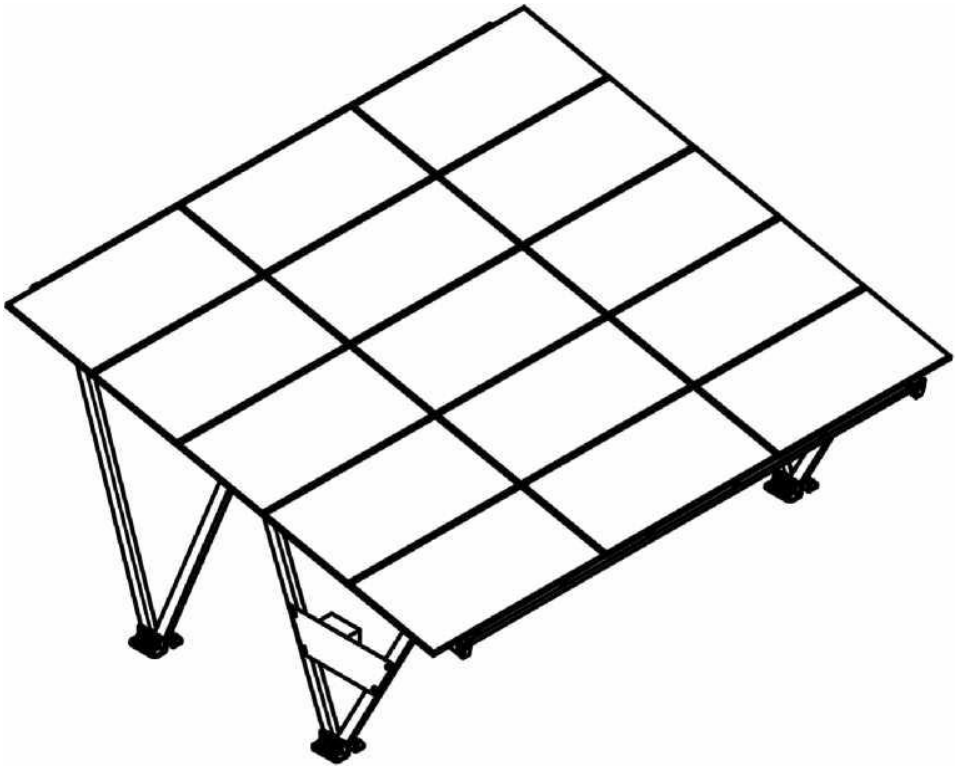
KENO

# INSTALLATION INSTRUCTIONS

## CARPORT TYPE STRUCTURES

## W-02-00



## MOUNTING INSTRUCTION FOR CARPORT TYPE STRUCTURE W-02-00

1. Before performing mounting work, verify that the installation site is up to 300 m above sea level. Otherwise, it is advisable to consult the designer for an individual analysis.

   Prepare the foundations in the previously excavated trenches as shown in the figure below. The foundations should contain 4 threaded rods (M20x1000 of grade 8.8 minimum, galvanized or stainless steel). The rods should be connected in the form of foundation reinforcement. At this stage, it is recommended to provide grounding in the form of a driven ground rod -if the required grounding is not available. Also route the wires around the mounting plate where the device (inverter/charger) will be mounted. A PE ground wire, an AC connection cable, and two Ethernet cables for possible communication with the energy meter and the Internet.

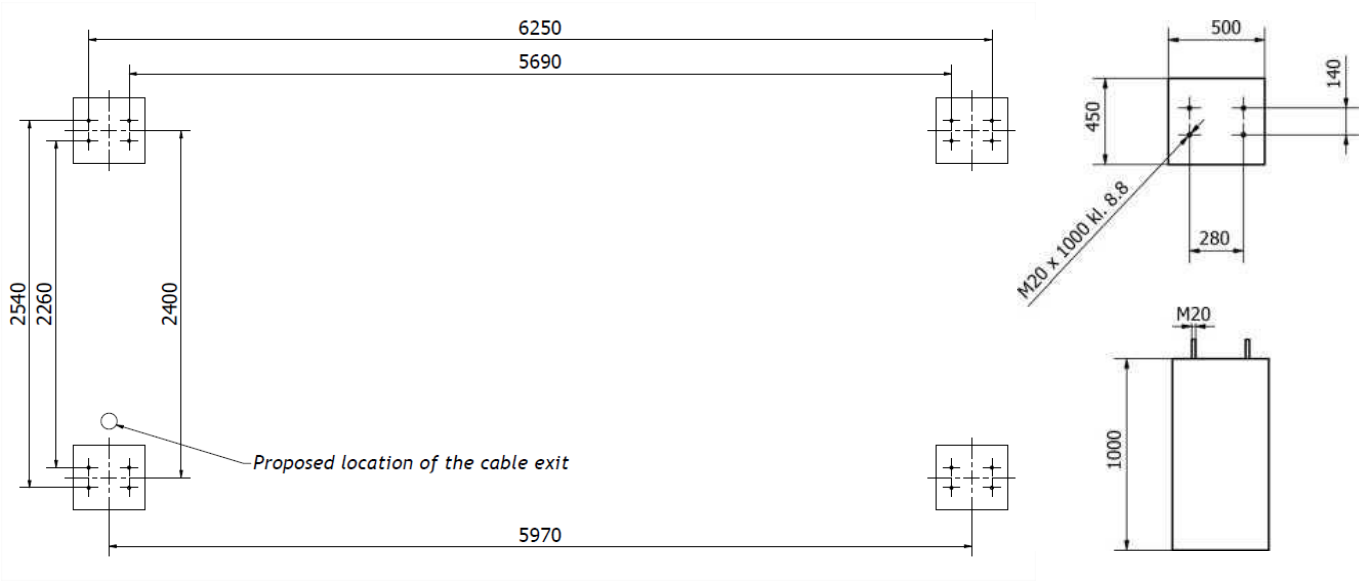



*Figure 1. Layout of foundations*

2. Measure all carports and sort out Carport I (W-02-01), Carport II (W-02-02), Carport III (W-02-03), Carport IV (W-02-04), rafters (W-02-05) and beam (W-02-06).

*Table. 1. List of structural elements*

| PART NUMBER | QUANTITY | PART NAME | DESCRIPTION |
|---|---|---|---|
| W-02-16 | 2 | Support I | 120mm x 80mm x 3100mm |
| W-02-15 | 2 | Support II | 120mm x 80mm x 2675mm |
| W-02-14 | 2 | Support III | 120mm x 80mm x 2595mm |
| W-02-13 | 2 | Support IV | 120mm x 80mm x 2225mm |
| W-02-05 | 2 | Rafter | 120mm x 80mm x 5860mm |
| W-02-06 | 6 | Beam | 80mm x 80mm x 6000mm |

3. Apply the foundation plates (W-02-07) to the previously made foundations and screw them together initially using a washer, a spring washer and an M20 nut.

