mounting systems

2-Post Steel
Installation manual

Content

1. Introduction

1.1 Short description

The 2-Post Steel ProLine is an open field, two post PV ground mount system. Because of material optimization and static security, there are different versions of Portrait and Landscape mounting. The 2-Post-Steel can be paved with driven piles or cast in concrete. It consists of aluminum and hot-dipped galvanized steel.

1.2 About these

Instructions
These instructions describe the mounting of the 2-Post product and provide essential information regarding their components, system planning and crucial security notice. Chapter 1, 2 and 3 provide an overview as well as detailed information concerning the 2-Post-Steel-System and its components. Chapter 4 contains the general module-layout and planning information. The remaining Chapters contain detailed information regarding mounting and installation.

Validity of the installation manual
This installation manual is only valid in conjunction with:

- The document "Installation manual" for PV mounting systems: general part". This document states the general information on Mounting Systems' products regarding standards, safety, transport, maintenance, disassembly and disposal.
- The product-specific overview drawing (POD). Therefore, the POD takes precedence over the installation manual in case of discrepancies between the two documents.
- A bill of material (BOM), which identifies all single components i.e. shows all single component of a rack.

These documents are an integral part of the 2-Post-Steel product and must be read at every Installation.

Please read both this installation manual and the above mentioned documents carefully prior to any installation, maintenance or disassembly work.
You will be provided with all information for safe and complete installation, maintenance and disassembly. However, if you have any questions after having read these documents, please contact Mounting Systems GmbH.

User group
These installation instructions are intended for the following persons (user group):

- Skilled personnel
- Instructed personnel

Skilled personnel
Skilled personnel are persons who, on the basis of their professional training, are able to execute installation, maintenance and disassembly work properly.

Instructed personnel
Instructed personnel are persons who have been instructed and taught appropriately regarding the assigned tasks and the possible risks in the event of improper conduct. An instructed person must have received instructions regarding the required safety devices, precautions, relevant regulations, accident prevention regulations as well as operating conditions and must have demonstrated their competence.
The implemented work must be inspected and accepted by skilled personnel.

Guidance notes
The following guidance notes enhance the orientation when handling this installation manual:

Pictograms:


This symbol indicates important information and useful tips.


This Symbol indicates ways and means to make the installation process easier.

1.3 Warnings

The following warnings are used in these Installation Instructions to indicate safety-related information. They include:

- Warning symbols (pictograms)
- Signal words which identify the hazard level
- Information about the type and source of the hazard
- Information about the potential consequences if the hazard is disregarded
- Measures for the prevention of hazards and the prevention of injuries or damage to property.

The signal words of the warnings respectively indicate one of the following hazard levels:tgeltenden Dokument „Montageanleitung für PV-Gestellsysteme: allgemeiner Teil." Lesen sie dieses Dokument sorgfältig durch und halten Sie die dort beschriebenen Punkte

 **DANGER**	Indicates a potentially mortal danger, disregard for which may result in death or serious injury.
 **WARNING**	Indicates a potentially dangerous situation which may result in serious injury or damage to property.
 **CAUTION**	Indicates a potentially dangerous situation which may result in injuries or damage to the property if ignored.
 **ATTENTION**	Indicates potential danger which can result in damage to the property.

1.4 Safety

All universally valid safety instructions for products of Mounting Systems GmbH are listed in the document "Installation manual for PV mounting systems – general part". Please read this document carefully and observe the instructions given therein: Do not use the product in a manner other than intended, comply with the obligations of the owner and observe all general and specific safety instructions.

In addition, please observe the specific safety instructions given in this installation manual for all installation work. The specific safety instructions are positioned in each case directly with the respective installation step.

2. Technical description

Upon delivery of the 2-Post-Steel system, check that all parts and components as described in the Bill of Materials and the Product Drawings are present. If an item is missing or damaged, please document the discrepancy and notify Mounting Systems immediately.

