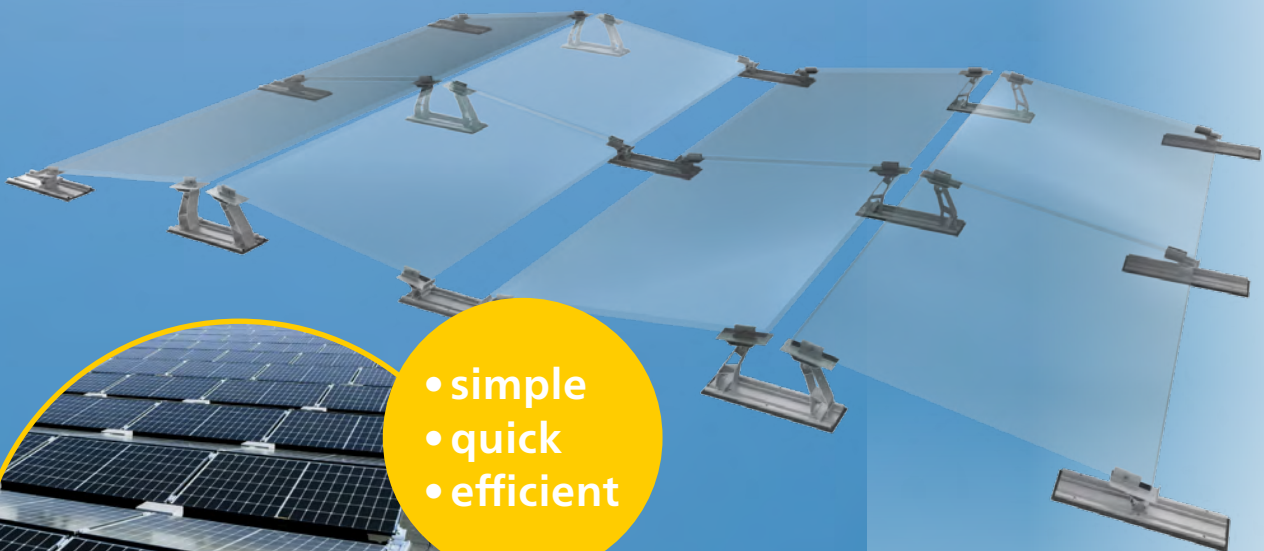


# TRITEC

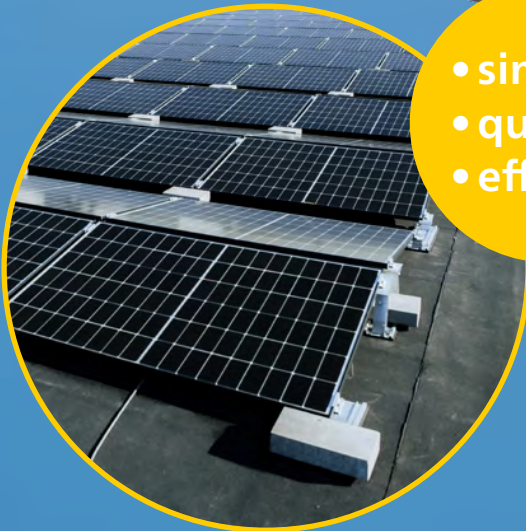
ENERGY FOR A BETTER WORLD

## TRI-FLAT EASYSPEED

Assembly instructions  
flat roof system



- simple
- quick
- efficient



### The main advantages:

- Quick assembly due to preassembled components
- No time-consuming measuring work required
- Low concentrated loads on the roofing and insulation

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# TRI-FLAT EASYSPEED

## Assembly instructions for flat roof



### 1 Basics

#### Notes

TRI-FLAT Easyspeed is an aerodynamic assembly system for framed PV modules that is used to install photovoltaic panels on flat roofs. The modules are installed at an angle of approx. 10° in east/west orientation and in south-facing orientation. They are held in place by ballast blocks and do not require drilling. Prior to assembly, make sure that you are using the current mounting instructions and read these carefully before you begin. These instructions explain how to assemble the TRI-FLAT Easyspeed components, the modules and the ballast.