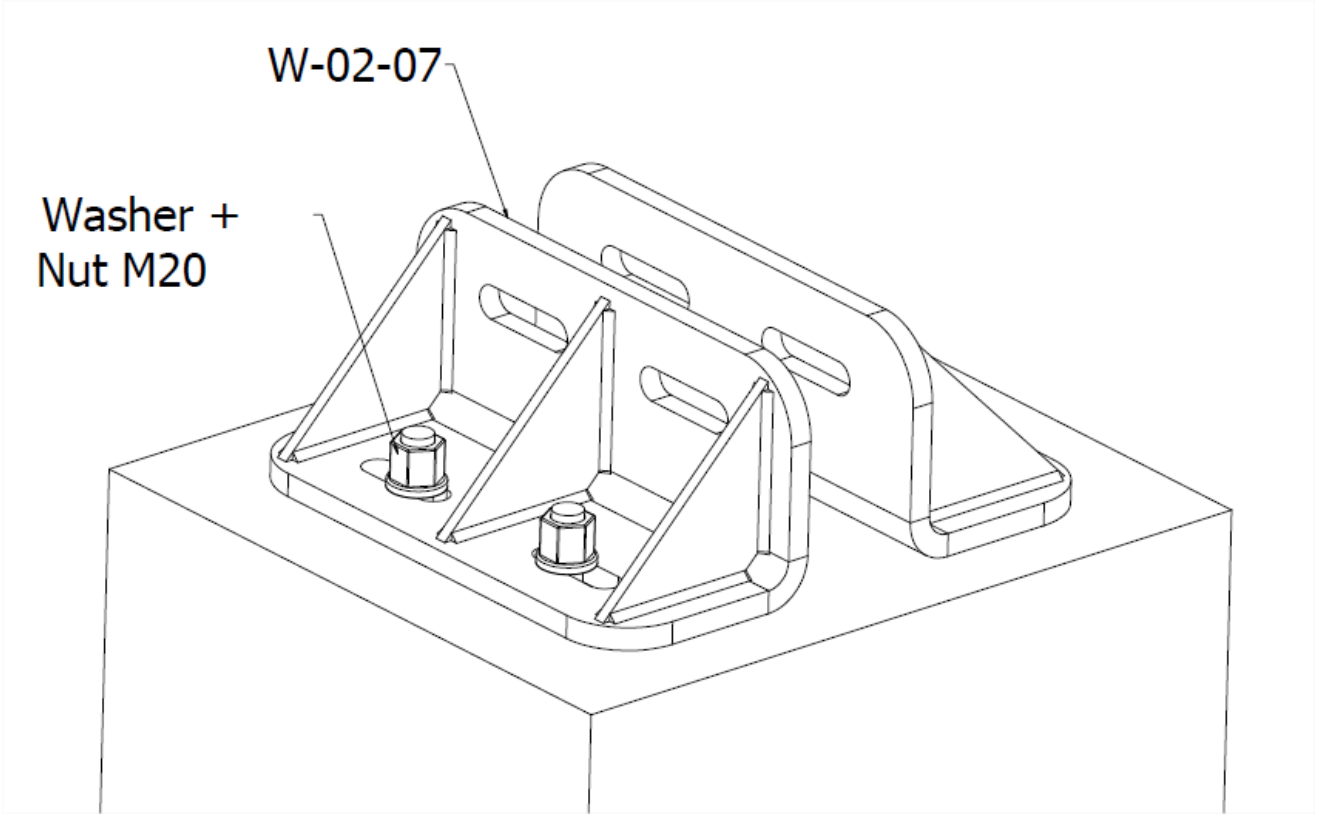



*Figure 2. Initial bolting of the foundation sheet*

4. **NOTE W-02-13, W-02-14, W-02-15 and W-02-16 are left and right elements.**
   Adjust the elements (W-02-13, W-02-14, W-02-15 and W-02-16) so that the sheet metal at the top of the support is on the outside of the structure.

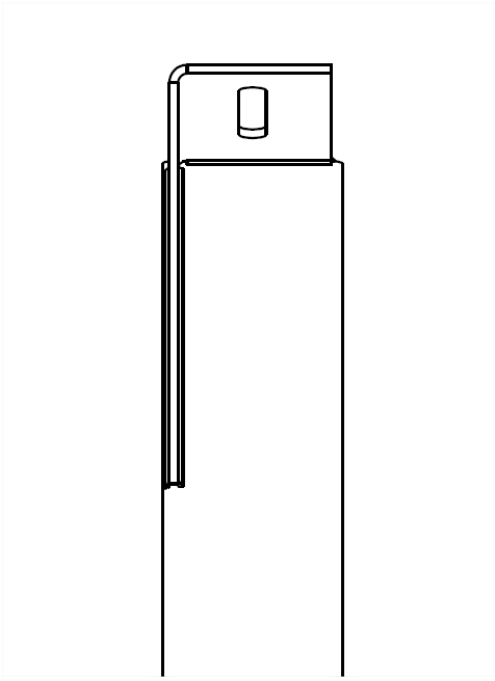


*Figure 3. The upper part of the support*

5. Place the W-02-17 elements so that the longer arms overlap the W-02-05 element and the mounting holes overlap with the threaded holes in the rafter on the wider wall. The components, adjusted in this way, should be pre-tightened using the K-28 screws and the M10 washers.

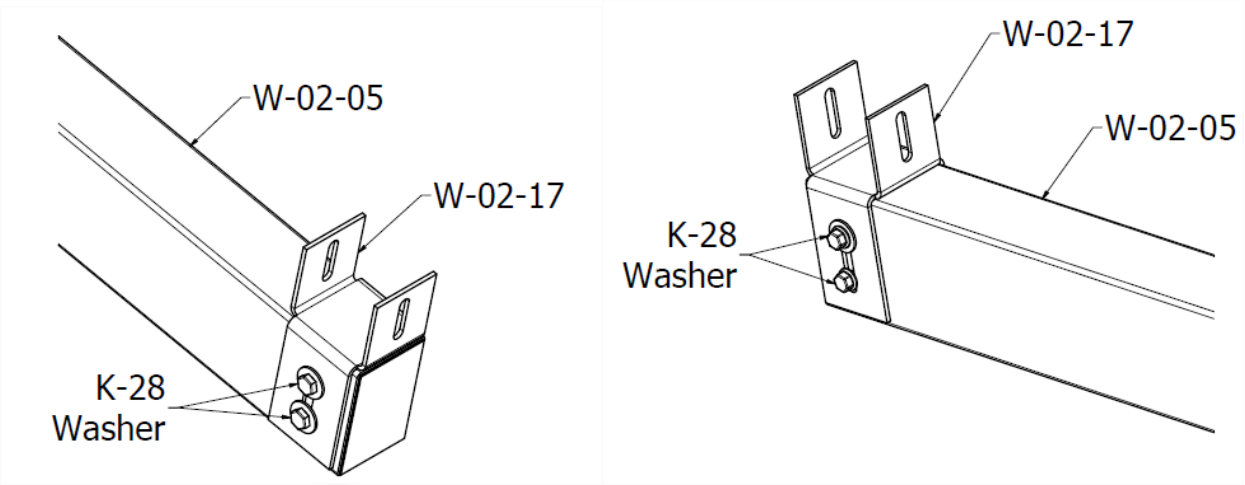



*Figure 4. Installation of the W-02-17 elements on rafters*

6. Installation of the structure should begin by pre-bolting the W-02-16 and W-02-13 supports to the W-02-07 foundation plates using M20x160 bolts, M20 washers, spring washers and M20 nuts.

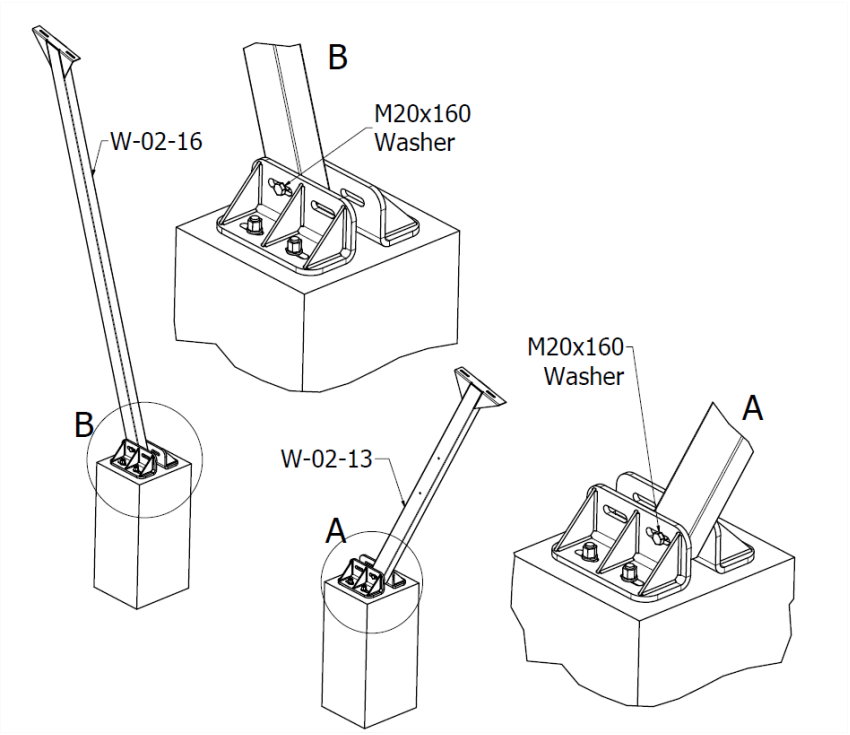



*Figure 5. Preliminary installation of the W-02-16 and W-02-13 supports, projection I*

