MEKA PRO OY | MEMBER OF PROPRIA GROUP

Meka Solar GP
Solar Park Racks Specifications and Installation Instructions

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Meka Solar Stand – Ground Mounting

1 INTRODUCTION

This document provides basic information for the ground installation of the Meka Solar Giga Park solar panel mount. It includes a parts list and installation instructions for the rack along with acceptable snow loads and wind loads. Going through the installation instructions carefully with the installers in advance is important for the smooth progress of the work and a high-quality result.

1.1 Public safety

The installation of a solar panel system requires special skills and know-how, which are determined by the current regulations on a country-by-country basis.

Only an authorized and trained professional can install a photovoltaic system. Installers must be aware of and be aware of all potential risks of injury and injury that may arise during the installation process, including the risk of lightning, high winds, electric shock, and other risks.

Occupational safety must be taken into account during installation. Installation must comply with occupational safety instructions, the Occupational Safety Act, a good safety culture, and only tools and methods in accordance with the Occupational Safety and Health Act must be used in installation work. Pay special attention to the lifting equipment and scaffolding used, the load-bearing capacity of the soil and the risks arising from unevenness. The installer is always responsible for his own safety and the safety of others – always follow the occupational safety plan, area plan and use appropriate pre-defined personal protective equipment. Never underestimate the importance of safety during installation work.

Before installing a solar panel rack, the hazards arising from the installation must be investigated and a plan must be drawn up to identify, reduce and eliminate them. After that, we are ready to get acquainted with how to install a solar panel mount.

The solar panel rack can be installed either on the ground or on a foundation at ground level. This solar panel mount is only for flat ground. Contact Meka Pro's

technical support in case the soil height changes by more than 3 cm over a distance of one metre (30 cm for 10 metres). The responsibility for designing and selecting a suitable foundation lies with the system installers.

During the installation of the system, it is important to comply with all applicable local, regional, and national regulations. If necessary, make sure that a building permit has been obtained before continuing.

Make sure that all equipment used is specifically designed and suitable for photovoltaic systems.

Avoid sitting, standing, stepping, climbing, or walking on the stand. Do not immerse any part of the panel or rack in water unless it is natural rain or regular cleaning. Constant contact with water should also be avoided.

Avoid installing or operating solar panels in areas with high levels of salt, dust, hail, snow, sand, air pollution, chemical activity, acid rain, soot residue, or other factors that could compromise the durability of the system. The solar rack system should be located in areas where the presence of aggressive substances such as salt, brine, or other corrosive substances does not compromise the safety and operational efficiency of the equipment.

The solar panel rack must not be installed in areas where the production of flammable gases or the concentration of flammable gases is common.

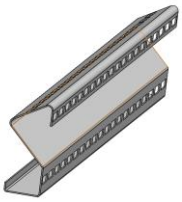
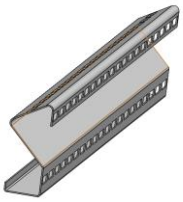
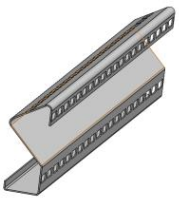
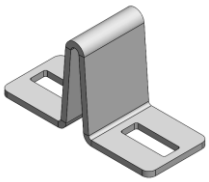
Ensure that the scaffolding installation method and scaffolding system fastening system are strong enough to withstand the load conditions specified for the site. It is important to consistently follow rack installation instructions and precautions.

During installation, ensure that the solar panel mount can withstand the specified local wind and snow loads.

2 PARTS LIST

Parts List for Solar Panel Stand:

NOTE: The ground foundation and its mounting bolts are not included.

 RS 8 HDG	 C-Profile 48x98x2 1380 XPG	 C-Profile 48x98x2 2560 XPG
 S-Profile 60x140x2 XPG	 S-Connector L=400 XPG	 S-End Profile L=800 XPG
 RTF-S 10 XPG	 A Bracket XPG	 SOLAR FOOT XPG
 AS XPG L= XXXX	 C-Purlin 100x70 L=4000	 DMCS 30-40

Position	Name
1	RS 8 HDG
2	Forefoot C-Profile 48x98x2 L= 1380 mm
3	Hind leg C-Profile 48x98x2 L= 2560 mm
4	S-Profile 140x60x2 L=3000 mm
5	S-Connector 140x62x2 L= 400 mm
6	S-End Profile 140x62x2 L=800mm
7	RTF-S 10
8	A-Bracket
9	Solar Foot
10	AS rail (different lengths)
11	C-Purlin 115x70x4000
12	Second clampDMCS 30-40

Table 1. Different parts of the rack

3 MAXIMUM PERMISSIBLE SNOW AND WIND LOADS

The MEKA® solar panel rack is designed to withstand EUROCODE compliant loads. The maximum loads have been determined by simulation by a third party. It is not allowed to exceed maximum loads, the warranty is only valid if the solar panel stand has been assembled in accordance with the instructions by a qualified person. The GP rack type is very durable, a properly installed rack can withstand decades of demanding climatic stresses, maintaining its strength throughout the life of the solar power plant.

3.1 Snow and wind loads of the sun rack

Snow load:

up to 2.5 kN/m^2, depending on the type of rack and the size of the panel.

Wind load:

up to 21 m/s, depending on the type of rack and the size of the panel.

The GP rack meets all EUROCODE requirements.

4 ELECTRICAL CONDUCTIVITY

The electrical conductivity of the panel system must be measured in accordance with local standards and local authority requirements.

The solar panel mount can be grounded to each other using accessories from different manufacturers, as long as the accessories are certified for grounding the panels and are installed according to the manufacturer's instructions.

5 INSTALLATION INSTRUCTIONS

The installation instructions for the MEKA® solar panel stand are described in this paragraph.

CAUTION: This content is intended to demonstrate and illustrate generally acceptable mounting methods for MEKA® solar panel mounts. The contractor or installer must ensure the necessary snow and wind load requirements for each project and installation site.

These instructions and information do not cover all the details or discrepancies of every system, nor do they cover every possible installation situation. This content is also not intended to replace the contractor's and installer's responsibility to obtain information and apply the applicable laws, rules, regulations, and standards relating to the installation of photovoltaic systems in each individual project and location. The installation method must always be finally approved by the construction site supervisor and the relevant authorities.

To prevent galvanic corrosion, make sure that all components used are compatible with the scaffolding material. It is important to note that damage caused by galvanic corrosion is not covered by the warranty.

It is not recommended to use racks with different configurations (such as ground and wiring) in a single system.

Arrange or secure excess wires appropriately, for example by securing them to the mounting structure with non-metallic cable ties or other suitable fasteners.

When using products from different manufacturers in the Meka solar panel stand, make sure that they are compatible and follow the instructions given by the manufacturer of the product.

5.1 General basic information

- The mounting angle is 30°
- The distance between the legs is 3 m, the distance between the front and back legs is 2.08 m
- The maximum overhang of the control end at the edges is 0.8 m, where the solar panels are attached.
- The total length of the rack due to thermal expansion is a maximum of 40 meters
- The parts are very light to handle large quantities with muscle power and can be transported in large quantities with lighter ATV equipment in the solar park's in-house logistics
- Corrosion class C4
- Steel quality and strenght:
  - C-profile XPG 2,0mm SSAB Domex 350GD+ ZA300 (Galfan)
  - S-Profile (strongest) 2,0mm XPG SSAB Domex 500LAD+ZA255 (Galfan)
  - S-Profile (mid area) 2,0mm XPG SSAB Domex 420LAD+ZA255 (Galfan)
  - C-Purlin (strongest) 1,4mm XPG SSAB Domex 500LAD+ZA255 (Galfan)
  - C-Purlin (mid area) 1,4mm XPG SSAB Domex 350GD+ZA300A (Galfan)
  - S-Connector, S-End, A-Bracket, RTF-S10, SolarFoot; XPG SSAB Domex 500LAD+ZA255 (Galfan) with different thicknesses

  More information:

  https://www.ssab.com/en/brands-and-products/ssab-domex/product-offer/500lad

  https://www.ssab.com/en/brands-and-products/ssab-domex/product-offer/420lad

  https://www.ssab.com/en/brands-and-products/ssab-domex/product-offer/350gd

5.2 Installation preparation and tools

The GP rack is designed so that it can be installed by a small work group. Rack installation can be carried out alone and panel installation in a group of two. It is easy to create a contract to whole ground mount project installation after the installation of the model installation.

Check that there is free space in the mounting area of the solar panel mount. Measure the position of the rack in the terrain by marking the positions of the corner legs of both ends, for example, with pieces of rebar. Reserve at least three metres of space around the rack and remove visible stones and stumps from the work area. Make sure that the installation area is load-bearing and level. In winter conditions, take care of anti-slip protection and sufficient lighting. If necessary, restrict access to the the installation area from outsiders. Arrange waste management for packaging waste.

Find out in advance the underground cables, fibre-optic cables, water pipes, sewers, pressure sewers, drains, filtration fields, robotic mower boundary cables and any other pipes, cables and obstacles that could be damaged during installation.

Mark the supply cable routes to be placed on the rack and, if the cabling has been done in advance, support the cables well and direct the risers to the right location. If necessary, try the WiFi connection if a solar panel inverter is attached to the rack.