#### Design software

**The TRITEC software TRI-DESIGN must be used to calculate the ballast required for the TRI-FLAT Easyspeed assembly system.** Refer to the project report prepared by TRITEC for the arrangement of the ballast blocks, the required components and their position. This data is vital to ensure that your PV system operates safely and reliably. TRITEC accepts no liability for failure to observe the mounting instructions, the project statics prepared with TRI-Design or for incorrect data communicated by the customer to prepare the project report. The TRITEC T&Cs and Warranty Conditions apply additionally.

#### Statics

**Before starting assembly, the PV system installer must ensure that the roof substructure is suitable for the additional prevailing loads.** To do so, please contact a structural engineer close to you. The compressive strength of the roof insulation and cladding as well as the coefficient of friction must be tested before starting construction. The surface and point loads of the TRI-FLAT Easyspeed system are stated in the project report.

#### Maintenance

A photovoltaic system requires maintenance, which is recommended on an annual basis or directly after a storm event. The position of the ballast blocks must be checked in particular.

#### Modules

The TRI-FLAT Easyspeed flat roof system is designed exclusively for mounting framed PV modules in a horizontal orientation. Any other form is considered improper use. By default, the modules are clamped on their short side. The installer must check whether clamping on the short module side is permitted before the start of construction. This approval may be stated in the module certification. The individual module manufacturer can also be requested to issue approval for specific projects if necessary.

**Please note: Kindly refer to the mounting instructions for the individual modules for the maximum load-bearing capacity of the PV modules and the approved clamping ranges.**

#### Installation

**When installing the TRI-FLAT Easyspeed mounting system, only products from the TRI-FLAT Easyspeed range may be used.**

The use of third-party components can affect the stability of the system and cause considerable damage. Installation may only be carried out by trained and competent personnel. No liability is accepted for damage caused by the use of third-party components or incorrect installation. If you have any further questions, please do not hesitate to contact TRITEC.



## 2 General information

<b>Use:</b>	Flat roofs: foil, bitumen and gravel roofs
<b>Roof pitch:</b>	Up to 5° depending on roof conditions without roof connection
<b>Max building height:</b>	25 metres
<b>Orientation:</b>	East/west and south facing
<b>System inclination:</b>	Approx. 10°
<b>Modules:</b>	Framed modules
<b>Module sizes:</b>	Width: 950 - 1200 mm x Length: 1650 - 2300 mm
<b>Module orientation:</b>	Horizontal
<b>Max. module panel size:</b>	21 x 21 metres
<b>Distance from roof edge:</b>	Roof zones F and G can be occupied in accordance with EN 1991-1-4 (minimum edge distance 600 mm)
<b>Wind load:</b>	Up to 2,4 kN/m <sup>2</sup>
<b>Snow load:</b>	Up to 5,4 kN/m <sup>2</sup>
<b>Proof of stability:</b>	Soft ware-assisted on the basis of wind tunnel investigations
<b>Properties and condition of roof:</b>	On-site checks must be carried out by the contractor to ensure that the roof construction and the building's supporting structure offer the necessary static load-bearing capacity and that the compressive strength of the thermal insulation is sufficient.
<b>Materials:</b>	Aluminium EN AW 6063/6005; sheet steel with an aluminium-zinc coating; small parts made from A2-70 stainless steel; building protection mat made from non-woven polyester
<b>Screw mounting:</b>	M8 (A2-70)
<b>Torque:</b>	15 Nm
<b>Recommendation for mounting on gravel roofs:</b>	<p>The gravel should be cleared so that the Easyspeed F1 plates are in direct contact with the roof covering. The removed gravel can be placed in gravel trays and reused as ballast. The system can also be mounted directly on the gravel.</p> <p>A check must always be carried out to ensure that a suitable protective fleece that complies with the regulations has been installed beneath the gravel layer. However, we recommend consulting with TRITEC about the specific project.</p>



