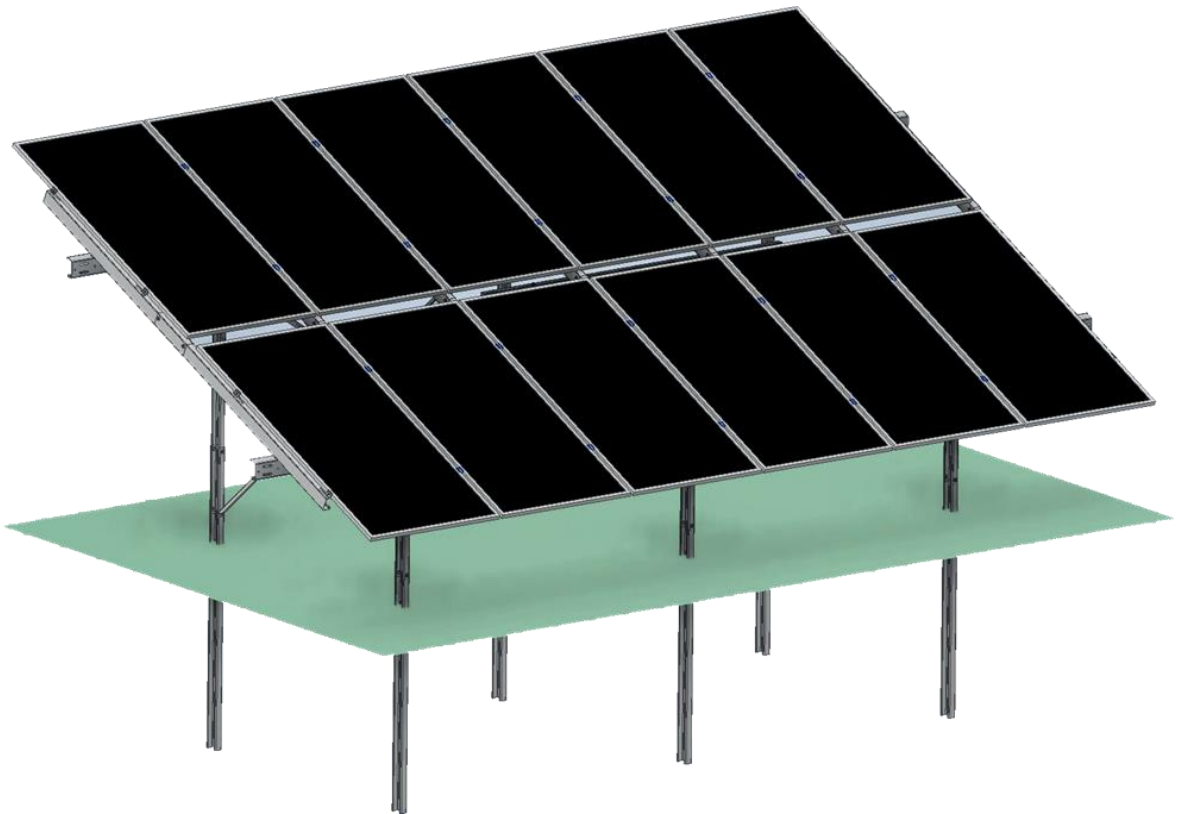


ASSEMBLY AND USAGE INSTRUCTIONS

for Photovoltaic Module Support Structure

FWD2 HBM BI 2x4 , 2x6



Budmat.

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GENERAL INFORMATION

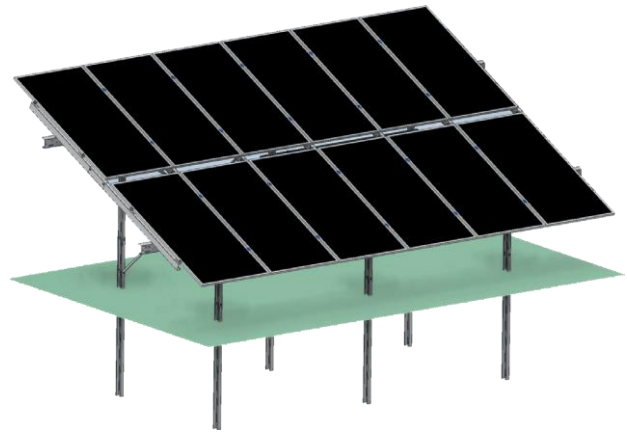
FWD 2 structures are complete systems of free-standing, ground-mounted support structures for photovoltaic panels manufactured in our own machine park. Each PV structure consists of components made of high-quality steel with Magnelis ZM310 and ZM 410 coatings, and it comes with an essential set of screws, nuts, clamps and washers.

This assembly instruction is intended for the Buyer/User to get familiar with the structure, its operating principle, storage and transportation guidelines, and correct assembly of the components.

1. STRUCTURE VARIANTS



2x4



2x6

2. SAFETY INFORMATION

Photovoltaic structures should be assembled by experienced and properly equipped professional teams only. During the assembly, use and repair of products covered by this instruction, generally applicable occupational health and safety regulations should be followed. It is therefore, among others, necessary to:

- Wear personal protective equipment such as helmet and other types of protective clothes
- Use ladders, scaffoldings and electric lifting equipment with proper certificates confirming their usability
- Secure the area in which there is work in progress against unauthorised entry
- Have a valid medical certificate for working at heights.



During works at heights, as well as while climbing and descending, there is a risk of falling. Follow accident prevention rules and regulations strictly and use proper fall protection equipment.



While carrying out works related to the assembly of photovoltaic structures, your hand may get crushed or injured on sharp edges. Wearing protective gloves is therefore recommended.



3. PRODUCTE USE

a. Maintenance

In order to ensure correct operation and a long useful time of the system, inspections should be carried out on a yearly basis. Check whether the fastening screws and ordinary screws and bolts are tightened and in the correct position.

Stepping on the structure and putting any other type of load on it is strictly prohibited.

Should you notice that any of the fastening components are loosened, secure the area around the structure against unauthorised entry and perform a repair in compliance with OSH regulations and provisions of the instructions.

b. Cleaning

In order to maintain the attractive appearance of the fastening structure, clean it regularly. Clean components of the frame provide for a nicer look, longer durability and better functioning of the structure.

System components are best cleaned with water and sponge. However, neutral detergents may also be used.



Do not use alkaline cleaning agents! The glass on the panels is sensitive to alkaline substances.

4. PACKAGING, STORAGE, TRANSPORT

The products should be packed in an original BUDMAT package in a manner preventing the loss of any component of the particular system. After receiving the delivery, please always check the product for its quality and possible lack of components in the respective kit(s).

The vehicle transporting Magnelis-coated profiles should be adapted to this kind of transportation.

The loading, unloading and proper fastening of the goods for the time of transport should be made easy for the person carrying out these activities.

Complete assembly systems are delivered to the recipient with protection against damage. The completeness of the delivery as well as appropriate condition of the delivered profiles shall be confirmed in writing by the recipient on the Stock Issue Confirmation or on any other equivalent document, on which comments regarding the product, provided there are any, should be written down.

5. ASSEMBLY - GENERAL INFORMATION

The assembly is to be conducted in accordance with the instructions issued by Budmat.

Adapt the foundation of the structure to the local soil conditions.

Recommended tightening torques during the assembly:

- **M8 hexagon socket screws, mid and end clamps: 10-11 Nm**



During the tightening of the screws to the module frame, the rhombic Magnelis nut may become deformed at the torque of 11 Nm. This deformation is acceptable.

- **Screws and nuts:** **M10: 44-48 Nm** (for tZn screws)
M12: 51-55 Nm (for A2-70 screws)
77-81 Nm (for tZn screws)



Tightening fasteners with impact drivers and/or wrenches is prohibited.

