

Solar systems from Schweizer

Installation instructions for PV mounting system

Green roof MSP-FR-G



Please read carefully before use and keep this document in a safe place.

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1 About these instructions

1.1 Basic information regarding the installation instructions

The installation instructions contain important information on how to install the mounting system safely, correctly and in accordance with the specifications. Following these instructions will help to avoid hazards and reduce repair costs and downtime.

These installation instructions must be kept for future reference throughout the entire installation period of the PV mounting system.

1.2 Standards and technical guidelines

The Schweizer MSP-FR-G PV mounting system complies with the following standards, amongst others, provided it has been designed using the Schweizer Solar.Pro.Tool (S.P.T for short) :

- DIN EN 1990: Eurocode 0: Basis of structural design
- DIN EN 1991-1-1 : Eurocode 1 : Actions on structures
Part 1-1 : General actions on structures – Densities, dead loads and live loads in building construction
- DIN EN 1991-1-3 : Eurocode 1 : Actions on structures
Part 1-3 : Snow loads, including national annexes
- DIN EN 1991-1-4 : Eurocode 1 : Actions on structures
Part 1-4 : Wind loads, including national annexes. The specific pressure coefficients were determined in wind tunnel tests.
- DIN EN 1999-1-1 : Eurocode 9 : Design of aluminium structures
- DIN EN 18195-1 : Building waterproofing – Part 2 – Materials

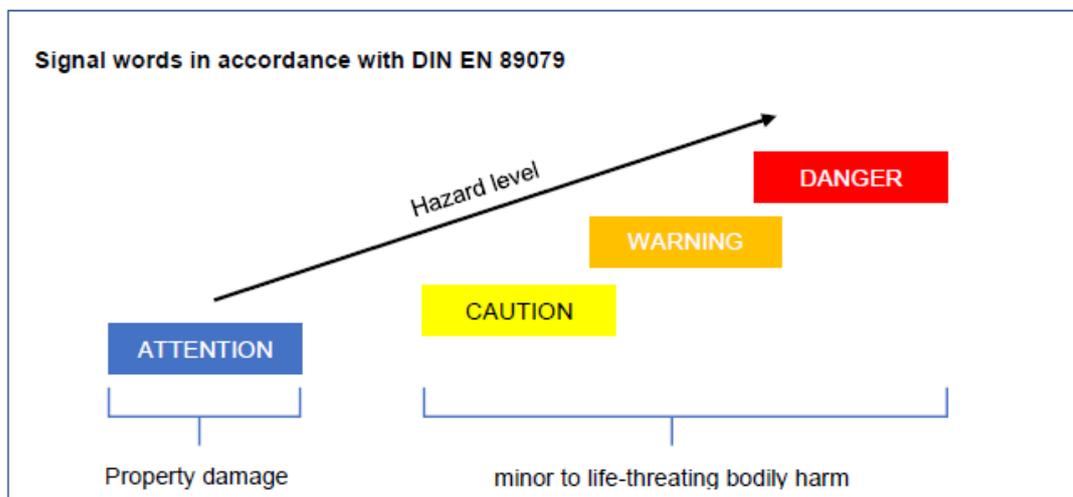
The tests were carried out in accordance with the following guidelines:

- VDE 0100
- Aerodynamic study in accordance with WTG guidelines

1.3 Structure of warning notices according to hazard levels

Distinction between hazard levels

The following signal words indicate the different hazard levels through different colour backgrounds :



2 Safety

2.1 Intended use

The Schweizer PV mounting system is designed exclusively for the installation of framed photovoltaic modules on buildings with flat roofs with a pitch of no more than 3°. Any other use is prohibited by Schweizer and is not in accordance with the intended use.

The definition of intended use includes compliance with the information in these installation instructions.

Schweizer cannot be held liable for any damage or loss arising from failure to comply with these installation instructions, in particular the safety instructions, or from misuse of the product.

2.2 Reasonably foreseeable misuse

The reasonably foreseeable misuse described here is not exhaustive. Where necessary, the list must be expanded to include documented incidents.

These include :

- the installation of photovoltaic systems at an angle greater than 3° (optionally with on-site connection to the roof substructure up to 10°).
- persons standing beneath suspended loads (during installation).
- the use of fittings and accessories such as screws or connectors during the installation of the support structure that are not included in the original scope of delivery.
- the installation of the support structure by unauthorised, technically unsuitable personnel.
- the damage to the roof covering.
- the installation of the support structure on a non-load-bearing substrate/roof.
- the incorrect positioning of the PV modules.
- when setting up the construction site on the roof, storing installation materials on the roof and when leaving the construction site, all site materials (tools, packaging materials, pallets, installation and system materials not yet installed, etc.), as well as unfinished systems, must in all cases be adequately protected from the effects of the weather.
- the failure to observe safety equipment, safety regulations and standard accident prevention regulations.
- when leaving the site, systems that have not been fully completed must be secured.

Errors may also occur due to the use of unauthorised components during repairs.

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2.3 Requirements for safe operation

To avoid personal injury and damage to property, caution must be exercised during all activities relating to the intended operation of the PV mounting system. In the event of non-compliance, Schweizer accepts no liability for any damage to property and/or personal injury.

Furthermore :

- The PV mounting system must only be operated when in perfect, fully functional condition.
- All warning and safety instructions in these installation instructions, as well as those provided by suppliers, must be strictly followed.
- Unauthorised modifications to the PV mounting system are prohibited.

2.4 Responsibility of the customer or installer

The customer or installer is responsible for ensuring compliance with the following relevant points :

It must be ensured that :

- all applicable accident prevention regulations and occupational safety regulations (or equivalent regional standards) are observed.
- the installation is carried out only by persons who possess the appropriate basic and specialist technical knowledge.
- the persons assigned to carry out the work are able to assess the tasks assigned to them and identify potential risks.
- the persons responsible for carrying out the work are familiar with the system components and the installation procedure.
- the project report for the project to be installed has been read and fully understood by the persons entrusted with carrying out the work.
- the project report is available at all times during installation. The project report is an essential part of the Schweizer PV mounting system.
- the permissible installation conditions are observed. Schweizer cannot be held liable for any damage or loss resulting from a failure to comply with these conditions.
- the correct installation is in accordance with the project report and the provision of any necessary tools are ensured.
- where necessary, a suitable lifting device is used for installation.
- components with visible damage are not used and are replaced.
- each component, as well as its accessories, is used exclusively as intended and as specified in the project report.
- only Schweizer MSP-FR-G or other specified Schweizer MSP components are used for installation, even if parts need to be replaced. Otherwise, no warranty claims will be accepted.
- the roof covering is not damaged in any way by parts of the PV mounting system falling onto it, being dragged across it or penetrating it.
- the regular (several times a year) care and maintenance of the green roof is carried out in accordance with growth patterns. In addition, a regular annual inspection of screw connections, mechanical connections, cabling and earthing must be carried out.

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- the roof on which the system is mounted is designed and constructed in such a way that it can adequately and safely support the PV mounting system. This includes, amongst other things, the structural strength of the roof, the condition and compatibility of the roof covering, the required long-term load-bearing capacity of the insulation material, and the appropriate drainage of water from the roof surface. Schweizer cannot be held liable for damage to roofs.
- the Schweizer PV mounting system MSP-FR-G can be incorporated into the design of the electrical equipotential bonding system and connected to it by correctly fitting a suitable earthing terminal or screw (not supplied by Schweizer). The customer must ensure compliance with current regulations, legal provisions and guidelines.
- the installation is carried out in accordance with current national regulations and guidelines, including, but not limited to, compliance with the required clearance from the roof, the installation of safety barriers, restricted access during operation, or precautions for anticipated dynamic loads or special events such as earthquakes and extreme weather conditions.
- if the system is fixed to the building in any way, this fixing must be appropriately designed and provided. Schweizer shall not be liable for any resulting damage.
- the building's lightning protection system, if any, must be adapted in accordance with current technical regulations and legal provisions. Where applicable, refer to the information sheet « Lightning current carrying capacity (PDF) » for Flat Roof Systems MSP-FR.
- to this end, the following standards (or corresponding regionally applicable standards) for the design and installation of lightning protection, earthing and equipotential bonding must be observed :
 - DIN EN 62305 Lightning protection
 - DIN VDE 0185 Part 1-4 Lightning protection
 - DIN VDE 0100 Part 410 Earthing
 - DIN VDE 0105 Operation of electrical installations
 - DIN VDE 0298 Electrical wiring

Furthermore, the following must be observed :

- “The regulations of the Central Association of the German Roofing Trade (ZVDH)” or equivalent regional standards for work on roofs must be observed.
 - DIN 18338 Roofing work
 - DIN 18451 Scaffolding work

as well as :

- the guidelines on damage prevention VDS 2023 – Electrical installations in buildings constructed predominantly of combustible materials and DIN 4102 – Fire behaviour of building materials and components (or equivalent regional standards) must be observed.

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2.5 Basic safety instructions

The following basic safety instructions and warnings form an integral part of these instructions and are of fundamental importance when handling this product :

- Work clothing in accordance with national regulations must be worn.
- Work safety regulations must be observed.
- Ensure that all electrical work is carried out by qualified electricians. All relevant regulations and guidelines must be observed.
- The presence of a second person who can provide assistance in the event of an accident is mandatory throughout the entire installation process.
- These installation instructions must be kept in the immediate vicinity of the system for use by the persons responsible for carrying out the work.
- Until the PV system is fully completed and ready for operation, all incomplete sections, components and materials must be secured in accordance with the applicable regulations.