# TRI-FLAT EASYSPEED

## Assembly instructions for flat roof



### 3 Components



TRI-FLAT Easyspeed small raiser

Standard

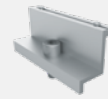
- Item no.: 1503301



TRI-FLAT Easyspeed large raiser

Standard

- Item no.: 1503302



TRI-FLAT Easyspeed end clamp

Standard

- Item no. 30 mm: 1503305
- Item no. 32 mm: 1503318
- Item no. 35 mm: 1503306
- Item no. 40 mm: 1503335



TRI-FLAT Easyspeed wind deflector plate 1945 / 2145 / 2395

Standard

- Wind deflector plate 1945
- Modul length: 1.650 - 1.850 mm
- Item no.: 1503315

- Wind deflector plate 2145
- Modul length: 1.851 - 2.050 mm
- Item no.: 1503316

- Wind deflector plate 2395
- Modul length: 2.051 - 2.300 mm
- Item no.: 1503317



TRI-FLAT Easyspeed small plate 140

Standard

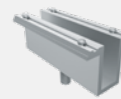
- Dimensions: 480 x 140 mm
- Item no.: 1503303



TRI-FLAT Easyspeed large plate 140

Standard

- Dimensions: 700 x 140 mm
- Item no.: 1503312



TRI-FLAT Easyspeed middle clamp 30-40 mm

Standard

- Item no.: 1503304



TRI-FLAT Easyspeed small plate 220

Optional

- Dimensions: 480 x 220 mm
- Item no.: 1503313



TRI-FLAT Easyspeed large plate 220

Optional

- Dimensions: 700 x 220 mm
- Item no.: 1503314



TRI-FLAT Easyspeed ballast tray 2025 / 2225 / 2475

Optional

- Ballast tray 2025
- Modul length: 1.650 - 1.850 mm
- Item no.: 1503321

- Ballast tray 2225
- Modul length: 1.851 - 2.050 mm
- Item no.: 1503322

- Ballast tray 2475
- Modul length: 2.051 - 2.300 mm
- Item no.: 1503323



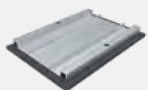
TRI-FLAT Easyspeed gravel ballast tray 2025 / 2225 / 2475

