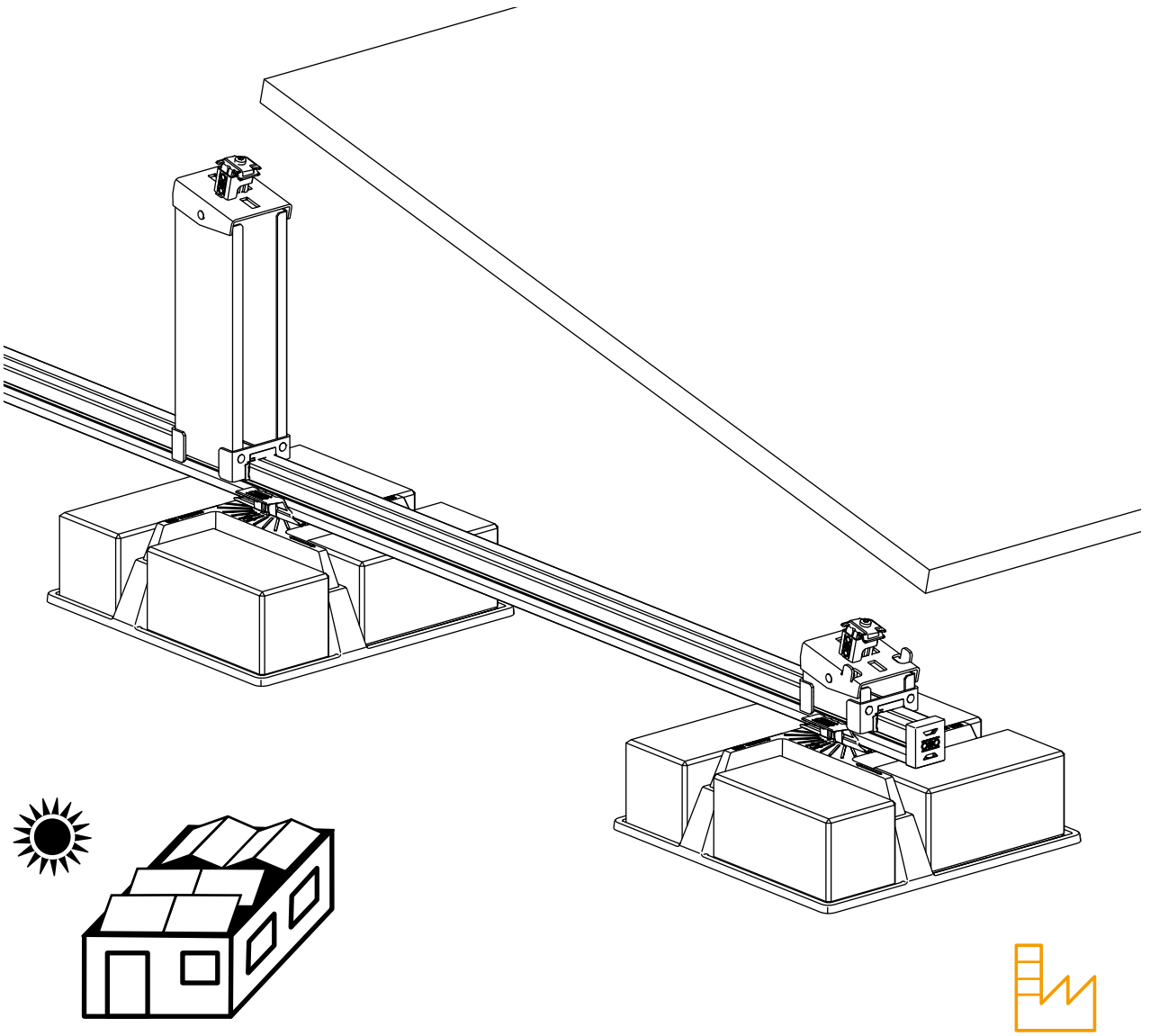


Mounting instructions

Magic PV Flat Pro photovoltaic mounting systems for flat roofs

OBO BETTERMANN

Magic PV Flat Pro photovoltaic mounting systems for flat roofs
Mounting instructions

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Table of contents

1 About these instructions 5

1.1 Target group 5
1.2 Relevance of these instructions 5
1.3 Types of warning information 5
1.4 Basic standards and regulations 5
1.5 Applicable documents 5

2 Intended use 6

3 Safety 6

3.1 General safety information 6
3.2 Personal protective equipment 7
3.3 Storage 7

4 Necessary tools 7

5 System overview 8

6 Mounting the system 14

6.1 Erecting the bases 14
6.1.1 Laying building protection mats 14
6.2 Inserting adapters for the truss profile 15
6.3 Shortening truss profiles 16
6.4 Inserting a truss profile 17
6.5 Weighing down the base 19
6.6 Mounting the endcap 20
6.7 Inserting the short and long supports 21
6.7.1 Establishing spacing with distance gauge 21
6.7.2 Inserting the supports into the truss profile 24
6.8 Additional ballasting of the system 25
6.8.1 System ballasting with mesh cable tray 25
6.8.2 System ballasting with ballast support plates 29
6.8.3 System ballasting with ballast rails 31
6.9 Attaching the PV module 34
6.9.1 Adjusting the angle of inclination of the supports 36
6.10 Fastening the PV module with universal clamps 37
6.10.1 Mounting the universal clamp as an end clamp 37
6.10.2 Mounting the universal clamp as a middle clamp 39
6.10.3 Fastening the PV module with end clamps at the top and bottom 40
6.11 Fastening the PV module with end/intermediate clamps with springs 42
6.11.1 Fastening the PV module with end clamps with springs at the sides 42
6.11.2 Fastening PV modules with intermediate clamps with springs 44
6.11.3 Fastening the PV module with end clamps with springs at the top and bottom 46
6.12 Replacing the PV module 47
6.12.1 Replacing with side and middle fastening 47
6.12.2 Replacing with top and bottom fastening 48
6.13 Mounting the windbreak 49
6.14 Integrating the system into the equipotential bonding and/or lightning protection system 50

6.15 Connecting truss profiles in a lengthwise manner 52
6.16 Connecting truss profiles transversely 53
6.17 Cable routing beneath the PV modules 54
6.17.1 Mounting the GRM mesh cable tray with UniBase 6 54
6.17.2 Mounting the GRM mesh cable tray with UniBase Glue 56

7 Maintaining the system 60

8 Dismantling the system 61

8.1 Dismantling the short and long supports 61

9 Disposing of the system 62

10 Technical Data 63

1 About these instructions

1.1 Target group

These instructions are intended for specialists and/or instructed technical personnel (e.g. roofers, solar panel installers, engineers, architects, construction managers, mounting engineers, installation engineers), who have been trained in the mounting of photovoltaic systems and have been charged with the mounting of PV mounting systems.

Only have electrical work, such as the connection and earthing of the systems, carried out by specialist personnel with electrical training.

1.2 Relevance of these instructions



These instructions are based on the standards valid at the time of compilation (September 2026).

Please read the instructions carefully before starting mounting. We will not accept any warranty claims for damage and liability caused through non-observance of these instructions.

Any images are intended merely as examples. Mounting results may look different.

1.3 Types of warning information

WARNING

Type of risk!
Shows a risky situation. If the warning information is not observed, then serious or fatal injuries may occur.

ATTENTION

Type of risk!
Shows a risky situation. If the safety instruction is not observed, then damage to the product or the surroundings may occur.

Note! *Indicates important information or assistance.*

1.4 Basic standards and regulations

EN 62305 (VDE 0185-305)

DIN VDE 0100-712

EN 61643-32

1.5 Applicable documents

The declarations of conformity are linked to the products at www.obo-bettermann.com.

2 Intended use

The Magic PV Flat Pro photovoltaic mounting systems for flat roofs are used for the mounting of photovoltaic modules with a height of 30–50 mm on flat roofs with a bitumen seal or sealing with plastic membranes. The roof inclination must be < 3°. With roofs with an inclination of > 3°, an individual case study is essential. The systems are suitable for accepting modules with widths of 992–1,134 mm and lengths of 1,640–2,112 mm. The modules can be mounted in an east-west composite or in a southerly direction with an angle of inclination of 13.5 to 15.6°, depending on the module size. The support profiles for the PV modules can be connected up to a maximum length of 20 m, in order to guarantee thermal separation. The mounting systems are not intended for securing people with belts or ropes during roofing work.

The mounting systems are not designed for any purpose other than the one described here. If the photovoltaic mounting systems are used for another purpose, any liability, warranty or damage claims shall be rendered null and void.

3 Safety

3.1 General safety information

Observe the following general safety information:

– It must be ensured that the planned PV system is intended for the load capacity of the roof. If necessary, consult a statics expert.

– The PV system and its ballasting must be matched to the local wind and snow load zones. Design only according to the planning using the OBO Construct app or a technical planner.

– Before commencing mounting, ensure that the materials such as the roof skin and insulation materials of the roof surface are suitable for accepting a PV system.

– The construction site must be protected against falling objects.

– Mounting must be carried out by at least 2 people.

– The people working must be protected as there is the risk of falling when working high above the ground.

– When working on the roof, care must be taken to avoid damaging the roof skin and insulation of the roof.

– Contact with electrical current can lead to an electric shock. Electrical work may only be performed by qualified specialists.

– Protective clothing must be worn as there is the danger of cutting from sharp profile edges and the risk of injuries to the eyes from flying chips when working with the angle grinder.

3.2 Personal protective equipment

List of personal protective equipment to be used:



Use hand protection



Wear safety shoes



Wear eye protection



Use catch protection

3.3 Storage

During storage, UniBase Glue sleeves FPO and BIT must be protected from sunlight, heat and moisture. During the cold season, the material must be stored at > 5 °C for at least 12 hours before processing.

4 Necessary tools

List of tools to be used:

- Folding yardstick/tape measure
- Chalk line
- Angle grinder
- Battery-operated screwdriver (Torx 30/40)
- Torque spanner (WAF 13)
- Screwdriver (Torx 30/40)
- Welding torch or hot air blower or automatic welding device (depending on whether it is a bitumen or plastic roof skin)
- Pressing roller

5 System overview

The Magic PV Flat Pro photovoltaic mounting systems (PV mounting systems) for flat roofs consist of:

– UniBase 10 universal base (non-degassing, UV-resistant), which must be weighed down with standard blocks with an edge height of 10 cm

– Short and long supports

– Aluminium truss profiles

– Universal clamps as end or middle clamps, or

– End and intermediate clamps with springs for larger contact surface for modules.

Windbreaks can be mounted, depending on the alignment of the PV system. The truss profiles are snapped onto the stands without screws using adapters and can be connected with straight or cross-connectors. The short and long supports are snapped onto the truss profiles, and the PV modules onto them. The PV modules are fastened with the universal clamps or end/intermediate clamps with springs. Fastening is possible both at the sides on the short edges of the module or as a quarter-point fastening on the top and bottom edges of the module.

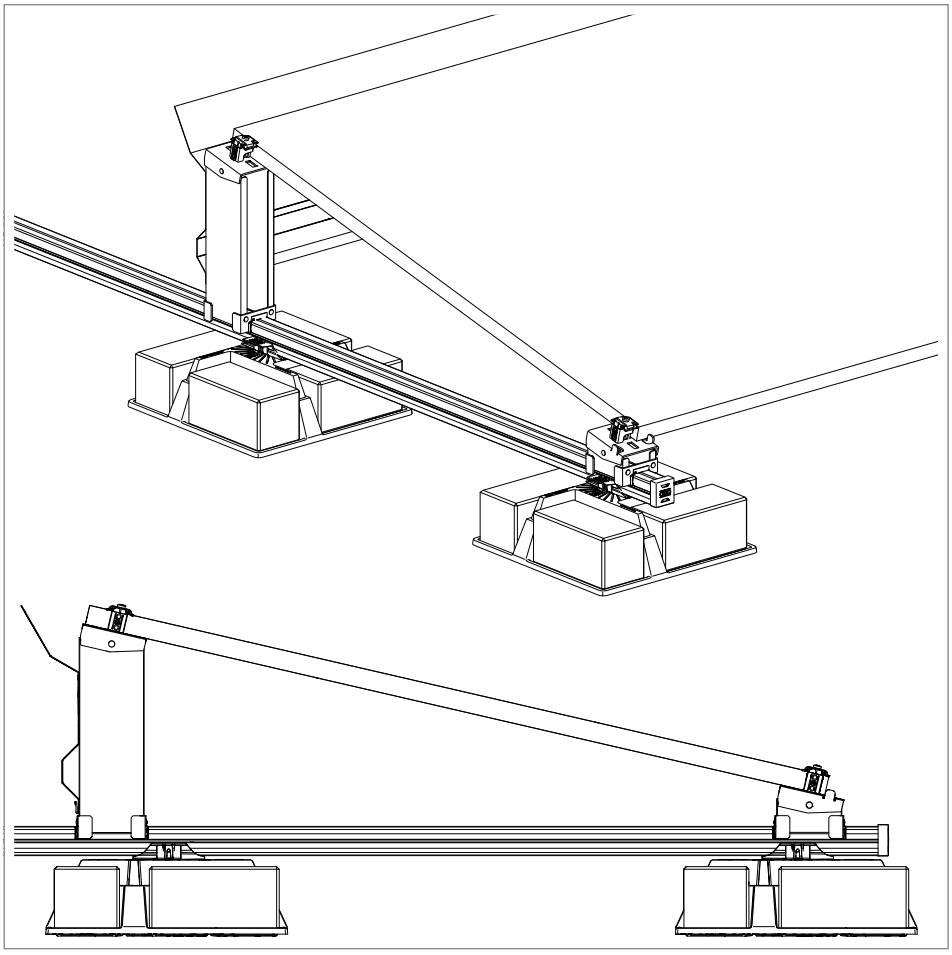


Fig. 1: Overview, system structure, side fastening

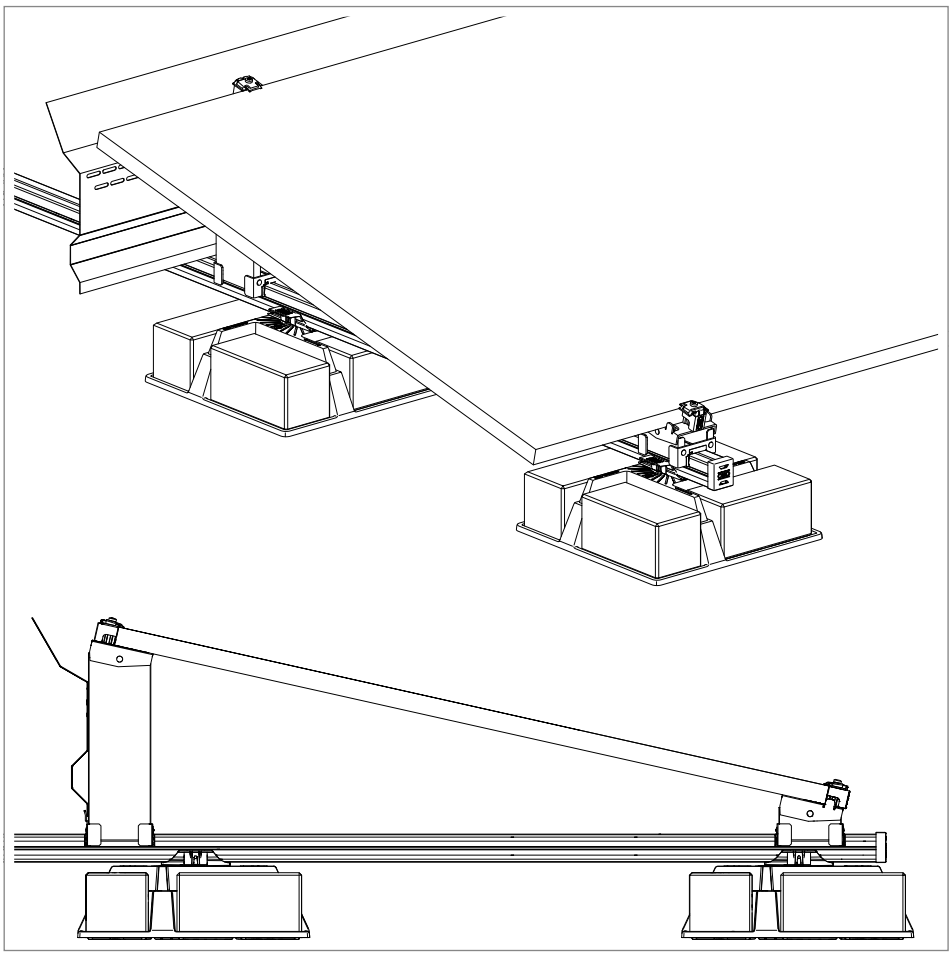


Fig. 2: Overview, system structure, quarter-point fastening top/bottom

The UniBase 6 and UniBase Glue universal bases are available for cable routing on mesh cable trays beneath the PV modules. The UniBase 6 is weighed down using standard blocks with an edge height of 6 cm. The UniBase Glue is welded on with a sleeve made of bitumen or plastic film. The bases each have a seat for an adapter, in order to mount the GRM mesh cable trays.

If the planning specifies additional ballasting in addition to the UniBase 10 universal base, there are three alternatives available. Ballasting with:

– Mesh cable trays and standard blocks

– Ballast rail and standard blocks

– Ballast support plate and standard blocks.

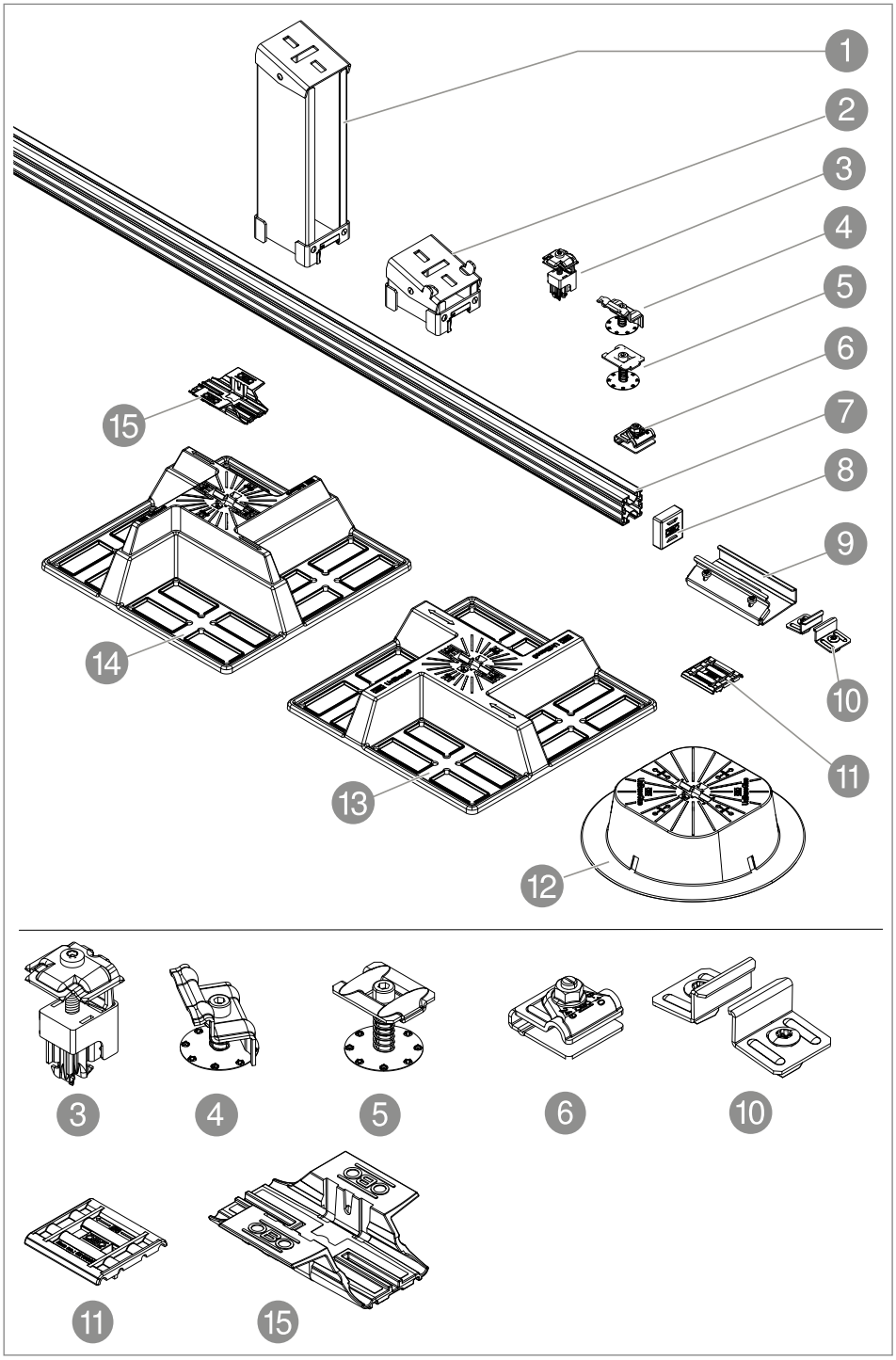


Fig. 3: Magic PV Flat Pro system overview

	Designation	Type	Function
1	Support, long	STL 15 DD	Sloping stand-off and support for PV module, fastening on truss profile
2	Support, short	STK DD	Sloping stand-off and support for PV module, fastening on truss profile
3	Universal clamp	KLU A2/KLU A2 S	Fastening of PV modules on supports
4	End clamp with spring	KLE F 25 A2 KLE F 30 A2 KLE F 35 A2 KLE F 40 A2	Fastening of PV modules on supports, suitable for high-load zones
5	Intermediate clamp with spring	KLZ F 25 A2 KLZ F 30 A2 KLZ F 35 A2 KLZ F 40 A2	Fastening of PV modules on supports, suitable for high loads
6	Universal earthing terminal PV	249 PV10 6-50V2A	Creation of equipotential bonding
7	Truss profile	TP 45/4700 ALU TP 45/4700 ALU S	Support and mounting rail for PV modules
8	Endcap	EK 45 G/ EK 45 G S	Protection against injuries and ingress of dirt
9	Straight connector	LV 45 DD	Straight connection of truss profiles
10	Cross connector	KV 45 DD	Cross-connection of truss profiles
11	Adapter for mesh cable trays	165 MBG HGRM	Fastening of GRM mesh cable tray on UniBase 6 base and UniBase Glue
12	Universal base, glueing	UniBase Glue	Base for glueing, for mounting systems, acceptance of HGRM adapters to mount GRM mesh cable trays for cable routing
13	Universal base, ballasting, for standard blocks up to 10 x 20 x 6 cm, ≥ 2 kg	UniBase 6	Base for weighing down, for mounting systems, acceptance of adapters to mount GRM mesh cable trays for cable routing
14	Universal base, ballasting, for blocks up to 10 x 20 x 10 cm, ≥ 4 kg (according to EN 1338)	UniBase 10	Base for weighing down, for mounting systems, acceptance of adapters with truss profile
15	Truss profile adapter for universal base	UniBase TMP	Connection between UniBase base and truss profile

