Mounting Solutions

AS 2.1
HANGER BOLT

EN

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Before beginning the installation, please carefully read through the safety instructions, which you will find at the end of these installation instructions. Before beginning installation, please ensure that you are using the latest version of the installation instructions.

The design and planning of the installation system should be performed using the **MOUNTING SOLUTIONS Solar.Pro.Tool** software. For information on the materials required and the positions and arrangement of the individual components, please refer to the project report which you have received from the **Solar.Pro.Tool** or from your MOUNTING SOLUTIONS distribution partner. This data is of crucial importance for the safe and error-free functioning of the installation.

Before installation, the party installing the photovoltaic system is to ensure that the existing roof substructure is designed for the additional loads that will occur. For this purpose, consult a structural engineer on site.

These installation instructions explain the installation procedures for the MOUNTING SOLUTIONS hanger bolts, how fastening to the roof substructure is carried out, and the installation of the modules.

The hanger bolts must always be anchored in the in substructure of the corrugated Eternit roof, never on the Eternit sheet itself! Purlin roofs are usually used for the substructure. The modules are usually mounted horizontally such that the support profiles have to be laid parallel to the verge.

The MOUNTING SOLUTIONS hanger bolt system has been designed exclusively for holding PV modules. Any other use is considered improper.

The use of elevating components is not recommended.

Installation must be carried out by trained specialists. In particular, work on the roof covering should be performed by a roofer.

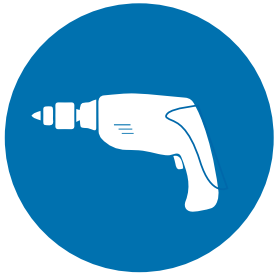
Should you have any further questions, please make use of ALUMERO's professional and comprehensive consultation service.

GENERAL INFORMATION

Use:	Corrugated Eternit roof, corrugated iron roof	
Roof inclination:	10° - 65°	
Fastening:	Hanger bolts, solar fasteners	
Module orientation:	Vertical/horizontal	
Max. module field size:	12 m length	
Screw installation:	M8 (A2-70)	M10 (A2-70)
Torque:	**15 Nm**	**30 Nm**

Note: The installation of a PV system on an asbestos cement roof is generally prohibited.