Optional

- Gravel ballast tray 2025
- Modul length: 1.650 - 1.850 mm
- Item no.: 1503325

- Gravel ballast tray 2225
- Modul length: 1.851 - 2.050 mm
- Item no.: 1503326

- Gravel ballast tray 2475
- Modul length: 2.051 - 2.300 mm
- Item no.: 1503327



TRI-FLAT Easyspeed shim

Optional

- Item no.: 1503330



TRI-FLAT Easyspeed ballast brace

Optional

- Item no.: 1503307



TRI-FLAT Easyspeed small cable cover

Optional

- Item no.: 1503308



TRI-FLAT Easyspeed large cable cover

Optional

- Item no.: 1503311



TRI-FLAT Easyspeed washer

Optional

- Item no.: 1503342



TRI-FLAT Easyspeed hexagon socket bolt

Optional

- Item no.: 1503341



TRI-FLAT Easyspeed wind deflector plate clip

Accessories

- Item no.: 1503340



TRI-STAND Edge Clip Cable Tie TS-EC

Accessories

- Item no.: 1502246



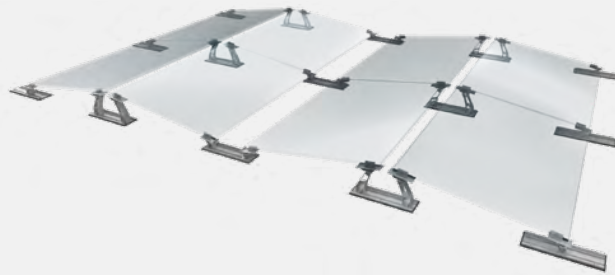
# TRI-FLAT EASYSPEED

## Assembly instructions for flat roof



### 4 System overview

# V1

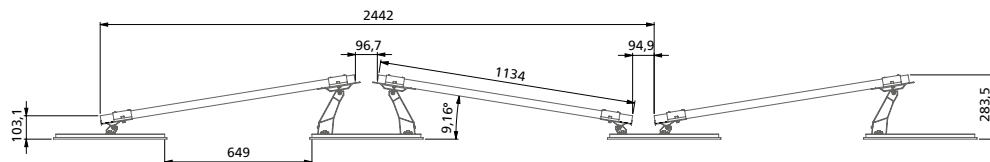
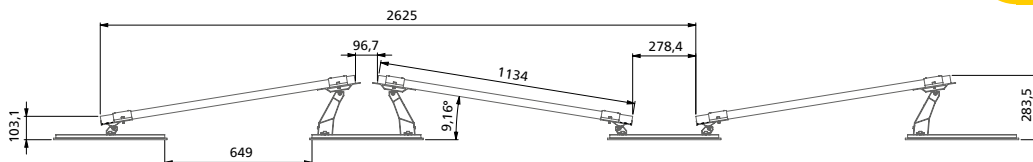


#### East/West

Clamping on short module side with long or short row spacing



Assembly from page 9



# V2

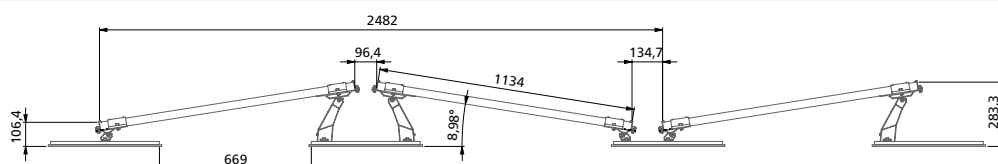
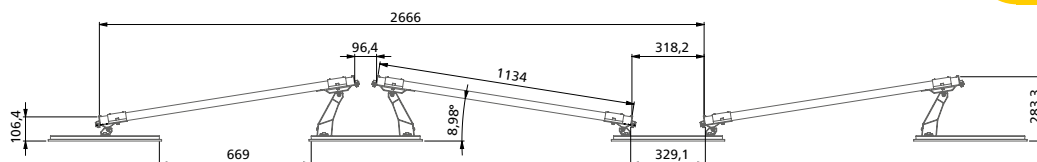


