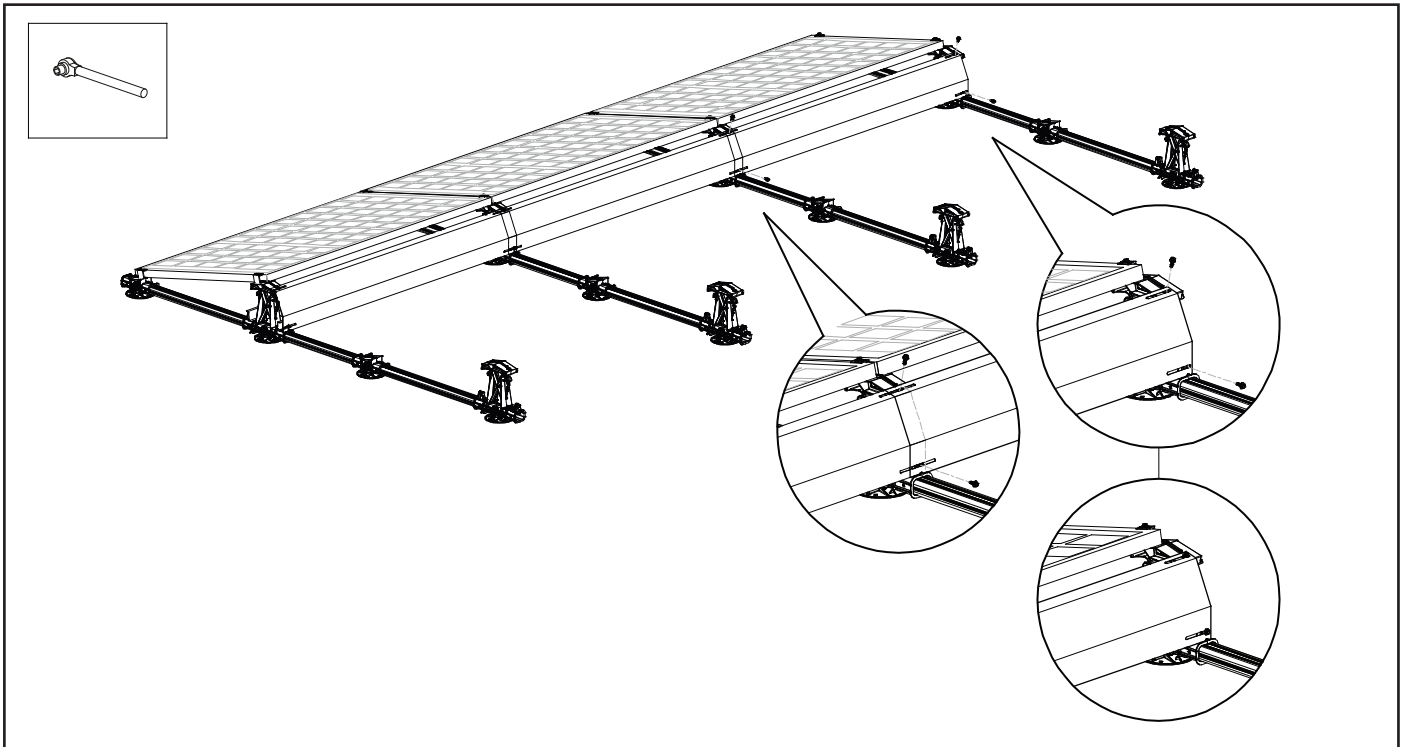


Place the last wind deflector on the rear side of the solar panels so that they fall between the upright notches of the high base elements and that there is a small overlap with the adjacent wind deflector.

Mount the wind deflector (on both sides) to the high base elements by placing the mounting screw 6.5 x 19 in the four slotted holes of the wind deflector and screw it into the mounting holes of the high base element.

