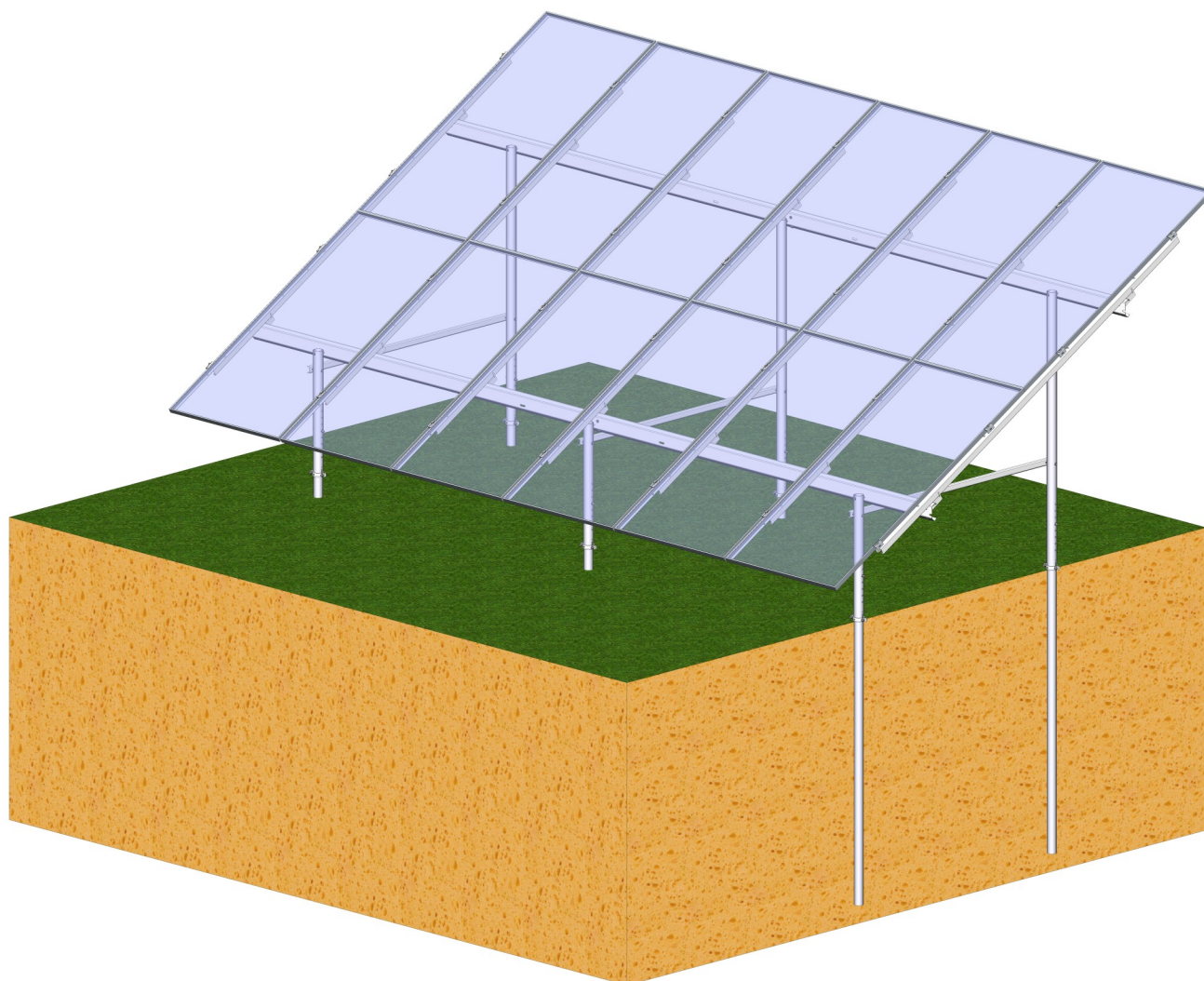


Orima Solar Beeta 12P

Solar Panel Ground Mounting Rack With Pile Foundation

ORIMA[®]