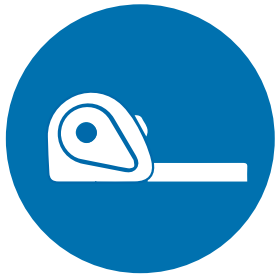
REQUIRED TOOLS



Cordless screwdriver
with bit inserts:
Allen key **WAF 6**

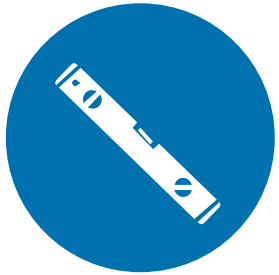
Allen key WAF 6

Torque spanner



Measuring tape

Chalk line



Spirit level

COMPONENTS

STANDARD

Hanger bolt 2.1
Product number:
8024xx

Solar fastener 2.1
Product number:
80245x

Support profile
Product number:
80210x

Profile connector
Product number:
80215x

Cross connector 2.1
Product number:
802200

Closing clamp, pre-mounted with pin
Product number:
802304-xxV P1

Closing clamp, pre-mounted
Product number:
802304-xxV

End clamp (Click) with pin
Product number:
802304CP

End clamp (Click) without pin
Product number:
802304C

Middle clamp (Click) with pin
Product number:
802301C P1 30-45

Middle clamp, (Click) without pin
Product number:
802301C 30-45

COMPONENTS

ACCESSORIES

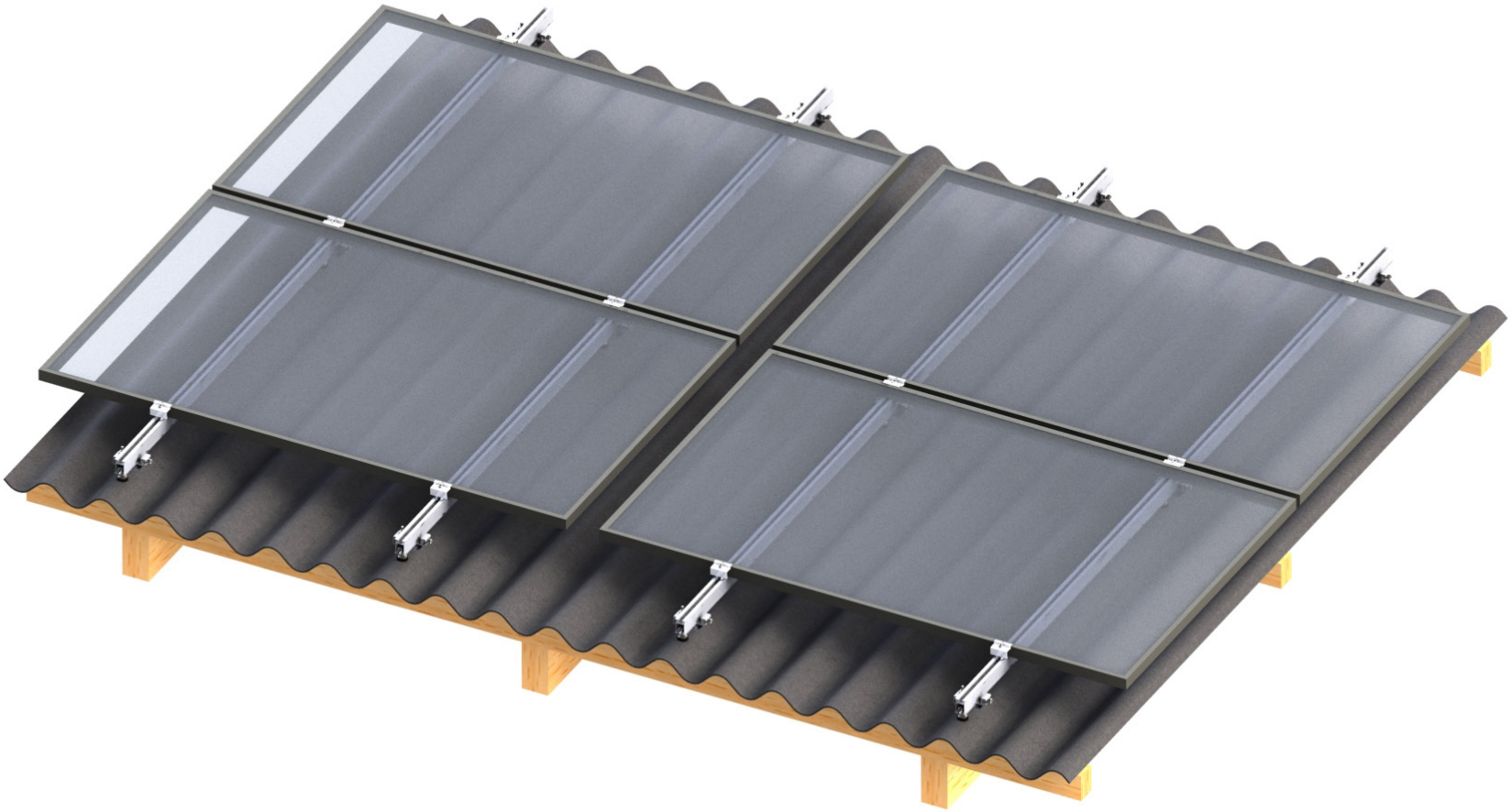
Cable tie incl. clip
Product number:
802604

Wire clamp
Product number:
802603

Aluminium wire
Product number:
802602

End cap
Product number:
802601

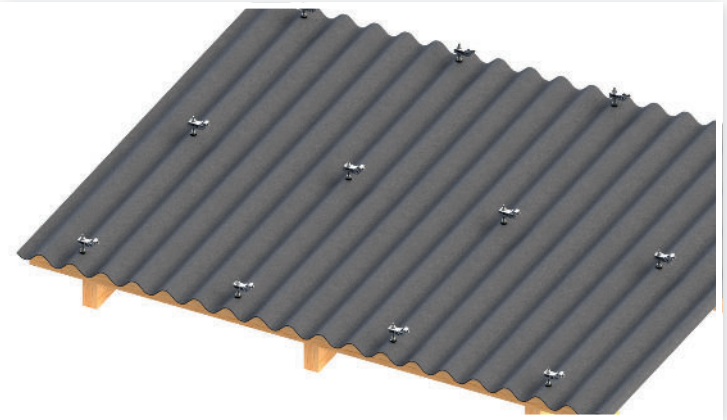
LAYOUT WITH HANGER BOLTS/SOLAR FASTENERS
MODULE ARRANGEMENT – HORIZONTAL, SINGLE-LAYER



INSTALLATION OF THE HANGER BOLTS/SOLAR FASTENERS

1 MEASURE OUT AND MARK POSITIONS

Measure out and mark the positions of the hanger bolts on the roof according to the **Solar.Pro.Tool project report**. When doing so, remember to pay attention to the **module clamping areas**. Please refer to the installation manual of the modules used for this information.



2 PRE-DRILLING

Both the **corrugated Eternit sheet** and the **substructure** have to be pre-drilled. Please observe the following specifications:

WOODEN SUBSTRUCTURE

Hanger bolts	Hole diameter in Eternit sheet	Hole diameter in substructure	Minimum anchor depth
M10	13 mm	7 mm	8 mm
M12	15 mm	8 mm	10 mm

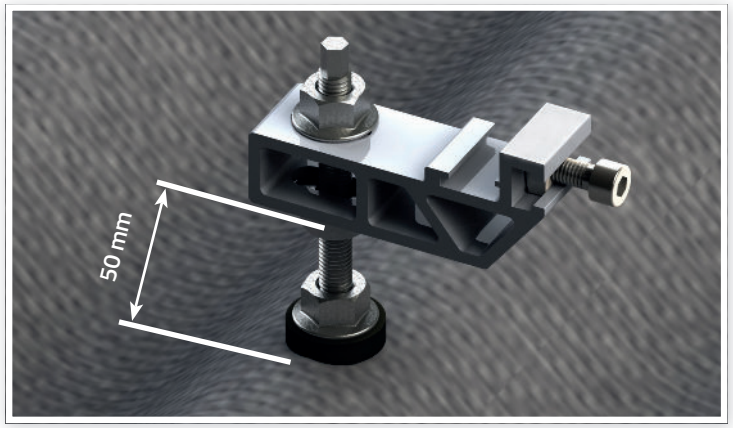
STEEL SUBSTRUCTURE

Substructure thickness	1.5-3.0 mm	3.0-5.0 mm	5.0-7.0 mm	> 7.0 mm
Drill hole diameter	6.8 mm	7.0 mm	7.2 mm	7.4 mm

3 INSTALLATION OF THE HANGER BOLTS/SOLAR FASTENERS

Screw the hanger bolt into the pre-drilled hole.

