

# Installation Guide

## BIOSOLAR PHOTOVOLTAIC (PV) MOUNTING SYSTEM

### Description

Load-supported Biosolar PV mounting system for penetration-free mounting of Axter Biosolar PV modules specifically for use with Axter extensive or biodiverse green roofs. Consisting of Base Plate, Mounting Frame, Drainage and Storage Board FKD 25MA or Water Retention Box WRB 80FMA.

### Area of use

An integrated solution for mounting solar PV modules on an Axter green or blue roof where the substrate and planting provide the ballast required to secure the array from wind load. Suitable for orientation of the PV modules in a south and east-west alignment.

### Accessories

- Easy Mounting Rails 36 and 50
- Rail Connector Kit 36 and 50
- Module Clamps
- Wind Bracing
- Spacer Board FKD 25 0.5m for Axter Biosolar PV FKD
- Axter Biosolar PV FKD Variant - Solar PV mounting system (Axter Biosolar PV) with pre-fitted adjustable Mounting Rail for free choice of rail spacings.



## Information for user

Only the complete Axter Biosolar PV mountingsystem must be used as per components listed in this guide. Any replacement and any changes to the components or to the intended use will result in the loss of the system warranty and liability by Axter Ltd. The statements provided in these assembly and laying instructions do not release the planners, the performing company and the user from inspecting and assessing the solar mounting system, the local conditions and other occurrences themselves under the given technical guidelines. Axter Ltd is to be informed in the event of any doubts concerning the installation and/or use.

## Delivery

Inspect the goods for completeness upon delivery before unloading:




- Is the Biosolar PV Mounting System (Base Plate and Mounting Frame) complete and undamaged?
- Are all accessories complete and undamaged according to the delivery note?
- Is the laying plan supplied?

If you identify any damage, this is to be reported to the carrier and the responsible forwarding agent immediately. You should immediately report the lack of parts or the laying plan to the Axter Ltd.

The sales and logistics department will then organise for the missing parts to be supplied quickly.

## Unloading

As the delivering vehicle does not usually have its own lifting device, the client is to provide a suitable method of unloading the components. This must be a forklift or a crane (with fork or loops) with a lifting capacity of at least 1,000 kg. Delivery by HGV with its own lifting device may be requested in advance. Suitable level, stable storage space is to be provided for the pallets.


	<p><b>CAUTION!</b></p> <p><b>Warning of falling pallets or elements!</b>            Always check pallets are stable.            Never try to support a falling pallet!</p>
<div style="display: flex; justify-content: space-around;">   </div>	<p><b>WARNING!</b></p> <p><b>Warning of suspended loads!</b>            There is a risk of injury due to suspended loads.            Do not go underneath suspended loads!            Wear a safety helmet!</p>

## Opening and storage of the package units

Before opening the package units, it must be ensured that the structural components sit safely in layers and cannot fall off. When opening, it must be ensured that the elements are not damaged by tools or similar.

The supplied plastic drainage and retention elements are stored flat in a cool, dry place protected from UV. Due to the expansion behaviour and low compressive strength of plastics in the event of high temperatures, heating of the Drainage and Storage Boards FKD 25MA and Water Retention Boxes WRB 80FMA above 40°C must be avoided.

## Handling

	<b>PLEASE BE SURE TO NOTE THE FOLLOWING INFORMATION</b>
	<p><b>Non-observance can lead to injuries.</b></p>

When handling the components on a construction site, it must be ensured that suitable protective clothing is worn (safety gloves, safety shoes, etc). Due to the manufacturing procedure, edges can display ridges. These are not defects.

 	<b>CAUTION!</b>
	<p><b>Warning of danger of cuts!</b> There is the risk of injury as edges can display ridges as a result of manufacture.</p>
 	<b>CAUTION!</b>
	<p><b>Warning of injuries!</b> Generally take care when handling the components due to the risk of injury. There is the risk that fingers or other body parts may be crushed or otherwise injured. Wear protective gloves!</p>

- Use the products according to these assembly and laying instructions.
- Ensure that the products and the materials used meet the requirements (e.g. load-bearing capacity of the base).
- Do not use any damaged, old or previously used products or materials.
- Please be aware of any specific conditions or regulations in force on the individual site.
- In situations that are not covered in these instructions and the valid standards and regulations, a written agreement with Axter Ltd is required.