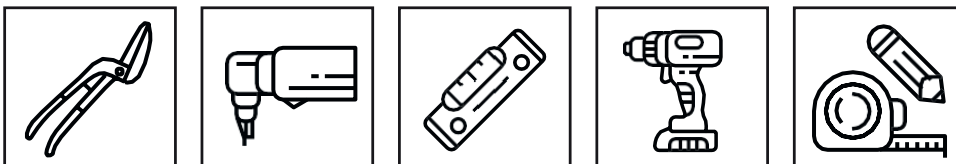
In order to prevent the fasteners from seizing, it is recommended to use a lubricant (eg. teflon grease) on joints exposed to dust, water etc.

It is prohibited to interfere with the structure by drilling holes, grinding its edges, cutting it or carrying out other activities that may damage its protective layer, unless such an activity is admissible as per the instruction or Budmat consents to such an activity being carried out.

The upper parts of the posts may become deformed while driven into the ground. In that case, the occurring deformations should be secured with zinc paint along the scratch. Remove any soiling from the components that has accumulated during the assembly immediately before proceeding to the next assembly phase.

a. Tools

Required tools








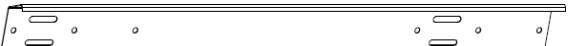


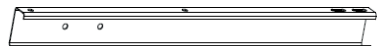

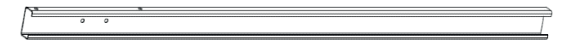



ASSEMBLY INSTRUCTION



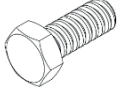

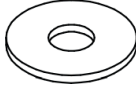
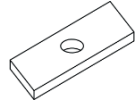
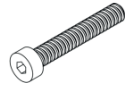
1. COMPONENTS

Structure configurations:

Modules in vertical alignment in layouts: 2x4, 2x6. Tilt angle: 25°

1.1. BASIC STRUCTURE COMPONENT KIT

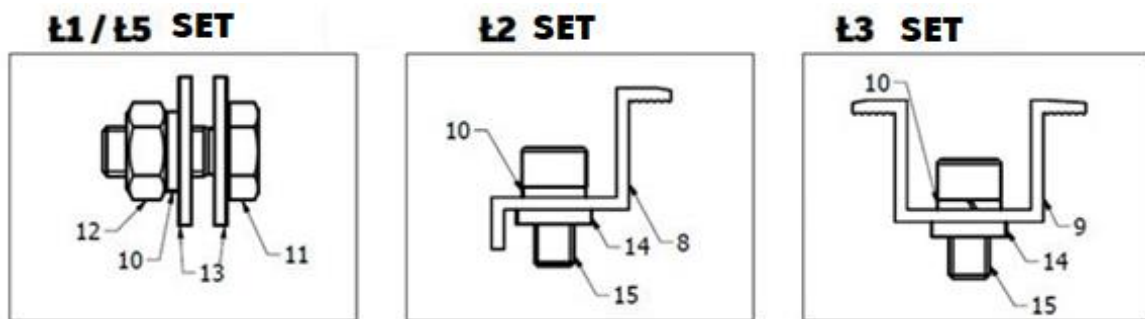
NO	COMPONENT	SYMBOL	NAME	LAYOUT 2x4	LAYOUT 2x6
1		FWD2 HBM BI KD L2200	RAFTER	5	7
2		FWD2 HBM BI KG L1824		5	7
3		FWD2 HBM BI MF1 L2200	INVERTER MOUNTING	2	2
4		FWD2 HBM BI MF2 L840		2	2
5		FWD2 HBM BI P1 L1560	BINDER	2	4
6		FWD2 HBM BI P2 L1560		2	4
7		FWD2 HBM BI P3 L1560		2	2
8		FWD2 HBM BI P4 L1560		2	2
9		FWD2 HBM BI SDP L1004	FRONT POST, TIGHTENED	2	3
10		FWD2 HBM BI SDT L2014	REAR POST, TIGHTENED	2	3
11		FWD2 HBM BI SW L2200	FRONT POST, DRIVEN	4	6
12		FWD2 HBM BI T1 L2200	BRACE	2	2
13		FWD2 HBM BI T2 L1301		2	2
14			END CLAMP	8	8

15			MID CLAMP	12	20
16			SPRING WASHER	M8 M10 M12	20 80 18 28 110 26
17			HEXAGON BOLT	M10x30 M12x30	80 18 110 26
18			M12 / M10 NUT	M10 M12	80 18 110 26
19			ENLARGED WASHER	M10 M12	160 36 220 52
20			RHOMBIC WASHER	M8	20 28
21			HEXAGON SOCKET SCREW	M8x35	20 28

1.2. CONNECTING SETS:

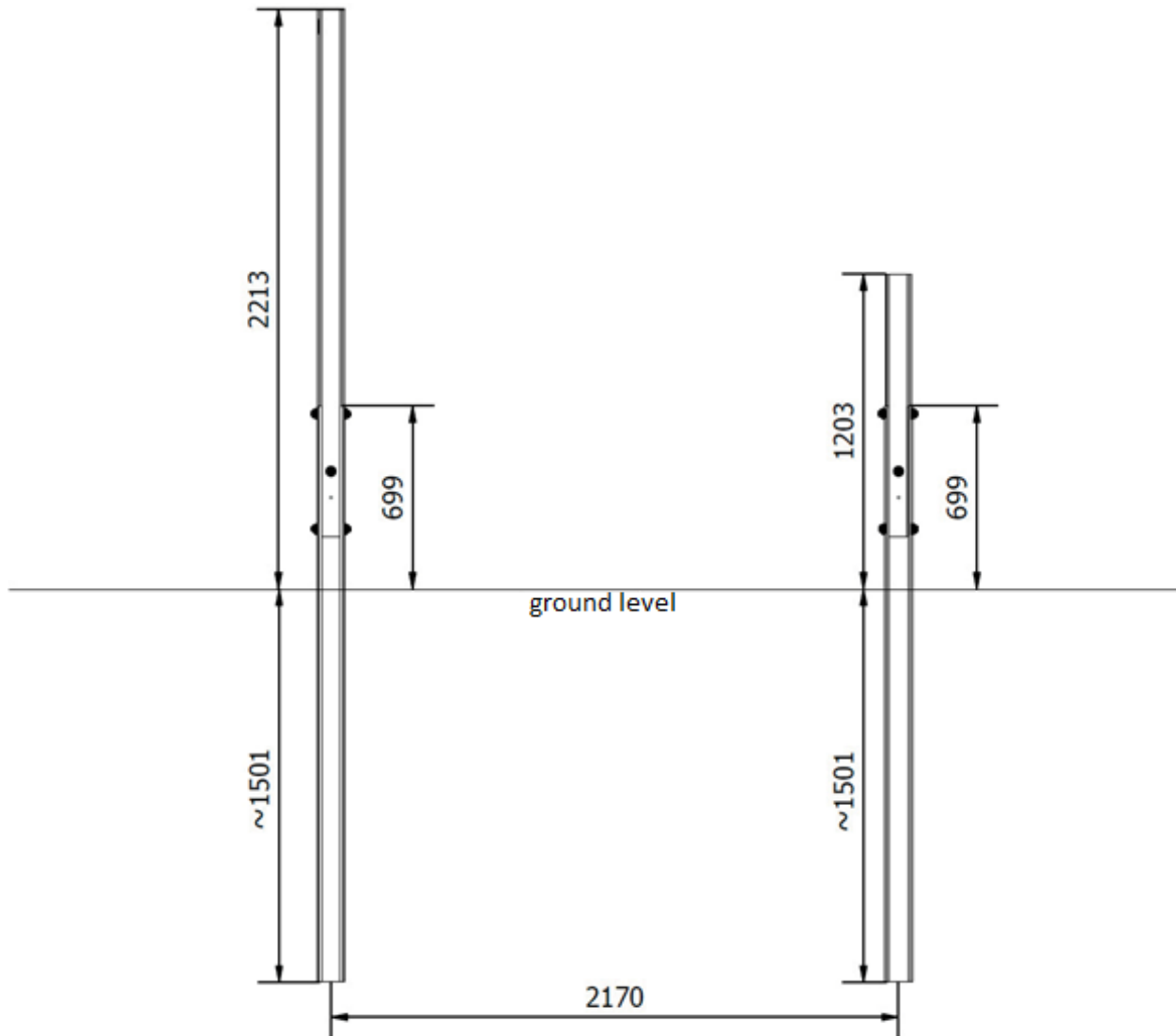
- Ł1 – M12 HEXAGON BOLT⁽¹¹⁾ + M12 ENLARGED WASHER⁽¹³⁾ (2 pcs.) + M12 SPRING WASHER⁽¹⁰⁾ + M12 NUT⁽¹²⁾
- Ł2 – M8x35 END CLAMP⁽⁸⁾ + HEXAGON SOCKET SCREW⁽¹⁵⁾ + SPRING WASHER⁽¹⁰⁾ + RHOMBIC WASHER⁽¹⁴⁾
- Ł3 – M8x40 MID CLAMP⁽⁹⁾ + HEXAGON SOCKET SCREW⁽¹⁵⁾ + SPRING WASHER⁽¹⁰⁾ + RHOMBIC WASHER⁽¹⁴⁾
- Ł5 – M10 HEXAGON BOLT⁽¹¹⁾ + M10 ENLARGED WASHER⁽¹³⁾ (2 pcs.) + M10 SPRING WASHER⁽¹⁰⁾ + M10 NUT⁽¹²⁾

