ASSEMBLY & MAINTENANCE INSTRUCTIONS

SL Rack
Schletter Ludwig

SL RACK
FLAT ROOF SYSTEM 2.0

IDEAS FROM **GERMANY**

FLA S

FLA OW

Product	**SL Rack Flat Roof System 2.0**
Type	SL Rack Flat Roof System FLA S
	SL Rack Flat Roof System FLA OW

Project name _____

Project number _____

Manufacturer/Address **SL Rack GmbH**
Münchener Straße 1
D-83527 Haag i. OB
Tel.: +49 80723767-0
www.sl-rack.de | info@sl-rack.de

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1.1. Important safety instructions

Before starting construction, be sure to check the completeness of the components against your delivery note. Please read these installation instructions in detail before starting installation and note that all work may only be carried out by skilled and competent persons!

It is essential to follow the installation and fastening instructions of the module manufacturer.

Failure to observe the installation instructions, the installation sequence and the safety instructions, as well as the use of third-party components, will invalidate the guarantee, warranty and liability vis-à-vis the manufacturer. This also applies to the module manufacturer's installation specifications.

Only use the system for the purpose described in these instructions. Incorrect installation or failure to observe safety and warning instructions may endanger yourself and others: Serious injuries or considerable damage to property can be the result.

1.2. Responsibilities of the manufacturer

The manufacturer has a responsibility under public law from the Equipment and Product Safety Act (GPSG) to bring only safe equipment onto the market. Market control is carried out by the Trade Inspectorates of the German Federal States (Länder). If the systems do not comply with the regulations when they are placed on the market, the Trade Inspectorate has the right to make complaints.

The CE marking is a prerequisite for the first placing on the market (or putting into service) of products for which a CE marking is required according to the following EU directives, namely in all participating states of the European Economic Area (EEA).

The EEA comprises the EU member states and the EFTA states with the exception of Switzerland. This means that CE marking is not required when placing on the market in Switzerland.

In many cases there are special conformity markings, but the CE marking according to the EU directives is recognised.

1.3. Areas of responsibility of the contractor

According to the Employer's Liability Insurance Association for Wood and Metal (BGHM), the contractor must appoint a responsible assembly supervisor who first of all carries out a project-related risk assessment. His tasks include general instruction of the employees as well as their workplace and activity-related instruction for the assembly site on site. The focus of responsibility and liability in occupational health and safety or in compliance with occupational health and safety regulations therefore lies with the contractor.

The contractor shall ensure that

- the complete assembly and installation instructions are always kept within easy reach on the system.

The contractor undertakes to only allow persons to work on the system, who

- have read and understood all text passages or information in the assembly and installation instructions that are relevant for the respective activity,
- are familiar with the basic regulations on occupational safety, accident prevention and environmental protection and
- have been instructed in the safe handling of the system (demonstration).

1.4. Training of the assembly and installation personnel

The system may only be assembled and installed by trained and instructed personnel.
Electrical equipment of the system may only be opened by a trained electrician.

- Only specialists trained for the respective work are permitted to carry out assembly and installation work.
- These must be demonstrably able to recognise hazards and risks that emanate or may emanate from the respective activity due to their training and occupational activity.
- Before starting work, the respective responsibilities must be clearly defined and assigned to the persons carrying out the work.
- Personnel to be trained may only work on the system under the supervision of a qualified person.

1.5. Obligation of the operator

Persons who work with a machine (lift, working platform, mini crane, etc.) undertake to observe the basic work safety and accident prevention regulations as well as the safety chapter and warnings in these instructions before starting work. In addition, operators must inform themselves about the functioning and operability of the machine before using it.

This chapter contains information on the safe use of the system described in this document.

2.1. Signs used and highlighting

When working on a PV system, there is always a potential danger that cannot be eliminated by technical measures. We therefore refer to this in the description of the respective system components by means of the following warning symbols:

	**Warning!** Non-observance of the instructions may cause **personal injury**.
	**Warning!** Non-observance of the instructions may cause **damage to the system**.
	**Dangerous electrical voltage!** Possible dangerous situation due to high electrical voltages.
	**Warning of obstacles and tripping hazards on the ground.**
	**Warning of danger of falling from the roof**
	This sign is in front of notes and useful information.

2.2. Commandment signs used

	**Wear a safety waistcoat**
	**Wear safety shoes**
	**Wear protective gloves**
	**Wear a safety helmet**
	**Use a safety harness**

2.3. Safety guidelines

The safety guidelines on which this is based regulate the authorisation to set up the system and the resulting responsibility of the respective users.

2.4. Ensuring qualification of the personnel

⚠ WARNING

Insufficiently qualified personnel can cause personal injury and damage to property.

The descriptions and instructions contained herein assume the knowledge of an instructed specialist.

Do not work on or with the system unless you

- have received instruction on safe operation and
- have read and understood the contents of the operating instructions.
- Otherwise you endanger yourself and others.
- Always comply with the relevant accident prevention regulations and environmental protection regulations.

Never work on or with the system,

- under the influence of alcohol
- drugs or
- medication.

Only assemble and install the system in the following cases,

- if you are a **trained specialist** for the relevant activity.
  Maintenance, servicing and repair work also require the expertise of a trained specialist.
- To this end, also comply with the relevant accident prevention regulations and regulations on environmental protection.

DANGER

Danger from electric current

The system operates at high voltage.

- **Never** open switch cabinets and terminal boxes of the electrical equipment if you are **not a trained electrician**.
- **Always** have the absence of voltage checked by a **trained electrician** before working on or near parts of the electrical equipment.

The solar modules of the system generate electricity immediately when the sun shines.

Modules that are not connected to a circuit also generate voltage. A light irradiation of a few percent of full sunlight is sufficient for the module to reach almost 100 % of the voltage. If more than two solar modules are connected in series, life-threatening voltages can occur! In addition, the risk of sparking between the individual modules increases.

- Check **daily** the condition of the electrical equipment of the system.
- **Never** work on or with the unit if you notice any damage.
- In such a case, inform your supervisor and the maintenance staff immediately.

2.5. Wearing personal protective equipment

⚠ WARNING

Warning against moving, heavy and sharp-edged parts

- Always wear a safety helmet and safety shoes when working on or with the system.
- In addition, wear the personal protective equipment prescribed in the internal regulations for your work.
- Follow your work instructions for this.

Warning against dusts and substances hazardous to health

- In addition, wear protective gloves, safety goggles and a respirator mask if you are
- carrying out grinding and cleaning work
- Please also observe the safety data sheets of the substances used.

Warning when working outside the building

- Wear a high-visibility waistcoat as soon as you are in the area around the building or carrying out work outside it.

2.6. Safeguarding the working environment

⚠ WARNING

Warning when using third-party machines, tools and aids

- Also observe the operating instructions for the machines, tools, auxiliary and lifting equipment required for assembly, repair and maintenance.

Warning of tripping hazards

- Deposited parts such as base rails, construction protection mats or ballast on traffic and walkways mean an increased risk of accidents for all persons present.

Warning against the risk of falling

- There is a risk of falling when working on the roof and when climbing up and down. The relevant accident prevention regulations must be observed. Suitable fall protection must be used.

2.7. Safe assembly

⚠ WARNING

Warning against unauthorised changes

- Never modify parts of the system without obtaining a written clearance certificate from the manufacturer.
- Only use original SL Rack spare parts or accessories expressly approved by the manufacturer.

2.8. General notes on intended use

Warning!
Non-intended use of the system is prohibited and can lead to serious bodily injury or even death if not observed.

The intended use of the system is generally subject to the following guidelines:

- The system may only be used within the scope of its intended use according to the technical specifications. Any other use or use in excess thereof shall be deemed improper.
- The system may only be used under the installation, connection and operating conditions specified in these installation instructions.
- Faultless and safe operation of the system requires proper storage, proper transport, correct installation and assembly or installation and commissioning of all components.
  Furthermore, careful operation, maintenance and service by sufficiently qualified personnel are basic requirements.
- In addition, the operating manuals of any connected systems must be observed with regard to the interfaces and signal sequences.

2.9. Non-intended use

Warning!
Non-intended use of the system is prohibited and can lead to serious bodily injury or even death if not observed.

The SL-Rack flat roof system was developed exclusively for installing PV modules. Any use that deviates from this is an unintended use. This also includes non-compliance with the specifications made in these assembly instructions. In these cases, SL Rack GmbH is not liable for any damage to property or personal injury of any kind that may occur. In this case, SL Rack GmbH does not assume any warranty for the proper functioning of the installed components.