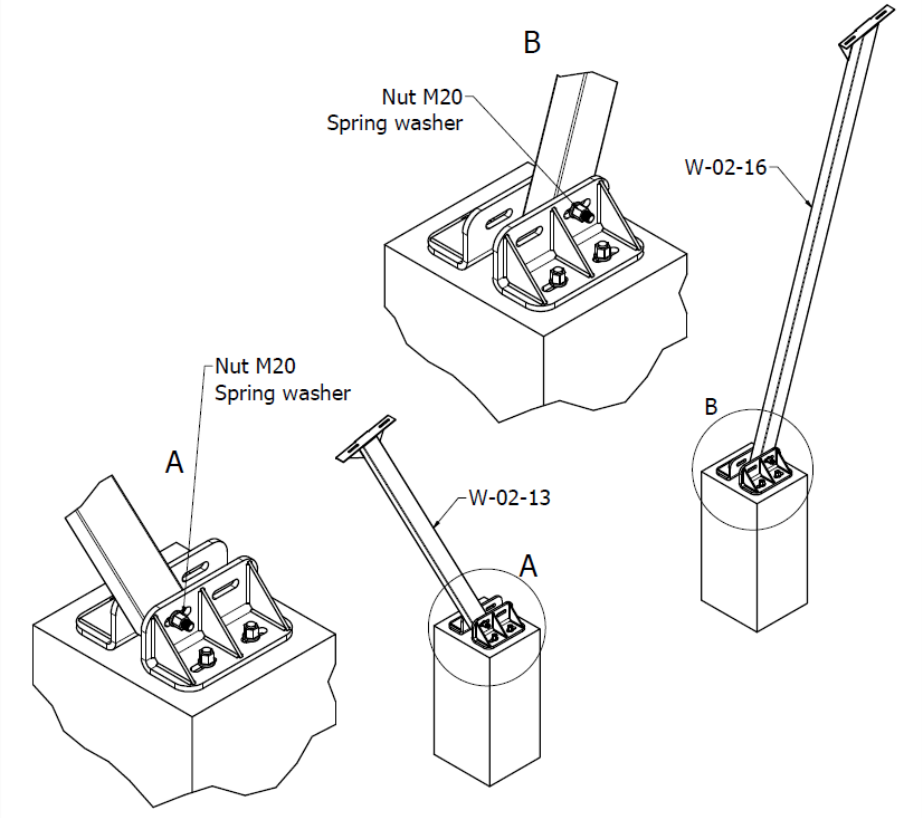



*Figure 6. Preliminary installation of the -02-16 and W-02-13 supports , projection II*

**7.** Attach the W-02-05 element to the set supports using K-28 screws and M10 washers.

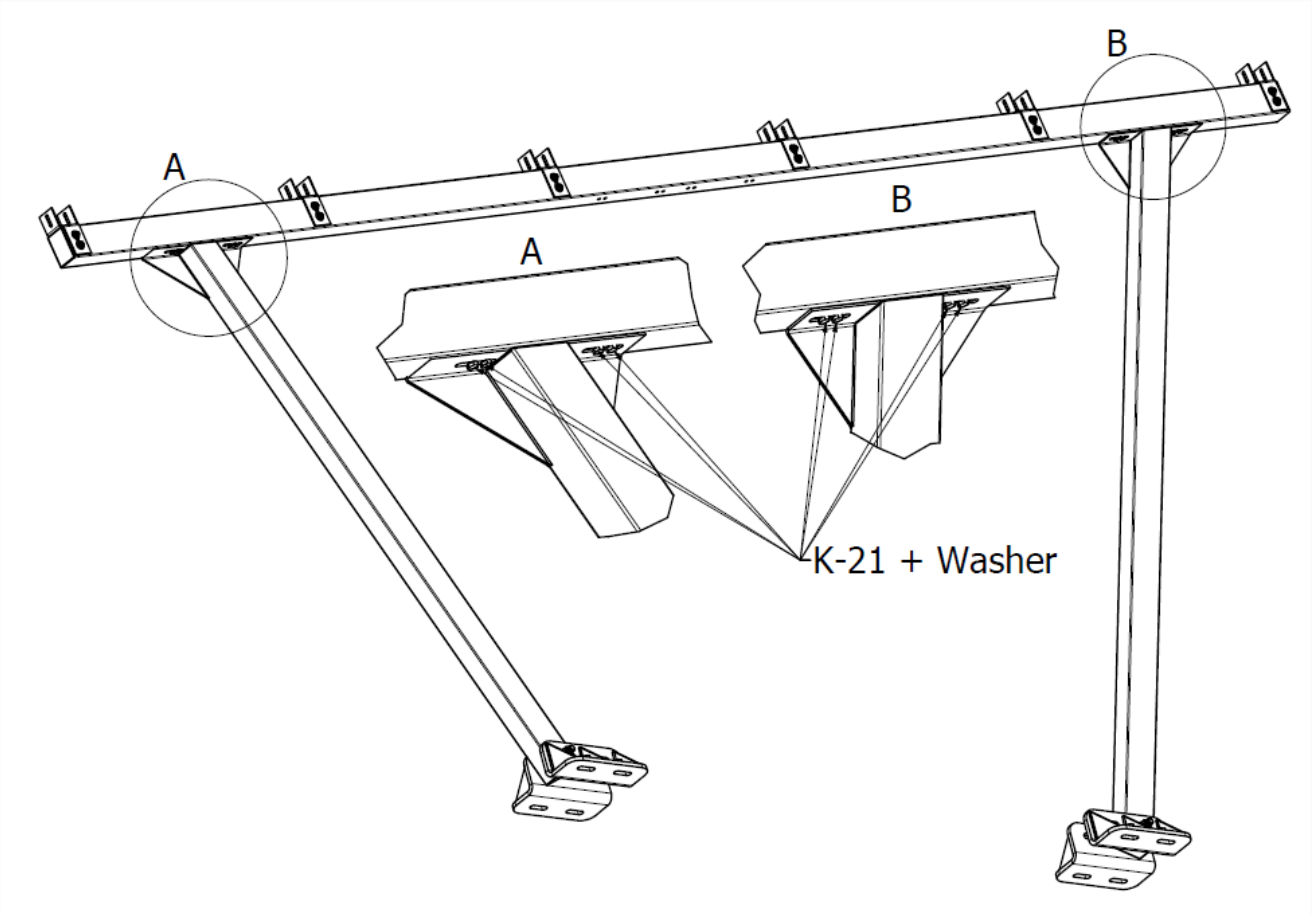



*Figure 7. Pre-assembly of rafters to supports*

8. After the pre-bolting rafters to the supports, install successive supports starting sequentially from element W-02-15 using M20x160 bolts, M20 washers, spring washers and M20 nuts. Then, screw the fasteners to the rafters using K-28 screws and M10 washers.

