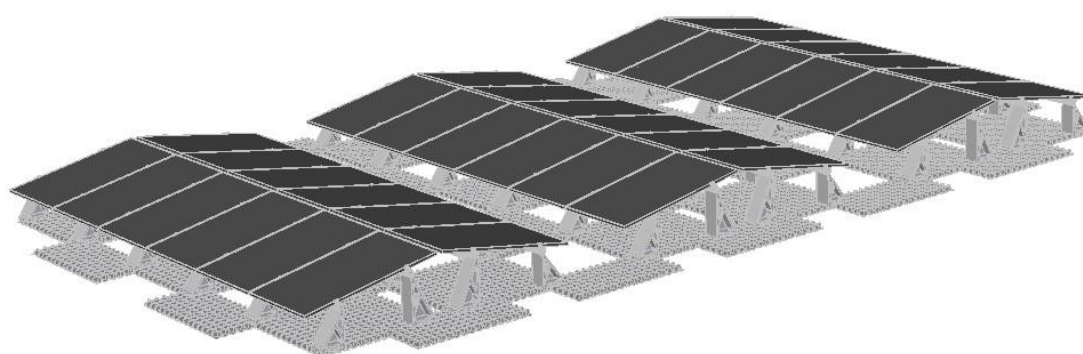
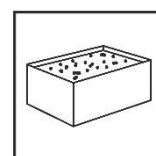


# Mounting instructions

Green roof

East-west



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# 1 Notes

The following instructions are generally valid for our mounting system novotegra and are to be applied or interpreted accordingly regardless of the respective roof and mounting system type.

## Safety information

Mounting tasks may only be carried out by qualified and competent persons. During the work protective clothing in accordance with the relevant national regulations and guidelines must be worn.

Mounting must be carried out by at least two persons to ensure help in case of an accident.

All relevant national and locally applicable health and safety regulations, accident prevention regulations, standards, construction standards and environmental protection regulations as well as all regulations of the employers' liability insurance associations must be complied with.

The national regulations for working at height / on the roof must be complied with.

Electrical work must be carried out in compliance with the national and locally applicable standards and guidelines and the safety rules for electrical work.

Earthing / equipotential bonding of the mounting system must be carried out in accordance with the national and locally applicable standards and guidelines.

## Categorisation into hazard classes

To alert the user of potential danger situations the hazard classes analogous to ANSI Z 535 are used. The hazard class describes the risk if the safety information is not observed.

Warning symbol with signal word

Hazard class analogous to ANSI Z 535



**DANGER!** describes an immediate danger. If it is not avoided, death or serious injury will result.



**WARNING!** describes a potential danger. If it is not avoided, death or serious injury might result.



**CAUTION!** describes a potential danger. If it is not avoided, light or minor injury might result.



**NOTE!** describes a potentially harmful situation. If it is not avoided, the plant or objects in its vicinity might be damaged.

## General information

After receipt the goods must be inspected for completeness using the accompanying delivery note.

novotegra GmbH does not accept the costs, nor can we guarantee subsequent express deliveries if missing material is only noticed during mounting.

Since our mounting systems are subject to continuous development, mounting processes or components may change. Therefore, please check the current status of the mounting instructions on our website prior to mounting. We are also happy to send you current versions upon request.

The mounting system is suitable for the attachment of PV modules with standard market dimensions. Please find more detailed information about this in chapter 3.

The usability of the mounting system for the respective project must be checked for each individual case on the basis of the roof cover / roof construction / facade present.

The roof cover / roof construction / facade must meet the requirements of the mounting system with regard to load bearing capacity, support structure and condition.

Requirements for the material of the roof construction / roof cover / facade:

Wooden components (rafters/ purlins) at least strength class C24: no fungal decay or rottenness. OSB with material grade OSB 3.

Steel purlins for stock screw installation exclusively material grade S235.

Tensile strength  $R_m$ , min Trapezoidal sheets: steel 360 N/mm<sup>2</sup>; aluminium 195 N/mm<sup>2</sup>.

Wall construction material: concrete, brick or sand-lime brick in solid or hollow block design.