Non-intended use of the systems **typically** includes:

- Use of the system for purposes other than those specified in the intended use.
- The transport, installation and supply, as well as the interface connection, if this was carried out under installation, connection and operating conditions other than those defined in these operating instructions.
- The electrical/pneumatic/hydraulic connection of individual modules separated from the system. Only the complete system may be connected and operated.

- The installation of spare parts, accessories and additional modules that have not been approved for this purpose by the manufacturers.
- Operating the system and carrying out service and maintenance work by unqualified personnel.
- The opening of service doors (e.g. control cabinet) and the removal of protective covers by unauthorised persons.
- The operation of the system with tampered or removed safety devices.
- Failure to observe the instructions in this operating manual.

3.1. Convention for safety instructions

The system was designed and built after conducting a risk analysis and taking into account the harmonised standards to be complied with as well as other technical specifications. It thus corresponds to the state of the art and ensures maximum safety.

However, this safety can only be achieved in operational practice if all the necessary measures are taken to achieve it. It is the duty of care of the operator of the system to plan these measures and to monitor their implementation.

The operator must in particular ensure that

- the system is only used for its intended purpose
- the system is only operated in perfect working order and the safety devices in particular are regularly checked to ensure that they are in good working order
- required personal protective equipment is available and used for the operating, maintenance and repair personnel
- the operating instructions are always available in a legible condition and complete at the place of use of the system
- only qualified and authorised personnel operate, maintain and repair the system
- this personnel is regularly instructed in all relevant occupational safety and environmental protection points, as well as being familiar with the operating instructions and in particular the safety instructions contained therein, and
- all safety and warning notices attached to the system are not removed and remain legible.

3.2. What to do in an emergency

A distinction must be made here as to whether it is an emergency in the area of the system, e.g. danger to the personnel present due to being drawn in, caught or splashed out, or hazards due to electrical voltage.

The greatest risk to employees is from falling and falling through. In an emergency, a speedy rescue must be guaranteed. However, staff can only ensure a rescue chain if they have practised the emergency situation. Personal protective equipment for rescue must also be available.

Other emergency situations are if the system is on fire.

Procedure

- Rescue the affected person and free him/her from the safety harness
- First aid
- If there is any danger from the system (electrical voltage, fire), switch it off immediately using the emergency stop button
- Keeping others and oneself safe
- Report fire

Source: www.vbg.de

SL Rack GmbH accepts no liability or warranty for defects and damage resulting from non-compliance with the instructions and specifications set out in this manual. SL Rack GmbH shall in particular not be liable for damage as a result of

- improper or incomplete assembly, installation of the flat roof system,
- structural modifications or use of system components contrary to regulations,
- the use of third-party components in our flat roof system or
- the violation of safety and maintenance regulations.

In all other respects, our General Terms and Conditions of Sale shall apply.

Disclaimer of warranty and liability

The assembly and installation instructions as well as the operating and maintenance instructions refer exclusively to the mechanical metal construction and its components supplied by SL Rack GmbH.

Non-system components of the photovoltaic system, such as modules, cable and plug connectors, inverters

or electrical switch boxes are not the subject of these installation and safety instructions.
Warranty and liability claims of SL Rack GmbH for these components are excluded.

Individual project planning of the flat roof system with regard to location and building

Before planning the installation, a static calculation (proof of stability) in accordance with national standards is required to ensure that the roof and insulation can bear the additional weight caused by the photovoltaic system including ballasting.

5.1. Required project planning data

Minimum requirements

5.1.1. Local conditions:

- Proof of the load-bearing capacity of the roof
- Information on regional weather & environmental conditions (wind, rain, snow, seismic occurrences, etc.)
- The route to the construction site must always be passable with suitable means of transport (e.g. truck, telescopic loader, etc.) (assembly, maintenance, repair)
- Determine roof pitch
- Check the roof for possible obstacles such as skylights, chimneys, possible façade cleaning systems or other interfering factors before planning.
- Obtain documentation on roof statics, insulation, lightning protection and drainage system

5.1.2. Environmental conditions:

- Check whether extreme temperature, air and environmental conditions are to be expected:
- Temperatures of-20 °C or above 45 °C
- Strong temperature fluctuations
- Humidity below 10% or above 90%
- Harmful or flammable gases
- High air pollution due to dust, salts or metal particles
- Shocks or vibrations
- Sites with existing and expected shading
- Locations with chemical or oil contaminated environment

5.1.1. Special local conditions:

- Determine whether the special environmental conditions listed below are to be expected. In such cases, electrical and electronic components may need special protection:
- Environments with static electricity
- Environments with strong magnetic fields
- Environment with possible radioactivity
- Proximity to power cables

The flat roof system has been developed for installation on almost any flat roof.

The maximum roof pitch should not exceed 5°.

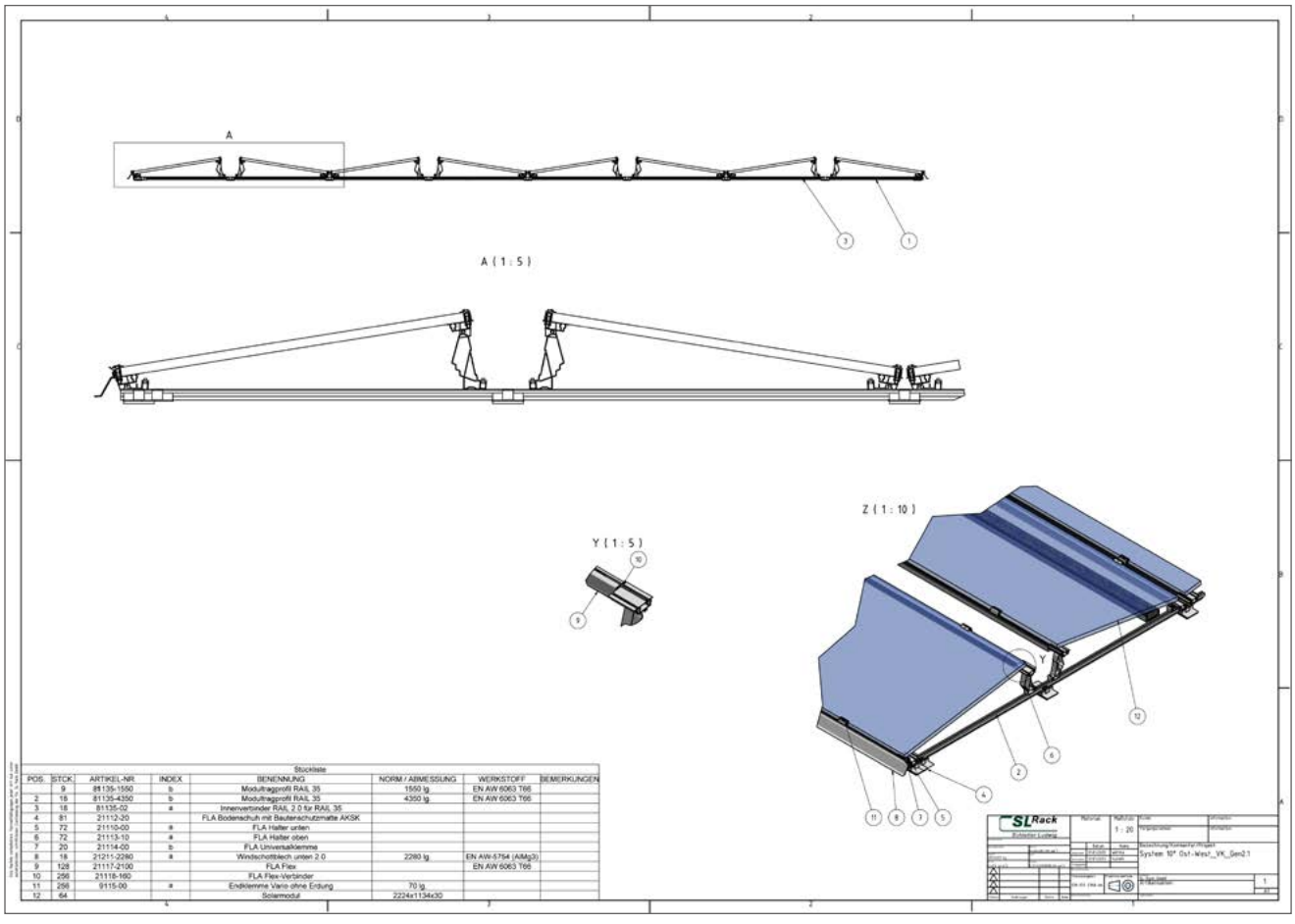
For steeper roof pitches, check on a case-by-case basis whether local anchoring or reinforced ballast is required on site. This must already be taken into account in the planning.

