

Mounting instructions

trapezoidal metal – roof parallel

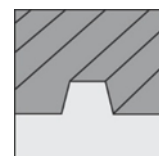


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1 Notes

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): 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

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.

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.

In addition to the visual inspection of the components, we recommend a random check of the connections and the safe and correct position of the ballast on the base rails and ballast troughs.

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 trapezoidal metal - roof parallel

These mounting instructions describe the design of the substructure on roofs with trapezoidal, corrugated metal and metal tile covering. The maximum permissible module width is 1.34 m for the respective mounting system to be used.








Dependent on the mounting system design the wind and snow loads are introduced as single or line loads into the roof covering. The static verification of the mounting system only takes account of the attachment of the substructure to the roof covering. The static calculation of the roof covering based on the load from the PV construction must be carried out by the customer. The roof covering is attached with thin sheet metal screws approved by building authorities for metal strengths from 0.4 mm (steel sheet) or 0.5 mm (aluminium sheet). For aluminium sheet the use of a metal strength from 0.7 mm is recommended!

Alternatively, to a direct attachment, our mounting system solutions for corrugated fibre cement plates / sandwich covering (hanger bolt solutions) can be used.





4 System components, tools and equipment

4.1 What is required for mounting






Clamping system

Figure	Tool	Component*	Product group
		Short rail C24/C47 with EPDM 385/200 mm Material: Aluminium and EPDM (mounting module in portrait/landscape)	Profile rails
		Mounting screw / set Tool: Socket AF 8 (mounting module in portrait/landscape)	Roof attachment
		Middle clamps Material: Aluminium, aluminium cast and stainless steel Tool: Socket AF 8	Module attachment
		End clamps Material: Aluminium, aluminium cast and stainless steel Tool: Socket AF 8	Module attachment
		Module slip guard Material: stainless steel and aluminium (mounting module in landscape/portrait)	Module protection and rail top cover

Insertion system

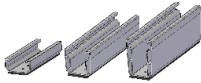



Figure	Tool	Component*	Product group
		EPDM units Material: EPDM	Sealing parts and protective devices
		Trapezoidal sheet bracket Material: stainless steel and EPDM Tool: Socket AF 8	Roof attachment
		Insertion rail Material: Aluminium	Profile rails
		Rail Connector IR 5 x 100 stainless steel Material: stainless steel	Rail connectors and expansion joints
		EPDM-T protection IR Material: EPDM	Module protection and rail top cover
		Edge stop set IR Material: Aluminium and stainless steel Tool: Torx TX bit 30 drive	Module protection and rail top cover

* The components vary dependent on the roof requirements, the static calculation or the component selection and may differ from the figures above.

Figure	Equipment	Use for tools	Application
	Battery-operated screwdriver	Torx TX bit 40, 30 or 25 Socket AF 8	Clamp mounting component attachments
	Torque spanner up to min. 50 Nm	Special socket AF 18 deep, Socket AF 13	Protection
	Torque spanner up to min. 10 Nm	Socket AF 8	Clamp mounting
	Mounting tool	---	Trapezoidal sheet bracket
	Mitre saw	---	Rail section

4.2 Mounting system components – mounting versions

Clamping system

Figure	Tool	Component**	Product group
		Short rails C24/C47/C71 with EPDM Material: Aluminium and EPDM (mounting module in portrait)	Profile rails
		Short rail C33 with EPDM Material: Aluminium and EPDM (mounting module in portrait)	Profile rails
		EPDM sealing strip 50 x 35 Material: EPDM (mounting module in portrait)	Sealing parts and protective devices
		C-rail 47-2 Material: Aluminium (mounting module in portrait)	Profile rails

** Required components dependent on the substructure (e.g. rail pieces cut to size on site), system design (e.g. insertion rails on short profile) or module layout (e.g. mounting modules in landscape).

Insertion system

Figure	Tool	Component**	Product group
		EPDM tape Material: EPDM	Sealing parts and protective devices
		Short rails C24/C47/C71 with EPDM Material: Aluminium and EPDM	Profile rails
		Rail Connector set IR Material: Aluminium and stainless steel Tool: Hexagon socket AF 3	Rail connectors and expansion joints
		Cross rail connector set C IR Material: Aluminium and stainless steel Tool: Socket AF 13	Rail connectors and expansion joints

** Required components dependent on the substructure (e.g. rail pieces cut to size on site), system design (e.g. insertion rails on short profile) or module layout (e.g. mounting modules in landscape).