2.1 System overview

The most important system's pieces are presented as follows. The execution of the individual system parts can variate, especially between components for portrait or landscape mounting, as well as the following conditions:

- Desired type of foundation
- Type of module
- Number and configurations of modules
- Local conditions

Bild 2.1 – 1 Hochkant Montage

2-Post-Steel Komponenten:

a Legs with driven piles
b Diagonals
c Rafter
d Module support clamps
e Module support rail
f Connector*
g Module mid clamp/end clamp
h Small parts*

* not shown in the overview

2.2 Komponenten

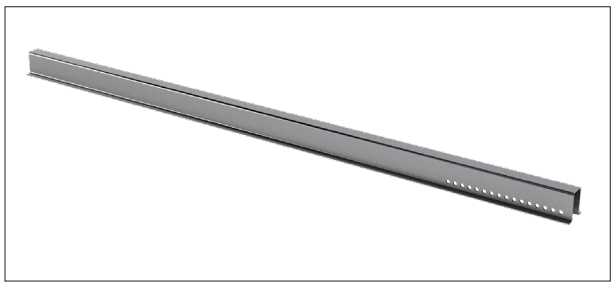


Bild 2.2 – 1 Ram Post

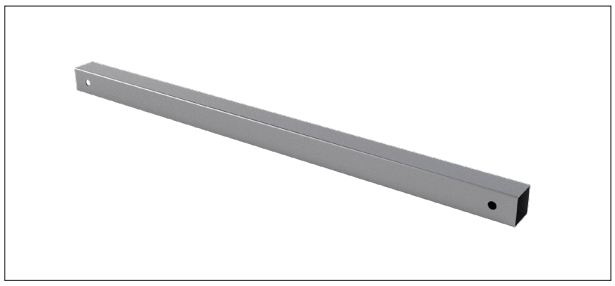


Bild 2.2 – 2 Leg

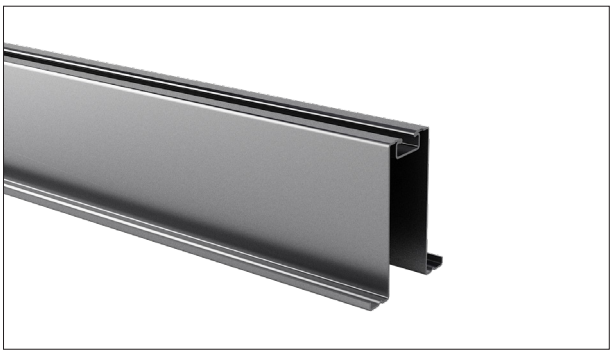


Bild 2.2 – 3 Rafter

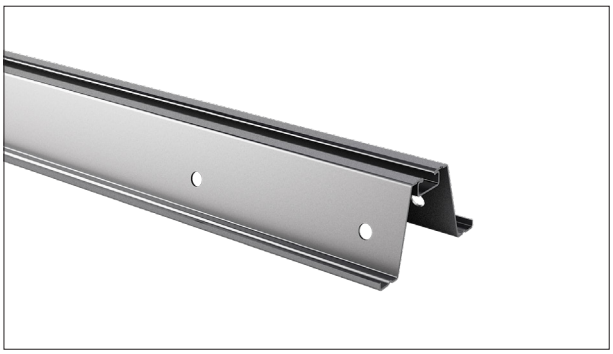


Bild 2.2 – 4 Module Support Rail

Bild 2.2 – 5 Module Support Clamp

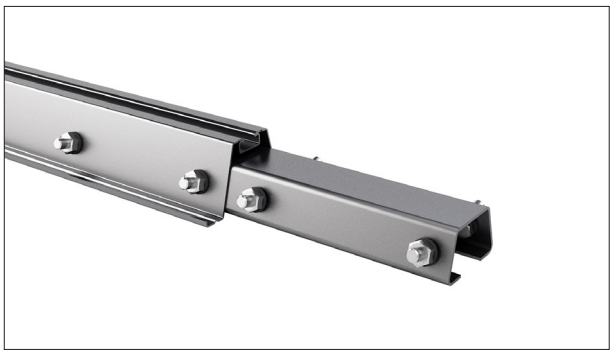


Bild 2.2 – 6 Connector

Module clamps

Module clamps are used to secure the PV modules to the 2-Post-Steel module rails. All module clamps are equipped with a Mounting Systems' Clickstone, a special clip to click into the module rail. Module end clamps are installed at the ends of the module rails. Module mid clamps are used to hold PV modules in the center of the module rails.