The load bearing capacity of the roof / roof construction (rafters, purlins, trapezoidal metal, concrete floors, number of adhesive points, folded seams, etc.) or the facade (wall construction materials) must be checked by the user or a check be commissioned.

Physical building aspects concerning insulation penetrations (e.g. condensation) must be taken into account by the user.

### **Notes on mounting**

The components of the novotegra mounting system are intended exclusively for the attachment of PV modules. Dependent on the roof type of the building the designated mounting system components must be used.

A condition for the intended use of the novotegra mounting system is the mandatory compliance with the specifications in these instructions regarding safety information and mounting.

In case of unintended use and non-compliance with the safety information and mounting instructions and non-utilisation of the corresponding mounting components or use of third party components not belonging to the mounting system any warranty and liability claims against the manufacturer are voided. The user is liable for damage and resulting consequential damage to other components, such as PV modules, or the building as well as personal injury.

The user must read the mounting instructions prior to mounting. Unresolved issues must be clarified with the manufacturer prior to mounting. The mounting sequence in these instructions must be adhered to.

It must be ensured that a copy of the mounting instructions is accessible in the immediate vicinity of the work on site.

The mounting specifications (module load, attachment, clamping areas etc.) of the module manufacturer must be observed and complied with.

Prior to mounting the mounting system must be statically calculated with the loads to be assumed for the building project in accordance with the national standards. Information relevant to mounting (e.g. roof hook distance, lengths of bolts, overhang and protrusions or distance of base trough and required ballast) must be determined by the static calculation using the design software [www.solar-planit](http://www.solar-planit).

The permissible roof inclination for using the mounting system according to these installation instructions is 0 to 60 degrees for roof-parallel installation on a pitched roof and 0 to 5 degrees for elevated installation on a flat roof. Facade systems must be mounted parallel to the facade.

For roof-parallel installation with the clamping system, two module support rails per module must be mounted symmetrically under the modules for equal load transfer into the substructure. Alternatively, the roof-parallel installation can also be installed with insertion rails.

The specified tightening torques must be adhered to and checked randomly on site.

## Notes on static calculations

The mounting system must generally be statically calculated for each individual project using the design software Solar-Planit. Excluding façade systems, the calculation for this will be carried out by the company novotegra GmbH.

The static calculation only determines the load bearing capacity of the novotegra mounting system and also takes account of the attachment to the building (rafters, purlins, trapezoidal metal, facade etc.). The load transfer within the building is not considered (customer static calculations).

The load bearing capacity of the mounting system components is determined on basis of the planned module layout and the underlying building information (project data recording). Deviations from the planning on site may lead to different results.

The load assumptions (load and roof division) are country-specific in accordance with the specifications of the Eurocode load standards. The determination of the loads to be assumed for Switzerland is in accordance with SIA 261.

At pitched roof, the modules may not be fitted above the gable end, ridge and eaves or the facade (increased wind load). At the ridge the modules may be fitted up to max. a theoretical horizontal line with the ridge tile and perfectly flush with the gable end. In the eaves area the modules may reach to max. the end of the roof cover due to loads.

In case of an exposed building position (with wind load e.g. at the edge of a slope) or snow accumulation (e.g. dormer or catchment grill or roof structures like domelights etc) the specifications of the Eurocode load standards or SIA 261 (Switzerland) must be taken into account by the user within his own responsibility. The design software does not consider these cases.

The static calculation of the mounting system is based on the symmetrical placement of the modules on the mounting rails at the longitudinal side of the modules (roof-parallel clamping systems) or on the support components (elevation) for equal load transfer into the substructure. For the insertion system a cross rail arrangement is expected for equal load transfer.

The results calculated with the design software, such as distances of the fasteners (e.g. roof hooks, stock screws, saddle clamps etc.), rail lengths and number of fasteners (e.g. direct attachment on the trapezoidal metal), overhang (e.g. rail and roof hook protrusions) or distances between the base troughs and number of fixing materials (e.g. rail joint) and the other calculation notes must be considered and complied with.

novotegra has been tested and certified by TÜV Rheinland:



## 2 Maintenance of the mounting system

The mounting system must be checked for stability and operation at regular intervals during the system maintenance.