4.3 Mounting system components – optional

Figure	Tool	Component***	Product group
		Top cover C-rail 2,000 mm Material: Aluminium	Module protection and rail top cover
		Grounding connector set AF 18 Material: stainless steel Tool: Special socket AF 18 deep	Accessories and optional components
		Mounting set C M8 with mounting plate	Accessories and optional components
		Cable-tie clip for profile flange	Cable fixing
		Cable clip d = 10 mm	Cable fixing
		Contact latch module clamp	Accessories and optional components

*** Optionally available mounting system components e.g. for the visual enhancement of the system, cable laying or the earthing of the mounting system.

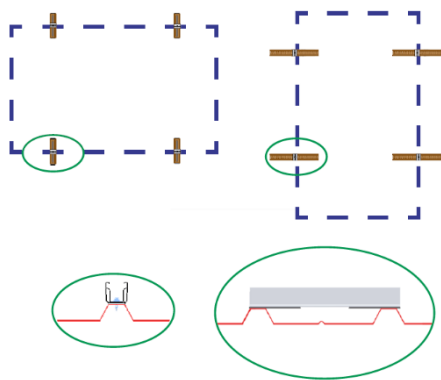
5 Installing the mounting system

Prior to mounting, the module field on the roof must be measured and the position of the fasteners (e.g. roof hooks, hanger bolts, saddle clamps, short profiles etc.) defined taking into account the static calculation.

The individual mounting steps for mounting modules in landscape and portrait for the clamping system (chapter 5.1) and insertion system (chapter 5.4) are explained below. Reference is made to the mounting versions (MV) for clamping systems (chapter 5.3) and insertion systems (chapter 5.6). This is followed by the corresponding work steps.

5.1 Direct attachment: clamping system

Measuring short profiles



Mark the mounting position of the short profiles on the trapezoidal metal raised beads dependent on the module orientation – portrait or landscape, right-angled or on the raised bead – and the clamping areas specified by the module manufacturer. A gap of min. 10 mm must be maintained between the modules at the short frame side.

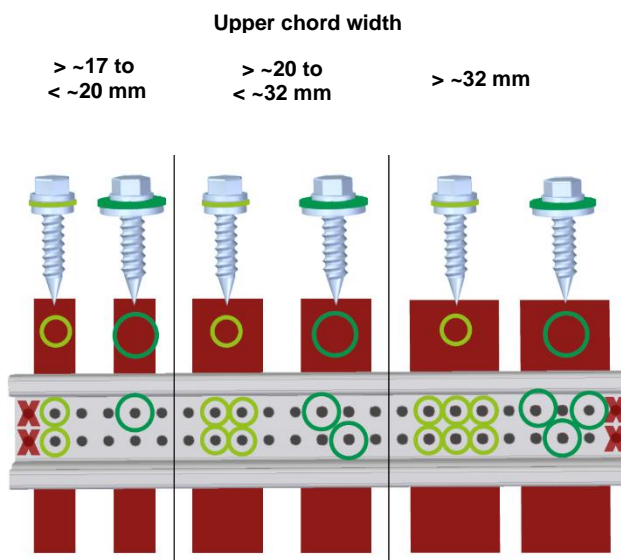
NOTICE

Module repeated spacing (framed) =
module width B + 12 mm
Module repeated spacing (frameless) =
module width B + 15 mm
Alternatively according to MV 4 for portrait modules.

WARNING

To execute the work a scaffold must have been installed in accordance with the relevant specifications.

Attaching short profiles – Module portrait



The static calculation in the system planning defines the number of fasteners required for mounting modules in portrait.

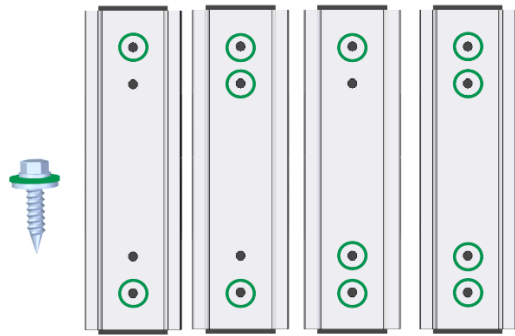
The selection of the fasteners for mounting is determined by the width of the raised bead and depends on the diameter (11 or 16 mm) of the sealing washer of the fasteners. For mounting modules in portrait the number of fasteners calculated with the design software is distributed on the raised bead as shown in the figure.