1.2.1. CONNECTION PATTERNS



2. ASSEMBLY

2.1. POST LAYOUT



Rys. 1 Post spacing: North <-> South

REAR POST AND FRONT POST CONSIST OF TWO SECTIONS EACH:

I - DRIVEN INTO THE GROUND: • FWD2 HBM BI SW L2200

II - CONNECTED:

- FWD2 HBM BI SDT L2014
- FWD2 HBM BI SDP L1004

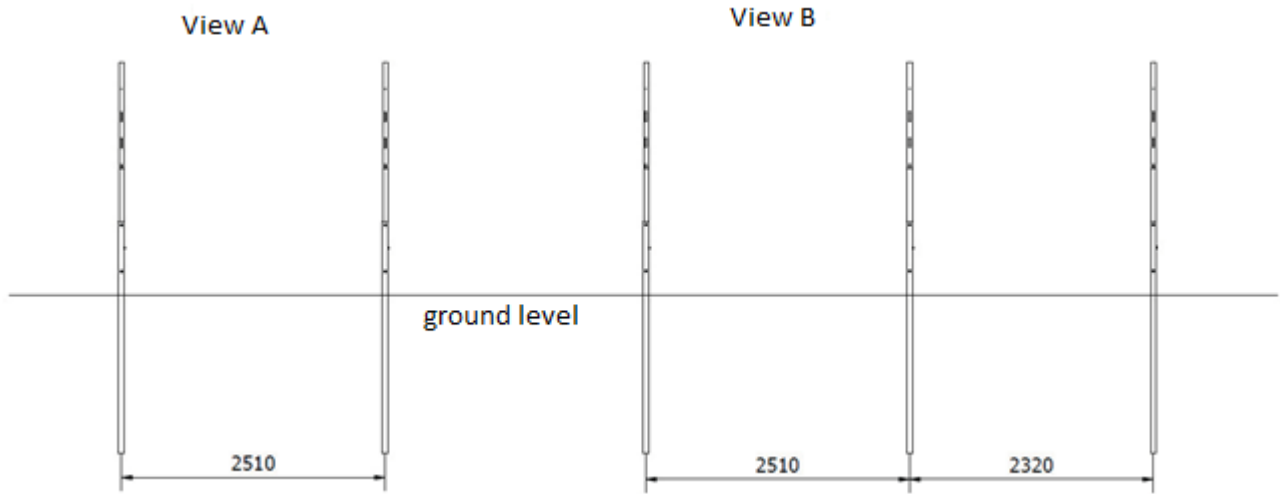


Fig. 2 Post spacing: East <=> West VIEW A – 2x4 Layout, VIEW B – 2x6 Layout

POST SPACING BETWEEN TWO ADJOINING TABLES:

Distance between tables: For vertical layout, **100mm between purlins are standard.** Mark the distances between the post in particular tables before the assembly.

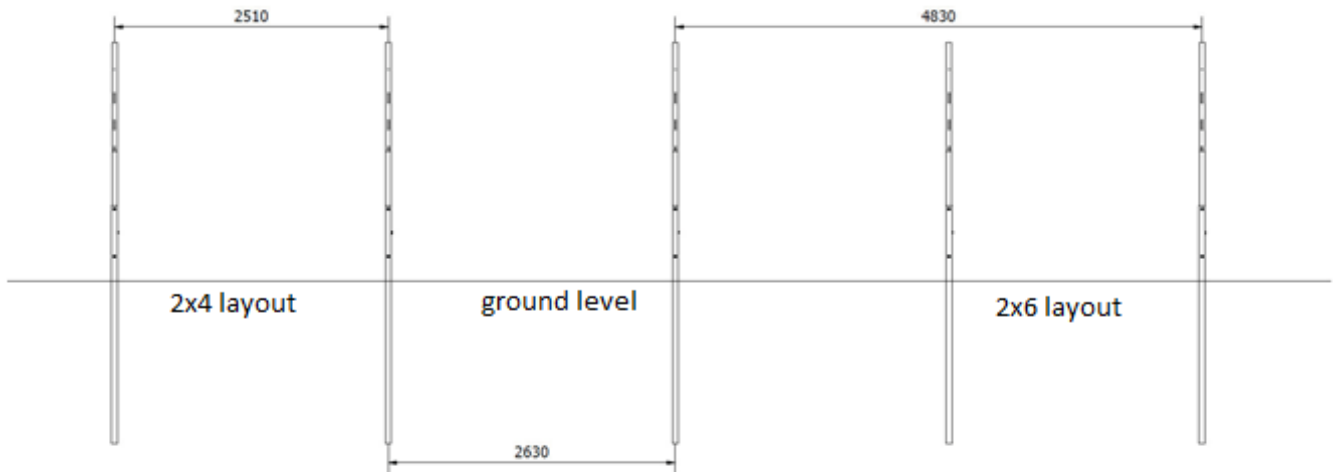
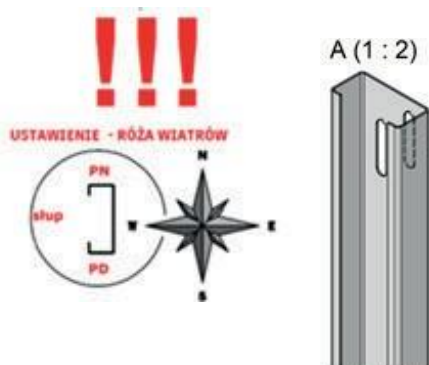


Fig. 3 Post spacing between tables

2.1.1. POST MOUNTING



The post are mounted as per wind rose pattern.