Make sure the right tools are available, in good condition and in sufficient quantities

- Stand's dimensions and tape measure (long and durable enough)
- Line Laser
- Impact screwdriver (min 55 Nm)
- Long socket wrench for 15 mm rack mounting
- Long socket wrench for 13 mm panel mounting
- 13 mm socket with light and long extension arm
- Loop wrench 15 mm
- A torque wrench, for example. 10-100Nm
- Instant press 2 pcs
- Line wire 50 m, durable quality
- Rebar 1 m 4 pcs for marking corner points (piling only)
- C-Purlin outer template: 1134 mm pan L=1084 mm, 1303 mm pan L=1253 mm
- Mounting platform approx. 800 mm and high approx. 1500 mm
- Key hammer adapter needed for piling
- Zinc spray, for example. MEKA SPRAY ZN 1449709

5.3 Receiving of materials on site

The solar panel racks will be delivered to the site by truck. Make sure that there is a drivable road for the truck all the way to the installation area. Pay attention to the height of the truck. In large solar parks, deliveries are matched weekly so that the unloading times of the truck are agreed in advance.

The driver calls in advance to agree on the details of unloading, such as the need for a forklift, telehandler or wheel loader to unload the load. Tailgate dismantling is only possible for smaller pallet goods.

Think in advance where the materials to be installed should be placed. The construction of the rack and the installation of the panels are carried out from the front side of the rack. The placement of supplies takes into account the use of space required by possible lifts and installation platforms, as well as short carrying distances for goods. Calculate a central location for solar panel packages. Consider the possibility of removing excess panels and waste after installation

If pre-assembly is carried out, these parts are sorted separately. If the solar panel racks is installed with pilling, it is not advisable to divide any other parts into the area to be piled until the piling is complete.

Many parts, such as the C-profiles, resemble each other. Carefully study the dimensions of the rack so that you can distinguish which profile belongs to the piles and which are legs. The parts may differ from each other only in terms of length.

5.4 Choosing a foundation method

On a large solar park site, it is possible to use several different foundation methods. Combinations with a front leg pole and a separate rear pole are also possible. The scaffolding is designed so that another type of foundation solution can always be installed in the middle of the work, if necessary.

Before choosing a foundation method, it is recommended to carry out a soil survey to determine the structure and acidity of the soil. The quality of the soil varies, which is why it is recommended that the survey be sufficiently comprehensive for the entire area. After the soil survey, it is recommended to test piling at the measurement points and then a tensile test to ensure sufficient traction. You can order test piles from MEKA, in which case you will also have access to the required holding forces and counterweights on a case-by-case basis for the tensile test.

There are four alternative implementation methods for the foundation.

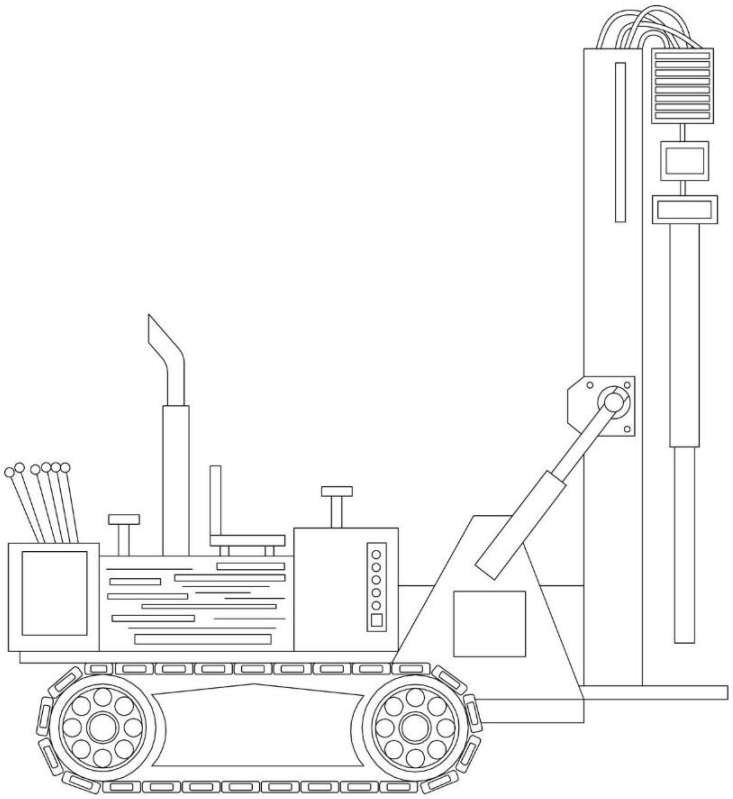
1. **Driven C-leg pile**, a uniform pile that also forms the leg part of the scaffolding
2. **Separate C-pile to be rammed**, extended with a separate leg section
3. **Screw pile with flange** to which a separate leg section is attached **by means of a** SOLAR FOOT piece.
4. **Concrete fastening SOLAR FOOT,** bolt recommendation HST M12-120

Before starting piling or concrete fastening, carefully prepare for section 5.2. If necessary, verify the functionality of the planned foundation method with soil surveys and tensile tests.

5.5 Choosing a piling machine

Choose a good and off-road piling rig. MEKA piles can be installed with lightweight track-driven percussion plate or MOVAX type piling machines, which can accommodate a 4800 mm long foot pile upright. When using separate piles, a lower and lighter machine can be used as a piling machine. Piling is also possible with an excavator of about 5 tonnes, which is equipped with a high-impact lightweight breaker. If the pile is driven with an excavator's breaker, a piling adapter must be used to concentrate the impact force in the middle of the pile. The pile cannot withstand low frequency high force piling; Do not use a hammer and machine that is too large, piling will be significantly more difficult if the weight, movements and forces of the machine are too great. A machine that is too large sinks into the terrain more often, costs more, consumes more and does not fit to work agilely.

The accuracy of piling work is easier to achieve with the right piling machine that rests on the ground surface. Correspondingly, a machine that is too small may have a limited reach. Prefer wide-track machines, ensure safe progress even in difficult terrain. If necessary, use access bridges to cross terrain obstacles. A sunken machine often means losing your goals for the day.



5.6 Pile distribution and measurement

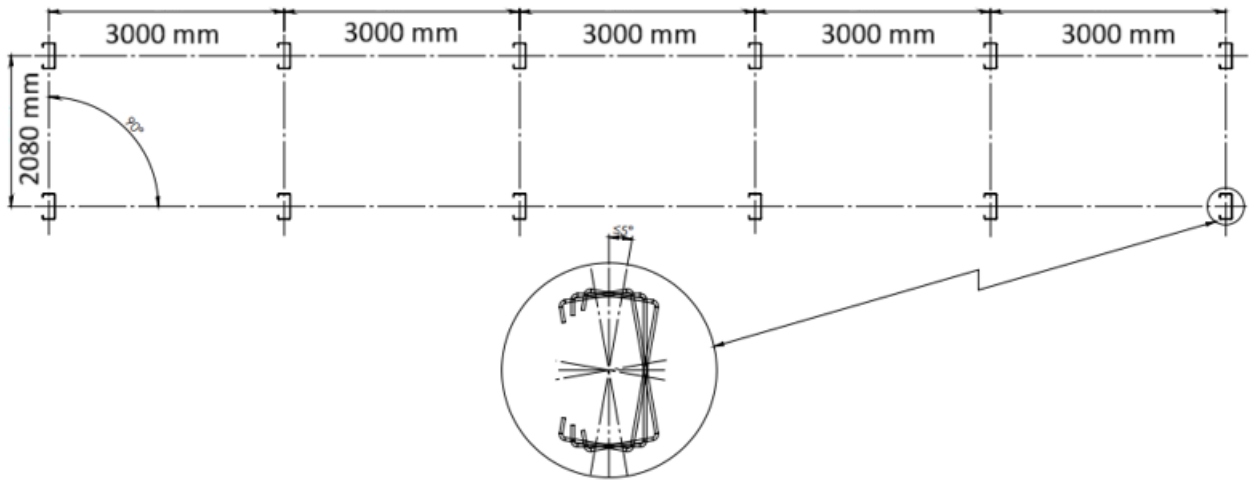
Measure the positions of the piles, starting with the corner piles.

- The piling is always exactly 3 meters apart
- The distance between the front and hind legs is 2.08 m from the center to the center.

Mark the intermediate poles with the line wire. On large construction sites, it is advisable to make a marker wire from a plastic-coated wire, which is tightened with hooks between the end piles. The Meka GP scaffold has large adjustment margins, which enables piling with basic precision.

Measure the corner piles carefully so that a 90-degree angle is formed at the beginning and the rack does not become trapezoid. The front and rear poles must be aligned.

Before installation, distribute the piles at the installation site in approximately the right places on the ground, paying attention to the path of the piling machine. You can also pull a pile load by using a sleigh behind the piling rig, which is always loaded before starting a new rack.



Dimensional view of the positions of the feet

5.7 Driving leg piles

The foot pile consists of a long C-profile, which also serves directly as a front leg and/or rear leg. The use of a foot pile is justified in easy soil where there are no known stones and other obstacles that would turn the foot pile at an angle when installed. The advantage of a foot pile is its installation speed, but its weakness it is prone to installation errors.