3 Residual risks

The following safety instructions must be strictly observed to avoid risks to people and damage to the PV mounting system and the PV modules.

DANGER



Electric shock due to a lightning strike on the PV mounting system

The support structure with the installed photovoltaic systems is operated outdoors. A lightning strike can result in life-threatening injuries.

Ensure the PV mounting system is properly earthed.

Do not carry out any maintenance or repair work on the PV mounting system during a thunderstorm.

DANGER



Electrical voltage due to loose protective conductors or earth connections

If protective conductors or earth connections have become loose, conductive parts – including handles, covers and locks that appear to be insulated – may cause an electric shock if touched. Check that all protective conductors and earth connections are connected.

If current is flowing through defective components or cables, leave the danger zone immediately.

WARNING



Risk of falling

Carelessness and tripping can lead to a fall when working at height. This can result in life-threatening injuries.

- Access to the roof must be secured by the operator in such a way that no unauthorised persons can enter the roof area.
- Ensure that suitable lanyards and a fall arrest system are available for cleaning and maintenance work.

CAUTION



Risk of tripping and falling

Objects lying around or cable ducts fixed to the floor can pose a risk of tripping and falling, which may result in injury.

- Avoid obstacles in the area of movement.
- Lay cable ducts so that they do not create any obstacles.
- Do not store or leave objects in the danger zone.

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4 Technical clarification prior to installation

The suitability of the roof for supporting a PV system must be checked and confirmed by the client (structural engineer / specialist planner) in accordance with recognised rules, technical standards, legal requirements, standards and specialist regulations.

The following points, among others, should be highlighted here :

- Sufficient structural load-bearing capacity for the additional loads of the PV system.
- Check of the load-bearing capacity of the insulation material with regard to the permissible contact pressure.
- Suitability and condition of the roof covering.
- Inspection of the roof drainage system to ensure there is no unauthorised water accumulation.
- Condition of the roof (free from any damage).

5 Installation conditions

The Schweizer PV mounting system MSP-FR-G is designed for the following conditions :

- The system must be installed in a manner correctly adapted to the project and its local conditions, in particular taking into account the necessary calculation of additional loads.
- For mounting framed photovoltaic modules with a frame height of 28–45 mm, or 28–40 mm when using the additional clamps.
- On flat roofs with a pitch of no more than 3° (optionally with on-site connection to the roof substructure up to 10°).
- For module sizes as per data sheet MSP-FR-G.
- A maximum block size of 15 m x 15 m is permitted to avoid unnecessary stress on the roof covering due to thermal expansion.
- The minimum permissible coefficient of friction between the substrate and the base profile is 0.3.
- Suitable for environmental conditions within the range of normal corrosive environments (e.g. at least 1 km from sea coasts) and in more corrosive environments (e.g. C4), provided regular maintenance is ensured.
- For all substrate coverings up to 15 cm thick. However, Schweizer is not responsible for ensuring the continued validity of the warranty provided by the manufacturer of the roof covering.
- For modules that allow the use of clamps on the short edges in the corners (Schweizer can provide a list of approved modules on request). Schweizer is not responsible for ensuring the continued validity of the warranty provided by the module manufacturer. However, Schweizer will, as far as possible and appropriate, assist customers in obtaining all necessary clamp approvals from the module manufacturers.
- For roofs that can sufficiently withstand the additional load from the PV mounting system (as assessed by the customer and within their responsibility). The calculated total load exerted on the roof by the MSP-FR-G PV mounting system includes the MSP mounting system, the modules (as specified in the project report) and the required ballast. All other loads are excluded (e.g. cables, inverters, etc.).

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6 Roof preparation

Before installation of the PV system begins, the roof must be thoroughly cleared of large vegetation, as well as snow and ice. The installer must ensure that the installation conditions required for the MSP-FR-G are met, and that the personnel carrying out the installation work are professionally trained and fully familiar with the PV mounting system.

NOTE



The material must be distributed across the roof in such a way that no excessive point loads occur.

7 Commissioning and maintenance

Installation and commissioning must be carried out exclusively by authorised personnel.

Observe the safety instructions listed here as well as the instructions at the beginning of this operating manual, **Chapter 2 Safety**.

Regular (several times a year) care and maintenance of the green roof must be carried out in line with plant growth. In addition, a regular annual inspection of screw connections, mechanical fastenings, cabling and earthing must be carried out.

Clamps may be reused provided they are undamaged. The specified torque must be strictly adhered to. In the event of visible damage, corrosion or over-tightening, they must be replaced immediately. As a precautionary measure, the clamps should be replaced after a maximum of 5 tightening and loosening cycles.

8 Supplementary documents

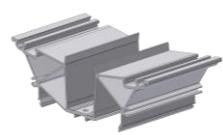
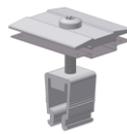
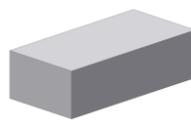
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- Important documents
- Information sheets
- Test results

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9 Components

1	2	3	4	5
				
Base profile MSP-FR-EW-BP	Adapter support MSP-FR-G-AS	Support high MSP-FR-EW-SH90	Support middle high MSP-FR-EW-SMH90	Support MSP-FR-EW-SL8 MSP-FR-EW-SL10
6	7	8	9	10
				
Support MSP-FR-S-SL8 MSP-FR-S-SL10	End clamp MSP-PR-EC MSP-PR-ECB	End clamp grounding MSP-PR-ECG MSP-PR-ECBG	Middle clamp MSP-PR-MC MSP-PR-MCB	Middle clamp grounding MSP-PR-MCG MSP-PR-MCBG
11	12	13	14	15
				
Complementary clamp low MSP-FR-LC MSP-FR-LCB	Complementary clamp high MSP-FR-HC MSP-FR-HCB	Connection channel MSP-FR-C	Ballast fixation MSP-FR-BF	Ballast tray holder MSP-FR-BT
16	17	18	19	20
				
Ballast carrier start plate MSP-FR-EW-BS	Ballast tray clamp MSP-FR-BC	Cable holder with edge- clip MSP-FR-CHE	Cable holder clip MSP-FR-CH	Connection channel clip MSP-FR-C-CL
21	22	23	24	25
				
Optimizer clamp MSP-FR-OC-33 MSP-FR-OC-63	Screw MSP-FR-S M6x16	Screw MSP-FR-TS 6.3x20 R lightning current capable connection	Screw MSP-FR-GS 6x60	Ballast stone not included in delivery
26	27	28	29	30
				
S.P.T Project report				



10.1 Explanation of symbols



Caution



Warning of dangerous electrical voltage



See S.P.T. project report



Tightening / Tightening torque



Correct procedure



Repeat steps



Incorrect procedure



Earthing / Earthing installation



click! Audible click



Direction of movement

10.2 Tools required



Cordless screwdriver



If the cordless screwdriver is equipped with a hammer drill function, this must be switched off.



Torx bit TX30



Bit extension



Bit extension recommended for easier installation with the strut raised (MSP-FR-EW-SH).



Torque wrench (10 Nm) with Torx attachment TX30

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10.2.1 Torques

8 Nm	+/- 2 Nm					
10 Nm	+/- 3 Nm					
4 Nm	± 1 Nm					

10.2.2 Installation instructions for stainless steel screw connections

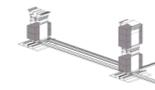
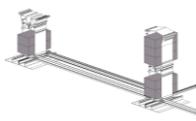
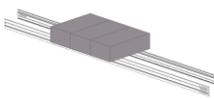
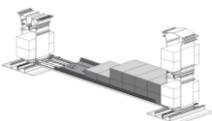
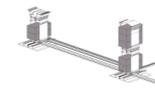
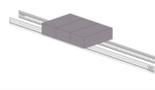
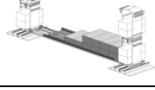


Installation must be carried out correctly.

To prevent cold welding between the bolt and nut, you should :

- use a screwdriver without a hammer drill function.
- set an appropriate, not too high, speed.
- do not apply excessive pressure to the bolt.

10.3 Ballasting – possible combinations and load-bearing capacity

				
		✓	✓	✓
	✓		✓	⊘
	✓	✓		⊘
	✓	⊘	⊘	



Possible / permitted



Not possible / not permitted



Maximum permissible load (from support to support) – see data sheet.

