

# iFIX

PV flat roof mounting system

## Installation Manual

english

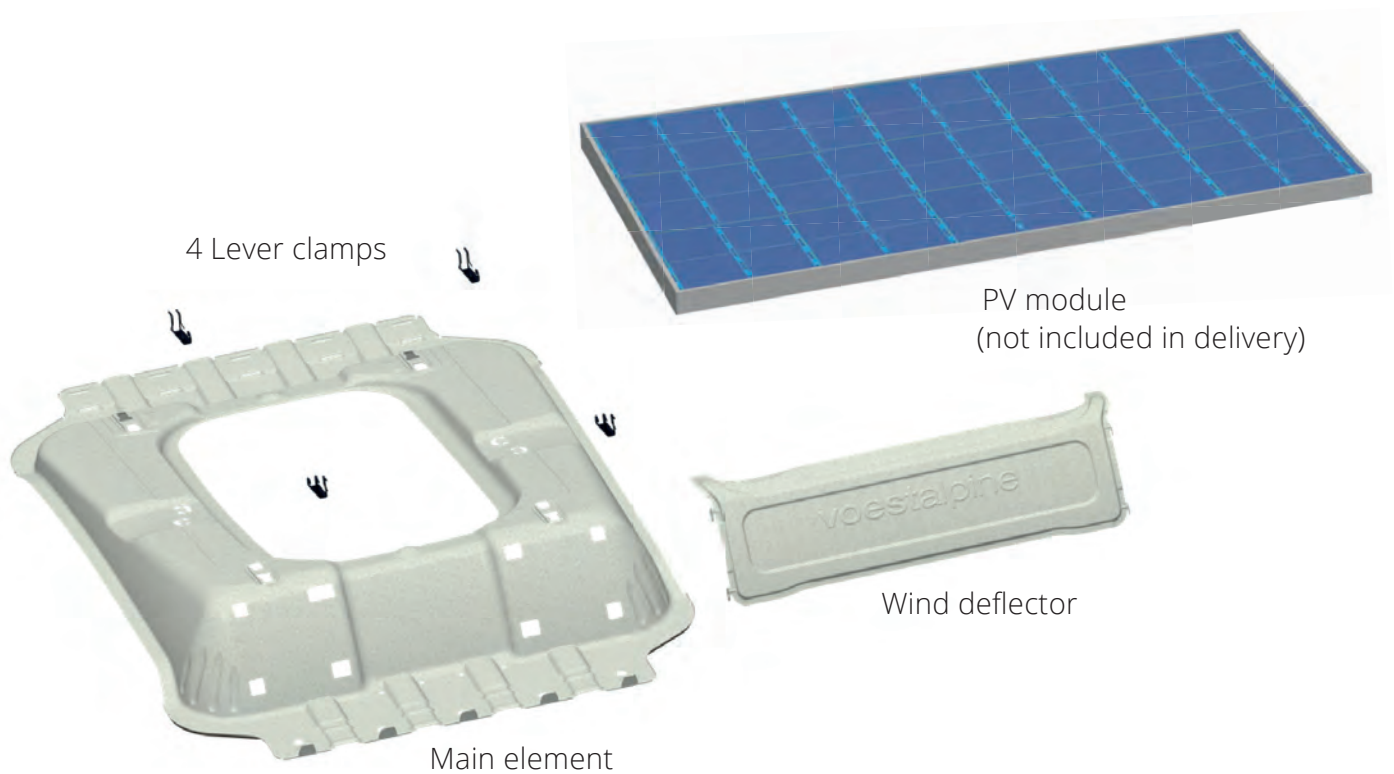
Version February 1st, 2018

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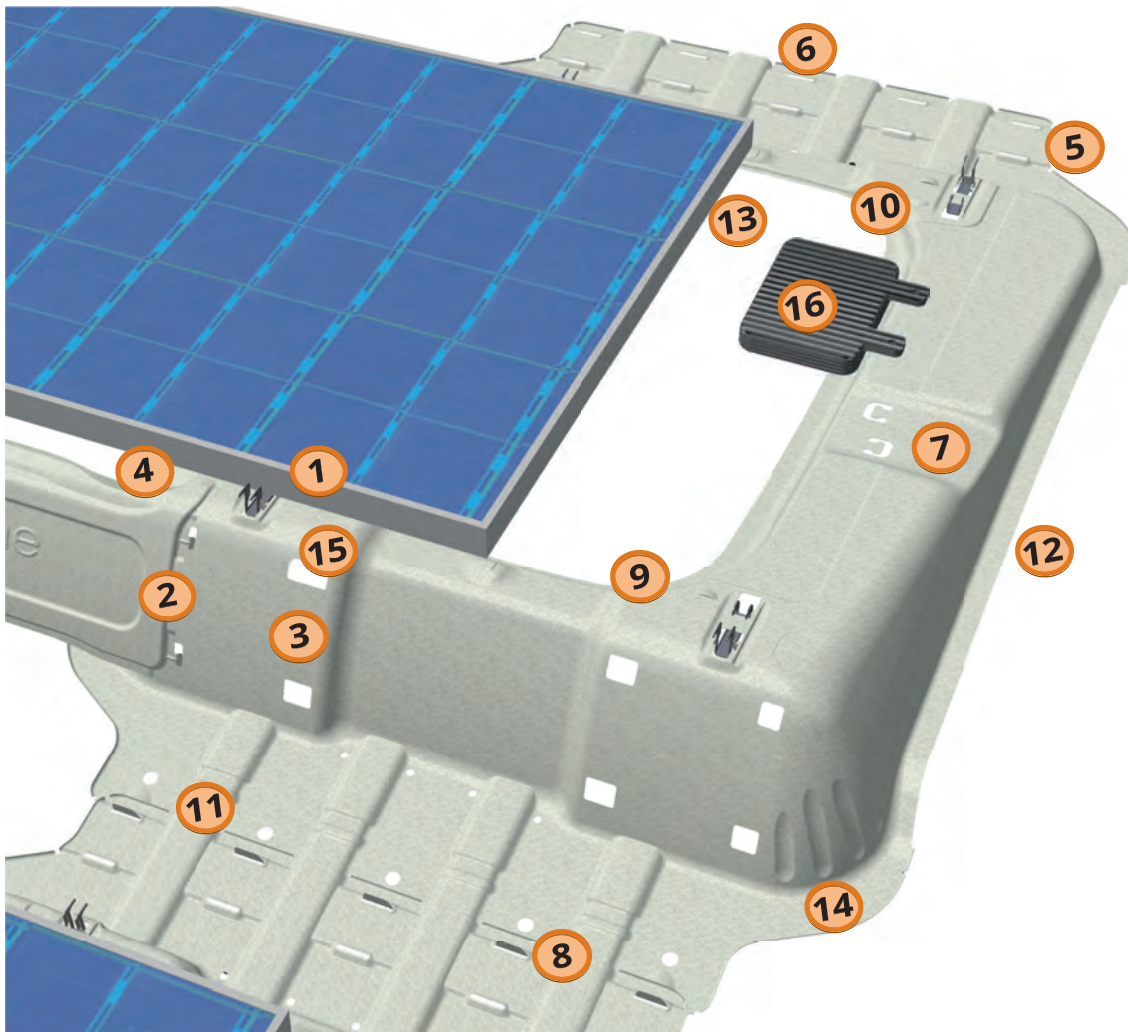
## iFIX Installation Unit

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## iFIX Installation Unit



## Special Characteristics of iFIX

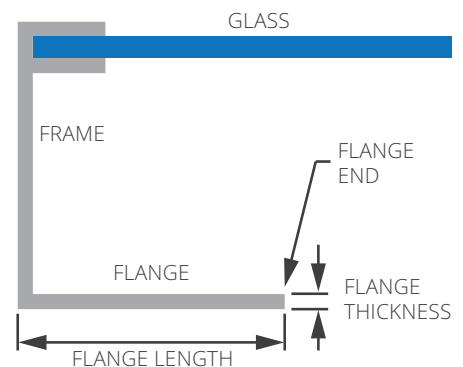


1. Lever clamps for toolless fastening of the PV modules
2. Easy to hook-in wind deflector
3. Second pair of holes for hooking the wind deflector into the end-of-row position
4. The deflector plate is secured by placing the PV module
5. 2 rows of holes for hooking in the next row of PV modules (shadow angle 16°/18°)
6. Center marks for longitudinal alignment of the main elements in the row
7. Weather-protected cable tray with U-shaped fastening shackles for cable ties
8. Bending shackles for toolless connection of the main elements between the rows
9. Upper positioning aid for PV module
10. Lower positioning aids for PV module
11. Weather-protected cable duct for the connection between the rows and placement surface for weighting
12. Handling and rear ventilation opening, flange for fastening lightning rods
13. Center marks for visual longitudinal alignment of the PV modules
14. Protective mat segments pre-mounted on underside to protect roof membrane (optional)
15. Large hole for fastening a short lightning protection rod
16. Place for the installation of a PV module inverter using self-tapping screws