For higher roof pitches or unclear conditions, anchor the system to the building.

With the configurator programme Solar.Pro.Tool., SL Rack GmbH provides its customers with a tool that enables the complete planning of flat and pitched roof systems. This allows a parts list and an overview drawing to be created and printed out from each system before ordering and delivery.

Optionally, customers can receive an individual overview drawing designed for the project in question for an additional charge (see illustration below). The required components and the corresponding dimensions can then be seen from this.

All components are shown in different views. In this way, all items can be assigned with quantity and item numbers on the delivery note.



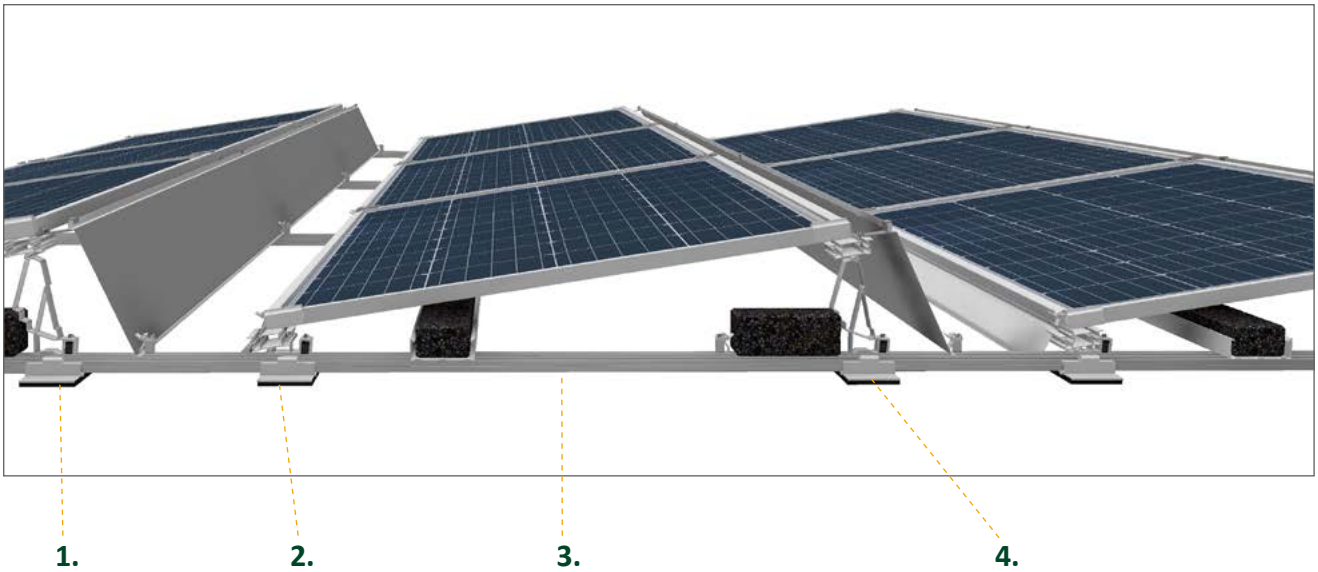
Example: SL Rack Flat Roof System FLA OW

The SL Rack flat roof system is assembled on the roof from various components. Depending on the version, a module row consists of the following assemblies when delivered:

Module bearing components	Connecting components	Fasteners/Accessories	Partitioning/Ballasting
▪ FLA base shoe with structural protection mat SK *(Article no. 21112-10)* or AKSK *(Article no. 21112-20)* ▪ Base rail RAIL 30 *(Article no. 81130-5400)* ▪ FLA holder, bottom *(Article no. 21110-00)* ▪ FLA holder, top 10/15° *(Article no. 21113-10, 21113-15)*	▪ Inner connector RAIL 2.0 for RAIL 30 *(Article no. 81130-02)* ▪ Ridge connector for module support profiles *(Article no. 23400-00)* ▪ Module clamps *(Article no. 91121-01, 91114-00)*	▪ Screw ISO 14580 ▪ Lightning protection terminals, top *(Article no. 91518-00)* ▪ Cable clip RAIL *(Article no. 91402-00)*	▪ Wind deflector, bottom 2.0 *(Article no. 21211-2280)* ▪ Wind deflector, top 10/15° 2.0 *(Article no. 21212-2280, 21217-2280)* ▪ FLA holder, wind deflector *(Article no. 21115-00)* ▪ FLA universal clamp *(Article no. 21114-00)* ▪ Ballast cage 2.0 *(Article no. 22111-00)*

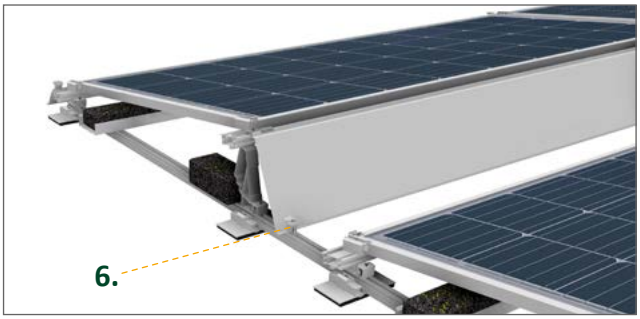
- Check all parts supplied **before starting assembly**.
- Report incorrect deliveries and/or damaged components to SL Rack GmbH immediately.

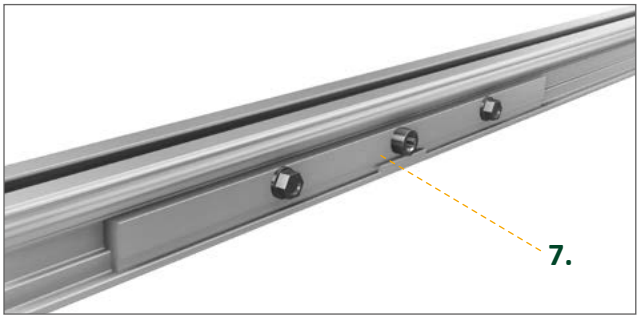
7.1. Module bearing parts

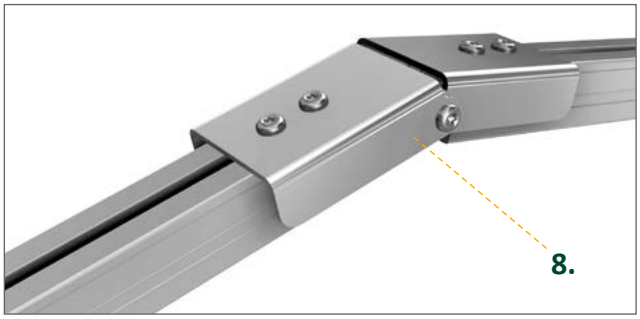


1. FLA holder, top 10/15° *(Article no. 21113-10, 21113-15)*
2. FLA holder, bottom *(Article no. 21110-00)*
3. Base rail RAIL 30 *(Article no. 81130-5400)*, RAIL 35 *(Article no. 81135-4750)*, RAIL 40 *(Article no. 81140-4750)* or RAIL 60 *(Article no. 81160-4750)*
4. Floor shoe with structural protection mat SK *(Article no. 21112-10)* or AKSK *(Article no. 21112-20)*