The tightening torque of the screw connections is 4.5 Nm

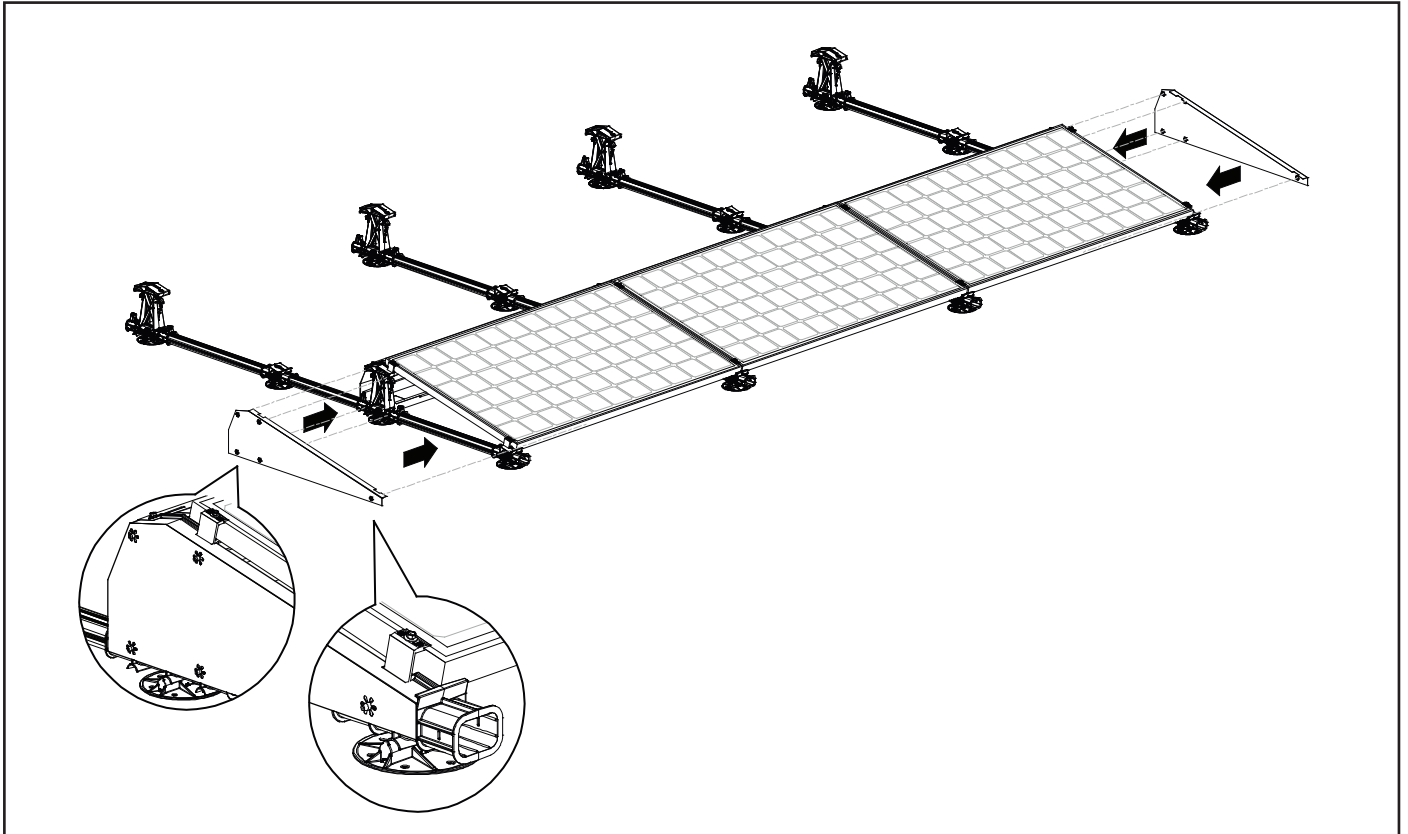
Check that the mounting screws are not over-tightened in the base element.