# Important Planning Instructions

- iFIX can currently be implemented in buildings with a closed facade. Other buildings after individual check.
- iFIX is suitable for all standard flat roofs with a pressure-resistant underlayer and an incline of 0 to 5 degrees that prevents water from collecting on the roof.
- Permissible roof skins: Bitumen, plastic foil, gravel. (Sheet metal and other roof skins after individual check).
- Building height: maximum 25 meters.
- Areas of implementation: Pressure load maximum 5.4 kN/m<sup>2</sup>  
Wind load zones 1 to 3 (min. distance to shore 3 km)  
maximum peak velocity pressure 1150 N/m<sup>2</sup>
- Minimum distance of iFIX main elements to the fascia 0.50 m. Attica not needed.
- The PV modules should be mounted in such a way that there are 9 units per block, that means three PV modules side by side in one row and three rows, one behind the other, in one block. If there are disturbing roof structures, then sporadically 2 PV modules next to each other in a row are permitted.
- Calculation of the required iFIX installation units per row:  
Number of PV modules + 1
- Calculation of row width (east-west):  
(Greatest PV module length + 10 mm) x Number of PV modules in the row + 410 mm
- Calculation of the field length (north-south):
  - With shadow angle 16°: (1590 mm x Number of rows) + 29 mm
  - With shadow angle 18°: (1519 mm x Number of rows) + 100 mm
- Usable PV module sizes:  
Length: 1638 mm to 1675 mm  
Width: 982 mm to 1000 mm

For use of the iFIX lever clamp, a horizontal flange is required on the lower edge of the aluminum profile. Flange thickness at least 1.4 mm and max. 2.0 mm. Free flange length at least 16 mm. Distance between flange ends at least 911 mm and max. 940 mm.



- For a long term protection of the roof membrane the compatibility with the mounting system must be verified (see General Installation Guidelines). Optional the iFIX main element can be equipped with factory-provided protective mats.

- During planning it must be verified whether the roof insulation endures the additional pressure load consisting of PV system weight, snow load and weighting or not. For each PV module and iFIX installation unit the average snow load area of 2.36 m<sup>2</sup> and the actual contact area to the roof of 0.17 m<sup>2</sup> must be considered.
- System weight for 5 PV modules per row, without PV and weighting, incl. clamps and pre-cut protective mats
  - with 16° shadow angle: 4.27 kg/m<sup>2</sup>
  - with 18° shadow angle: 4.47 kg/m<sup>2</sup>
- Rows not longer than 40 meters. A passage of 1 meter should be free (due to thermal expansion und accessibility of firefighters).
- Overbuilding the roof ridge is only permitted if the crease line is identical with the line of the bending butt straps. Thereby, the series of elongated wholes, which are used for a shadow angle of 16°, has to be used in the area of roof ridge. Alternatively, the crease line may be in the lateral access region.
- The system must be secured against lifting-off depending on the position of the building, wind load zone and building height. For this, weighting must be placed on the surfaces intended for this purpose in accordance with a weighting plan that is drawn up individually by the system provider. Gravel can be used for weightings lower than 10 kg per weighting area. Otherwise concrete slabs can be used.
- Delivery of the components on pallet: Per pallet (with/without pre-mounted protective mats) 70/100 iFIX main elements with 70/100 iFIX wind deflectors and 280/400 iFIX stainless steel lever clamps (alternatively, if required, standard termination clamps with screw and threaded plate).