### Handling rules for aluminium structural components

- Material compatibility with jointly processed materials is to be verified with regard to possible contact corrosion.
- In the event of contact with (salty) sea air, seawater, (dissolved) grit, chemicals and other special environmental influences, the use of the Biosolar PV mounting system is to be checked.
- It should be ensured that the material of the Biosolar PV mounting system and its associated structural components are not exposed to any aggressive leaching from other materials.
- Abrasive and/or aggressive detergents may not be used.
- To fertilise the substrate, use a slow-release fertiliser supplied by Axter. The use of liquid fertilisers is prohibited.

## Installation

An approved installation plan from Axter must be available for the installation of the Biosolar PV.

mounting system. The dimensions listed in this plan for edge and row spacing, the specified orientation, and the necessary minimum imposed loads must be observed.

Additional installation materials may be required (lightning protection, cable trays, etc.) in addition to the structural components mentioned and supplied as accessories. These requirements must be coordinated in advance with the Biosolar PV installer and, if necessary, the lightning protection engineer, and must be kept ready in good time for assembly.

The specified waterproofing system must act as a root protection layer and be resistant to root penetration. Only PV modules that have the following valid certificates may be used:

IEC 61215 / IEC 61730 (Further standards, regulations and safety information cf. p. 16.)

### Tools and materials required for assembly:

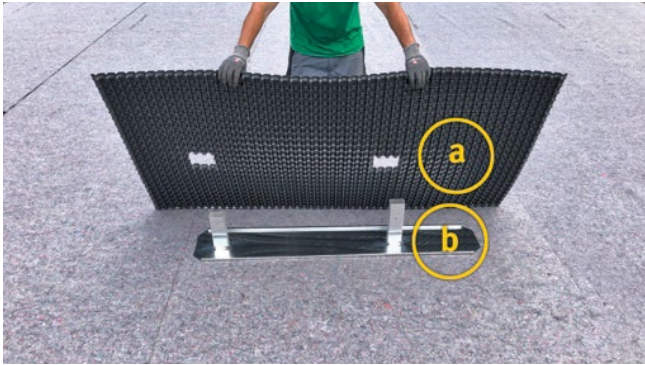
- Cordless screwdriver
- Hexagon socket bit size: 6 mm
- Scissors
- Bit for Phillips head screws
- Spirit level
- String line
- Angle grinder
- Tape measure
- Torque wrench
- Adhesive (suitable for bonding Filter Fleece)
- Compass

### Work step 1: Prepare the roof area

Ensure roof area is in a clean and tidy condition and check that it is level.

Axter Protection and Storage Fleece RMS 500 must be laid first to protect the waterproofing. It should be ensured that the protection fleece overlaps by at least 100 mm and are sufficiently high at the structural components that the waterproofing is protected. If unevenness is ascertained after rolling out the protection fleece (e.g. the formation of hollows > 10 mm deep and > 4 m<sup>2</sup> area in places), compensatory measures must be taken so that the PV modules can later be correctly mounted.

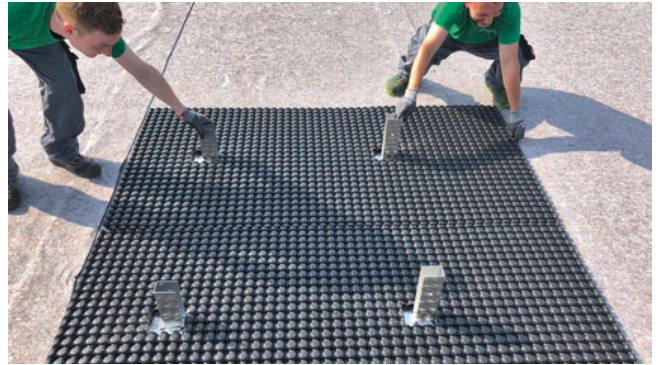
To do this, use a fine-grained drainage material (e.g. Perl 2/10 expanded shale, expanded clay or lava) on the Axter Protection and Storage Fleece RMS 500 to extensively level out the areas of unevenness. Ideally spread the loosely applied material level with the surrounding area using an aligning pole.