Fig. 4 WIND ROSE - Post positioning

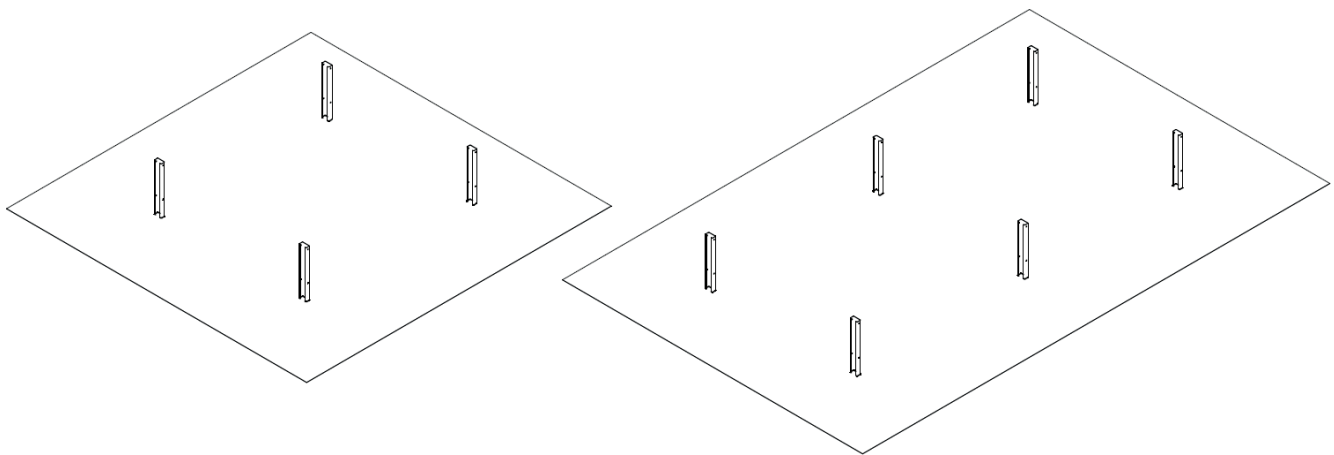
SECTION DRIVEN INTO THE GROUND: FWD2 HBM BI SW L2200

Fig. 5 POST LAYOUTS IN 2x4 AND 2x6 TABLES

JOIN THE POSTS WITH A **Ł5** CONNECTING SET

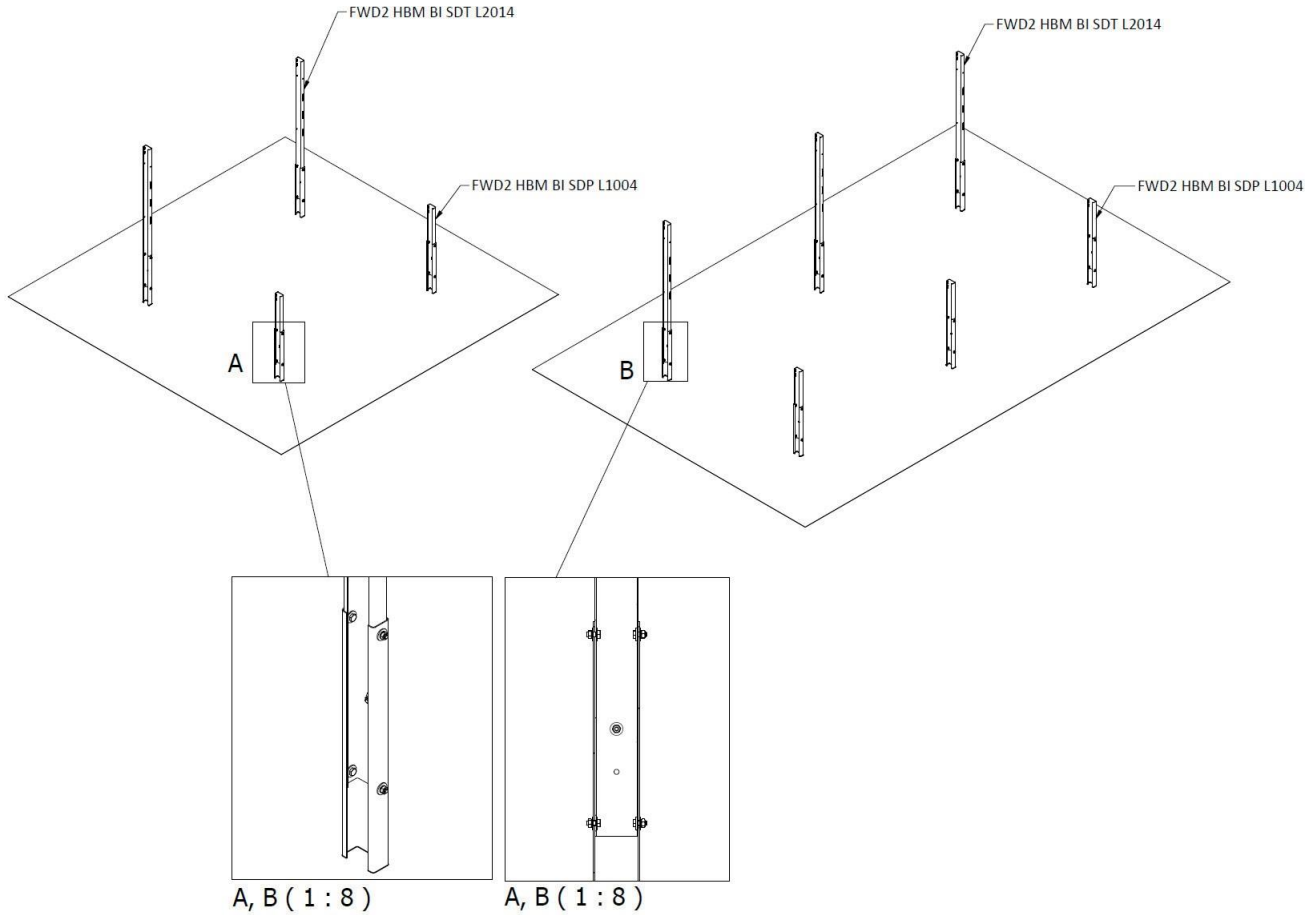


Fig. 6 MANNER AND POINTS OF POST CONNECTION

2.2. BINDER ASSEMBLY

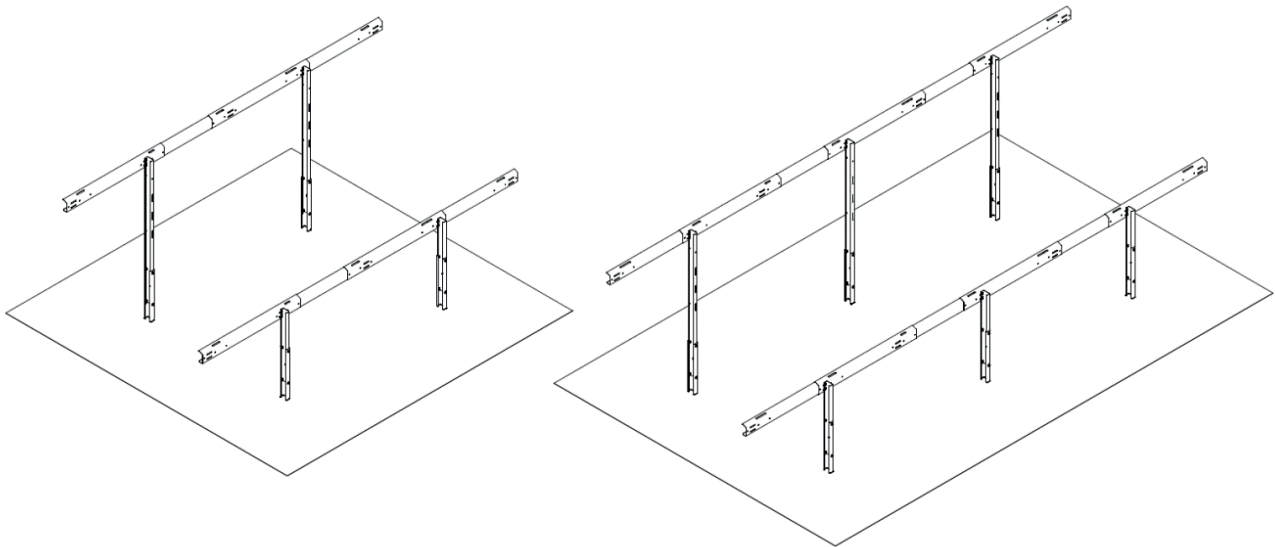


Fig. 7 2x4 and 2x6 TABLE LAYOUTS

Before assembling the binders, connect the particular binders with a Ł5 connecting set. Join the binders in the manner shown below and connect them with 3 connecting sets.