Accessories

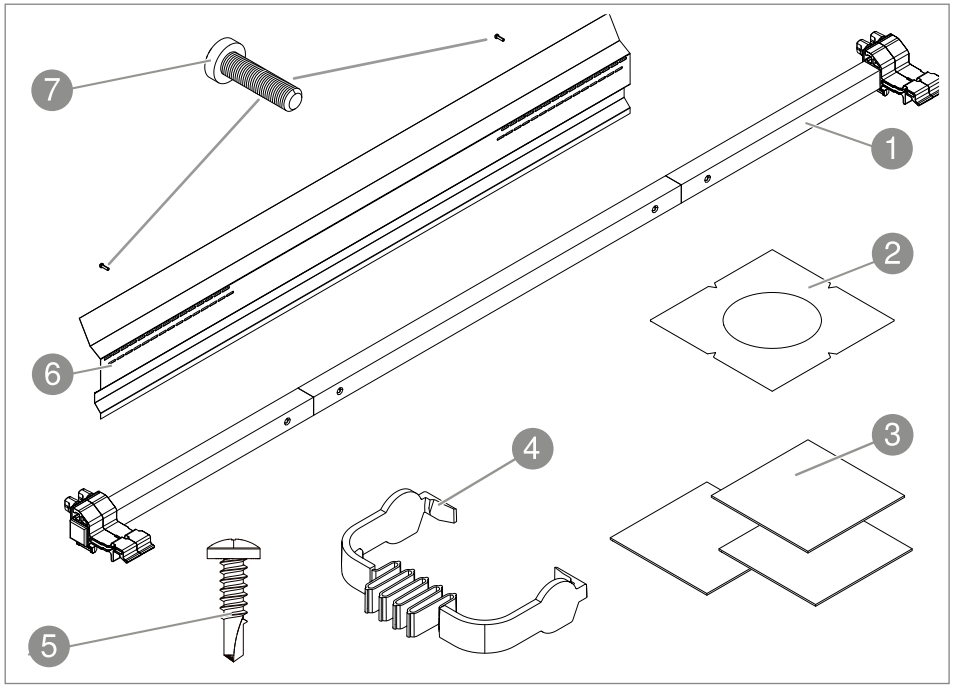


Fig. 4: System accessories

	Designation	Type	Function
1	Distance gauge	AASL FD	Transfer even spacing between truss profiles and between supports
2	Sleeve (bitumen or plastic)	UniBase Glue Bit UniBase Glue FPO	Fixing of UniBase Glue
3	Building protection mat	UniBase BSM AL/ UniBase BSM	Non-slip base for UniBase 6/UniBase 10 base
4	Dismantling tool	nicht separat zu bestellen, liegt den Trägerprofilen bei	Release of the short and long supports from the truss profile
5	Drilling screw	BS BKS KB	Optional fastening of truss profiles to adapter
6	Windbreak	WSB 2200 DD	Protection against wind load/wind pressure
7	Flat-head screw	FKS 6x25 A2	Fastening of windbreak to long support

Accessories for additional ballasting

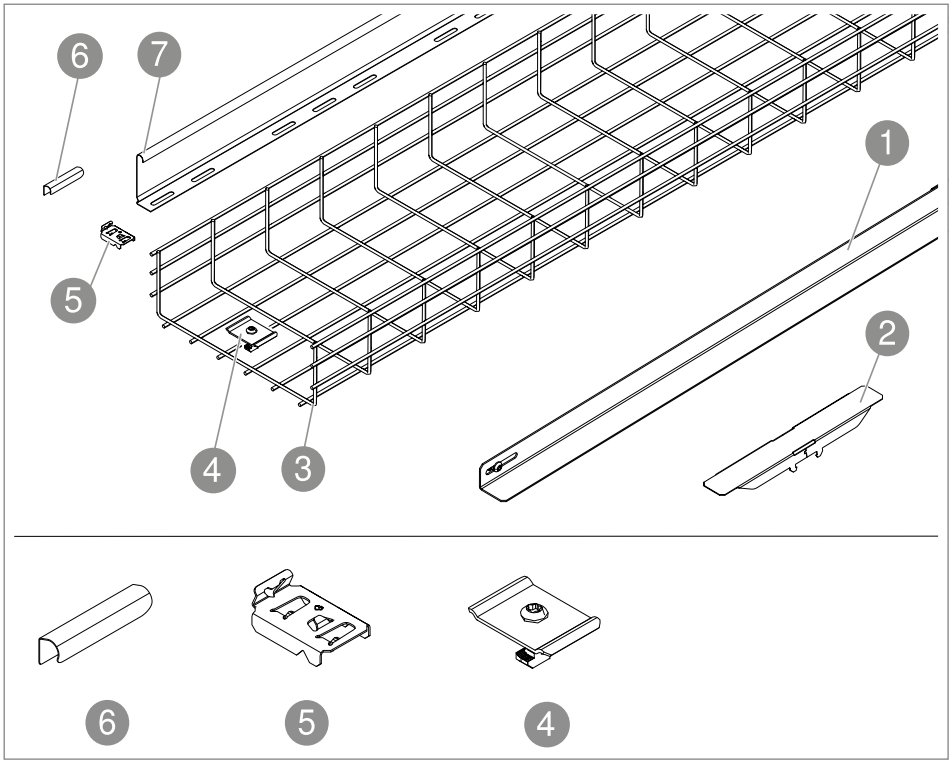


Fig. 5: Accessories for additional ballasting

	Designation	Type	Function
1	Ballast rail	BAS	Support for ballasting
2	Ballast support plate	BTB	Support for ballasting
3	Mesh cable tray	GRM 55 (200-600) FT GRM 105 (200-600) FT	Support for ballasting and cables
4	Fastening set for mesh cable trays for flat-roof systems	BF GR	Fastening of mesh cable tray GRM on truss profile
5	Hold-down clamp for mesh cable tray	KS GR A2	Barrier strip fastening
6	Barrier strip connec tor, for all barrier strip side heights	TSGV A2	Straight connection of barrier strips, all side heights
7	Barrier strip	TSG 45 DD TSG 85 DD	Separation of ballasting and cables in mesh cable tray

6 Mounting the system

ATTENTION

Danger of breakage and function loss!
PV modules can be lifted from below through the effect of wind. There is the danger of breakage and function loss. Maintain the spacings between the modules, as intended in the planning, along with the planned ballasting.

ATTENTION

Risk of shading!
If, with a southerly alignment, the PV modules are mounted too close to one another, there is the risk of mutual shading and thus reduced power yields. Maintain the spacings between the modules, as intended in the planning.

6.1 Erecting the bases

The number, spacing and weighting of the UniBase 10 bases and the number of PV modules are specified by the roof assignment plan from the planner/statics engineer and/or the OBO Construct planning app.

6.1.1 Laying building protection mats

Building protection mats must be laid under the bases to prevent slippage of the PV system and to protect the roof skin. In addition, smaller height differences can be compensated using a maximum of 3 building protection mats, in order to mount the truss profiles in a flush manner.

In the case of larger height differences, for reasons of stability, the truss profiles may not be mounted continuously, but must be separated. A further, separate mounting system must then be mounted.

Note! *Whether building protection mats are required must be determined from the planning.*

1. Locate and align bases according to the roof assignment plan. The arrows on the bases show the running direction of the truss profiles.

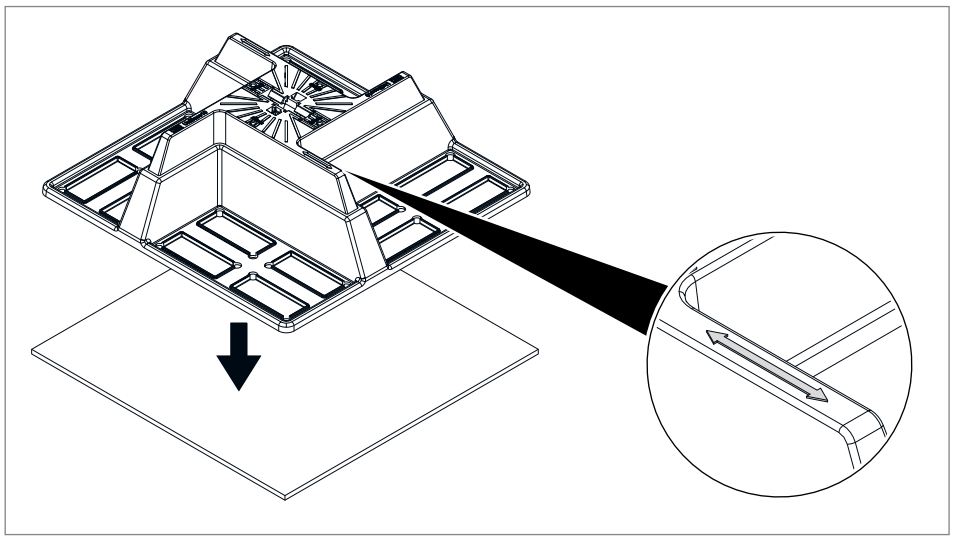


Fig. 6: Erecting a base

2. Lay the building protection mats under the bases.

6.2 Inserting adapters for the truss profile

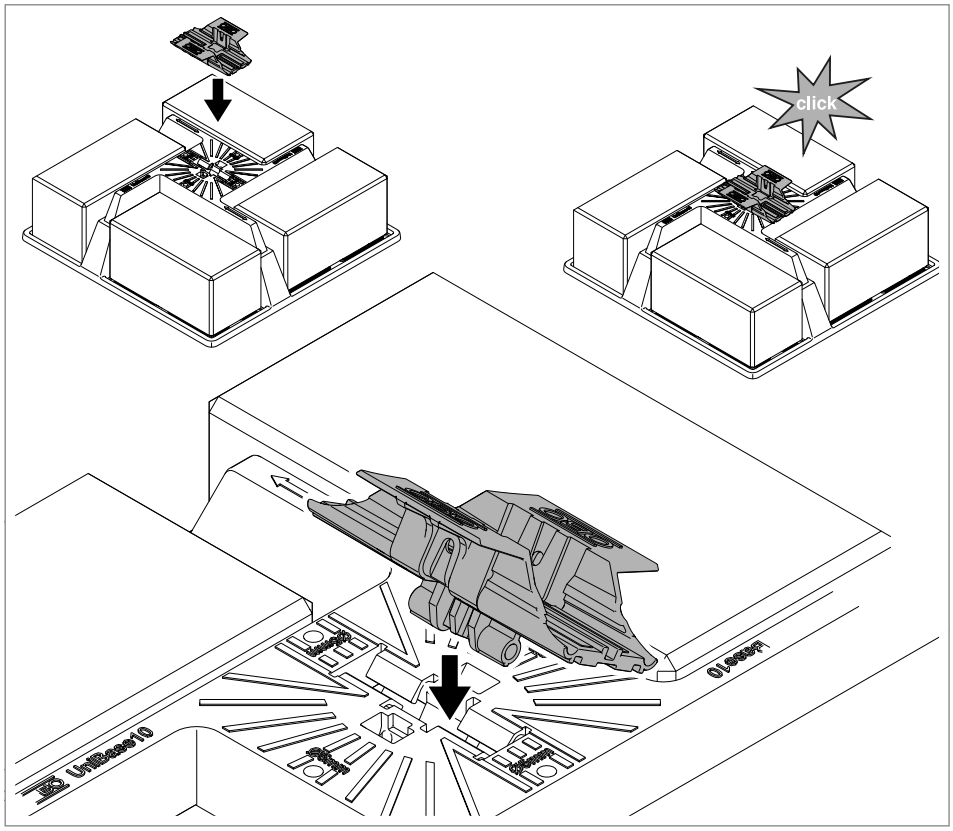


Fig. 7: Inserting adapters

1. Engage the UniBase TMP adapter in the seat of the UniBase base.
2. Engage adapters in all the other bases.

6.3 Shortening truss profiles

The number and lengths of the truss profiles are specified by the roof assignment plan from the planner/statics engineer and/or the OBO Construct planning app.

It may be necessary to shorten truss profiles.

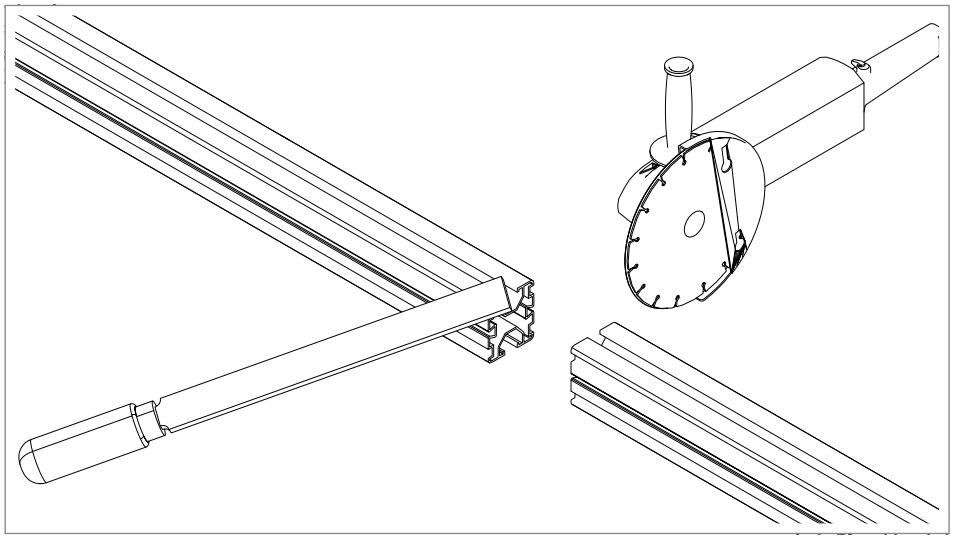


Fig. 8: Shortening truss profiles

1. Using an angle grinder, shorten the truss profile to the prescribed length.

2. Deburr cut edges.

6.4 Inserting a truss profile

Note! *Before insertion, the truss profile must be correctly positioned in the straight direction, as the integrated anti-slip device in the adapter means that it can only then be moved with great difficulty.*

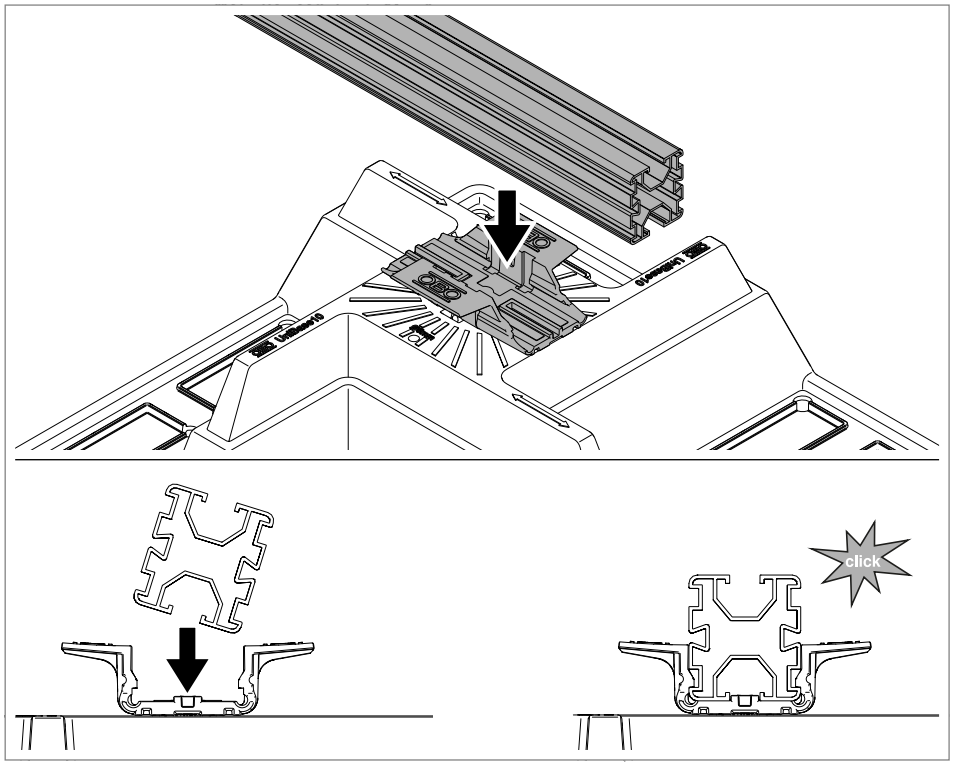


Fig. 9: Inserting a truss profile

1. Insert the truss profile into the seat of the adapter at a slight angle and push it horizontally into the necessary position.
2. Engage the truss profile in the adapter.
3. Insert all the remaining truss profiles.
4. Connect the truss profiles at joints with straight connectors (see Chapter „6.15 Connecting truss profiles in a lengthwise manner“ on page 52

Note! *The truss profile must be screwed to the adapter using self-tapping screws, if the planning dictates additional securing of the mounting system.*

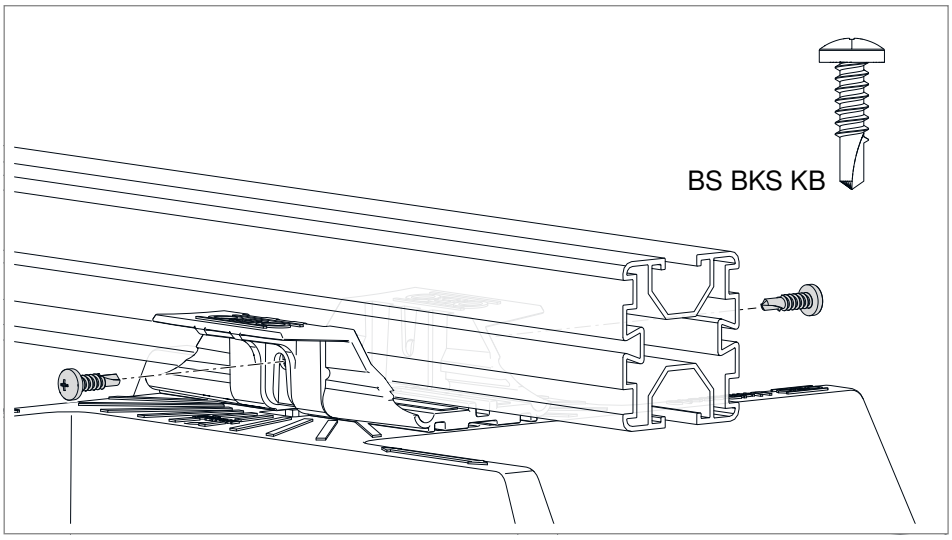


Fig. 10: Securing the truss profile with screws

5. If necessary, additionally screw the truss profile to both sides of the adapter using BS BKS KB self-tapping screws

6.5 Weighing down the base

As standard, the UniBase 10 base is weighed down using baseard blocks according to EN 1338 of size (length x width x height) 10 x 20 x 10 cm. Alternatively, blocks of other sizes can be used if the specified ballasting is observed. The weights of UniBase 10 ballasts with different block sizes are listed in the following table for guidance

Anzahl Steine und Maße in cm	Gewicht in kg
UniBase 10 inclusive 4 blocks 20x10x6	11,315
UniBase 10 inclusive 4 blocks 20x10x8	15,315
UniBase 10 inclusive 4 blocks 20x10x10	18,915
UniBase 10 inclusive 5 blocks 20x10x6	13,915
UniBase 10 inclusive 5 blocks 20x10x8	18,915
UniBase 10 inclusive 5 blocks 20x10x10	23,415
UniBase 10 inclusive 6 blocks 20x10x6	16,515
UniBase 10 inclusive 6 blocks 20x10x8	22,515
UniBase 10 inclusive 6 blocks 20x10x10	27,915

Tab. 1: Weights of different block combinations

ATTENTION

Danger of a loss of function and damage!
If the UniBase base is weighed down with other materials, then there is the risk that it will be damaged or be insufficiently stable.
- Use only blocks with the specified dimensions for weighing down.
- If the weight of an individual unweighted UniBase base is insufficient in any location, then a further UniBase base must be mounted alongside.

1. If necessary, realign the subconstruction of bases and truss profiles exactly before weighing down.

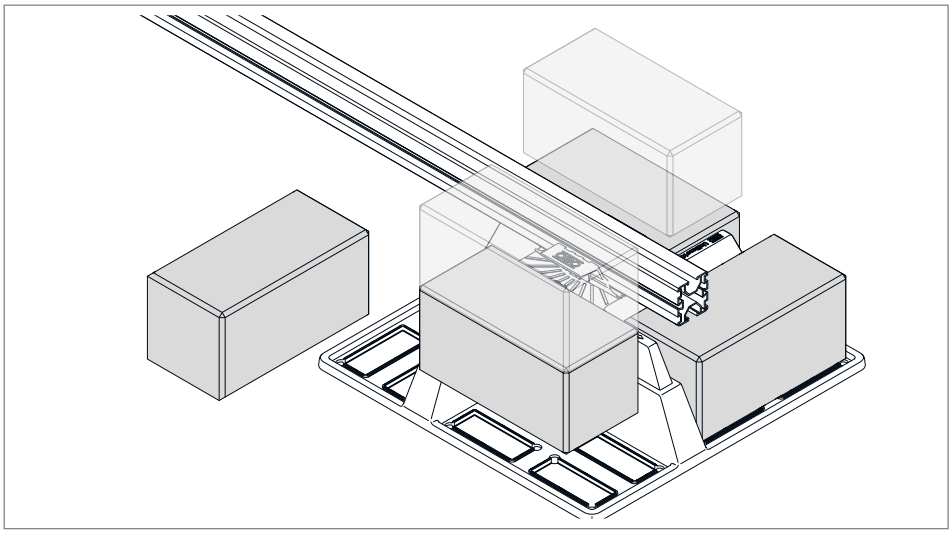


Fig. 11: Weighing down the base

2. Weigh down all the bases with up to 6 blocks.

6.6 Mounting the endcap

As protection against injuries and the ingress of dirt, the ends of the truss profiles are closed off with endcaps.

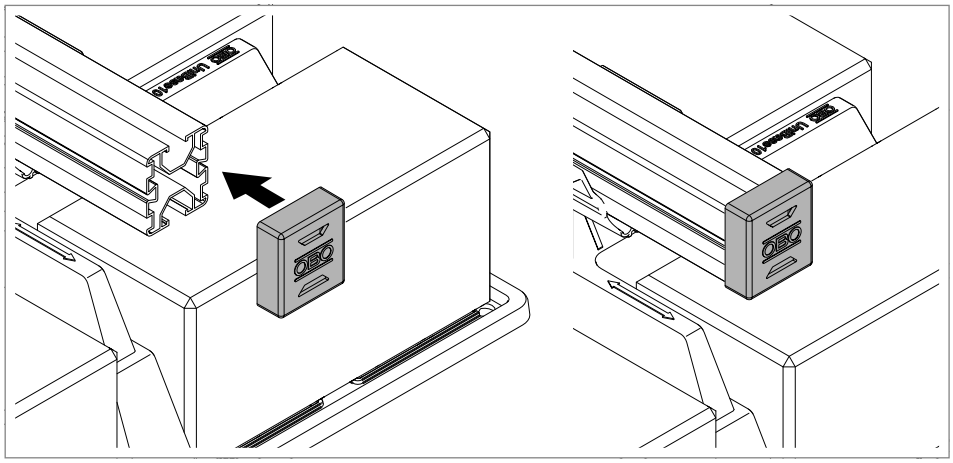


Fig. 12: Mounting the endcap

1. Attach the endcap to both ends of the truss profile and press it in.

6.7 Inserting the short and long supports

Note! *The position of the short and long supports is dependent on the size of the modules and the points in which the universal clamps must be placed. Refer to the planning of the PV system or the OBO Construct planning app for the exact position. The supports can be engaged at any point of the support rail, irrespective of the position of the bases or connectors.*

Note! *The short and long supports can be released again using a dismantling tool (see also Chapter „8.1 Dismantling the short and long supports“ on page 61.*

6.7.1 Establishing spacing with distance gauge

The spacings between the truss profiles and between the supports can be established evenly using the distance gauge. The module widths and lengths are set on the distance gauge and then transferred to the profiles and support spacings.