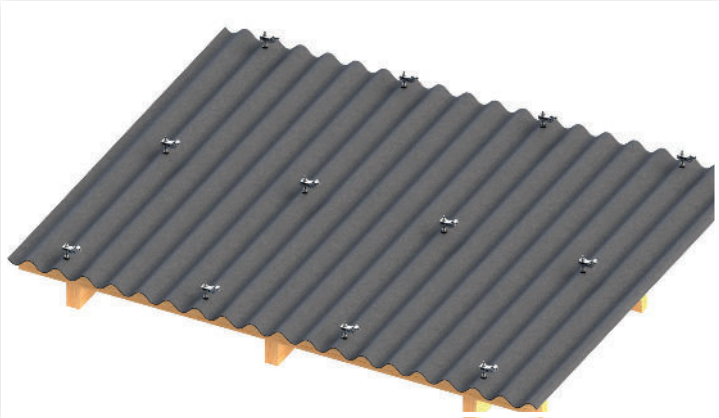
Position the quick-mounting adapter **no more than 50 mm away from the wave crest.** Fix this and the EPDM seal with the lock nut (M10/ M12) above the hole.



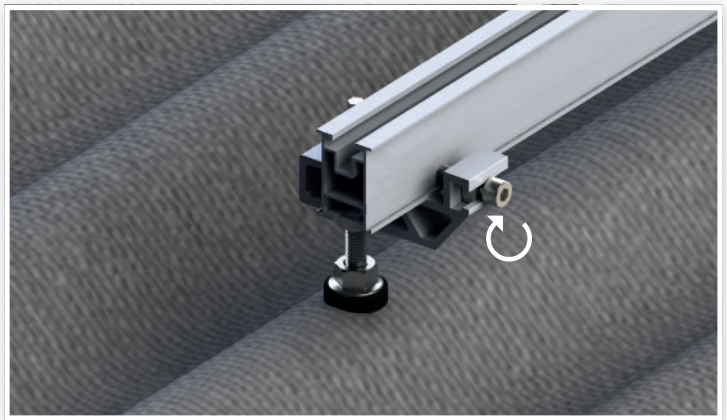
Please note: The attachment points must always be on a crest of the corrugated Eternit sheet!

INSTALLATION OF THE HANGER BOLTS/SOLAR FASTENERS

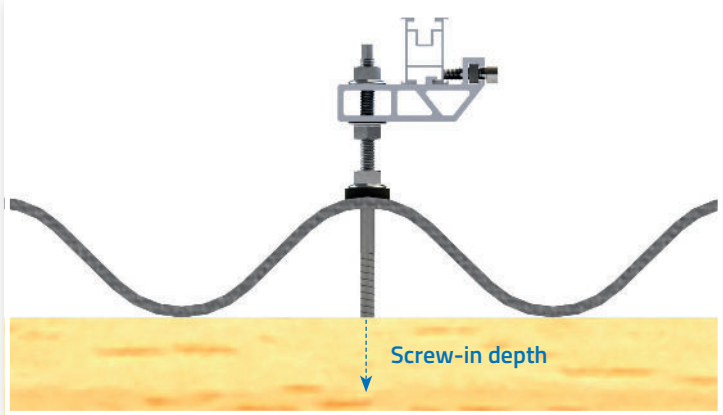
Install the remaining hanger bolts/solar fasteners according to the pre-drilled holes.



Set the quick-mounting adapter so that a **straight and stress-free** installation of the support profiles is possible.



Make sure that the hanger bolts/solar fasteners are mounted **straight and in the middle** of a wave crest.



Please note:

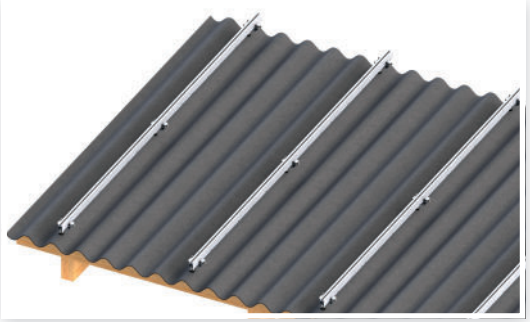
+ The **screw-in depth** of the **M10** hanger bolts should be **at least 80 mm** and for the **M12 bolts at least 100 mm**.
+ The recommended **purlin width in the grain direction** for **M10** hanger bolts is **100 mm**.
+ The recommended **purlin width in the grain direction** for **M12** hanger bolts is **120 mm**.
+ We recommend that any modifications to the roof covering only be carried out by specialists (roofers).

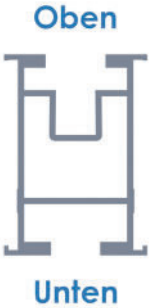
Please note: do not tighten the hanger bolts above the recommended torque! The seal should be slightly compressed and lie on the entire surface!

INSTALLATION OF THE SUPPORT PROFILES, SINGLE-LAYER

1 INSTALLING SUPPORT PROFILES

Mount the support profiles vertically, parallel to the verge and with the correct side facing upwards and tighten with a torque of **15 Nm**.