Besides the visual inspection of the components, we recommend random connection checks.

The installation should be checked regularly for shady areas due to vegetation growth.

Removal is possible in reverse order in the work steps mentioned below. The maintenance work must be carried out by a specialist company with proven experience in electrical systems and work on mounting systems.

## 3 novotegra for green roof

The contents of this installation manual describe the installation of the substructure on roofs with sheet or bitumen waterproofing, with or without gravel respectively substratum.

On flat roofs without parapets, the modules must be mounted at a distance of at least 1.50 m to the edge of the roof. On flat roofs with parapets, a minimum distance of at least 0.50 m must be maintained between the module edge and the inner edge of the parapet, or rather, the distance to the edge must be taken into account after the individual calculation in the planning software to ensure that the general conditions of the wind tunnel tests can be maintained.

Depending on the roof seal material, separation and/or protection membranes may need to be added between the roof seal and the substructure. This must be agreed upon directly between the company installing the PV system, the building owner and the specialist roof sealing company.

The substructure is installed without puncturing the roof. The photovoltaic system is secured against wind suction with ballasting (substrate or suitable stones) on the basis of the results of the wind tunnel tests for the system. The required substrate or ballast height must be determined specifically for each project with the planning software. The ballasting applies to the planned installation; deviations from the plan by the installer may lead to different results.

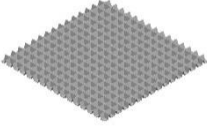
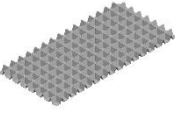




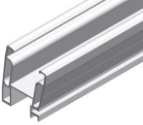


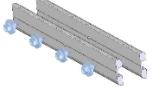




General conditions to be observed in accordance with the wind tunnel test results:

- Roof incline 0 – 5 degrees
- Flat roofs with and without parapet
- Distance from system to roof edge (without parapet) = 1.50 m
- Distance from system to parapet (inside edge) = min. 0.50 m
- Module width = max. 1,34 m
- Module length = max. 1,85 m
- Angle of installation (fixed) = 10°
- Distance between rows = see planning software Solar-Planit

The mounting system is designed for loads up to 2.4 kN/m<sup>2</sup> (2,400 Pa). The module is clamped (clamping area 11 x 52mm) along the long side. Any potentially existing drainage openings on the module frames must not be obstructed; the same applies to the formations on the supporting components designed for this purpose.

## 4 System components, tools and equipment

### 4.1 What is required for mounting

Figure	Tool	Component*	Product group
		Green roof substrate plate Material: Recycled HDPE	Substrate layer / protection layer
		Half green roof substrate plate Material: Recycled HDPE	Substrate layer / protection layer
		Green roof high module support: Recycled plastic	module elevation
		Green roof low module support: Recycled plastic	module elevation
		Green roof module support 6 x 80 mm mounting screw material: Stainless steel Tool: TX25	fastening equipment
		Green roof module support rail Material: Aluminium	profile rails
		6.5 x 51 mm mounting screw for green roof module support rail Material: Stainless steel Tool: Socket bit AF 8 mm	fastening equipment
		Rail connector set C47 S Material: Aluminium Tool: Socket bit AF 8 mm	rail connector
		Middle clamp set C Material: Aluminium, cast aluminium and stainless steel Tool: Socket bit AF 8 mm	Module elevation
		End clamp set C Material: Aluminium, cast aluminium and stainless steel Tool: Socket bit AF 8 mm	Module elevation

\* The components vary depending on the requirements of the roof, the structural analysis and the choice of components and may deviate from the images above.