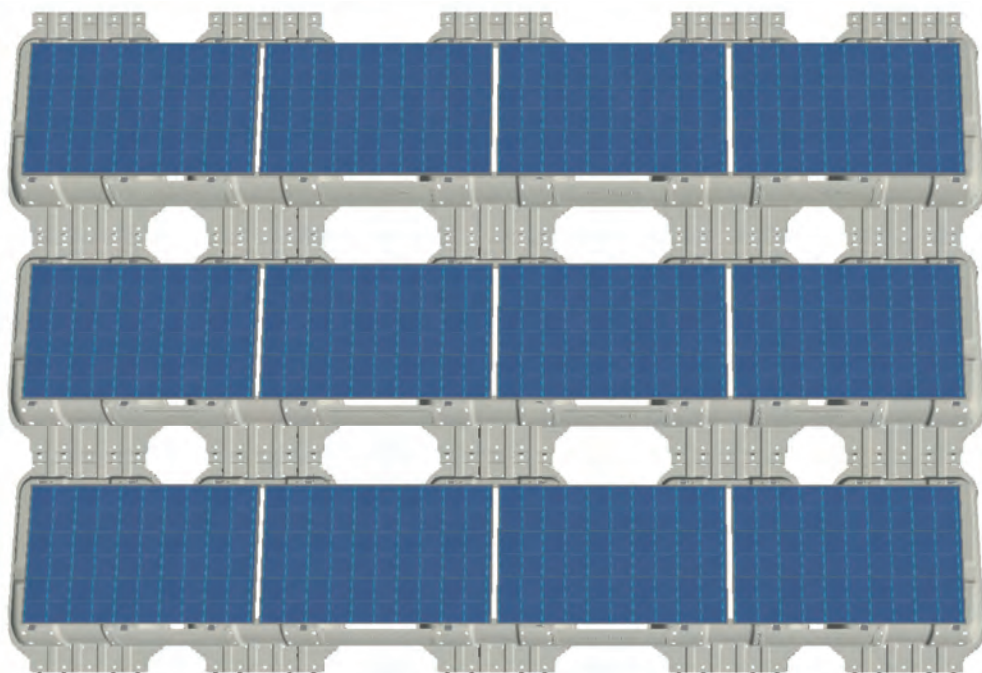


Fig. 1: Example of a system consisting of 12 PV modules in 3 rows

# General Installation and Safety Guidelines

**Structural analysis:** Prior to installation, the client must check whether building and roof comply with the additional static requirements of the iFIX system relative to horizontal and vertical loads. Please notice Eurocode 3 (DIN EN 1993). The additional loads are specified in the weighting plan that is drawn up by the system provider for each customer. The weighting plan must only be created by trained staff. Thereto a calculation program is available, which is based on wind load expertise and system statics of a certified inspecting structural engineer. The general building supervisory approval is certified by the German Institute for Structural Engineering. For any further information please visit the official website [www.dibt.de](http://www.dibt.de) and search for the certification number **Z-14.4-793**

If the bearing structure of a system is planned by the client himself, then set-up and configuration, as well as stability must be in accordance with

EN 1991-1-3	snow loads (Eurocode 1)
EN 1991-1-4	wind loads (Eurocode 1)

The calculations must be made in accordance with the current civil engineering standards. National and local construction regulations, standards, and environmental protection regulations must be strictly complied with.

**Safety:** Country-specific occupational health and safety regulations, relevant standards, as well as the regulations issued by the professional trade association, must be complied with! In particular, the following must be complied with:

- Wear safety clothing (particularly protective helmet, safety shoes and gloves).
- For roof work, the regulations for working on a roof must be complied with, (e.g. use of: fall protection, scaffolding with arresting device from an eaves height of 3 meters, etc.).
- The presence of two persons is strictly required for the entire course of the installation process, in order to ensure fast help if there is an accident.
- Required roof work has to be done by a qualified person.
- AC/DC cabling has to be done by a qualified person.

**Installation:** PV systems must only be installed and commissioned by persons who can ensure the compliant performance due to their professional qualifications (e.g. training or professional activity) or experience.

During the entire installation period you must ensure that at least one copy of the installation manual is available at the construction site and that the instructions are complied with.

We constantly make technical improvements to iFIX. Installation procedures can change in this process. Consequently, you must always use the current version of the iFIX Installation Manual for the installation. [Link to current documents](#)

[www.voestalpine.com/ifix](http://www.voestalpine.com/ifix)

Before building up a PV installation, make sure that the roof membrane meets with specifications according to DIN 18531. For a long term protection of the **roof membrane**, the **compatibility** with the iFIX mounting system must be verified, especially with the protective mats. Protective mats are not necessary for gravel covered roofs if the iFIX main sheet element is standing on top of the gravel. On bitumen covered roofs iFIX main sheet elements with pre-mounted protective mats have to be used. On plastic film covered roofs use iFIX main sheet elements with pre-mounted aluminum laminated protective mats for avoiding embrittlement of the roof skin. The compatibility of the plastic foil with protective mats must be approved by the plastic foil manufacturer. **Do not use** fleece mats as underlay, it is hazardous and therefore not allowed. Local dents should be compensated by roof skin compatible underlays. In case of utilizing pre-mounted protective mats it is necessary to underlay a minimum 11 cm width stripe of protective mat at the south side of the PV installation to prevent any contact with the roof skin.

If iFIX sheet metal elements need to be trimmed at the installation site, then you must ensure that **cut edges** are handled so as to avoid any risk to personnel or the roof membrane due to sharp edges and corners.

The installation instructions provided by the **PV module** manufacturer must be complied with to ensure that modules are only **clamped** in areas permitted by the PV module manufacturer.

**Conductor loops** must be avoided during the cable installation below the PV module.

**Bending butt straps** between iFIX main elements can be opened and reclosed for a maximum of 3 times. Otherwise the iFIX main sheet metal element must be replaced.

The PV module surface may not be shaded by the used weighting material. In case of using gravel as weighting make sure that ventilation openings are not covered.

Country-specific standards have to be considered regarding the fire behavior of applied materials and electrical installations and regarding drainage.

If you fail to comply with our general installation and safety instructions, or if you install or attach third-party components, voestalpine Automotive Components Schwäbisch Gmünd GmbH & Co. KG reserves the right to exclude liability.