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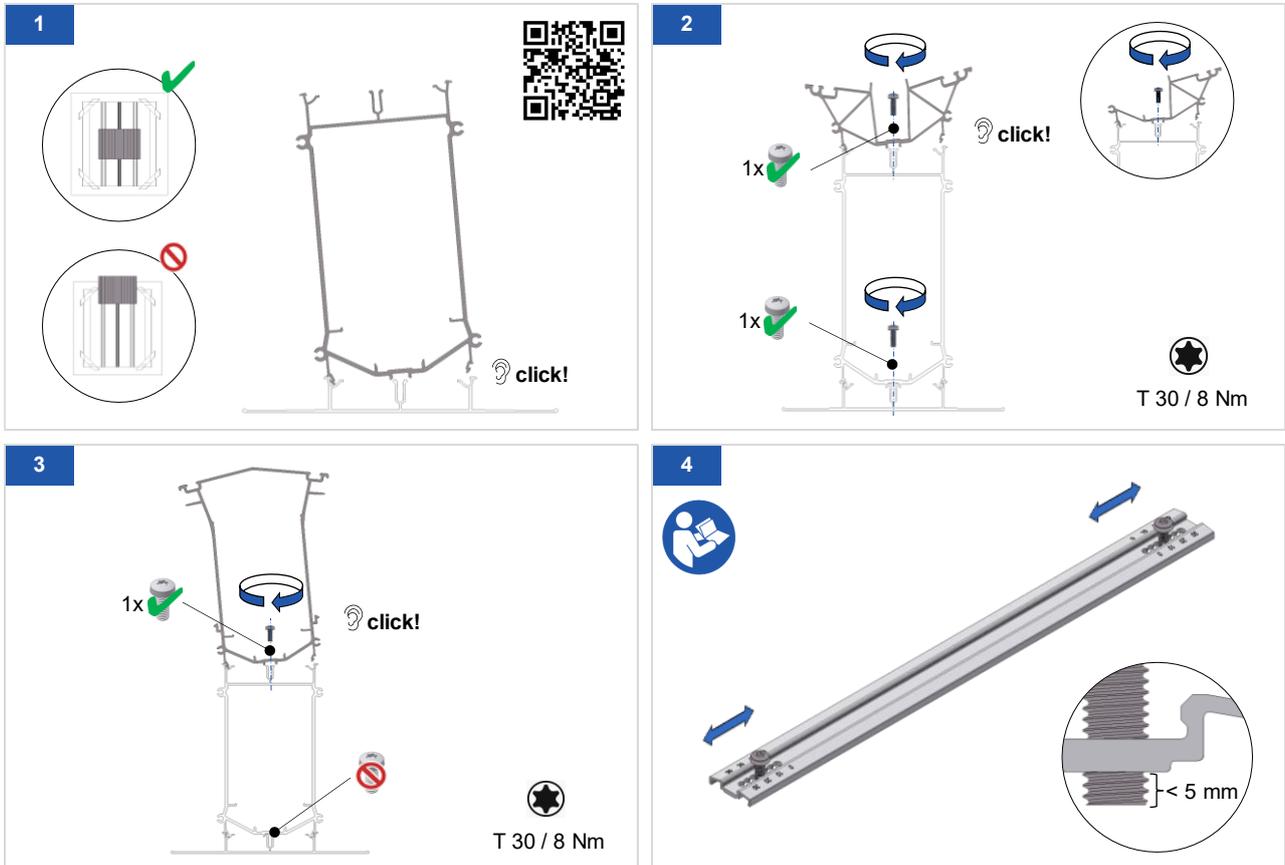
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10.4 Pre-assembly

Before installation, the following must be in place :

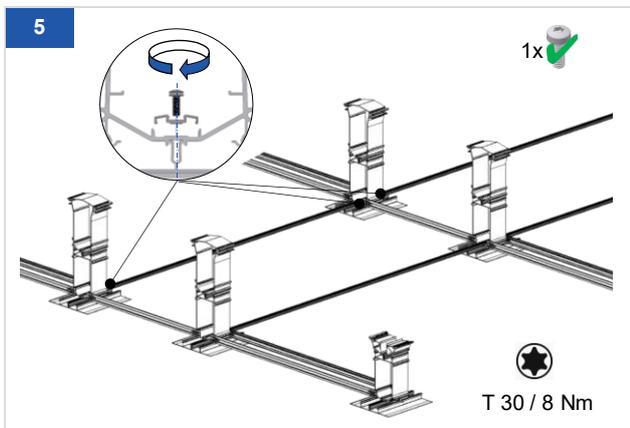
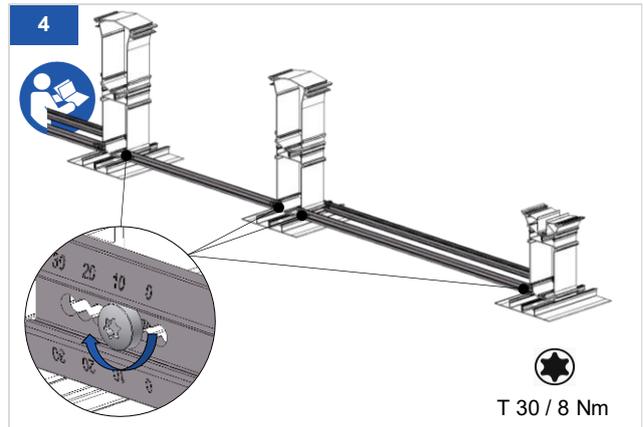
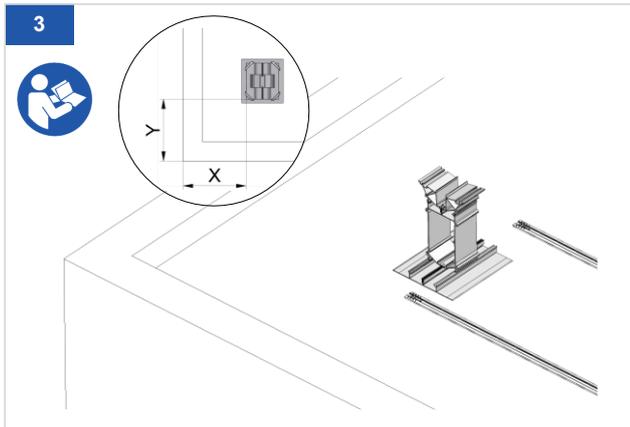
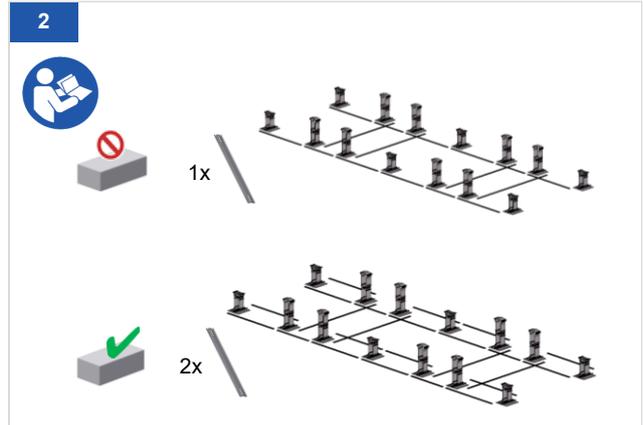
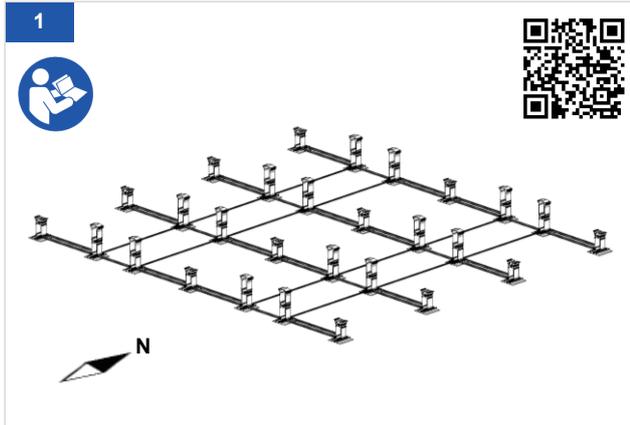
- the S.P.T project report must be available.
- the materials must be complete.

Preparation can also be carried out off-site.



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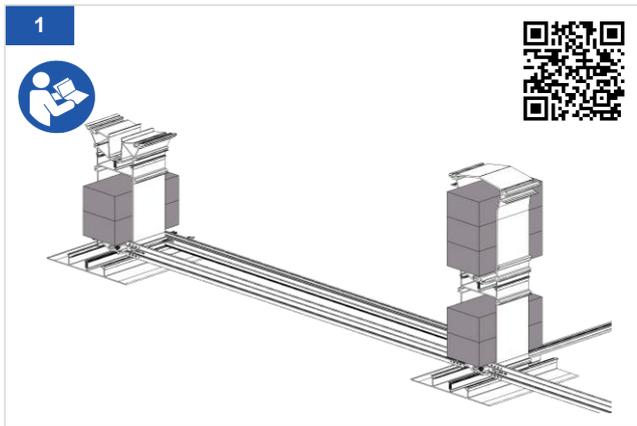
10.5 Basic configuration with the maintenance aisle at the ridge



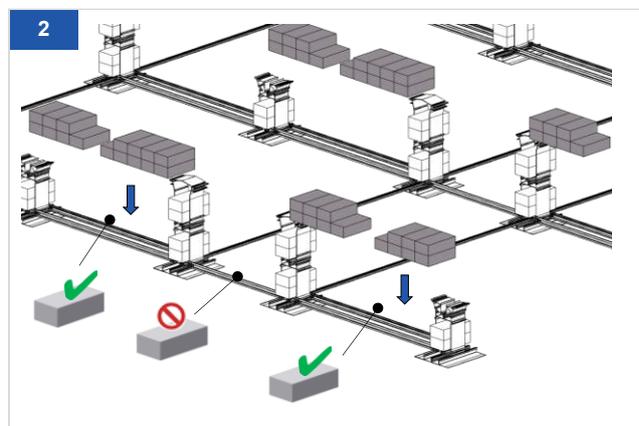
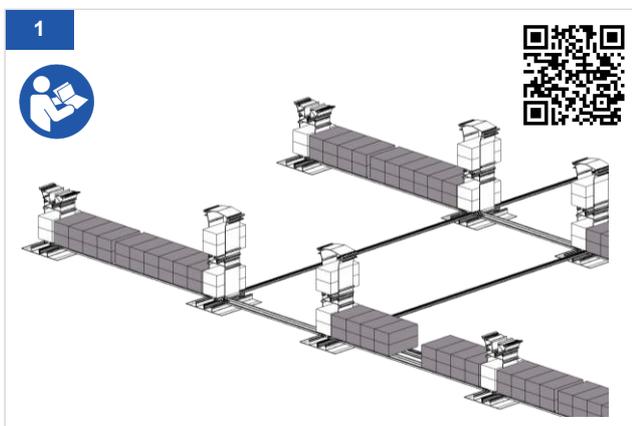
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10.6 Ballasting