**Figure****Equipment**Cordless  
screwdriverTorque key up  
to at least 8 Nm

Chopsaw

**Use for tool**Bit-Torx TX25  
Socket bit AF 8mmSocket bit AF 8 mm  
Socket bit AF 18 mm

---

**Application**Component  
connections, clamp  
assembly  
Clamp assembly  
Ground connector

Cutting rails

## 4.2 Mounting system components – optional

**Figure****Tool****Component\*\*\***

Cable-tie clip for profile flange

Cable-Clip d = 10 mm

Grounding connector set AF 18 mm  
Material: stainless steel  
Tool: Special lock nut AF 18 mm  
deepPerforated Alu-tape 10,000 x 20 x 1  
Material: Aluminium  
Tool: Socket bit AF 8 mm

Mounting screw SL 5,5

Contact latch module clamp

**Product group**

Cable fixing

Cable fixing

Accessories and  
optional componentsAccessories and  
optional components

fastening equipment

Accessories and  
optional components

\*\*\* Optionally available installation system components, e.g. for improving the aesthetics of the system, cable management or grounding of the installation system.



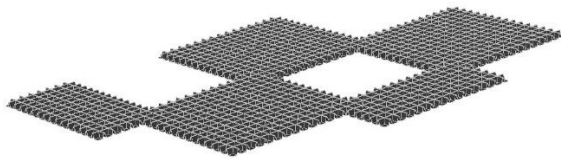
## 5 Installing the mounting system

Prior to installation, the module array must be measured out on the roof and the position of the modules determined, taking into account any obstacles such as light domes or strips, fans or drains.

The individual mounting steps for the east/west system variation are explained below with reference to the mounting variations (MV) for the different installation options or the system variations "south" and "butterfly". This is then followed by the respective work sequence.

### 5.1 Substrate plate installation and support component mounting

#### Arrange substrate plates

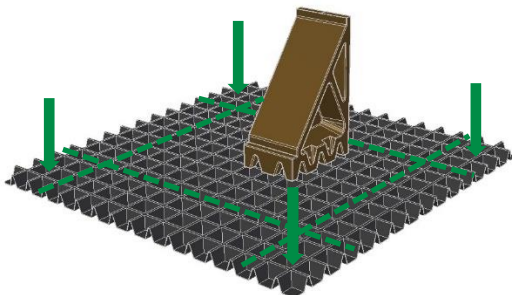


Define starting point and measure up first whole substrate plate. Lay the following substrate plates (whole/half) according to planning documents

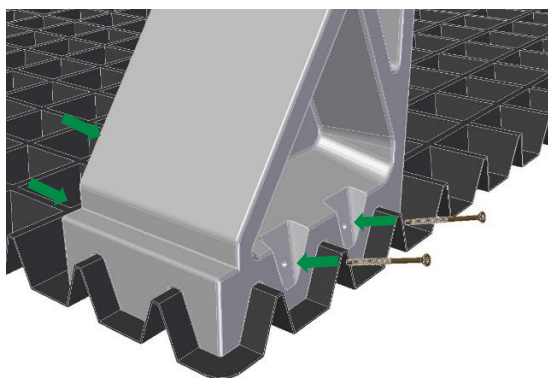
#### NOTICE

The substrate plate overlaps must always been taken into account. The substrate plates must be laid on top of an existing and suitable protection fleece.

#### Position and fasten module supports



Position module supports (high/low) on the substrate plates according to planning documents. Fasten each support at the positions specified with four 6 x 80 mm support mounting screws. The supports must be placed in the corners of the (whole) substrate plates. On these corners, the substrate plates (half) may overlap.

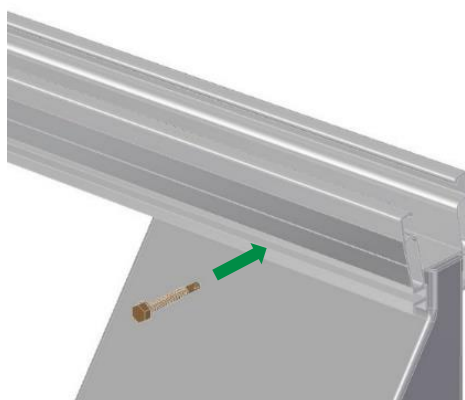
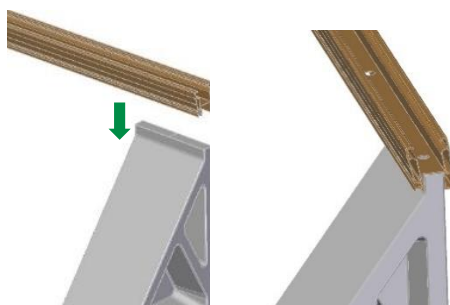


#### NOTICE

The horizontal and vertical substrate plate line grid pattern must be adhered to. Always refer to the planning documents.