The system is dismantled in the reverse sequence of the specified installation step.

**Equipotential bonding:** All system-internal connections of the iFIX system are made so that they are electrically conductive, with cross-sections that are sufficient for standard grounding. When using the stainless steel iFIX lever clamp the internal potential connection of the PV system is completely ensured for each contiguous row. An electrically conductive connection must be established between each row. As opposed to other systems with conventional middle/end clamps, the PV module frame is integrated in the iFIX mounting system using toothed stainless steel clamps, which ensures electrical conductivity. As a result, simply connect a ground connector with sufficient cross section to a suitable point of the module block and route this ground conductor to the equipotential busbar of the building to establish the required equipotential bonding of the mounting system. **Attention:** The use of standard aluminum termination clamps does not ensure equipotential bonding, because the aluminum-oxide layers of the clamp and of the PV module frame are not scratched. In this case install a sufficiently low resistive connection between PV module frames. In case of using the optional variant of painted zinc coated steel sheet, connect the wind deflectors with the main plates by a low impedance connection.

**Lightning current load capacity:** The lightning protection of a PV system, or of the building on which it is installed, must always be planned by a lightning protection specialist. The term lightning current load capacity is used in this regard for connections, clamps, etc. that must actively dissipate lightning currents as part of the lightning protection system. Each of these components must be tested and certified through a separate test. The lightning current load capacity of a mounting system is

not relevant for this task because the mounting system is not used as a surge arrester or lightning rod as part of the exterior lightning protection system. Normally the lightning protection system must be planned completely independently of the PV system. As a rule, a defined separating distance between PV system and lightning protection system must be maintained.

In certain cases it is also permissible to connect the mounting system to the lightning protection system; however you must always take the injection of lightning currents into the electrical system into account. For this case it is relevant that the internal potential connections of the frame are low resistive and have sufficient cross section. All parts of the iFIX system are successfully tested by an independent examination according to DIN EN 50164-1 and DIN EN 62305-3. Attention should be paid to the separately available „**iFIX Guideline on lightning protection**“.

**Attention:** The proof of the lightning protection carrying capacity is only valid for the version made of aluminum-zinc-coated sheet steel, with lever clamps made of stainless steel.

National and local regulations and standards regarding lightning protection, grounding and potential equalization must strictly be followed.

Please read all of the installation steps first, to ensure a safe and proper installation of the system. The material required is listed for each step. If you have problems with the installation or if you have questions concerning the system, contact our

**Service Hotline: +49 7171-972-906**



## Required Components

### iFIX Main element

Dimensions: 1170 x 1620 x 231 mm

Weight: 7.7 kg

Material: steel sheet aluminum-zinc-coated

Optionally available with protective mat

segments pre-mounted on the underside



### iFIX Wind deflector

Dimensions: 897 x 296 x 70 mm

Weight: 1.15 kg

Material: steel sheet aluminum-zinc-coated



### iFIX Lever clamp

4 clamps per PV module

Material: stainless steel

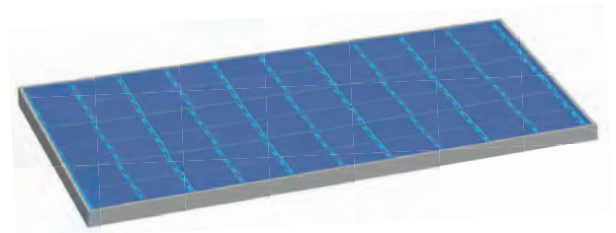


### Photovoltaic module

(Not included in delivery)

Sizes that can be used:

See „Important Planning Instructions“



## Required Tools (Not included in delivery)

### Safety gloves

EN388-protection class min. 4431



### Chalk line

### Tape measure

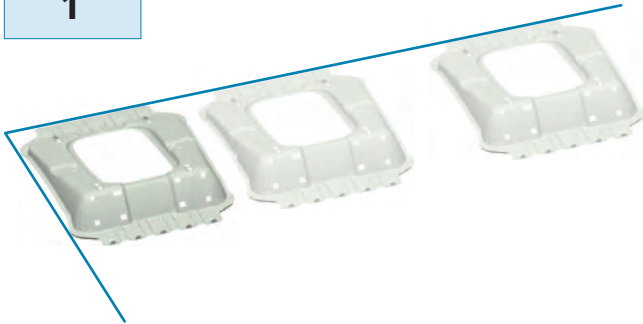


### Cable ties

UV resistant

# Installation Steps

## Step 1

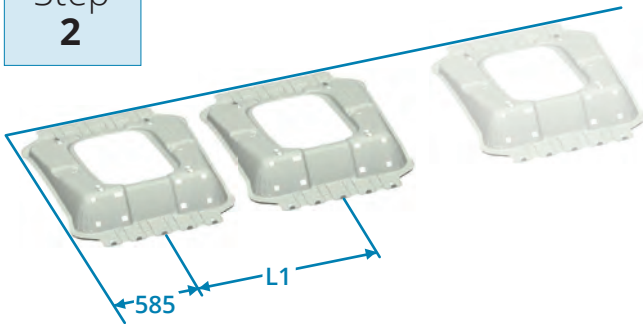


### Set up the first main element of the row

starting from the south so that it is aligned at the prescribed distance to the edge of the roof.