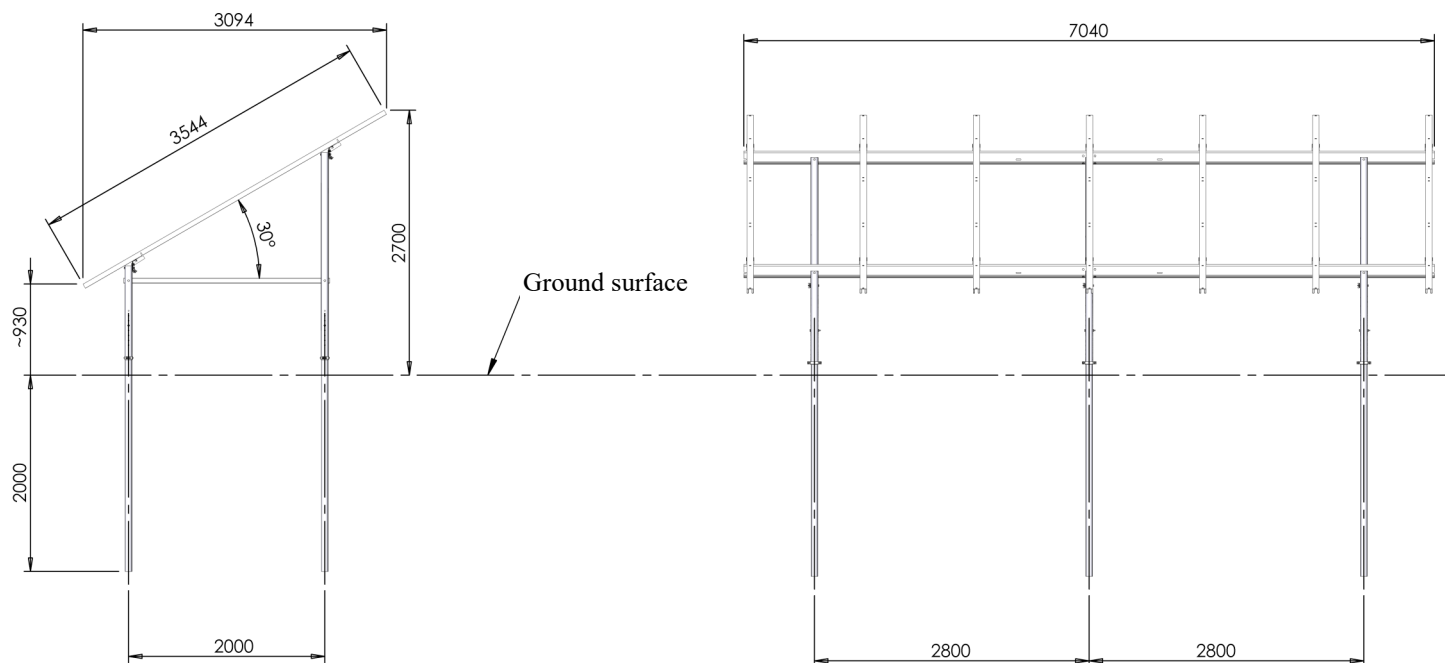
Nordic solar partner



Basic information

- Panel tilt angle 30°
- 12 panels installed vertically, two rows on top of each other (6+6)
- Pile foundation with Ø70 mm steel tube, foundation depth 2 m
- Ground clearance between the bottom edge of the panels and the ground surface min. 70 cm
- Foundation made from two pile rows. Very good stability due to support from ground
- Height adjustment for each leg separately. Less requirements for piling accuracy
- Panel height max. 2300 mm, width max. 1135 mm, frame thickness 30-40 mm
- Panel support from the long sides (high load capacity)
- Fastening the panels at four points with Easy Rail panel fasteners
- Structure optimized for bifacial panels. Maximized yield also from the back of the panel
- Modular design. Does not require modification of components on site
- Installation tolerances and installation ergonomics specially considered in the design
- Excellent resistance against corrosion due to special zinc-coating

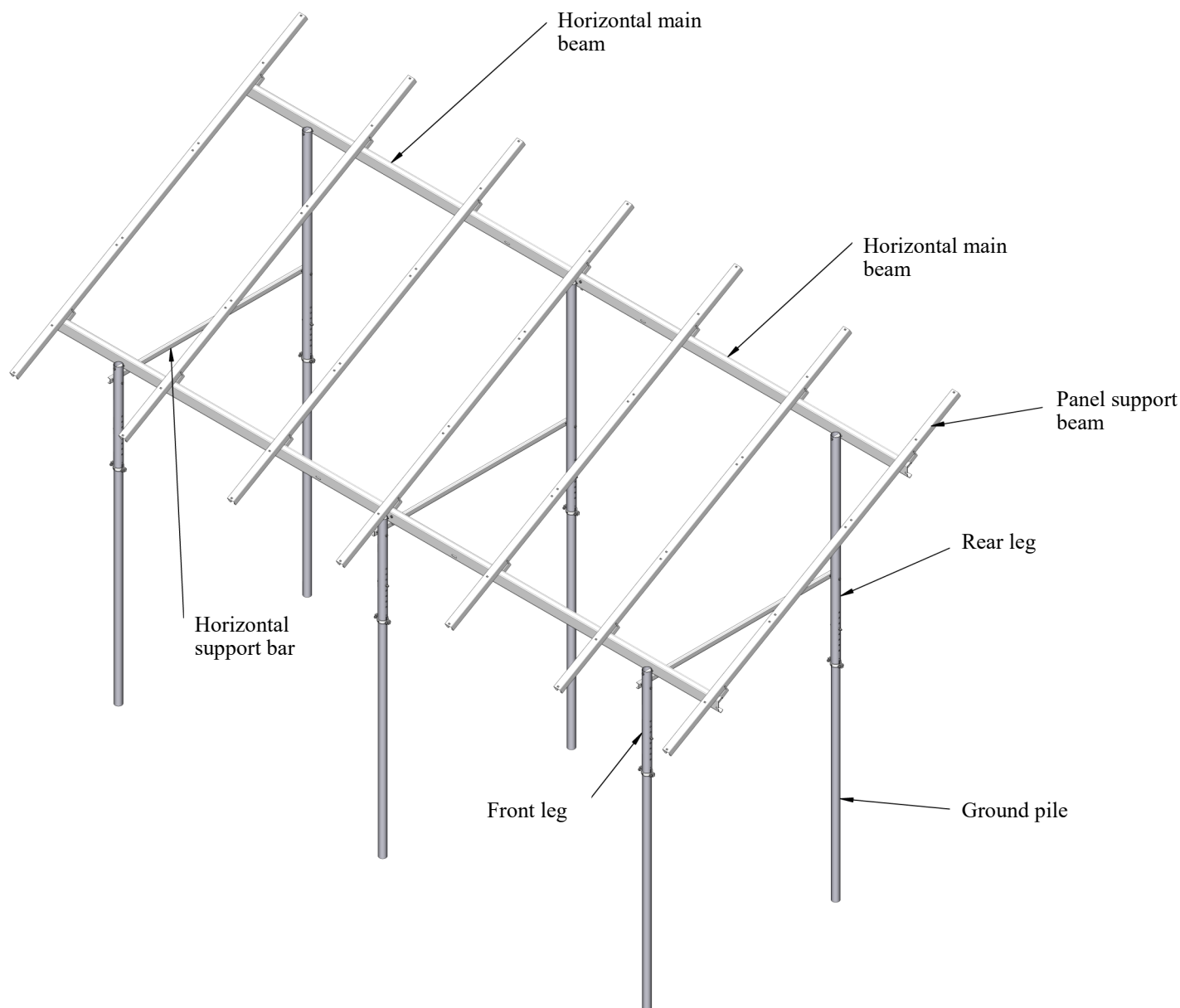
Main dimensions of the rack



Preparations

- Check that the soil is suitable for the selected foundation solution. It is recommended to make a soil survey to ensure the properties of the soil.
- Remove visible stones, stumps, rootstocks etc.
- Check that the straightness of the ground surface is sufficient. The rack has 200 mm height adjustment.
- Check that the necessary tools are available
 - ◇ Line laser
 - ◇ Tape measure
 - ◇ Impact screwdriver
 - ◇ Socket wrench 19 mm
 - ◇ Socket wrench 13mm
 - ◇ Ring spanner 19 mm
 - ◇ Ring spanner 13 mm
 - ◇ Allen key 6 mm
 - ◇ Torque wrench

