
Mounting instructions



novotegra for flat roofs
closed II / East-West II

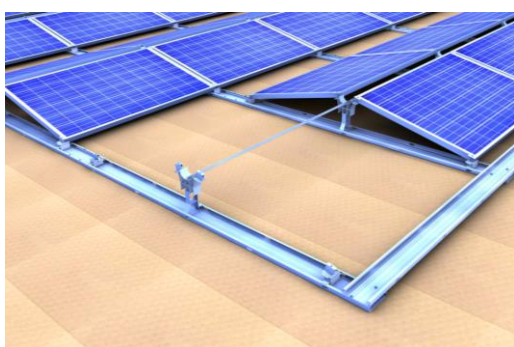
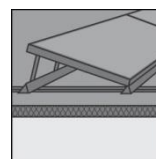


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1 Notes

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.

BayWa r.e. Solar Energy Systems 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. The maximum permissible module width is 1.34 m.

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 present.

The roof cover / roof construction 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 or roof cover:

Wooden components (rafters/purlins): min. strength class C24, no fungus infection or rot

Tensile strength R_m , min for trapezoidal metal: steel 360 N/mm²; aluminium 195 N/mm²

The load bearing capacity of the roof / roof construction (rafters, purlins, trapezoidal metal, number of adhesive points, folded seams, etc.) 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) must be determined by the static calculation using the design software Solar-Planit.de.

The permissible roof inclination for the use of the mounting system in accordance with these mounting instructions is 0 to 60 degrees.

For each module two module support rails must be fitted symmetrically under the modules for the even load introduction to the substructure.

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.de.

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 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 the basis of the planned module layout and the underlying roof 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.

The modules may not be fitted above the gable end, ridge and eaves (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) 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 for even load transfer into the substructure.

The results calculated with the design software, such as distances of the fasteners (e.g. roof hooks, hanger bolts, 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) 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.

In addition to the visual inspection of the components and the roof cover for damage we recommend a random inspection of the connections.

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 tile roofs II

The contents of this installation manual describe the installation of the substructure on roofs with sheet or bitumen waterproofing.

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 penetrating the roof. The PV system is secured against wind suction by providing ballast (e.g. suitable stones), based on the results of the wind tunnel tests for the system. The required ballast is determined by BayWa r.e. Solar Energy Systems GmbH based on the project data provided by the installation company. The ballast applies to the planned system; on-site deviations from planning may lead to different results.

Protection against system sliding is verified based on a coefficient of friction of $\mu = 0.5$. This value must be checked by the installation company prior to installation. If the coefficient of friction is determined by the installation company in advance, protection can be verified during planning using the determined value.

The system must be secured on site to prevent it from "creeping" due to expansion caused by temperature. This can be achieved by installing suitable stop points on the roof surface or by anchoring to the parapet, for example. The connection points on the building and building parts must be able to bear the forces exerted.

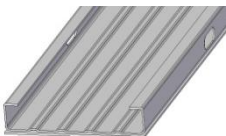
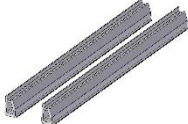



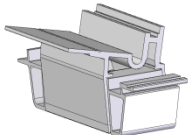



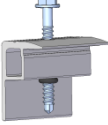

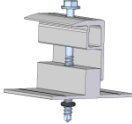



General conditions to be observed in accordance with the wind tunnel test results:

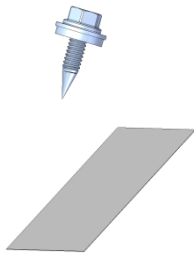
- Roof incline 0 – 5 degrees
- Flat roofs with and without parapet
- Distance from system to roof edge (without parapet) = 0.50 m
- Distance from system to parapet (inside edge) = 0.50 m
- Max module width = approx. 1.08 m max. module length = approx. 1.70 m
- Angle of installation (fixed) = 13°
- Distance between rows = 1.30 – 2.40 m (closed II) respectively 2.15 – 2.45 m (East-West II) (distance between the front of a panel and the front of the one behind)

The installation system is designed for loads of up to 2.4 kN/m² (2,400 Pa). The modules are clamped on the short frame side or, alternatively, on the long frame side in the corners (clamp surface 11 x 52 mm). This requires approval from the module manufacturer for clamping on the short frame side or on the corner of the long frame side. Any drainage openings on the module frame may not be blocked. This also applies to the features provided for this purpose on the support components.