10.6.1 Ballast in support

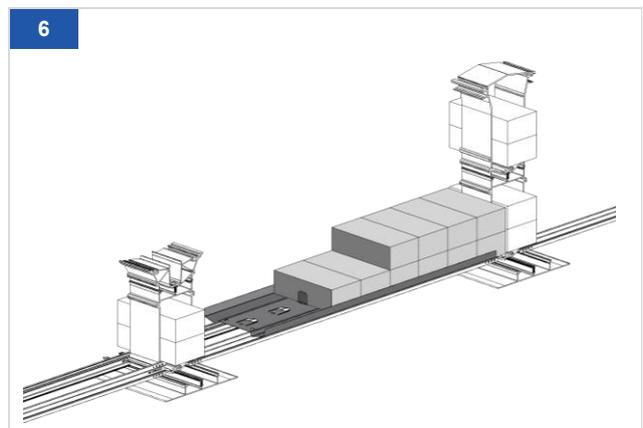
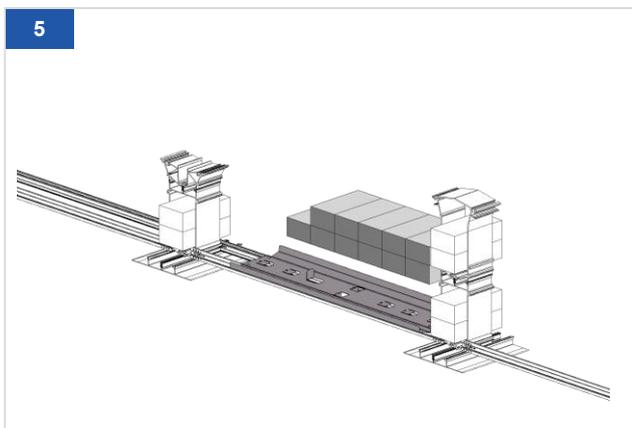
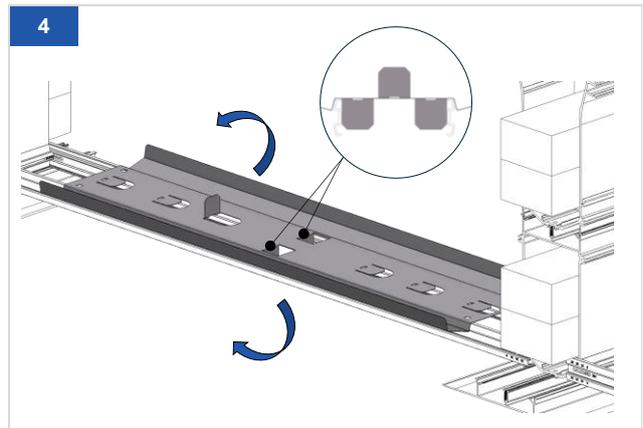
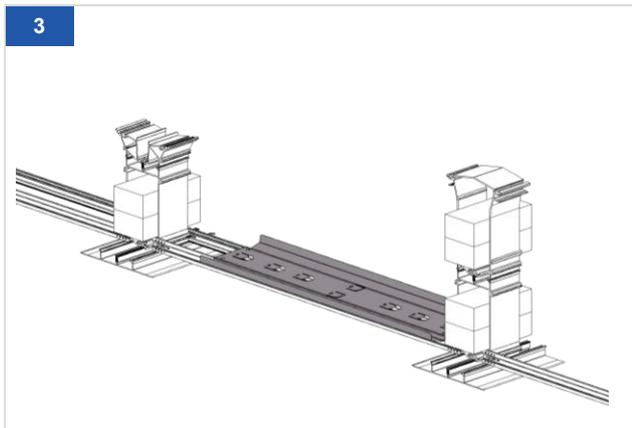
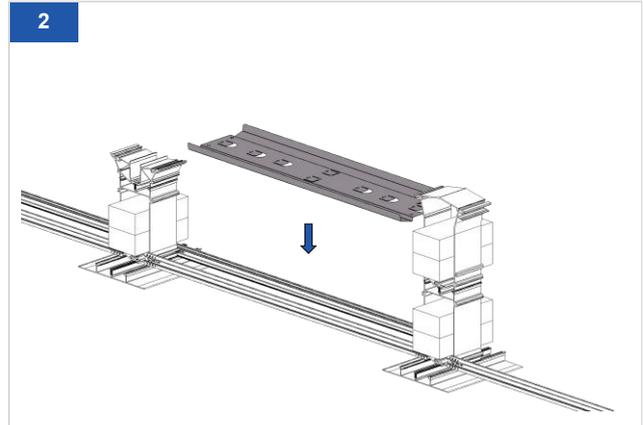
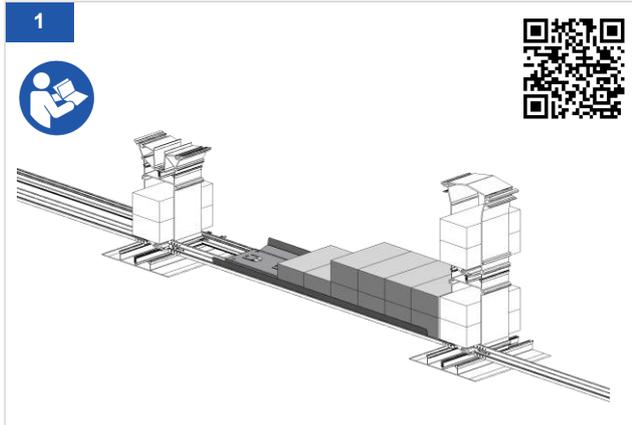


10.6.2 Ballast on connection channels



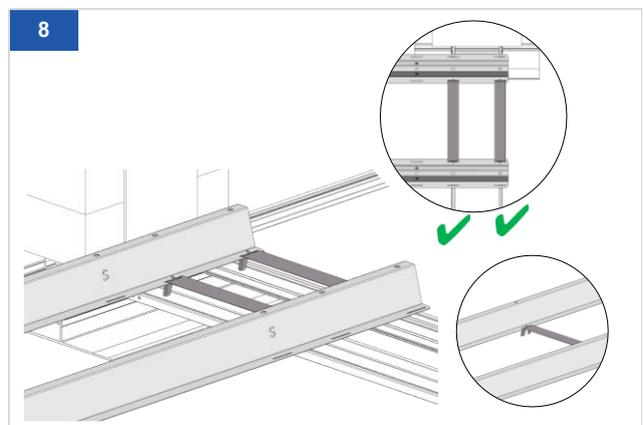
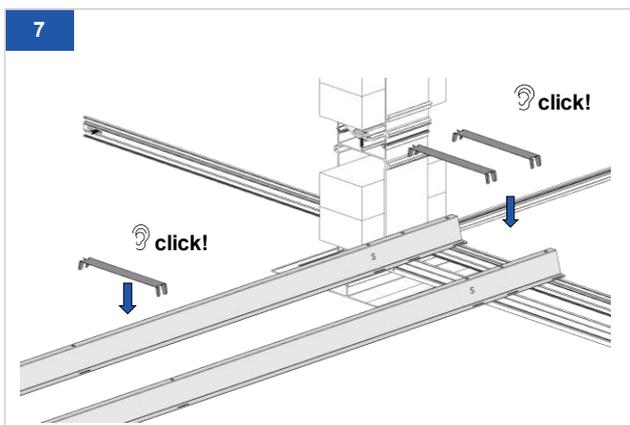
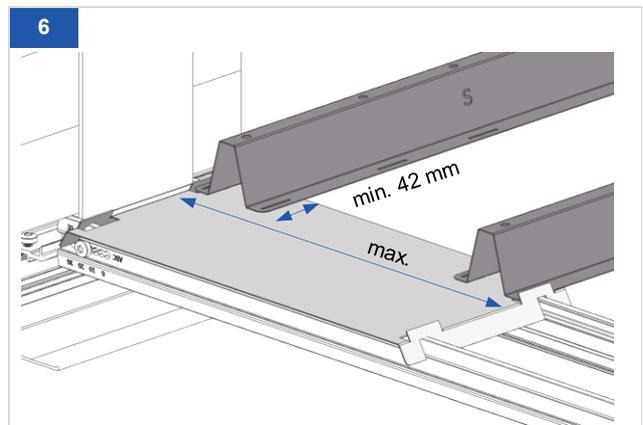
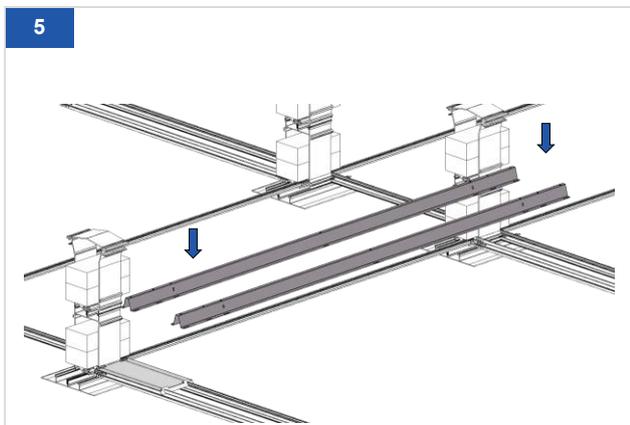
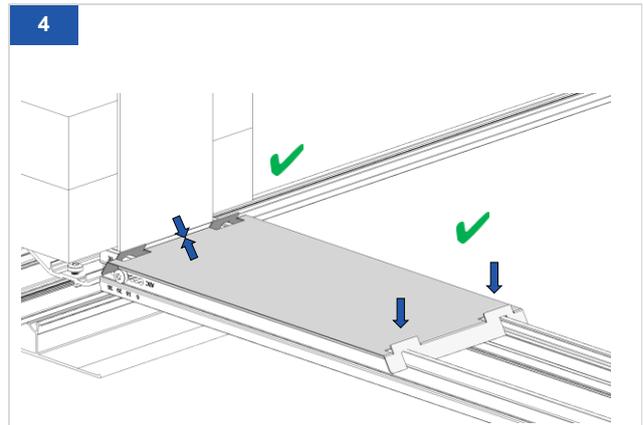
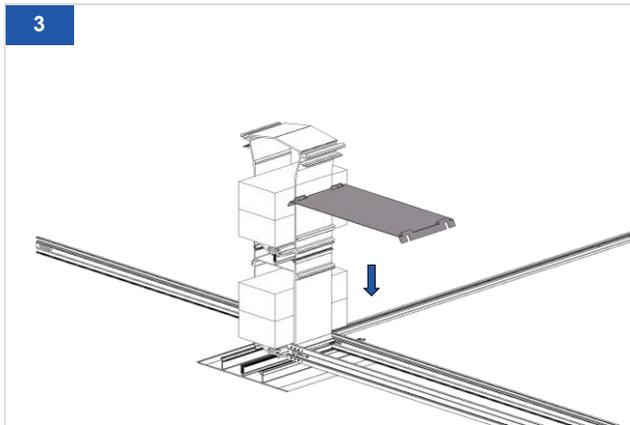
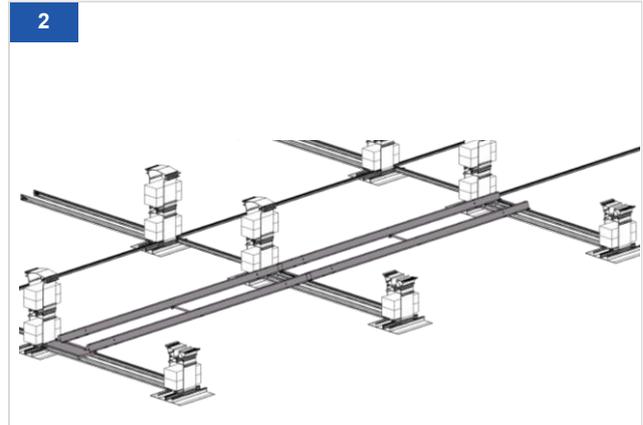
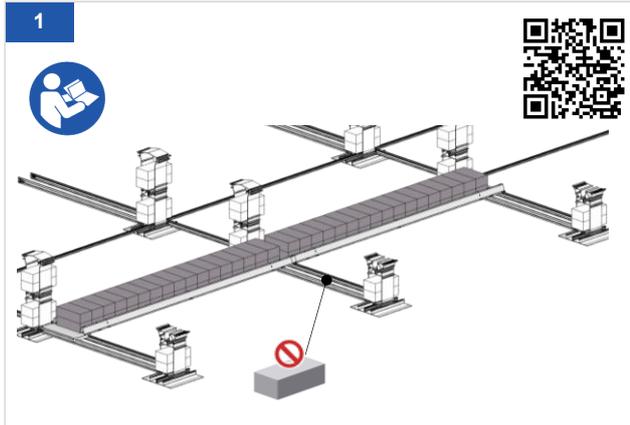
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10.6.3 Ballast on ballast fixation