Main parts of the rack



Installation steps

1. Install the piles (6 pcs) to the ground
2. Install the front and rear legs
3. Install the horizontal support bars between the legs (3 pcs between the front and rear legs)
4. Install the horizontal main beams running in the width direction of the rack (2 lines)
5. Install the panel support beams (7 pcs) on top of the horizontal main beams.
6. Installation of panels
7. Finalizing the installation

Orima Solar Beeta 12P

Installation instructions

#	DESCRIPTION	PCS
1	Ground pile 2,5 m	6
2	Front leg ~1 m	3
3	Rear leg ~2,1 m	3
4	Leg locking bracket	6
5	Horizontal support bar	3
6	Horizontal main beam 3,52 m	4
7	Extension bar	2
8	Tube support	6
9	Panel support beam 3,54 m	7
10	Panel support beam bracket	14
11	Hex screw M12x25	8
12	Hex screw M12x100	18
13	Washer (big size) M12	12
14	Washer M12	8
15	Spring washer M12	20
16	Hex nut M12	26
17	Hex nut M8x35	28
18	Washer M8	28
19	Spring washer M8	28
20	Hex flange nut M8	28
21	Universal end bracket 30-40 mm	8
22	Universal middle bracket 30-40 mm	20

1



2



3



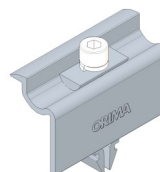
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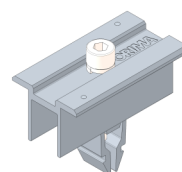
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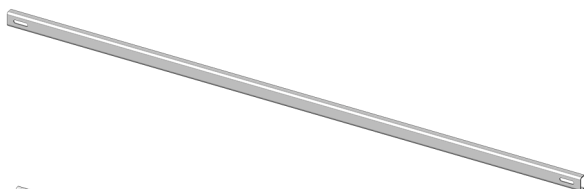
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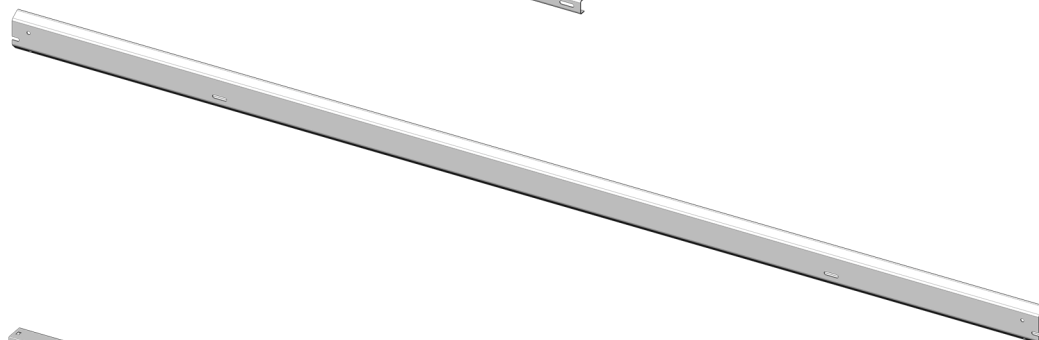
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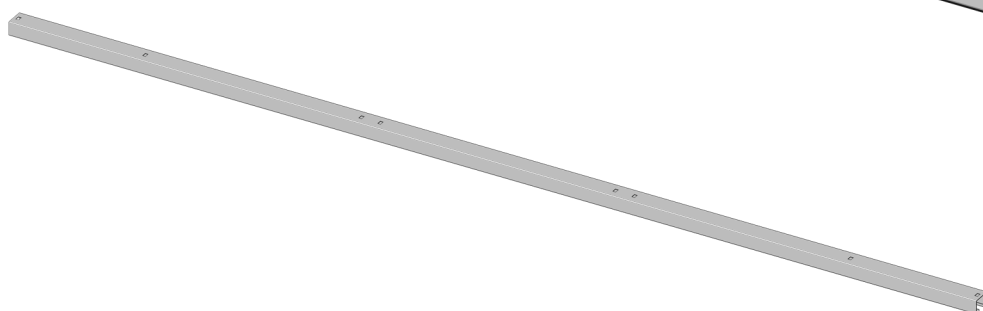
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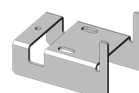
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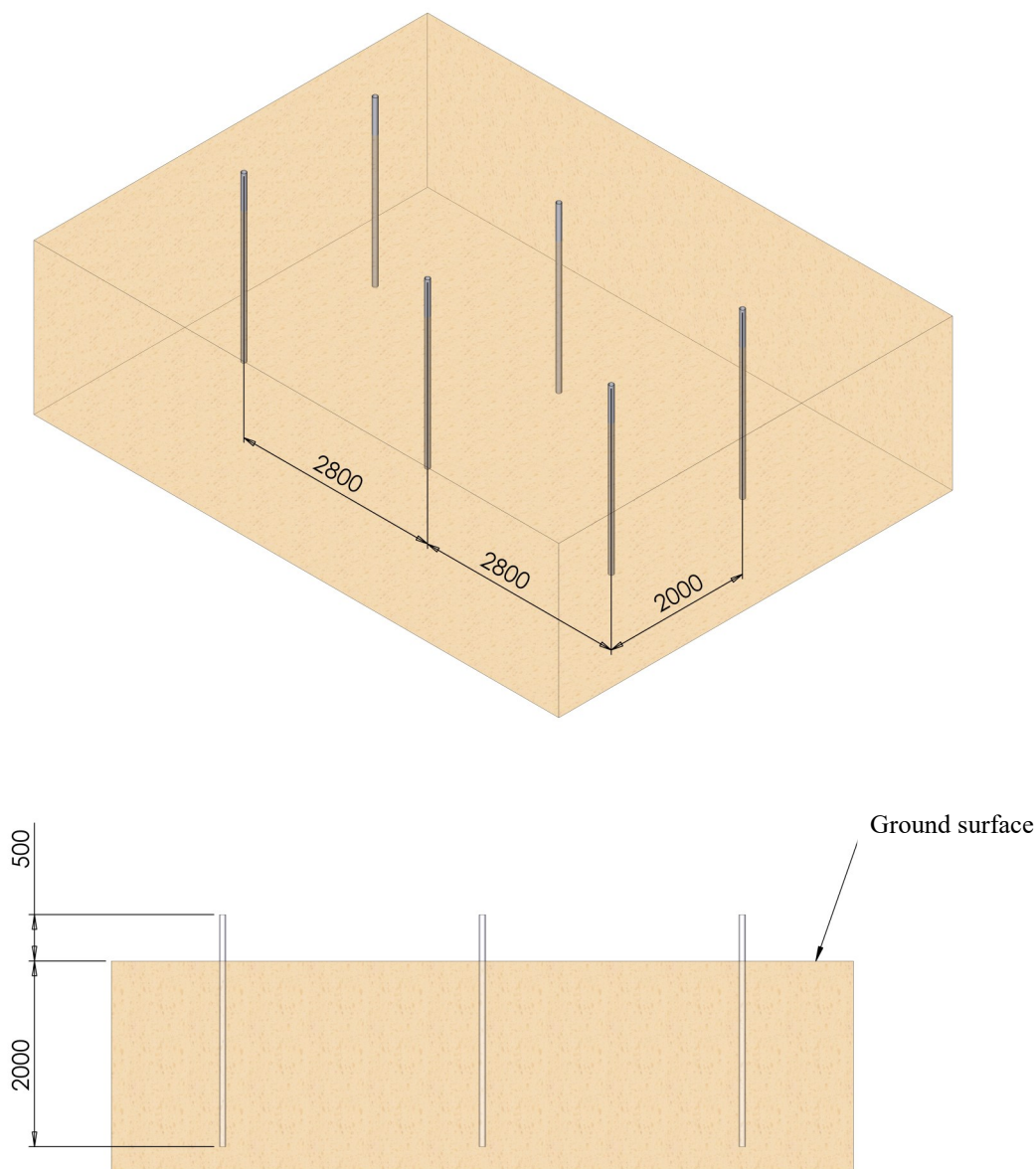
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Step 1. Installation of ground piles