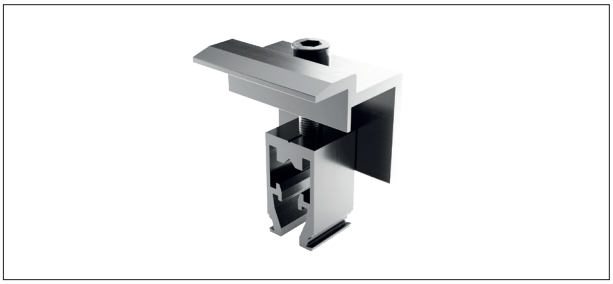


Bild 2.2 – 7 Module Fix-End Clamp

Bild 2.2 – 8 Module Fix-End Clamp

3. Product Drawings and Bill of Materials

Product-specific documentation is supplied as part of the 2-Post-Steel system. It contains all the information necessary to install the system.

The documentation includes:

- Bill of Material (BOM)

- System overview drawing(s) which show:
  - the exact module configuration for the project
  - Component variations specific to the project
  - the parts supplied for bolted connections specific to the product
  - Dimensions and tolerances

4. Basic Installation Requirements

4.1 System units

The 2-Post-Steel is designed in separate system units which can be up to 55 m long. The Bill of Materials and dimensions of the specific system unit are listed in the POD.

4.2 Required tools

n order to mount the 2-Post-Steel, the following tools are required:

- Power drill/ electric screwdriver
- Folding rule/ measuring tape
- Angle
- Spirit level or laser level tool
- Allen key 5 mm
- Open end wrenches: 2 x size 17 mm and size 13mm for module support clamp

4.3 Tightening

A good quality torque wrench should be used to tighten bolted connections to the torque requirements. These values will be specified in your POD.

5. Foundation

5.1 Installation of ram posts

Ram posts should be oriented as shown in Image 5.1 - 1. Make sure that the posts are positioned and installed within the tolerances. The corresponding tolerances will be specified in your POD. The absence of specific information in the POD shall apply the following guidelines:

Tolerances

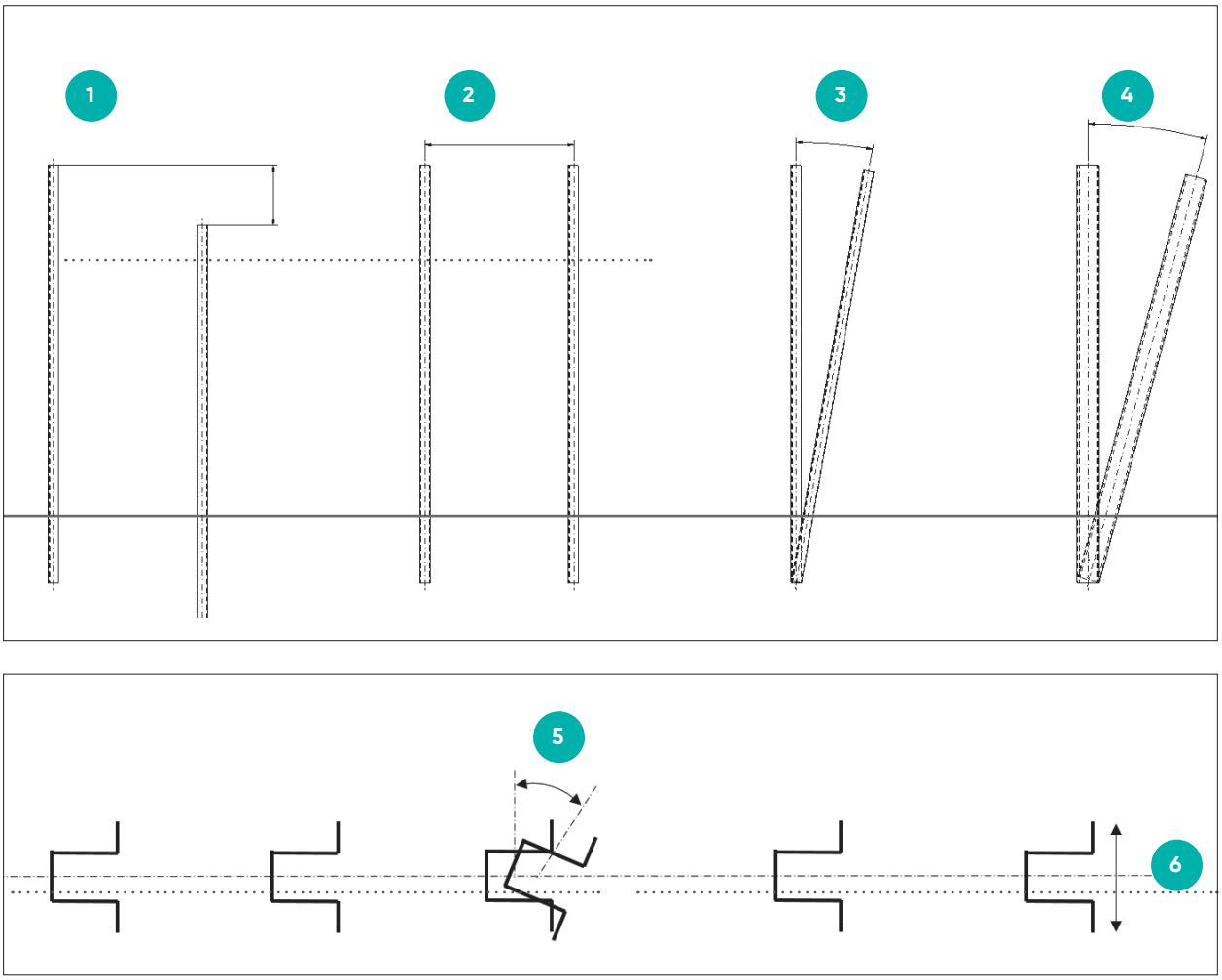


Bild 5.1 - 1 Ram Posts Orientation

1. Post height max. ± 2 cm based on planned height
2. Position E-W max. ± 5 cm, Position N-S max. ± 2 cm
3. Inclination tolerance E-W max. 2° (1° ≈ 2cm/m)
4. Inclination tolerance N-S max. 2°
5. Torsion max. 2°
6. Axis tolerance E-W max. ± 2cm based on the post top

HINT!
After the ramming posts have been set, the pile head (about 3 cm) should be treated with zinc dust primer. This prevents premature corrosion and thus support the longevity of the system.

6. Superstructure Assembly

6.1. Adapter-Legs-Rafter

Mount the adapters onto the posts. Set the legs into the adapters and fix them. Position the rafter as well as the diagonal on the legs. Connect the rafters, legs and diagonal using the small parts specified in your POD.

Observe the right tightening torques!