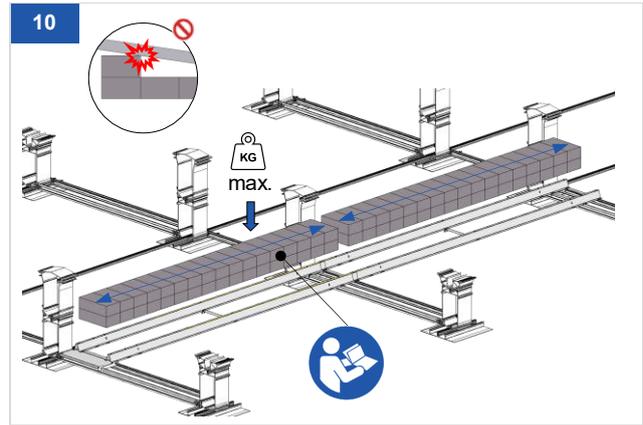
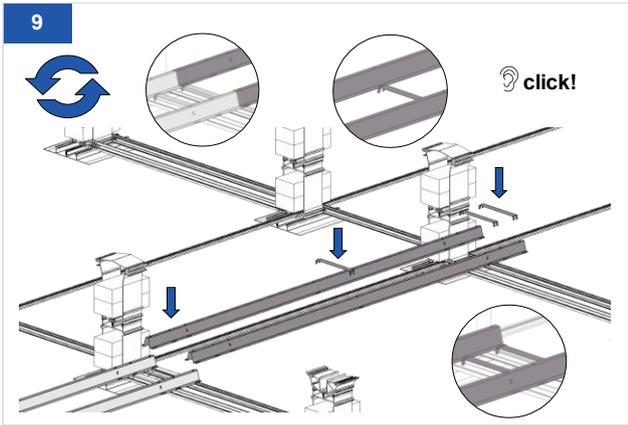


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10.6.4 Ballast on ballast tray holder system

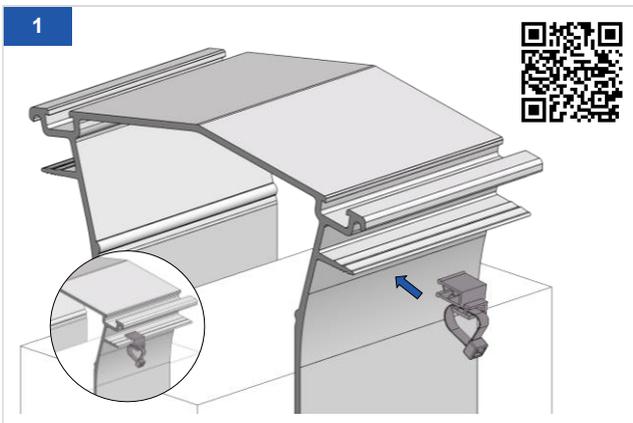


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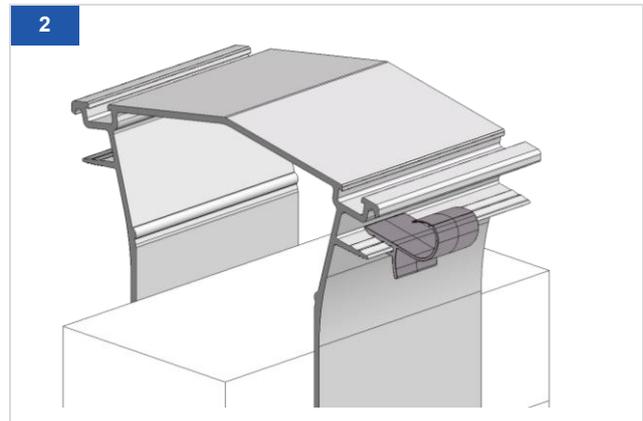
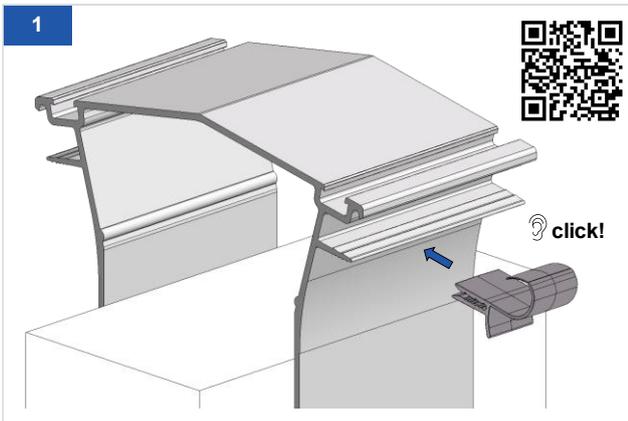