Note! *Different contact surfaces must be used to measure the module widths, depending on the clamp type used (KLU or KLE F/KLZ F).*

Setting support spacings between two truss profiles

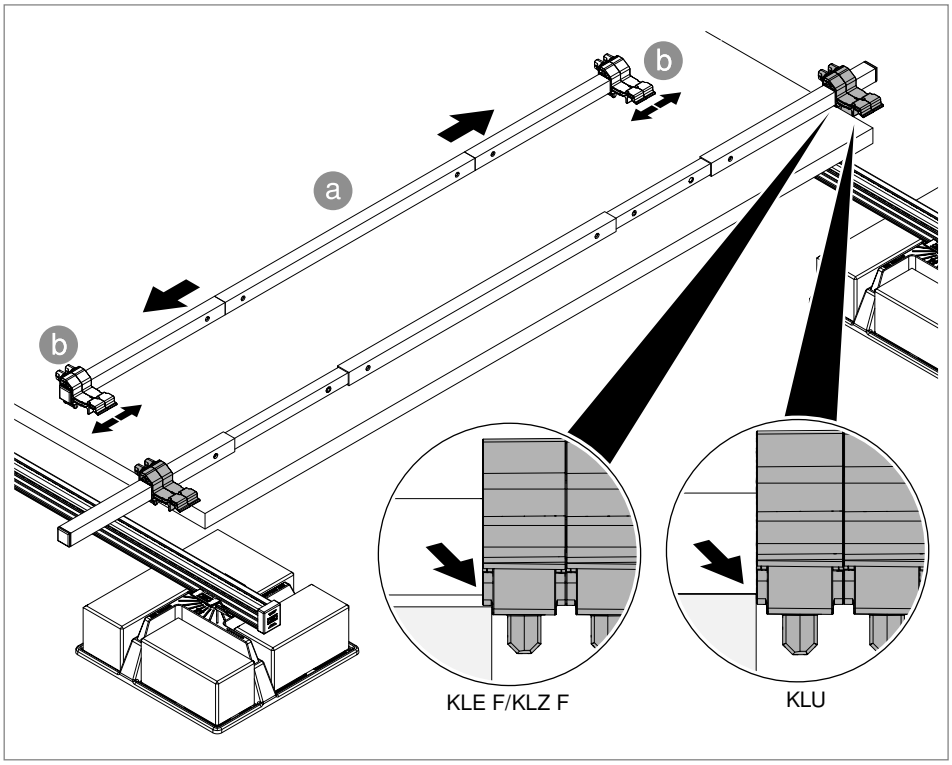


Fig. 13: Set distance gauge to module width

1. Set the distance gauge with telescopic extension a and the infinitely adjustable spacers b to the length of the module. Pay attention to the clamp type KLU or KLE F/KLZ F used later.

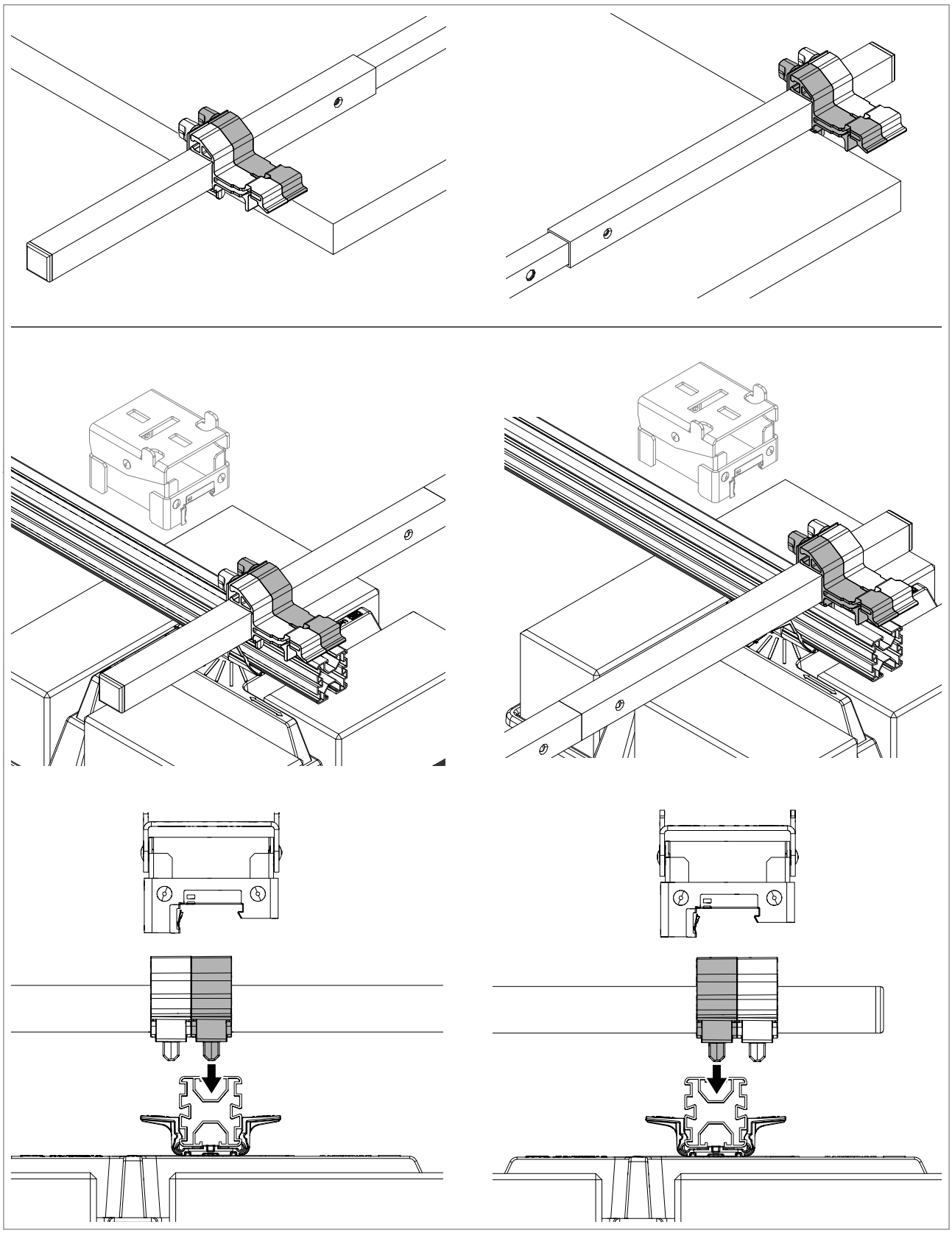


Fig. 14: Transfer set module width to truss profiles

2. Insert spacers into the truss profiles on the left and right to establish the exact spacing between the profiles and supports.

Setting support spacings on a truss profile

Refer to the planning of the PV system for the support spacings X be tween short and long supports.

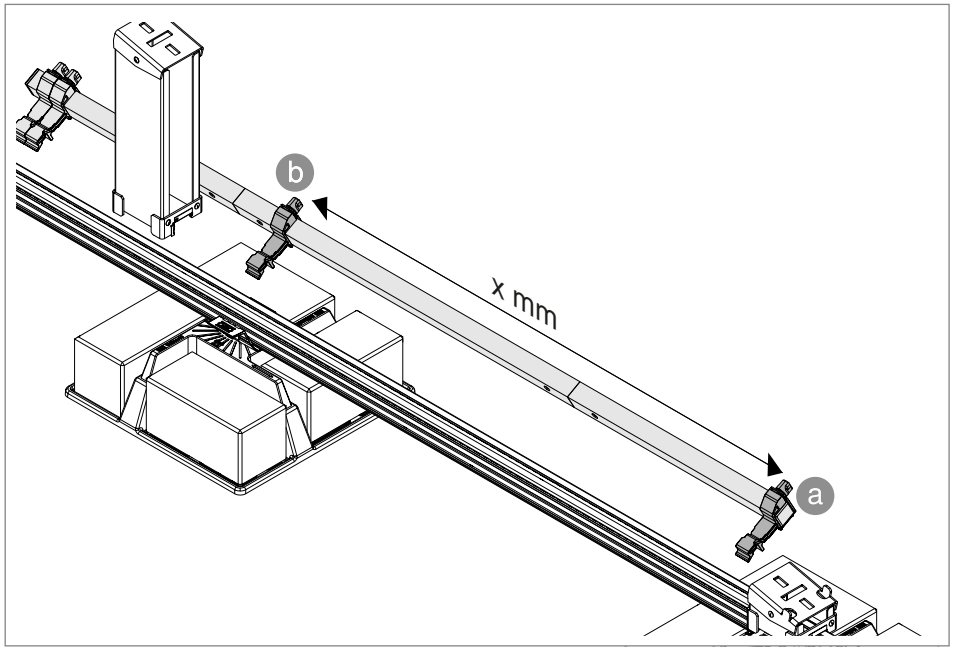


Fig. 15: Setting spacing between supports

1. Set spacing x between the supports using spacers a and b.

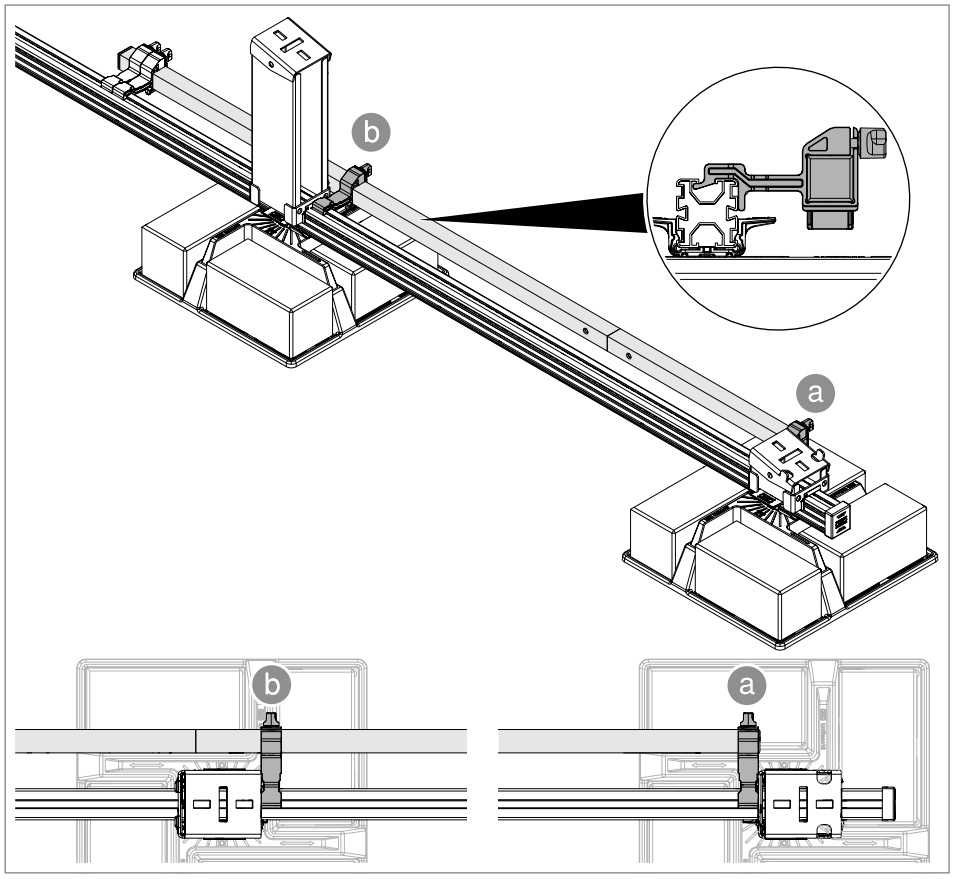


Fig. 16: Aligning the support spacings using the distance gauge

2. Hook the distance gauge into the truss profile. Spacer ⓐ is positioned directly behind the short support. Spacer ⓑ is positioned directly in front of the long support (inserting supports as described in chapter „6.7.2 Inserting the supports into the truss profile“ on page 24).

6.7.2 Inserting the supports into the truss profile

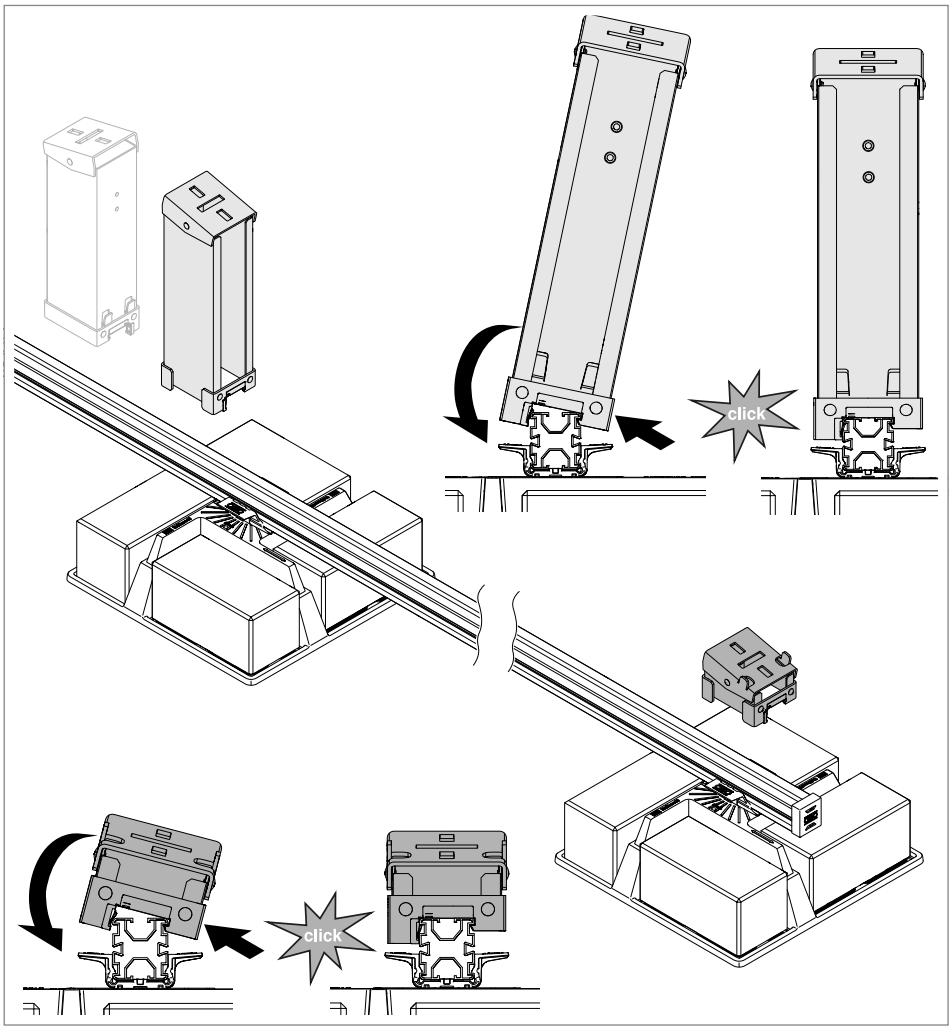


Fig. 17: Inserting the supports

1. Hook the long and short supports into the truss profile using the shorter side (↖).

2. Engage the support in the truss profile.

3. Engage all further supports in the truss profiles.

6.8 Additional ballasting of the system

If the planning specifies additional ballasting in addition to the UniBase 10 universal base, there are three alternatives available. Ballasting with:

– Mesh cable trays and standard blocks

– Ballast rail and standard blocks

– Ballast support plate and standard blocks.

If using the mesh cable tray, it is also possible to route cables. The tray is divided using barrier strips.

ATTENTION

Risk of damage!
If the ballast weight falls below or exceeds the specified level set out in the planning, this may result in damage to components of the PV mounting system..
- Adhere to the specified ballast weight as set out in the planning.

6.8.1 System ballasting with mesh cable tray

Mounting the mesh cable tray using the fastening set

The mesh cable trays are fastened to the truss profile with the BF GR fastening set.

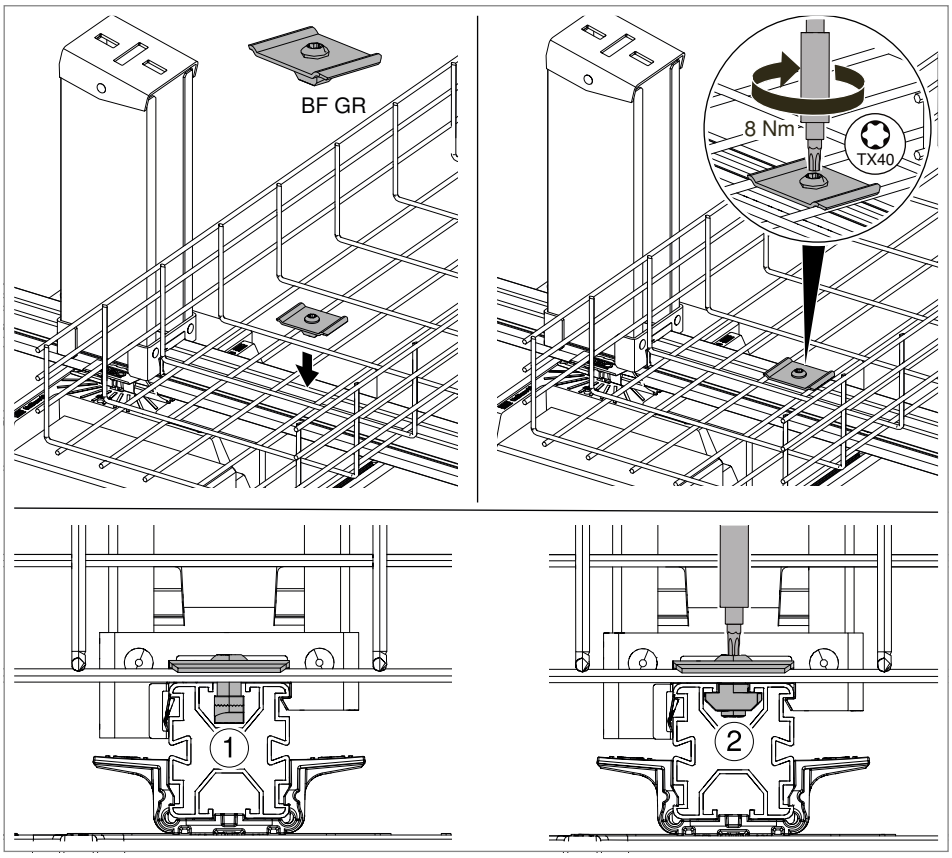


Fig. 18: Fastening the mesh cable tray

1. Place the mesh cable tray on the truss profile.
2. Insert the slide nut from the fastening set into the truss profile ①.
3. Tighten the screw from the fastening set with 8 Nm until the slide nut seizes, while clamping the straight wires of the mesh cable tray ②.
4. Fasten the mesh cable tray to all further truss profiles with the fastening set.

Mounting a barrier strip

The barrier strip is fastened to the mesh cable tray with a KS GR fastening set without a screw connection. For type GRM 55 mesh cable trays, the TSG 45 barrier strip is used; barrier strip TSG 85 is used for type GRM 105. Multiple barrier strips are connected lengthwise with the TSG V barrier strip connector.

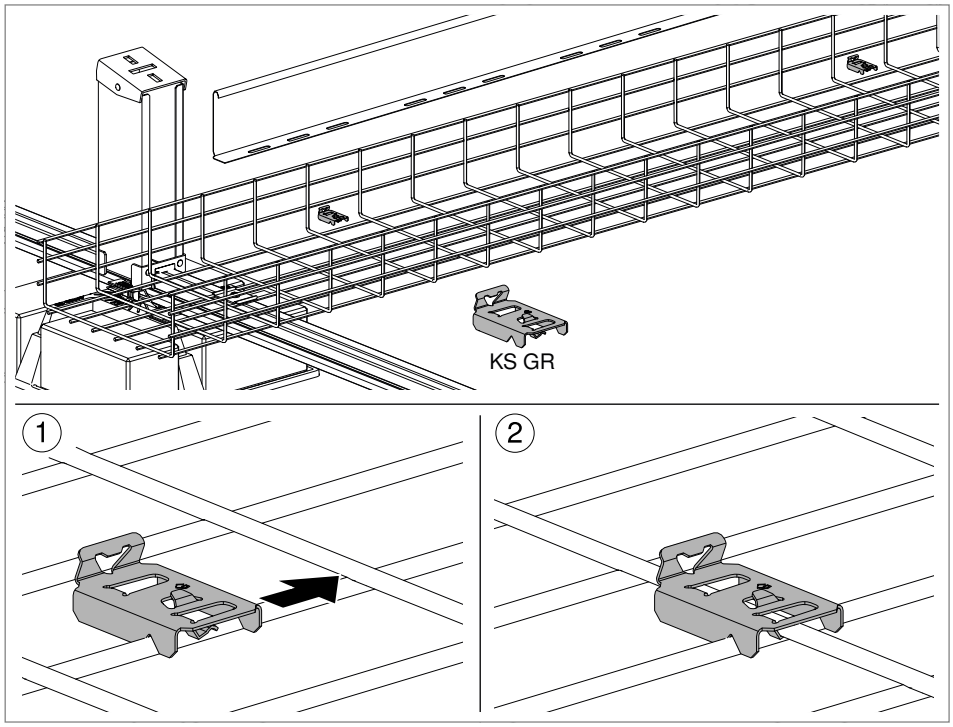


Fig. 19: Fastening barrier strip with fastening set

1. Place the fastening set on the mesh cable tray wire ①.
2. Engage the hook of the fastening set under the mesh cable tray wire ②.

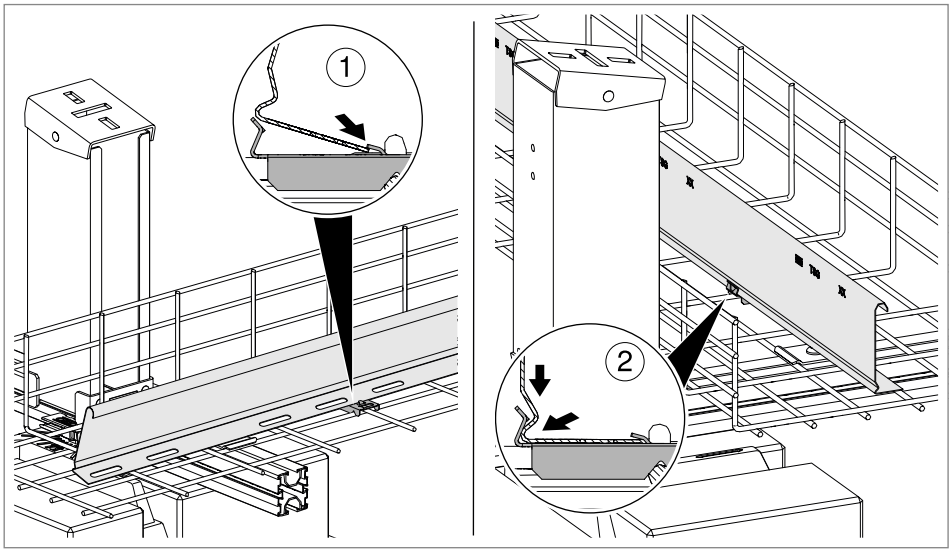


Fig. 20: Clamping the barrier strip

3. Clamp the barrier strip in the fastening set.

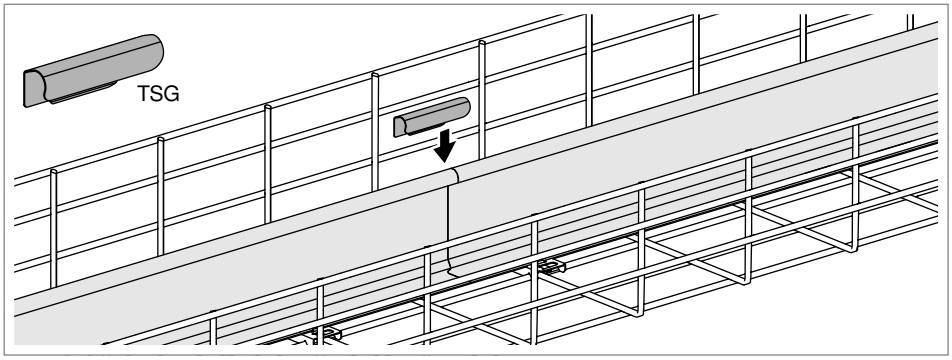


Fig. 21: Clamping barrier strip connector

4. To connect the barrier strips lengthwise, clamp the TSG barrier strip connector at the joint of 2 barrier strips.

Mesh cable tray ballasting

The mesh cable trays are ballasted using standard blocks with a maximum width of 10 cm. The maximum number of blocks per tray depends on the tray width and height and the weight needed to ballast the system. Refer to the system planning for the number of blocks.