Position the laser indicating height at the desired level and ram the foot posts into the ground. The foot post always opens to the right when viewed from the front Take into account any slopes in the terrain so that the solar panel rack is always horizontal.

Depending on the piling machine, the fastest way is to proceed with the front and rear rows separately, but excavator piling also progresses quickly with the front and rear rows at the same time.

With long rear piles, installer must always be careful that the piles are not left at an angle; Check the verticality of each pole, do not go to the next pole until the pole is at the correct height and perfectly vertical. The horizontal bar adjustment allows for a tilt of about 1 - 2 degrees. The pile may rotate no more than five degrees. If the solar panel rack is installed at an angle, installing the panels becomes more difficult, in other words, all mistakes are repeated if the foot piling is poorly done.

5.8 Driving separate piles

Separate piles are shorter than leg piles and always the same length, the sinking dimension is +30-40 cm. The pile is positioned when viewed from the front so that the C-profile opens to the left. The front and rear legs attached to the pile always open to the right.

Piling is done as accurately as possible. In the vertical direction of the pile, a tilt of no more than 1 degree is allowed in the transverse direction of the rack. The pile is driven to the planned depth so that approximately 300–400 mm of the pile end is visible on the surface of the ground. Take into account the possible slopes of the terrain so that the rack is always horizontal. The pile may rotate no more than five degrees.

If the pile tilts more due to a stone or other obstacle, the obstacle must be removed by digging and the pile must be reinstalled. The pile can also be straightened with a small amount of mechanical power.

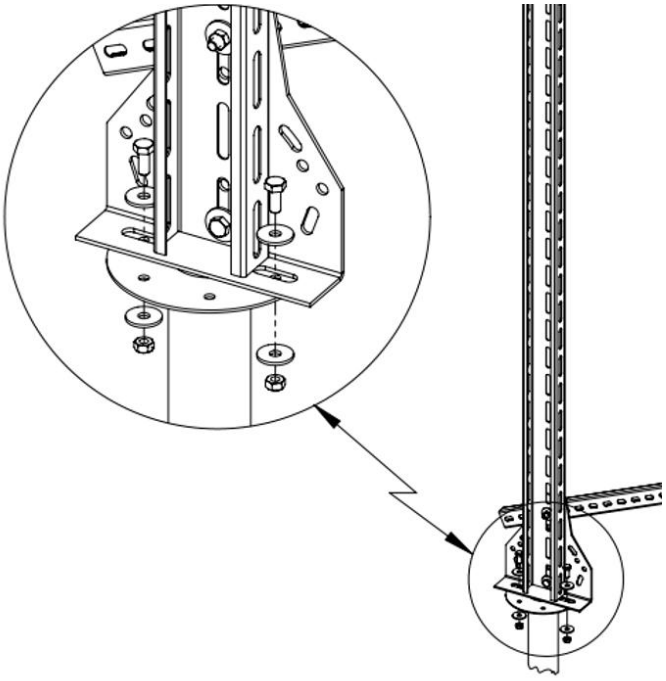
Do not ram the pile anymore, if the pile gets stuck in the stone, the stone will not crack by ramming, but the end of the pile may collapse. The pile with collapsed end must be cut off at the intact point and the cut point must be painted with zinc spray.

All piling errors are repeated in later installation phases. The biggest mistakes are multiplied from the end onwards from the installation error of the second pile. For this reason, it is advisable to be careful at all stages of piling and always strive for the exact success of the first two pairs of piles. When using a separate pile and foot section, vertical and tilt adjustment is easier to implement

5.9 Screw piling

Instal the screw piles into the ground with mechanical power according to the installation diagram above. Select the size of the threaded flange to use based on the soil study and the required holding forces. If the screw pile does not hold at the designed depth, rotate deeper and extend the pile with an extension pile.

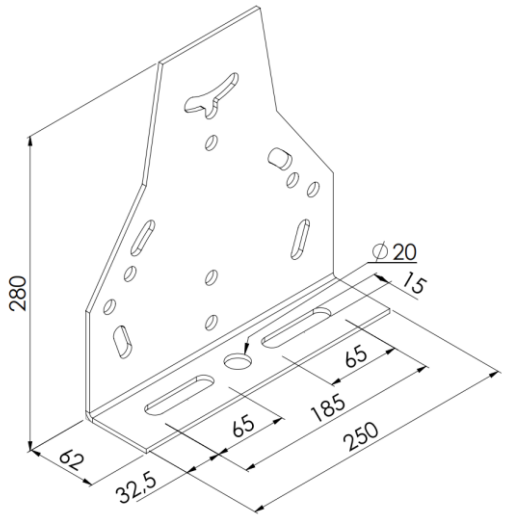
In screw piling, the leg part of the rack is attached to the screw pile mounting flange (not included) using the SOLAR FOOT piece. Choose the size of the mounting flange so that the bolt spacing is between 80 and 170 mm. When designed separately on a case-by-case basis, the screw pile can be bolted directly into the leg. Design the solution together with a Meka Solar expert and screw pile manufacturer for the optimal fit.



5.10 Concrete fastening

In the case of a concrete foundation, the sufficient weight of the foundation is first taken into account. Depending on the installation location, the MEKA SOLAR expert will provide you with a weight calculation based on wind loads for your installation location.

Concrete beams are installed with an accuracy of + - 3 cm horizontally, every 3 meters. The beams can be longitudinal, transverse or overlapping. The beams can be embedded in the ground or installed on the surface of the ground. Concrete beams can also be cast on site. It is essential that the concrete is heavy enough and that the scaffolding cannot move at all even in stormy winds.



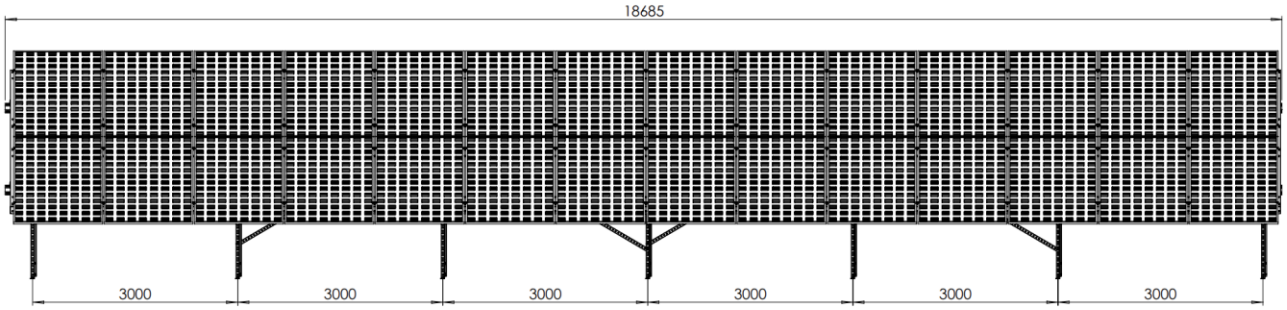
RECOMMENDED SOLUTION: ANCHORING TO A 65x15MM HOLE (2 ANCHORS)

- Hilti article number: 2329109 – HST 4-R M12x105 (Stainless steel – A4)
- Immersion depth: 72 mm
- Concrete casting size: min. 300x300 mm (beam element according to SFS-EN 13225)
- Installation: According to Hilti installation instructions

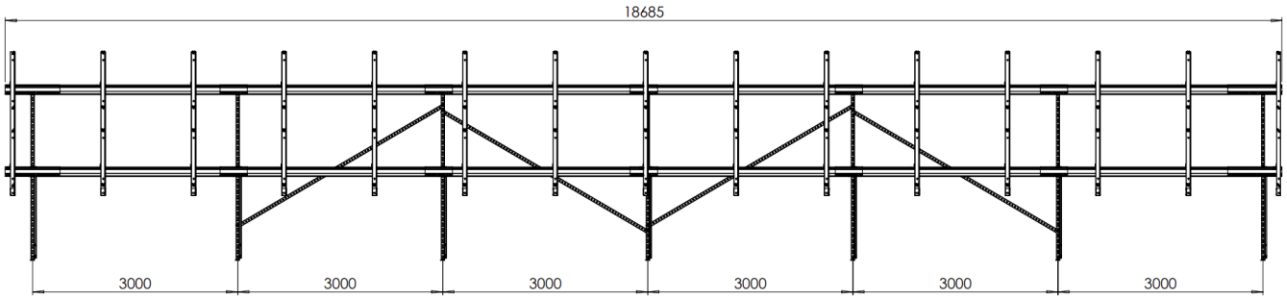
5.11 Dimensions of the ground rack

Rack Width:		2x28	37175		mm
Rack Width:		2x14	18685		mm
Panel Widht		1134/1303			mm
Purlins spacing:		1084/1253			mm
Purlin Lenght:			4000		mm
Ground clearance:			800		mm
Front - Front spacing			3000	Ø - Ø	mm
Rear-Rear spacing			2080	Ø - Ø	mm
Hypotenuse of the cross-measure			3842	Ø - Ø	mm
Area	2x28	4317	37175	160,5	m2
Area	2x14	4317	18685	80,7	m2