Installation steps

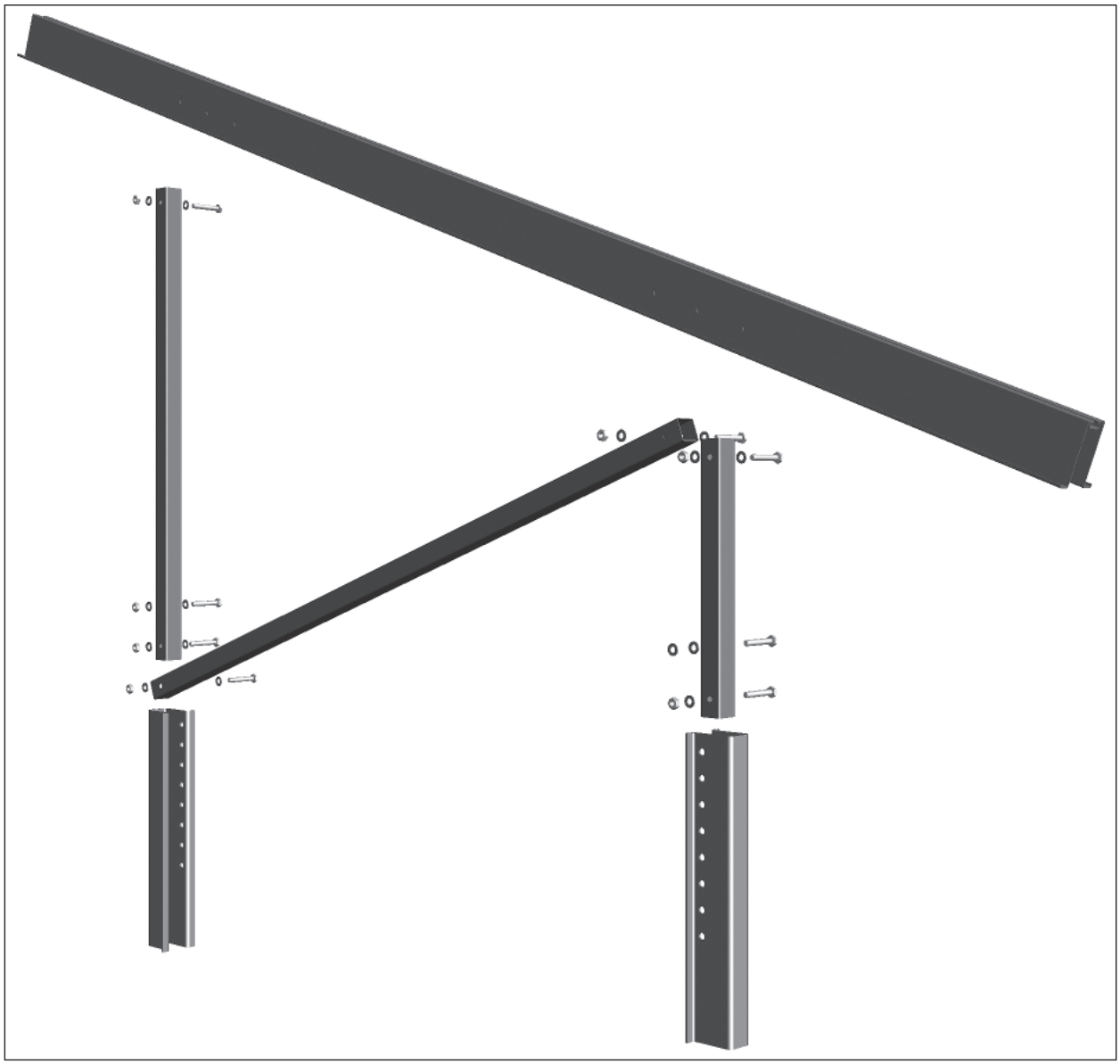


Bild 6.1 - 1 Installation steps

HINT!
The smooth side of the diagonal is fixed on the smooth side of the foundation.
The correspondent screw is also fixed on this side.

6.2 Module support rail

2-Post-Steel system uses module rails (Image 6.2 - 1) mounted on the rafter to hold the modules in place. Module rail clamps (Image 6.2 - 2) are used to mount the module rails to the rafters.

While using a special rocket stone under the module support clamp, transverse inclinations /east west direction) of up to 10° can be realized. This East-West rocket stone is only used for transverse slopes over 2°.

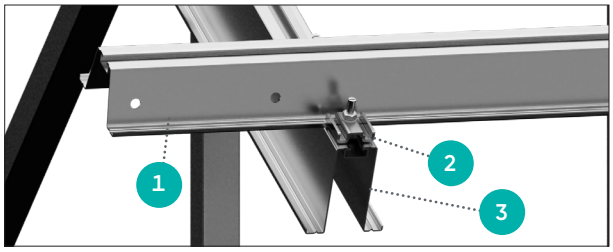


Bild 6.2 - 1 General structure
1 Module support rail
2 Module support clamp
3 Rafter

Setting the east-west rocket stone

1. Assemble the East-west rocket stone with the module support rail clamps. (Image6.3 - 1) Make sure not to forget the small rocker block, without it the rocket stone loses its functionality.