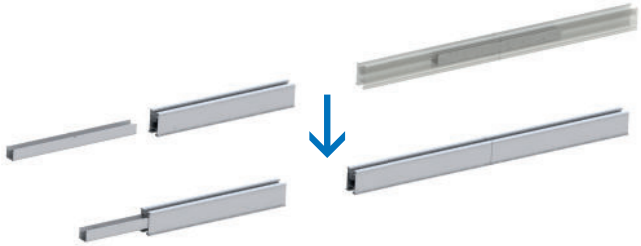




2 CONNECTING SUPPORT PROFILES

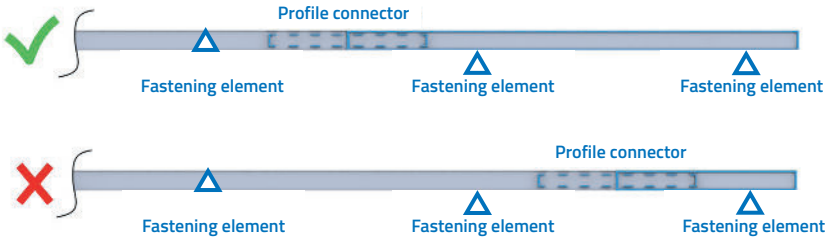
This is necessary if the width of the module field is greater than the length of the support profile.

Insert the profile connector halfway into the first support profile and then push the second support profile into the profile connector.

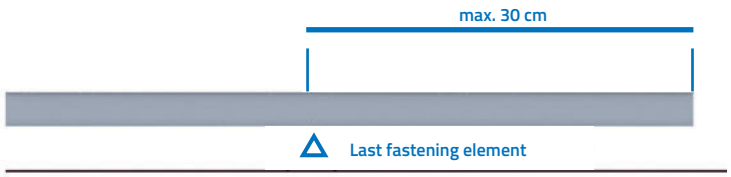


Please note:

+ Affix each support profile to at least two fastening points!
+ Support profile joints must not be located in the area of the fastening points.



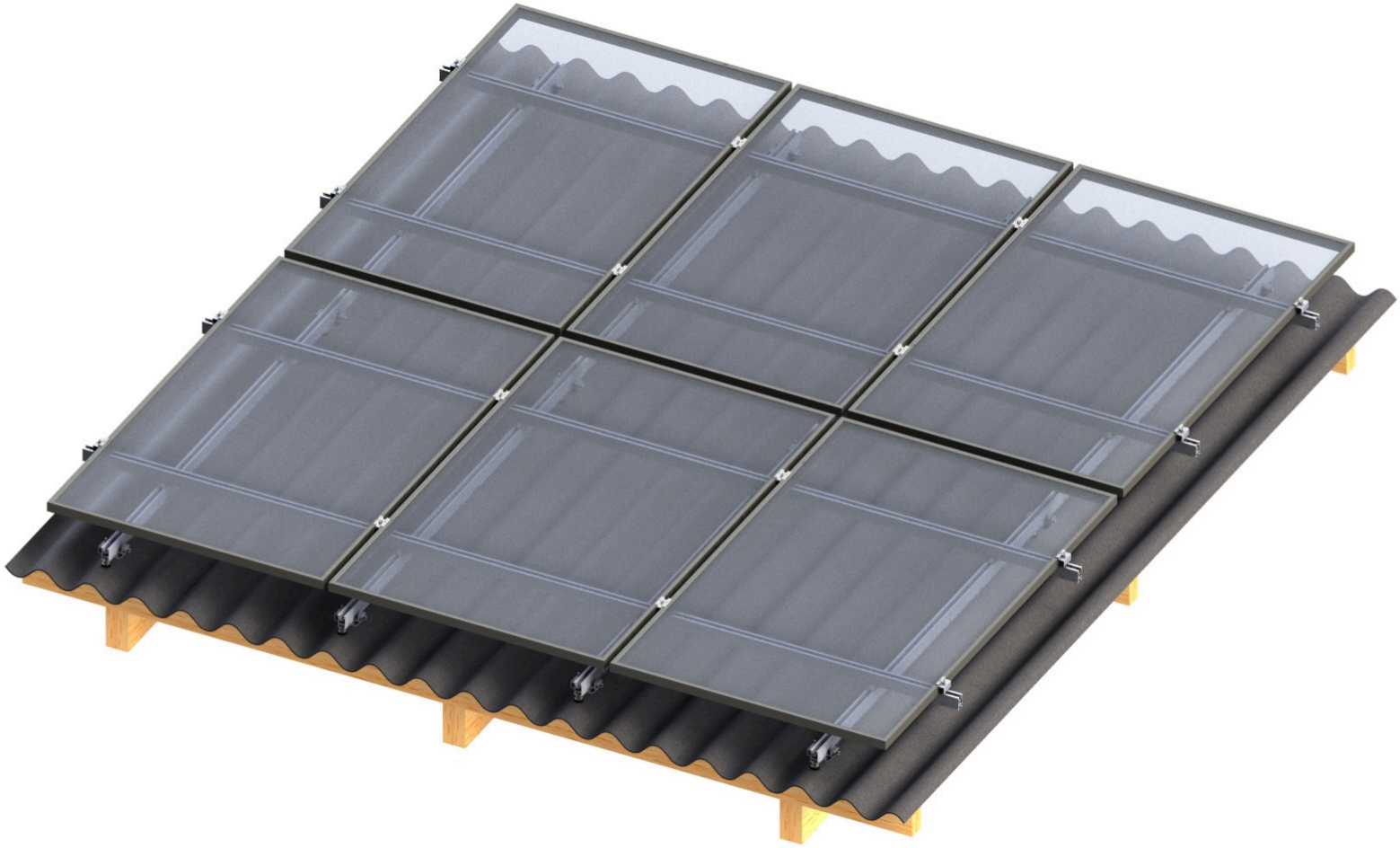
+ Support profile length: **max. 12 m!**
+ After a **max. of 12 m**, form an expansion joint measuring at least **5 cm**!
+ Projection of the support profiles over the last fastening element: **max. 30 cm!** Projection should be the same on both sides.