- Define the spacing of the rack rows according to the table below and mark the positions of the concrete ground piles.
- Install the ground piles to the marked positions and leave 50 cm on top of the ground surface.
- Small excavator equipped with hydraulic hammer can be used for piling. Suitable size adapter may be needed.
- Recommendation of the position accuracy is +/- 25 mm
- If the pile does not go into ground check if there is stone that can be removed. In some cases (big stone / rock) a concrete foundation may be needed
- Check the dimensions

Sun inclination angle	10°	15°	20°	25°	30°
Row space (c-c) 1,7 m high paneel	13 m	9,5 m	8 m	6,5 m	6 m
Row space (c-c) 2,2 m high paneel	16,5 m	12 m	10 m	8,5 m	7,5 m

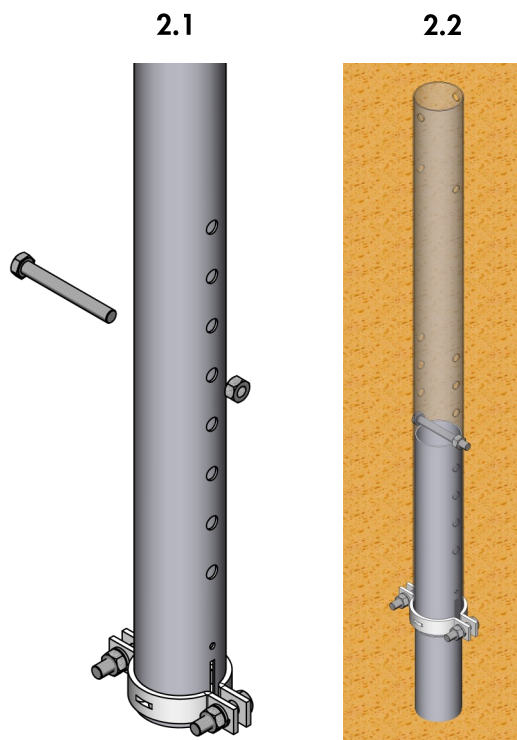