2. Place the east-west rocket stone in the rafter.

3. Place the module support rail
   If needed, use the mounting help
   (see following general mounting steps).

4. Tighten the screw connections (Image 6.3 - 2).

Bild 6.2 - 2 East-West rocket stone assembly

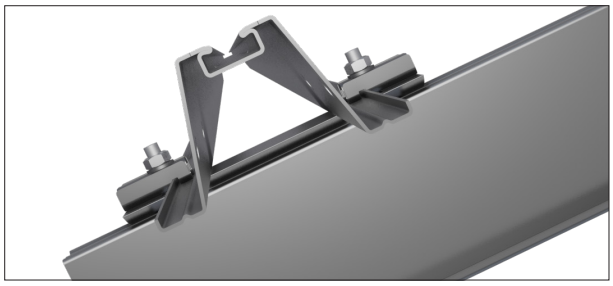
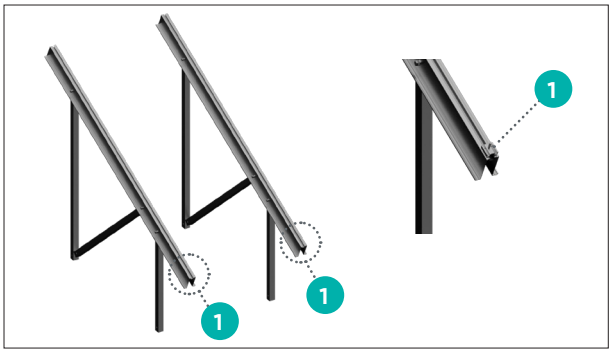
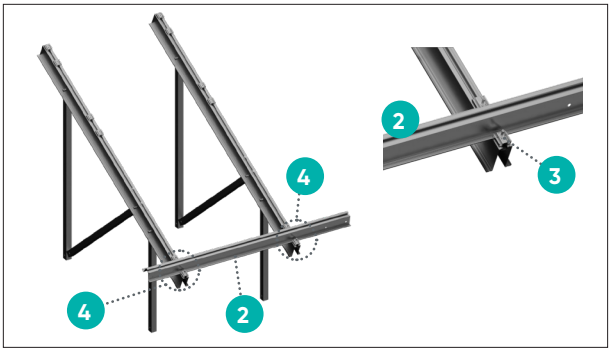
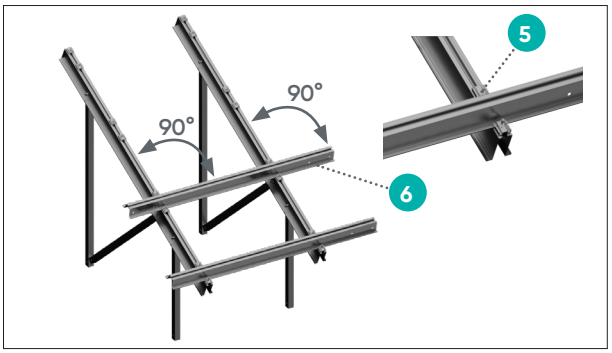
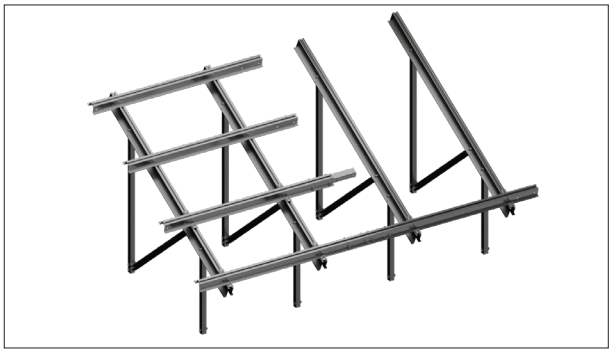


Bild 6.2 - 3 Module support rail mounted









General installation steps

1. Mark cantilever arm length on module support rail
2. Place the module support rail
3. Lay module support rail
4. Mount top module support clamp
5. Control right angle between rafter and module support rail
6. Mount bottom module support clamp / Mount second module support rail with the help of a spacer block.

6.3 Connector

The module's support rail are connected together through a connector (Image 6.3 - 1 bis 6.3 - 3).

- In order to connect 2 support rails with each other, align them on the rafter, as shown in Picture 6.3 - 1. Place the Connector in the Module support rail. Attach the Connector with the screws, plate screw and nut which are included in the instructions, as shown in Picture 6.3 - 2 and tighten them to the required torque.

- Repeat these steps for the next connector.

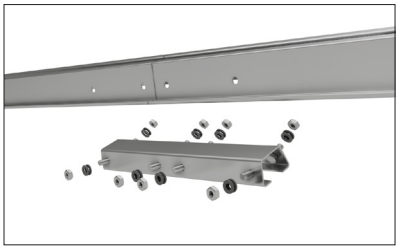


Bild 6.3 - 1 Connector and small parts

Bild 6.3 - 2 Installed Connector

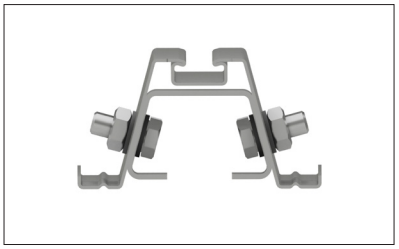


Bild 6.3 - 3 Installed Connector with Module support rail

7. Modulmontage

7.1 Installing Clickstones

Mounting Systems' Clickstone is a special clip with which the module clamps are fastened in the module rail. You only need a 5mm Allen key for the installation. The Click-stone is inserted from above into the top channel of the module rail.