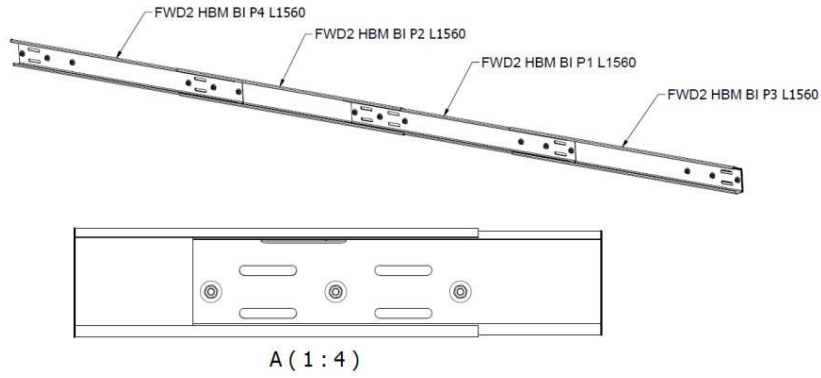


Fig. 8 ASSEMBLY OF BINDERS IN A 2x4 LAYOUT

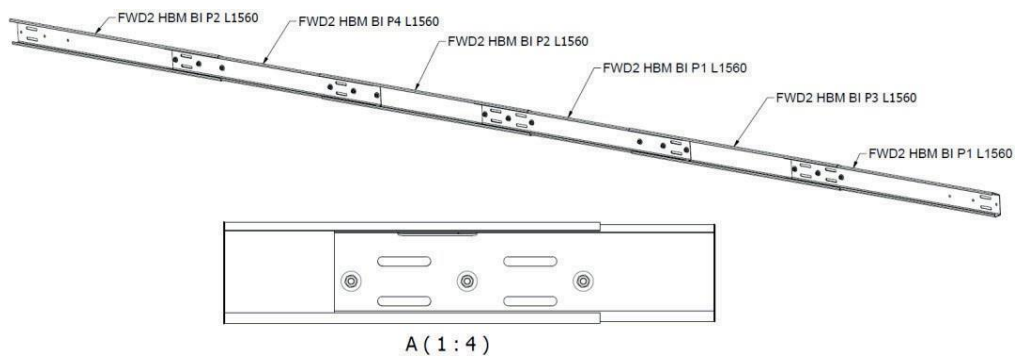


Fig. 9 ASSEMBLY OF BINDERS IN A 2x6 LAYOUT

CONNECT THE BINDER TO THE POST WITH A L1 CONNECTING SET.

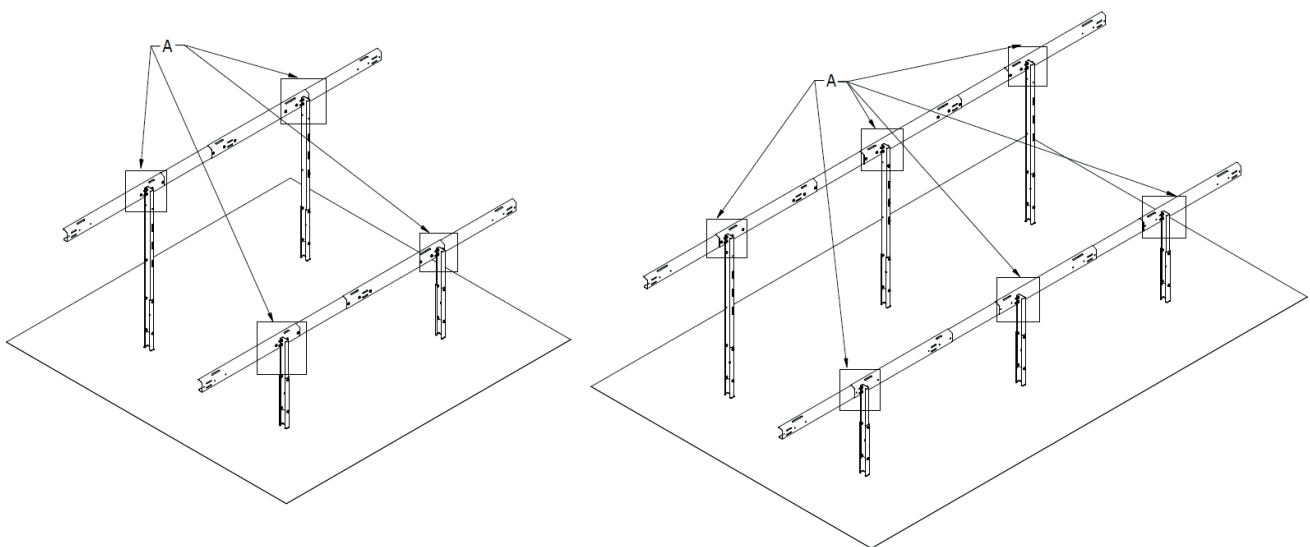


Fig. 10 Binder connection points in 2x4 and 2x6 layouts

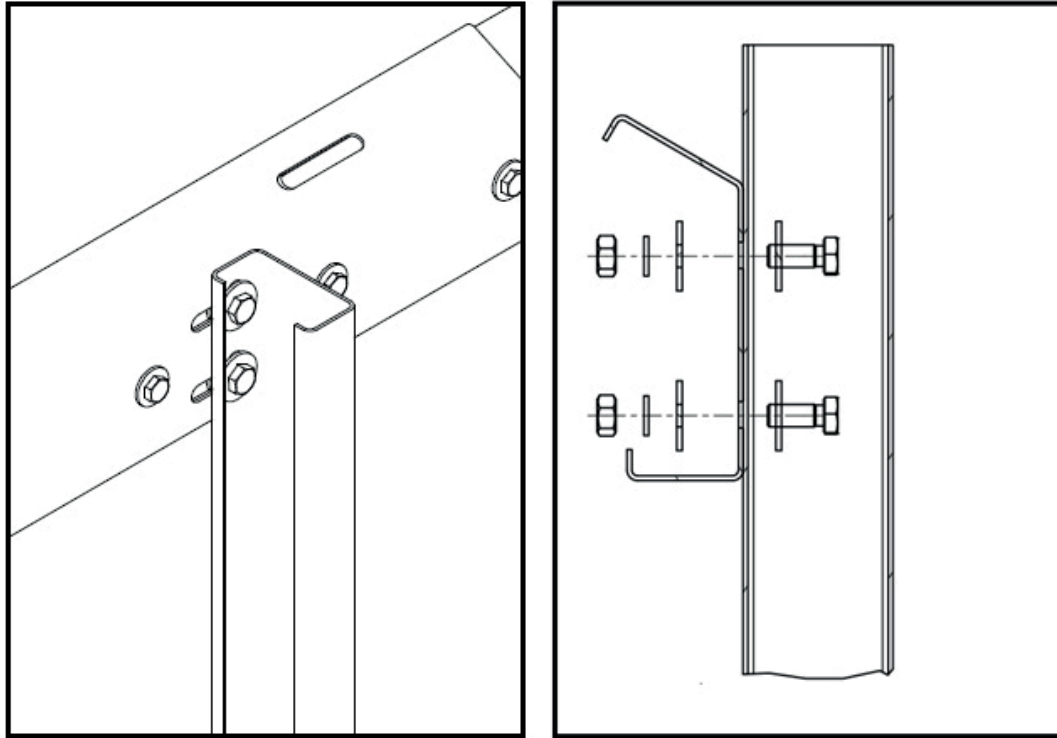


Fig. 11 Binder connection

2.3. RAFTER ASSEMBLY



Before connecting the rafters to the binders, connect the particular rafter components with a Ł5 connecting set. Connect the rafters in the manner shown below with 4 connecting sets.