4 System components, tools and equipment

4.1 Required for installation

Figure	Tool	Component*	Product group
		Base trough 150-30 Material: Aluminium	Profile rail
		Base trough connector set 150-30 I Material: Aluminium Tool: Socket bit AF 8 mm	Rail connectors and expansion joint
		Base trough expansion joint 150-30 Material: Aluminium and V2A Tool: Socket bit AF 8 mm	Rail connectors and expansion joint
		Base foot set Material: Aluminium	Module elevation
		Module support set 13° Material: Aluminium	Module elevation
		Flat roof mid clamp Material: Aluminium and V2A Tool: Socket bit AF 8 mm	Module elevation
		Flat roof end clamp Material: Aluminium and V2A Tool: Socket bit AF 8 mm	Module elevation
		Flat roof end clamp (short side) Material: Aluminium and V2A Tool: Socket bit AF 8 mm	Module elevation
		Wind deflector 13° 1.85 m Material: Aluminium Tool: Socket bit AF 8 mm	Module elevation



Flat roof mounting screw chipless
Material: V2A
Tool: Socket bit AF 8 mm

Fastening equipment

Alu edge protector self-adhesive
Material: Aluminium

Seal parts and
protective devices

* 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
screwdriver

Use for tool

Bit Torx TX 40
Socket bit AF 8 mm

Application

Component
connections, clamp
assembly



Torque key up
to at least
12 Nm

Socket bit AF 8 mm

Clamp assembly



Chopsaw

Cutting rails



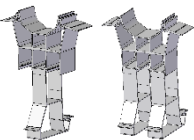
Place / replace
tool base trough
150-30

For place / replace of base foot and
module supports set in the base
trough 150-30

Correct installation

4.2 Installation system components – installation variants

Figure



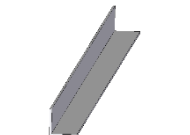
Tool

Component**

Product group

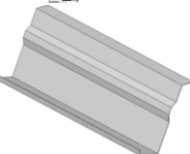
Module support set 13° East-West
Material: Aluminium

Module elevation



Support Brace 20x20x1.5 East-West
Material: Aluminium

Profile rail



Wind deflector 13° 1.85 m East-West
Material: Aluminium
Tool: Socket bit AF 8 mm

Module elevation



C-rail (base profile, base trough)
Material: Aluminium

Profile rail



Rail connector set
Material: Aluminium and V2A
Tool: Special lock nut AF 18 deep

Profile rail



PE pad 140 x 390 x 20 mm
Material: PE foam

** Required components for ballast distribution at system edge, depending on substructure construction.

4.3 Installation system components – optional

Image	Tool	Component***	Product group
		Ballast trough Material: Aluminium	Support and module fastening
		Connector profile C47 385 mm Material: Aluminium Tool: Socket bit AF 8 mm	Module elevation
		Cable holder Material: Plastic	Cable protection
		Top cover base trough 150-30 3.00m Material: Aluminium	Module protection and rail top cover
		Self-locking cable tie	Cable protection
		Cable clip d = 10 mm	Cable protection
		Grounding connector set AF 18 Material: V2A Tool: Special lock nut AF 18 deep	Accessories and optional components
		Alu perforated tape 10,000 x 20 x 1 Material: Aluminium Tool: Socket bit AF 8 mm	Accessories and optional components

*** Optionally available installation system components, e.g. for improving the aesthetics of the system, cable routing or earthing of the installation system.

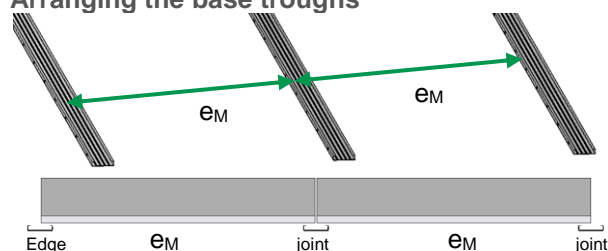
5 Installing the substructure

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 installation steps of the system variant closed II (south facing) are described below. References are made to mounting versions (MV) for the various design possibilities respectively to the system variant East-West II. The associated work steps are described at the end.

5.1 Installing the base rails and support components

Arranging the base troughs



Install the base troughs centrally beneath the module joint (MV 1).