NOTICE

The thin sheet metal screws must be screwed at right angles to the raised beads, fixed on both edges of the slotted holes and may not be overtightened.

In the case of short profile C24 385 mm, the outermost drill holes must not be used for fastening.

Attaching short profiles – Module landscape



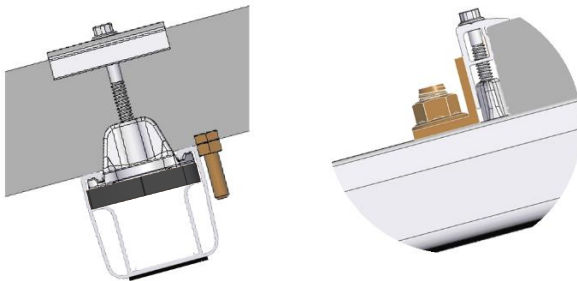
The static calculation in the system planning defines the number of fasteners required for mounting modules in landscape. For mounting modules in landscape the number of fasteners calculated with the design software is distributed on the raised bead as shown in the figure.

NOTICE

Alternative for module landscape (MV1)
The thin sheet metal screws must be screwed at right angles to the raised beads, fixed on both edges of the slotted holes and may not be overtightened.

5.2 Module mounting: clamping system

Module protection

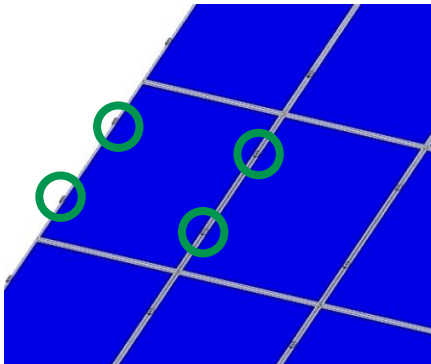


Prior to mounting modules in portrait, the module slip guards must be fitted to the frame holes above the bottom rail position (MV 3). For mounting modules in landscape module slip guard sets must be inserted at the lowest module row.

NOTICE

The module slip guard for mounting modules in landscape must be tightened with a tightening torque of 50 Nm.

Module clamping

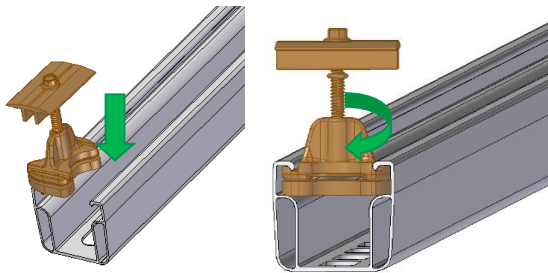


The modules must then be attached to the rails using end clamps and middle clamps – this applies analogously also to mounting the modules in landscape.

NOTICE

Minimum gap between modules along the short side 10 mm.

Mounting the middle and end clamps

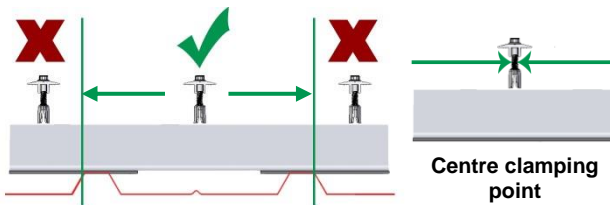


Insert the middle clamps or end clamps at the clamping position from above into the rail chamber. Then turn the rail nut in the rail and push the module clamps towards the module frame.

NOTICE

Assembly of contact latch for module clamp please check MV 6

Clamp position



Position the end clamp or middle clamps in accordance with the adjacent figure.

Push the modules all the way towards the rail nut of the middle clamps.

NOTICE

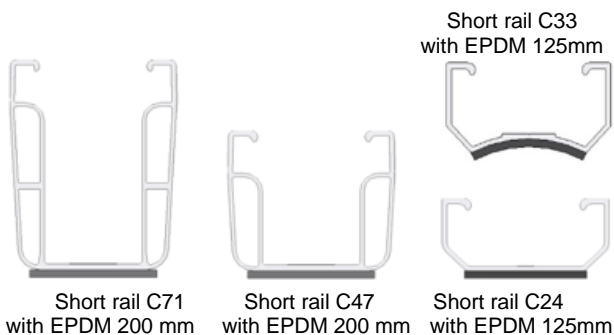
To maintain the clamping position the modules must be measured on the roof in advance.