Fig. 12 WIND ROSE - Rafter positioning

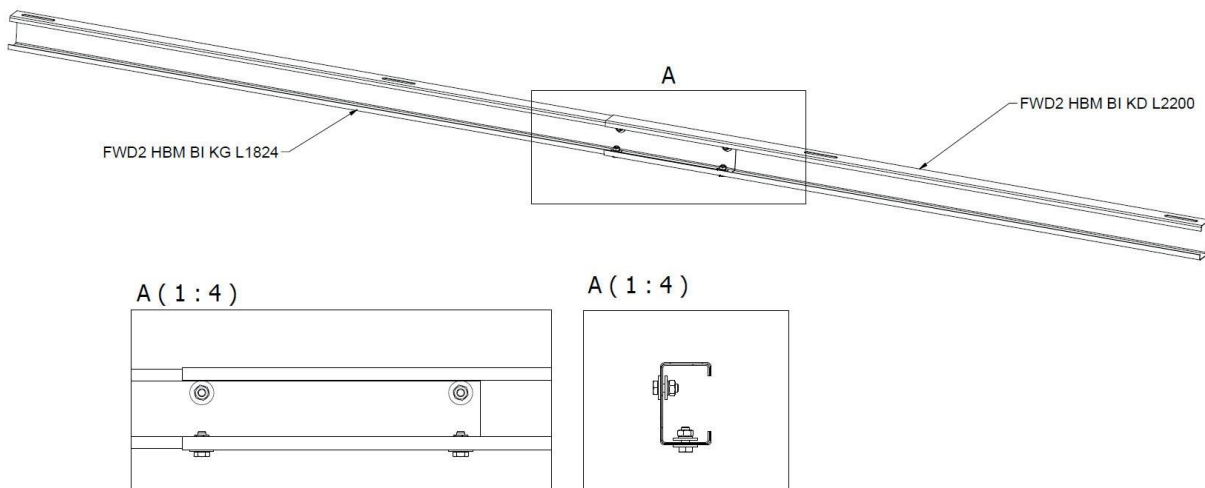


Fig. 13 RAFTER ASSEMBLY

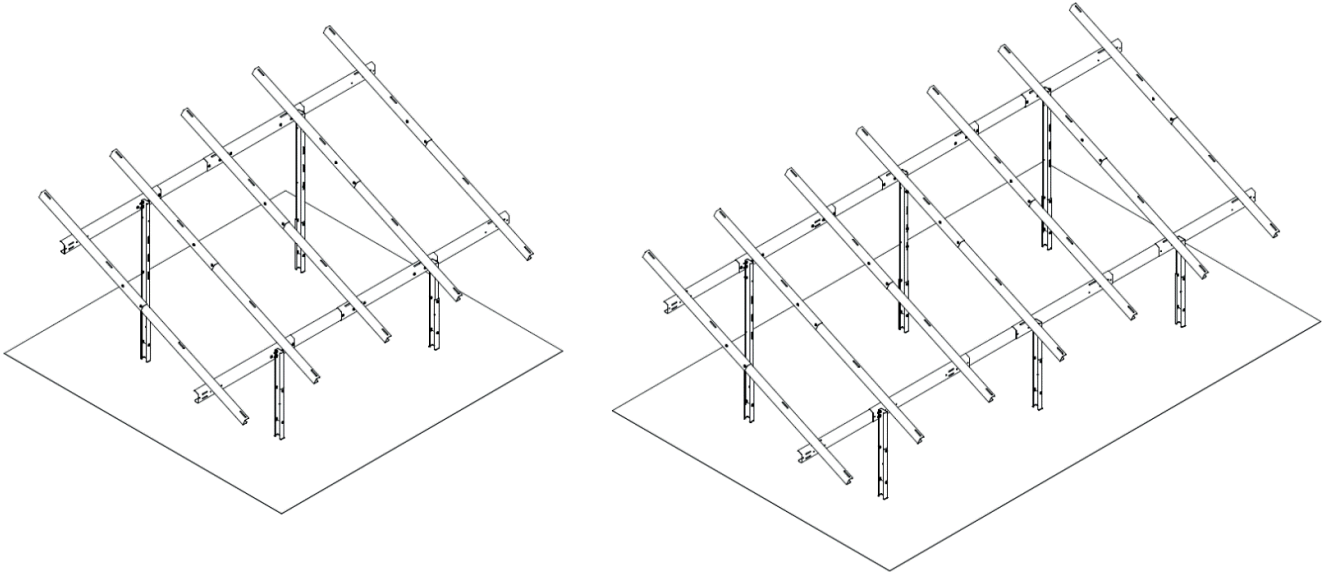


Fig. 14 Distribution of rafters in 2x4 and 2x6 tables

CONNECT EACH RAFTER TO THE REAR AND FRONT BINDER
WITH A **L1** CONNECTING SET.

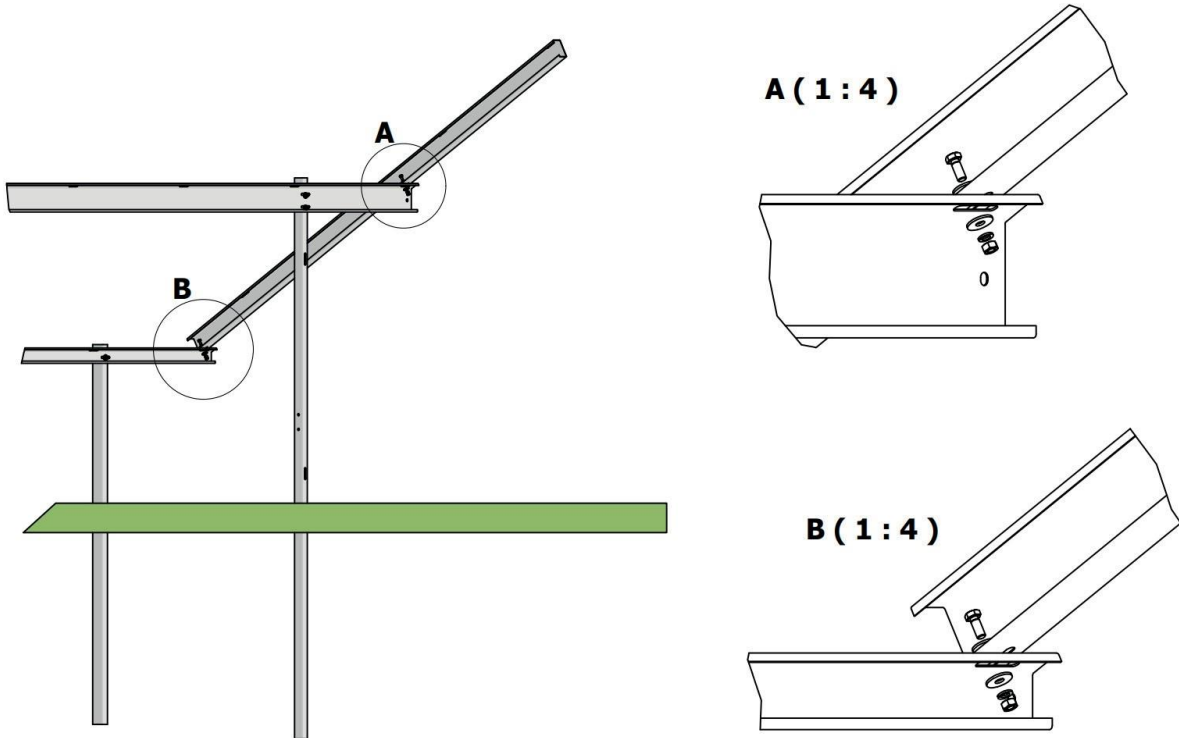


Fig. 15 Rafter connection point

2.4. BRACE ASSEMBLY

Before connecting the BRACES to the POSTS, connect their particular components with a L5 connecting set. Connect the BRACES in the manner shown below with 3 connection sets.