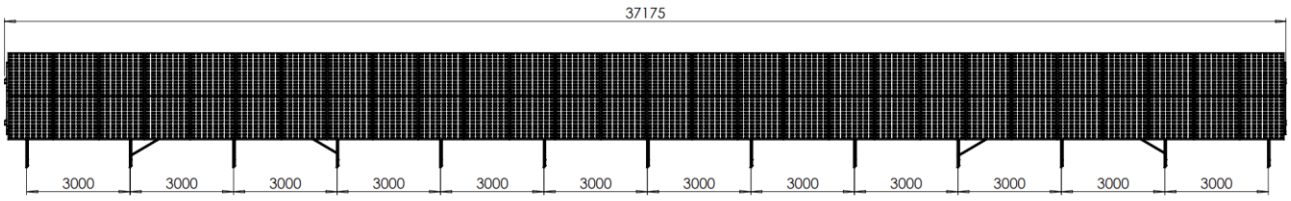
With panels 2x14



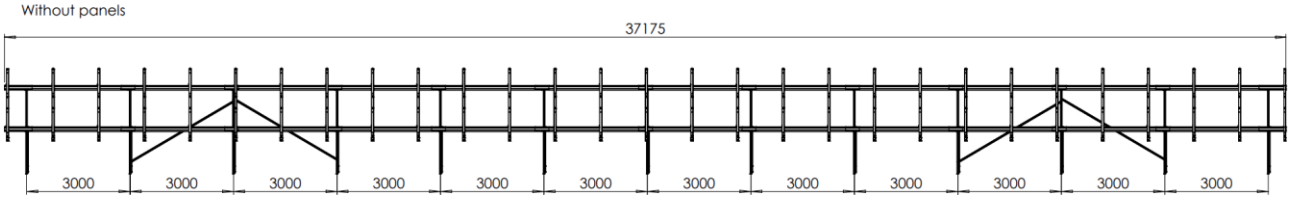
Without panels



With panels 2x28



Without panels



5.12 Bolt Torque

The tightening torques for each type of screw or bolt are shown in the table below.

In general, tightening torques are specified for 8.8 class bolts, unless otherwise noted. The torque is always measured on the nut side, on the panels on the nut side.

CAUTION: FOR SOLAR FOOT concrete fastening, each rack leg must be secured to the foundation structure with at least two M12-105 HST bolts. Always make sure that the installation fits the foundation and that its design supports the weight of the racks + possible wind and snow loads.

Part	Type	Moment
MEKA RS 8	M10x30	55 Nm
MEKA Solar DMCS	M8	13 Nm
MEKA Solar DECS	M8	13 Nm

5.13 Rack installation sequence

In-house logistics:

Installation work always begins with the distribution of supplies for each work phase. You can divide all the necessary parts into bundles at pile intervals, from where it is a short distance to install the parts. When the parts are reasonably next to the need, working time is not wasted on walking and looking for parts. You can prepare bundles with the following components:

- Front leg L=1360 1 pc (not in the leg pile solution)
- Rear leg L=2560 1 pc (not in the foot pile solution)
- S-Profile L=3000 2 pc
- AS Rail L=2475 1 pc
- RTF-S 10 2 pc
- S-extension L=400 2 pc (omitted at the other end)
- RS8 HDG bolts front pockets full 4 pack/ full rack
- S-Extension L=400 2pcs **or**
- Adjustment End L=800 2pcs are added to the first and last gap, depending on the length of the overhang

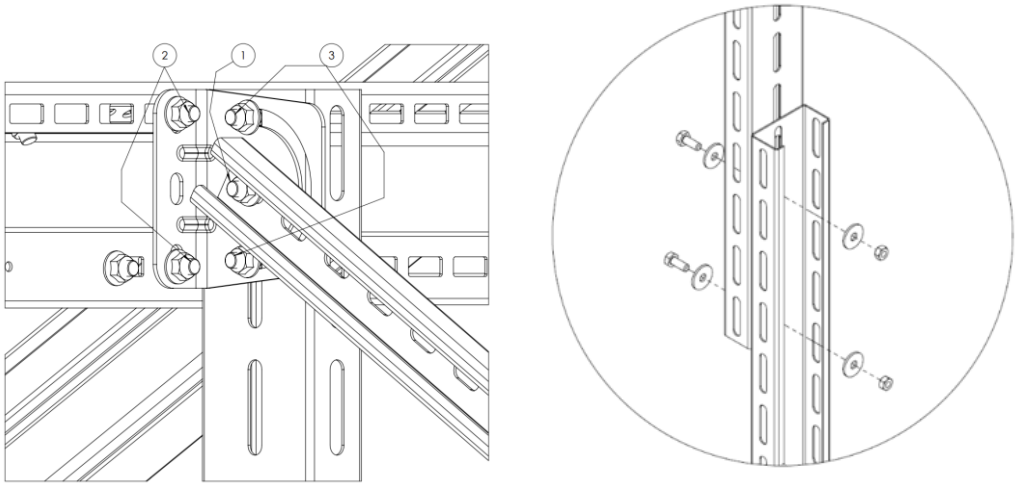
Installation is carried out in two stages:

- Installation up to the horizontal beam, for wiring
- Installation of c-purlins, to be panelled

5.14 Installation of foot parts

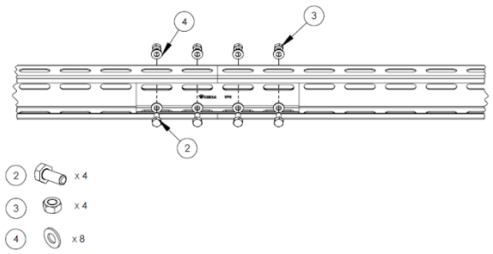
The first stage of assembly is started by installing the separate leg parts either with the help of the SOLAR FOOT piece on the concrete foundation or by installing the separate leg pieces on the piles. First the rear pole, then the front pole. There will be two bolts at the bottom of the leg. Solar Foot can be either way around and the foot profile of the end can be installed the other way around.

At the top, first attach the RTF-S 10 with a single bolt to the centre hole. An AS rail is also attached to the upper part of the front leg under the middle bolt, which is also attached to the lower bolt of the rear leg.



Front leg design and bolting sequence

To extend the pile:
Front and rear leg connection to separate pile, J-extension, 8x RS 8 HDG bolt overlapping min. 335 mm



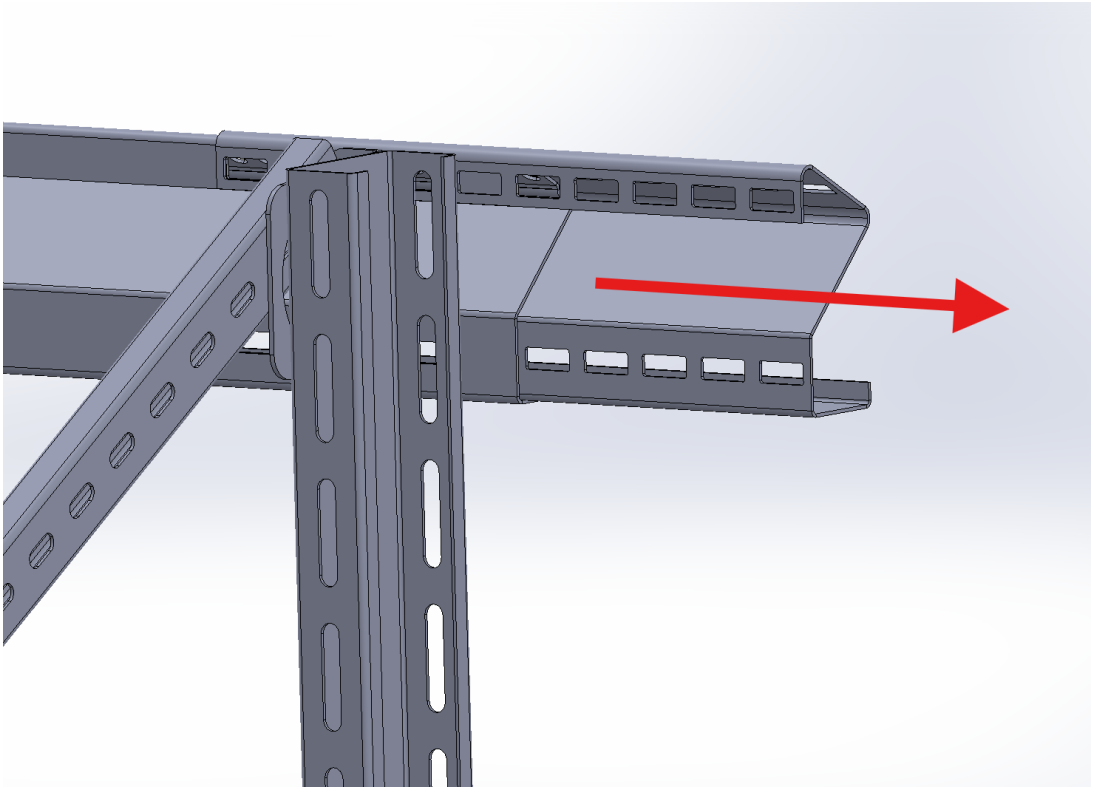
5.15 Installing S-Profile as a horizontal bar

The installation is continued by installing an S-adjustable end and an S-extension at the end of the S-profile.
Rectangular holes are aligned. Only S-extensions are attached to the following S-profiles. Some solar panel racks are dimensioned so that the overhang is short, in which case the overhang is also made with a shorter extension

The S-profile is bolted to the top of the legs to the RTF-S 10 piece with two RS 8 HDG bolts. Always install from right to left when looking from front, starting with attaching the end adjustment piece to the first horizontal profile and attaching the foot to the end using the RTF-S 10 piece. Finally, add the two bolts of the smiley face groove.