Step 2. Installation of the legs

2.1

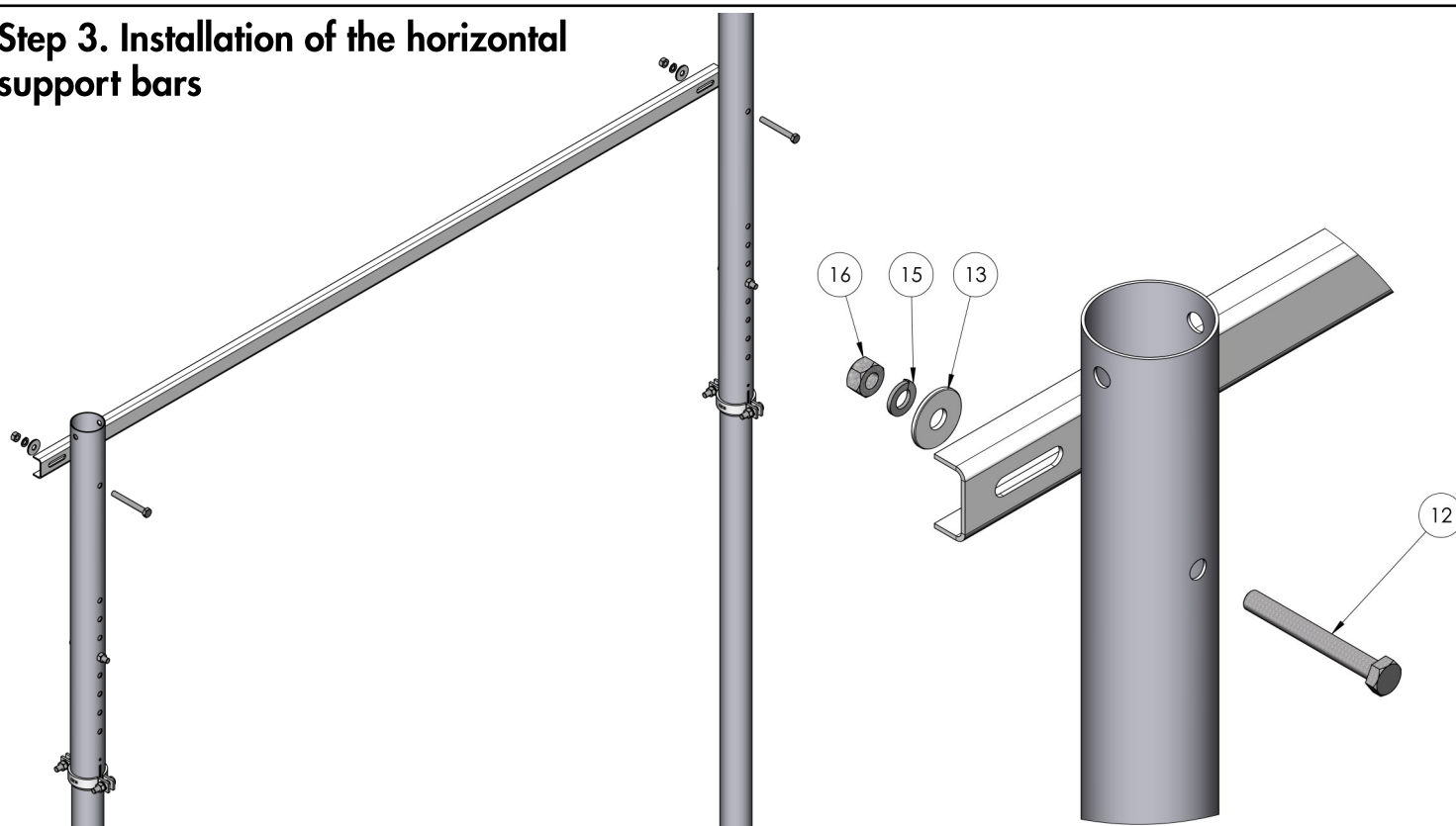
- Install hex bolt M12x100 and hex nut to the 5th holes of the leg.

2.2

- Lift the leg on top of the ground pile
- Install the locking bracket to the leg so that the outcoming part fits the hole in the leg tube
- Tighten the bolts only until they keep the position of the leg locking bracket.
- Adjust the height of individual legs to the same height if needed (move the bolts to next hole in the leg).

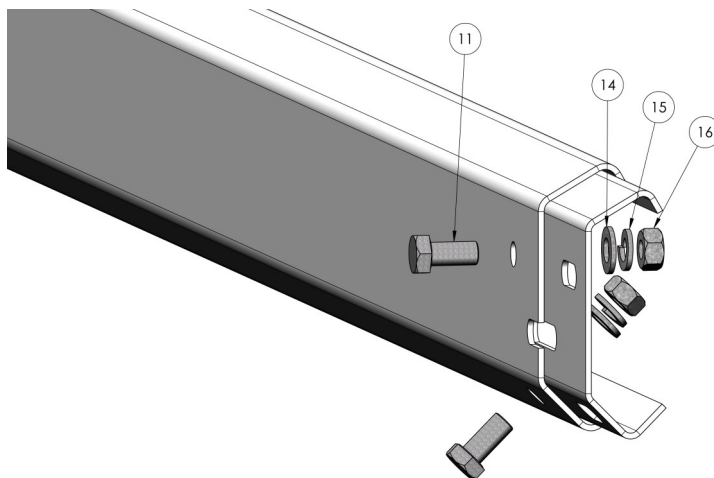


Step 3. Installation of the horizontal support bars



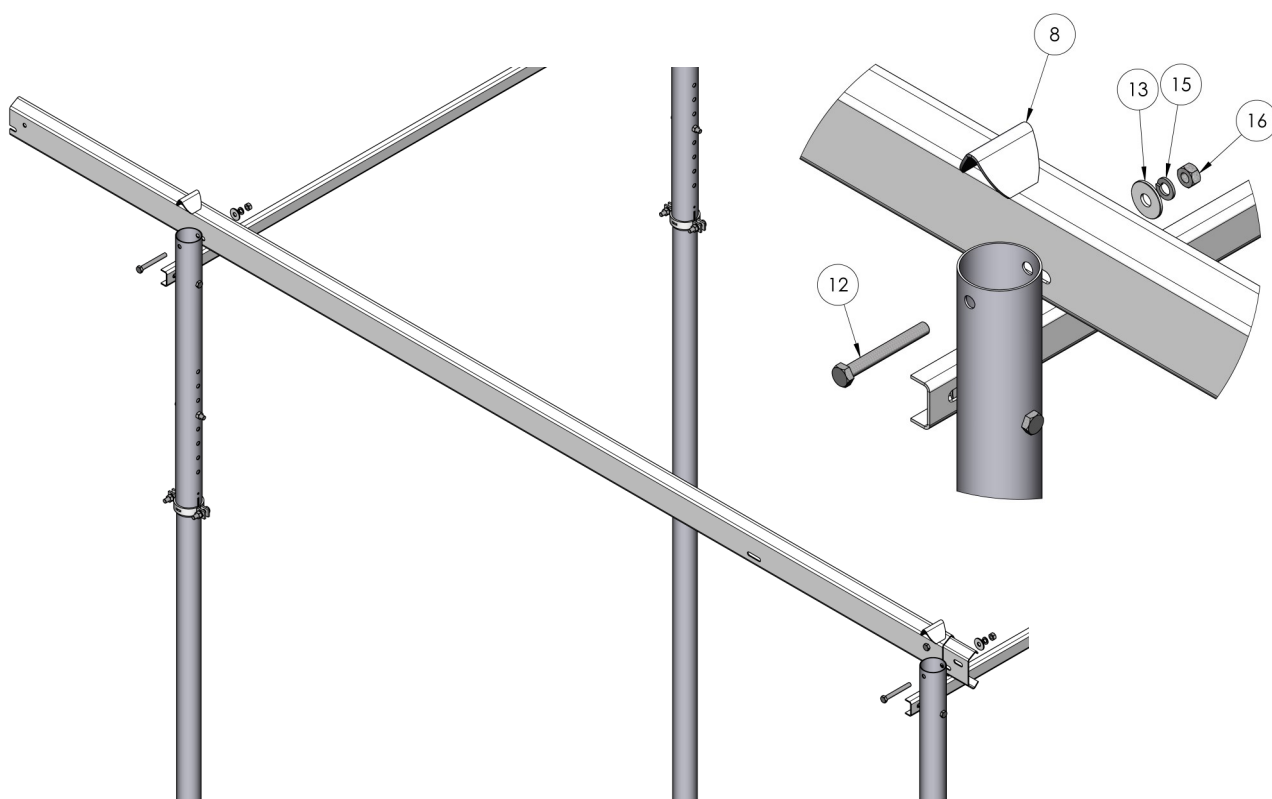
Install the horizontal support bar as shown on the drawing above with M12x100 hex bolt, (big size) washer, spring washer and hex nut.