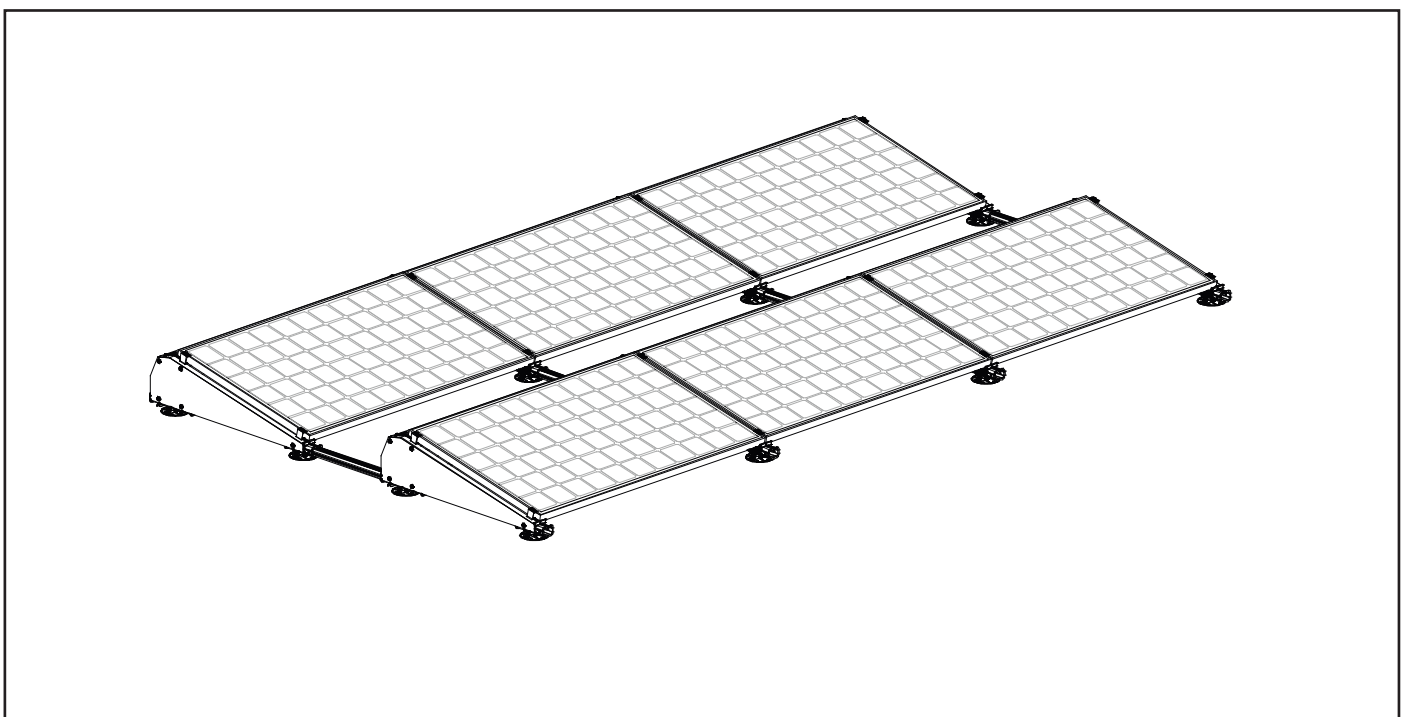
7.11 Mounting of wind deflector left/right

Place the left wind deflector next to the left side of the panel field and the right wind deflector next to the right side. Please note: the flange of the wind deflector must always face the panel field.

Install the two wind deflectors (left and right) by pressing the Sunlock in the wind deflectors over the catches of the base elements. Mount the wind deflector carefully. Make sure all the tabs on the Sunlock fit well over the catch of the base element. Press the wind deflector well so that it fits on the base. If you are unsure whether the wind deflector is secure, you can fix it with a screw. Put a screw through the wind deflector in both the low and high base element. The wind deflectors are now locked. And the first row of solar panels is now ready!