+ Measure out the positions of the profile connectors on the roof according to the **Solar.Pro.Tool project report** and screw the profile connectors in place (optional).

INSTALLATION OF THE SUPPORT PROFILES WITH CROSS-CONNECTION

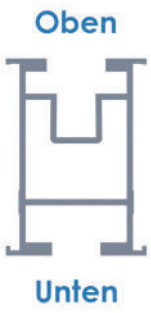
MODULE ARRANGEMENT - VERTICAL



INSTALLATION OF THE SUPPORT PROFILES WITH CROSS-CONNECTION

1 MOUNTING THE SUPPORT PROFILES "BASE RAIL"

Mount the support profile **"Base rail"** vertically, parallel to the verge and with the correct side facing upwards and tighten with a torque of **15 Nm**.



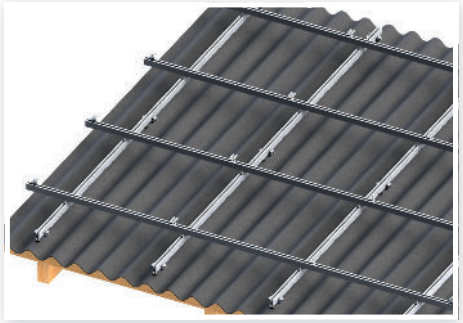
2 INSTALLING CROSS CONNECTORS

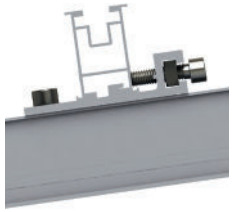
Screw the cross connector into the **"base rail"** and tighten with a torque of **15 Nm**.

Please note: If the support profiles **"base rail"** are mounted vertically, parallel to the verge, the support profile fastening screw of the cross connector must always be aligned upwards towards the ridge.

3 MOUNTING THE SUPPORT PROFILES "MODULE RAIL"

Mount the support profile **"module rail"** horizontally, parallel to the ridge and with the correct side facing upwards, on the cross connectors and tighten with a torque of **15 Nm**.

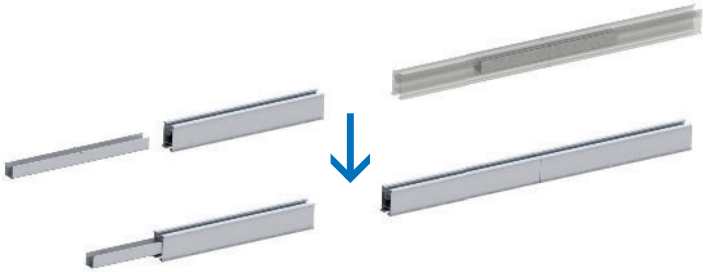




4 CONNECTING SUPPORT PROFILES

This is necessary if the width of the module field is greater than the length of the support profile.

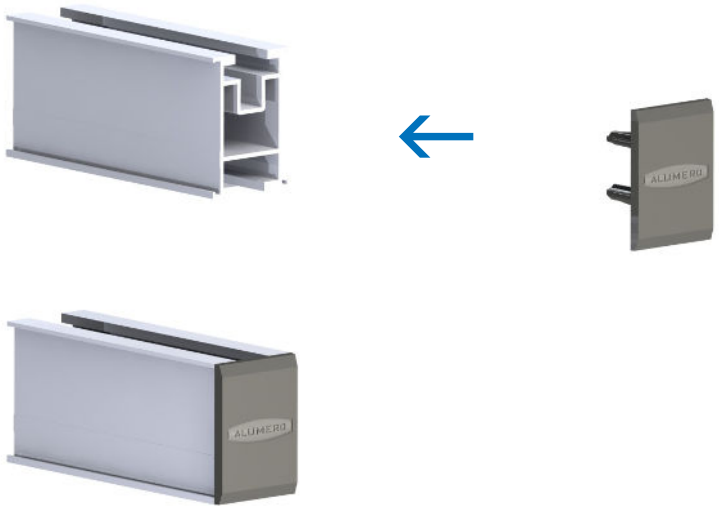
Insert the profile connector halfway into the first support profile and then push the second support profile into the profile connector.



INSTALLATION OF THE SUPPORT PROFILES WITH CROSS-CONNECTION

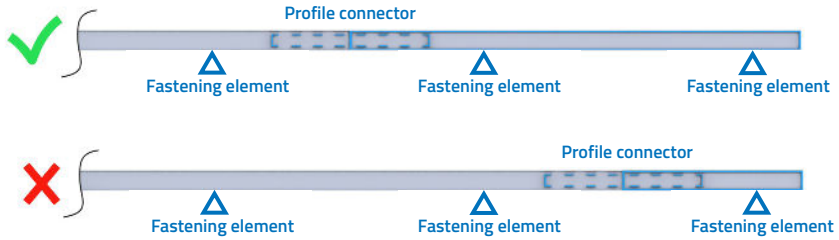
5 INSTALLING END CAPS

Push the end caps into the profile ends by hand.