Middle clamp tightening torque 10 Nm
End clamp tightening torque 8 Nm

5.3 Clamping system mounting versions

Explanation of the mounting versions dependent on the design version (e.g. rail pieces, modules with box frame).

MV 1 Short rails for module landscape



To improve ventilation behind the modules the modules can be mounted using the short rail C47 or C71, the mounting steps must be carried out as described in chapter 5.1.

MV 2 Metal tile roof



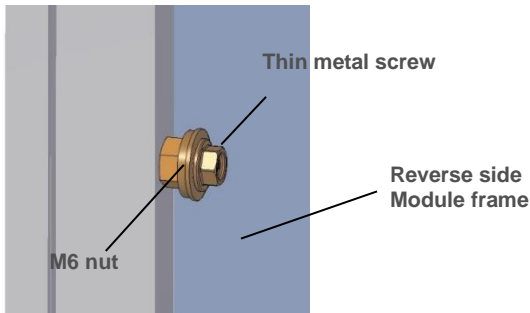
Direct fixing on metal tile roofs for module portrait and module landscape.

The same conditions apply as for trapezoidal sheet metal roofing as described in these mounting instructions.

NOTICE

Which profiles can be used for the respective roofing must be checked by the installer.

MV 3 Mounting the module slip guard for box frame



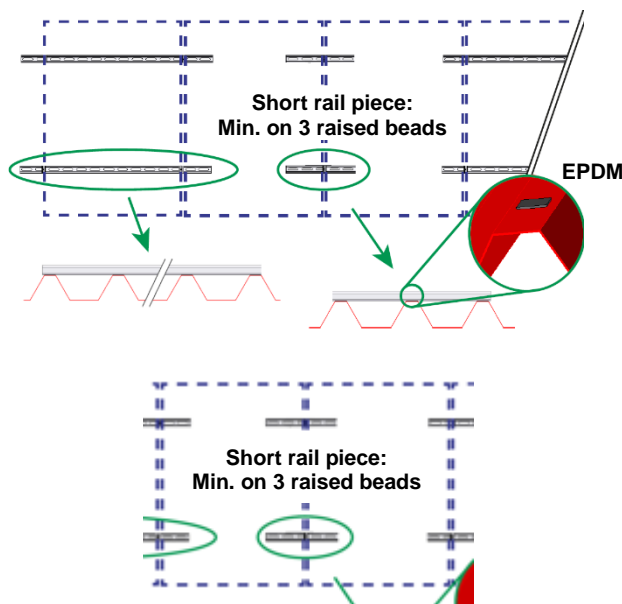
Push the nut over the screw and screw the thin metal screw into the module frame without predrilling.

NOTICE

The thin metal screw must not be overtightened. The approval of the module manufacturer might need to be obtained.

MV 4 Rail pieces

MV 4.1 Rail pieces cut to size on site



Mark the mounting axes of the rail pieces on the trapezoidal metal raised beads dependent on the clamping areas specified by the module manufacturer. Mark the position of the module clamps on these axes. Determine the length of the rail pieces from the Solar-Planit calculation dependent on the clamping position (taking into account MV 3.2 and 3.3) Glue EPDM sealing strips to the raised beads in the area of the rail pieces, fix the rail pieces to each raised bead across the rail piece length.

NOTICE

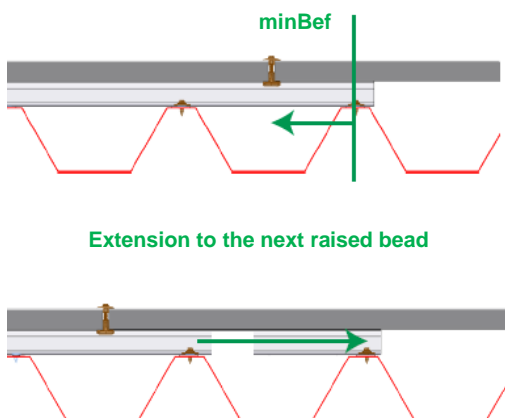
For rows with an even module number short rail pieces must be installed across min. 3 raised beads in the clamping area.

The thin sheet metal screws must be screwed at right angles to the raised beads and may not be overtightened.

WARNING

Maximum rail piece length 2.0 m.
Only glue the EPDM units onto dry surfaces free from dust and grease, temperatures > +5°C.