#### Alpine East/West

Clamping on short module side with long or short row spacing



Assembly from page 12

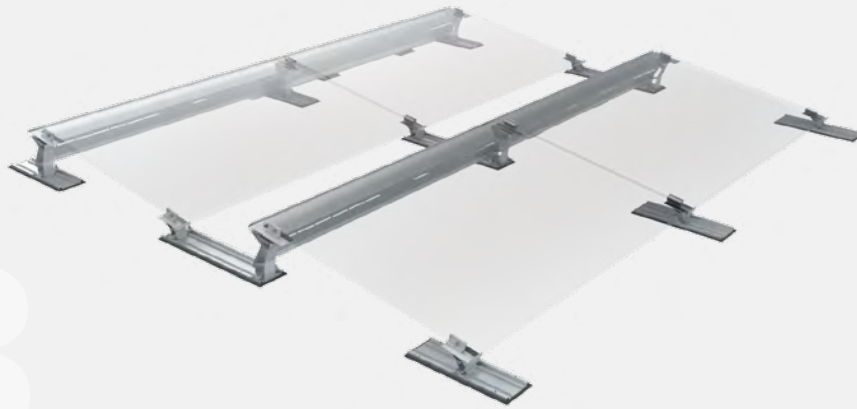


# TRI-FLAT EASYSPEED

Assembly instructions for flat roof

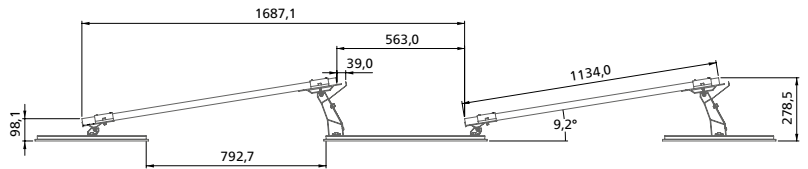


## V3

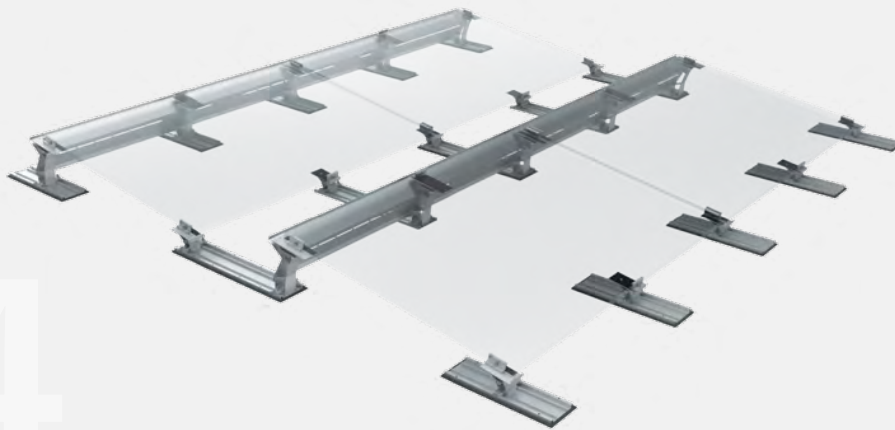


- South, 18° angle for shading clearance  
Modules are clamped on the **short** side

Assembly from page 13 

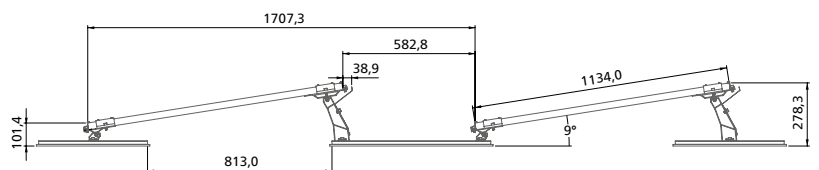


## V4



- Alpine South, 18° angle for shading clearance  
Clamping on **short as well as long side** of the module