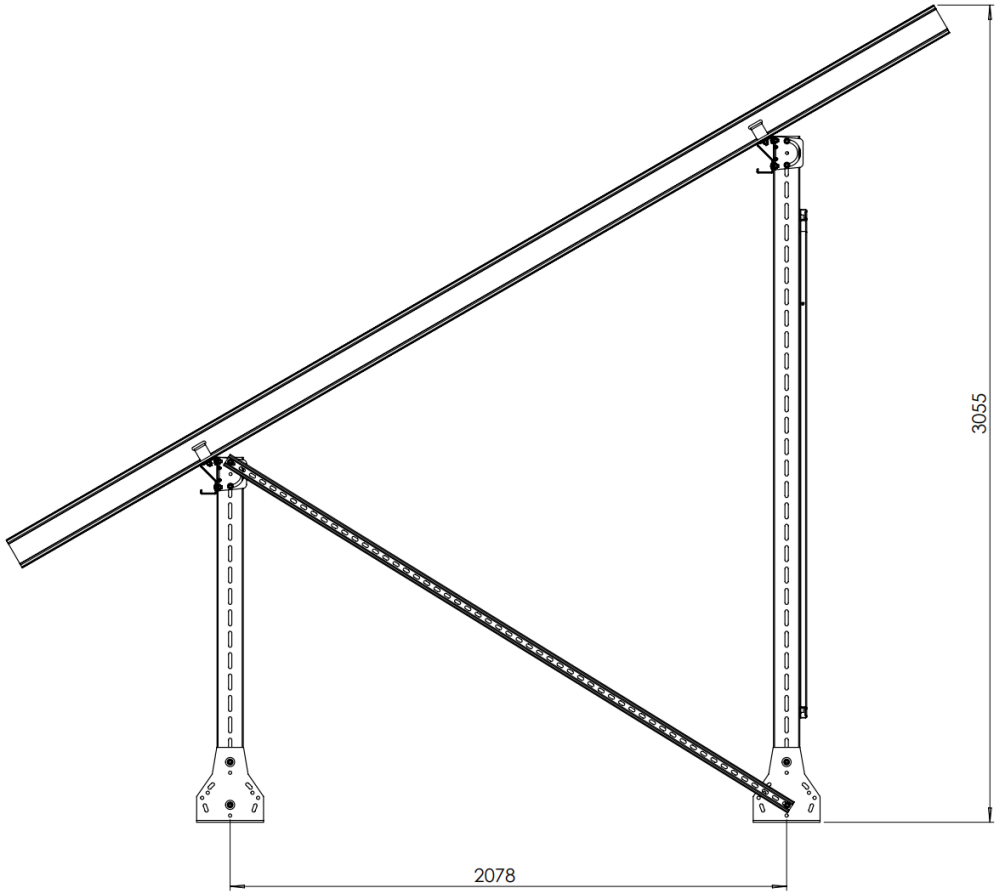
Exception: The adjustment end is also attached to the C-Profile with two bolts.

Installation also proceeds quickly when installed alone, as the extensions are already in place for the next profile.



Adjustment:

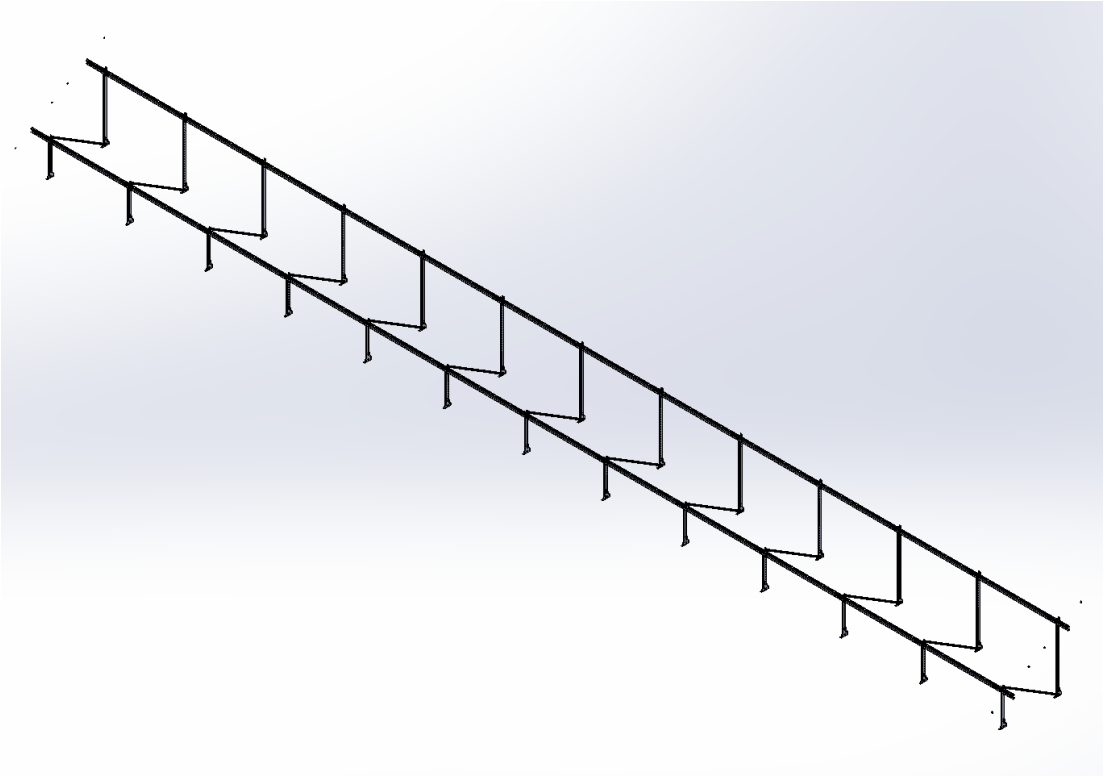
If the legs or foot piles are badly tilted, the RTF-S 10 pieces can be adjusted and tightened to the desired position. Front/rear adjustment up to 40 mm.



The structure of the rack as seen from the end

Adjustment

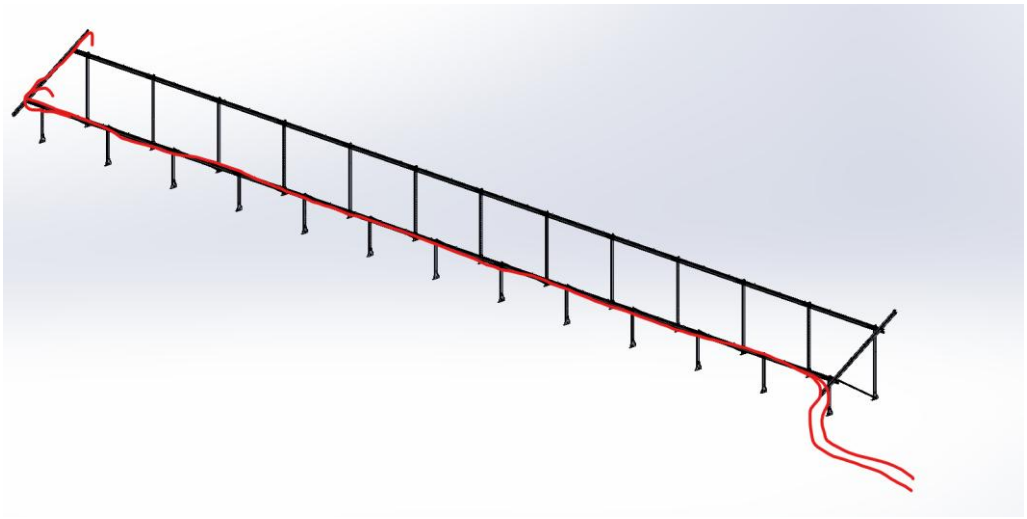
When all the S-horizontal profiles have been installed, adjust the straightness and length of the profiles and tighten the bolts to the torque. Now the rack installation team can start assembling a new solar panel rack.



Rack Mount Step 1 Ready for Wiring

5.16 DC cabling

1. The DC cable feeds of the panels are lifted into the lower S-profile cable duct on the front. In this context, the feeds are also dragged to the ends of the upper panel row. The wires are attached to the gutter before installing the Purlins. We recommend direct chaining of the panel cabling so that the Leapfrog installation method is not used.



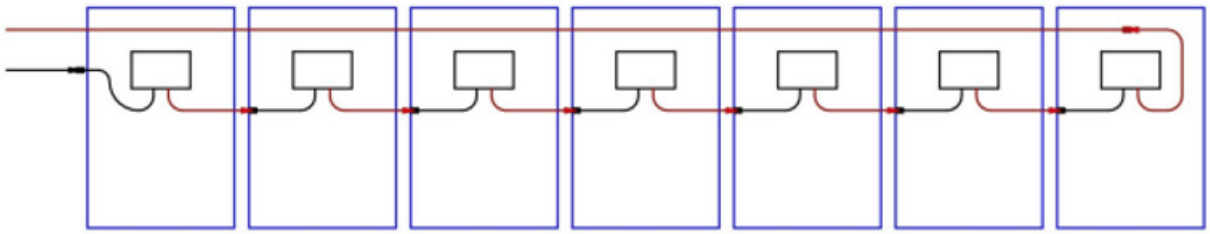


Image: Meka recommends the Standard Daisy Chain Wiring method to wire the solar panels.