Note! *Generally, the blocks can be positioned on the left or right side of the barrier strip. The side is selected at the planner and installer's discretion, e.g. taking into account the accessibility of the cable duct for subsequent cable routing.*

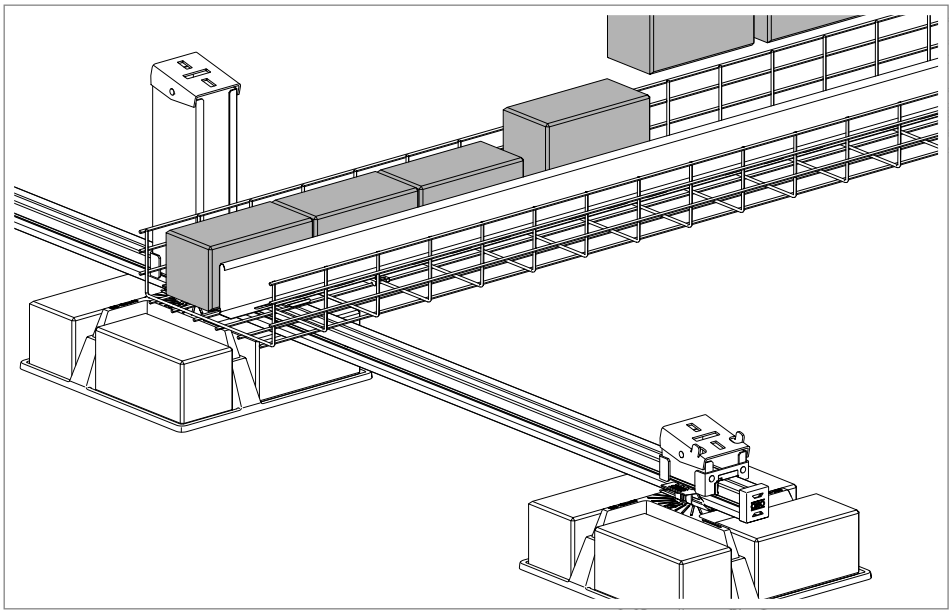


Fig. 22: Mesh cable tray ballasting

1. Place the required number of blocks into the mesh cable tray on one side of the barrier strip.

6.8.2 System ballasting with ballast support plates

Two or three ballast support plates and up to 9 standard blocks with a width of 10 cm can be used.

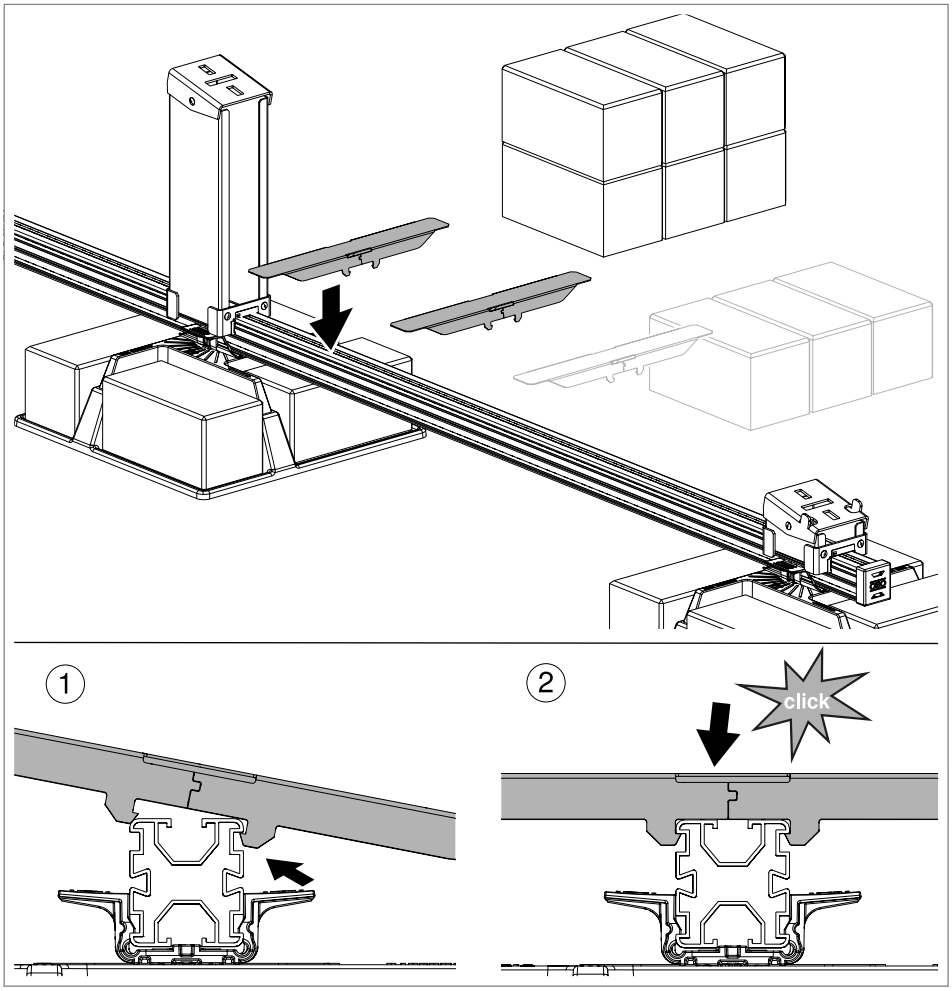


Fig. 23: Engaging ballast support plate

1. Hook the ballast support plate under the truss profile on one side ①.
2. Press down the ballast support plate and hook under the truss profile on the other side ②.

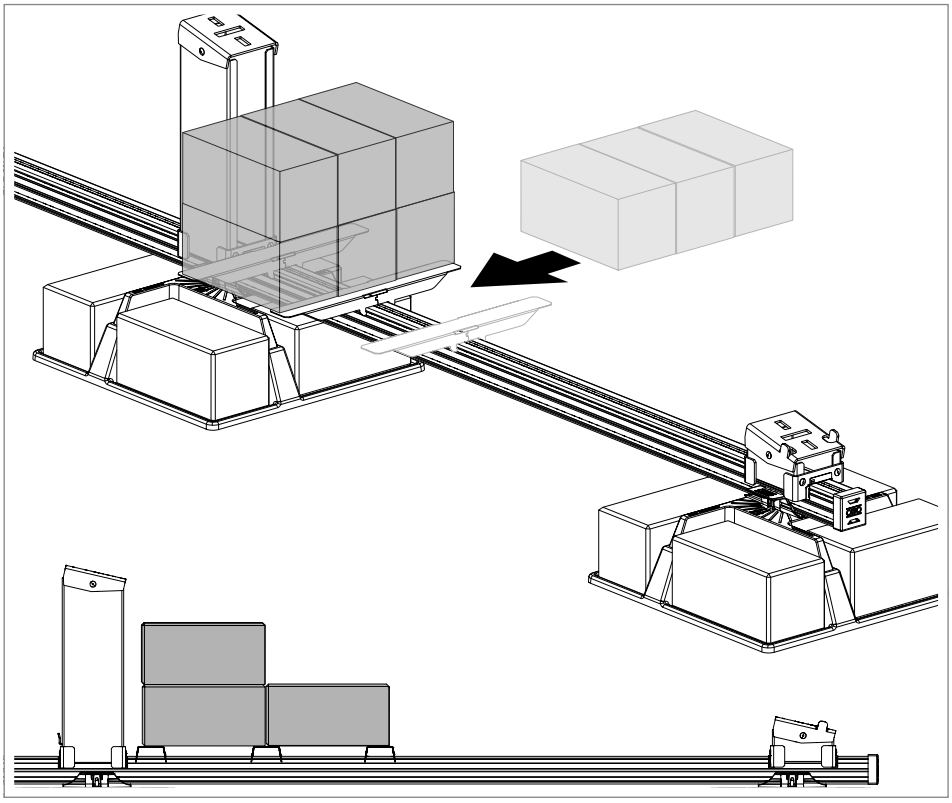


Fig. 24: Ballasting ballast support plates

3. Place the required number of blocks on the ballast support plates.

6.8.3 System ballasting with ballast rails

For ballasting with ballast rails, two ballast rails are mounted parallel to one another on two truss profiles. The rails are ballasted using standard blocks with a maximum width of 10 cm. The maximum number of blocks depends on the rail length and the weight needed to ballast the system.

Note! *When using quarter-point mounting, the ballast rails are laid across 3 truss profiles, as the support rails are closer together. The ballast rails are extended accordingly and only fastened to the outer profiles.*

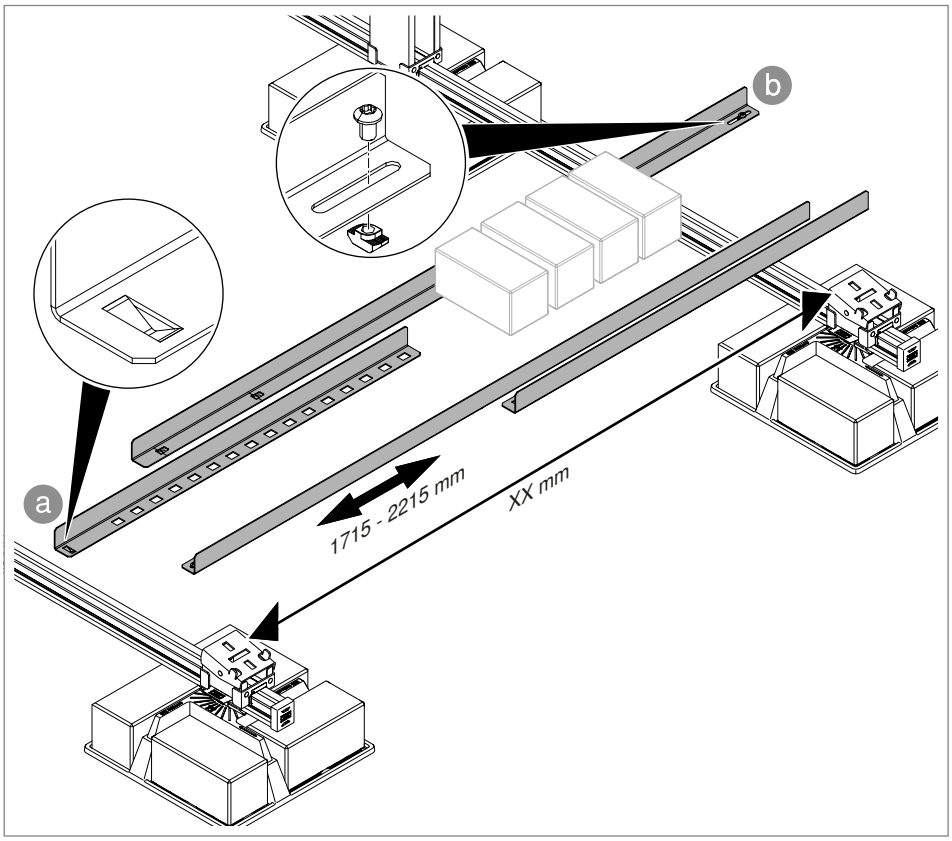


Fig. 25: Using ballast rails

A ballast rail consists of two parts that can be hooked together in increments to set a total length of 1,715 to 2,215 mm. One rail end a is hooked into the truss profile, the other end is fastened to the truss profile opposite via a slot using a slide nut and screw b. Tolerances of up to 50 mm in length can be compensated for via the slot.

Note! *The ballast rails are positioned in front of the long supports.*

1. Measure the required rail length XX mm.

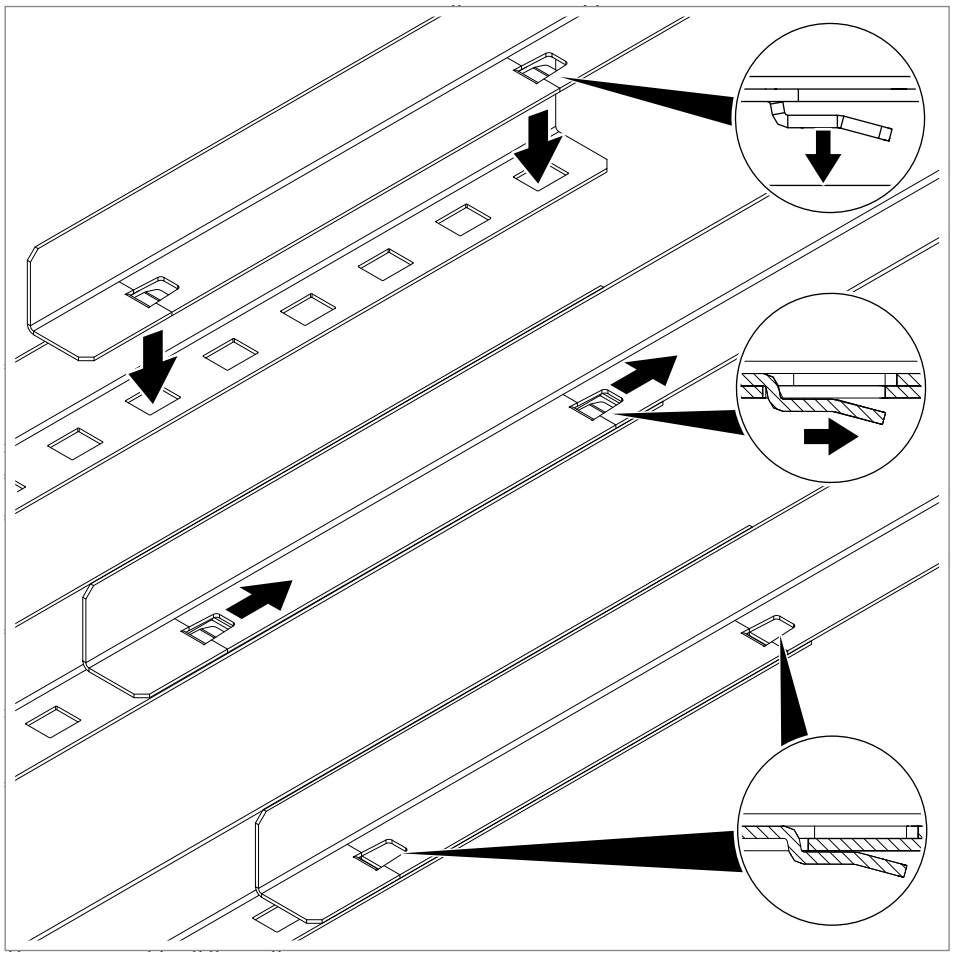


Fig. 26: Hooking together two parts of the ballast rail lengthwise

2. Place the rail parts on top of one another and hook together.

3. Create two ballast rails of equal length.

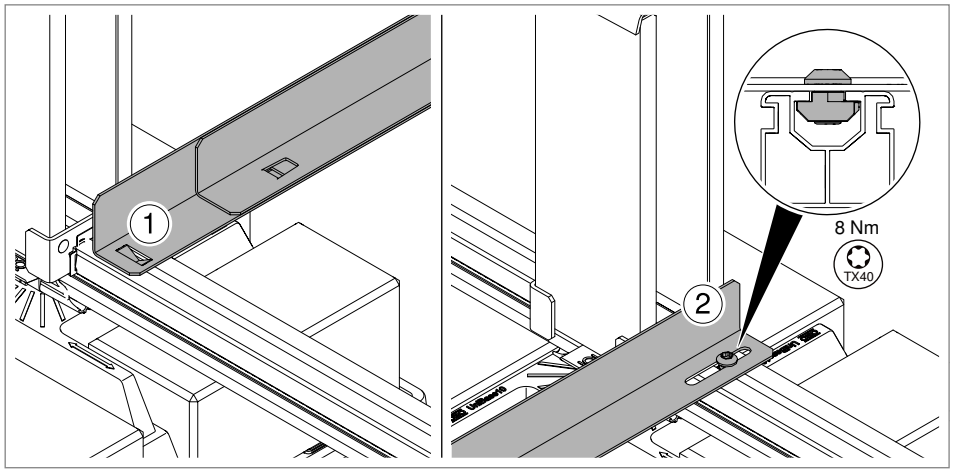


Fig. 27: Fastening the ballast rail

4. Insert the locating end of the ballast rail into the truss profile ①.

5. Fasten the other end of the ballast rail to the second truss profile using a slide nut and screw, and a tightening torque of 8 Nm ②.

6. Mount the second ballast rail parallel to the first ballast rail spaced appropriately (length of block).

Ballasting ballast rails

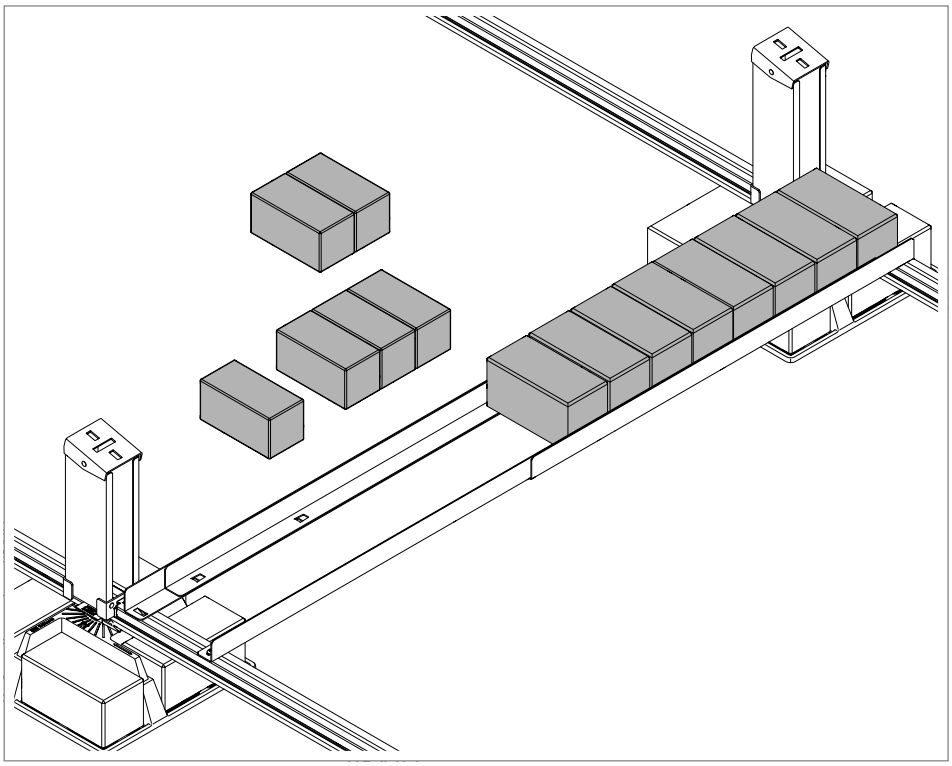


Fig. 28: Ballasting ballast rails

1. Place the required number of blocks onto the ballast rails.

6.9 Attaching the PV module

The PV module is placed on the supports and is then fastened to the supports with universal clamps or end/intermediate clamps with springs. For fastening, horizontal and vertical slots are drilled into the supports for the clamps.

Note! *Depending on the necessary inclination, the support surface of the supports can be adjusted, so that the PV module is flat (see also „6.9.1 Adjusting the angle of inclination of the supports“ on page 36).*

Note! *To avoid slippage of the PV modules during mounting, holding straps are worked into the short supports (see also Fig. 29 on page 34 und Fig. 30 on page 35).*

Attaching the PV module with side fastening

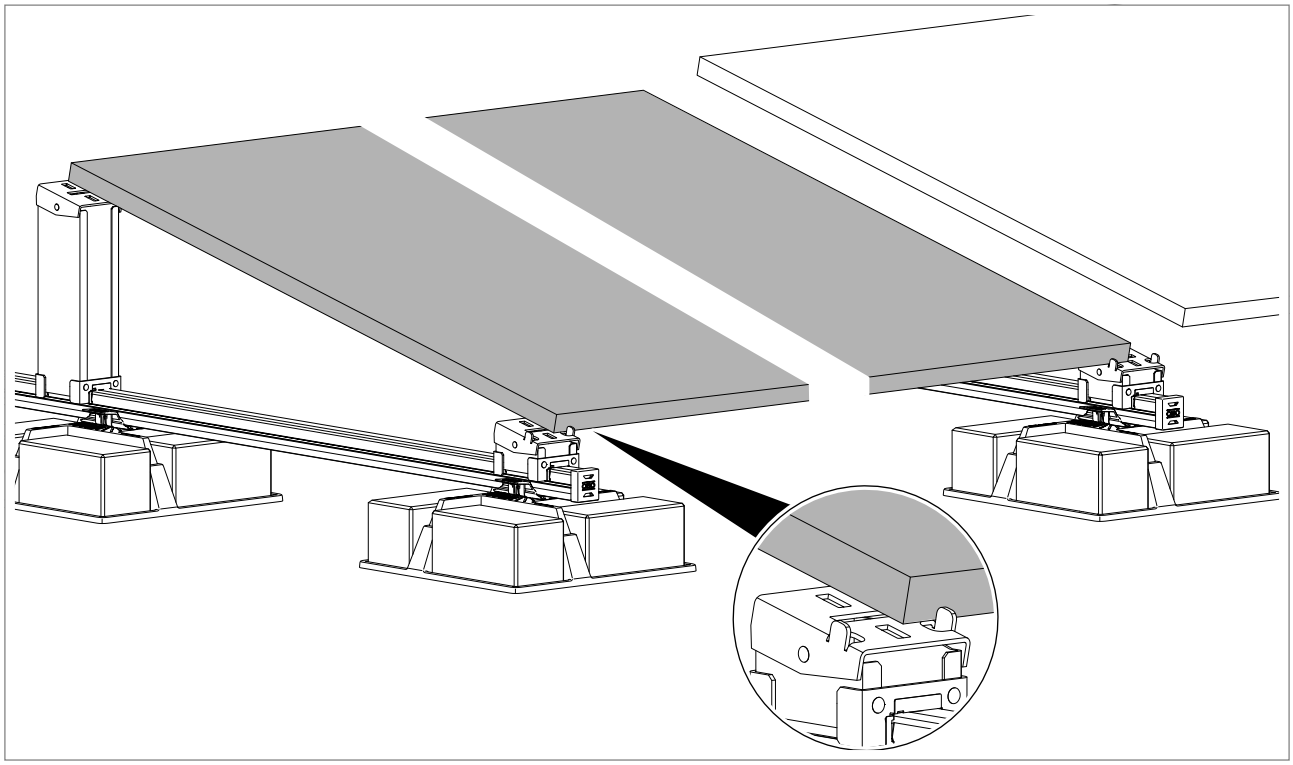


Fig. 29: Attaching the PV module with side fastening

1. In case of side fastening, place the PV module so that a clamp can still be placed in the corresponding slot of the support.