**Material:** Tape measure, chalk line, main element

## Step 2



### Position the second main element in the row

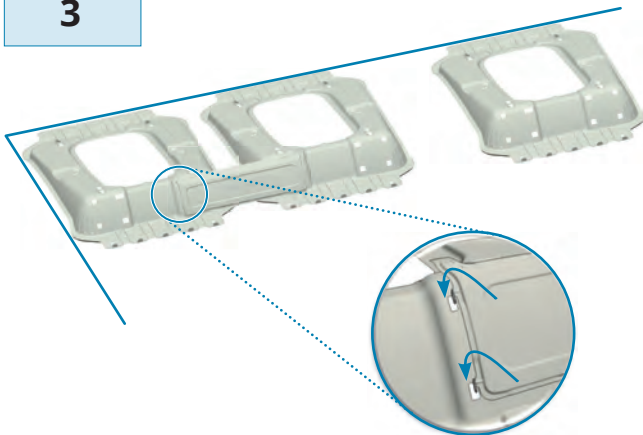
next to the first one.

Center spacing:

**L1** = PV module length – 385 mm

**Material:** Tape measure, main element

## Step 3

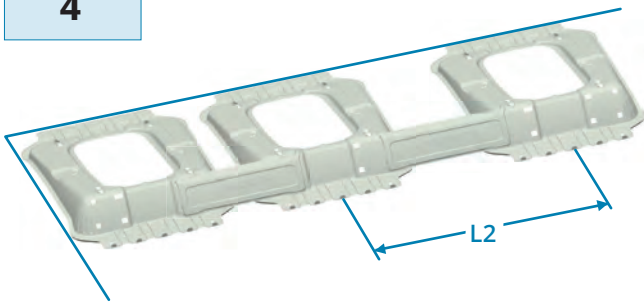


### Hook in the first wind deflector of the row

into the intended rectangular openings on the main element, from above.

**Material:** Wind deflector

Step  
4

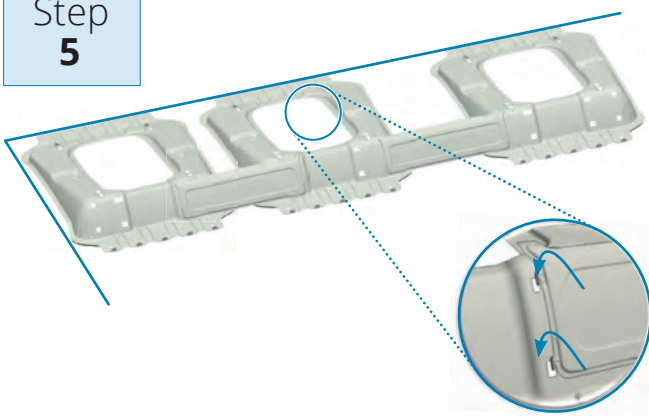


**Position the third main element of the row**

next to the second one.  
Center distance:  
**L2** = PV module length + 10mm

**Material:** Tape measure, main element

Step  
5

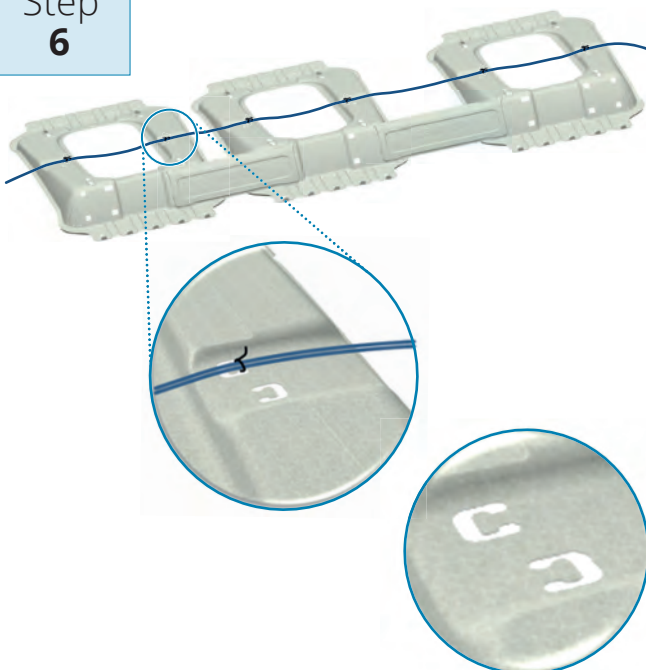


**Hook in the second wind deflector in the row from above.**

Continue in this manner and set up the row to the end; note that the last element must be placed at the same shortened distance as the second main element.