Step 4.1. Installation of the main horizontal beam extension bar



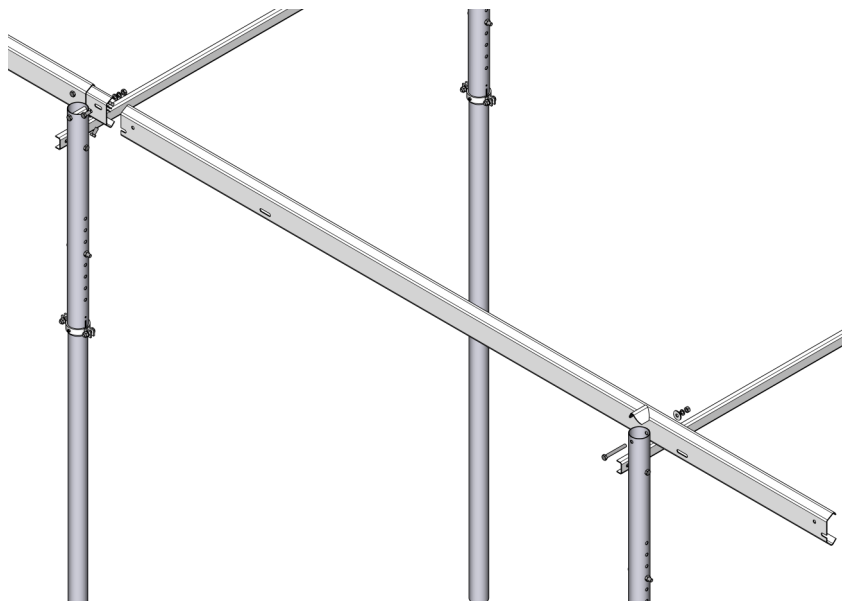
Start the installation of the main horizontal beams from the left side (looking from front). Install the main horizontal beam extension bar to the right end of the horizontal main beam with two M12x25 hex bolts, washers, spring washers and hex nuts as shown in the drawing above.

Step 4.2. Installation of the 1st horizontal main beam



Lift the leftside horizontal main beam to the correct position and attach it to the legs with M12x100 hex bolt, (big size) washer, spring washer and hex nut. Install the pipe support (7) on top of the hex bolt. Do not tighten the bolt (11) to the leg yet.

Step 4.3. Installation of the 2nd horizontal main beam



Install the 2nd horizontal main beam to the horizontal main beam extension bar as shown in the drawing above. Attach the other end to the leg with M12x100 hex bolt, (big size) washer, spring washer and hex nut. Do not tighten the bolt (11) to the leg yet. Install the pipe support on top of the hex bolt.

Attach the left end of the horizontal main beam to the horizontal main beam extension bar with two M12x25 hex bolts, washer, spring washer and hex nuts.

Step 4.4. Installation of the horizontal main beams

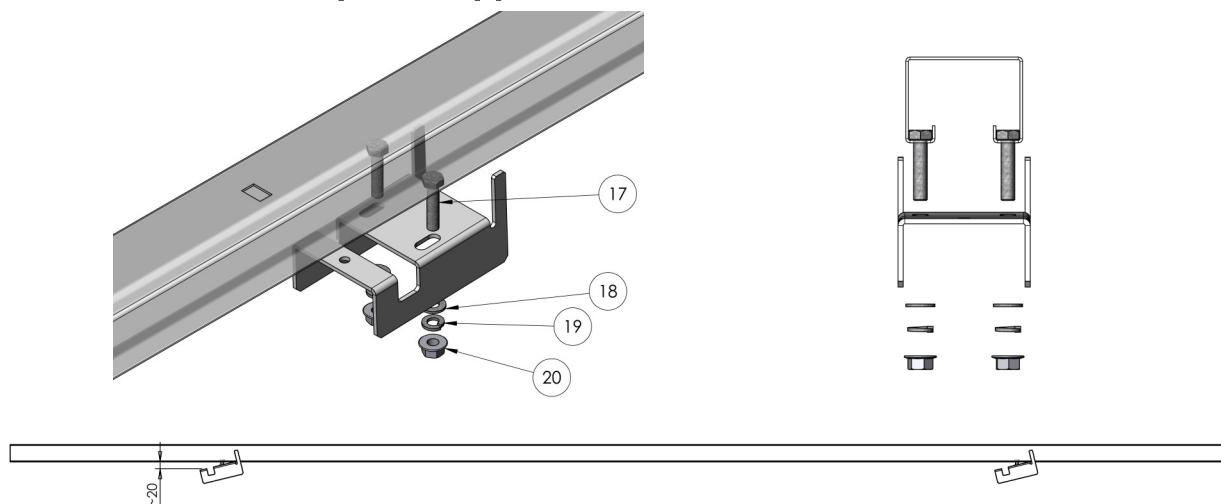


Install the rear side horizontal main beams similarly.

Tighten all M12x25 hex bolts between horizontal main beams and horizontal main beam extension bars.