Attaching the PV module with top/bottom fastening

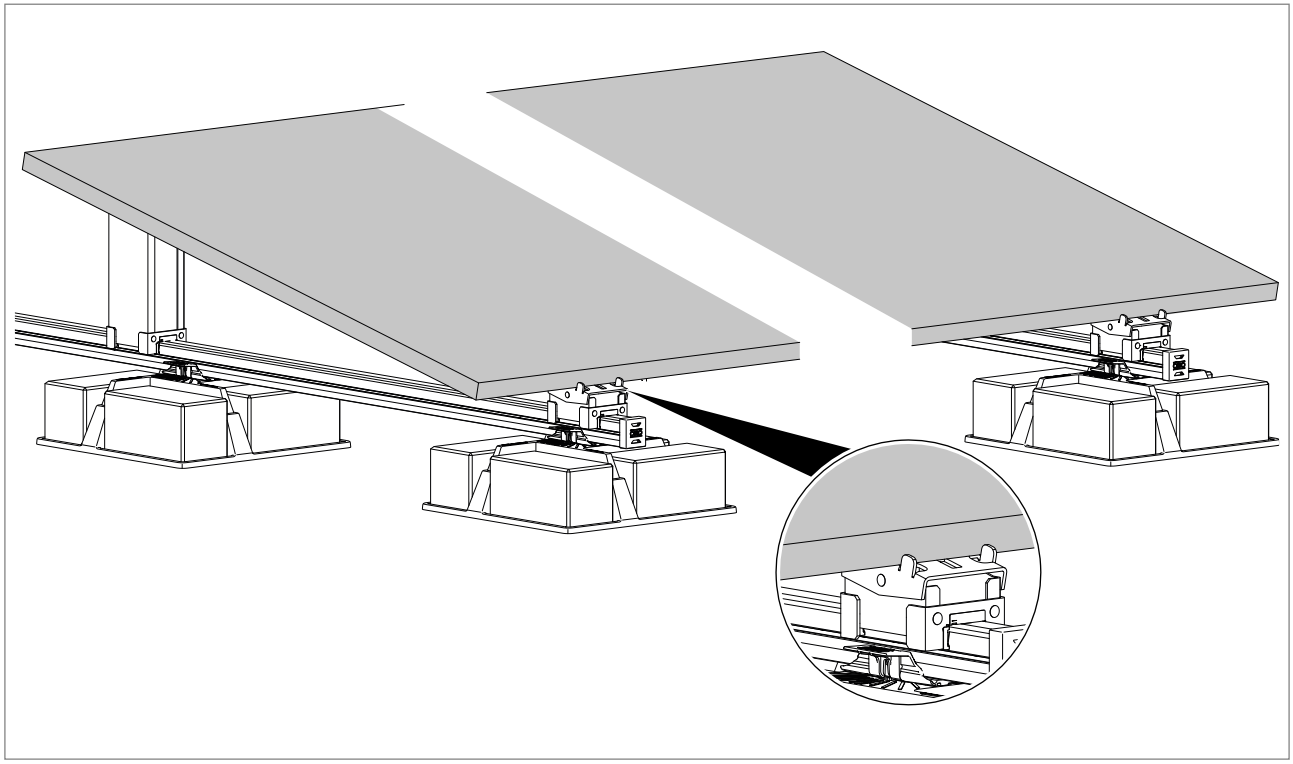


Fig. 30: Attaching the PV module with top/bottom fastening

1. In case of top/bottom fastening, place the PV module so that a clamp can still be placed in the vertical slot of the support.

6.9.1 Adjusting the angle of inclination of the supports

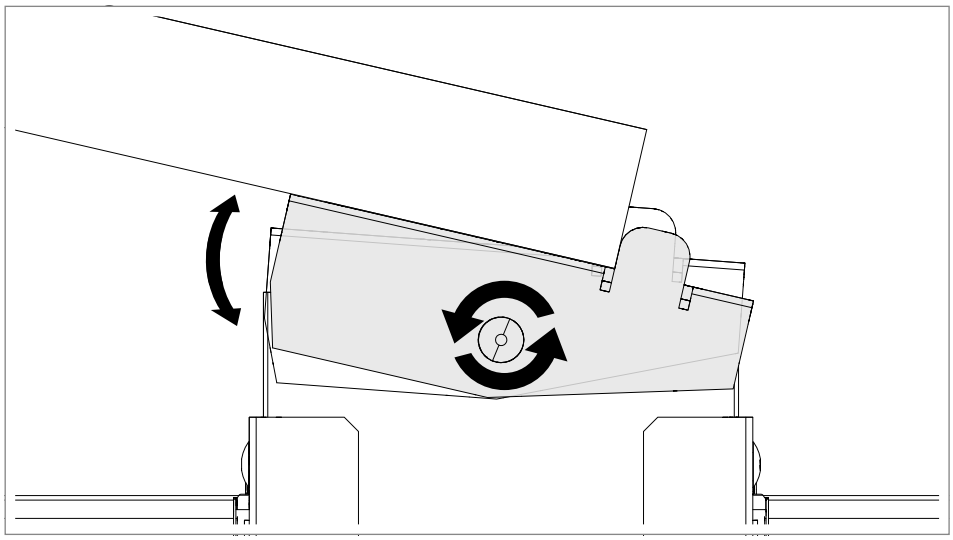


Fig. 31: Adjusting the angle of inclination of the supports

1. If necessary, adjust the angle of inclination of the support surface of the short and long supports, so that the PV module is flat.

CAUTION

Danger: loose/unsecured module!
If the module frame is not flat on the upper and lower supports in case of quarter-point mounting, the universal clamps cannot be fastened correctly. The module can come loose if the flexible support surfaces of the supports shift later on. Before tightening the screws on the universal clamps, the angle of the support surfaces must be adjusted to the short and long supports so that the module is flat at the at the top and bottom.

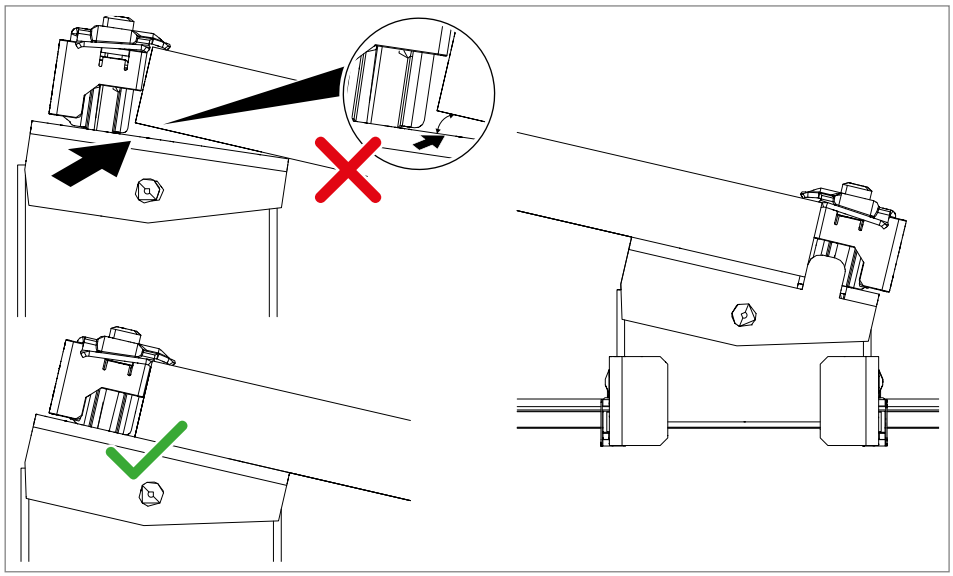


Fig. 32: Angle of inclination incorrect/correct, quarter-point mounting

6.10 Fastening the PV module with universal clamps

The PV modules are clamped at the edges of the module with at least four universal clamps. With larger modules, six clamping points may be required, depending on the specifications of the module manufacturer.

The universal clamp can be used for the following:

– As an end clamp at the side edges of the module

– As a middle clamp for two modules placed next to each other on the same support

– As an end clamp at the bottom and top edges of the module, if four supports are required per module (quarter-point fastening).

CAUTION

Risk of loss of function of universal clamp!
Pressing on the top part of the universal clamp when inserting and fas tening the clamp may impair its function as an end clamp. Do not press on the top part of the clamp, and only fasten the top part of the univer-sal clamp by screwing it onto the module after the PV module has been positioned.

Note! *To make it easy to slide the modules under the universal clamps, the top section of the clamps can be locked in place. To do this, pull the top section upwards until it clicks into place. To secure the modules, do not press the top section of the clamps down by hand; instead, screw on only.*

6.10.1 Mounting the universal clamp as an end clamp

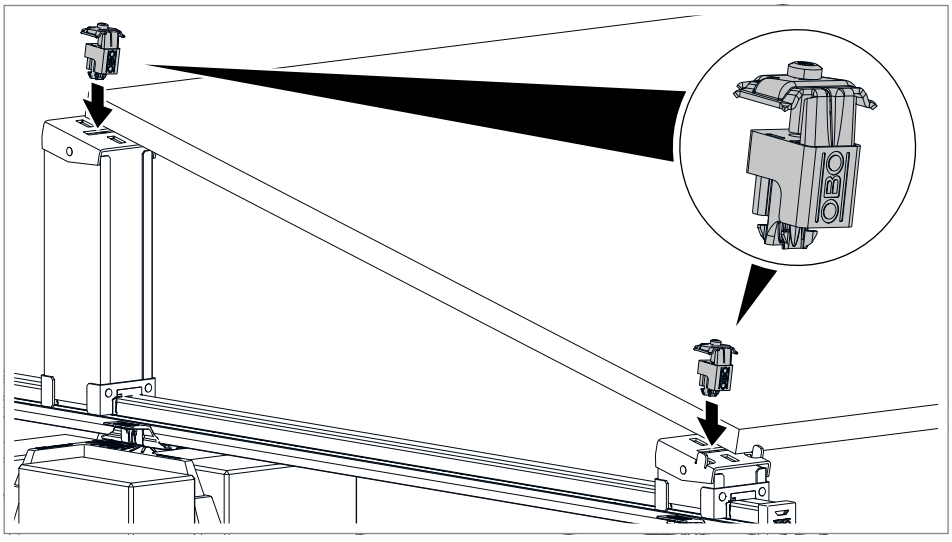


Fig. 33: Inserting the universal clamp in the slot

1. Insert the universal clamp in a horizontal slot of the short and long support. The “OBO” label points to the bottom edge of the module.

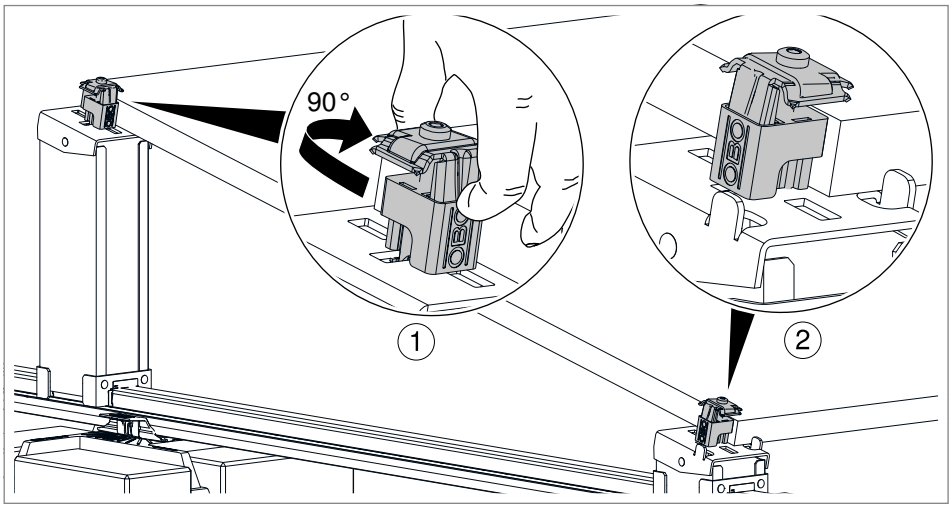


Fig. 34: Manually turning the universal clamp

2. Turn the universal slots through 90° in the slot ①. The “OBO” label points outward ②.

3. Push the module up to the universal clamps.

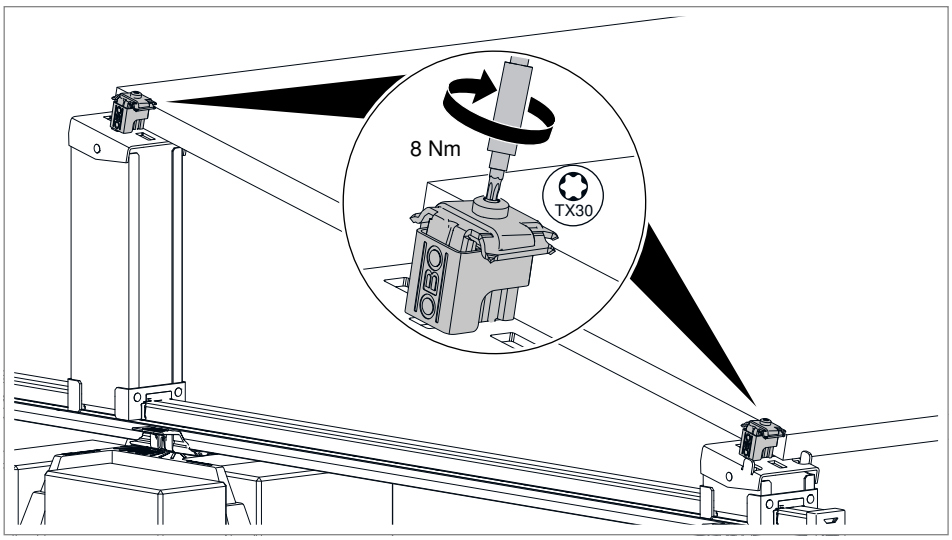


Fig. 35: Fastening the universal clamp

4. Tighten the screws of the universal clamps with 8 Nm, in order to clamp the PV module to the supports (observe the max. tightening torque of the module manufacturer).

5. Add additional PV modules and clamp as middle clamps using universal clamps (see 6.10.2 on page 39) or clamp the module with universal clamps as end clamps at the end of the module row.

6.10.2 Mounting the universal clamp as a middle clamp

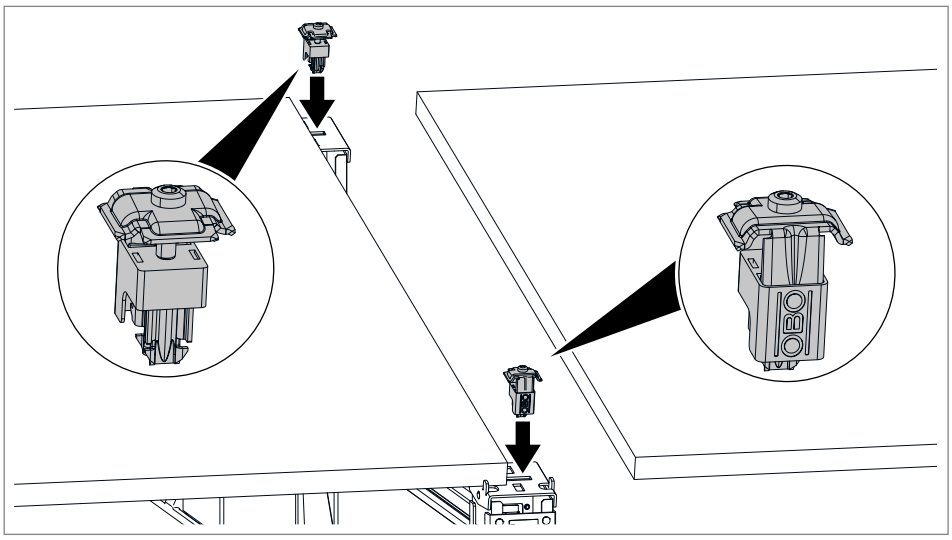


Fig. 36: Inserting the universal clamp in the slot

1. Push the universal clamp as a middle clamp into the horizontal slot of the next support. The “OBO” label points to the top or bottom edge of the module.

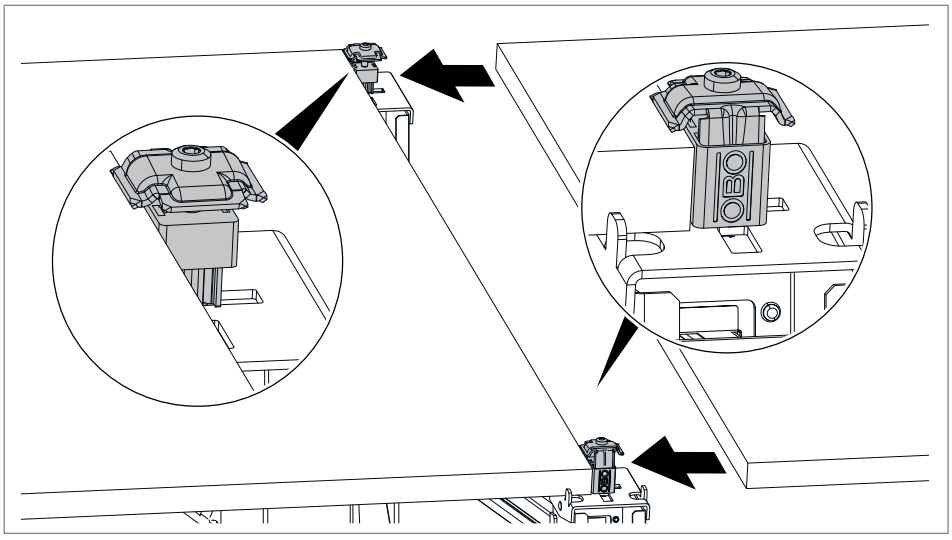


Fig. 37: Inserting the universal clamp in the slot

2. Place and align a further PV module and push it up to the universal clamps.

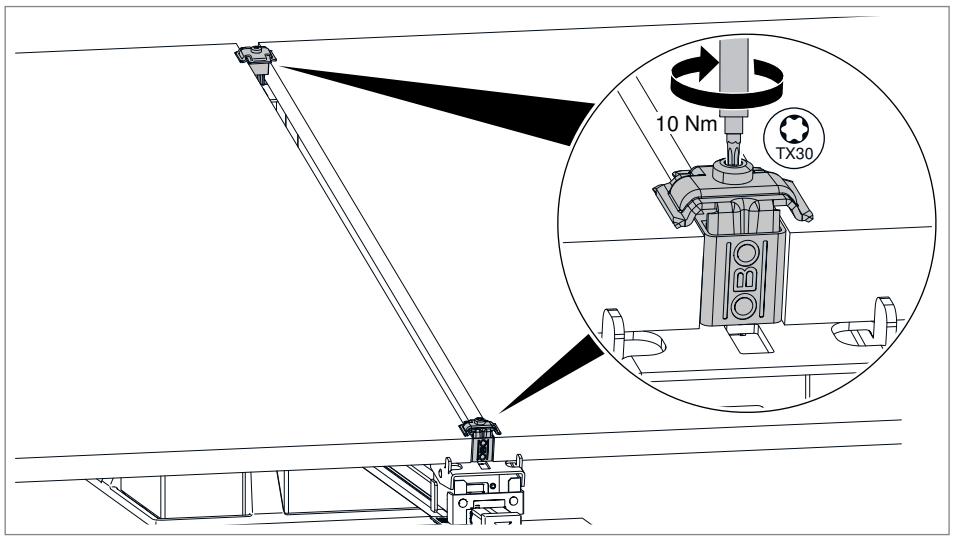


Fig. 38: Fastening the PV module centrally with a universal clamp

3. Tighten the screws of the universal clamps with 10 Nm, in order to clamp the two adjacent PV modules to the supports (observe the max. tightening torque of the module manufacturer).

4. Add additional PV modules and clamp as middle clamps using universal clamps or clamp the module with universal clamps as end clamps at the end of the module row.

6.10.3 Fastening the PV module with end clamps at the top and bottom

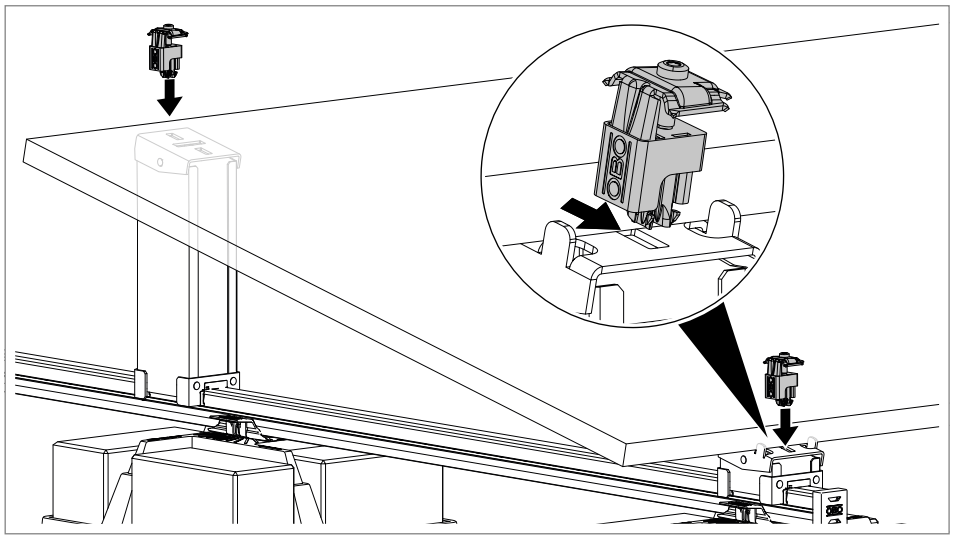


Fig. 39: Inserting the universal clamp in vertical slots

1. Insert universal clamps in the vertical slots of the short and long support. The “OBO” label points to the side.

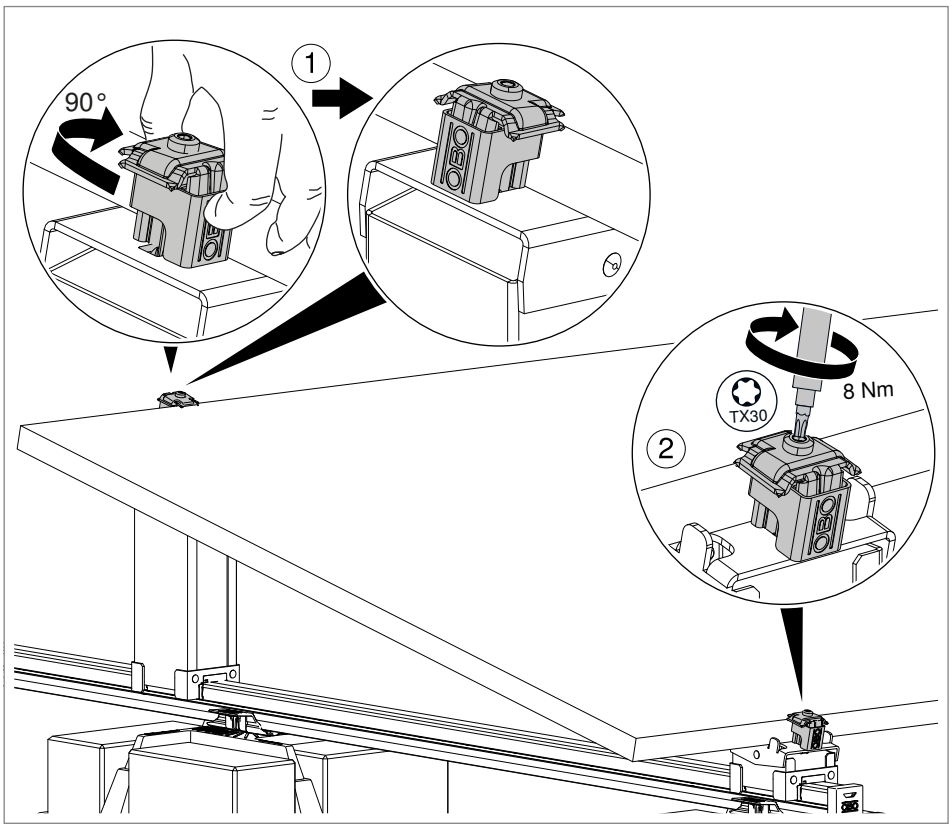


Fig. 40: Fastening universal clamps

2. Turn the universal clamps through 90° in the slots ①.

3. Tighten the screws of the universal clamps with 8 Nm ②, in order to fasten the PV module to the supports (observe the max. tightening torque of the module manufacturer).

4. Place additional PV modules and fasten with universal clamps.

6.11 Fastening the PV module with end/intermediate clamps with springs

The end clamps and intermediate clamps with springs offer a higher pressure surface and are used for higher snow and wind loads. The finished teeth on the connection plate press into the aluminium frame of the PV module, offering additional support and ensure continuous equipotential bonding.

The end/intermediate clamps can be used for the following:

– As an end clamp at the side edges of the module

– As an intermediate clamp for 2 modules placed next to each other on the same support

– As an end clamp at the bottom and top edges of the module, if four supports are required per module (quarter-point fastening).