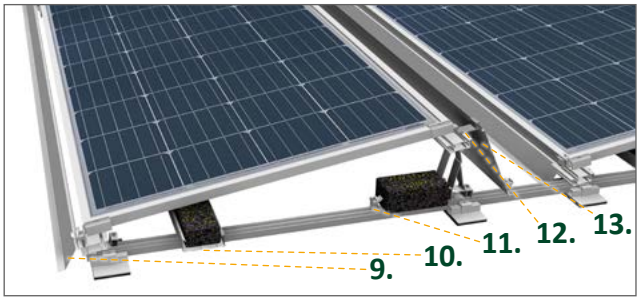
7.2. Connecting components







7.3. Partitioning / ballasting



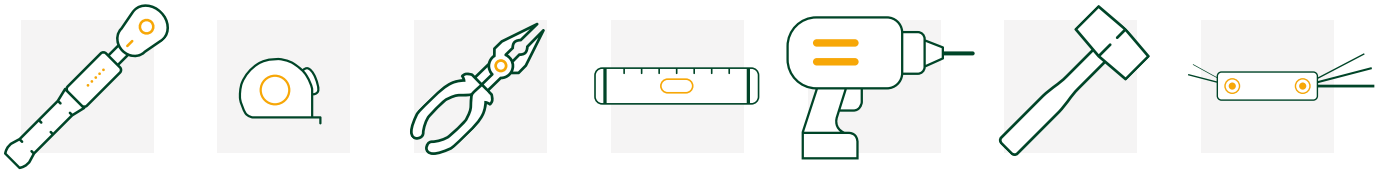
7.4. Fasteners

7.5. Structure description

5. Module clamp *(Article no. 91121-01)*
6. FLA universal clamp *(Article no. 21114-00)* for wind deflector, top 10/15° 2.0
7. Inner connector 2.0 for RAIL 30 *(Article no. 81130-02)*
8. Ridge connector for module support profiles *(Article no. 23400-00)*
9. Wind deflector, bottom 2.0 *(Article no. 21211-2280)*
10. Ballast cage 2.0 *(Article no. 22111-00)*
11. FLA universal clamp *(Article no. 21114-00)* for paving stone
12. FLA holder, wind deflector *(Article no. 21115-00)*
13. Wind deflector, top 10/15° 2.0 *(Article no. 21212-2280, 21217-2280)*
14. Screw ISO 14580 (preassembled)

The flat roof system is installed on base rails that run vertically to the roof pitch. In the first step, the base shoes are mounted under the rails. The solar modules rest on the FLA holders at the bottom and top and are fastened by means of module clamps. Depending on the system (south or east/west), or depending on the ballasting requirements, corresponding wind deflectors are also installed.

The following is a list of assembly tools that are usually required



8.1. Measuring the base rails

- Measuring tapes (100 m)
- Ballast stones to fix the cord (approx. 10 pieces)
- Mason’s rope
- Waterproof coloured pen
- Set for determining the coefficient of friction

8.2. Frame assembly

- Assembly stands for easier assembly in standing position
- Screwdriver bit 40 TX
- Digital torque wrench (< 4-12 Nm)
- 40 TX bit for torque wrench
- Protractor spirit level
- Measuring tape
- Mason’s rope
- Cordless screwdriver
- Template / spacer

8.3. Module assembly

- Mason’s rope
- Measuring tape
- Possibly spacers for distance between modules
- Cordless screwdriver
- Screwdriver bit 40 TX
- Digital torque wrench (< 4-12 Nm)
- 40 TX bit for torque wrench

WARNING

Warning of falling, heavy parts in case of handling errors

- Always wear safety shoes, hard hat, safety goggles, protective gloves and high-visibility waistcoat when unloading parts of the frame components.
- Also wear your personal protective equipment as specified in your factory regulations for the job in question.
- Follow your work instructions for this.
- Never step under lifted loads.
- Ensure that no unauthorised persons can enter the danger areas.

Also consider the following

The accompanying documents contain important information, instructions and safety instructions for transporting and loading. They are also valid for this manual, but are project-specific and therefore cannot be reproduced here in full.

- The project report created via the Solar.Pro.Tool and enclosed contains specific information on the requirements for statics and ballasting, which must be observed without fail.
- Check all delivered components
- Report incorrect deliveries and/or damaged components to SL Rack GmbH immediately.

Delivery of the components

The parts/components for the SL Rack flat roof system will be delivered by

- truck or via
- overseas containers 20 feet (approx. 6 metres) or 40 feet (approx. 12 metres)

Preparing for delivery

- Provide a firm and passable surface for the delivery.
- Make sure that all
  - access roads
  - manoeuvring areas and
  - unloading areas

  are accessible by trucks and can be used by forklifts and lifting equipment.

Keeping forklift trucks and lifting equipment at the ready

- Organise suitable forklifts and lifting equipment for the time of delivery.
- Choose suitable forklifts and lifting equipment together with the responsible site management.
- Ensure that the components, pallets and long goods can be unloaded properly.
- Organise forklifts and lifting equipment with different fork spacing or with adjustable forks.
- Note that components, pallets and bundles will have the following weights and dimensions:
  - Weights up to 1,500 kg
  - Lengths up to 6 m
  - Widths/loads up to 1.20 m
  - Height up to 1.00 m

Having trained personnel ready

- Ensure that only trained specialist personnel carry out the loading and transport work.
- When selecting personnel, also observe the requirements of the DIS unloading guideline.

ATTENTION

Store components safely

Components are also delivered in boxes on pallets.

- Only unload the components on firm and load-bearing ground.

In this way, you prevent damage even before installation.

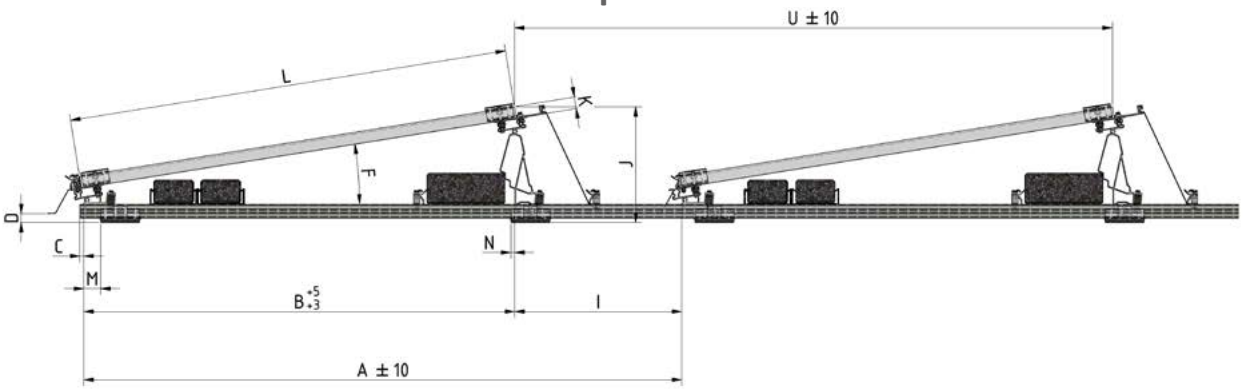
10.1. Measuring the base rails

- Adhere exactly to the information given in the assembly plans and the specified sequence of work steps.
- Mark the positions of the base rails and align them accordingly.
- Measure both diagonals and match them up to achieve a right-angled construction.

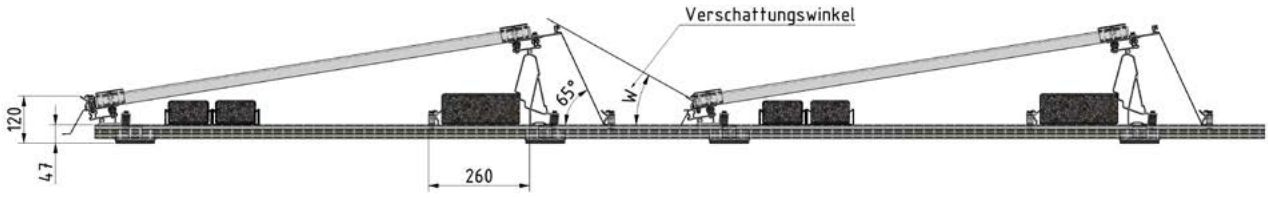
10.2. Complying with required tolerances

The positions of the individual solar rows are coordinated in such a way that, for example, mutual shading is minimised in a south orientation (FLA S). It is therefore important that you keep the row spacing of the modules exactly according to the plan. This is the only way to avoid possible shading due to different distances.