**Work step 2: Installation and positioning Base Plate**

*Figure 1: Installation FKD on Base Plate.*

Place the Drainage and Storage Board FKD 25MA or Water Retention Box WRB 80FMA (cf. page 9) above the Base Plate as shown in *Fig. 1*.

Please ensure that the longer side of the FKD/WRB (a) is above the longer side of the Base Plate (b). This has an influence on the stability of the overall superstructure.



*Figure 2: Formation of rows according to the installation plan.*

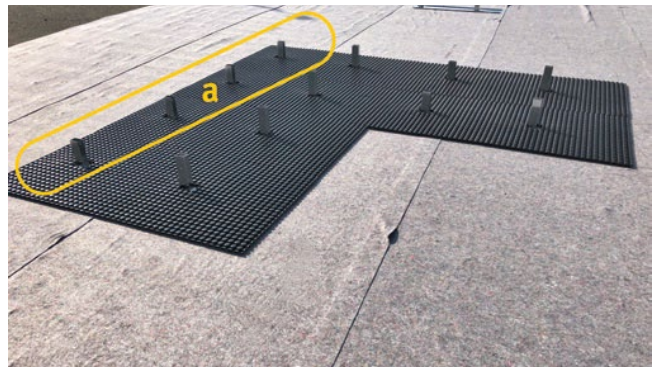
Distribute the first rows of Base Plates with FKD 25MA/ WRB 80FMA according to the manufacturer's installation plan.

For better orientation, it is recommended to first place the rows along the transverse and longitudinal sides of the roof to form a right angle, see also *Fig. 4*. The edge spacings are to be observed. It is important that the exact orientation towards specified direction is verified using a compass. Align the Base Plates so that the support on the Base Plate without a notch (a), as shown in *Fig. 4*, points towards the specified direction.



*Figure 3: Installation of additional FKD 25 without Base Plate to create the spacing according to the installation plan.*

To achieve the correct spacing between the Base Plates, Spacer Boards FKD 25 0.5 m or individual FKD 25/WRB 80F without Base Plates may have to be laid between the FKD 25MA/WRB 80FMA *Fig. 3*



*Figure 4: Installation at a right angle.*



**Special characteristics when using the Water Retention Box WRB 80FMA:**

*Figure 5: Laying out the Base Plate with WRB 80FMA.*

Place the WRB 80FMA unfolded with the open side facing upwards over the Base Plate.



*Figure 6: First WRB 80FMA placed unfolded on Base Plate.*

As in *Fig. 6*, the open side of the WRB 80FMA must face upwards.



*Figure 7: Placing of the second WRB 80FMA on the Base Plate.*

Then place another unfolded WRB 80FMA with the open side facing downwards on the first WRB 80FMA *Fig. 7*.



*Figure 8: WRB 80FMA 8 cm with Base Plate.*

This creates another retention element with a height of 80 mm *Fig. 8*.



*Figure 9: Close the click system.*

Finally, close the click system on the long sides of the WRB 80FMA again *Fig. 9*.

*The rest of the instructions are valid for superstructures with both types of drainage elements (FKD 25/WRB 80F).*



**Work step 3: Laying of Filter Fleece**


*Figure 10: Rolling out the Filter Fleece.*



*Figure 11: Smooth out the fleece.*

Roll out the Filter Fleece as close as possible to the middle of a row of installed FKDs/WRBs *Fig. 10* and smooth out as much as possible *Fig. 11*.



*Figure 12: Piercing*



*Figure 13: Cutting*

Pierce the centre of the outer edge of the U-shaped supports with scissors *Fig. 12* and make a cut approximately the same length as the support width *Fig. 13*.