Maximum module field size without measurements (MV 4) for compensation of temperature-related length expansions 17 x 17 m (Module field 10 x 10 with approx. 1.70 m row spacing)

Distance to adjacent module field: min. 50 mm

NOTICE

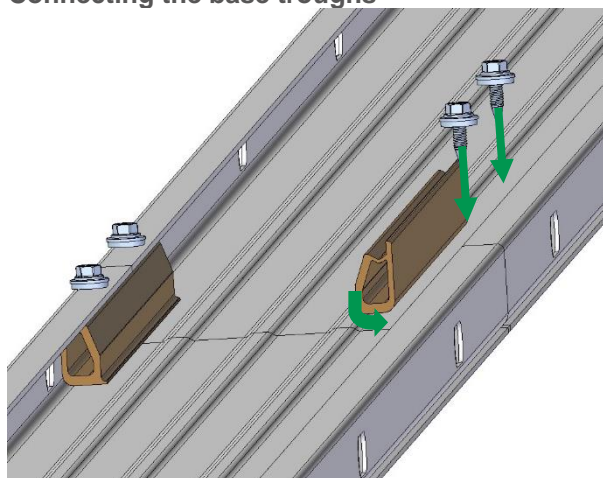
System edge / module joint:

$e_M = \text{module length} + 12 \text{ mm}$

⚠ WARNING

Observe the accident prevention regulations when sawing.

Connecting the base troughs



Push the ends of the base troughs tightly together, push the connectors under the ridge on the base troughs and screw together with two screws on each side.

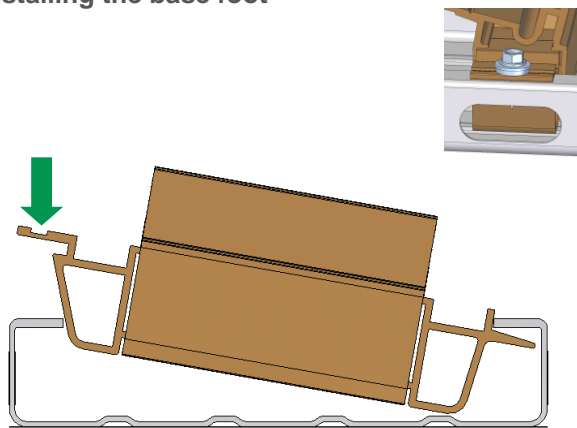
Maximum uninterrupted rail length approx. 17 m, then install expansion joint or disconnect the rail (MV 4).

The base trough joints and base trough ends must be covered using the self-adhesive edge protection provided.

NOTICE

The distance between the base troughs in the joint may not exceed 100 mm.

Installing the base foot



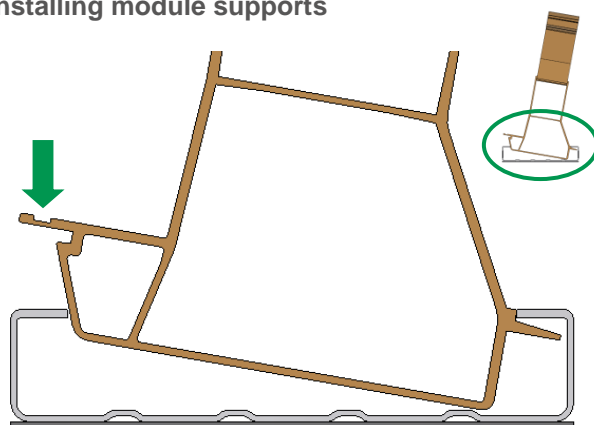
Insert the component into the base trough on one side as shown and then click into the base trough. The component may need to be screwed down, depending on the wind load (MV 5). If a base foot is located above a long hole, the foot must always be secured with a screw.

NOTICE

Prior to installation, the position (installation axis) of the components must be determined on the base trough.

Depending on the existing conditions on site, installation using the installation and removal tool is recommended.

Installing module supports



Insert the component into the base trough on one side as shown and then click into the base trough. The component may need to be screwed down, depending on the wind load or if its position is above long hole (MV 5).

Installation module support East-West regarding MV4.

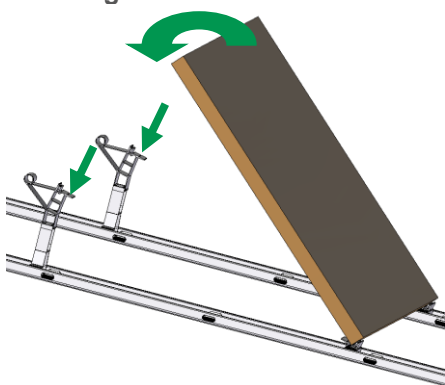
NOTICE

Prior to installation, the position (installation axis) of the components must be determined on the base trough.