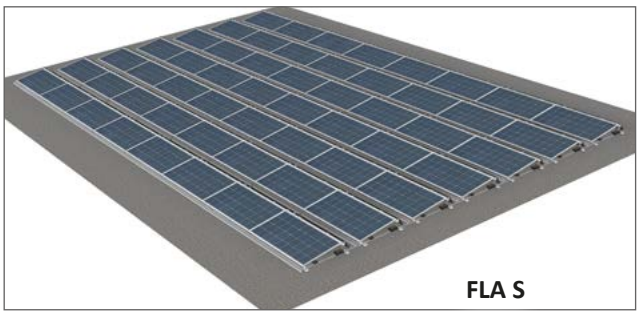
Example structure

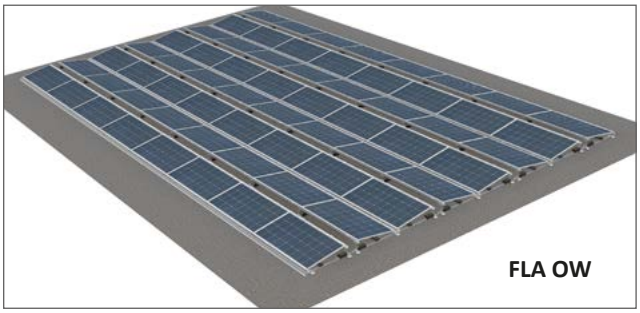


Tolerance



Shading





11.1. Flat Roof System Generation 2.0

With Generation 2.0, SL Rack GmbH offers you an installation system that is variably adaptable and has innovative as well as many pre-assembled components. In sum, however, it gets by with few components. This makes both handling on the roof and storage easier for you, as you can get by with fewer components. It is a unique system with material-optimised quarter-point clamping.

Your advantages:

- SOUTH or EAST/WEST orientation
- No special building protection mat required thanks to pre-assembled, aluminium-laminated base shoes
- Strain-free module installation thanks to swivelling bearing
- Clamping possible on both sides of the module as well as at the quarter point
- Among the lowest ballasting available on the market
- Integrated maintenance walkway on top for good accessibility
- Simple fixation of the ballasting via stepping for 50 mm, 60 mm and 70 mm
- Cable management using cable clip
- Lightning current carrying capacity
- **All components can be screwed together with Torx TX40!**

11.2. Measuring the base rails

All individual parts for the following assembly instructions are listed in **Chapter 7 “Scope of delivery”**.

- Have the individual parts ready for assembly.

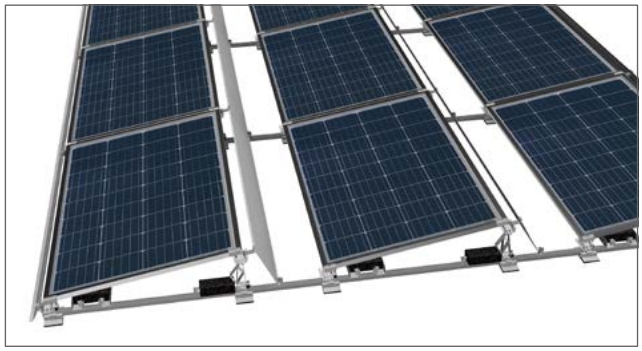
11.3. Observing the planning specifications

Necessary installation positions and profile distances depend on the flat roof structure and the planned module arrangement.

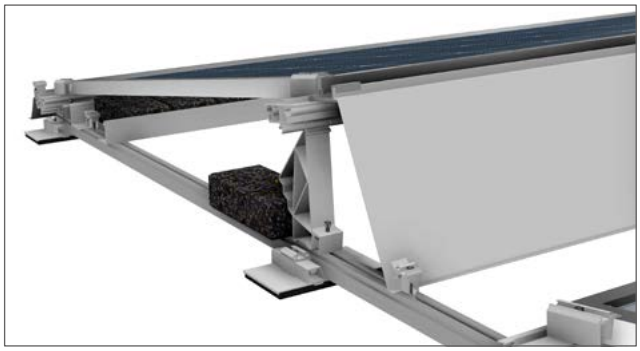
- Determine the installation positions and the necessary distances of the base rails, FLA holders above and below.

11.4. Previews and illustrations for orientation

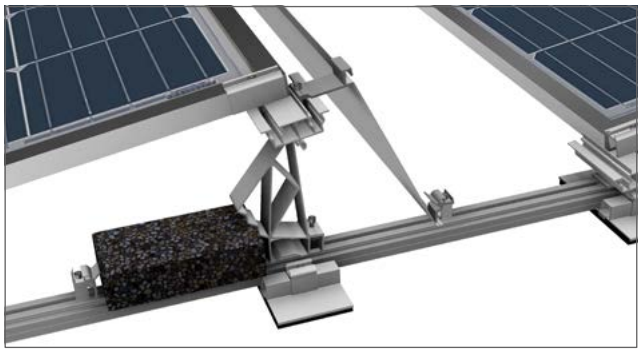
Structure: South orientation



FLA holder top with wind deflector top (south)



Ballasting arrangement (south)
FLA holder bottom with wind deflector bottom



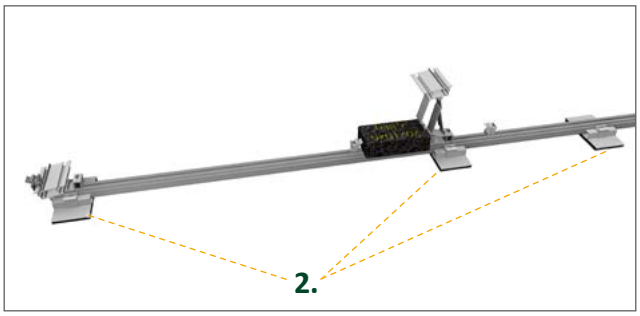
FLA holder, wind deflector (south)

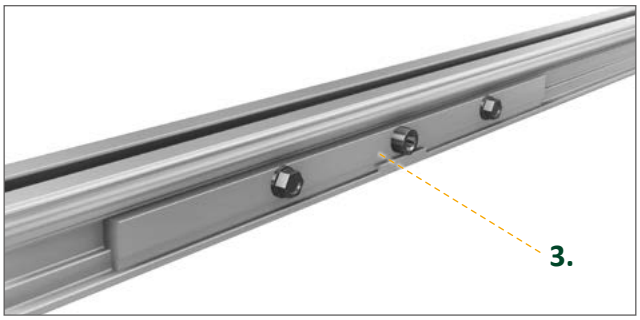
Structure: East/West orientation

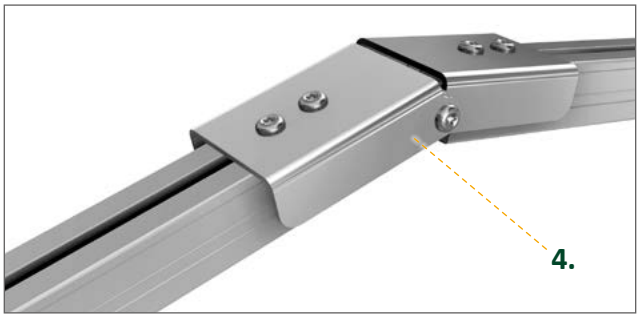
FLA holder top with modules (east/west)

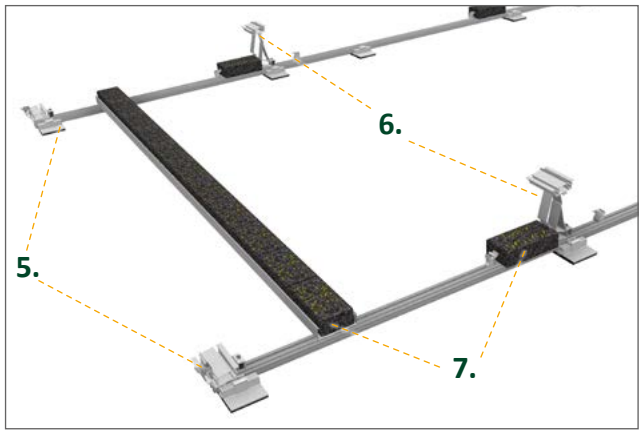
Ballasting arrangement (east/west)
FLA holder bottom with wind deflector bottom