*Figure 14*

Pull the cut fleece down over the support *Fig. 14* and *Fig. 15*.



*Figure 15*



*Figure 16: Lay second row of fleece.*

When rolling out and laying the Filter Fleece for the following row, make sure that the pieces of fleece overlap by at least 10cm *Fig. 16*.



*Figure 17 Bond rows of fleece with compatible adhesive.*

Cover all FKDs/WRBs with Filter Fleece as shown.

#### Work step 4: Installation of the Mounting Frame



*Figure 18: Align the Mounting Frame above the Base Plate.*

The longer side of the Mounting Frame is marked with a notch.

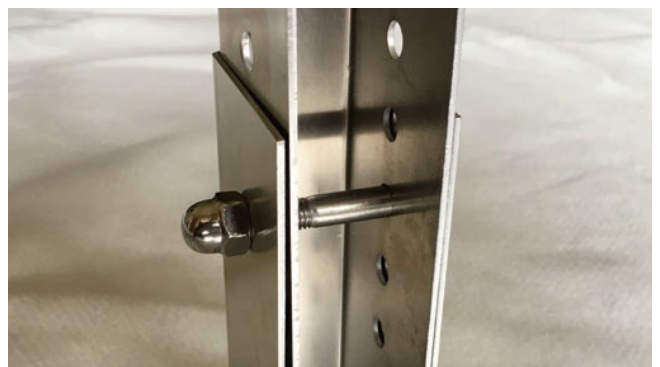
It must be inserted into the support on the Base Plate, which is also marked with a notch *Fig. 18*.

This has an influence on the stability of the overall superstructure.



*Figure 19: Installation of the Mounting Frame on the Base Plate.*

Insert the Mounting Frame as far as it will go into the support on the Base Plate *Fig. 19*.



*Figure 20: Fastening of the Mounting Frame with shaft screw and cap nut.*

Secure the Mounting Frame on both supports with the supplied shaft screws and cap nuts *Fig. 20*.



**Work step 5: Fastening of the Easy Mounting Rails**

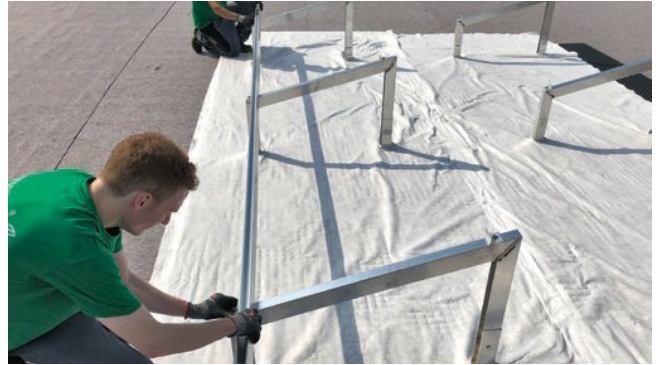
*Figure 21: Alignment of the row using a string line.*

Before installing the Easy Mounting Rails, check the orientation of the Biosolar PV mounting system based on the installation plan and correct the position if necessary.

The Biosolar PV mounting system can be easily shifted lengthwise for fine adjustment without moving the now attached drainage mat. Alignment can be performed, for example, with a string line *Fig. 21*.

Latch the Easy Mounting Rails into the Rail Fixings on the Mounting Frame *Figs. 22 and 23* and tighten the cylinder head screw on the Rail Fixing *Fig. 24*.

Loosen the threaded joints of the Rail Fixings if necessary before latching.



*Figure 22: Mounting the first Easy Mounting Rail.*



*Figure 23: Mounting the second Easy Mounting Rail.*

If height differences are ascertained during the assembly of the Easy Mounting Rails, the height of the Mounting Frames can also be adjusted.

The Mounting Frames can be raised by fixing both feet of the Mounting Frame in a higher hole of the support on the Base Plate. The Mounting Frames can be lowered by cutting the feet of the Mounting Frame evenly with an angle grinder.

To form a row of rails, screw together the adjacent Easy Mounting Rails without spacing using the supplied Rail Connector Kit *Fig. 25*.