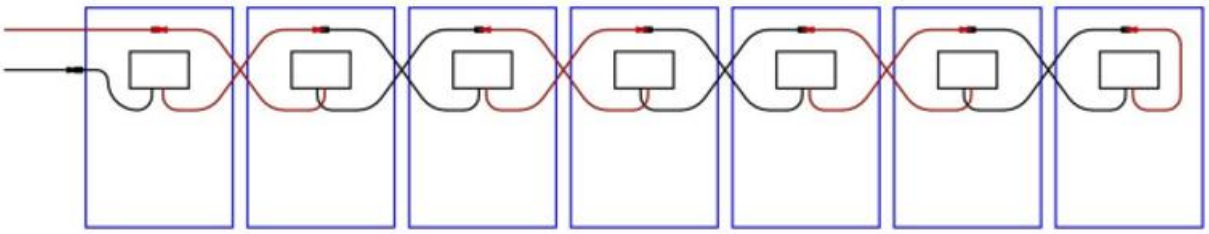


Image: A more demanding *Leapfrog Wiring* connection method with significantly more cable fastening, panel rotation and the possibility of errors, but saves cable length.

Don't rush to install the C-Purlin, because wiring is really easy and quick without C-Purlins, but of course you can also do it afterwards.

5.17 Installation of C-Purl with line wire

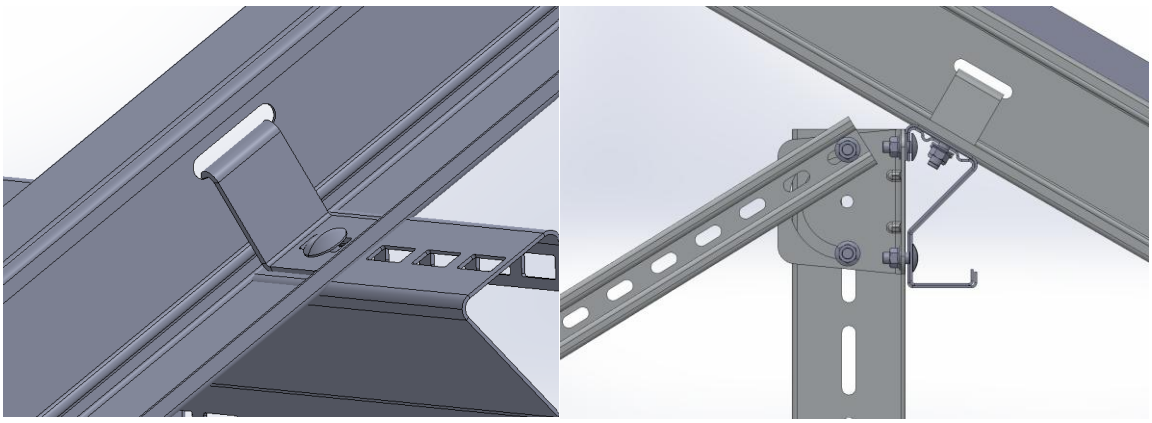
After wiring, all C-Purlins are divided from a bundle against the S-horizontal profile, 2x28 rack 29 pcs and 2x14 rack 15 pcs. One more than the number of panels in a row.

Installation is started at the end by attaching the first C-Purl with the A-Bracket to the edge of the adjustment end piece perpendicularly.

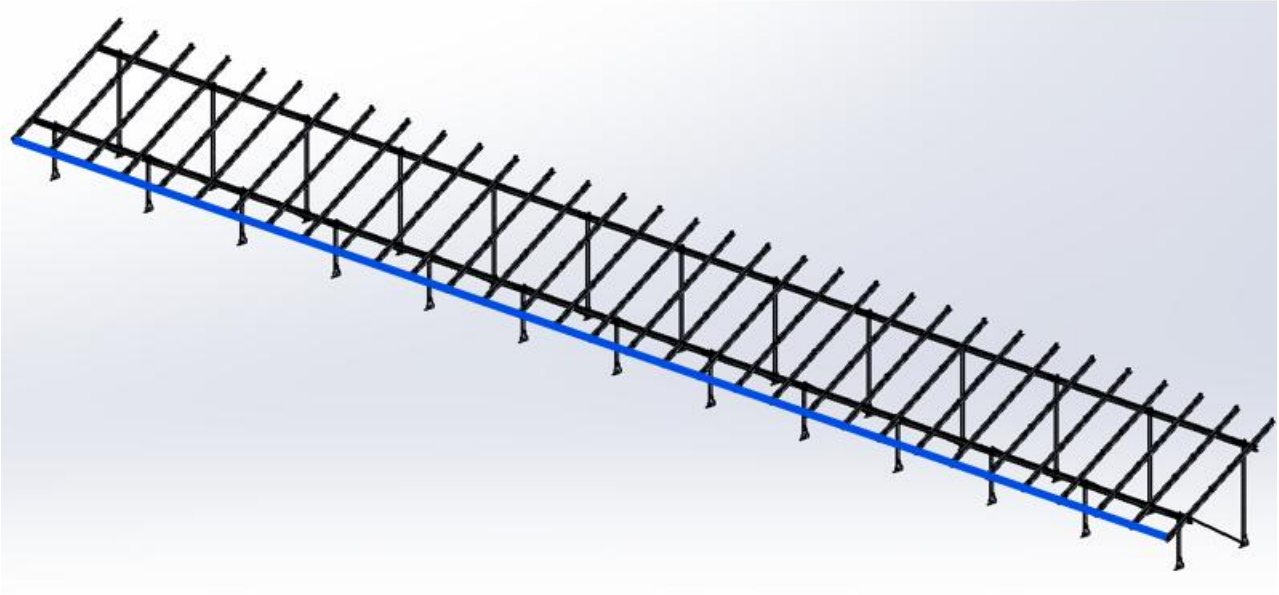
It is very important that the C-Purlins are not installed at an angle but are 90 degrees to the horizontal beam. Crooked installation leads to serration of the lower edge of the panels. Adjust the end using the adjustment headboard and bolt adjustment allowance.

Lift the remaining C-Purlins into place using the measuring stick (see size chart), select the most suitable bolt hole laterally. Do not tighten the bolts yet to move the C-Purlins during the installation of the panels.

Tighten the bolts at the ends and pull the line wire between the C-Purlins to the bottom edge with the help of quick clamps and adjust the rest of the C-Purlins into place. The quick screw vice is pressed to the underside of the C-Purlin upside down and the wire is attached to the clamp arm so that the wire goes along the surface of the panel to the other end of the rack.



In the picture, the A-Bracket is attached from the hole in the C-Purlin to the S-profile with two RS 8 HDG bolts.



Rack ready for panel installation

Ground clearance:

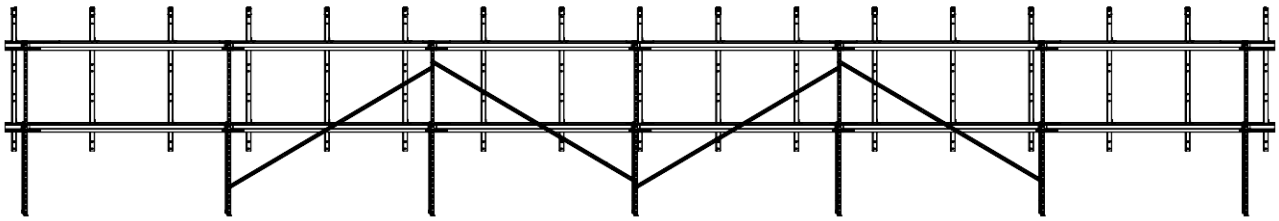
Also at this point, make sure that the bottom edge of the panel is high enough from the ground, notice that the panel comes about 500 mm further from the bottom edge of the C-Purlin. The minimum height should be about 0.8 m from the ground so that the snow falling from the panels does not cover the lower panel. Check the height along the entire length of the rack. If the height is insufficient at some point, it is also possible to shape the ground surface instead of raising the entire scaffold upwards.

5.18 Rear support AS-rails

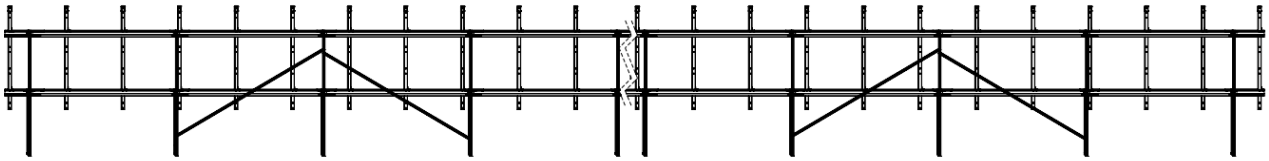
Distribute and install all rear support **AS** rails.