11.5. Making an assembly/installation plan





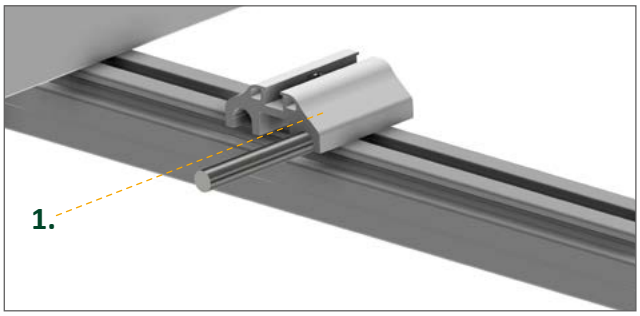




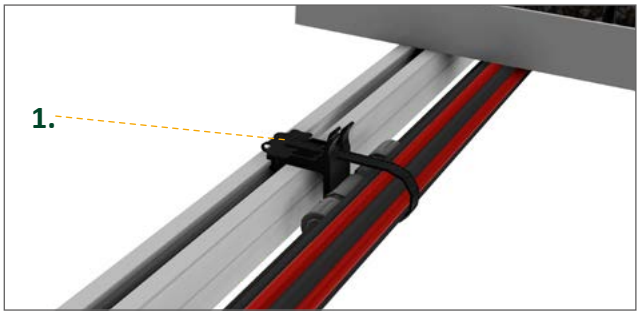
1. Measure the distances between the base rails and lay out the rails.
2. Hook the base shoe into the continuous base rail, bring it into position and screw it tight. If the roof is problematic in terms of compression, place several base shoes in a row to better distribute the surface load on the roof.
3. Insert the inner connector into the rail and screw it tight *(tightening torque of drilling screws = 2 Nm, M6 screw = 6 Nm)*.
4. If ridge connectors are to be used, determine the position and location according to the specifications in the planning documents (Solar.Pro.Tool), hang the pre-assembled ridge connectors in the ground rail and screw them in place.
5. Hook the FLA holder into the bottom of the base rail, turn it into position, click it into place and screw it in place.
6. Hang the FLA holder at the top (10° or 15°), align and screw tight.
7. Place the ballast stones under the FLA holder at the top according to the ballasting plan, fix them in place and screw them down. If required according to the ballast plan, bring the telescopic ballast cage 2.0 to the appropriate length according to the module dimensions, **position on the RAILS** and insert the specified number of ballast stones.

The tightening torque for all M6 screws is 6 Nm.

11.6. Lightning protection and cable management



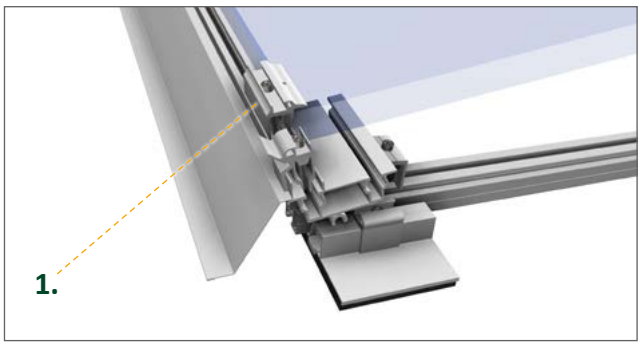
1. Click in the lightning protection clamp at the top *(Article no. 91518-00)*
2. Lay round wire
3. Tighten the lightning protection clamp at the top

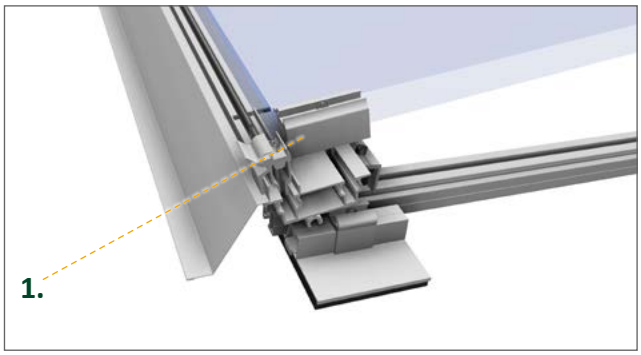


1. Click the cable clip *(Article no. 91402-00)* into the RAIL
2. Insert MC4 connector and/or cable into cable clip
3. Close cable clip

The cable clip makes it possible to fix an MC4 connector and up to 15 other cables.

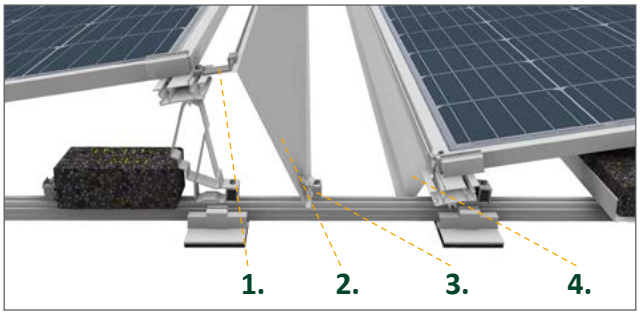
11.7. Module clamping





1. Attach end clamps on the short or long side, depending on the assignment plan, click into the FLA holder at the top and bottom, place the first module, push it up to the end clamp, align the module and screw on the end clamp.
2. Click in the centre clamps, place the next module on them and screw it in place
3. Terminate last module again with end clamps
4. Hang and screw the wind deflectors into the FLA holder at the top (left and right base rail) using the FLA universal clamps in accordance with the statics report (Solar.Pro.Tool).
5. **Note:** Wind deflectors top only for south orientation, wind deflectors bottom for both systems (SOUTH or EAST/WEST orientation). The wind deflectors can also be fitted at a later date.

11.8. Fitting the wind deflectors



1. FLA holder, wind deflector
2. Wind deflector, top (10 or 15°, south orientation only)
3. FLA universal clamp
4. Wind deflector, bottom

DANGER

Danger from electric current

The system operates at high voltage.

- **Never** open switch cabinets and terminal boxes of the electrical equipment if you are **not a trained electrician**.
- Inform your electrician.

12.1. Reasons for the necessary protective earthing

Consistent earthing of all metallic parts that are connected to components of the electrical system is mandatory according to the applicable standards.

This ensures contact safety in the event of faults in electrical equipment.

An earthing connection of the **mounting frames** in the sense of a **protective earthing** is therefore sensible and necessary in any case.

However, the module itself must be viewed in a more differentiated way. Many common module designs are defined as protection class II equipment, so that an earthing connection of the module is often not necessary and may not even make sense.

Nevertheless, some module manufacturers, by means of an earthing symbol on the module frame and corresponding instructions in their installation manual, tell the installer to also earth the module itself.

12.2. Including modules in the equipotential bonding

It may be necessary to include the module frames in the equipotential bonding, e.g. for reasons of operational safety, even if the application of the respective applicable standards may not necessarily prescribe this.

- Take this into account when planning the system.

For earthing the module frames, suitable components (e.g. earthing and lightning protection clamps) can be ordered optionally from the scope of delivery of SL Rack GmbH.

To protect people and the technical equipment, lightning and/or surge protection is recommended for photovoltaic systems. What has to be observed is described in supplement G of DIN EN 62305-3.

Contact your local specialist to find the right solution.

WARNING

Risk of crushing and impact from transport vehicles during unloading

- Secure the unloading area over a wide area.
- It is mandatory for unloading personnel to wear personal protective equipment.

Warning against sharp-edged surfaces and free-standing profile ends at head height

- Always wear safety shoes, hard hat, safety goggles, protective gloves and high-visibility waistcoat when carrying out assembly work.

This is the only way to protect yourself from impact injuries and cuts.

- Also ensure that no unauthorised persons can enter the danger areas.

DANGER

Danger from electric current

As soon as solar modules are exposed to light, they generate electricity. All module cables are then live and cannot be switched off!

If several PV modules are connected to each other, the risk of sparking and fatal electric shock increases significantly.

If the insulation of cable or plug connectors is damaged, even the substructure may be live.

- Have assembly and installation work carried out exclusively by trained electricians.
- Observe all the safety instructions of the module or inverter manufacturer and
- only use insulated, antistatic tools.

Installation instructions

- In any case, comply with the module manufacturer's installation instructions.
- If these are missing, request them from the module manufacturer on your own responsibility.

The system manufacturer SL Rack GmbH offers various installation solutions, depending on the module type.

SL Rack GmbH
Münchener Straße 1
D-83527 Haag i.OB
Tel.: +49 8072 3767- 0
Email: info@sl-rack.de
Web: **www.sl-rack.de**

DANGER

Danger from electric current

The system operates at high voltage.

- **Never** open the control unit or other electrical equipment if you are **not a trained electrician**.
- If electrical work is to be carried out, inform your electrician.
- Do not carry out any electrical installation work in damp conditions
- Observe the valid regulations and safety instructions
- Keep unauthorised persons away from the workplace.

14.1. Connecting the switch box

- Check whether the on-site prerequisites have been fulfilled
- Have the control box of the system connected appropriately by a trained electrician.

Because photovoltaic systems have no moving parts, they are basically very low-maintenance. However, to ensure system safety and efficient yield performance, it makes sense to regularly visually inspect all installed system components and check the existing screw connections.