Assembly from page 15 

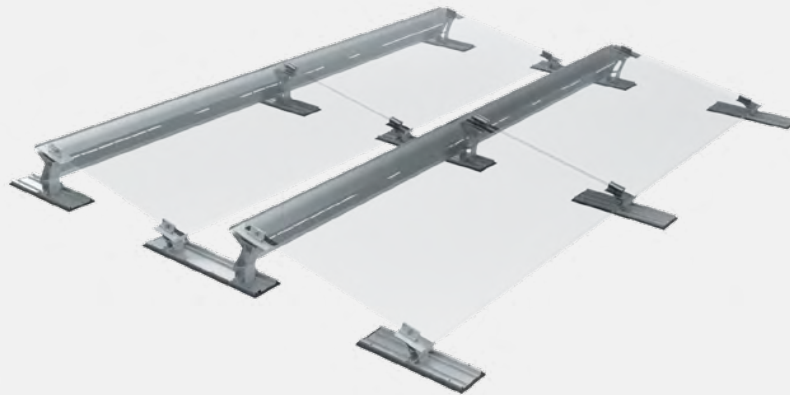


# TRI-FLAT EASYSPEED

Assembly instructions for flat roof

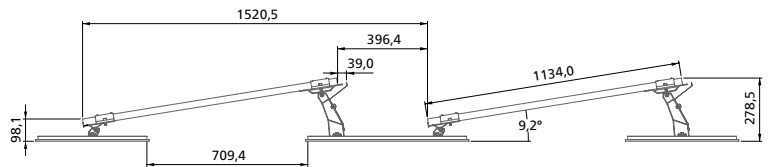


## V5

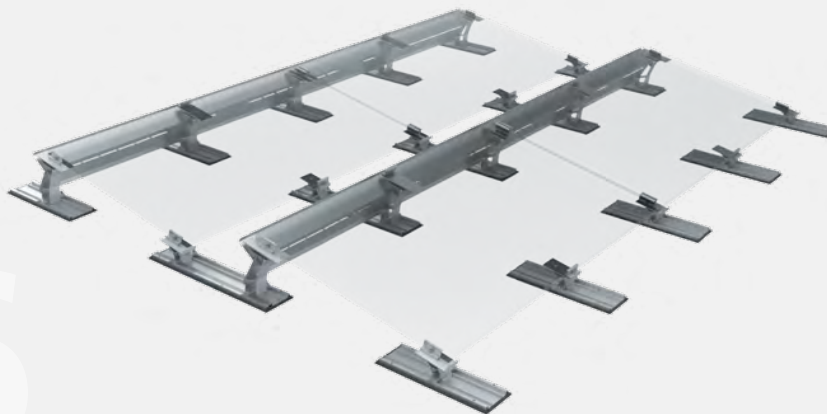


- South, 25° angle for shading clearance  
Modules are clamped on the **short** side

Assembly from page 13 

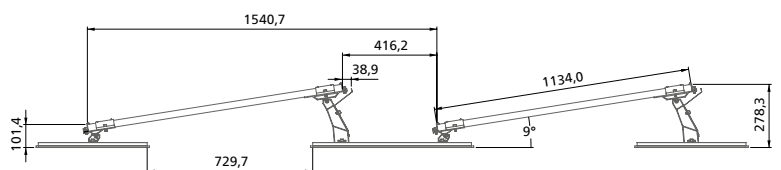


## V6



- Alpine South, 25° angle for shading clearance  
Clamping on **short as well as long side** of the module

Assembly from page 15 





### Required tools

The following tools are required for the installation:



01 Cordless screwdriver with SW6 hex key socket

02 SW6 hex key

03 Torque wrench

## 5 Assembly East/West

### 5.1 Mounting the front leg

Position the small raiser on the central hole in the small plate. Apply 15 Nm to tighten the hexagon socket bolt.



5.1 Mounting the front leg

### 5.2 Mounting the lowered centre leg

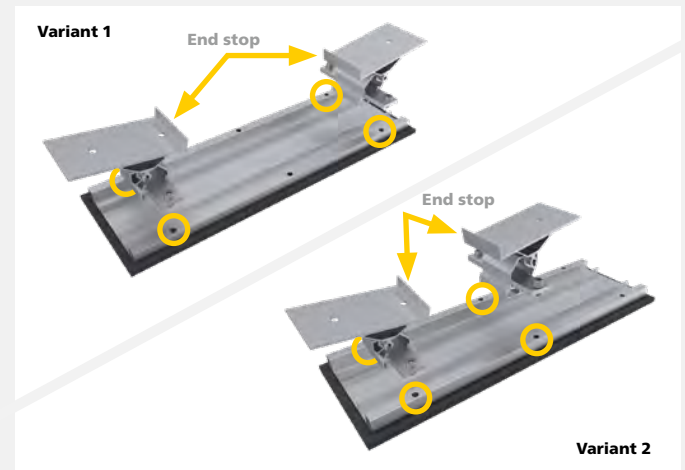
#### Variant 1 with long spacing

For installation with standard row spacing, position the small raisers on the outer holes of the small plate.

#### Variant 2 with short spacing:

For installation with short row spacing, position one raiser small on the outer holes of the plate small. Position the second small raiser on the middle holes of the small plate.

Apply 15 Nm to tighten the hexagon socket bolt. Make sure that the end stop on both raisers is facing inwards on the plate.