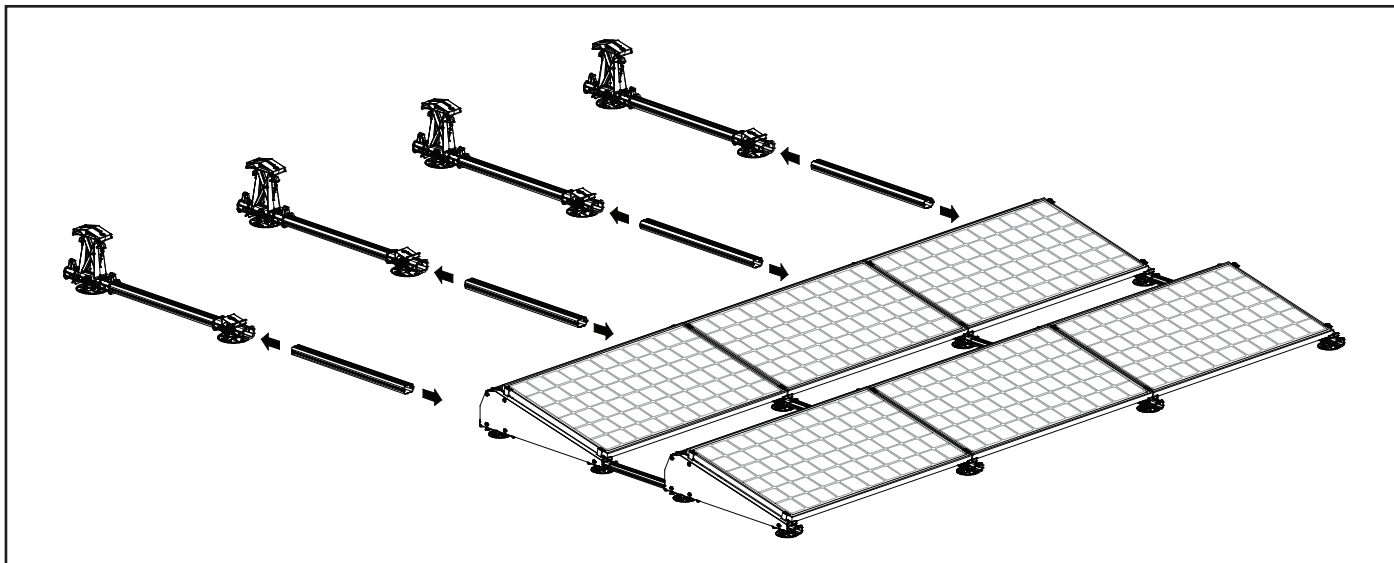


You can now mount the 2nd solar panels row. To do this, follow the steps from Chapter 7.5 to 7.11.