Depending on the existing conditions on site, installation using the installation and removal tool is recommended.

5.2 Module installation, load redistribution and ballast

Installing the module



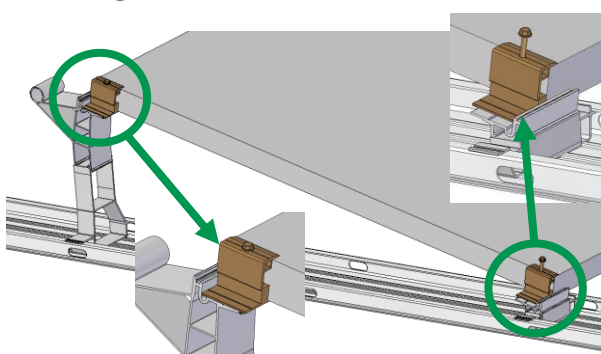
Position the module on the base feet and then place it on the module support set.

For notes regarding module installation for East-West II, see MV 8.

NOTICE

Wire adjacent modules while installing them
Install the string cable first

Fastening the modules on the row end



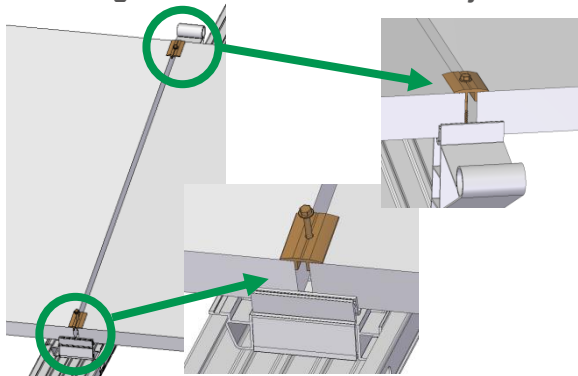
Secure modules at the end of a row or at a break in the row (light domes, fans, etc.) using the flat roof end clamp (short side).

Push the clamping block of the module fastener beneath the module, place the fastener on the module and screw the drilling screw through the bore hole.

NOTICE

Tightening torque max. 6 Nm.
The screw must not be overtightened!
Clamp on the short frame side.

Fastening the module to the module joint

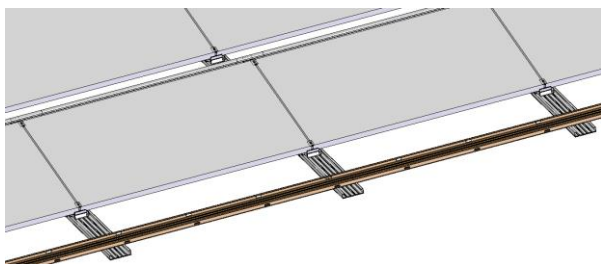


Position the following module on the base foot or module support. Determine the gap between the modules (12 mm) by inserting the flat roof mid clamp. Insert the module fasteners so that the drilling screw is positioned in the bore hole on the base foot or module support.

NOTICE

Tightening torque max. 6 Nm.
The screw must not be overtightened!
Clamp on the short frame side.

Connection rail



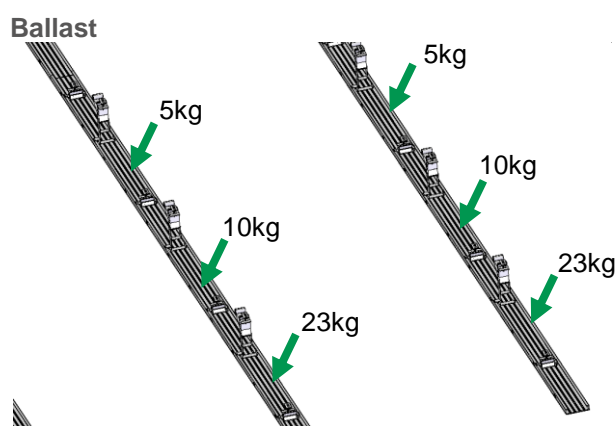
To reduce ballast on the southern (east-west) edge or at breaks in the system (e.g. along light strips or maintenance pathways), position the base trough 150-30° perpendicular to the base trough as a connection rail and secure with two screws on each side. Extend using base trough connectors or expansion joints at system breaks. Arrange the expansion joints identically to the expansion joints of the module supports. Cut the base troughs to length if required.