15.1. Visual checks

Especially after storms or a hurricane, the position of the system should be checked, as – depending on the inclination of the flat roof – the gusts and the slope downward force can occur.

Check the position of the ballast stones against the ballast plan.

Check the building protection mat for correct position.

Search the installation system for loosening components and inspect the cable sheaths for breaks and check the plug connections.

Check the modules for obvious damage. These can be caused by birds dropping walnuts on the modules, for example. However, hailstorms or flying parts caused by strong winds can also cause lasting damage to the modules.

15.2. Mechanical checks

Check the screw connections on the flat roof frame using a torque wrench.

Tighten the screw connections to the torque specified by the manufacturer. If this is not possible, the screws must be replaced. All important screw connections are listed under the item “Inspection points”.

In accordance with the regulations in DIN 18914, it must be ensured that 50 % of the planned prestressing is present. The test is done by setting the torque wrench to 50% of the tightening torque.

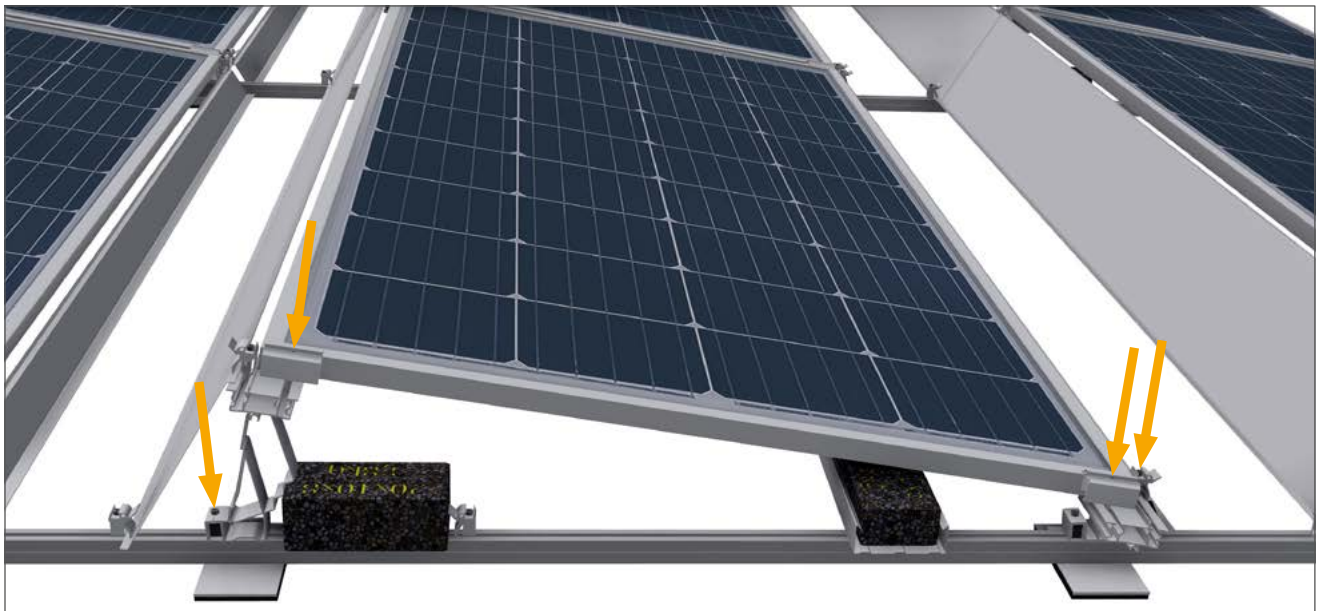
If this does not loosen the screw, the test is successful. A torque wrench according to DIN EN 6789 must be used (indicating torque wrench [measuring wrench] or triggering torque wrench [click wrench]).

The tightening torque to be observed is based on VDI 2230.

A maintenance interval of 12 months is recommended. 2 % of the system must be inspected here.

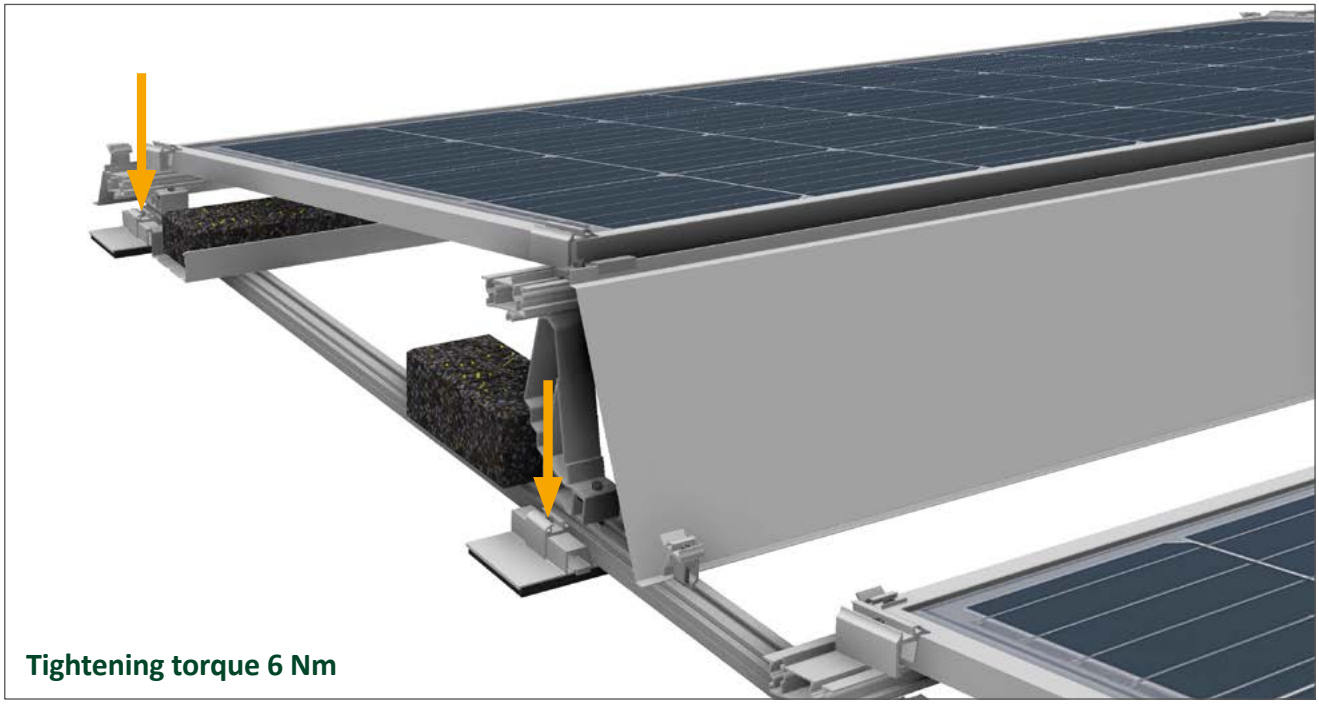
15.2.1. Inspection points – module supporting parts

To do this, remove the wind deflectors and refit them after the inspection.