10.7 Cable management

10.7.1 Cable holder with edge-clip

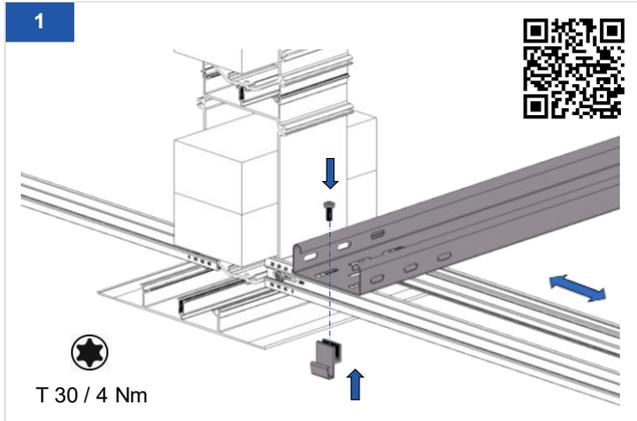


10.7.2 Cable holder clip

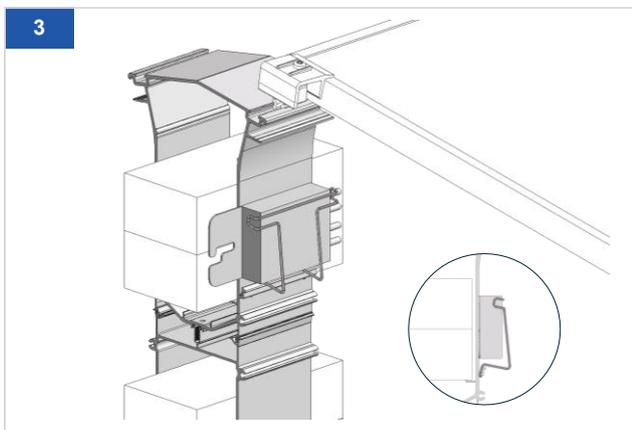
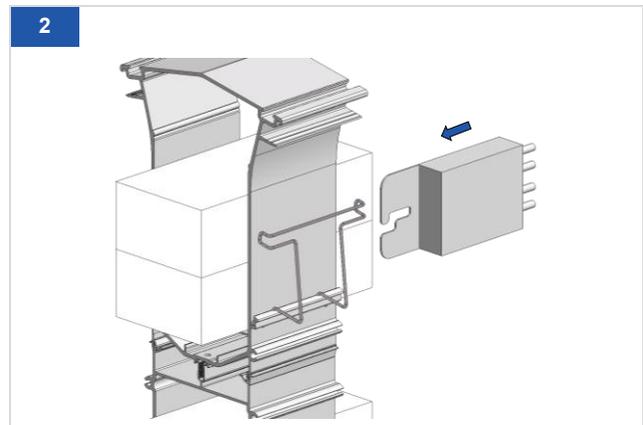
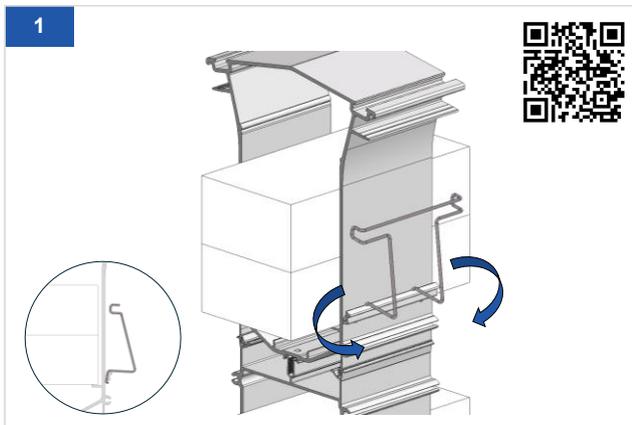


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10.7.3 Connection channel clip for fastening cable ducts an accessories

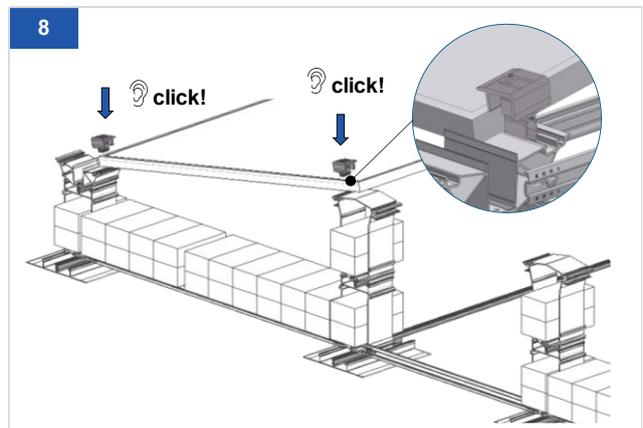
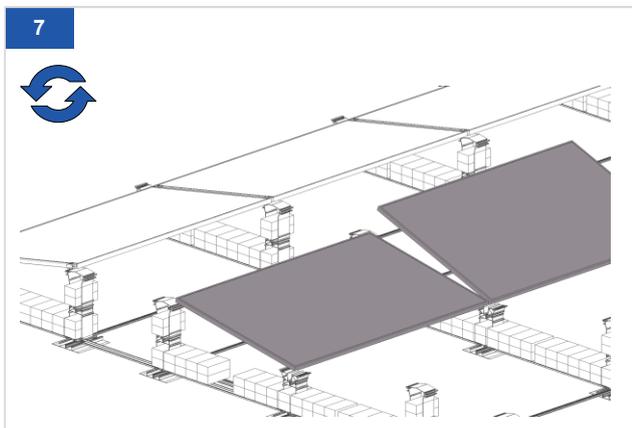
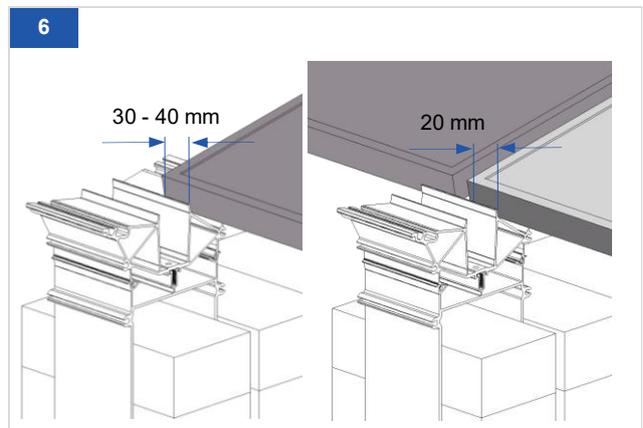
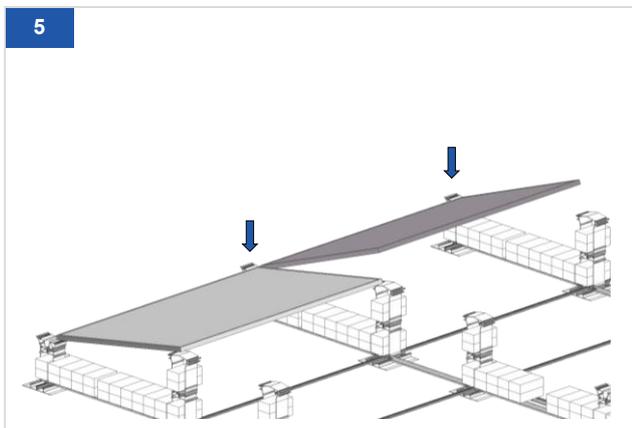
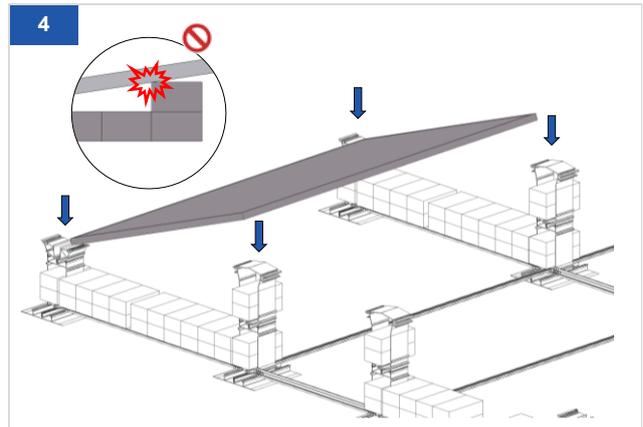
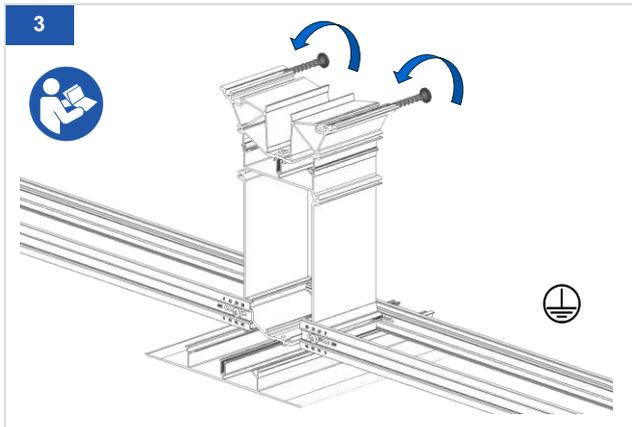
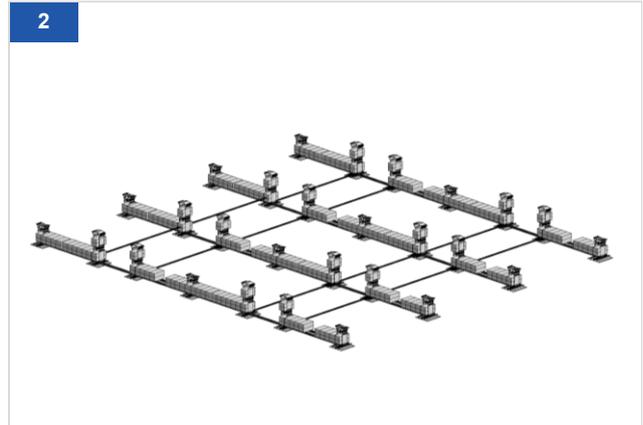
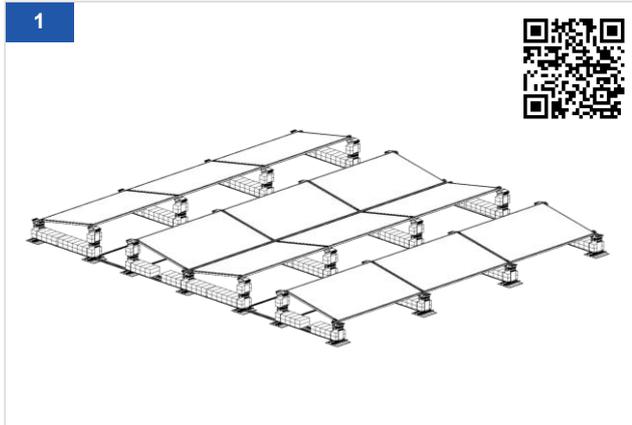