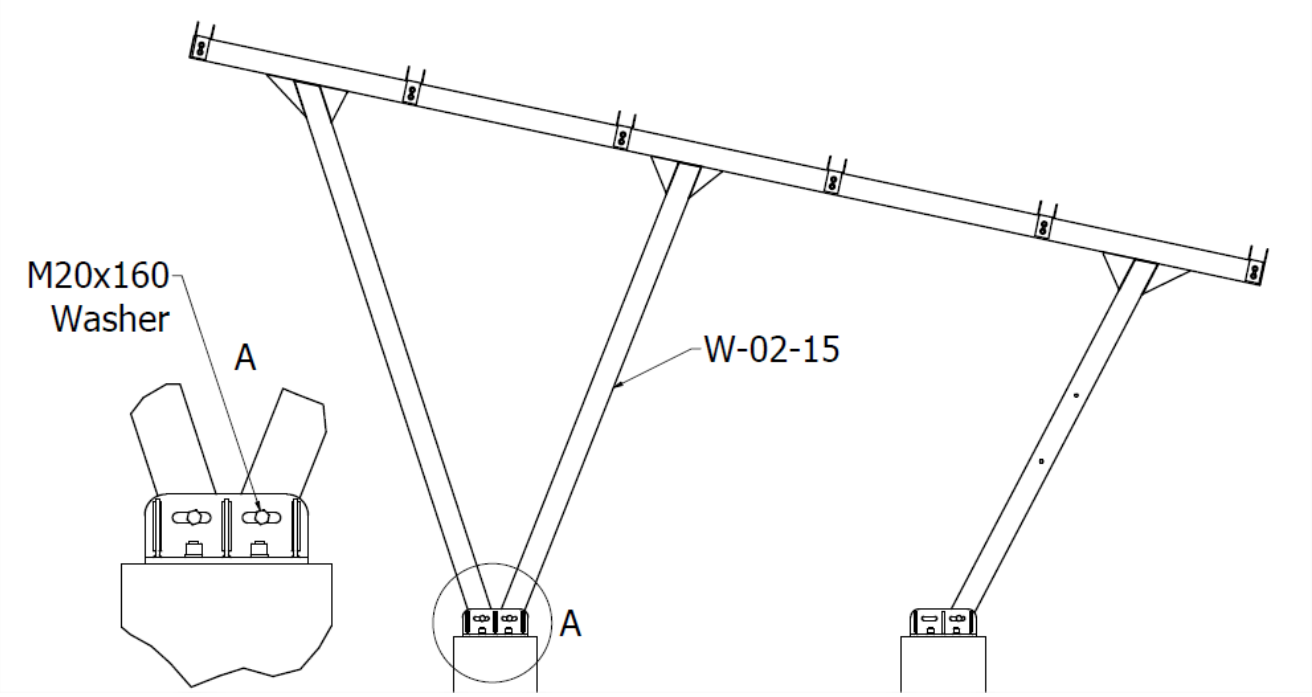



*Figure 8. Installation of the W-02-15 support, projection I*

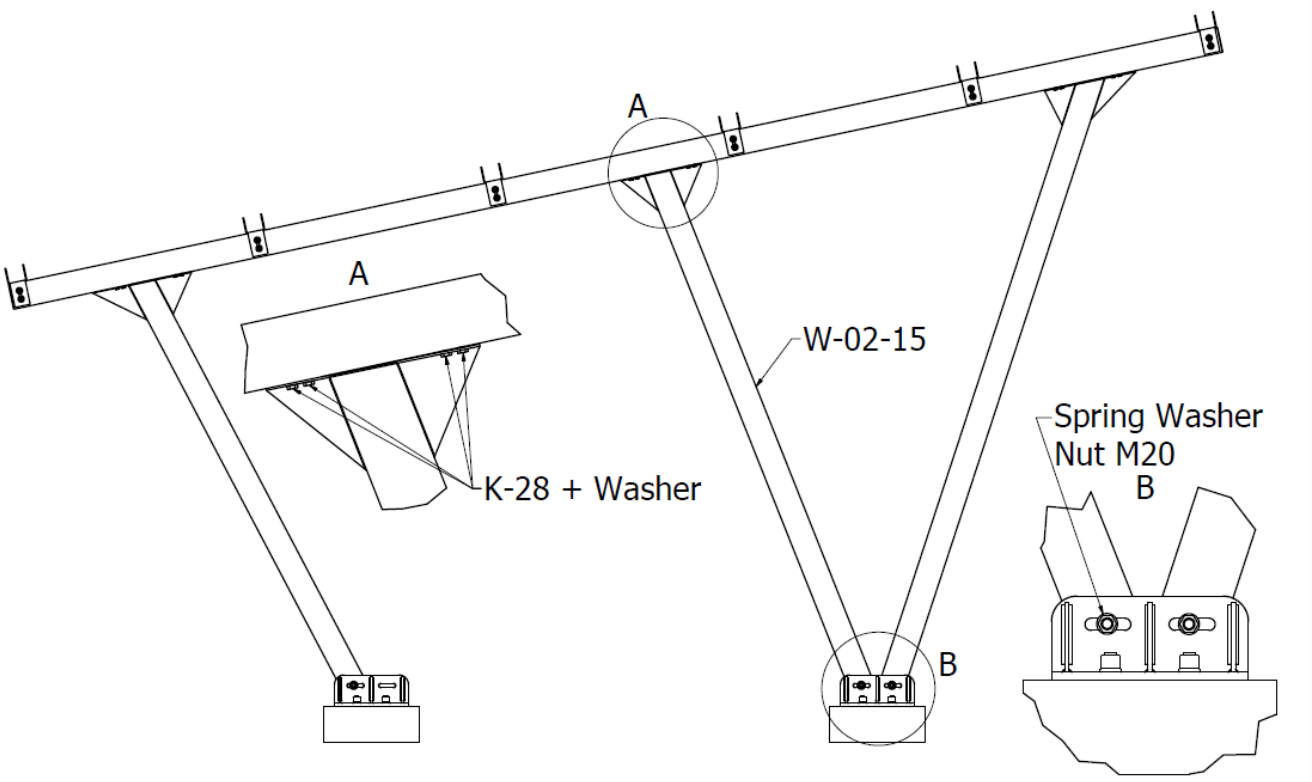



*Figure 9. Installation of the W-02-15 support, projection II*

**9.** Next, install the W-02-14 support using M20x160 bolts, M20 washers, M20 spring washers and M20 nuts. Subsequently, screw the connecting elements to the rafters using K-28 screws and M10 washers.