## 5.2 Rail mounting and fastening

### Position green roof C-rail



Place rail on module supports.

Fasten a 6.5 x 51 mm module support rail mounting screw as close to the middle of each module support as possible.

#### NOTICE

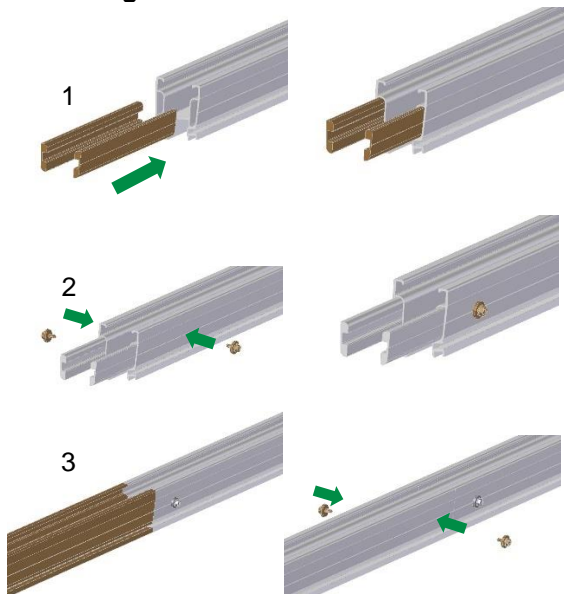
Do not over tighten the screws. Maximum rail overhang on the last module support 65 cm. Always heed the planning documents. Each rail part must lie on and be fastened to at least two module supports.

After the module support and rail installation, the substrate is placed on top. The ballasting is achieved with the substrate; refer to the planning documents for the substrate weight per m<sup>2</sup>. If necessary, additional stones must be put on top of the substrate plates as ballast. The mounting system will only stand securely once the required amount of ballast/substrate has been put in place.

#### WARNING

Observe the accident prevention regulations when sawing the rails.

### Connect green roof C-rail



Push the rail connector set (1) halfway into one of the rails to be connected (2) and fasten it there with one self-drilling screw on either side, at a distance of approx. 20 mm to the end of the rail. After that, push the other rail fully onto the rail connector set until both rail ends meet (3), then fasten as described above.

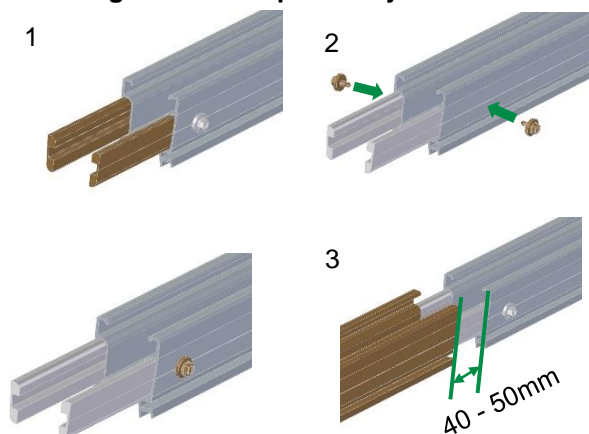
#### NOTICE

Do not over tighten the screws.

#### WARNING

Observe the accident prevention regulations when sawing the rails.

### C-rail green roof expansion joint



Push the rail connector set (1) halfway into one of the rails to be connected (2) and fasten it there with one self-drilling screw on either side, at a distance of approx. 20 mm to the end of the rail. Then push the other rail on top at a distance of 40mm - 50mm (3) and fasten it only to the following supports.