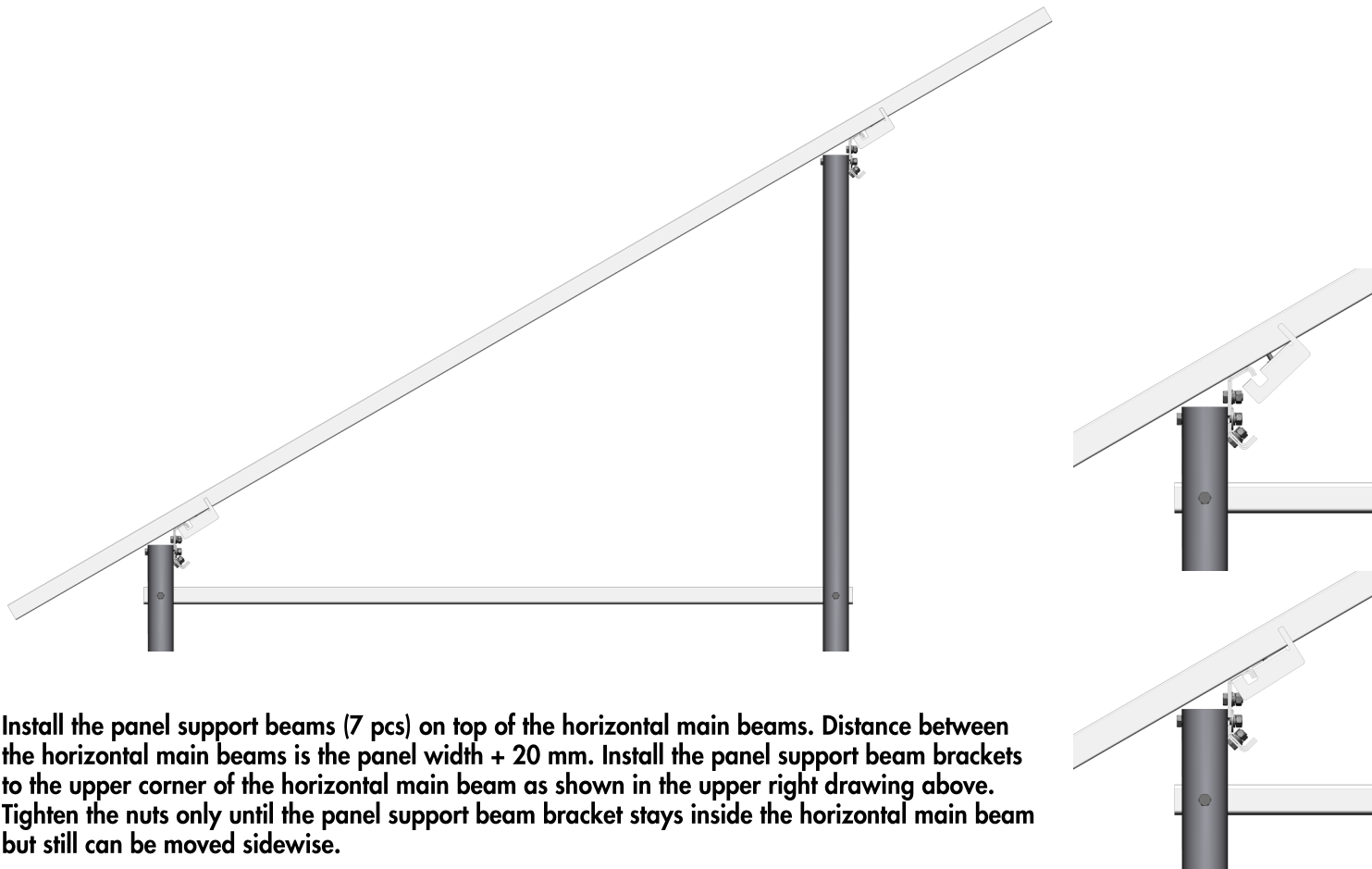
Tighten all M12x100 hex bolts between main horizontal bars and legs.

Step 5.1. Installation of the panel support beam bracket



Install the M8x35 hex bolts (2 pcs / bracket) inside the panel support beam. Install the panel support beam brackets (2 pcs / panel) to the panel support beam with washer, spring washer and hex flange nut (4 pcs / panel). Tighten the bolts only until the bracket has 20 mm gap to the panel support bar as shown in the drawing above.

Step 5.2. Installation of the panel support beam



Install the panel support beams (7 pcs) on top of the horizontal main beams. Distance between the horizontal main beams is the panel width + 20 mm. Install the panel support beam brackets to the upper corner of the horizontal main beam as shown in the upper right drawing above. Tighten the nuts only until the panel support beam bracket stays inside the horizontal main beam but still can be moved sideways.

Step 6. Installation of the panels

Start installation from the right end.

Check the starting position of the panels based on the used panel width.

Total width of the panel surface with 1134 mm wide panels is $6 \times 1134 \text{ mm} = 6804 \text{ mm}$ and the middle panel clamps need $5 \times 20 \text{ mm} = 100 \text{ mm}$ so total width of the solar panel surface is 6904 mm.

Total length of the horizontal beam line is 7040 mm \Rightarrow with 1134 mm wide panel the extra length from outermost panels is $\sim 70 \text{ mm/side}$.

For example with 1048 mm wide panel the extra length is $\sim 320 \text{ mm/side}$.

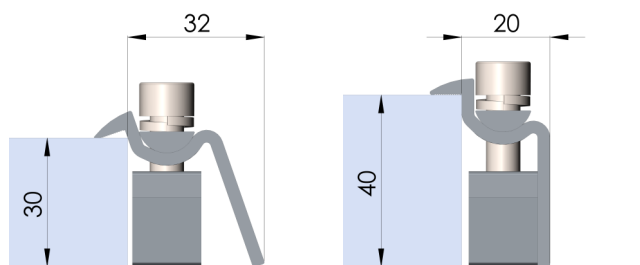
Tighten the first panel support beam to the horizontal main beam.

Check that the panel support beams are in 90 degrees angle with the horizontal main beams.

Panel support beams have several rectangular holes for different size panels. Install the universal end brackets to the holes that are nearest to the recommendation from the panel manufacturer.

Press the universal end brackets to the rectangular holes in the panel

Install the first panels against the universal end brackets and tighten the universal end bracket bolts. Tightening torque is 15 Nm.