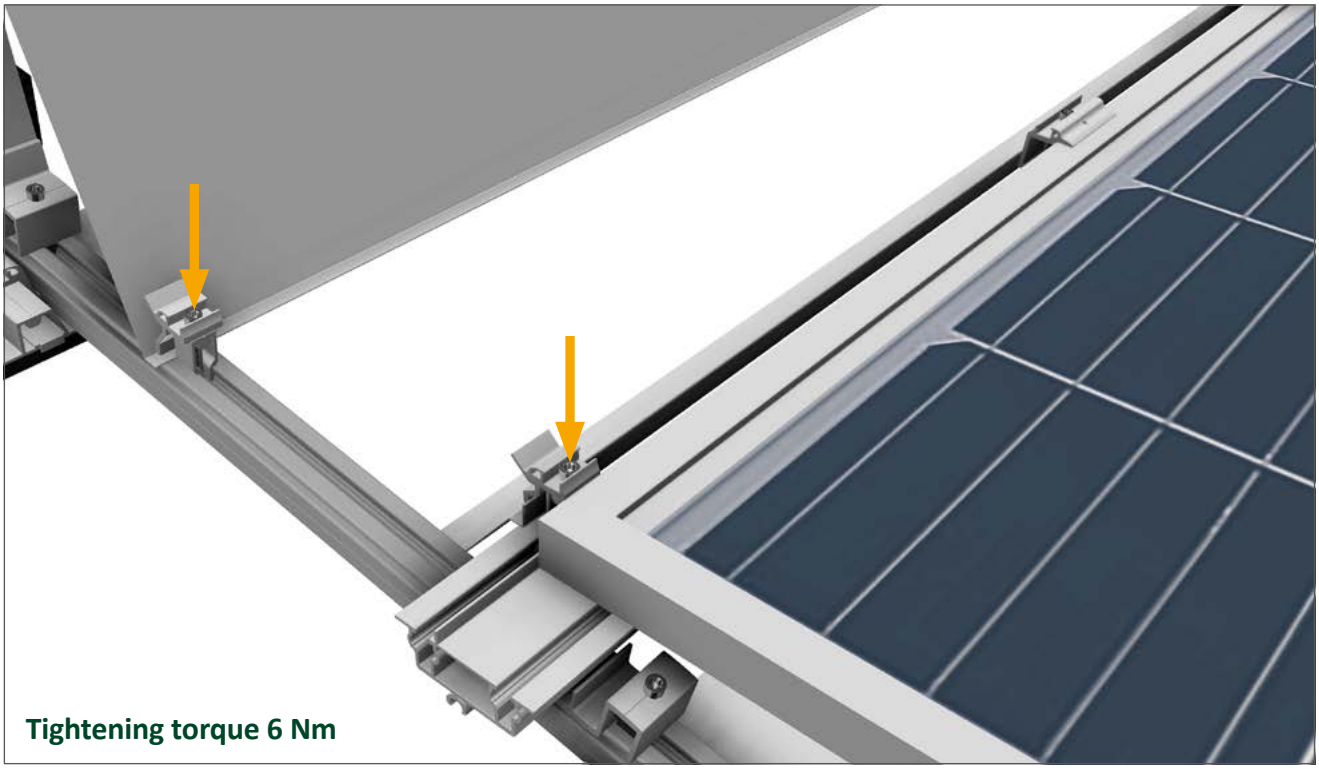
Tightening torque 6 Nm

15.2.2. Checking the position and condition of the base shoes and ballasting

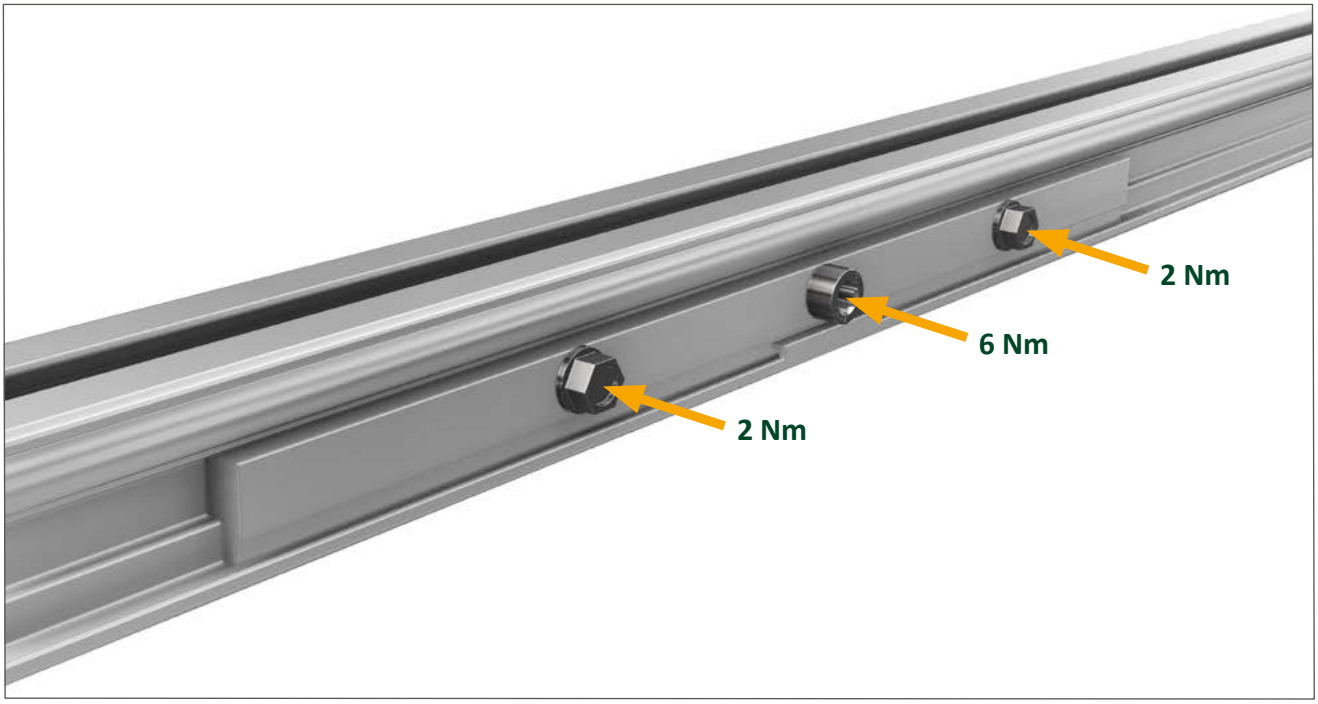


Tightening torque 6 Nm

15.2.3. Inspection points – wind deflectors (for flat roof system FLA S)



15.2.4. Inspection points – internal connector



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1. Maintenance on (date): _____

Inspection point	Inspection result	Measure/Comments	Inspector	Signature
Visual checks				
Inspection points for module supporting parts				
Position check for ballasting				
Inspection points for wind deflectors				
Inspection points for base rail connectors				

2. Maintenance on (date): _____

Inspection point	Inspection result	Measure/Comments	Inspector	Signature
Visual checks				
Inspection points for module supporting parts				
Position check for ballasting				
Inspection points for wind deflectors				
Inspection points for base rail connectors				

3. Maintenance on (date): _____

Inspection point	Inspection result	Measure/Comments	Inspector	Signature
Visual checks				
Inspection points for module supporting parts				
Position check for ballasting				
Inspection points for wind deflectors				
Inspection points for base rail connectors				

16.1. Taking out of service

- Switch off the system according to the operating and maintenance instructions.
- If you do not have the operating and maintenance instructions at hand, ask for written confirmation that the unit has been properly decommissioned.
- Have the system dismantled into transportable individual parts by the manufacturer or by a specialist trained for this purpose.
- Observe all information, notes and instructions in these assembly instructions.
- Make these assembly instructions available to the dismantling personnel.
- Have the disassembly work carried out in exactly the reverse assembly sequence.

⚠ WARNING

Warning against sharp-edged surfaces and free-standing profile ends at head height

- Always wear safety shoes, hard hat, safety goggles, protective gloves and high-visibility waistcoat when carrying out disassembly work.

This way you protect yourself from impact injuries and cuts.

- Ensure that no unauthorised persons can enter the danger areas.
- Do not step under lifted loads during loading.

⚠ DANGER

Danger from electric current

The system operates at high voltage.

- **Never** open the control unit or other electrical equipment if you are **not a trained electrician**.

Disconnecting the switch box

- Have the on-site safety devices switched off/removed.
- Only have the control box disconnected from the on-site power supply by a qualified electrician.

Disassembly of modules

The solar modules of the system generate electricity immediately through solar radiation.

With a large number of switched solar modules, the risk of sparking between the individual modules also increases.

Bear this in mind during disassembly.

Safely disposing of individual parts

Logo: *Recycling*

- Separate the materials
  - Steel
  - Plastics
  - Electrical and electronic waste
  - Aluminium
  - Stainless steel
  - Copper
  - Glass
- Dispose of the components in accordance with local regulations or
- return the components to the manufacturer.

Separating electrical and electronic waste

Logo: *Collection container electrical and electronic waste*

- Never throw electronic components into the household waste.
- Only dispose of electronic waste in the collection containers provided by your waste disposal company.

17. Supplementary documents (for project planning)

17.1. Base rail plan

17.2. Drawings and layouts

17.3. Individual project report including drawings from the Solar.Pro.Tool of SL Rack GmbH

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ASSEMBLY & MAINTENANCE INSTRUCTIONS

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Online ordering system

Contact us for your personal offer:

SL Rack GmbH
Münchener Straße 1
83527 Haag i. OB
Email: sales@sl-rack.de
Tel.: +49 8072 3767-0
www.sl-rack.de

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