#### NOTICE

Do not over tighten the screws.

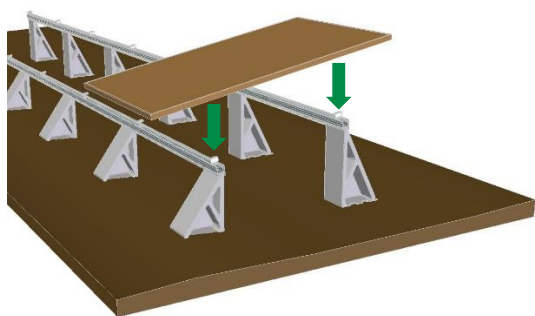
Do not install the expansion joint underneath a module. Maximum rail length without expansion joint 17m. Always heed the planning documents.

#### WARNING

Observe the accident prevention regulations when sawing the rails.

## 5.3 Module installation

### Module positioning and clamping

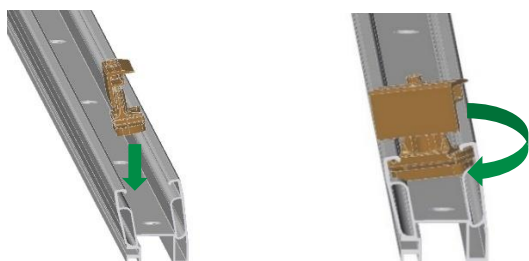


Position the photovoltaic modules upright onto the mounting rails, ensuring that they are straight. End clamps are used at the start and the end of a module row; middle clamps are used between the modules.

#### NOTICE

Panel gap at the ridge must be at least 50 mm.

### Middle and end clamp installation

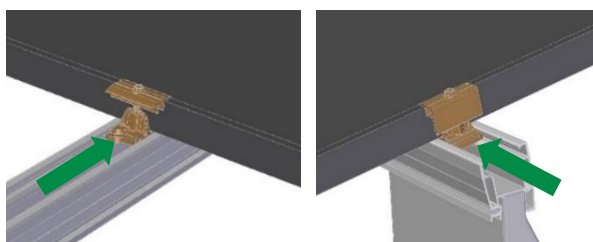


At the clamping point, guide the middle and end clamps into the rail chamber from the top. Then turn the rail nut inside the rail and push the module clamps onto the module frame.

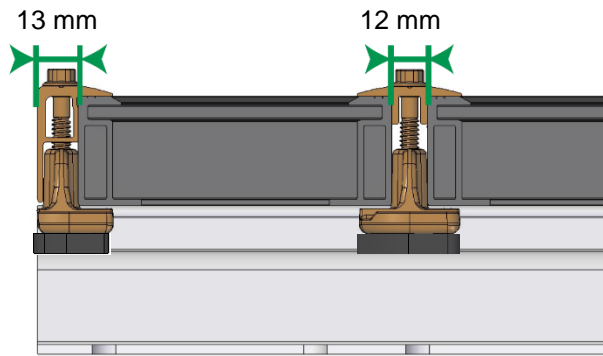
#### NOTICE

Contact latch installation see MV 3.2

Middle clamp fastening torque 10 Nm  
End clamp fastening torque 8 Nm



### Middle and end clamp space requirement



End clamps may be installed flush with the rail end.

Push module completely onto the rail nut of the middle clamps.