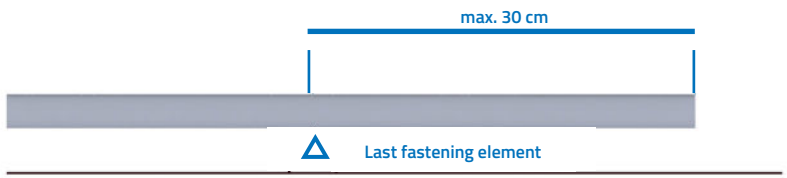


Please note:

+ Affix each support profile to at least two fastening points!
+ Support profile joints must not be located in the area of the fastening points.



+ Support profile length: **max. 12 m!**
+ After a **max. of 12 m**, form an expansion joint measuring at least **5 cm**!
+ Projection of the support profiles over the last fastening element: **max. 30 cm!**
  Projection should be the same on both sides.



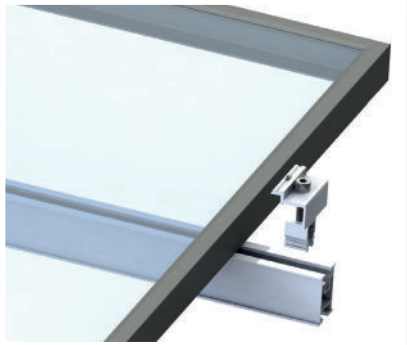
+ Measure out the positions of the profile connectors on the roof according to the Solar.Pro.Tool project report
  and screw the profile connectors in place **(optional)**.

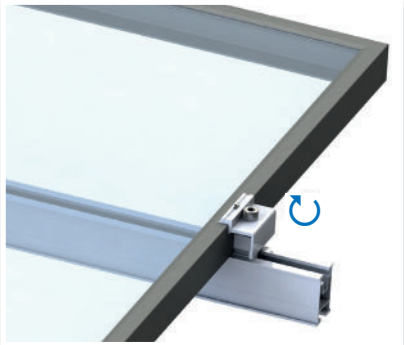
INSTALLING MODULES

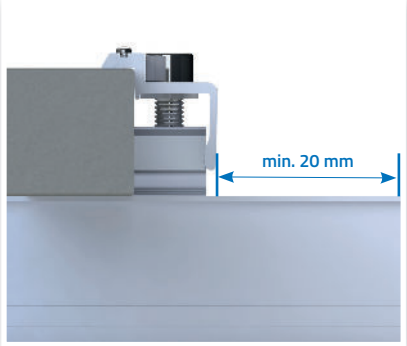
1 INSTALLING END CLAMPS

Start with the lowest module row. Place the first module on the support profiles and align it.

Click in the end clamp (Click) at a slight angle and push it towards the module frame.





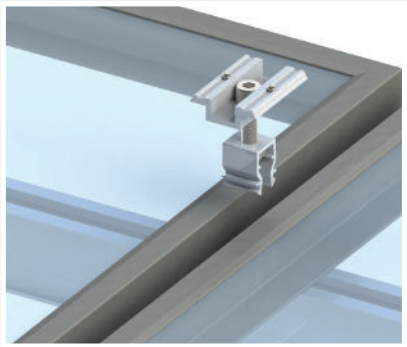


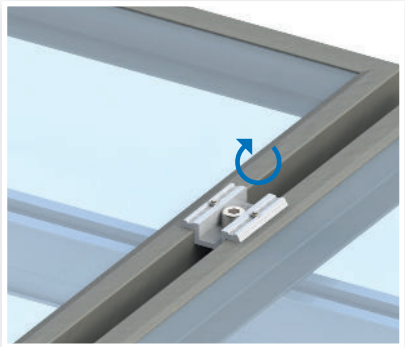
Please note: The closing clamps must be fitted at least 20 mm from the end of the respective mounting profile.

Note: When using end clamps with threaded plates, attention needs to be paid to the alignment. The threaded plate must be positioned at right angles to the profile channel.

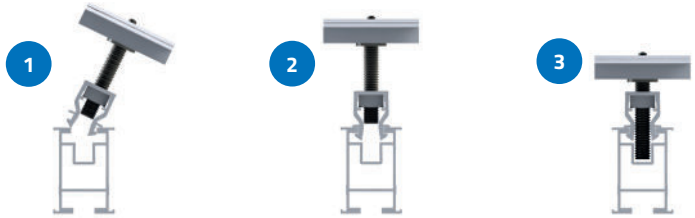
2 INSTALLING THE MIDDLE CLAMP

Place the middle clamp (Click) on the frame of the previous module and click it in at a slight angle. Push the module in so that both modules firmly touch each other. Tighten the Allen screw with a torque of **15 Nm**.





Mount the last module of each module row using closing clamps, as previously described. Mount the remaining module rows in the same way.