MV 4.2 Min / max rail length

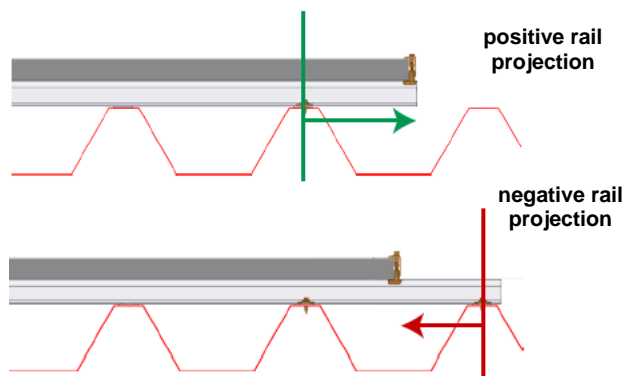


The distance (minBef.) between middle clamp and the next fastener in accordance with the static calculation must not be fallen below, if not observed, an extension to the next raised bead is necessary – this results in the min or max rail length.

NOTICE

The values can be found in the Solar-Planit calculation tool for the respective project.

MV 4.3 Positive and negative projection

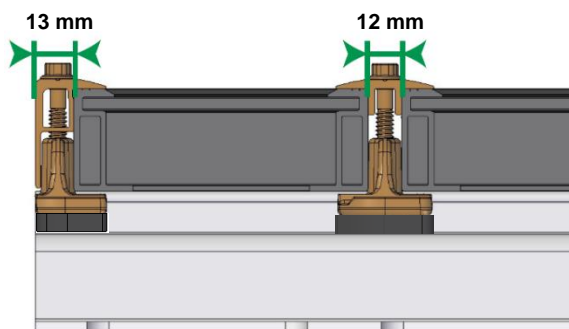


Rail projections are only possible at edge modules. The length of the rail pieces depends on the position of the clamping point to the next fastener. The rail length determined in the static calculation (min/max) must be transferred to the roof accordingly.

NOTICE

The values can be found in the Solar-Planit calculation tools for the respective project.

MV 5 Space requirement for middle and end clamps



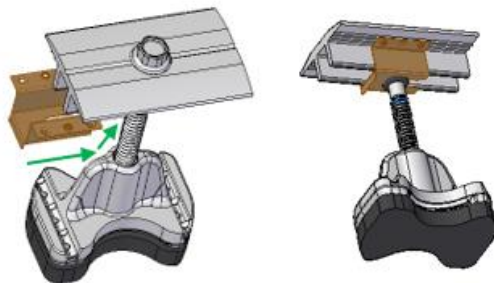
End clamp mounting flush with the rail end possible.

Push the modules all the way towards the rail nut of the middle clamps.

NOTICE

Middle clamp tightening torque 10 Nm
End clamp tightening torque 8 Nm

MV 6 Assembly of contact latch for grounding



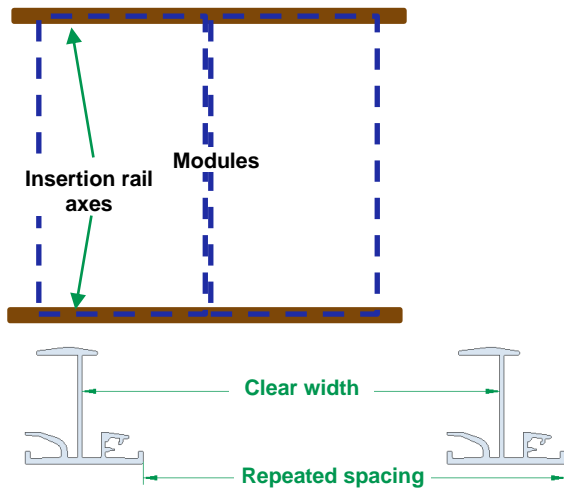
Push the contact latch on the sliding plate over the vertical webs of the middle clamp up to the screw.

NOTICE

Mounting of the middle clamp with the contact latch attached is carried out as described previously in chapter 5.2.

5.4 Direct attachment: insertion system

Measuring the insertion rails



Mark the mounting axes of the insertion rails on the trapezoidal metal raised beads dependent on the module orientation - portrait or landscape.