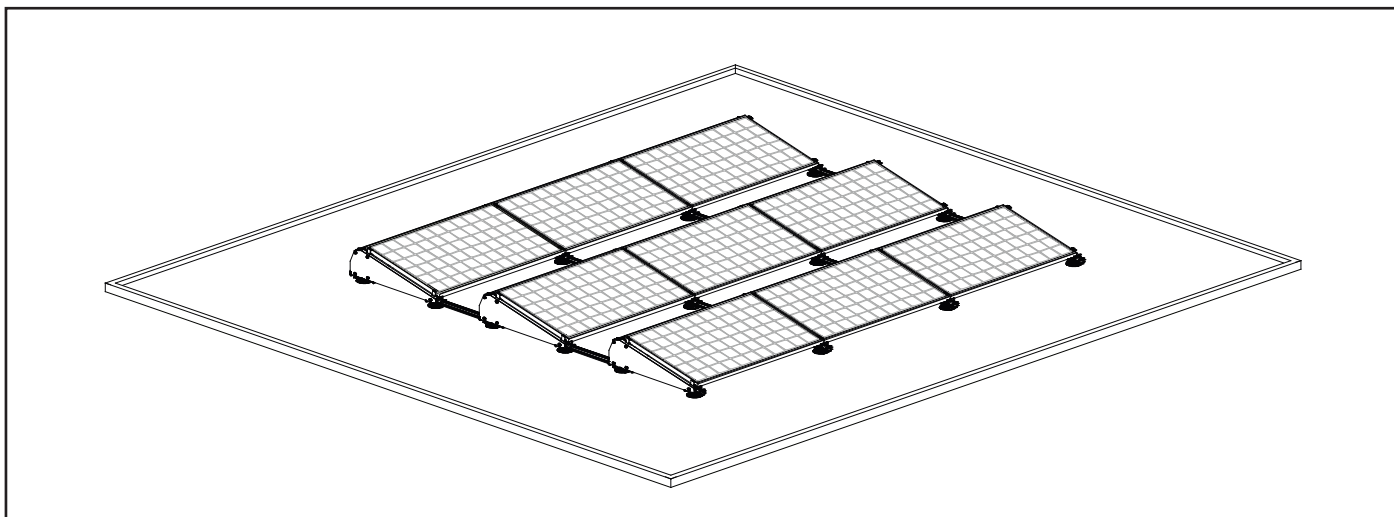


7.12 Several rows behind one another

If you want to mount more rows of solar panels one behind the other, then you must first create FlatFix Fusion segments again (see section 7.1) and connect them to the base profile to the already mounted panel field.

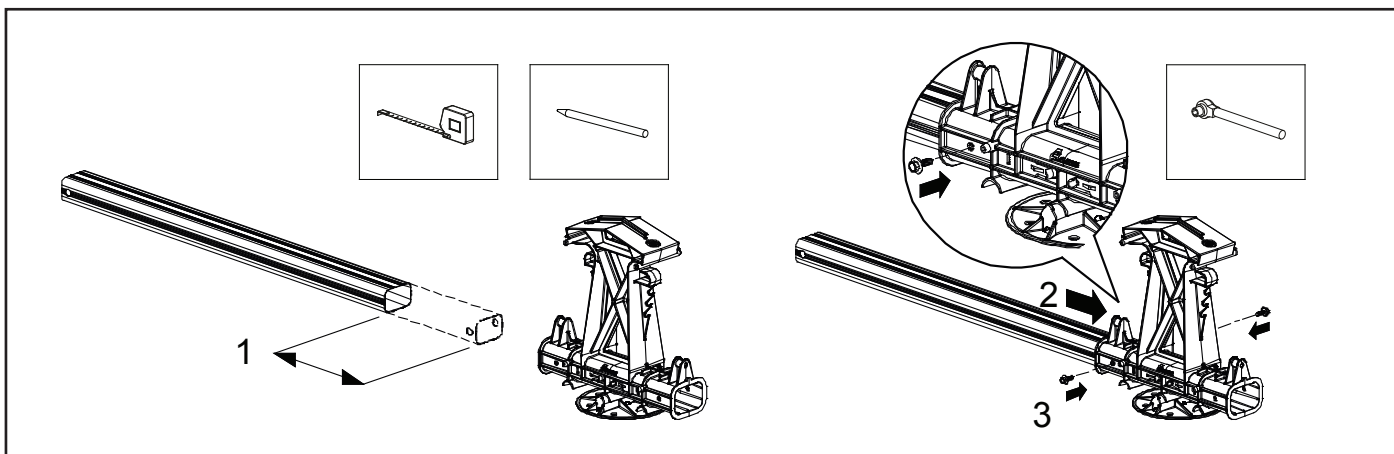


The panel field is now ready!



7.13 Shorten base profile (option)

If desired, the base profiles between the rows of solar panels can be shortened. Cut the profiles to the desired length on the side of the high base element. Slide the base profile in the high base and secure it with two self-tapping screws 6,0x25 (Article nr.100-3010).