10.8 Optimizer clamp

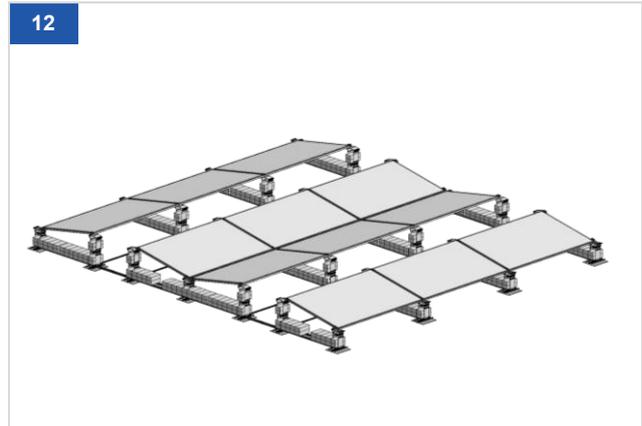
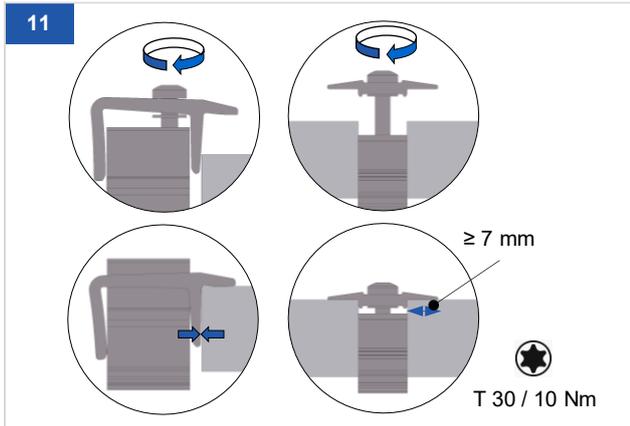
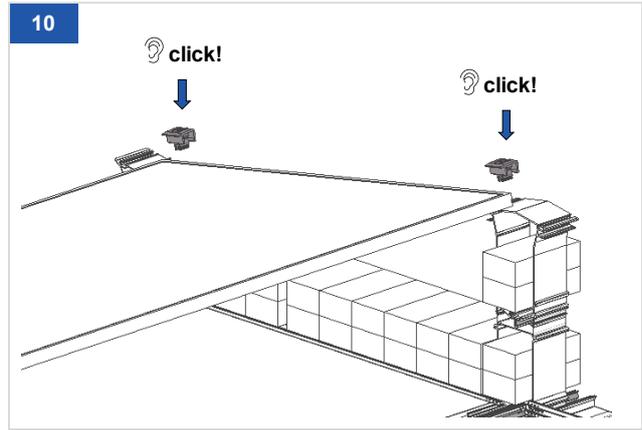
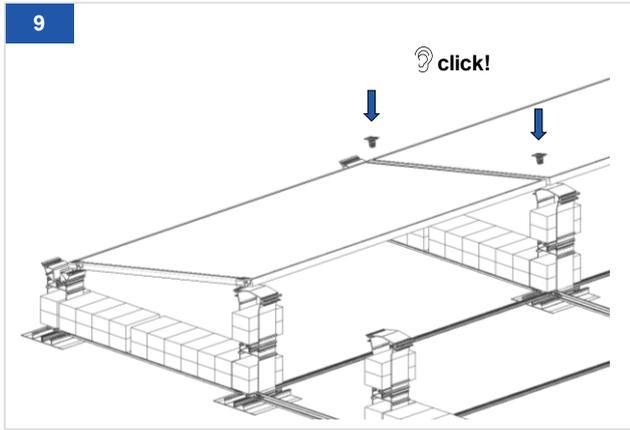


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10.9 Module mounting with potential equalisation (screwed version)

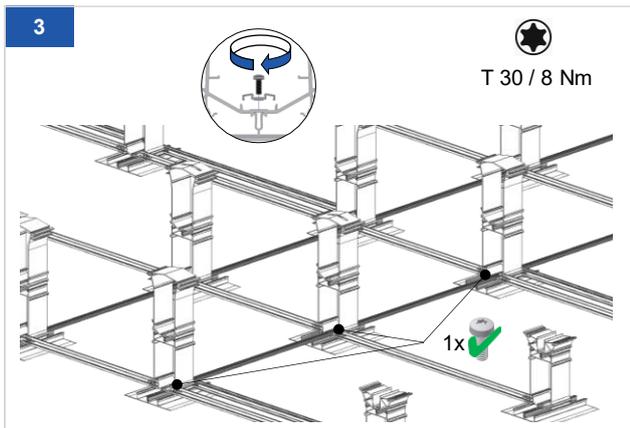
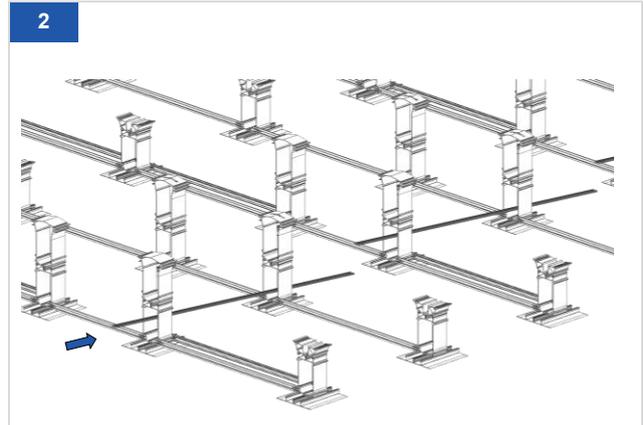
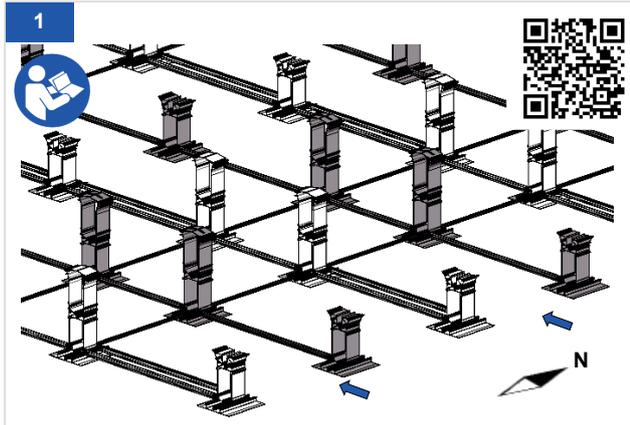