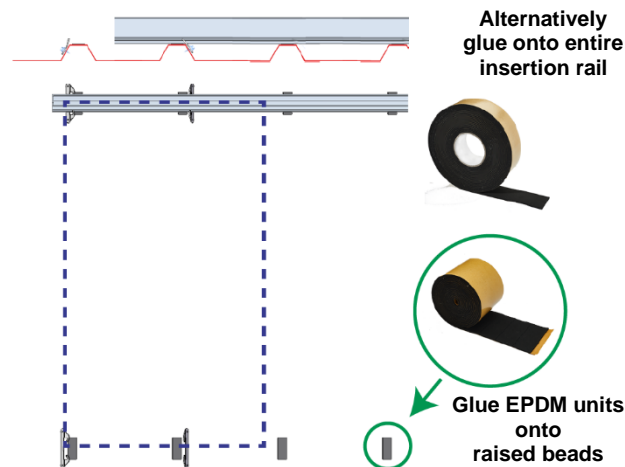
NOTICE

Repeated spacing = module length $L + 12$ mm
 Clear rail width = module length $L + 10$ mm
 For mounting modules in landscape the module width instead of the module length must be used.
 Insertion system on short profiles according to MV 7 to 10.

Frameless modules:

Repeated spacing = module length $L + 22$ mm
 Clear rail width = module length $L + 20$ mm

Gluing on EPDM units (alternatively tape)

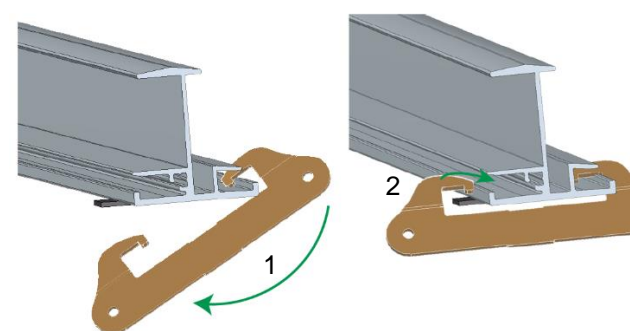


Glue the EPDM units onto every raised bead below the insertion rails. Alternatively, the EPDM tape can also be glued onto the insertion rail for small raised bead distances.

WARNING

Only glue the EPDM units onto dry surfaces free from dust and grease, temperatures $> +5^{\circ}\text{C}$.

Placing and securing insertion rails



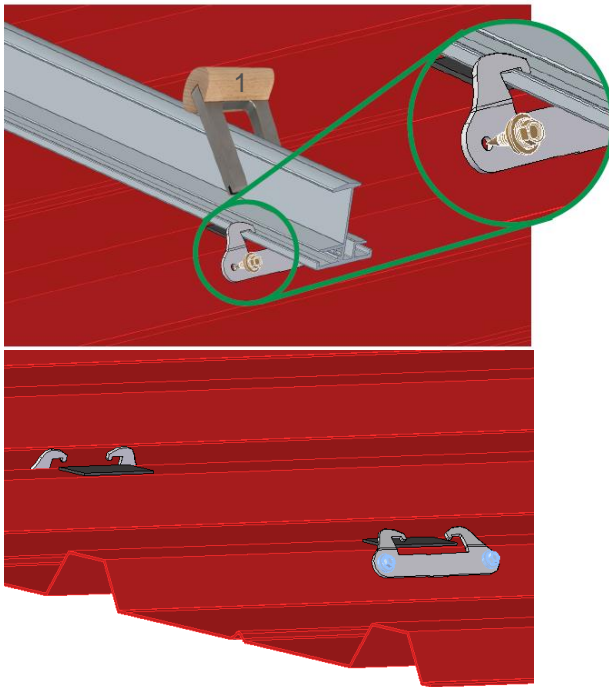
Place the insertion rail onto the EPDM strips, maintain 10 mm gap at the rail joint, Hook the trapezoidal sheet bracket into the rail on one side, feed it below the rail (1) and hook it in on the other side (2). The trapezoidal sheet brackets must be hooked into the insertion rail on both sides.

NOTICE

Distance of insertion rails to the roof edge at the ridge and eaves or overhang of the insertion rail at the last trapezoidal sheet bracket ≥ 50 mm.
 Bead height for trapezoidal sheet bracket ≥ 25 mm.

Insertion rail attachment on short profiles according to MV 9.1.