6.11.1 Fastening the PV module with end clamps with springs at the sides

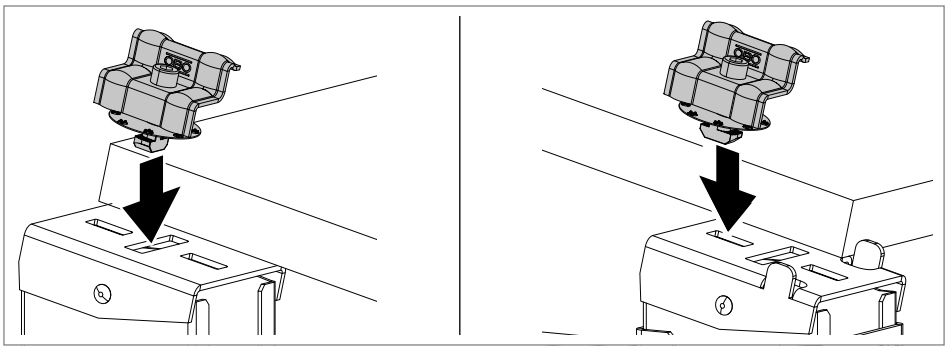


Fig. 41: Inserting end clamps in slots

1. Insert slide nuts of the end clamps in slots (long support = horizontal slot, short support = top vertical slot).

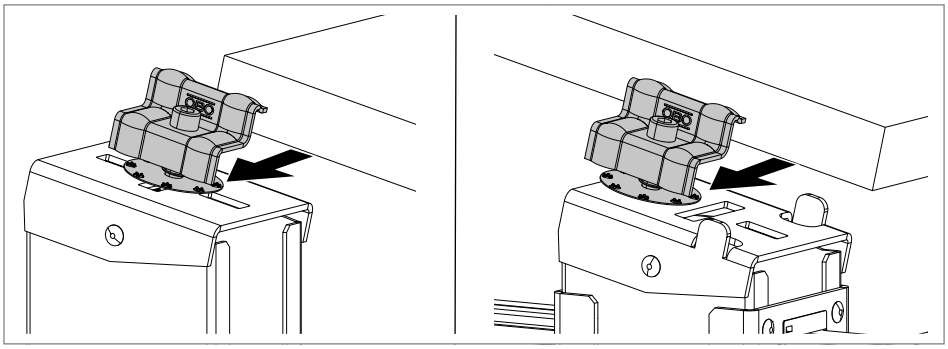


Fig. 42: Pushing PV module up to the end clamps

2. Push the PV module up to the end clamps.

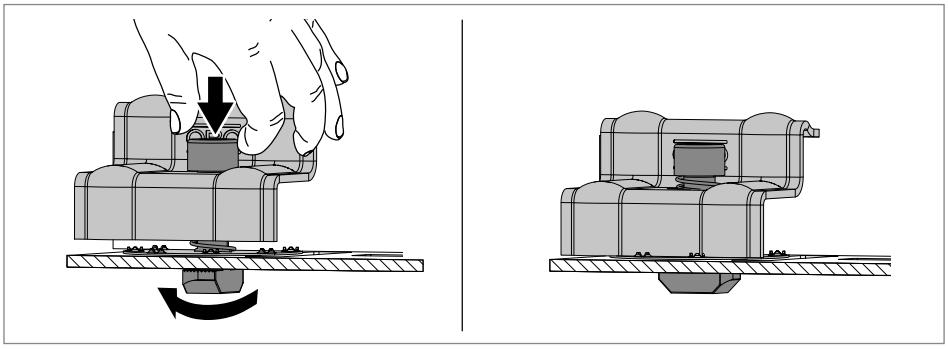


Fig. 43: Engaging the slide nut

3. Press down lightly on the screw with spring and turn until the slide nut engages.

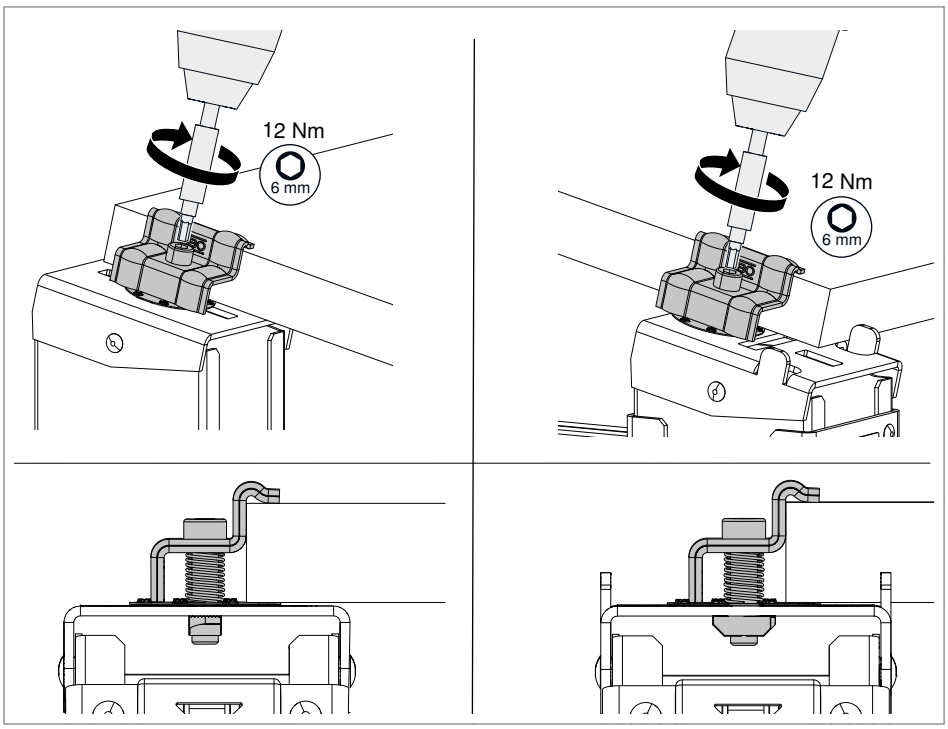


Fig. 44: Tightening the end clamp screws

4. Tighten the screws with 12 Nm.

6.11.2 Fastening PV modules with intermediate clamps with springs

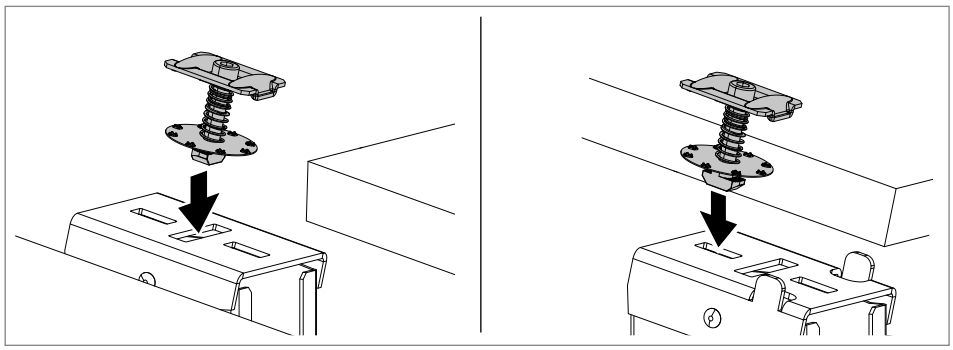


Fig. 45: Inserting intermediate clamps in slots

1. Insert slide nuts of the intermediate clamps in slots (long support = horizontal slot, short support = top vertical slot).

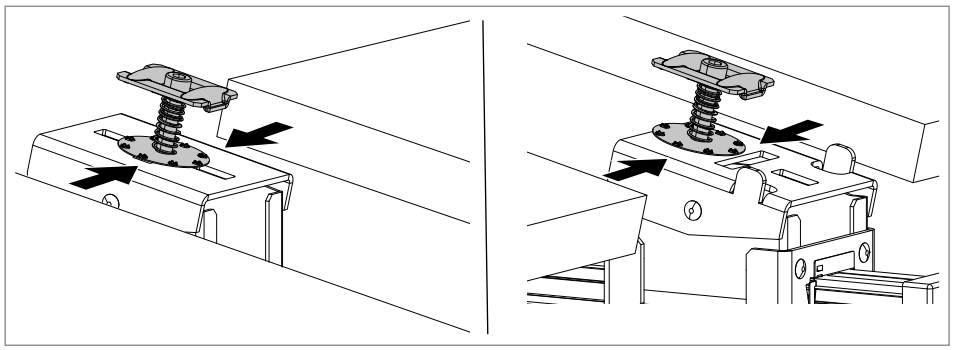


Fig. 46: Pushing PV modules up to the connection clamps

2. Push the PV modules up to the intermediate clamps on the right and left.

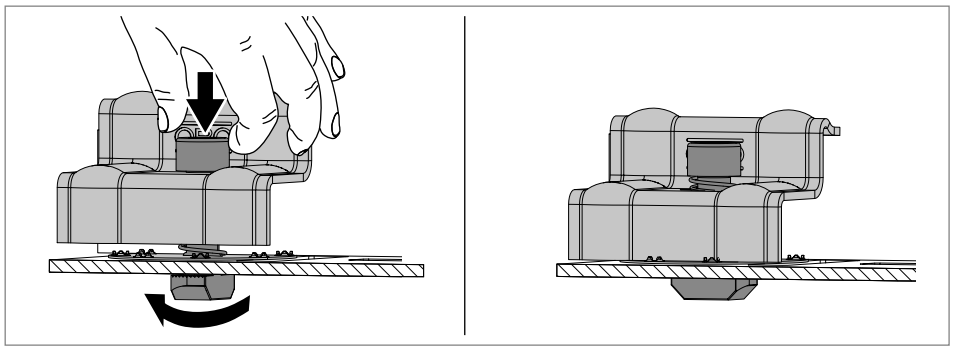


Fig. 47: Engaging the slide nut

3. Press down lightly on the screw with spring and turn until the slide nut engages.

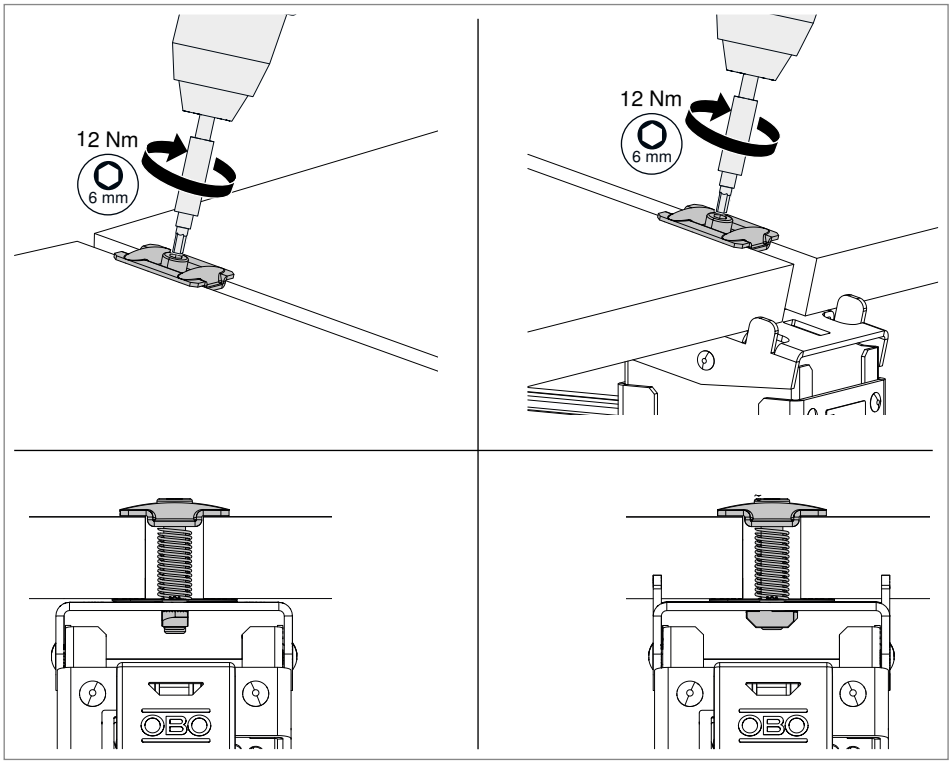


Fig. 48: Tightening the intermediate clamp screws

4. Tighten the screws with 12 Nm.

6.11.3 Fastening the PV module with end clamps with springs at the top and bottom

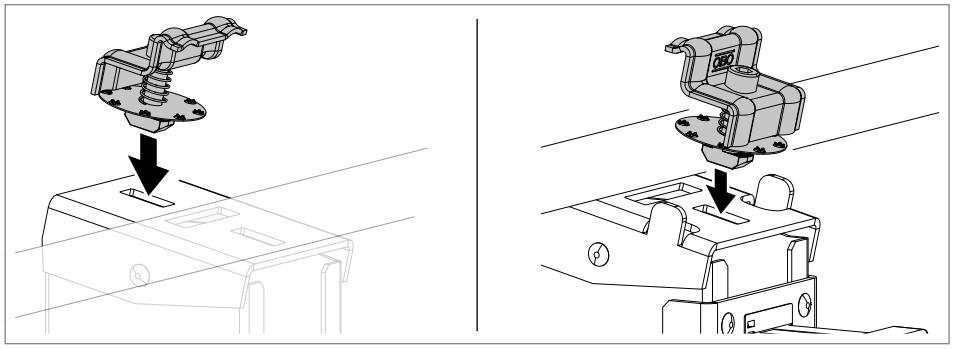


Fig. 49: Inserting end clamps in slots

1. Insert slide nuts of the end clamps in vertical slots (long support = top slot, short support = bottom slot).

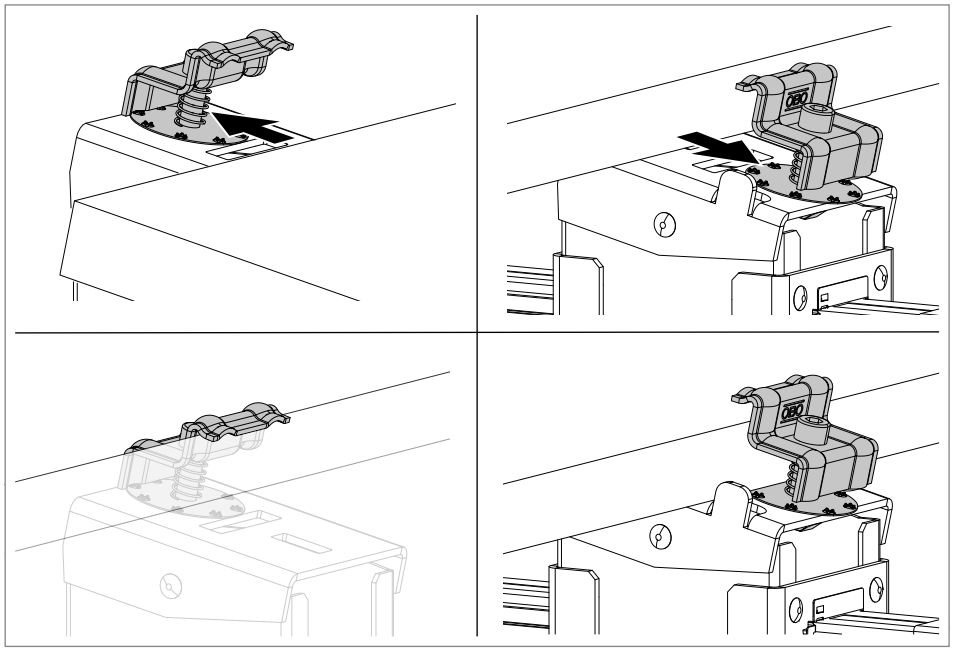


Fig. 50: Pushing PV module up to the end clamps

2. Push the PV module up to the end clamps at the top and bottom.

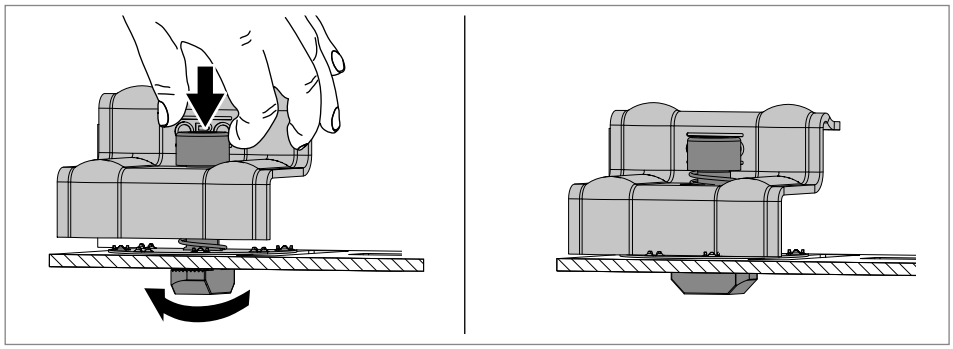


Fig. 51: Engaging the slide nut

3. Press down lightly on the screw with spring and turn until the slide nut engages.

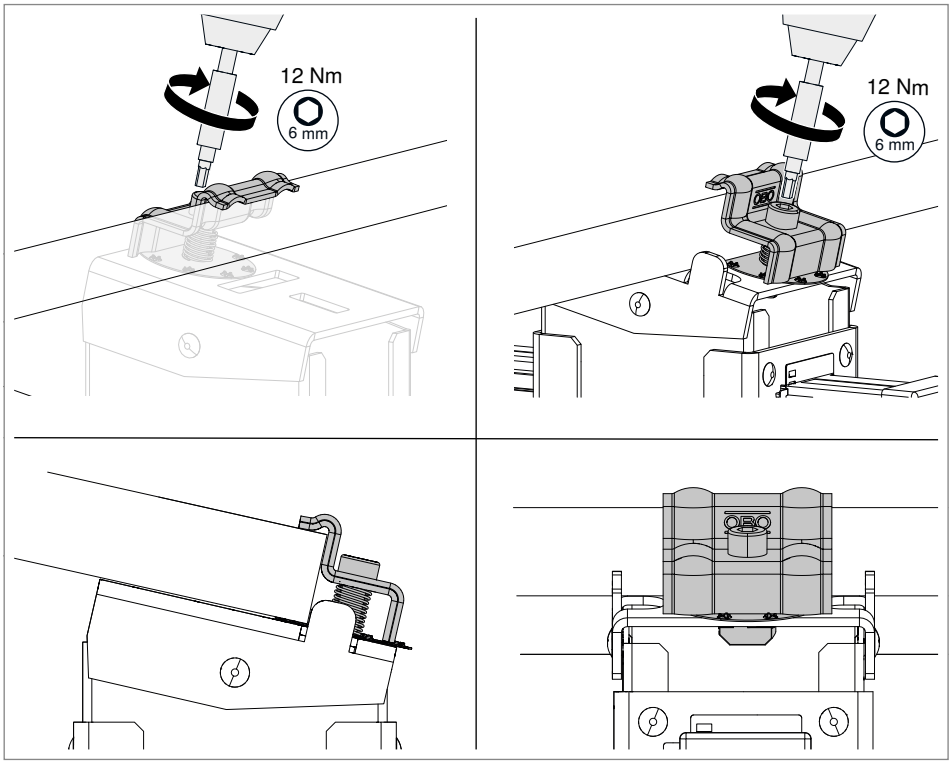


Fig. 52: Tightening the end clamp screws

4. Tighten the screws with 12 Nm.

6.12 Replacing the PV module

The following only shows replacing of the PV module fastened with universal clamps. If the modules are fastened with end/intermediate clamps with springs, the screws of the clamps are unscrewed in the same way and the PV module removed accordingly.

6.12.1 Replacing with side and middle fastening

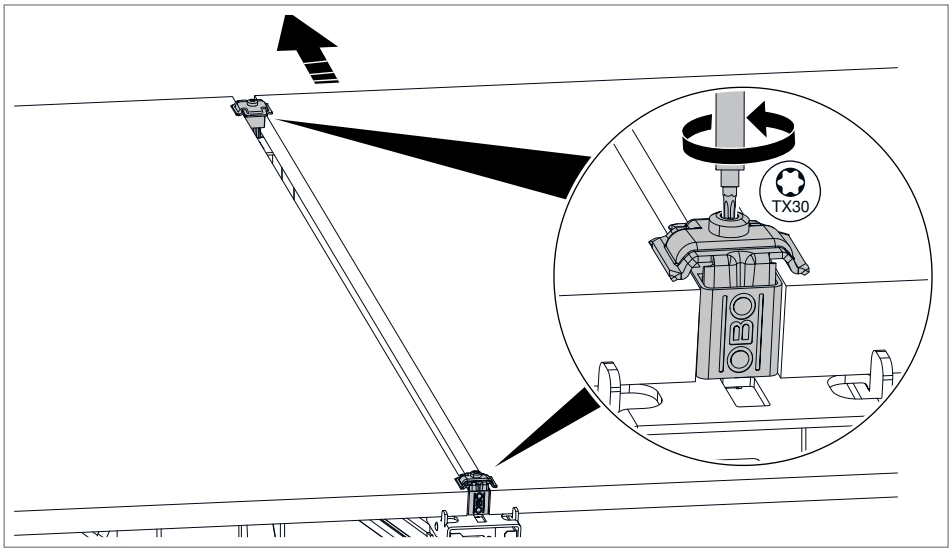


Fig. 53: Replacing the PV module, side and middle fastening

1. Slightly unscrew the screws of the universal middle and end clamps.

2. Push the PV module upwards and out to exchange it.
3. Push in the new PV module from above.
4. Fasten the universal clamps with the prescribed tightening torque.

6.12.2 Replacing with top and bottom fastening

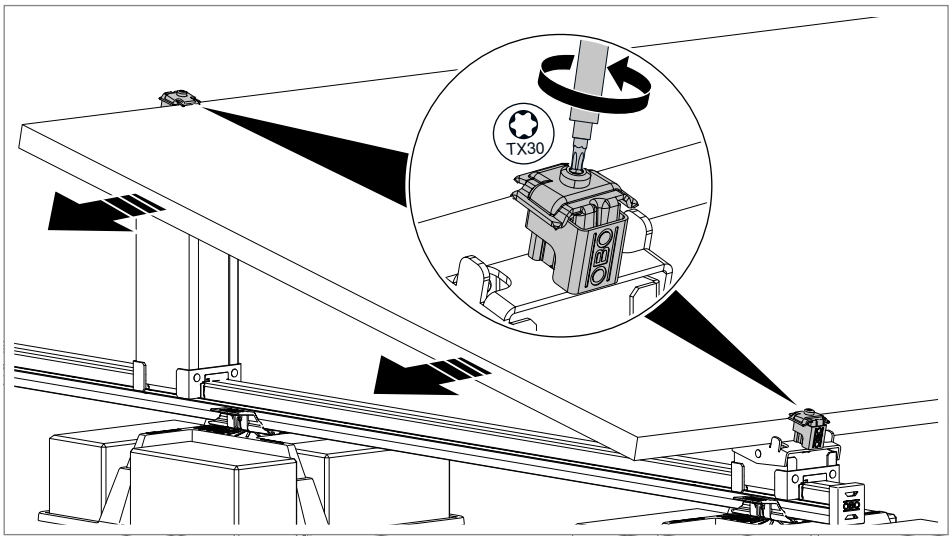


Fig. 54: Replacing the PV module, top and bottom fastening

1. Loosen the screws on the universal clamps slightly.
2. Slide the PV module out at the side to replace it.
3. Push in the new PV module at the side.
4. Fasten the universal clamps with the prescribed tightening torque.

6.13 Mounting the windbreak

To prevent the PV mounting system from becoming unstable or damaged due to the impact of wind from below, windbreaks must be mounted on the long supports of south-facing PV systems.