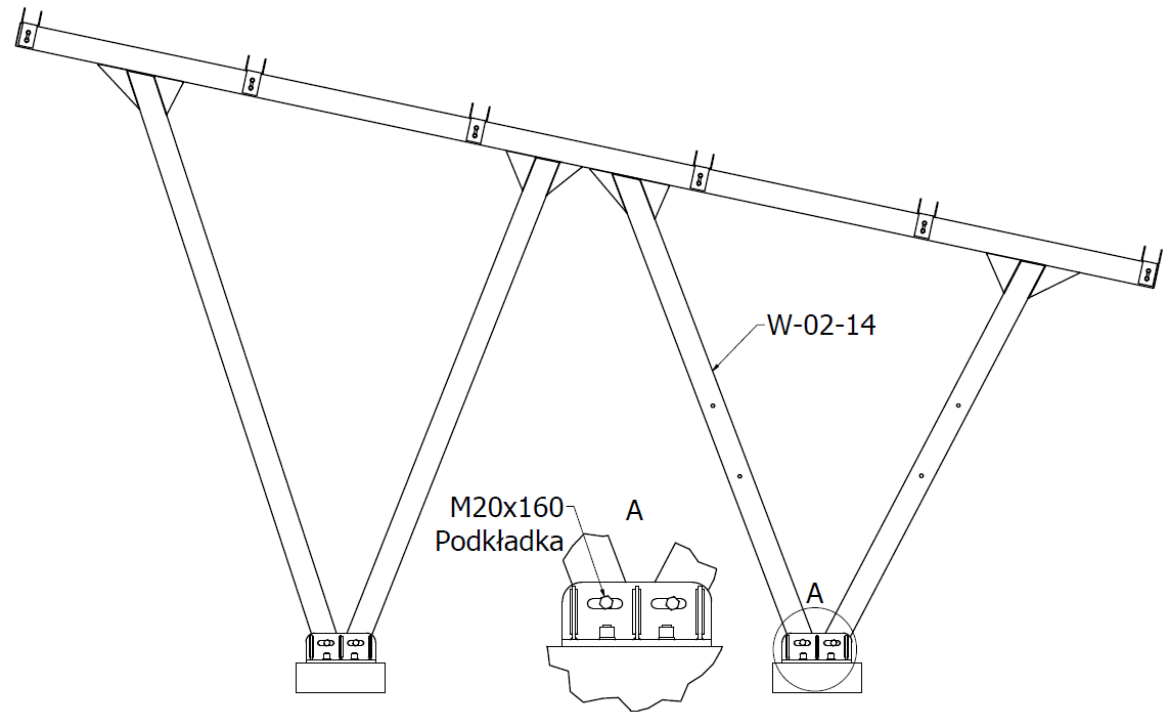



*Figure 10. Installation of the W-02-14 support, projection I*

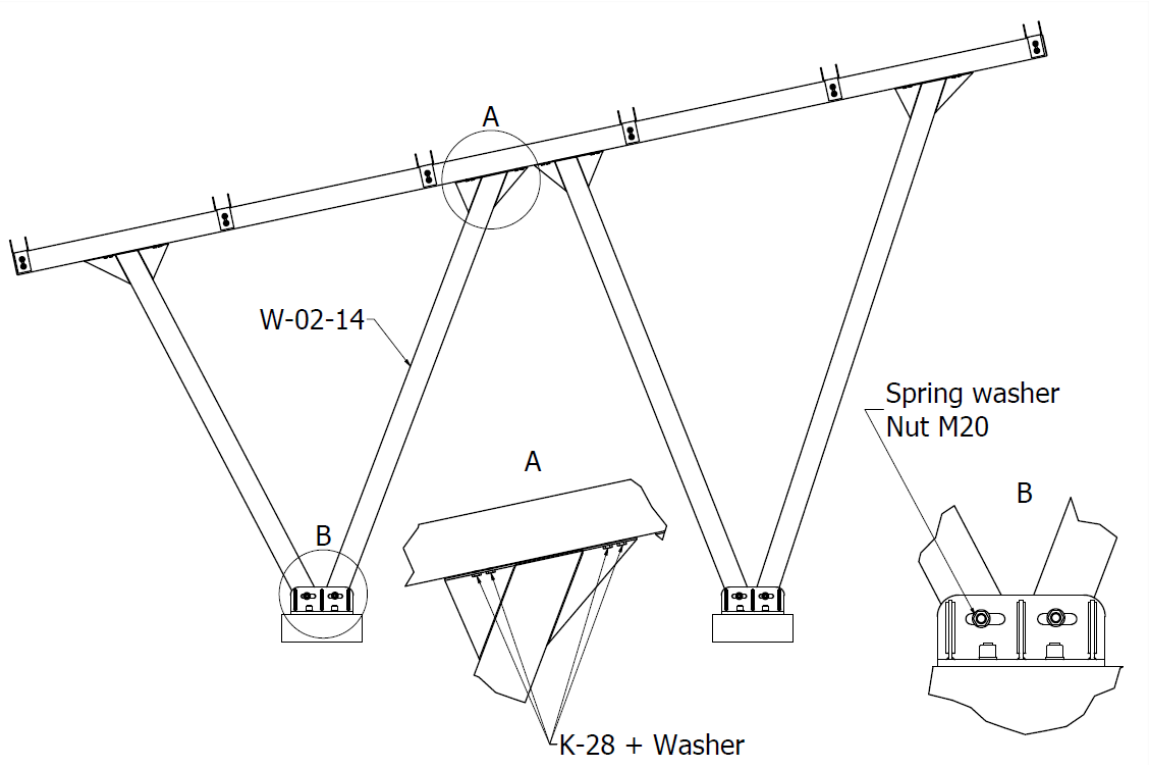



*Figure 11. Installation of the W-02-14 support, projection II*

**10.** After attaching the supports to the foundation sheets and rafters, the W-02-18 element can be mounted to the W-02-13 and W-02-14 supports pre-tightened with K-28 bolts and M10 washers.

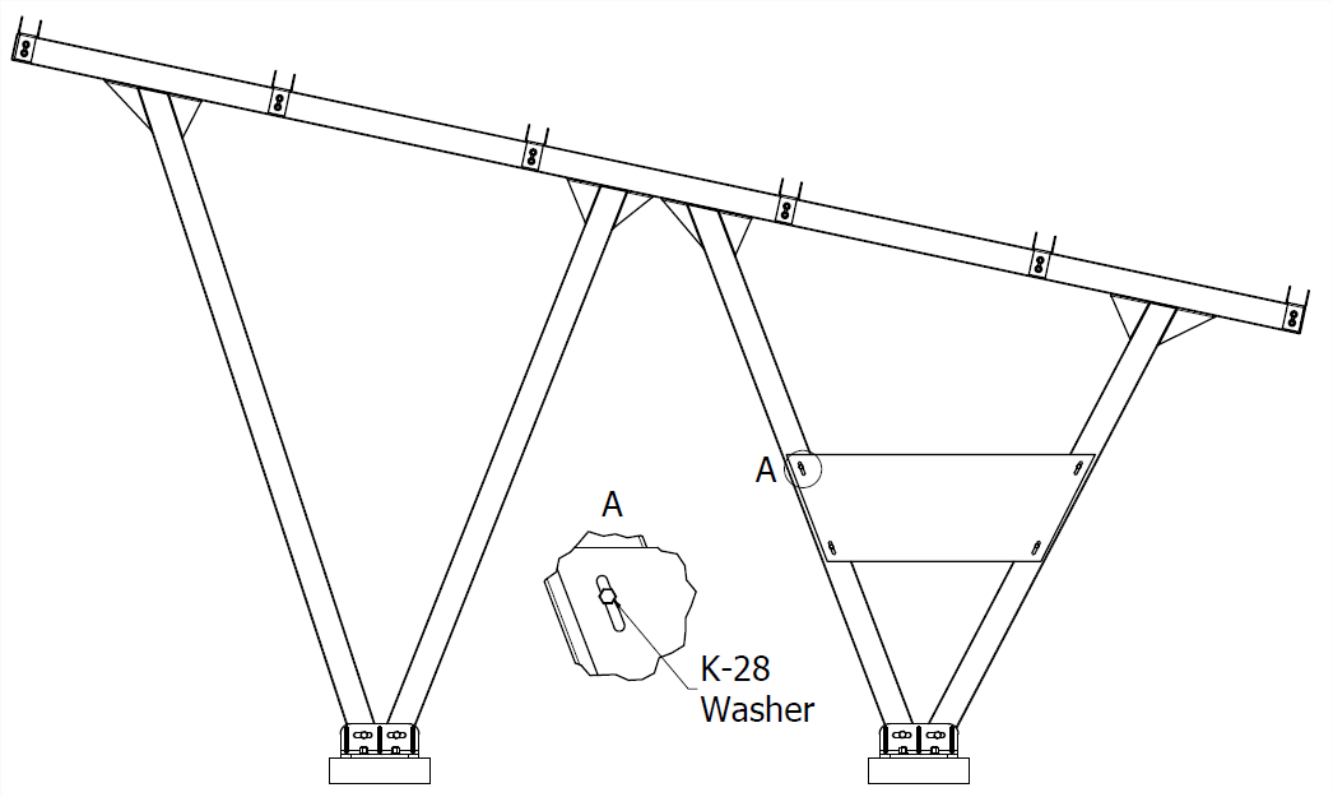



*Figure 12. W-02-18 element assembly*

**11.** Do the same on the other side. **This must be done before attaching the crossbeams!**

**12.** After stable and correct installation of all supports on two sides. You can proceed to the installation of the cross beams. A forklift or HDS vehicle is recommended for this operation. **The mounting of the crossbeams should be planned so that the beams are placed one after the other in order to avoid jamming of the machine inside the structure and collision between the machine and the structure.**

**13.** Before preparing the beam for lifting, verify where the M8 holes are located.
The M8 holes located along the entire length of the beam must always face upward.