Fixing the trapezoidal sheet brackets



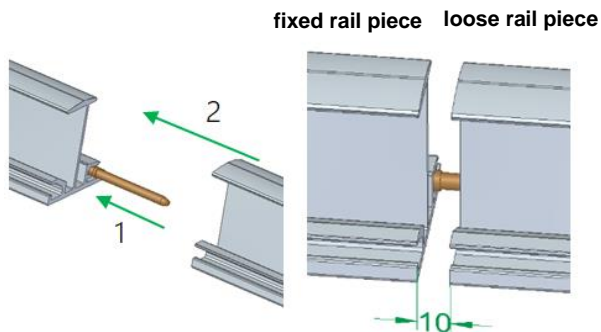
Position the trapezoidal sheet bracket with the aid of the mounting tool (1) on the insertion rail in the inclination of the raised bead with downward pressure. Screw the trapezoidal sheet bracket with two thin sheet metal screws into the side of the raised bead without predrilling.

The trapezoidal sheet brackets must be fitted in an opposing pattern, i.e. alternating on the left and right side of the raised bead.

NOTICE

The thin sheet metal screws must be screwed at right angles to the raised beads and may not be overtightened.

Connecting the insertion rails



Push the connector into the secured rail piece up to half way into the screw channel, then push the loose rail piece with the screw channel onto the connector with a 10 mm gap between the rail ends, then attach the second rail piece.

NOTICE

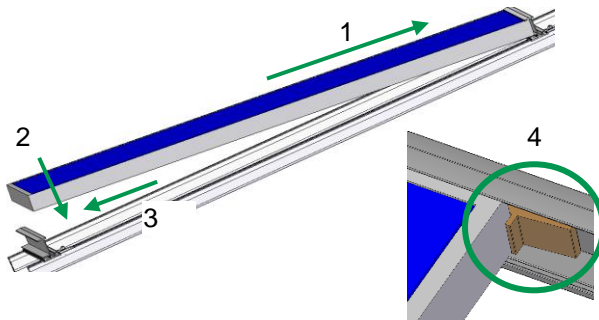
Mounting Rail connector IR on short profiles according to MV 10.

⚠ WARNING

Rails secured only through the connector are not permitted. Both rail pieces must be attached using trapezoidal sheet brackets.

5.5 Module mounting: insertion system

Module mounting: insertion system

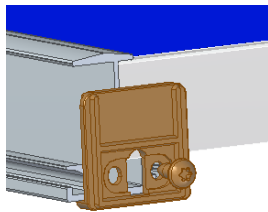


Place the module onto the top insertion rail and push it up (1). Then lower the module onto the bottom insertion rail (2) and push it down against the insertion rail (3). Mount the next modules following the same principle, the gap between the modules must be min. 3 mm.

NOTICE

Install the EPDM-T protection IR between the modules (4) with a module inclination $< 10^\circ$ or as theft protection.

Edge stop mounting



Fit an edge stop set IR at the end of a module row at each insertion rail with a metal screw in the screw channel.

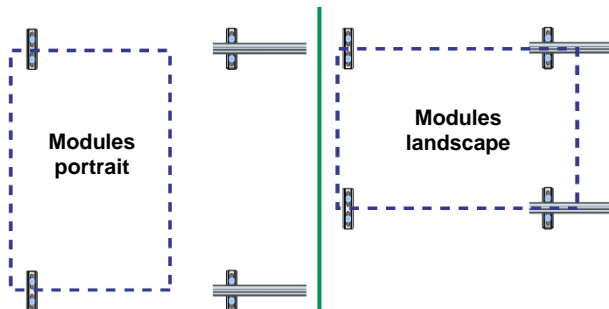
NOTICE

The opening of the edge stop set IR must expose the drainage channel of the insertion rail.

5.6 Insertion system mounting versions

MV 7 Insertion system on short profile

MV 7.1 200mm length



To improve ventilation behind the modules the modules can be mounted on short profiles.

The insertion rails are calibrated as described above.

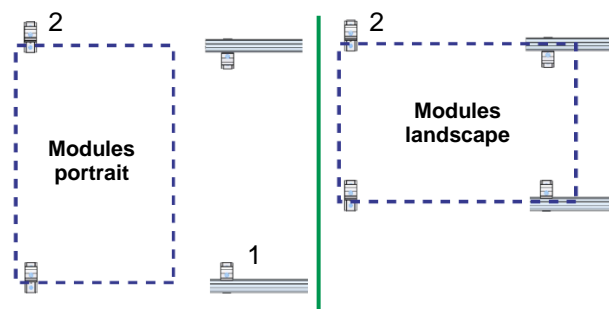
Rails step size = module length $L + 12$ mm

clear width of rails = module length $L + 10$ mm

In case of transverse module mounting, the module width is to be used instead of the module length.