Please note:

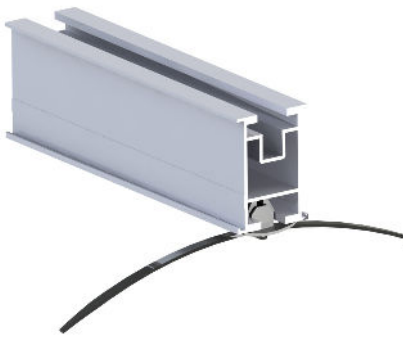
+ Distance between the clamp and the ends of the support profile: **min. 20 mm!**
+ Middle clamps must not be mounted directly on the support joint!
+ Modules are only to be clamped at prescribed fastening areas!
  For information on which these are, please refer to the module data sheet provided by the module manufacturer.
+ Clearance (horizontal and vertical) between modules: **approx. 20 mm!**

FASTENING MODULE CABLES

1

Module cables should not hang down or rest on the roof covering.
Press the clip attached to the cable tie into a profile channel of the support profile.
Tie cables together using the cable tie.

Remove the clip by pushing it sideways out of the profile channel.



POTENTIAL EQUALISATION

Potential equalisation between the individual parts of the system is to be carried out in accordance with the respective country-specific regulations. The following shows one possibility for earthing the MOUNTING SOLUTIONS hanger bolt system. Cable cross-sections and the overall earthing concept are not provided in these instructions, and will need to be calculated or created by the executing fitter in accordance with applicable standards and guidelines. Professional earthing methods other than those listed here are also possible.

1

EARTHING THE SUPPORT PROFILE ROWS

Insert a wire clamp into the lower profile channel of the support profile in each support profile row. Insert the aluminium wire into the wire clamp and fix it in place by tightening the screw. Establish a conductive connection between all module rows in this manner.

Fastening the aluminium wire using a wire clamp

Fastening the earthing wire using a hammerhead screw.

2 EARTHING THE MODULES

Whether the modules need to be earthed is specified by the module manufacturer in the respective module data sheet. If this is the case, the potential equalisation of the modules can be established in the following manner, which is recommended by ALUMERO:

To integrate the modules into the potential equalisation, you can use MOUNTING SOLUTIONS end and middle clamps with pin. The pins sit in the clamps and pierce through the anodised layer of the module frames, thereby conductively connecting all module rows with each other.

End clamp (Click) with pin

Middle clamp (Click) with pin

All product illustrations in these installation instructions are for illustrative purposes and are not to scale. Errors and omissions excepted!

PLEASE PAY ATTENTION TO THE FOLLOWING INSTRUCTIONS!

We recommend that you read the following instructions very carefully, as they are extremely important for the handling of the product. Please also inform yourself about the safety instructions for the other system components.

SAFETY AND WARNING INSTRUCTIONS

The pitched roof system AS 2.1 has been designed exclusively for holding PV modules. Any other use is considered improper. Intended use also includes compliance with the information in these installation instructions. MOUNTING SOLUTIONS cannot be held liable for damages resulting from non-compliance with the installation instructions, in particular the safety instructions, or from misuse of the product.

+ MOUNTING SOLUTIONS accepts no liability whatsoever for loss of performance or damage of any kind to the module.

All work on the PV system should be carried out in strict accordance with these instructions. Installation, commissioning, maintenance, and repair may only be performed by persons who are appropriately qualified and authorised.

Please observe the applicable regulations and safety instructions.

The following accident prevention regulations must be taken into account:

+ BGV A 1 – General regulations
+ BGV A 3 – Electrical installations and equipment
+ BGV C 22 – Construction work (personal protective equipment against falls from a height)

+ BGV D 36 – Ladders and steps
+ Rules of the Employer's Liability Insurance Association for Safety and Health at Work BGR 203 (Roof Work) and DIN EN 516 Prefabricated accessories for roofing
+ Work attire and health and safety regulations in accordance with the regulations of the employer's liability insurance association

You must comply with the following DIN standards:

+ DIN 18299 – General rules applying to all types of construction work.
+ DIN 18338 – Roofing and roof waterproofing works
+ DIN 18360 – Metal construction work, locksmith work
+ DIN 4102 – Fire behaviour of building materials and components

Work on the systems of MOUNTING SOLUTIONS PV Systems GmbH is only to be carried out by authorised personnel. The operator of the system has the following safety-relevant obligations:

+ We require that an inspection and maintenance of the installed pitched roof system AS 2.1 components and the roof cladding is performed at least once annually. During this, at least the following aspects should be checked:
  - » Correct fit and tightness of all mechanical connections
  - » Position of the system on the roof and the system itself with regard to deformation.
  - » Wiring is intact
  - » PV modules for damage
+ Installation of the frame is only to be carried out by persons with appropriate qualifications, trade-specific skills, and a basic knowledge of mechanics.
+ It must be ensured that the persons commissioned are able to assess the tasks assigned to them and recognise possible dangers.
+ The installation instructions are a component of the product and must be available during installation.

+ It must be ensured that the installation instructions, and in particular the safety instructions, are read and understood by the personnel commissioned before installation.

+ The regulations of the employers' liability insurance association, the local health and safety regulations, and the rules of engineering must be observed.
+ Suitable lifting gear and ladders must be used for assembly. No leaning ladders are to be used.

+ It is necessary that a structural analysis of the existing building be performed by a competent civil engineer with regard to the additional loads from a PV system.
+ Applicable general load limits specified by MOUNTING SOLUTIONS PV Systems GmbH (e.g. need for snow clearance to limit snow load) must be taken into account.

WARRANTY / PRODUCT LIABILITY (EXCLUSION)

The information on dimensioning contained in these instructions merely constitutes practical advice. Binding mounting frame structural information can be generated using the program MOUNTING SOLUTIONS Solar.Pro.Tool.