The connection rail can be used to install the string cable or to insert the required ballast. MV 10 applies if installing without connection rail.

NOTICE

Further rails can be used to redistribute load:

- C-rail 47, 71 and 95, base profile 6.12 m

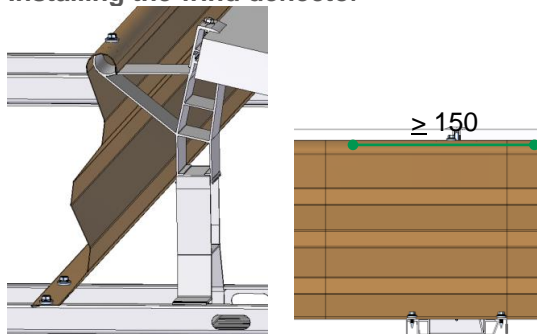


Place ballast in accordance with the ballast planning into the base troughs after installing the modules. The required ballast depends on the system area and is specified in the ballast plan in kg and/or number of stones. The ballast can be laid out under, in front of or behind the module to accommodate the required ballast. The choice of ballast stones is done during installation, and the dimensions are based on the height of the ballast.

NOTICE

For ballast installations using large amounts of ballast, ballast troughs (MV 11) or additional base troughs under the module are recommended (MV 6).

Installing the wind deflector



Guide the wind deflector over the round part of the module supports and place on the base trough. Install the adjacent wind deflector for the following module with an overlap of at least 150 mm to the first wind deflector.

Secure the wind deflectors to the base troughs with two screws for each rail and to the round part of the module support with one or two screws, depending on the load to be borne (specifications in detail plan).

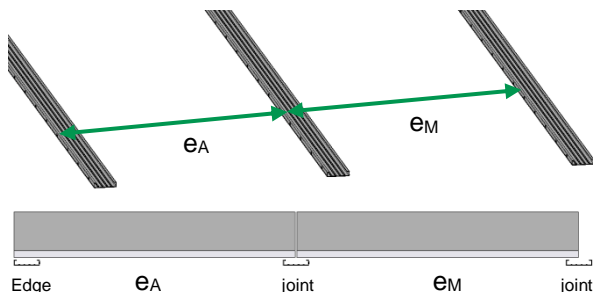
NOTICE

The screw must not be overtightened!

5.3 Mounting versions

Explanation of the installation variants depending on the roof construction or design variants.

MV 1 – Flush base troughs on system edge



Alternatively, the first base trough at the system edge / expansion joint must be installed flush with the modules, the subsequent troughs must be positioned centrally beneath the module joint.

NOTICE

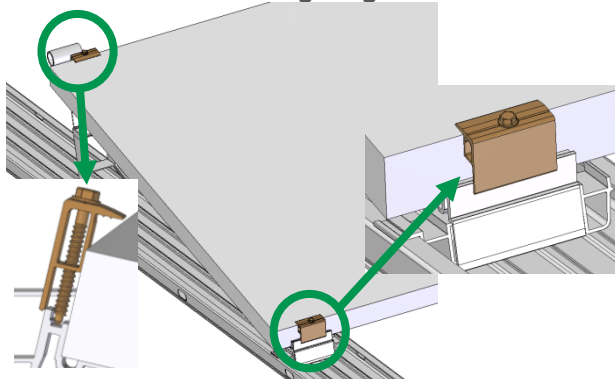
Prerequisite: Flat roof end clamp (MV 2)
Approval module manufacturer
for module clamping

System edge / expansion joint:

$e_A = \text{module length} - 69 \text{ mm}$

Module joint: $e_M = \text{module length} + 12 \text{ mm}$

MV 2 – Module fastening long side



Place the drilling screw from the flat roof end clamp centred over the screw channel of the base foot or module support and screw in.

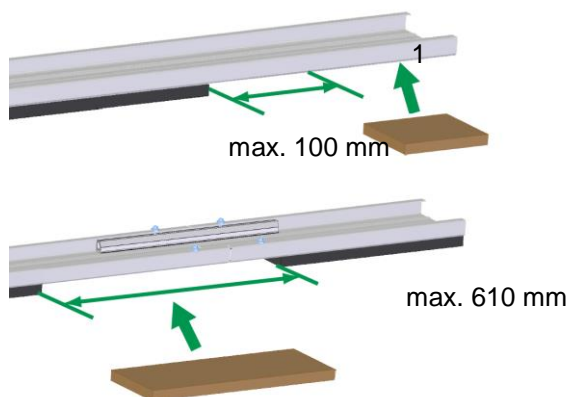
NOTICE

Tightening torque max. 6 Nm.