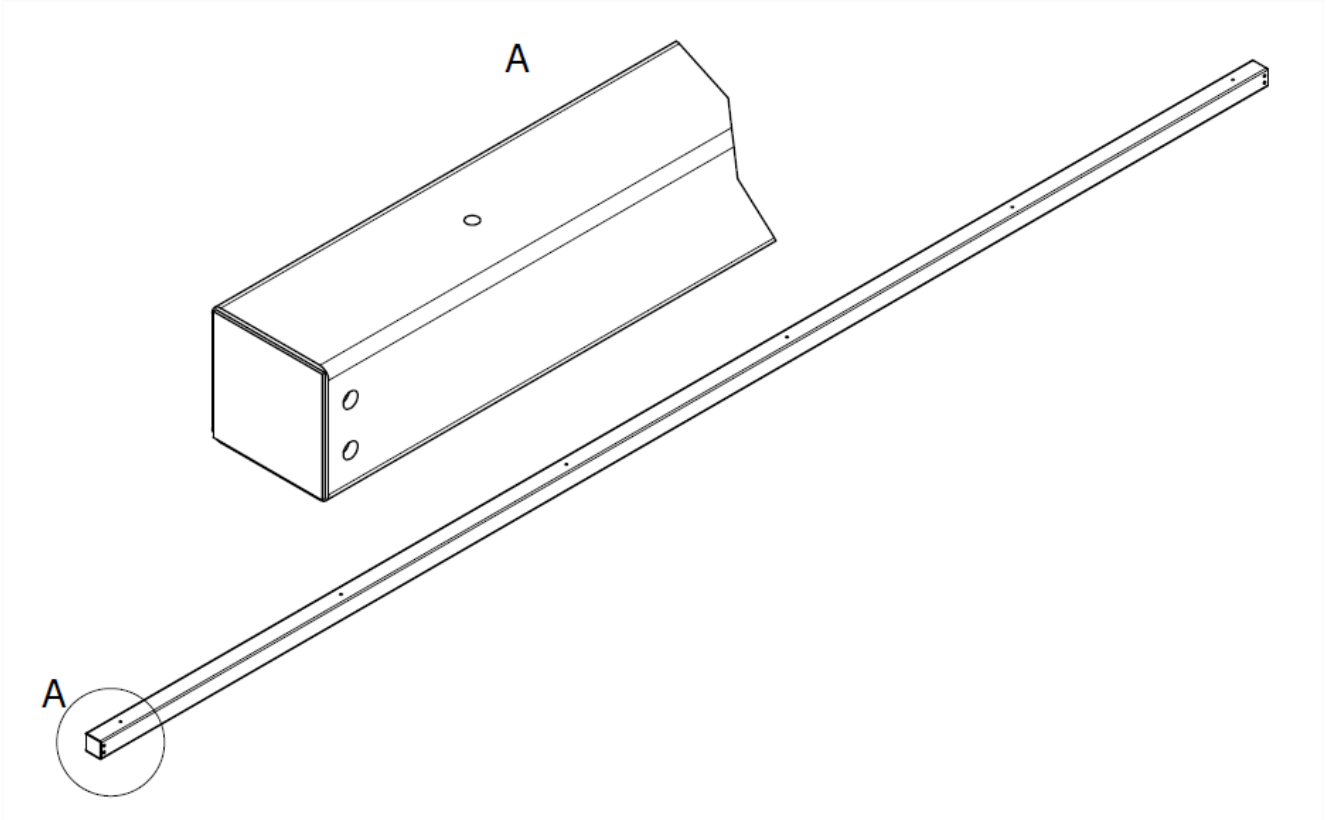



*Figure 13. W-02-06 beam*

**14.** W-02-06 beam should be placed in W-02-17 brackets on both sides of the structure and bolted on both sides of the beam using K-28 bolts and M10 washers. This operation should be repeated six times until the last beam is installed.

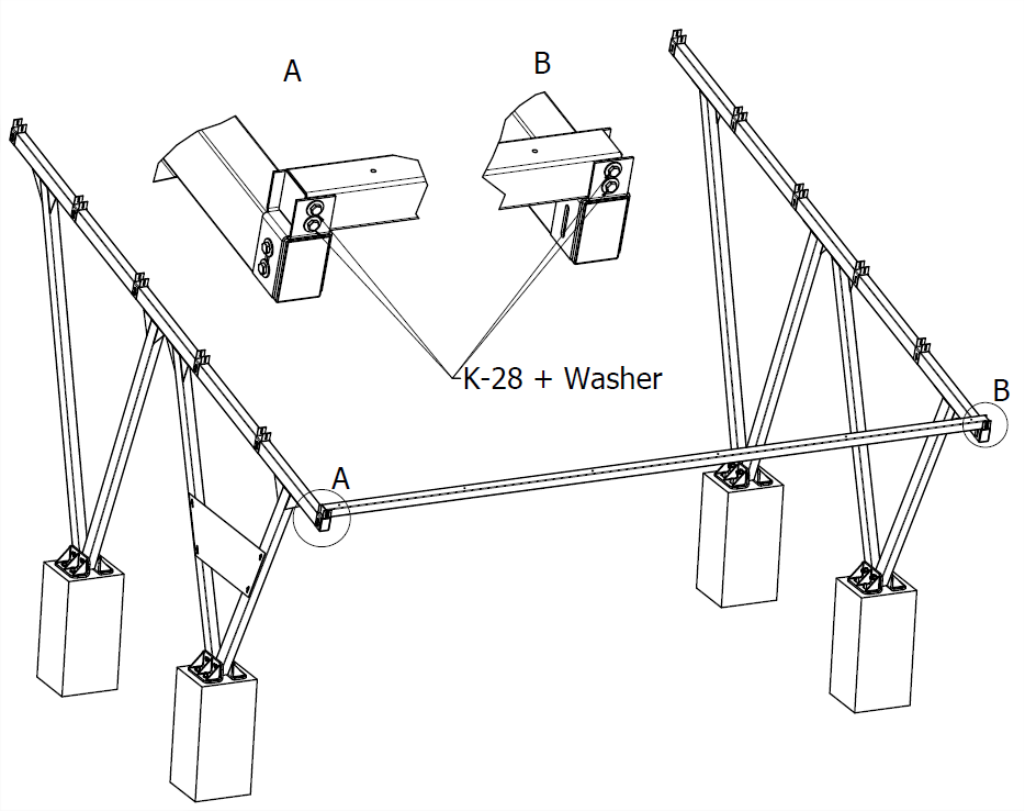



*Figure 14. Installation of the W-02-06 beams, projection I*

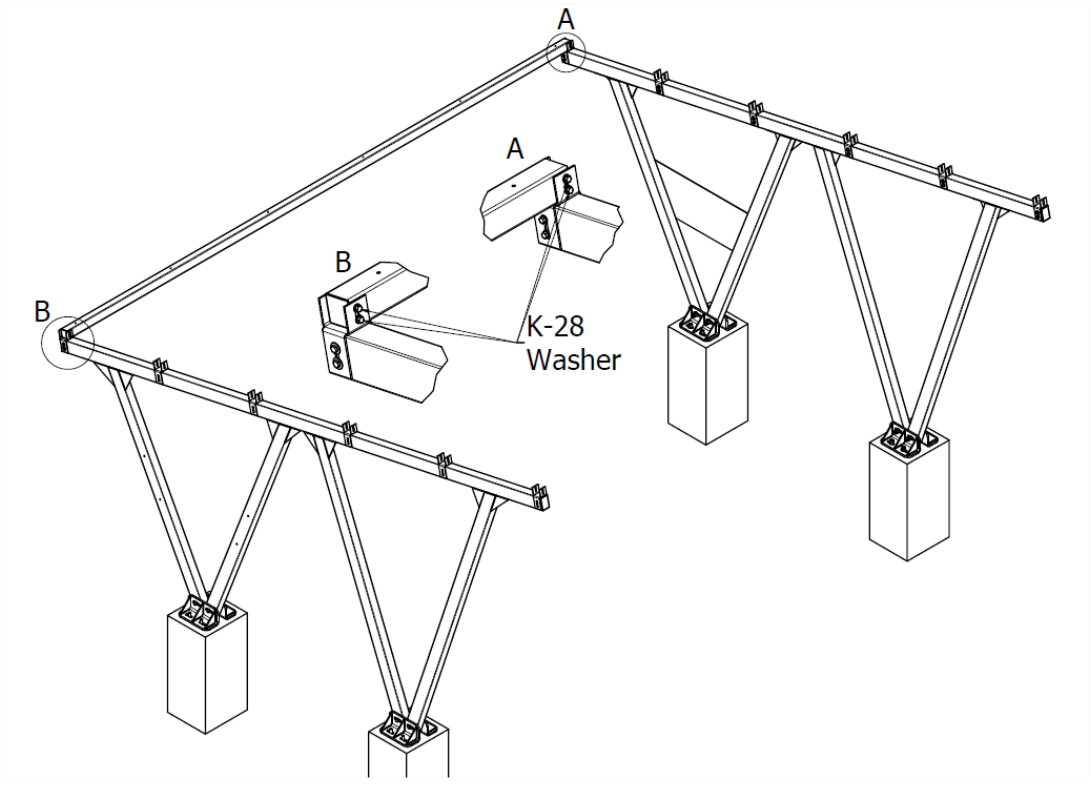



*Figure 15. Installation of the W-02-06 beams, projection II*

15. After pre-tightening all the components, you can proceed to tighten all the K-28 screws using a torque of ~50Nm. It is advisable to tighten all screws going from the top of the structure to the bottom in order to get rid of any slack that may have been created during the twisting of the structure.