Leave the first and last leg space free. The AS rail is attached at both ends with an RS8 HDG bolt; Check that the 15 mm socket **has an outer diameter of less than 21 mm** so that it fits inside the rail. If the socket does not fit, you can also use the RS Solar AS 1449129 screw set, which is tightened with an 8mm Allen wrench on the side of the rail jaw

The finished packages have the following quantities and are installed as shown, starting from the ends of the two legs in shape A:
GP 1303 2x14: 4 pcs AS L=3510 XPG
GP 1303 2x28: 4 pcs AS L=3510 XPG



Principle of rear support for half rack (e.g. 2x14)



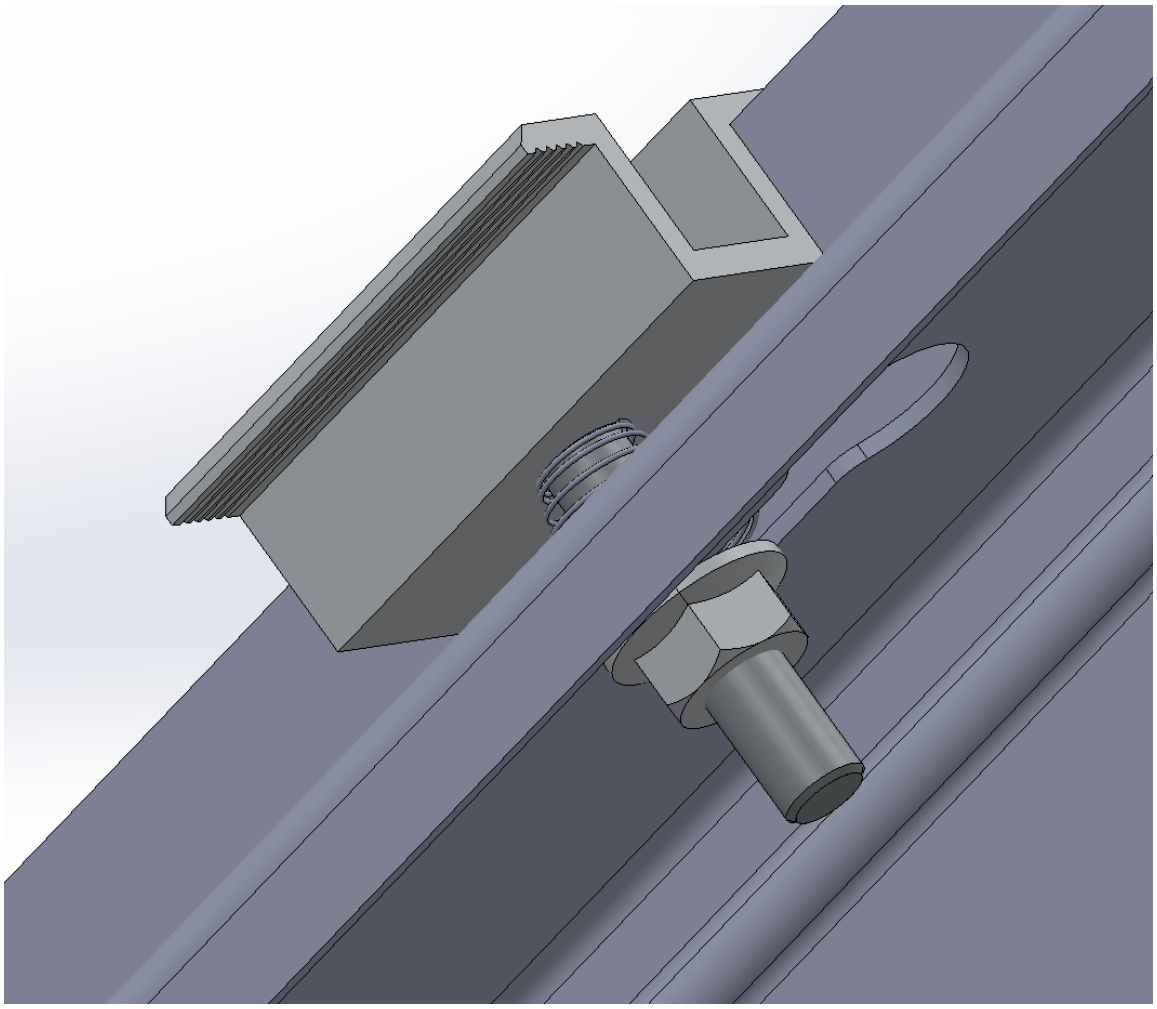
Principle of rear support for a full rack (e.g. 2x28)

In the finishing phase of the scaffolding, the dimensions and straightness of the scaffolding are checked, surface bruises and cut surfaces created during installation are repaired with zinc spray, e.g. Meka Spray ZN 1449709

5.19 Solar panel installation

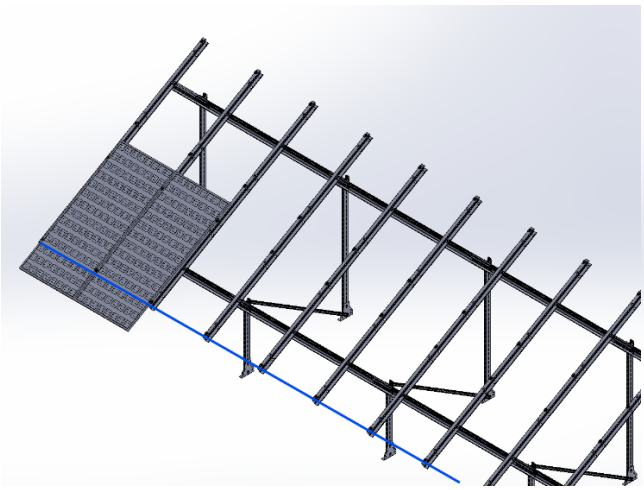
The solar panels are attached to the rack with DMCS and DECS spring mounts or M8-16 bolts. The fasteners are installed through the C-Purlin by pressing the nut through the hole onto the spring. Select the appropriate bracket hole according to the panel length. After aligning the panel, the nut is tightened clockwise from the underside of the rack. The tightening torque is 15Nm.

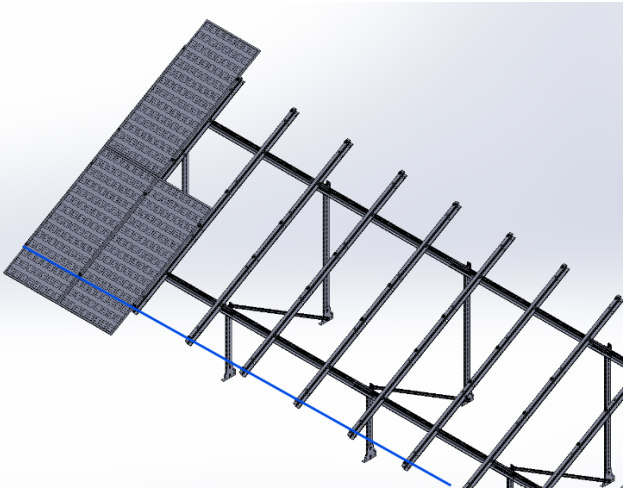
When installing the bracket, use light long e.g. 1/4"-300 extension arms so that you don't have to climb on the racks unnecessarily during installation.



Begin installing the panels at the end of the rack by installing the C-Purlin entry point as far as possible to the edge of the adjustment end. Find out the required measure of the overhang. Align the rectangular holes. Attach the adjustment headboard. There is no need to leave extra margin.

Focus on the straightness of the first panels. The gap between the top and bottom rows is determined by the panel bracket used. When installing a panel, it is important that the first 3–5 panels are carefully installed and that the row starts to proceed straight. Start with the two end panels in the bottom row, aligned from the bottom to the ends of the C-Purlins using a stretched line wire.





After that, the first top panel is installed above the bottom panel. Once the first 2+1 panels have been installed, the dimensions are checked, the adjustment end of the S-Profile is checked to the correct position, and all the remaining lower and upper panels are installed alternately. Follow the polarity of the panels to make sure the connectors are the right way around.

In a large solar park, the way the panels are installed is decisive. It is worth thinking about each movement to see if there are any unnecessary steps in the installation. The daily achievement of two installers can exceed 200 panels, and three installers up to 400 panels per day.

Important: Take special care when using the LEAPROG installation method, where every other panel is installed the other way around. Mark the other side of the panel already on the package so that you do not accidentally install the panel the wrong way around.

Properly secure the cables, follow the panel manufacturer's fastening instructions.

When installing the rack, it may be necessary to drill additional holes in the profiles; Adding perforations to the profile is allowed if necessary. For this, it is recommended to use a good stair drill, e.g. a stair drill. Wurth 0694459820 or Milwaukee 48899321

After panel mounting, tighten all the big bolts on the C-Purlins to a torque (55Nm). Finally, the installation area is cleaned, and the waste is recycled appropriately. During the cold season, take care of the waste from the installation area before it freezes to the ground.

5.20 Attaching the inverter, combiner box and ground cable conduits

The leg parts of the Meka rack are made of perforated C-profile. In addition to being light to handle, they are easy to attach to the necessary equipment and cables.