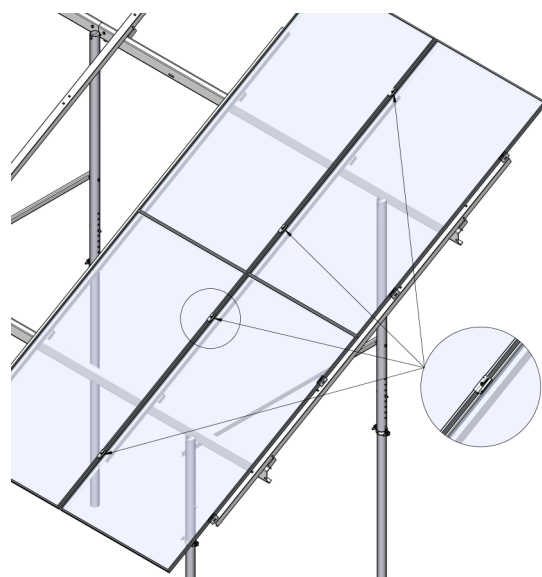


End clamp upper part tilting and width according to the panel thickness

Press the universal middle brackets to the rectangular holes of the next panel support beam. Move the panel support beam sideways until the universal middle brackets are firmly against the panel edge. Tighten the panel support bar brackets to the horizontal main beam.

Install the next panels against the universal middle brackets and tighten the bolts. Tightening torque is 15 Nm.

Continue similarly until all panels are installed. Use universal end brackets in the last panel support beam.

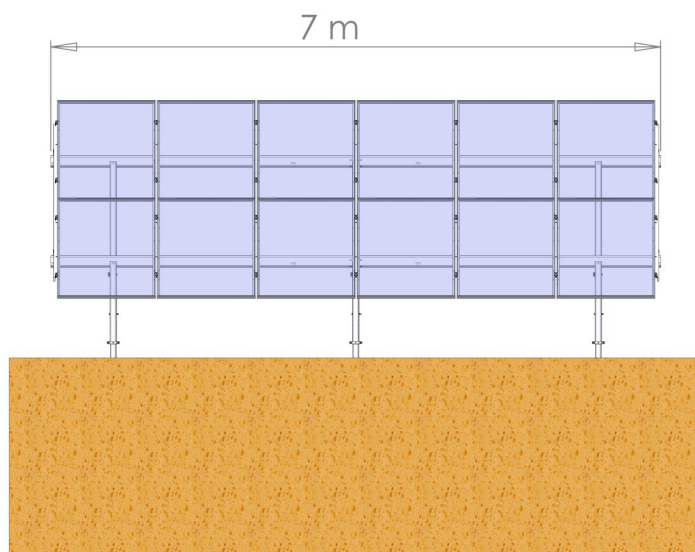
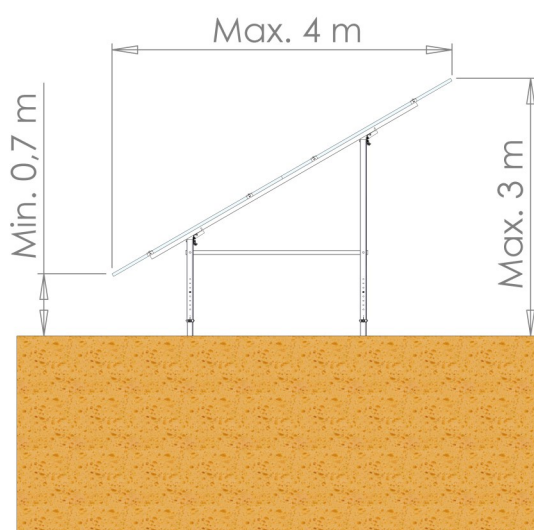
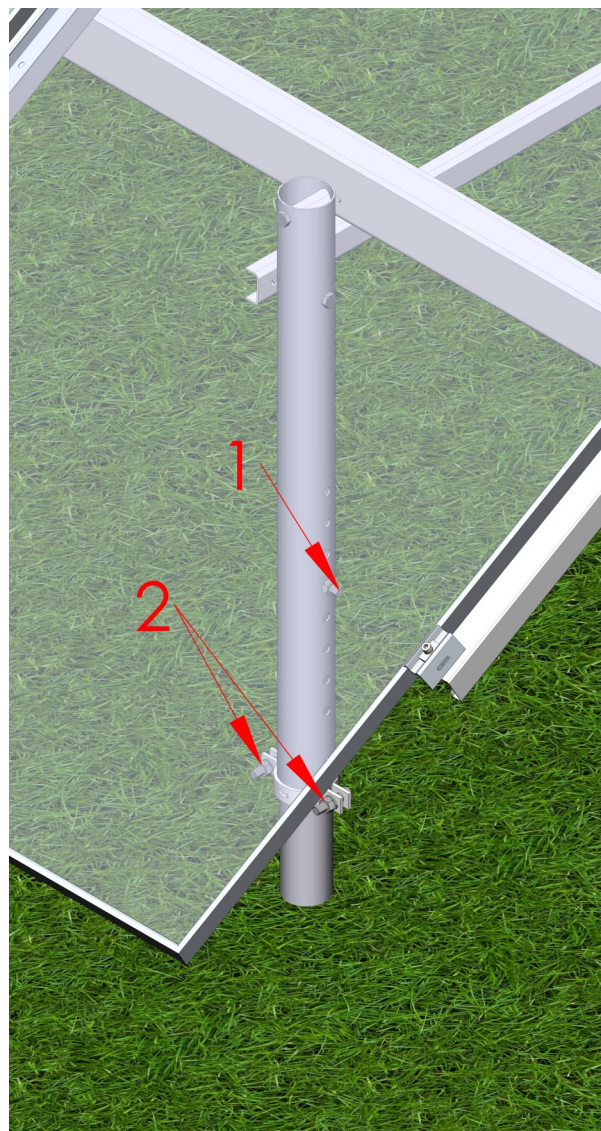


Step 7. Finalizing the installation

Check the rack visually (horizontally and vertically) after the panels have been installed.

Height of the individual legs can be adjusted by moving the hex bolts (1) to the different hole in the leg if needed.

After checking / adjusting the height of the individual legs tighten the leg locking bracket bolts (2) firmly. The recommended tightening torque is 80



Max dimensions of the rack if maximum size panels are used.

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