16. The foundation plates should be tightened using a torque of ~200Nm.

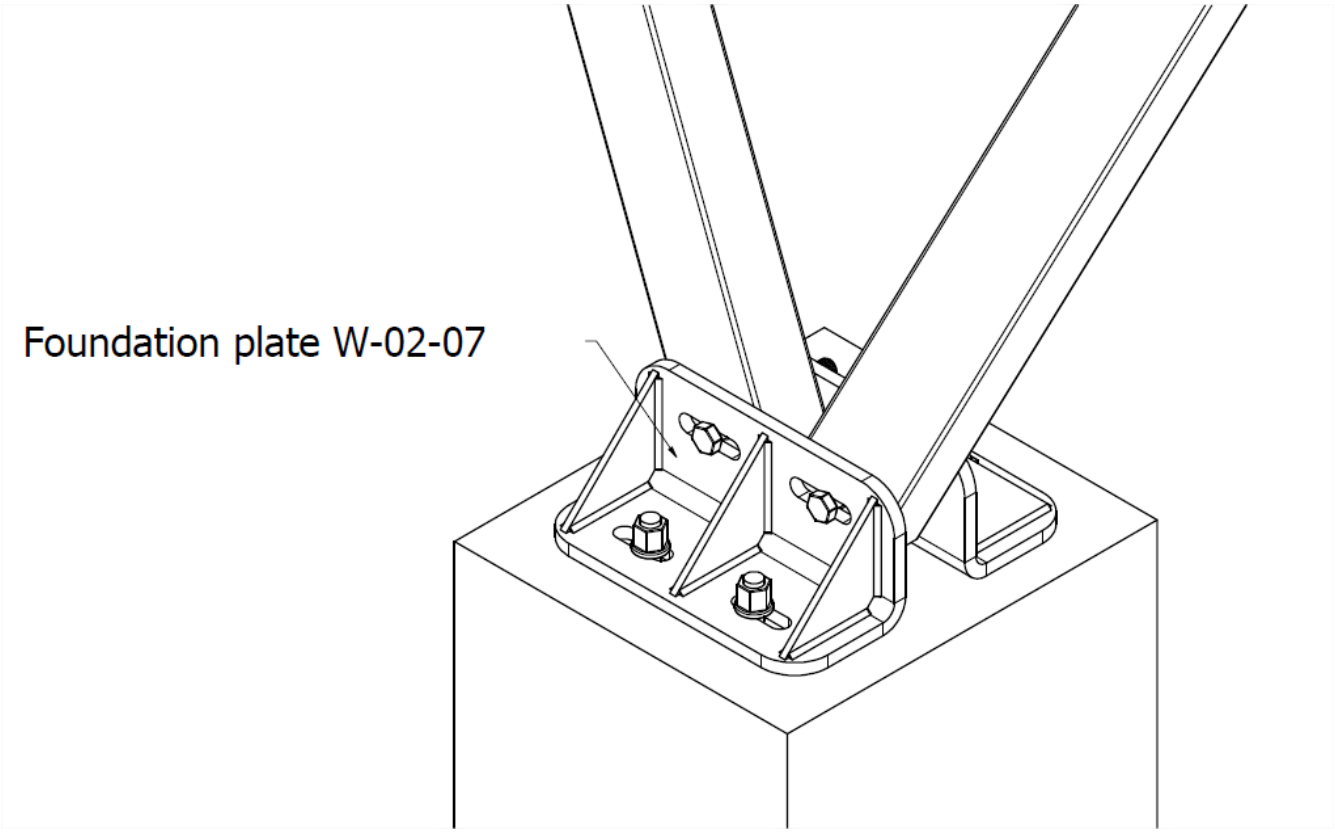



*Figure 16. Tightening of foundation plates*

**17.** After bolting the whole structure together, proceed to the installation of photovoltaic modules. It is recommended to mount the modules in consecutive vertical rows, this will facilitate the installation process.

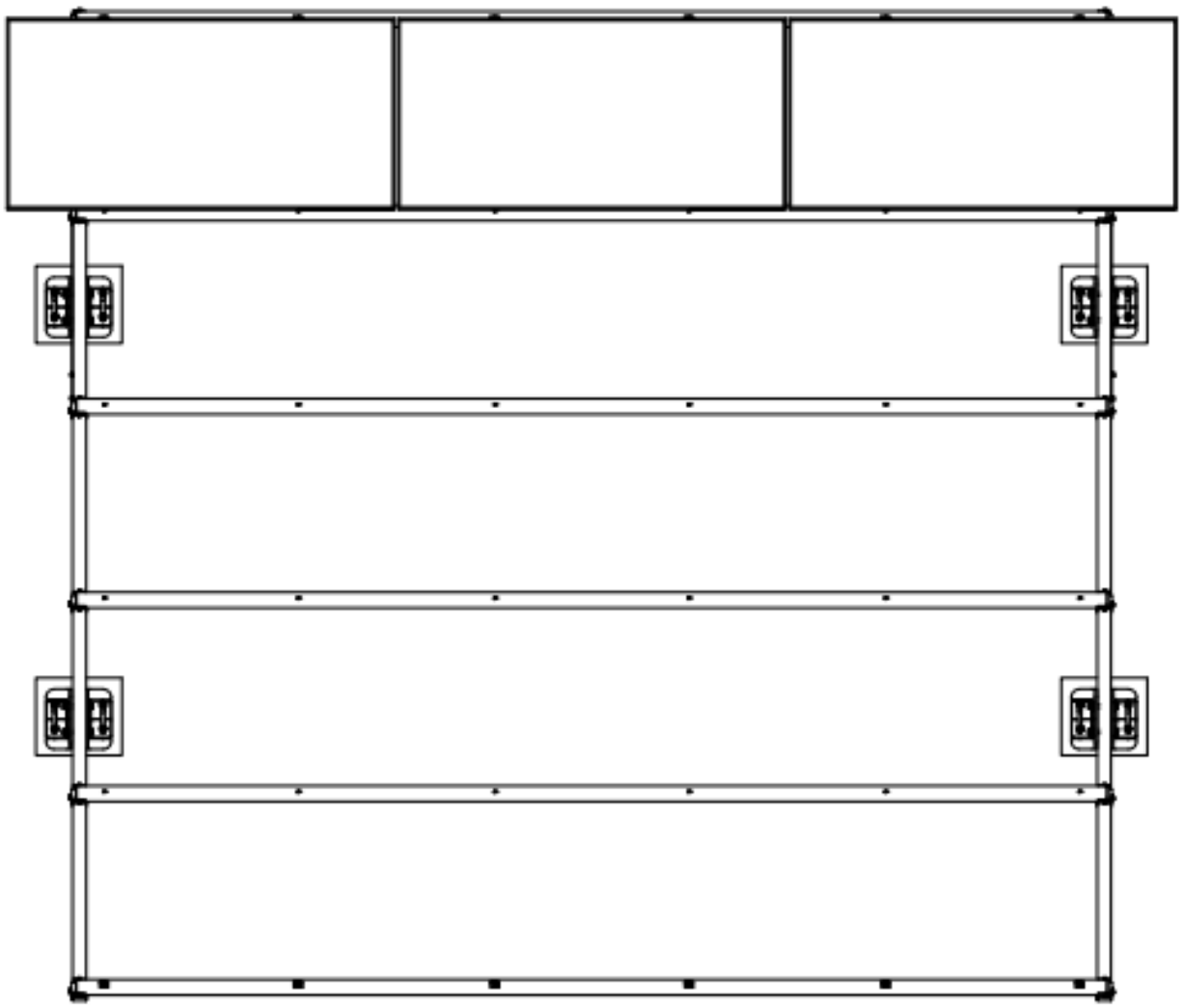


*Figure 17. Installation of photovoltaic modules*

**18.** Next, insert the K-06 end clamps into the first beam with the K-18 allen bolts. The first of the edge and the last will always be the end clamp, stabilizing the edge of the first and last row of modules. The mid clamps, on the other hand, will simultaneously stabilize the sides of the two modules. A correctly selected edge clamp will have a height equal to the module thickness, while mid clamps are universal and fit any module thickness.