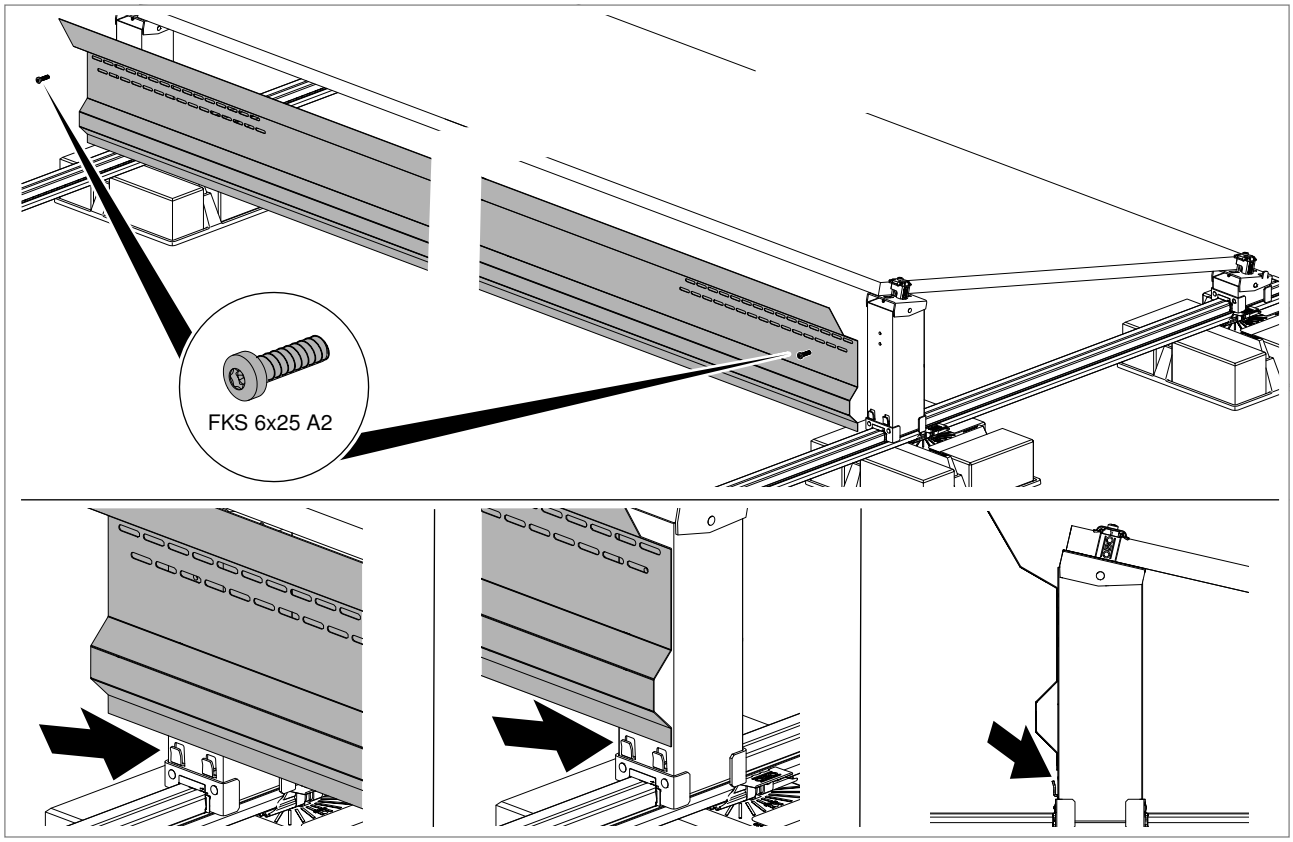


Fig. 55: Clamping the windbreak

1. Clamp windbreak behind the straps on the rear side of the long supports.

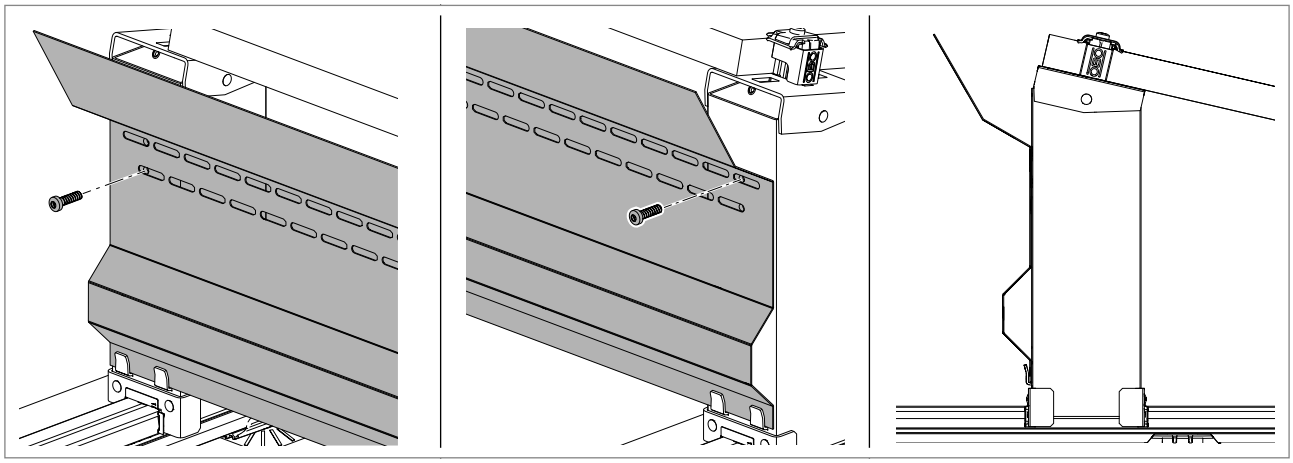


Fig. 56: Screwing on the windbreak

2. Screw the windbreak to long supports with FKS 6x25 screws (6 Nm), using the predrilled fastening holes.

6.14 Integrating the system into the equipotential bonding and/or lightning protection system

To ensure the safety of the PV system, it must be integrated into the equipotential bonding system. If the risk analysis according to

EN 62305-2 requires an external lightning protection system for the building, and if the separation distance between the PV system and the lightning protection system cannot be maintained, then both of these systems must be interconnected so that they can carry lightning current.

The universal earthing clamp can be used for both applications. The individual truss profiles must be interconnected, in order to guarantee continuous, low-ohmic equipotential bonding.

A round conductor of ∅ 8–10 mm and/or an equipotential bonding conductor of 6–50 mm² can be mounted on the universal earthing clamp.

WARNING

Risk of electric shock!
In the case of a lightning strike in the lightning protection system, lethal voltages can occur in the system. Do not work on the lightning protection system during a thunderstorm or if there is the risk of one.

1. If the truss profile is anodised, the anodisation must be removed from the accessible contact surfaces between the universal earthing clamp and the truss profile in order to ensure low-resistance contact.

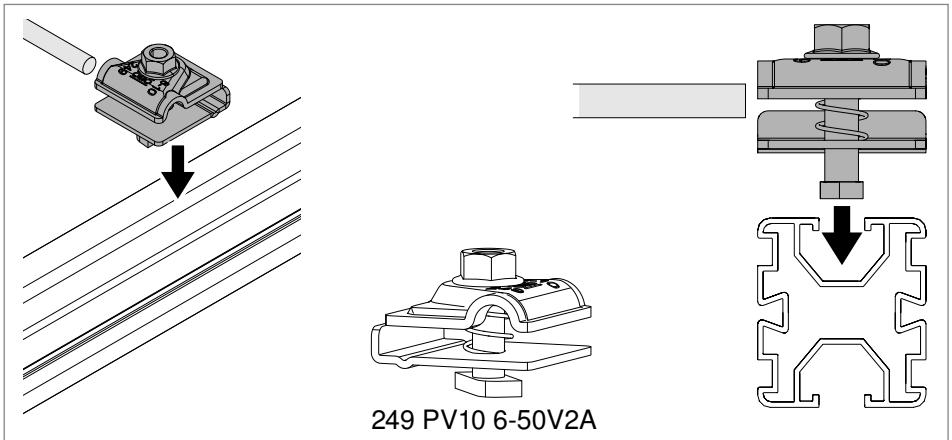


Fig. 57: Inserting the universal earthing clamp in the truss profile

2. Insert the hammerhead bolt of the universal earthing clamp in the truss profile.

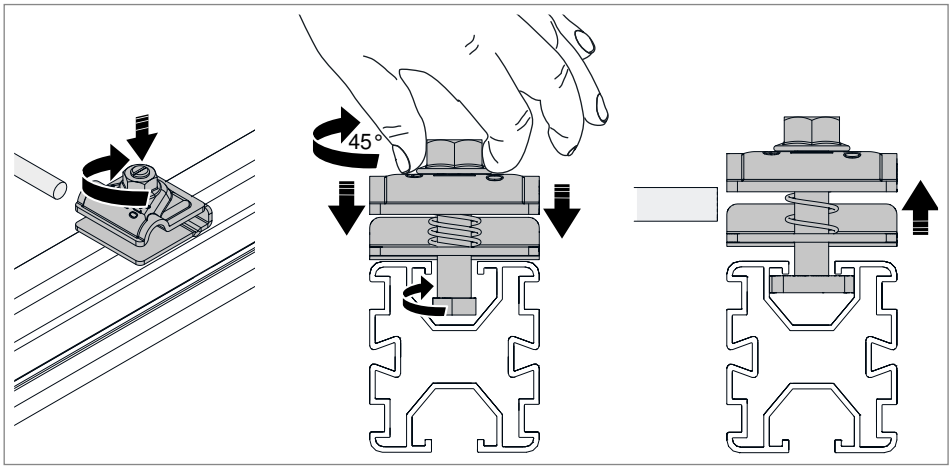


Fig. 58: Engaging the hammerhead bolt in the truss profile

3. Push the hammerhead bolt with spring downwards, turn it through 45° and release it. In so doing, ensure that the hammerhead is firmly engaged in the truss profile.

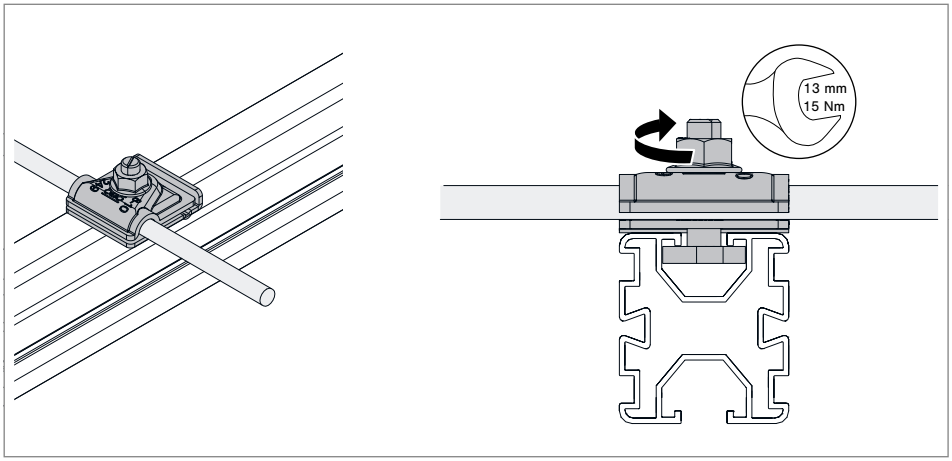


Fig. 59: Mounting the conductor in the universal earthing clamp

4. Insert the round conductor and/or equipotential bonding conductor.
5. Tighten the nut of the clamp with 15 Nm.

6.15 Connecting truss profiles in a lengthwise manner

Truss profiles can be connected lengthwise using straight connectors of type LV 45 DD.

ATTENTION

Risk of damage due thermal expansion!
If too many truss profiles are connected lengthwise, this may result in excessive thermal expansion of the profiles. In turn, this may result in system instability and damage to the roof skin.
- Only connect truss profiles up to a maximum length of 20 m.
- Maintain minimum distance of 50 mm between 2 truss profiles that are not connected lengthwise.

Note! *For type 45 4700 ALU S truss profiles, the anodisation on the accessible contact surfaces between the straight connector and truss profile must be removed to ensure low-impedance contact.*

Note! *Straight connectors may not be mounted in the area of the supports, to avoid obstruction of the insertion of the truss profile in the adapter.*

Note! *Truss profiles must have at least 2 support points, even if they are connected using straight connectors.*

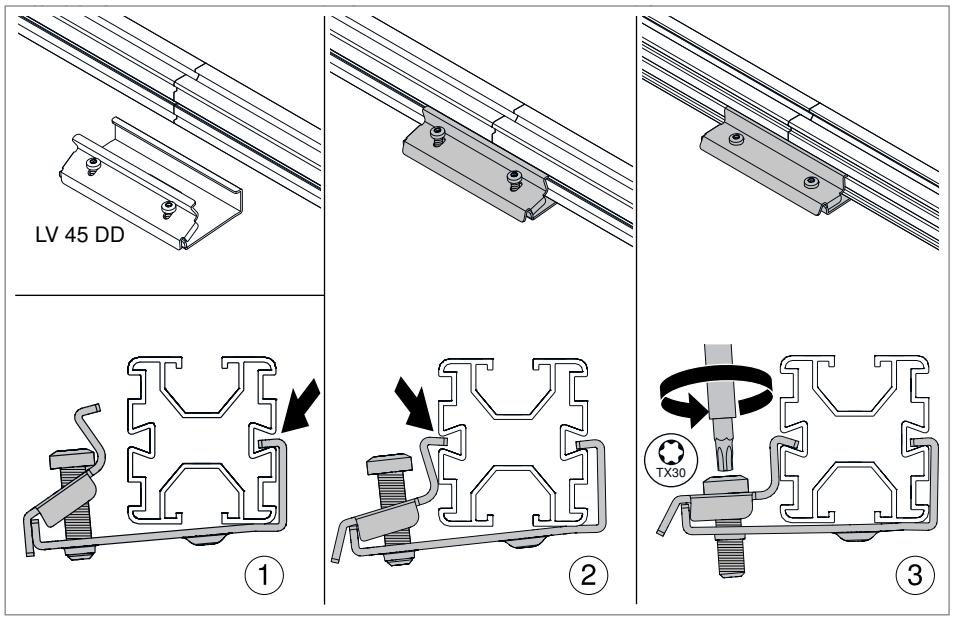


Fig. 60: Mounting a straight connector

1. Insert straight connectors in the groove on one side of the truss profiles ①. The butt of the truss profile must be located in the centre of the straight connector.

2. Hook the variable piece of the straight connector into the truss profiles ②.

3. Tighten the screws on the straight connector with 6 Nm ③.

Note! *Alternatively, the truss profiles can also be pushed into the straight connectors and the screws then tightened.*

6.16 Connecting truss profiles transversely

Truss profiles can be connected transversely using cross connectors of type KV 45 DD.

Note! *For type 45 4700 ALU S truss profiles, the anodisation on the accessible contact surfaces between the cross connector and truss profile as well as the contact surfaces between the truss profiles must be removed to ensure low-impedance contact.*

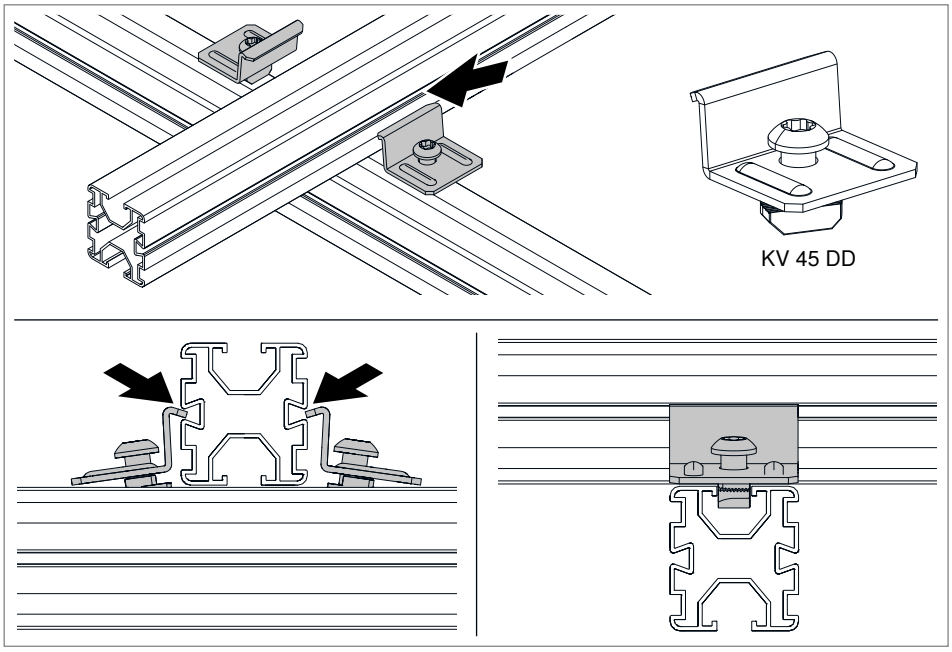


Fig. 61: Inserting cross connectors

1. Insert cross connectors with slide nuts into the lower truss profile.
2. Hook the cross connectors into the transverse truss profile.

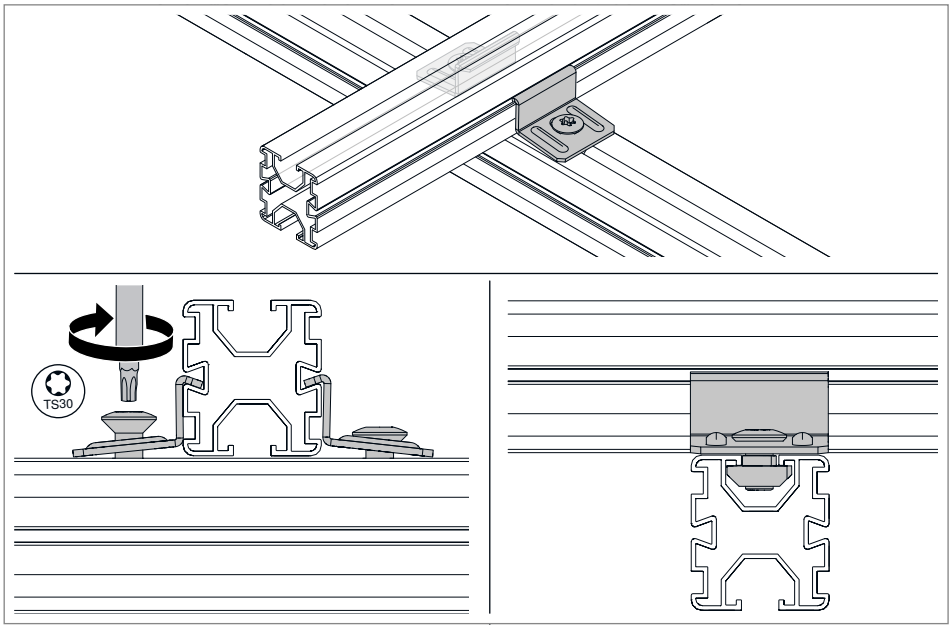


Fig. 62: Screwing on the cross connectors

3. Tighten the screws on the cross connectors with 6 Nm.

6.17 Cable routing beneath the PV modules

Using the lighter, lower UniBase 6 and UniBase Glue bases, cable guides are mounted on mesh cable trays of type GRM beneath the PV system. The UniBase 6 base is weighed down using baseard blocks of size (length x width x height) 10 x 20 x 6 cm, whilst the UniBase Glue is welded on with a sleeve. The mesh cable trays are fastened to the bases with the 165 MBG HGRM adapter..

6.17.1 Mounting the GRM mesh cable tray with UniBase 6

1. Locate and align bases according to the roof assignment plan, maximum support spacings between the bases = 1.5 m.

2. Lay building protection mats under the bases (see „Laying building protection mats“ on page 13).

Note! *The arrows on the bases show the running direction of the truss profiles.*

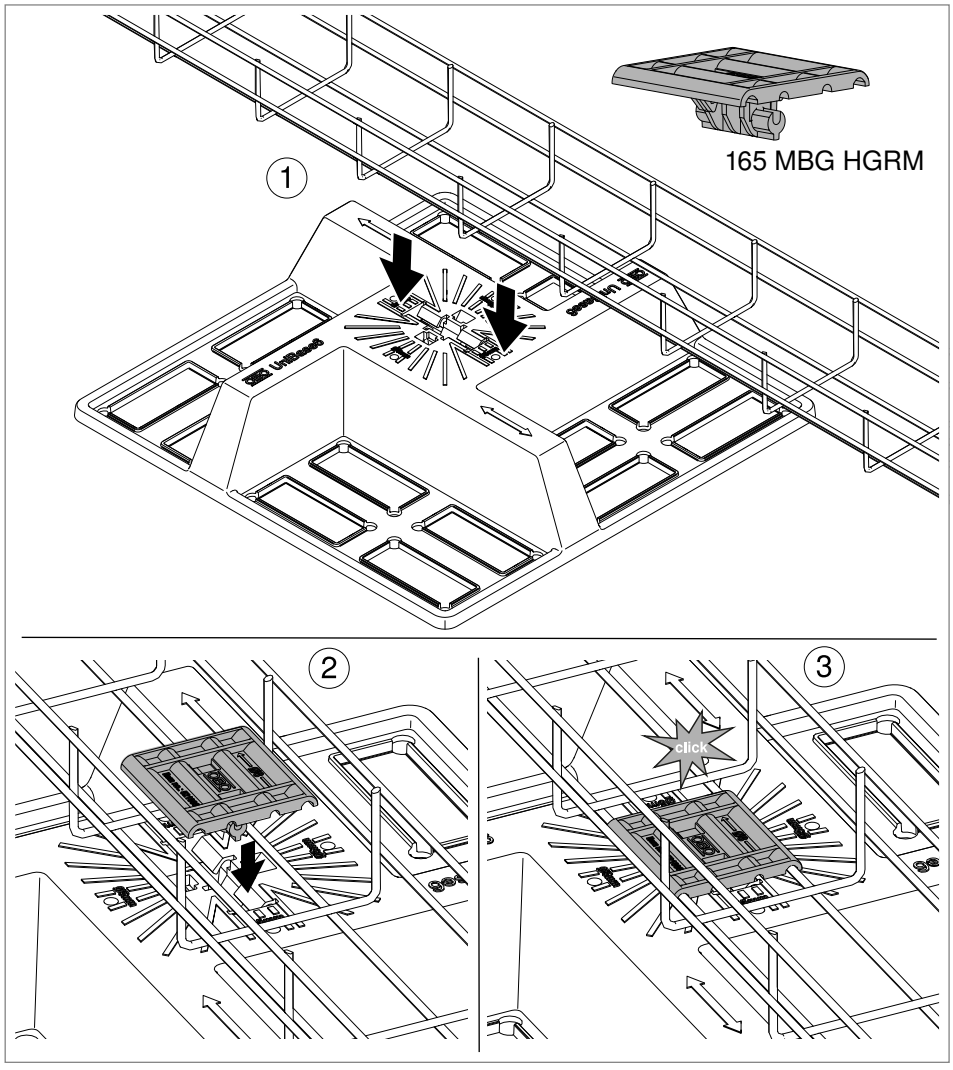


Fig. 63: Fastening the mesh cable tray on UniBase 6

3. Place the mesh cable tray on the bases ①.

4. Click the adapter into the bases, ensuring that the straight wires of the mesh cable tray are clamped ② ③.

5. If necessary, realign the subconstruction of bases and mesh cable trays exactly before weighing down.

ATTENTION

Danger of a loss of function and damage!
If the UniBase base is weighed down with other materials, then there is the risk that it will be damaged or be insufficiently stable.
- Use on blocks with the specified dimensions for weighing down.
- If the weight of an individual unweighted UniBase base is insufficient in any location, then a further UniBase base must be mounted alongside.