The screw must not be overtightened!

Approval from manufacturer required for clamping in the corner section of the long frame side.

MV 3 – Base troughs for cross drainage



If the base troughs 150-30 for cross drainage end without PE pads, stick additional PE pad (1) onto these troughs

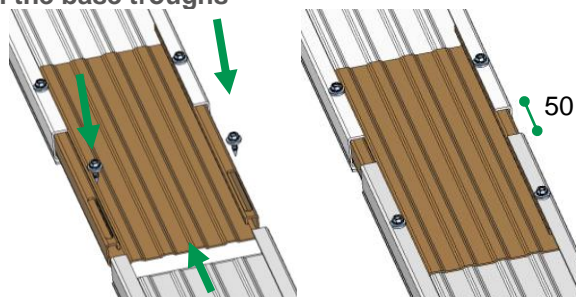
Max. 100 mm. extension over PE-pad

Distance between PE pads: max. 610 mm

NOTICE

Shorten PE-pad to the required length if needed

MV 4 – Installation of expansion joints in the base troughs

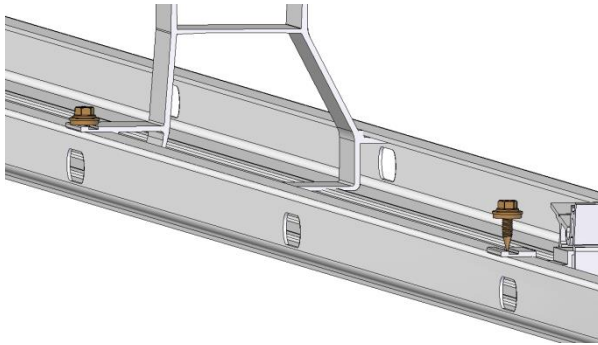


Push the base trough expansion joint centrally into the adjacent base troughs. A gap of 50 mm must remain between the ends of the rails. Screw the expansion joints to the base troughs. On the moving side, the two screws must be screwed into the base trough so that they are centred in the slots.

NOTICE

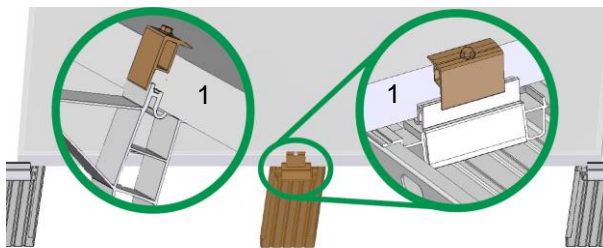
Do not install the expansion joint below a module. Max. base trough length with the base trough expansion joint approx. 34 m, plan for proper expansion joints after this.

MV 5 – Securing the base foot / module supports set



Depending on requirements, the base foot and module support may need to be secured with screws.

MV 6 – Mounting 3. Base rail

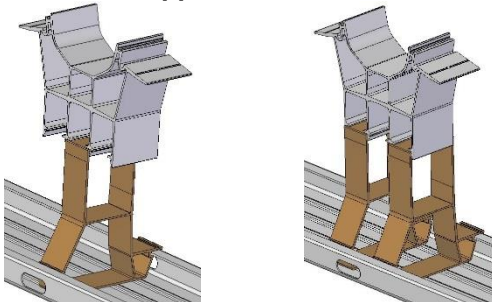


Depending on the ballast, a 3rd base trough may be required for additional storage space. It should be positioned midway between two base troughs in accordance with the ballast plan. Secure the module in addition to the clamps at the corners using the flat roof end clamp on the long side (1)

NOTICE

Secure wind deflector with one screw at base trough and module support

MV 7 – Module supports East-West



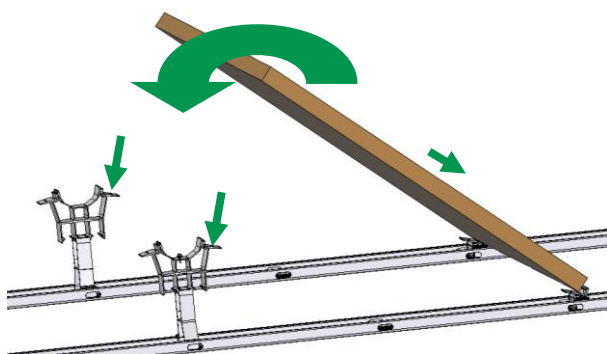
Regarding the occurring loads the module support set of the East-West II system variant must be installed with a single or a double leg.