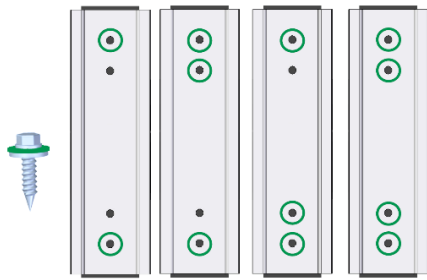
The short profiles with a length of 200 mm must be placed centrally under the insertion rails at a distance according to the static calculation on the high beads and screwed off with the required number of fasteners.

MV 7.2 125mm length



The short profiles with a length of 125 mm are to be placed on the inner side (1) of the top and bottom insertion rail and alternately on the top and bottom (2) of the middle insertion rails in accordance with the static calculation on the high beads and tightened with the required number of fasteners.

MV 8 Attaching short profiles

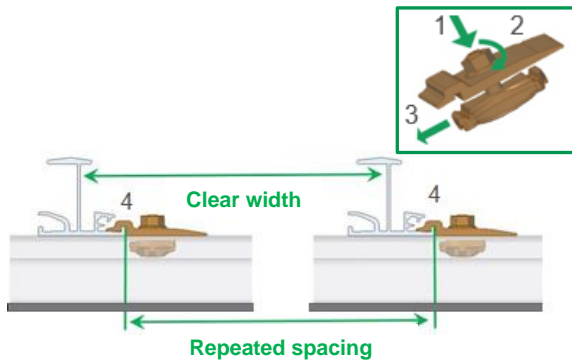


The number of fasteners is based on the static calculation with the fasteners shown.

NOTICE

The thin sheet metal screws must be screwed at right angles to the raised beads, fixed on both edges of the slotted holes and may not be overtightened.

MV 9.1 Cross rail connector IR

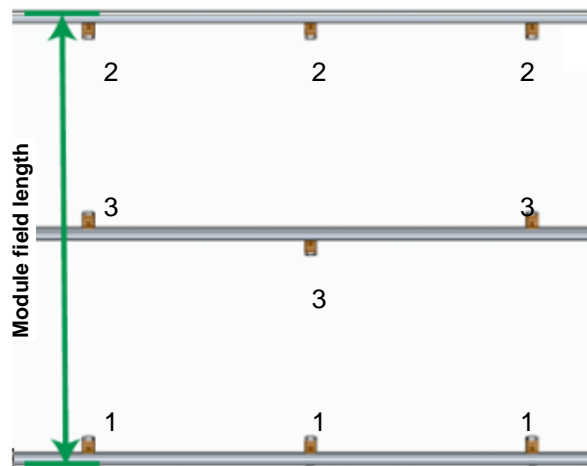


Insert the Cross rail connector set C IR from the top into the rail groove (1), rotate the nut by 90° (2) and push the component against the insertion rail (3) until Cross rail connector set C IR engages with the mounting flange (4).

NOTICE

The tightening torque for the Cross rail connector set C IR is 25 Nm.

MV 9.2 Position of the cross rail connector IR

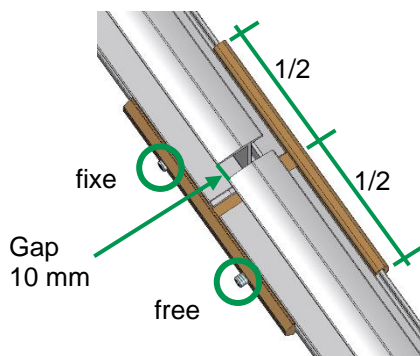


For the top and bottom insertion rail of the module field the Cross rail connector set C IR M8 is fitted on the inside in each case (1, 2), at the centre insertion rails the Cross rail connector set C IR M8 must be fitted alternating at the top and the bottom at the mounting flange (3).

NOTICE

Module field length =
Repeated spacing x number of module fields
+ width of insertion rail

MV 10 Mounting Rail connector IR



Centre the rail connector over the fitted rail and tighten the first threaded pin. Insert the rail to be connected into the connector, gap between the rails 10 mm, tighten the second threaded pin without play.

NOTICE

- Fit connectors at the cantilever.
- Threaded pin without play for longitudinal expansion

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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