**Material:** Wind deflector

Step  
6

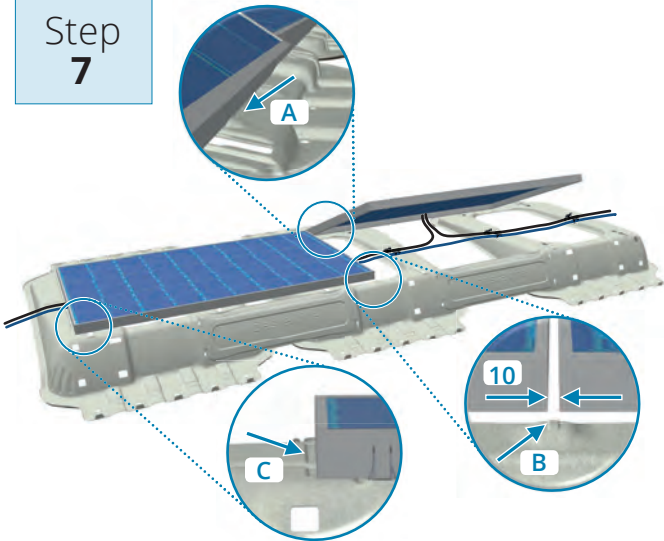


**Lay the cable**

Other required cables can be installed in the provided duct and fastened to the provided U-formed butt straps with cable ties prior to installing the PV modules.

**Material:** Cable ties (UV resistant)

Step  
7



**Placing the PV modules**

Place the PV module on the lower positioning aid [A], connect the cable and lay it in the duct provided in the main element. Then lower the PV module until it lies flat on the support. Use positioning aid [B] for constant distance between PV modules. At the end of a row positioning aid [C] must be visible. The step ensures water drain.

**Material:** PV modules, cable ties

Step  
8



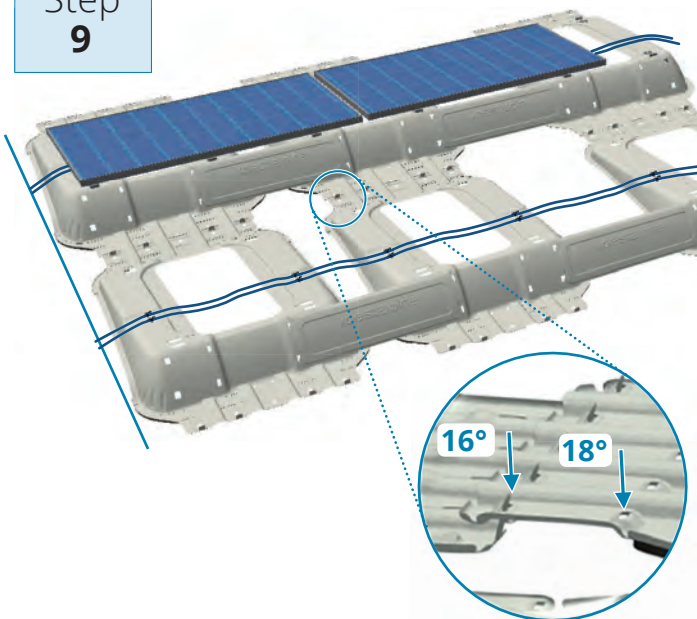
**PV module fastening**

Thread in the lever clamps and lift them up until you hear a "Click"

**Material:** 4 lever clamps per main element.



Step  
9



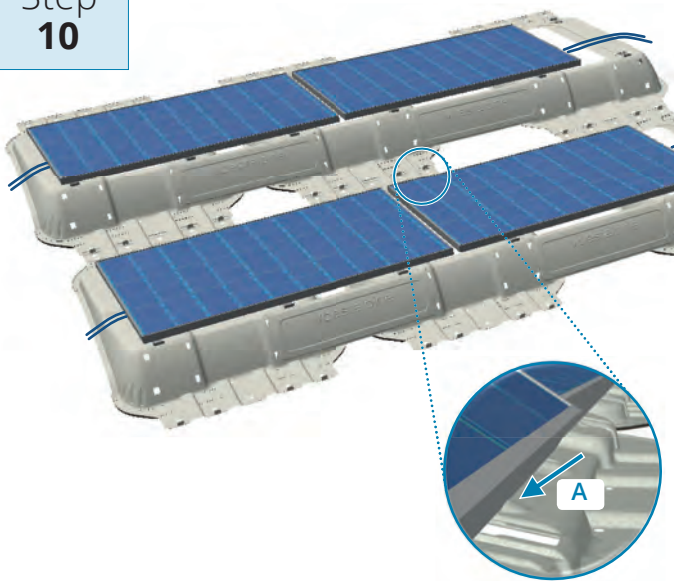
**Placement of the main elements of the second row, connection, cable installation**

Fit the main elements via slotted holes onto the butt straps of the preceding row (select the slotted hole row according to the desired shadow angle).