Ground cables are usually routed to the end of the rack, from where the cables rise to the devices. For attaching cable pipes, we recommend the mounting rail **AS L=2120 HDG 114189** scale, which is attached to the legs of the rack **with RS 8 HDG bolts**. The AS rail can easily carry even heavy equipment, and the **SMT HDG 1449684** parallelogram nut intended for it attaches the intersecting rails and the devices to be attached. If diagonal support is needed higher than the rack, a suitable rail is AS L= 2475 (same length as the lower diagonal support)

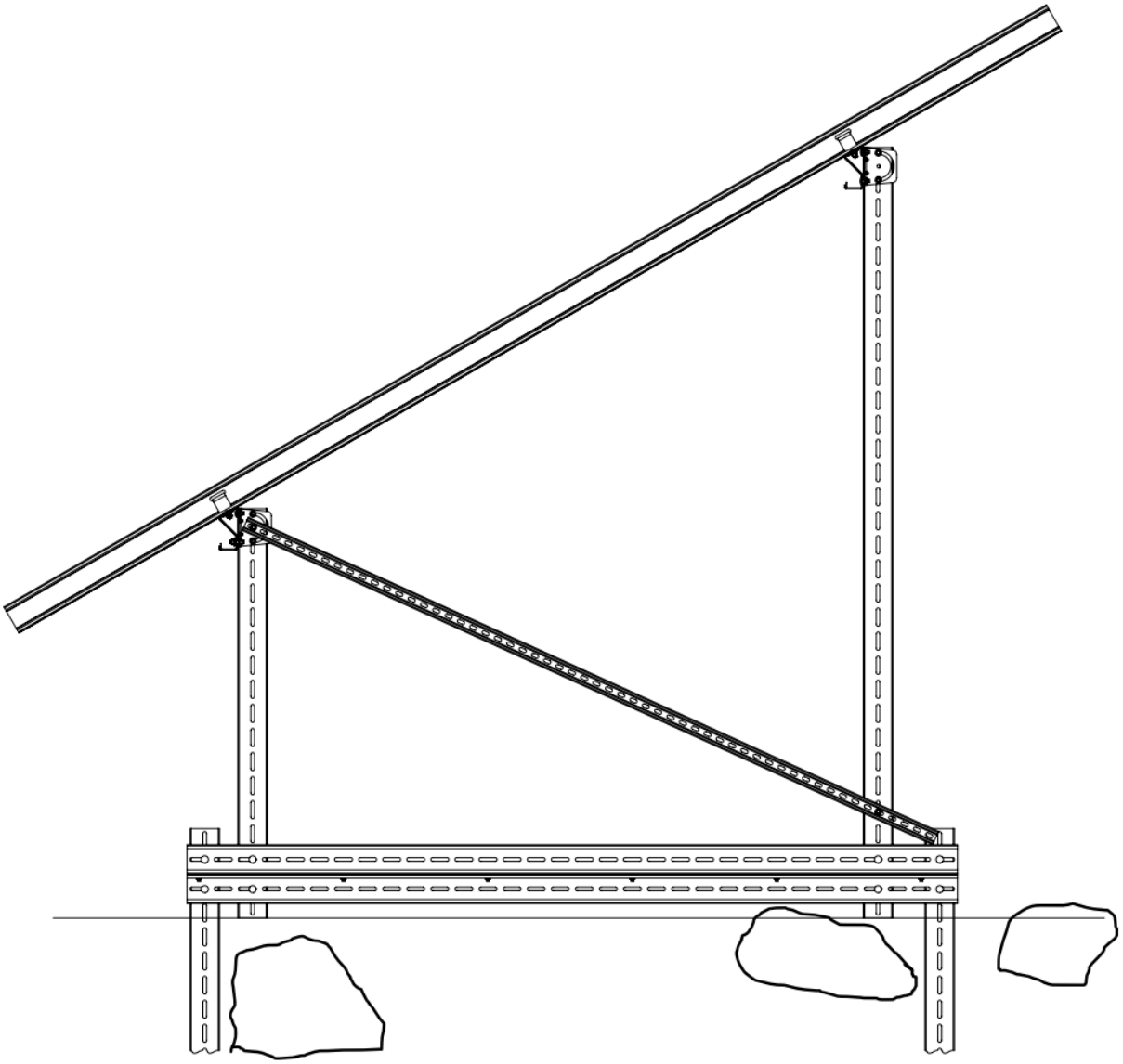
The underground cable pipes are tied to the AS rail with suitable hot-dip galvanised U-bolts, depending on the diameter of the cable pipe. The products presented in this paragraph are not included in the basic contents of the rack but are compatible and tested solutions for use in Meka Solar racks.

5.21 Installation problems

Problems may arise during the installation, due to, among other things, variations in the dimensional accuracy of the previous steps.

- Changes in the position and vertical direction of the pile cause changes in the position and angle of the C-Purlin and are easily multiplied up to the final surface, which may cause the panel surface to become wavy. This can be reduced by requiring higher accuracy from the piling and by adjusting the RTF-S 10 fittings in the desired direction
- The pile does not sink; Remove the obstacle by digging. If the pile is < 30 cm too high, cut the pile to a suitable length with a reciprocating saw or metal circular saw and paint the cut point with zinc spray.
- The pile was too crooked and won't straighten; Pull the pole up and try again. Remove the obstacle by digging.
- The end of the pole was damaged during the impact. Straighten the end of the pile or cut off the damaged part if the leg cannot be installed. Damage to the pile head can be reduced by using a Movax type piling rig or an impact-resistant piling adapter when pressing on the pile end. Remember to repair the cut surface, for example. MEKA with zinc spray.
- The screw does not hit the hole, but stays between the holes; Drill a new hole with a good stair drill.
- The C or S profile must be cut off. First, find out the reason for the need to cut off. If cutting is necessary, it is performed with a reciprocating saw with a sparse metal blade (e.g., 7 teeth/inch) at a slow speed or with a metal circular saw. Remember to protect your hearing and eyes, hot work regulations and repair the galvanizing at the cutting point with zinc spray.
- The wind pushes the line wire into an arc and the panel installation bends with it. Do I need to disassemble? In windy weather, it is advisable to use durable threads that can be pulled tight enough between the arms of the quick presses. The manufacturer of the panels specifies the maximum permissible dimensional variation.
- Panel mounting teeth; The panel manufacturer specifies the maximum permissible serration and tolerances for panel installation.
- In panel installation, the straightness of the first three panels decides the entire rack. Plan the installation of the first and second C-Purlin so that the installation of the three panels turns in the desired direction as a whole board, if necessary. The A-Bracket can be loosened and articulated via the tightened A.-Bracket. When the wire is in a straight line with the stripes of the panels, the rest of the panels can be installed quickly.
- The S-Profile was too long and can be seen at different lengths from the end. Unscrew all the bolts on the adjustment end and adjust the length to fit. Remember to support the rack if the panels are already in place.

Example of additional piling support as needed in stony soil:



6 SERVICE AND MAINTENANCE

Proper service and maintenance are crucial to ensure the long-term performance and durability of your solar panel system. Follow these steps to keep your system in optimal condition:

1. **Regular Inspections:** Conduct regular visual inspections of the solar panel support structures. Also check the tightening torque of the screws. Look for any damage, wear or debris buildup. Larger cutting surfaces and scratches must be protected with zinc spray or paste.
2. **Safety First:** Ensure safety when performing maintenance. If you are working with electrical components, follow proper safety precautions or consider hiring a professional.
3. **Harsh weather conditions:** After harsh weather conditions, such as storms or heavy snowfall, check the rack system for any damage. In snowy areas, carefully remove heavy snow deposits to restore optimal performance of the panels as well as the durability of the rack.
4. **Professional inspection:** Schedule a professional inspection annually or according to the manufacturer's recommendations. They may detect problems that may not be visible during regular inspections.
5. **Manufacturer's Instructions**: Always follow the manufacturer's maintenance instructions and recommendations that are specific to your solar panel stands.
6. **Warranty:** Understand your system's warranty and any service requirements that come with it. Some warranties may require periodic maintenance to ensure the validity of the warranty.
7. By following these service and maintenance practices, you will ensure the efficient operation and longevity of your solar panel system.

7 DISCLAIMER AND LIMITATIONS:

The following statements define the manufacturer's liability exemptions and limitations with respect to the installation, operation, and maintenance of solar racks:

- **Limited Control and Liability:** The rack manufacturer is not responsible for any loss, damage, or expense resulting from the use, installation, or maintenance of the solar racks, as these factors are beyond the manufacturer's control.
- **Rights of third parties:** The manufacturer of the stand assumes no responsibility for any patent infringement or infringement of the rights of third parties resulting from the use of the stand. The use of the product does not entitle you to any implied or express license under any patent or patent right.
- **Information and warranty:** The information presented in this manual is based on the manufacturer's knowledge and experience and is believed to be reliable. This information is not considered a warranty, neither obvious nor explicit. The instructions include product information, recommendations, and other details. The manufacturer has the right to change the instructions, product information or product brochure without prior notice.

Be aware of these disclaimers and limitations when installing, operating, and maintaining your solar panel mount.

Revisio	Päivämäärä	Muutos	Tekijä
0.1	05.03.2025	First draft	VHi
0.2	10.07.2025	Second draft	VHi
1.0	21.07.2025	Published 1.0 FI in Finnish	VHi
1.1	13.08.2025	Minor bug fixes	VHi
1.2	11.02.2026	Published 1.2 EN in English	VHi