**Please note:** The Easy Mounting Rails should only be assembled in a set of 4 due to thermal expansion.

Therefore a distance of 2cm in every fifth connector is to be left between the Easy Mounting Rails *Fig. 26*. This ensures that the maximum length of the Easy Mounting Rails which are directly connected is 21.5m.



*Figure 24: Tighten Rail Fixings.*



*Figure 25*



*Figure 26*

**Work step 6: Fastening of the Wind Bracing**

*Figure 27: Removing the protective film from the wind bracing.*

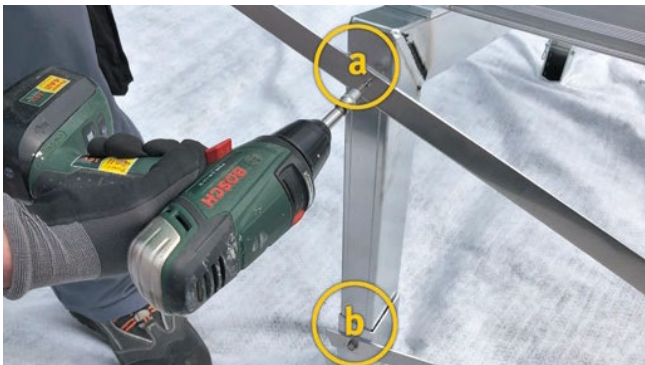
Remove any protective film from the wind bracing (flat aluminium strip) *Fig. 27*.

Create one wind brace per row with two flat strips.



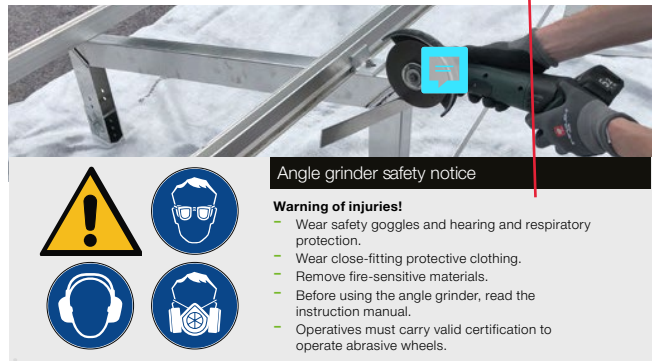
*Figure 28: Fastening of the metal strip.*

To do this, connect two Mounting Frames in a row using the flat strips and the supplied stainless steel drilling screws, making a cross shape *Figs. 28 and 29*.



*Figure 29: Position of drilled holes.*

Use the drill holes provided for this purpose (a and b).



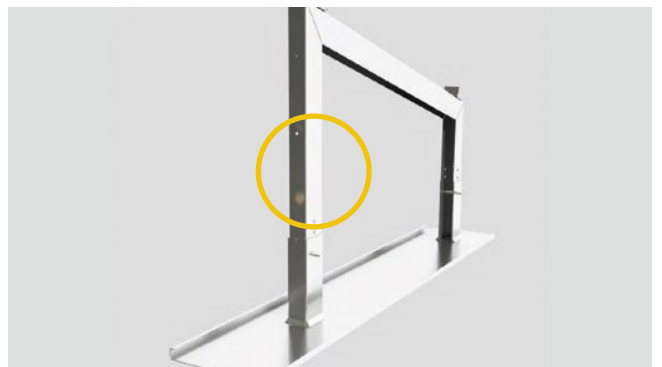
*Figure 30: Cutting off the overhang from the wind bracing.*

Cut off the overhanging parts of the wind bracing with the help of an angle grinder *Fig. 30*.



*Figure 31: Wind bracing.*

Finished wind bracing *Fig. 31*.



*Figure 32: Additional drill hole on the long side of the Mounting Frame.*

On the long side of the Mounting Frame, there is an additional drill hole on the outside. This can be used e.g. for installing lightning protection devices or cable ducts *Fig. 32*.



**Work step 7: Ballasting of the Biosolar PV mounting system**

Figure 33: Blowing of the substrate.