As an installation company, you are responsible for the correct execution of the installation. MOUNTING SOLUTIONS PV Systems GmbH cannot be held liable for the dimensioning information contained in commercial system offerings.

As the installation company, you are responsible for the mechanical durability of the installed interface connections on the building envelope, in particular also for ensuring the absence of leaks. The components provided by MOUNTING SOLUTIONS PV Systems GmbH are designed for this purpose according to the expected loads and the valid state of the art. For this purpose, you must specify all general technical framework conditions in writing in the project description sheet (details of the supporting structure, snow load zone, building heights, wind loads, etc.) in the enquiry/order submitted to MOUNTING SOLUTIONS PV Systems GmbH.

MOUNTING SOLUTIONS PV Systems GmbH shall not be held liable in the case of improper handling of the installed parts.

Use near the sea is excluded due to the risk of corrosion.

With proper handling, dimensioning according to the structural framework conditions and normal environmental and ambient conditions, MOUNTING SOLUTIONS PV Systems GmbH grants a 2-year product guarantee on the service life and durability of the frame systems. This applies within the framework of generally prevailing weather and environmental conditions.

Material and workmanship warranty: MOUNTING SOLUTIONS PV Systems GmbH grants a material and workmanship guarantee of 10 years on the materials used. For more detailed information, please refer to the separate warranty conditions.

NOTES ON ELECTRICAL INSTALLATION

All electrical work is to be carried out by a qualified electrician. The applicable DIN standards, VDE regulations, VDEW guidelines, VDN guidelines, accident prevention regulations and the regulations of the local electricity supply company (EVU) are authoritative in this regard.

+ DIN VDE 0100 (Erection of power installations with nominal voltages up to 1000 V)
+ VDEW guideline for parallel operation of domestic power-generating systems with the low-voltage grid of the electricity supply company
+ VDI 6012 Guideline for decentralised energy systems in buildings: Photovoltaics
+ Leaflet on the VDEW guideline "Domestic power-generating systems connected to the low-voltage grid"
+ VDN Guideline "Domestic power-generating systems connected to the low-voltage grid"
+ DIN/VDE regulations, DIN/VDE 0100 "Erection of high voltage current installations with mains voltages up to 1000 V", in particular VDE 0100 Part 410 "Protection against direct and indirect contact" (DC voltages > 120 V, < 1000 V DC) and the "Accident Prevention Regulations of the Industrial Trade Associations" VBG4 "Electrical installations and equipment".
+ DIN VDE 0100-540 Selection and erection of electrical equipment - Earthing arrangements and protective conductors
+ VDE 0185 Erection of a lightning protection system and VDS 2010

Solar modules generate a current as soon as they are exposed to light, i.e. they are always live. Although the fully insulated plug contacts provide protection against contact, you must pay attention to the following when handling the solar modules:

- Do not insert any electrically conductive parts into the plugs and sockets.
- Do not install solar modules and cables when plugs and sockets are wet.
- Perform all work on the cables with extreme caution.
- Do not perform any electrical installation work under damp conditions.
- Even at low light levels, extremely high DC voltages are generated at the series connection of solar modules, which are life-threatening if touched. In particular, consider the possibility of secondary damage in the event of electric shocks.

High contact voltages can occur in the inverter even when it is in a disconnected state:

- Be especially careful when working on the inverter and the cables.
- Even after switching off the inverter and performing subsequent work, make sure to observe the time intervals specified by the manufacturer to allow the high-voltage components to discharge.
- Please also adhere to the installation instructions provided by the manufacturer of the inverter.

Opening a closed circuit path (e.g. disconnecting the DC cable from the inverter under load) can cause a lethal electric arc to be discharged:

- Never disconnect the solar generator from the inverter while it is connected to the grid.

All the standards and guidelines listed have been issued for Germany and are to be applied. Please observe the respective prevailing version. Outside Germany, also observe the applicable national standards and guidelines.

NOTES ON FRAME INSTALLATION

For installation in roof areas, you will need to observe the provisions of the Dutch standard NEN 7250 as well as the prevailing rules of structural engineering, in particular the requirements formulated in the eurocodes and in the "Rules of the German Roofers' Association".

+ Ensure in advance that the product complies with the structural requirements on site in accordance with EN 1991 – and all related national application documents.
+ EN 1991 "Actions on structures" - and all associated national application documents
  - » Part 1-1: Densities, self-weight, imposed loads for buildings
  - » Part 1-3: Snow loads
  - » Part 1-4: Wind actions
+ EN 1990: "Basis of structural design" – and all associated national application documents
+ The design of the mounting frame is carried out according to DIN EN 1993 "Design of steel structures" and DIN EN 1999 "Design of aluminium structures".
+ NEN 7250 Solar energy systems - Integration in roofs and facades – and all associated national application documents
+ Ensure that the substructure is suitable in terms of its load-bearing capacity (dimensions, condition, relevant material parameters) and the support structure. To assess the condition of the roof, use the Dakreflector, in which the criteria are described as "good" and "without additional measures".
+ Ensure that the drainage of rainwater is not impeded.
+ Check that all screw connections are tightly fastened.
+ Adhere to the torques specified.

PRODUCT LIABILITY

The technical documentation is a component of the product. MOUNTING SOLUTIONS PV Systems GmbH cannot be held liable for damages resulting from non-compliance with the installation instructions, in particular the safety instructions, or from misuse of the products.

IHR HÄNDLER

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