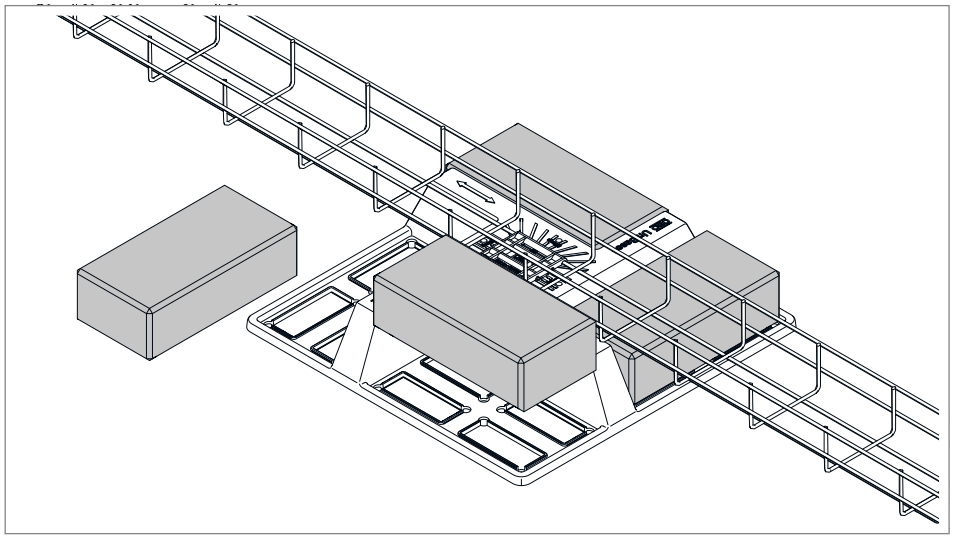


Fig. 64: Weighing down the base

6. Weigh down all the bases with up to 4 blocks (the level of weighing is specified by the planning of the OBO Construct app or the planner/ static engineer).

6.17.2 Mounting the GRM mesh cable tray with UniBase Glue

The UniBase Glue base is not glued directly onto the roof membrane, but is held in position using a welded sleeve. Depending on the roof skin, a plastic sleeve or a bitumen sleeve of a rectangular shape is welded on. The plastic sleeve is welded on using a hot-air blower and pressing roller or with an automatic welding device. The bitumen sleeve is welded on with a welding torch and pressing roller. The following section only shows mounting with the welding torch.

WARNING

Risk of fire!
When the sleeve is welded, there is the risk of igniting the roof. Only use materials and devices suitable for the purpose and follow the manufacturer's instructions for laying and use.

Note! *When processing plastic sleeves, stripping and shearing tests must be carried out when starting work and the temperature, welding temperature and processing speed logged.*

Preparing the substrate

1. Clean the substrate thoroughly.
2. If necessary, clean the plastic films with an appropriate cleaner, in order to remove substances impairing adhesion.
3. If necessary, grind the substrate.

Attaching the sleeve

Note! *The sleeve possesses notches, in order to align them exactly with a marked line, which can be created with a chalk line or laser, for example.*

1. Locate the bases according to the roof assignment plan. Select selection spacings according to the design of the cable support system (baseard support spacings of mesh cable trays 1–1.5 m).

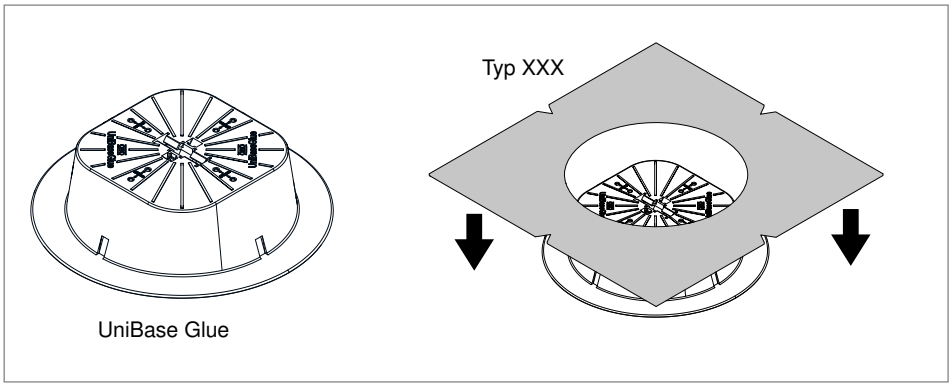


Fig. 65: Placing the sleeve

2. Place the sleeve around the base.

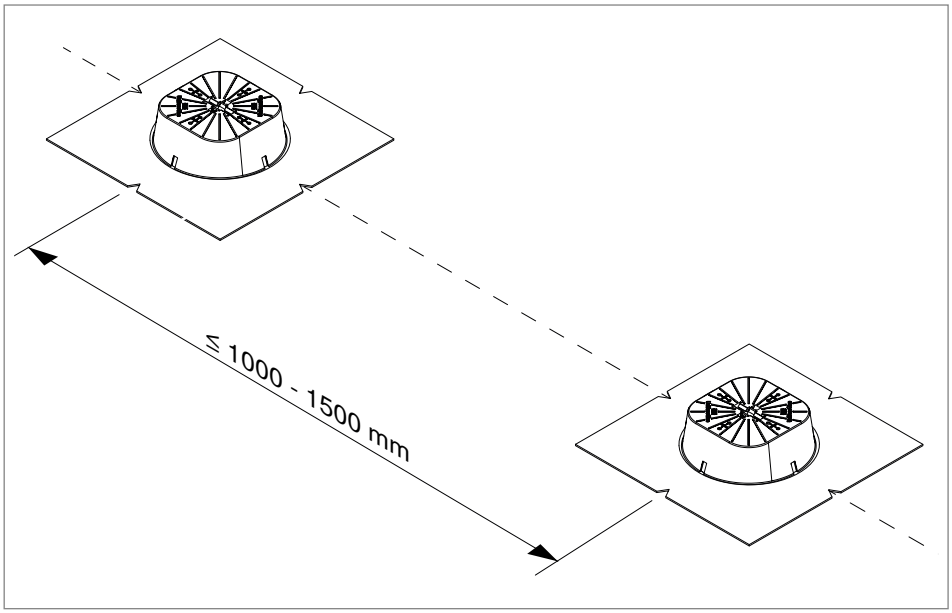


Fig. 66: Aligning the UniBase Glue with sleeves

3. Align the bases using the notches in the sleeve.

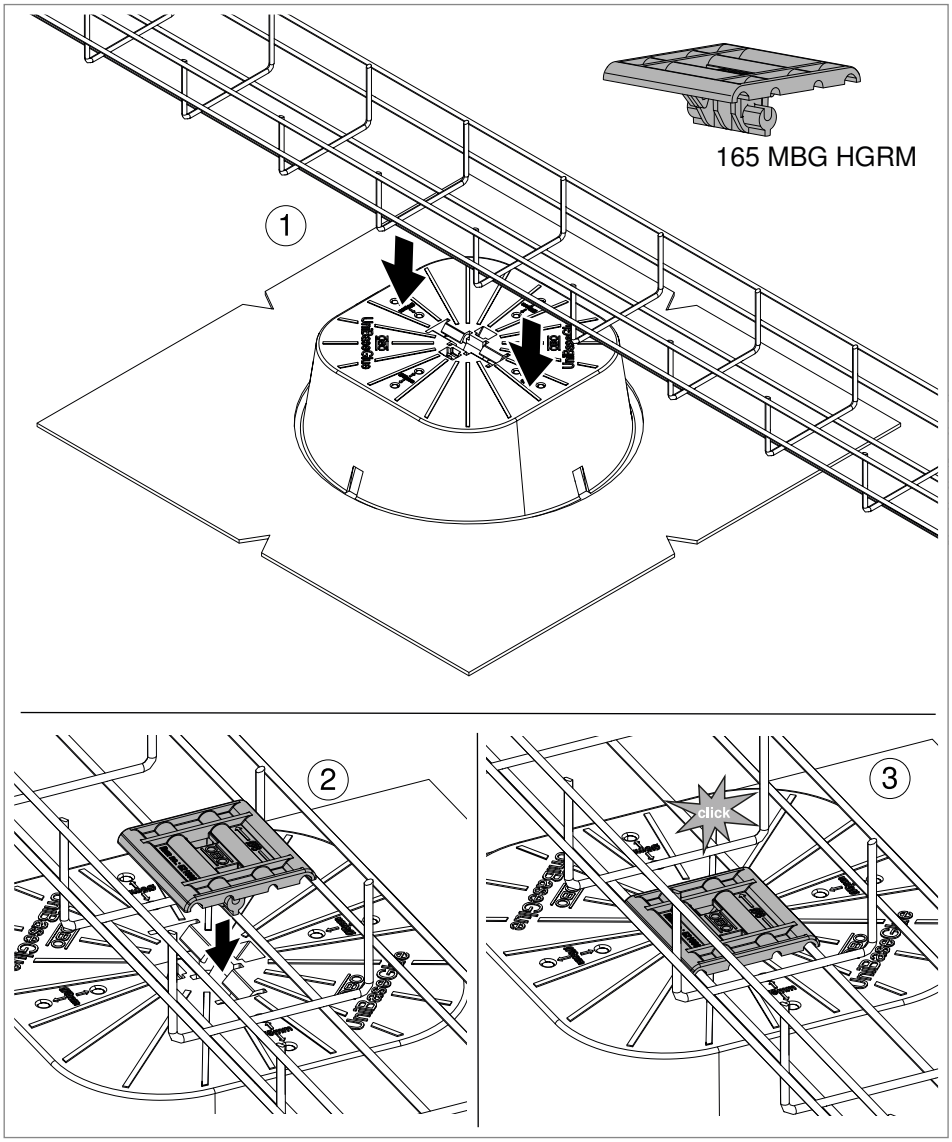


Fig. 67: Mounting the mesh cable tray on UniBase Glue

4. Place the mesh cable tray on the bases ①.
5. Click the adapter into the bases, ensuring that the straight wires of the mesh cable tray are clamped ② ③.
6. Lay and align the entire course of the cable support system.

Note! *To guarantee an exact alignment of the cable support system, welding of the sleeves may only be commenced when the entire course has been laid and aligned.*

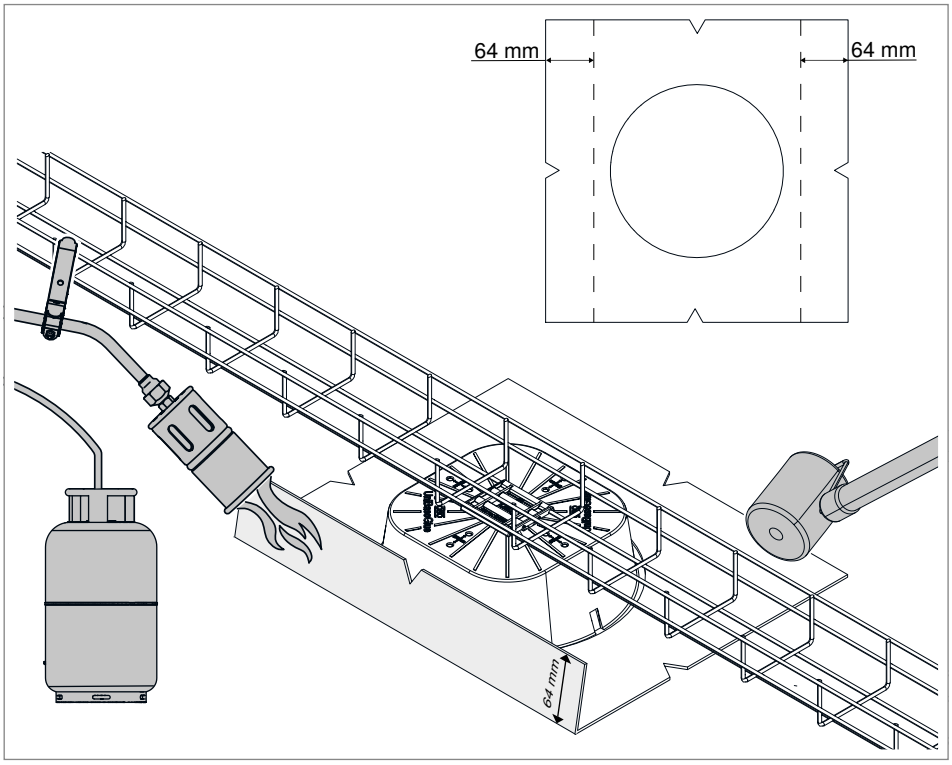


Fig. 68: Welding on the sleeve

7. Melt the underside of the sleeve to a width of 64 mm on both sides parallel to the mesh cable tray and press with a pressing roller.

8. Weld on all further sleeves.

7 Maintaining the system

The PV mounting systems must be maintained once a year. Maintenance includes a visual inspection as well as the testing of different system components, repairing damage and removing impurities.

Visual inspection of the system

– Repair any obvious damage such as corrosion, deformations or cracks.

– Tighten the module fastenings, such as loose screws or clamps.

– Repair or replace worn materials, e.g. seals or fastenings.

– Check the number and condition of the ballast blocks and increase and/or replace if necessary.

– If installed, check the state and position of the building protection mats and fix them if necessary.

Check the fastening system

– Check the stability and secure positioning of the support structure and repair if necessary.

– Check the tightening torque of screws, nuts and connection elements and tighten if necessary.

– Check the wind and snow load protection and repair or replace if necessary.

Check the seals and corrosion protection

– Check the roof seal in the area of the fastening points and repair or replace if necessary.

– Identify any potential water entry points and seal if necessary.

– Check corrosion protection and repair if necessary.

Check the electrical components

– Perform a visual inspection of the cable paths and plug connections and repair if necessary.

– Repair any damage due to UV radiation, animals or mechanical loads.

– Ensure proper earthing of the mounting system.

Clean the system

– Eliminate any impurities that can negatively affect performance.

– If necessary, remove dirt and leaves from the support structure.

8 Dismantling the system

The PV mounting systems are dismantled in the reverse order to the mounting. The UniBase TMP and 165 MBG HGRM adapters cannot be dismantled. The universal clamp cannot be dismantled without being destroyed. The long and short supports can be dismantled with a dismantling tool, which is included with the truss profiles.

8.1 Dismantling the short and long supports

To be able to release the support from the truss profile, the dismantling tool must be used, which is included with the truss profiles.

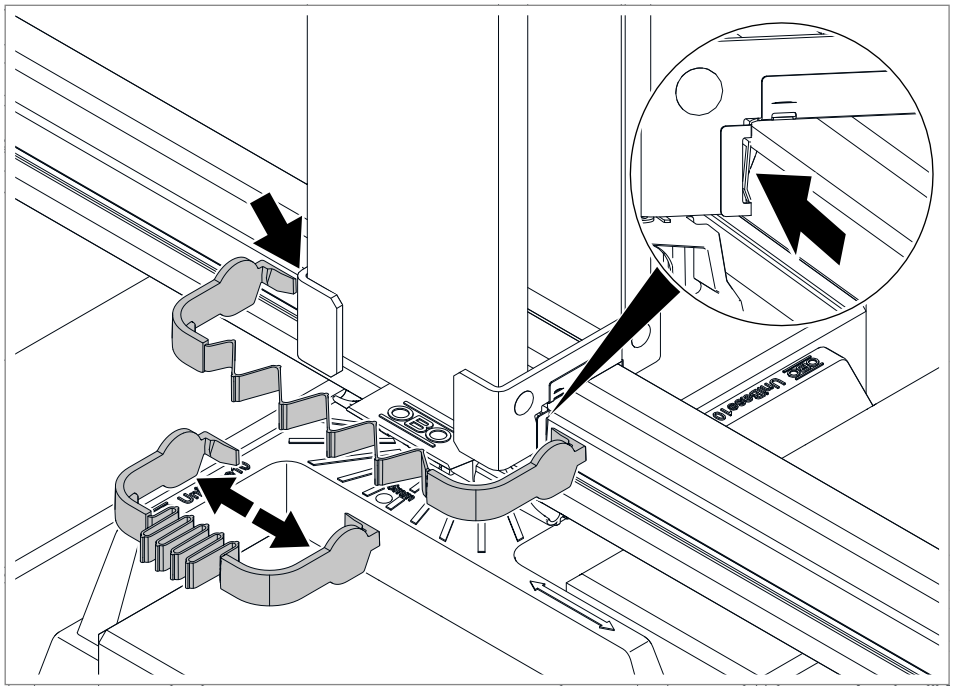


Fig. 69: Applying the dismantling tool

1. Pull the dismantling tool apart and apply it to the springs of the support.

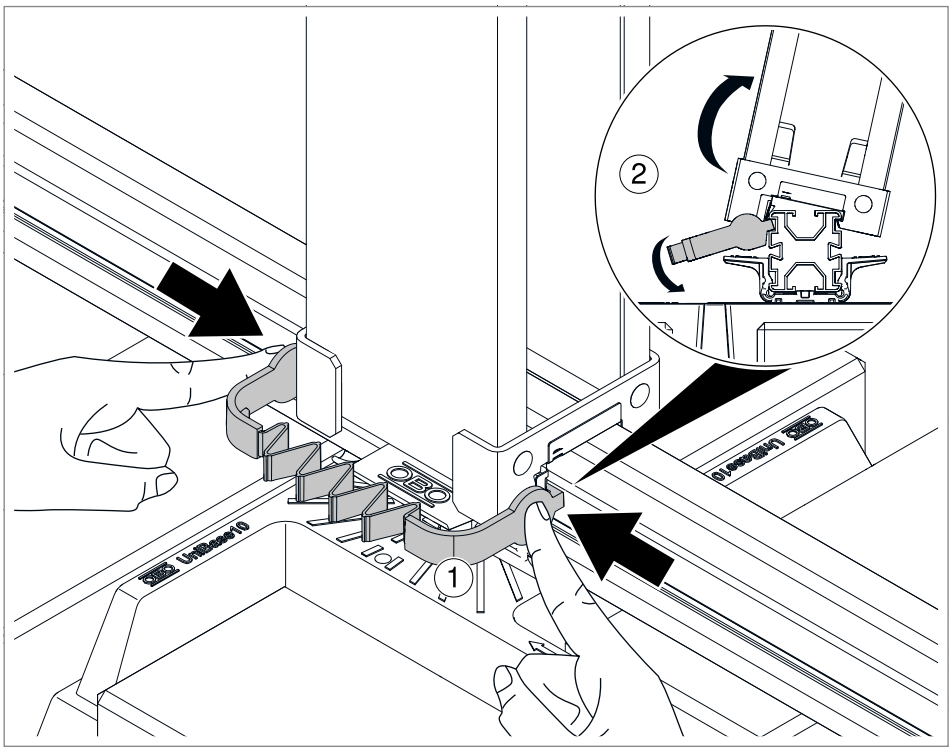


Fig. 70: Removing the support

2. Push the dismantling tool together ① to open the springs.
3. Press down on the dismantling tool to tilt the support and remove it ②.

9 Disposing of the system

Comply with the local waste disposal regulations.

– Metal parts: As scrap metal
– Plastic parts/accessories: As plastic
– Packaging: As household waste/as metal (depending on packaging type)

10 Technical Data

Designation	Type	Dimension mm	Material/ surface	Article number
Truss profile, for flat/ pitched roof system	TP 45/4700 ALU	40 x 45 x 4700	Aluminium	5900410
Truss profile, for flat/ pitched roof system	TP 45/4700 ALU S	40 x 45 x 4700	Aluminium, black	5900412
Universal base, bonding	UniBase Glue	Ø 314 x 79	Acrylnitrile-styrene-acrylate (ASA)	5403395
Universal base, ballasting, for blocks up to 10 x 20 x 10 cm	UniBase 10	373 x 118	Acrylnitrile-styrene-acrylate (ASA)	5403393
Universal base, ballasting, for blocks up to 10 x 20 x 6 cm	UniBase 6	373 x 79	Acrylnitrile-styrene-acrylate (ASA)	5403391
Building protection mat for UniBase, without aluminium lamination	UniBase BSM	410 x 410 x 6	PUR-composite rubber granules	5403402
Building protection mat for UniBase, with aluminium lamination	UniBase BSM AL	410 x 410 x 6	PUR-composite rubber granules with aluminium-coating	5403404
Universal clamp, for flat/pitched roof system	KLU A2	41 x 42 x 79	Stainless steel A2	5901010
Universal clamp, for flat/pitched roof system	KLU A2 S	41 x 42 x 79	Stainless steel A2 black	5901012
End clamp with spring	KLE F 25 A2 KLE F 30 A2 KLE F 35 A2 KLE F 40 A2	56x46x48 56x46x53 56x46x58 56x46x63	Stainless steel A2	5901092 5901093 5901094 5901095
Intermediate clamp with spring	KLZ F 25 A2 KLZ F 30 A2 KLZ F 35 A2 KLZ F 40 A2	50x40x48 50x40x53 50x40x58 50x40x63	Stainless steel A2	5901062 5901063 5901064 5901065
Short support for flat roof systems	STK DD	86 x 166 x 107	Steel doubledip	5901650
Long support for flat roof system	STL DD	86 x 166 x 300	Steel doubledip	5901655
Truss profile adapter for universal base	UniBase TMP	91 x 110 x 42	Acrylnitrile-styrene-acrylate (ASA)	5403397
Universal earthing clamp PV	249 PV10 6-50V2A	43 x 40 x 34	Stainless steel A2	5051520
Endcap for truss profile	EK 45 G	44 x 49 x 16	Polyethylene grey	5901722
Endcap for truss profile	EK 45 S	44 x 49 x 16	Polyethylene black	5901720
Straight connector for truss profile	LV 45 DD	40 x 69 x 150	Steel doubledip	5901210
Cross connector for truss profile	KV 45 DD	30 x 40 x 40	Steel doubledip	5901250
Windbreak for flat roof systems	WSB 2200 DD	44 x 372 x 2200	Steel doubledip	5901610

Designation	Type	Dimension mm	Material/ surface	Article number
Flat-head screw for windbreak	FKS 6x25 A2	Ø 12 x 30	Stainless steel A2	5901880
Bitumen sleeve	UniBase Glue Bit	444 x 444	Bitumen	5403410
Plastic sleeve	UniBase Glue FPO	444 x 444	FPO (Flexible polyolefines)	5403412
Mesh cable tray	GRM 55 200 FT GRM 55 300 FT GRM 55 400 FT GRM 55 500 FT GRM 55 600 FT	55x200x3000 55x300x3000 55x400x3000 55x500x3000 55x600x3000	Hot-dip galvanised steel	6001420 6001424 6001428 6001432 6001436
Mesh cable tray	GRM 105 200 FT GRM 105 300 FT GRM 105 400 FT GRM 105 500 FT GRM 105 600 FT	105x200x3000 105x300x3000 105x400x3000 105x500x3000 105x600x3000	Hot-dip galvanised steel	6002435 6002437 6002439 6002443 6002445
Fastening set for mesh cable trays for flat-roof systems	BF GR	60x40x20	Hot-dip galvanised steel	5901770
Ballast rail	BS DD	1765x40x53,3	Steel double dip	5901686
Ballast support plate	BTP 35 DD	304x51x25,5	Steel double dip	5901674
Barrier strip	TSG 45 DD	45x2995	Steel double dip	6062321
Barrier strip	TSG 85 DD	85x2995	Steel double dip	6062331
Barrier strip connector, for all barrier strip side heights	TSGV A2	60x20x15	Stainless steel A2	6067970
Hold-down clamp for mesh cable tray, for barrier strip fastening	KS GR A2	41,5x26	Stainless steel A2	6062282
Distance gauge	AASL FD	1570 x 127 x 67	Aluminium	5901620
Dismantling tool	Does not need to be ordered separately, included with the truss profiles			

Tab. 2: Technical Data

Additional parameters straight connector/ cross connector

Straight connector LV 45 DD

Straight connector LV 45 DD suitable for indoor and outdoor areas. Releasable connection, not suitable for accepting a static mechanical load.

Lightning current carrying capacity for:

– Aluminium profile 45 x ALU / aluminium profile 45 x ALU class H, in longitudinal arrangement

– Aluminium profile 45 x ALU S / aluminium profile 45 x ALU S class H, in longitudinal arrangement

Cross connector KV 45 DD

Cross-connector KV 45 DD suitable for indoor and outdoor areas. Releasable connection, not suitable for accepting a static mechanical load.

Lightning current carrying capacity for:

– Aluminium profile 45 x ALU / aluminium profile 45 x ALU class H, in a cross arrangement

– Aluminium profile 45 x ALU S / aluminium profile 45 x ALU S class H, in a cross arrangement

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Building Connections