Installation steps:

- Insert the Clickstone at a slight angle into the rai channel.
- While holding it firmly in place, rock the Clickstone upright until it clicks into place.

HINT!
The Clickstone is made undersized, so it is easy to lock it. In Clickstone-channel, it can be pushed into place easily. By screwing the screw, Clickstone is forced apart, thus ensuring the right support. To remove the Clickstone again, loosen the screw so that it no longer touches the noses in the Clickstone. Then, you can easily squeeze the legs of the Clickstone together and remove it from the channel.

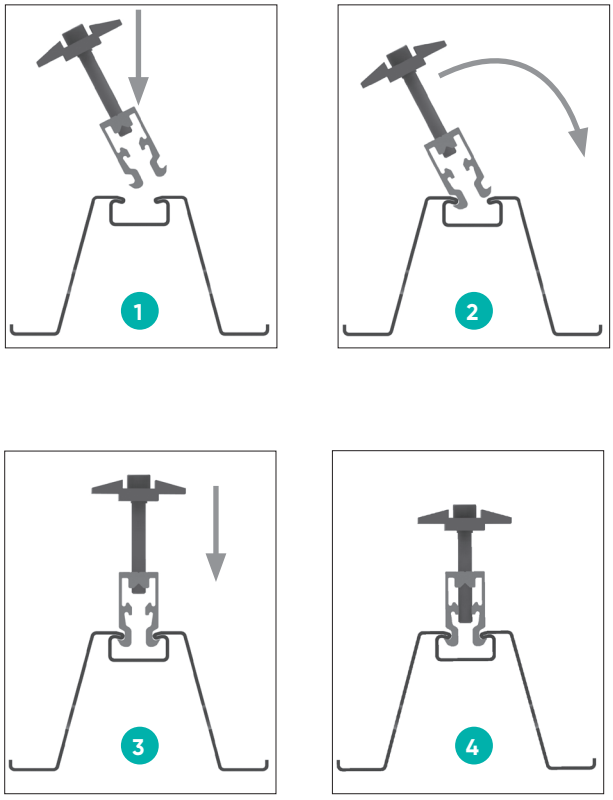


Bild 7.1 - 1 Installation steps Clickstone

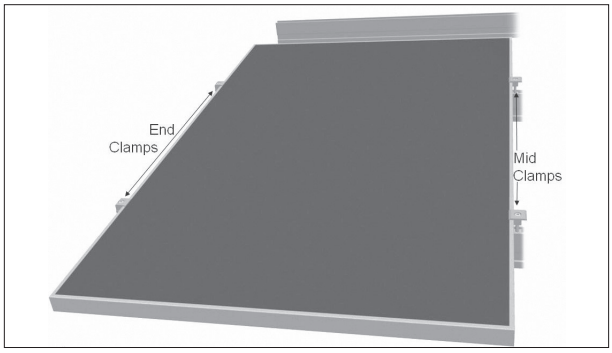


Image 7.2 - 1 Installing locations clamp

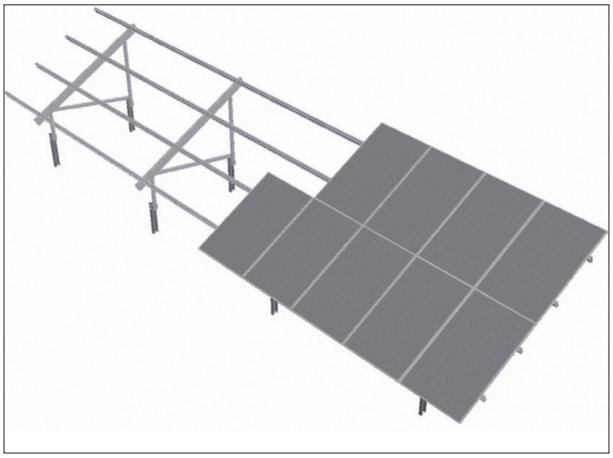


Image 7.2 – 2 Portrait installation

HINT!
Use of a spare module clamp Clickstone or other item as a spacing gauge between the top of one row of modules and the bottom of another can help provide a neat, aesthetically pleasing array.