**Tip:** In order to correct set-up errors, do not bend over the butt straps yet!

Lay out the cables (as in step 6).

Step  
10



**Place the PV modules and fix them in place**

Place the PV module on the lower positioning aid [A], connect the cable and lay it in the duct provided in the main element. Then lower the module until it lies flat on the support.

Starting at the low long edge of the PV module, place each lever clamp (as in step 8, 4x per main element). Set up each of the other rows, as in step 9 and 10

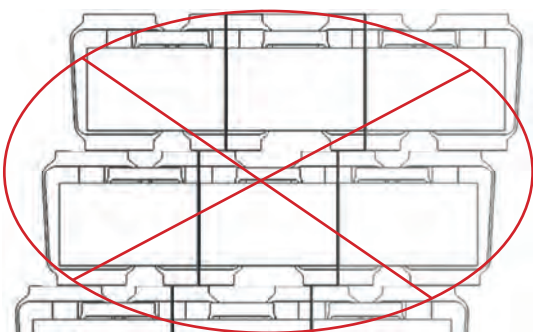
Step  
11



**Connection of all iFIX main elements**

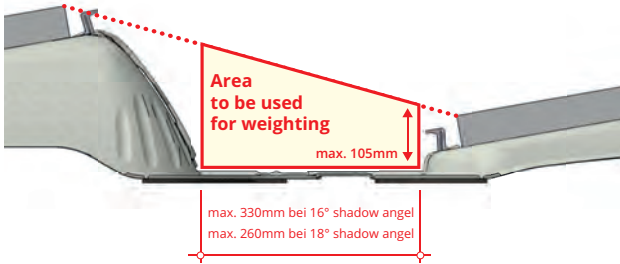
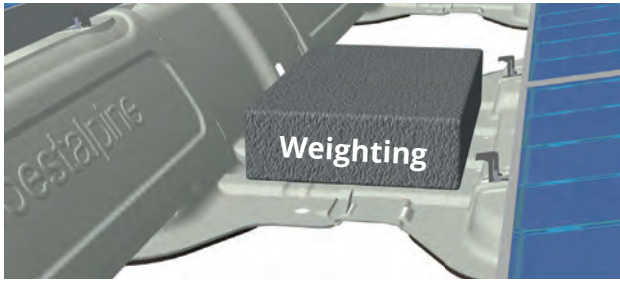
For each main element **bend over 5 butt straps in the south direction.**

In order to correct set-up errors, we recommend that you bend over the butt straps just before applying the weighting.



**Not permissible:** slight displacement of

Step  
12



### Placing the weighting

The weight for each base plate of the main element is specified in the weighting plan.

The area shown is intended for weighting.

The weighting should be placed on without grinding motion, and must not shade the PV modules due to its height.

### PV system with iFIX mounting system (without weighting)



Contact Distributor:



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## Maintenance

The PV system must be checked for its mechanical safety once a year through an on-site inspection. You must verify the firm joining of the PV modules by attempting to lift them with your hand. Loose PV modules must be secured immediately. To achieve a period of corrosion protection that is as long as possible, dirt accumulation must be removed and coarse fouling must be removed with water. Regarding the maintenance of PV modules and electric cabling the specifications of PV module manufacturer and electrician have to be considered.

## Warranty

There applies the iFIX General Warranty Conditions valid at the time of purchase and the Purchase terms and conditions of voestalpine Automotive Components Schwäbisch Gmünd GmbH & Co. KG.

## The Company

### Through competence

For decades, voestalpine has stood for quality and service in metal forming technology. As a supplier to the automobile industry we developed the technical innovation power that we are investing in the solar industry today.

### Together

We create new values by combining existing ones: Four locations in Germany and in the Netherlands. And above all: The experience of more than 1,500 employees. When our certified experts for design, technology, development, and production combine their know-how, trend-setting solutions are created for our customers.

### Systematically

We develop photovoltaic system solutions with a range of products that are perfectly matched, that seamlessly intermesh and that can be adapted to different requirements. This is precisely what the patented system solution iFIX stands for.