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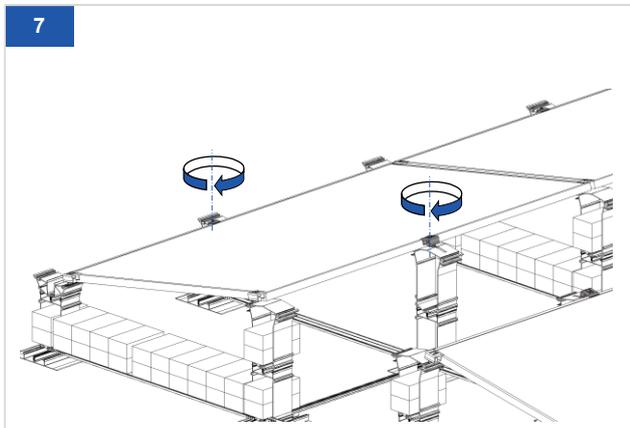
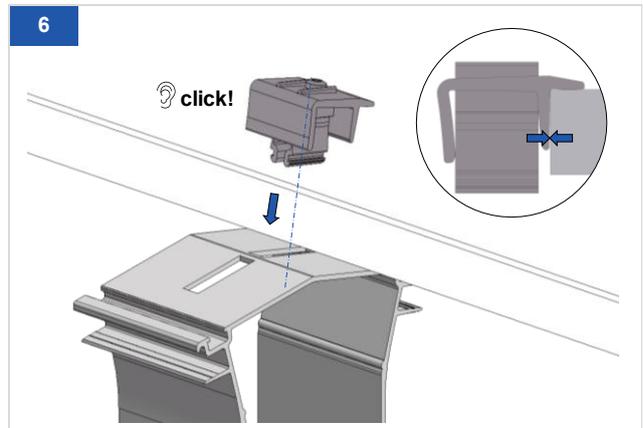
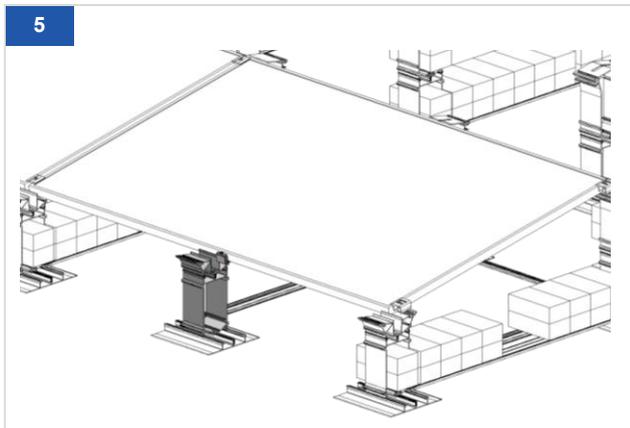
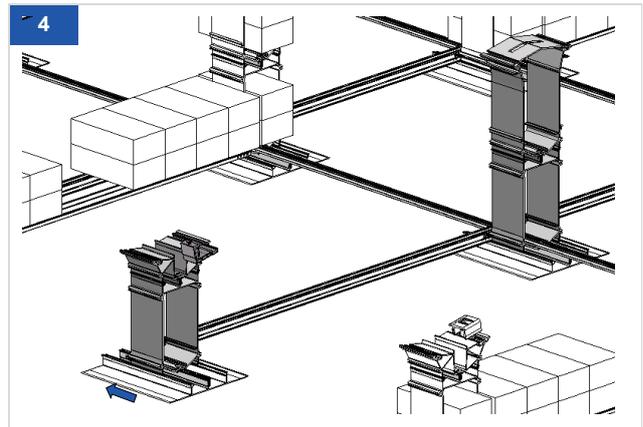
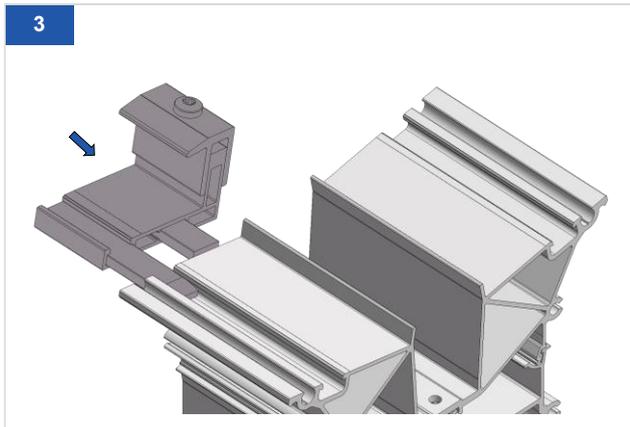
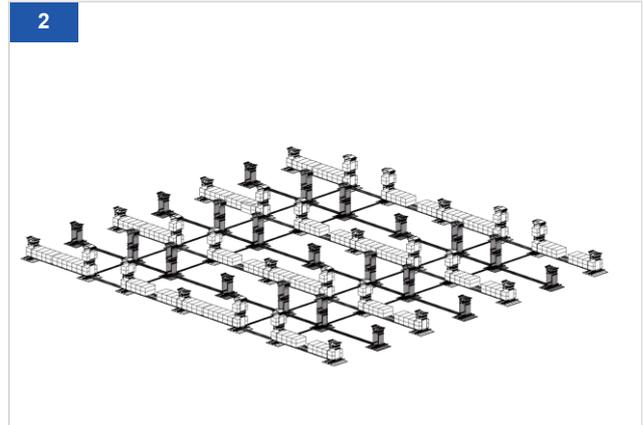
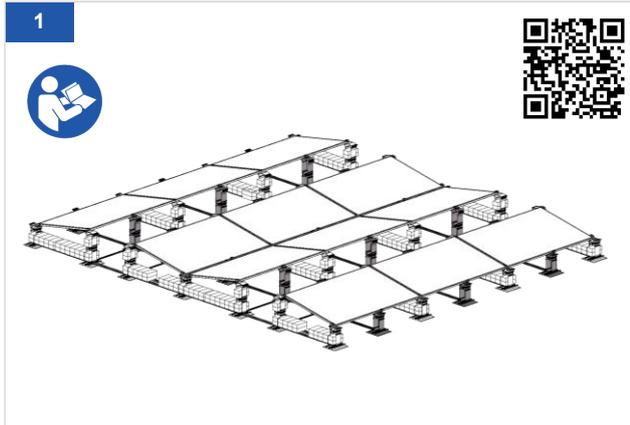
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10.10 Central support



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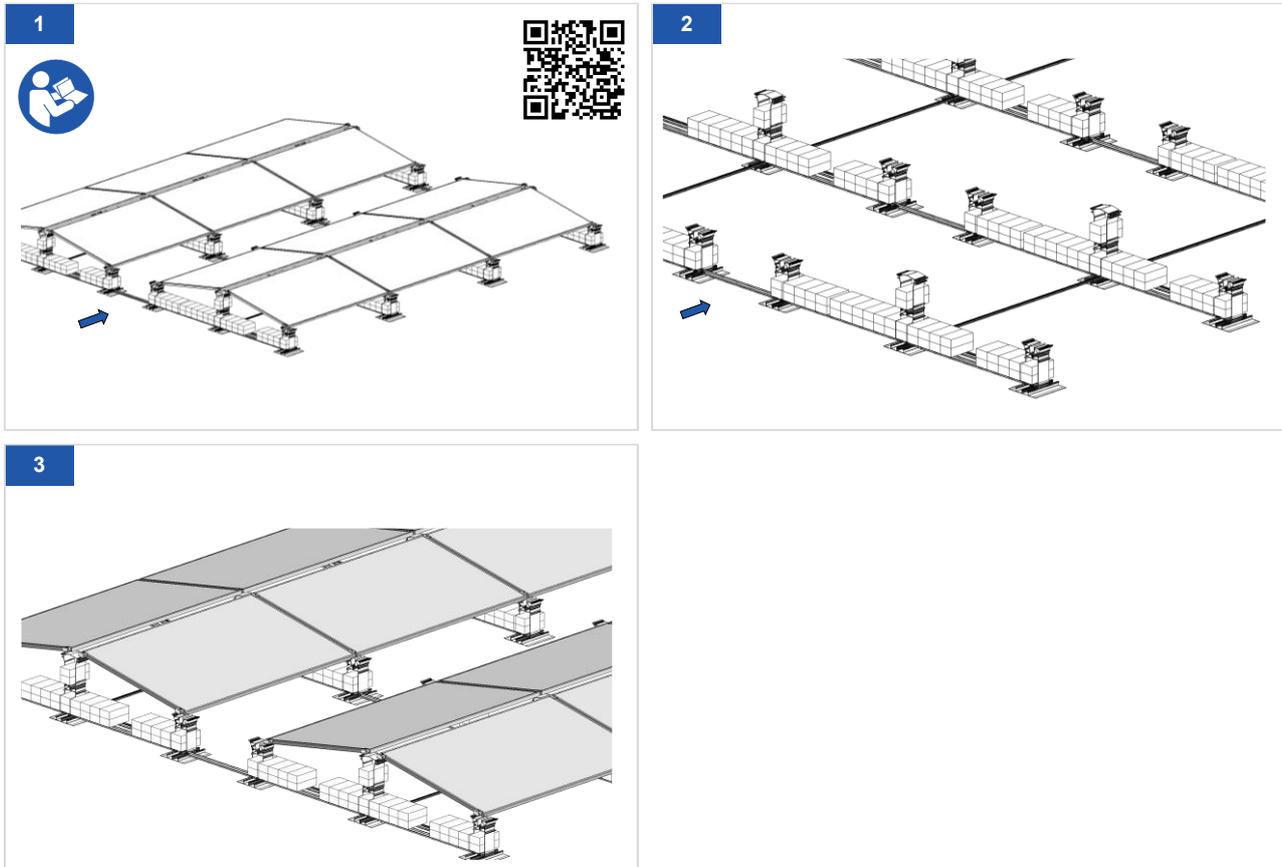
10.11 Module installation with central support



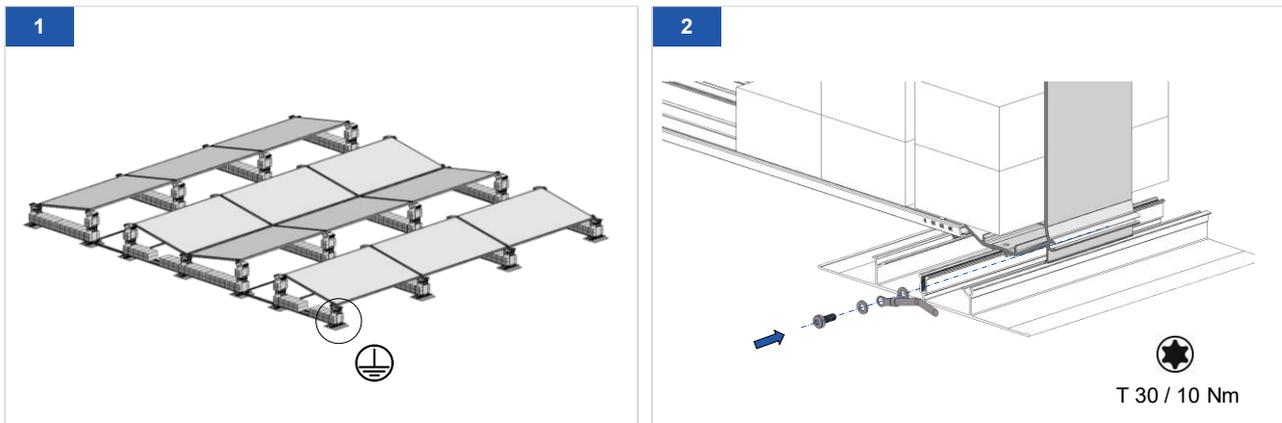
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10.12 Pavement at the eaves

10.13 Module installation with a maintenance aisle at the eaves



10.14 Option – Earthing of the PV system



10.15 Checking the screw connections

Once installation is complete, all screw connections must be checked using a torque wrench. The permissible torques are specified in **Section 10.2.1**

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11 Rights and liability

11.1 Legal notice

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All appendices form an integral part of the installation instructions.

The PV mounting system has been constructed in accordance with recognised safety regulations. However, improper use may result in personal injury or damage to property.

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