8. ANNEX

Frame height	Screw length	End clamp height
29 mm	55 mm	29 mm
30 mm	55 mm	30 mm
31 mm	60 mm	31 mm
32 mm	60 mm	32 mm
33 mm	60 mm	33 mm
34 mm	60 mm	34 mm
35 mm	63 mm	35 mm
36 mm	63 mm	36 mm
37 mm	63 mm	37 mm
38 mm	63 mm	38 mm
39 mm	63 mm	39 mm
40 mm	70 mm	40 mm
41 mm	70 mm	41 mm
42 mm	70 mm	42 mm
43 mm	70 mm	43 mm
44 mm	70 mm	44 mm
45 mm	70 mm	45 mm
46 mm	75 mm	46 mm
47 mm	75 mm	47 mm
48 mm	75 mm	48 mm
49 mm	75 mm	49 mm
50 mm	75 mm	50 mm

2A. Available base profiles

Article nr	Description	Rowdistance Single
100-7021	FlatFix Fusion base profile 210 mm	1160 mm
100-7037	FlatFix Fusion base profile 370 mm	1320 mm
100-7055	FlatFix Fusion base profile 550 mm	1500 mm
100-7075	FlatFix Fusion base profile 750 mm	1700 mm*
100-7094	FlatFix Fusion base profile 940 mm	1890 mm
* Default lenght in FlatFix Fusion calculator		

6. Available ballast holders

Article nr	Description	Panel lenght
100-7060	FlatFix Fusion Ballast holder 1600	1611-1680
100-7061	FlatFix Fusion Ballast holder 1200	1200-1306
100-7062	FlatFix Fusion Ballast holder 1900	1900-1972
100-7063	FlatFix Fusion Ballast holder 1500	1465-1610

11. Available wind deflector rear (single)

Article nr	Description	Panel lenght
100-7050	FlatFix Fusion Wind deflector rear 1600	1611-1680
100-7051	FlatFix Fusion Wind deflector rear 1200	1200-1306
100-7052	FlatFix Fusion Wind deflector rear 1900	1900-1972
100-7053	FlatFix Fusion Wind deflector rear 1500	1465-1610

Considerations during system design and installation:

By installing a PV system on or at an existing building the load compatibility, (e.g. snow/wind) up to that point will be changed. To prevent personal injury and/or material damages it is necessary to have the static calculations of the building reviewed by a qualified technician. It is also necessary to regard the current regulations, especially NEN6702, NEN7250, NEN1991-1-1-4 A1 + C2/NB. If the static calculations of the building are not verified, this may result in worst case scenario of the building collapsing (the supporting construction). The insurer should be consulted in the case of architectural changes. Roofs are always subject to vibrations and movement, which can be caused by activities in the building, such as the influence of the weather, thermal working or seismic activity, by means of which PV systems can move, shift or sag. In some cases it may be necessary to attach/anchor the PV system to the roof.

When determining the edge and angle zones of a building, it is necessary to adhere to the current regulations. When the edge and angle zones are indicated by Esdec, these are the minimum edge and angle zones. Placement of the solar panels in the edge and angle zones of a building is always at your own risk and is strongly discouraged.

The following subjects, amongst others, must be checked architecturally and approved, for instance by a builder:

- The emergent loads caused by the additional weight of the complete PV system on the building.
- The emergent loads caused by the changed geometry of the roof surface on the building.
- The emergent loads caused by the static load of the PV system on the building.
- The emergent loads caused by the dynamic wind pressure and possible accumulation of precipitation on the building and the PV system.
- The emergent loads during the installation on the building, the roof construction, the roof covering and the insulation.
- The long term compatibility of the insulation and the roof covering at the locations of the supporting structure contact points of the PV system, resulting from the point pressure.
- The compatibility of the roof covering in combination with the PV system at the location of the contact points.
- The effect of thermal activity between the building and the PV system.
- The effect of possible movement and vibration between the roof and the PV system.

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