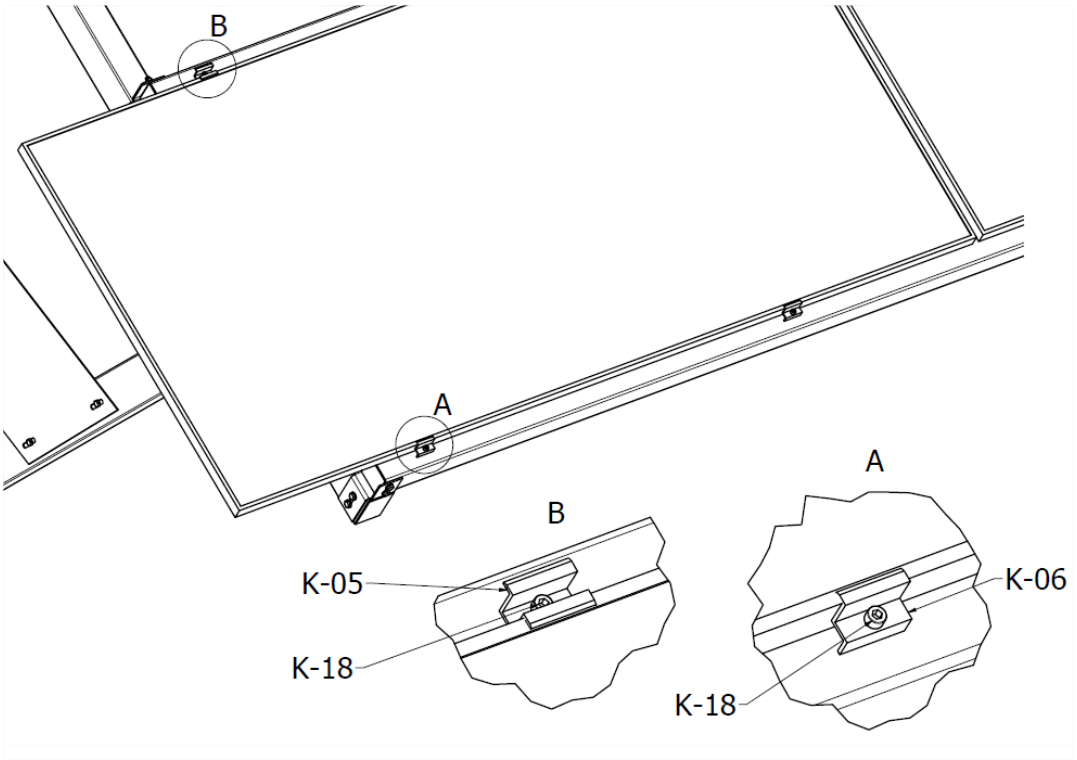



*Figure 18. Installation of clamps*

**19.** The modules should be installed row by row starting from the bottom row and after pre-tightening the bottom row of clamps. Center clamps can be used as a spacer between modules, with the aim of mounting at equal intervals in a given row, Figure 19, and should be pulled out after installation.

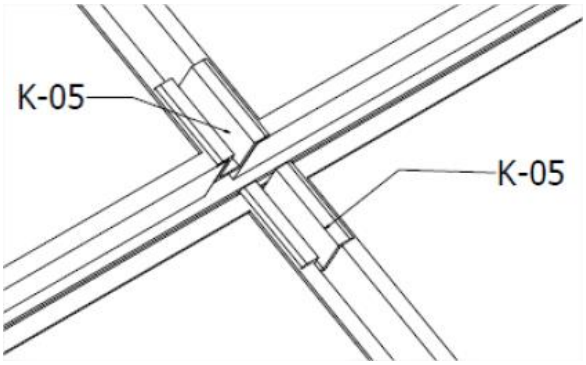



*Figure 19. Maintain equal distance between modules in a row*

**20.** After mounting the modules, proceed to install the gasket which should be placed in the gaps between the modules (the gasket should face the module frame). The next step is to mount the inverter and the switchgear to the W-02-18 mounting plate according to the recommendations of the manufacturer of a given inverter and switchgear, by drilling through the plate in appropriate places, matching the given components. Route the wires in the covers. The connection proposal is included in the following Figure 20.

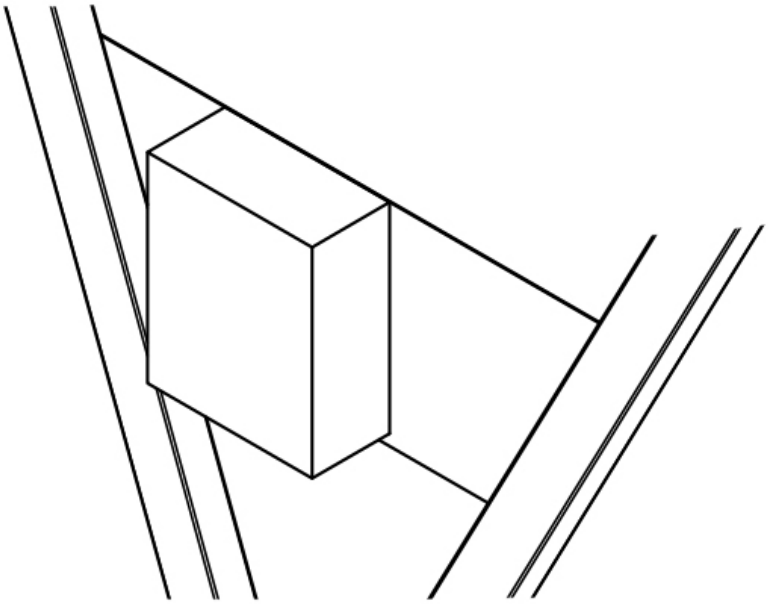


*Figure 20. Inverter mounting proposal*

**21.** Tighten the clamps to a torque of 18 Nm

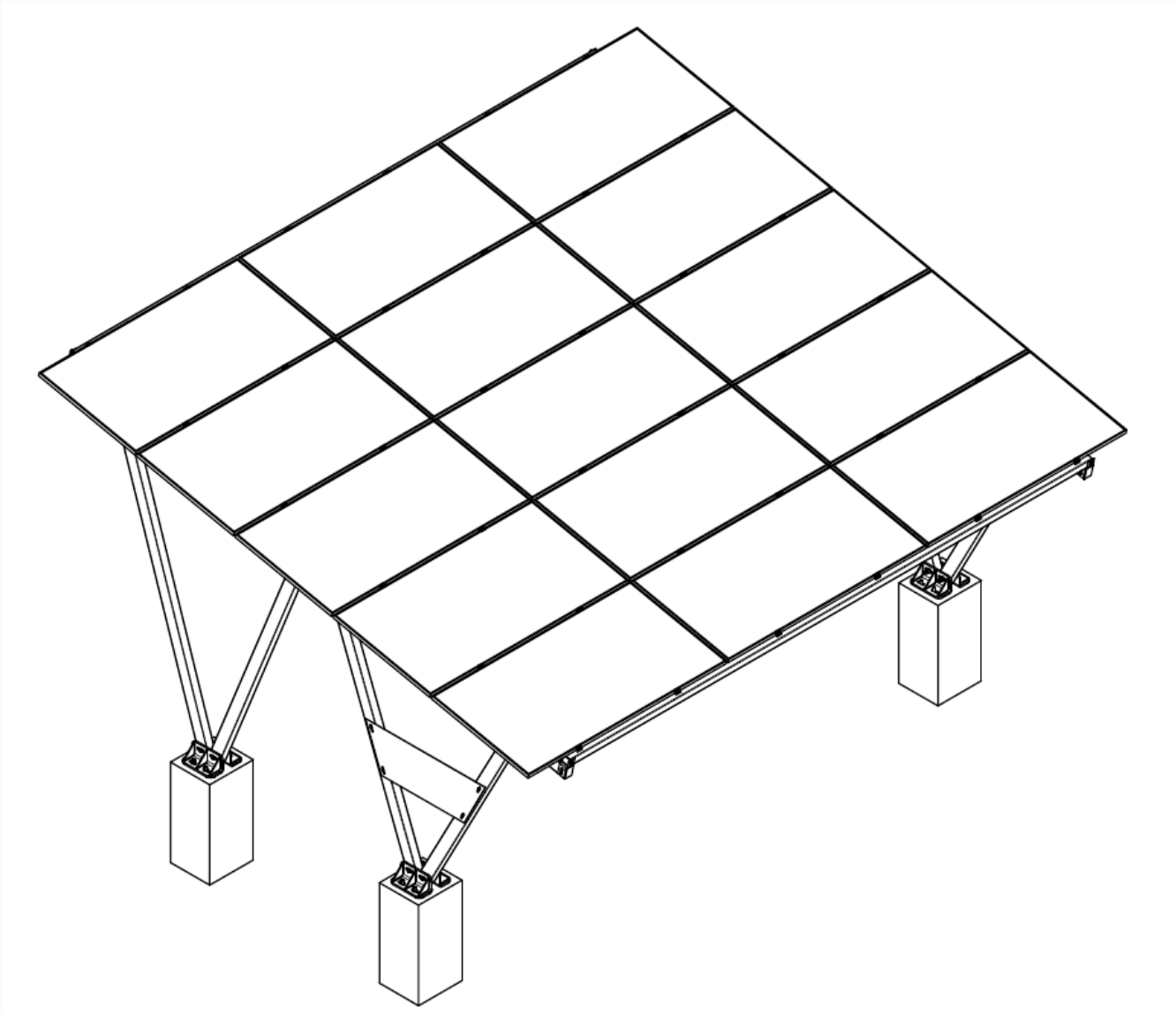


*Figure 21. Design when folded*

## Thank you for using KENO Sp. z o.o structure.