WHEN CONNECTING THE BRACE TO A 2X4 TABLE, ITS FINAL LENGTH MUST BE **L2741**.

WHEN CONNECTING THE BRACE TO A 2X6 TABLE, ITS FINAL LENGTH MUST BE **L3101**.

The length is adjusted with "beans" included in the FWD2 HBM BI T1 L2200 component.

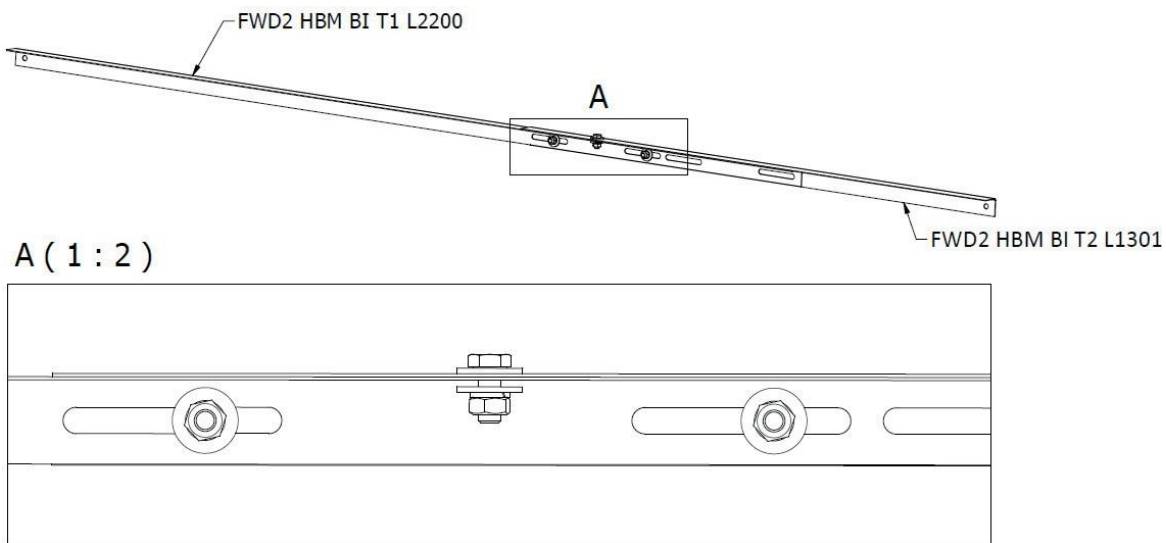


Fig. 16 BRACE CONNECTION

BRACES CONNECTED IN SUCH A MANNER ARE READY TO BE FASTENED TO THE POSTS.

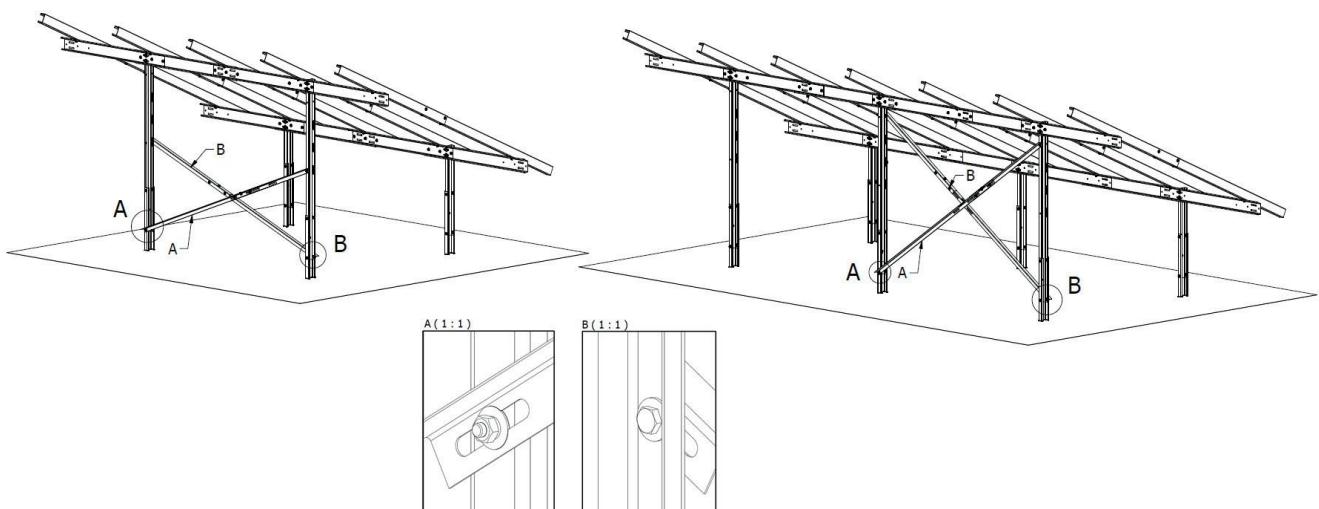


Fig. 17 BRACE FASTENING MANNER AND POINTS

2.5. PV PANEL ASSEMBLY

Assemble your PV panels in accordance with the instruction issued by the manufacturer.

ASSEMBLE THE PANELS WITH A Ł2 AND Ł3 CONNECTING SET

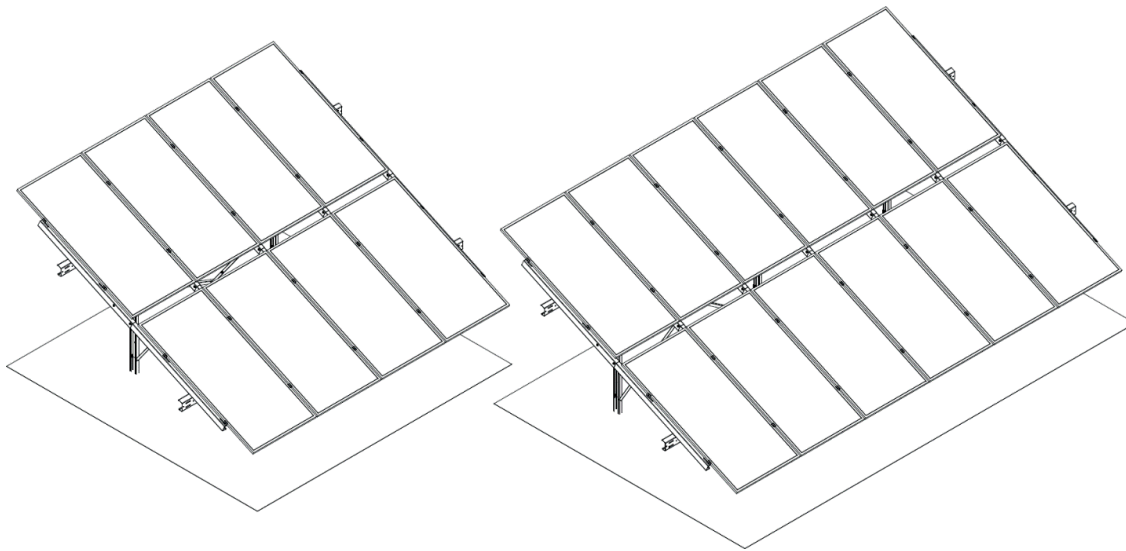
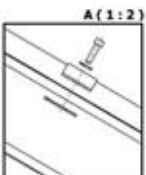