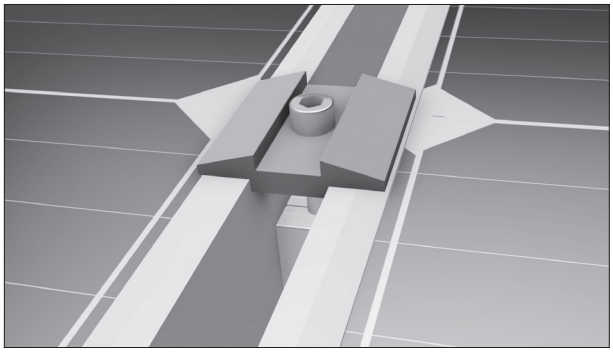


Image 7.2 – 3 Module mid clamp

7.2 Portrait installation

The procedure below describes the installation of modules on a single row. This procedure begins on the west end of the array and moves east. Modules can also be installed from east to west if desired.

- Insert the Clickstone of an end clamp into each module support rail.
- Place the first PV module on the rails and slide the module frame against the end clamp. With the module's clamping points correctly positioned under the end clamps, tighten the end clamps onto the module frame.
- Insert a mid clamp into each module support rail. Push it flush against the module, ensuring the clamp body rests on top of the previously installed module frame.
- Place the next module on the module support rail and slide it against the mid clamps.
- Repeat the above steps for the rest of the row of modules. At the end of a row, install an end clamp on the outside of the last module to complete the row.

ACHTUNG

Material damage due to incorrect mounting

Incorrectly fastened modules can fall and become damaged.

- Ensure the Clickstones click in securely.
- Ensure the modules are flush against both sides of the clamp.
- Observe and adhere to the recommended torque specifications.

8. Installing back-stiffening

If specified in your POD, install bracing on the right and left side of each system unit between the two rear legs. Please refer to your POD for the correct positioning and small parts used in the connection.

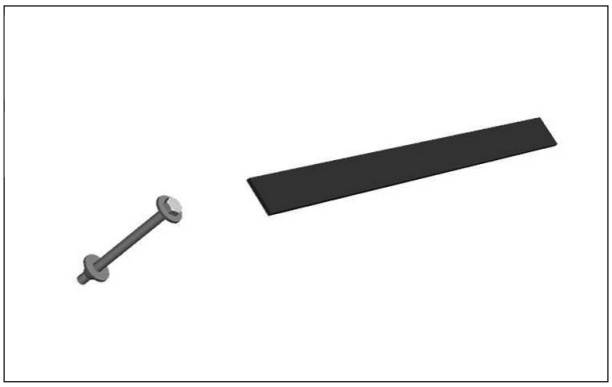


Bild 8.1 - 1 Rear bracing with Small parts

9. Maintenance

When properly assembled, the 2-Post ProLine is a reliable and trouble-free system and should require little in the way of ongoing repair. Nevertheless, Mounting Systems recommends maintaining a regular inspection and maintenance schedule. Such a program can detect and address potential problems before they become serious and help ensure the system's excellent long-term durability and reliability.

The following procedure pertains only to the 2-Post ProLine mounting system structure. Maintenance and repair of other PV system components should be carried out in accordance with the respective manufacturers' recommendations.

9.1 Inspection

At least annually the system should be visually inspected for obvious loose connections, missing components, modules which appear to have shifted, vegetation overgrowth, wind-blown debris and other indications of abnormality. Any problems detected at this time should be addressed and repaired as necessary.

9.2 Testing

After one year in service, it is a good practice to check the torque settings of a representative sample of system connections including module clamps and rail clamps. Do not exceed the recommended torque settings. If a disproportionate number of loose connections (more than 10% of connections) are found, it may be an indication of improper assembly and it may be necessary to take comprehensive corrective action.

A smaller sampling of connections can be tested annually thereafter. Mounting Systems recommends keeping records of the connections sampled each year and testing and, if necessary, adjusting previously untested connections in succeeding years. After all connections have been tested, sample sizes and test frequency can be reduced.

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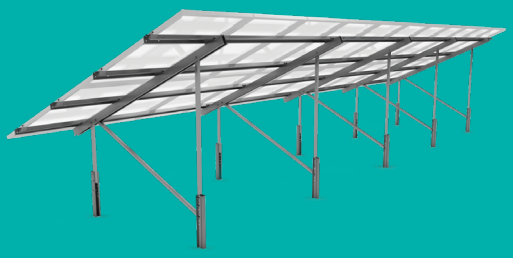

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