NOTICE

Prior to installation, the position (installation axis) of the components must be determined on the base trough.

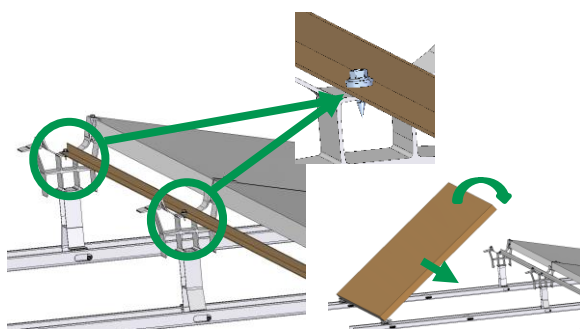
Depending on the existing conditions on site, installation using the installation and removal tool is recommended.

MV 8 – Installing the module – system variant East-West II



Position the module on base feet and then place it on the module support set. Install the modules of one axis of a double row first.

Place ballast in accordance with the ballast planning into the base troughs after installing the modules.



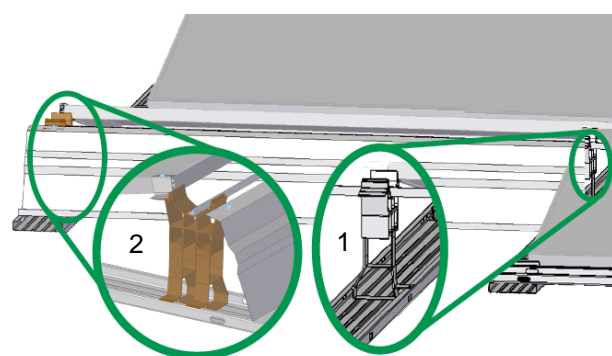
After fixing the modules place the support brace on the module support set and fix the support brace to the module support set. Support brace joint overlapping above the module support brace

Place ballast and install the modules on the other side of the double row on the module support set.

NOTICE

Wire adjacent modules when installing them
Install the string cable first

MV 9 – wind deflector East-West

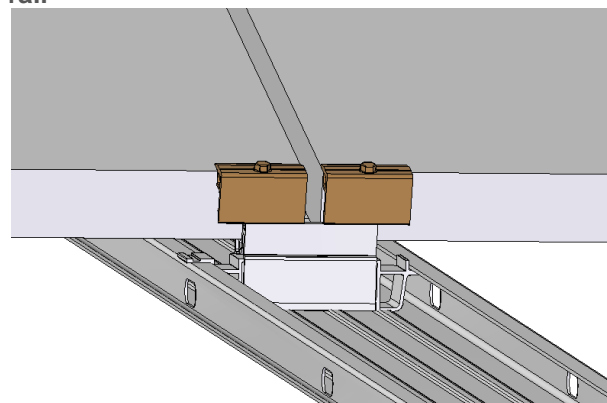


Wind deflector-module support (1):

Lay the wind deflector under the module. The module and wind deflector should be fastened to the support with flat roof end clamps (short side) and attached to the base trough with two additional screws.

Wind deflector-wind deflector (or edge) support (2)
Install the wind deflector East-West on the module support set double as detailed in the section 'Installing the wind deflector' and attach it to the base trough using two screws and to the module support using one screw

MV 10 – Installation / ballast without connection rail



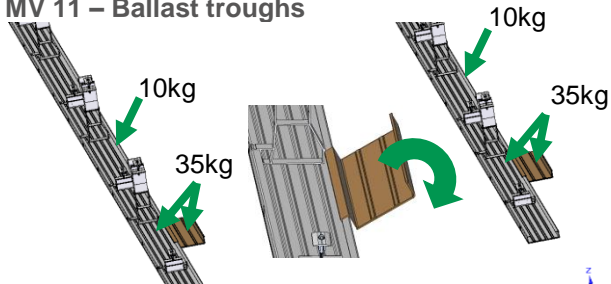
The amount of required ballast at the system edge increases if not using a connection rail. No load redistribution is possible.