Fig. 18 PANEL DISTRIBUTION IN 2x4 and 2x6 LAYOUTS

A – END CLAMP CONNECTION
Connect the end clamps with a Ł2 connecting set



B – MID CLAMP CONNECTION
Connect the mid clamps with a Ł3 connecting set

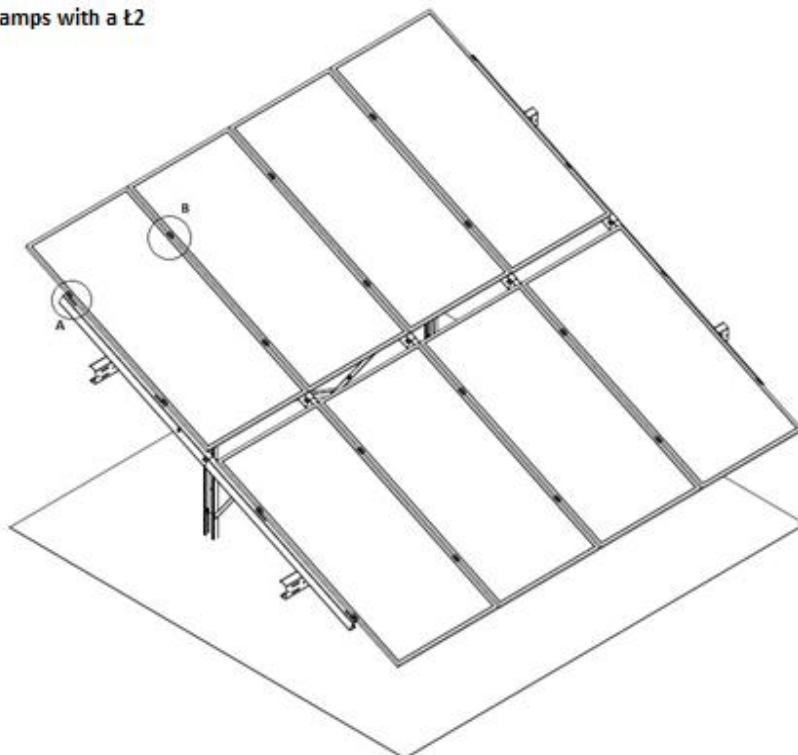
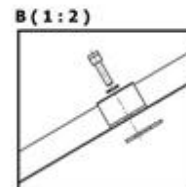


Fig. 19 Module assembly

2.6. INVERTER MOUNTING ASSEMBLY

ASSEMBLE THE INVERTER MOUNTING WITH A **Ł5** CONNECTING SET

Before connecting the INVERTER MOUNTING to the POSTS, connect their particular components with a Ł5 connecting set. Connect the MOUNTINGS in the manner shown below with 3 connecting sets.

The final inverter mounting length must be **L2620**.

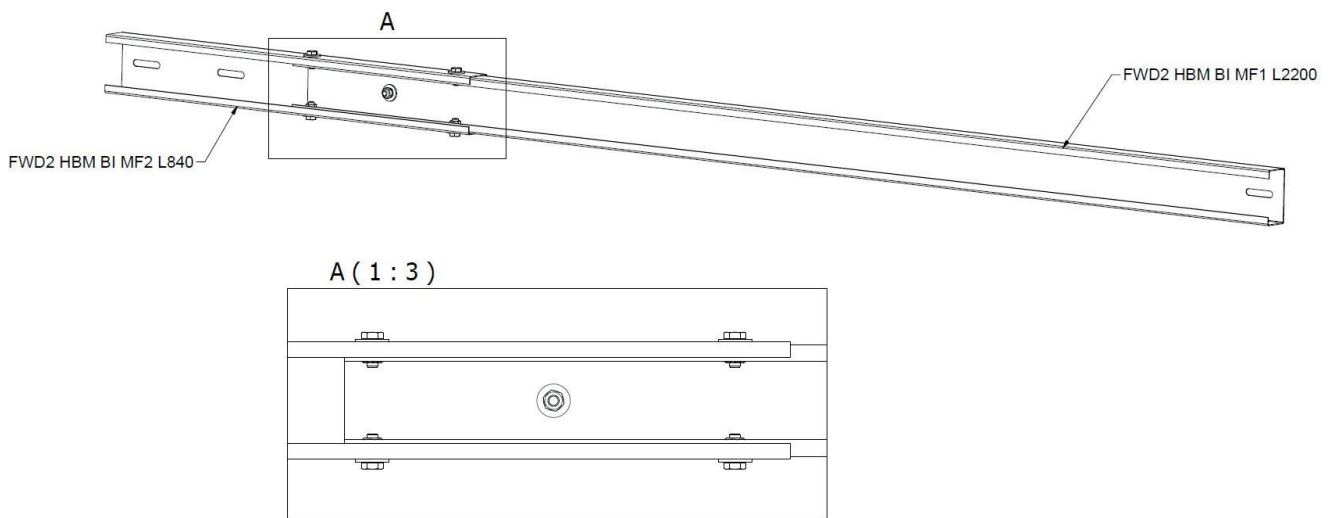


Fig. 20 INVERTER MOUNTING CONNECTION POINTS

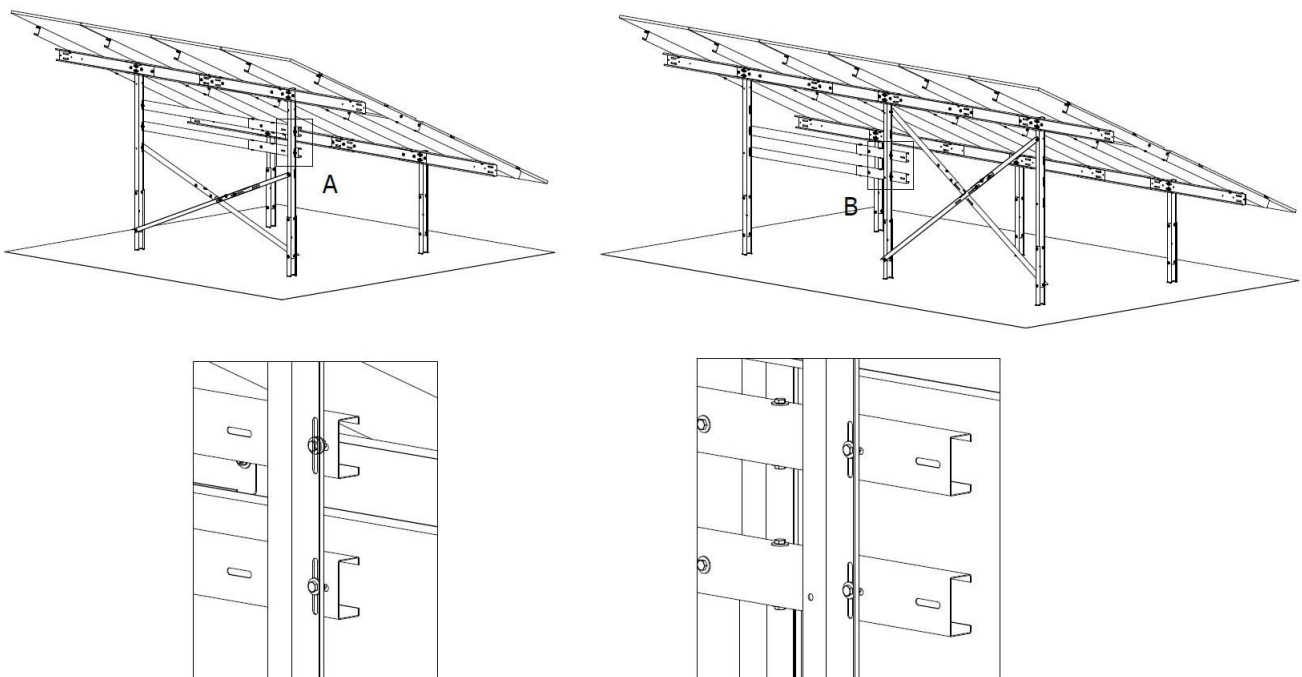


Fig. 21 INVERTER MOUNTING ASSEMBLY POINTS IN 2x4 and 2x6 LAYOUTS

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ASSEMBLY INSTRUCTION