Apply Axter green roof substrate as ballast material to the superstructure ensuring no voids.

A cylindrical blower may be used where available.

**Fig. 33.**

Always ensure the minimum imposed load detailed within the specification is achieved.

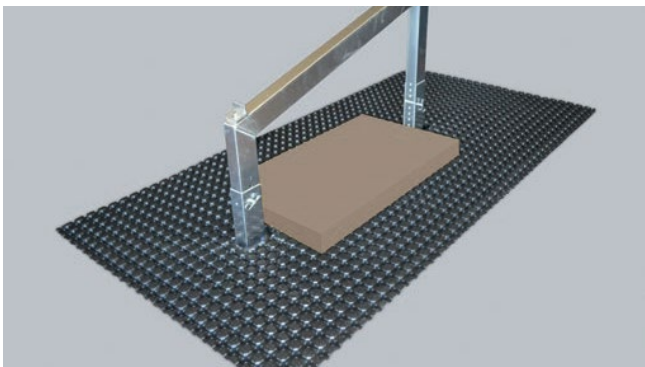


Figure 34: The centre of the Base Plate is the best position for ballast.

In addition to the substrate, an additional ballast, usually in the form of stones, may also be necessary (see Axter specification). If necessary, apply additional ballast on the FKD 25MA/ WRB 80FMA in the centre of the Base Plate **Fig. 34**. ~~If stones are used, they must be placed on the substrate, not on the drainage mat.~~

When applying the substrate, check the alignment of the Easy Mounting Rails and, if necessary, realign the Biosolar PV mounting system, as by curving the Easy Mounting Rails the PV modules would not be aligned either.

The depth of the ballast material and substrate must be recorded for each individual row. Failure to do so will invalidate a future warranty claim.

The height of the screw in the supports on the Base Plate can be used as a reference point for the material depth (see **Fig. 19**).

The height of the screw is:

- 145mm above the Drainage and Storage Board FKD 25
- 80mm above the Water Retention Box WRB 80F

Only Axter specified vegetation should be used on the fully installed substrate as high-growing herbs and grasses can lead to shading of the PV modules and thus to performance losses.



**Work step 8: Fastening of the PV modules**

Fix the PV modules to the Easy Mounting Rails vertically (portrait) or horizontally (landscape) using Module Clamps.

Apply the first module at one end of a row. Align the module in the middle and at a right angle corresponding to the orientation from the planning documents (landscape or portrait) on the Easy Mounting Rails. Secure the module at the end of the Easy Mounting Rails using two Module End Clamps and tighten it with 14 Nm. On the other side of the module, attach two Module Middle Clamps and apply and align the next module. Fasten the modules with the Module Middle Clamps and tighten the Module Middle Clamps with 14 Nm torque. Apply and fasten the whole row, based on the planning documents. The last module must be fixed once again with two Module End Clamps on the outer side.

Any overhang of the Easy Mounting Rails can be shortened with an angle grinder after fastening the PV modules.

**The following points must be noted during assembly:**

- When mounting, the manufacturer's specified clamping ranges must be observed.
- The torque of the clamp screws must be 14 Nm.
- A suitable torque wrench or cordless screwdriver with a torque limit is to be used for this.  
Please note: Lower torques can lead to the failure of the system. Higher torques can damage the module frame and PV modules.
- Contact corrosion between the PV module frame and substructure is to be prevented when using different materials.
- Do not drill, nail or weld the module frame.
- Only use corrosion-free screws for assembly.
- Install PV modules only with the socket in the direction of the long side of the Mounting Frame.

**Work step 9: Electrical connections**

(Must be completed by a qualified electrician/solar PV installer)

Observe the instructions of the PV module manufacturer for the electrical connection of the PV modules.

**Additional information**

Deviation from the design supplied by Axter Ltd is only permissible following written approval.

**Information on loading**

In the event of an order, the Biosolar PV mounting system is installed according to the imposed load and static calculations supplied by Axter Ltd. It remains the customer's responsibility to gain approval from a structural engineer for the area to be covered.

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