#### NOTICE

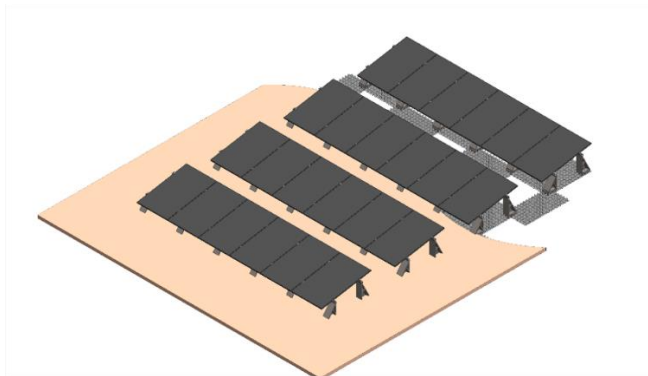
Middle clamp fastening torque 10Nm

End clamp fastening torque 8Nm

## 5.4 Mounting variations (MV)

### MV1

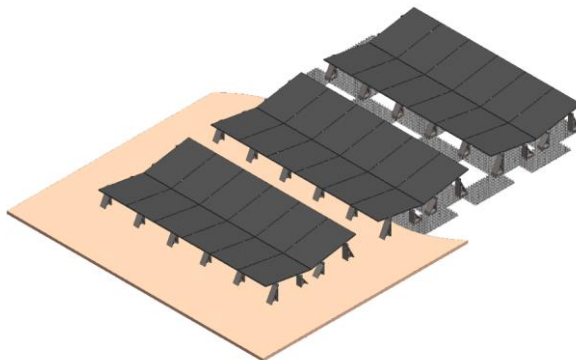
Module position south-facing



Heed the planning documents and position and fasten the components accordingly. Further installation steps the same as variation east/west.

### MV2

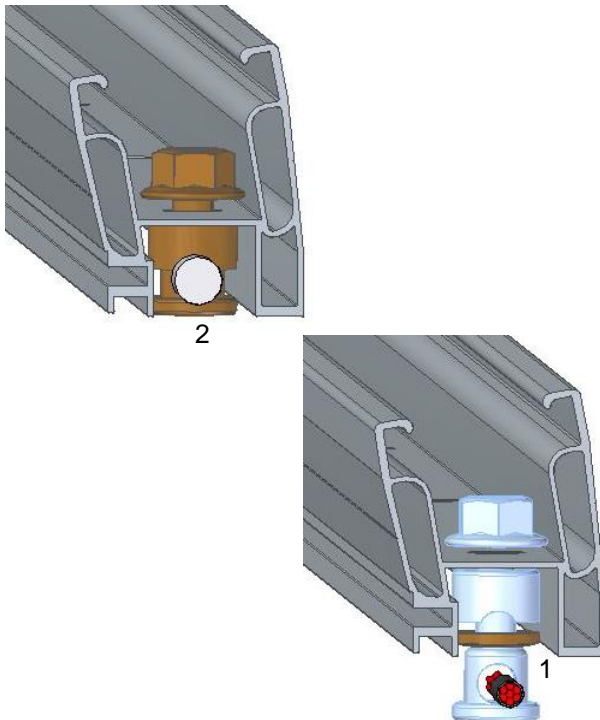
Module position "butterfly" (east/west)



Heed the planning documents and position and fasten the components accordingly. Further installation steps the same as variation east/west.

## MV 3 Grounding

### MV 3.1 Grounding connector installation



Grounding wire ( $\varnothing$  as per national specifications): Disassemble grounding connector, remove clamp washer (1). Push the component through the green roof module support rail from below. Push the grounding wire (2) through the opening (suitable for  $\varnothing$  6-10mm) and fasten the component to the rail floor with the self-locking flange nut. Grounding cable ( $\varnothing$  as per national specifications): Strip the grounding cable (e.g. stranded wire) and push it through the opening. Leave clamp washer in place (1). Clamp to rail floor with the self-locking flange nut.

#### NOTICE

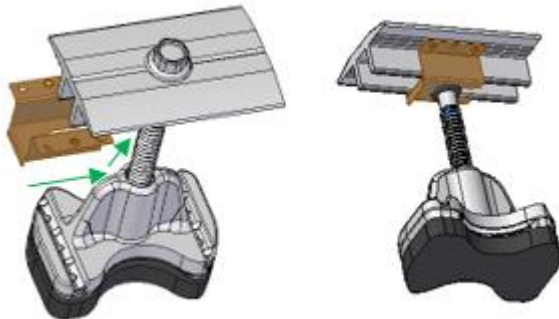
Grounding wire fastening torque 20 Nm, grounding cable 10 Nm.

The grounding connector is used to connect the mounting system to the potential equalisation.