The adjacent modules must each be secured with the flat roof end clamp in the corner of the long frame side instead of with the flat roof mid clamp.

NOTICE

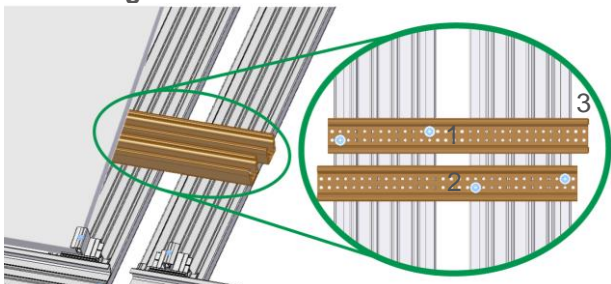
Tightening torque max. 6 Nm.
The screw must not be overtightened!

MV 11 – Ballast troughs



Using ballast troughs allows small or large-size ballast to be securely inserted if required. The ballast troughs must be mounted on the side of the base troughs.

MV 12 – Installation of expansion joints in the base troughs

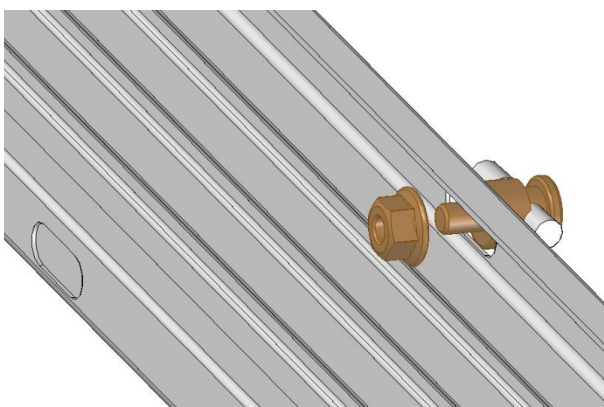


Connect adjacent module fields with two connector profiles. Secure the first rail profile (1) with two screws on the left base trough and then secure the second rail profile (2) on the right base trough. Leave the loose end of the coupling profile protruding over the edge (3).

NOTICE

The connector profile is only ever firmly secured to a base trough
Distance between base troughs 50 mm

MV 13 – Attaching grounding connectors



Ground wire (\varnothing according to national specifications):

Remove grounding connector, remove clamping disk. Push component through long hole in the base trough. Push ground wire through the opening (suitable for \varnothing 6-10 mm) and attach the component with the self-locking nut.

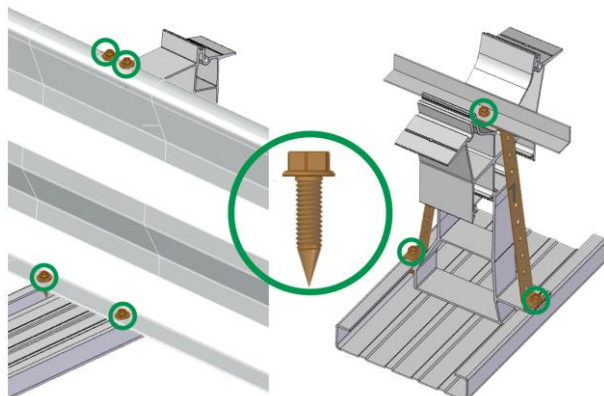
NOTICE

Ground wire tightening torque 20 Nm
On site, perforate the base trough for cross drainage in the desired spot

⚠ WARNING

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

MV 14 – Lightning current carrying capacity measures



To ensure the lightning current carrying capacity of the mounting system, securely fasten the supports with screws. To do this, 4 or 3 mounting screws without seal should be used. (South II or East-West II variant). The East-West support is furnished with the alu-perforated tape and should be screwed to the module support head and both sides of the foot.

NOTICE

These actions shall be performed upon consultation with and under consideration of the guidelines of an approved electrician or lightning protection engineer

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. BayWa r.e. Solar Energy Systems 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 may be taken into account and must be provided to BayWa r.e. Solar Energy Systems GmbH for the calculation. BayWa r.e. Solar Energy Systems 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 BayWa r.e. Solar Energy Systems GmbH sales team before mounting the novotegra mounting system or – in the case of components not supplied by BayWa r.e. Solar Energy Systems 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.

BayWa r.e. Solar Energy Systems 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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