#### WARNING

The applicable standards and guidelines, e.g. lightning protection standard, must be observed.

### MV 3.2 Contact latch installation

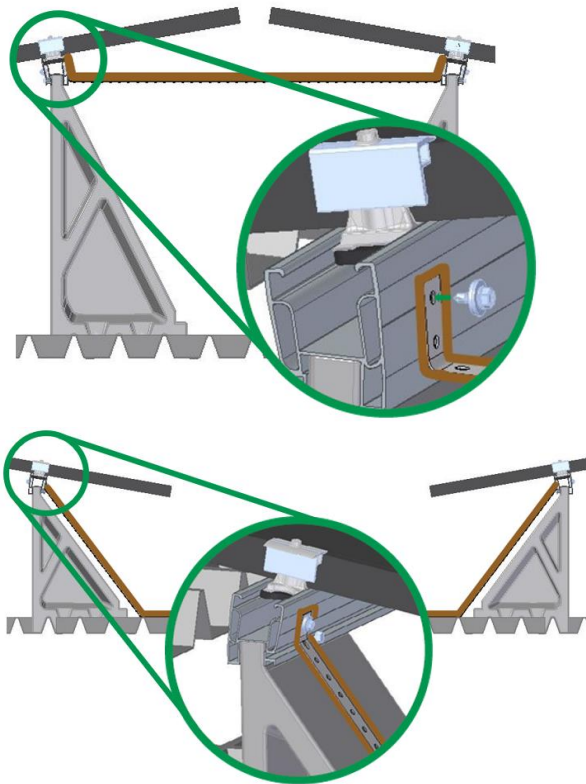


Use the sliding clip to push the contact latch over the vertical bridges of the middle clamps up to the screw.

#### NOTICE

The middle clamp with the contact latch in place is installed as previously described in Chapter 5.3.

### MV 3.3 Strapping installation



Cut aluminium strapping to size. Position the strapping over the groove at the side of the module support rail. Position the mounting screw at the groove and fasten.

#### **NOTICE**

The aluminium strapping is used to connect the individual module rows with each other for the potential equalisation.

#### **⚠ WARNING**

The applicable standards and guidelines, e.g. lightning protection standard, must be observed.



## 6 Warranty / product liability (exclusion)

In addition to the above-mentioned regulations and safety notices the applicable regulations and rules of technology must be observed by the installing specialist company.

The installer is responsible for the dimensioning of the mounting system.

The installer is responsible for the connection of the interfaces between the mounting system and the building. This also includes the tightness of the building envelope.

For flat roofs the roof insulation must be evaluated by the installer on site within his own responsibility regarding the material of the sealing layer, resistance, ageing, compatibility with other materials, overall condition of the roof insulation, need for a separating layer between the roof insulation and the mounting system. The required and necessary measures or precautions for the protection of the roof insulation for the mounting of the substructure of a PV system must be initiated by the installer with the aid of a specialist tradesman where necessary. novotegra GmbH does not accept liability for faulty or inadequate measures and precautions for the protection of the roof insulation!

The installer must review the friction coefficient used in the calculation for the verification of the slip safety of PV systems on flat roofs on site. Friction coefficients determined on site can be taken into account by entering them in the Solar-Planit planning tool. novotegra GmbH does not guarantee the correctness of the assumed values and is not liable for damage due to the use of incorrect values.

The specifications of the module, cable and inverter manufacturers must be observed. If these contradict the mounting instructions, always consult the novotegra GmbH sales team before mounting the novotegra mounting system or – in the case of components not supplied by novotegra GmbH – the manufacturer concerned.

During the preparation of the offers for novotegra by our sales staff the local conditions are not always sufficiently known, which is why changes to the offered quantities may result during installation. These changes relate mainly to the number of fasteners for the building envelope (for example roof hooks). In this case the additionally required components must always be installed in accordance with the dimensioning.

novotegra GmbH is not liable for incorrect or incomplete data collection sheets. Error-free and fully completed data collection sheets are essential for correct dimensioning.

The information in the mounting instructions, the warranty terms and the information about the liability exclusion must be noted.



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