5.2 Mounting the lowered centre leg

### 5.3 Mounting the raised centre leg

Position each of the large raisers on the outer holes in the small plate. Apply 15 Nm to tighten the hexagon socket bolt. Make sure that the bracket on both raisers is facing outwards on the plate.



5.3 Mounting the raised centre leg



### 5.4 Pre-mounting the clamps

If necessary, tighten the end and middle clamps with approx. 2 rotations on the pre-mounted raisers of the front and centre legs.

**Tip:**  
Check the orientation of the small and large raisers one more time.

## 6 Mounting details East/West

### 6.1 Positioning of the legs

Position the module panels on the selected roof surface according to the TRI-Design project report. To do so, measure the length and width of the module panel and position the raised front and centre legs and the lowered central legs. The precise spacing between the legs depends on the length and width of the module.

When positioning the legs, pay attention to the end stop on the small raiser (fig. A) and the characteristic curve on the large raiser (fig. B).



End & middle clamp

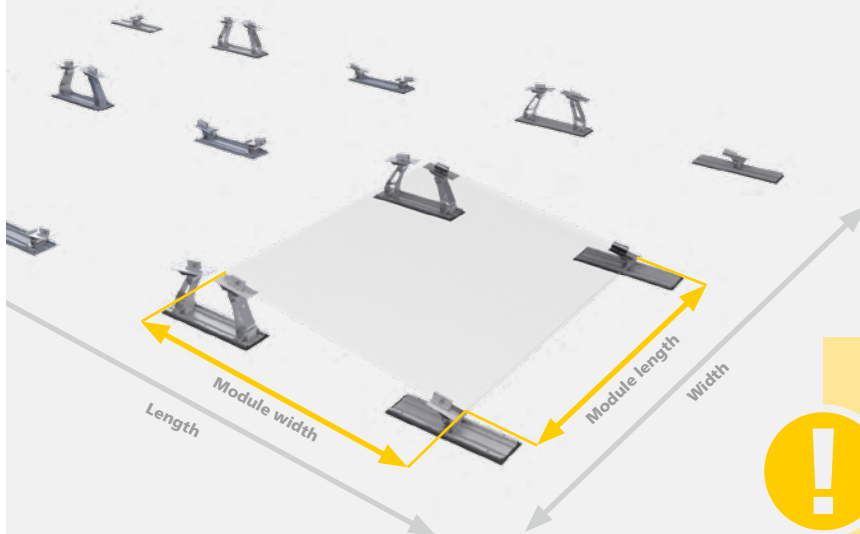
Legs



Fig. A, end stop at front



Fig. B, characteristic curve at rear



**Caution:**

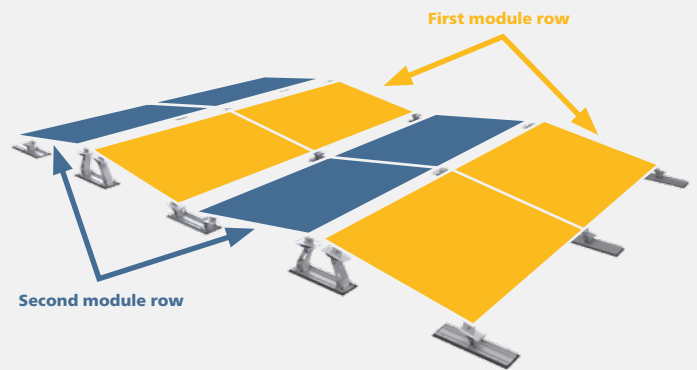
Pay attention to the positioning of the front and centre legs when using the alpine variant! In this case the modules are positioned along the characteristic curve of all legs. The procedure for mounting the alpine variant is described from page 12 onwards.



### 6.2 Mounting the modules

#### First module row:

Place the first module horizontally on the raised front and centre legs so that it is flush with the end stop at the front of the small raiser (fig. A) and the characteristic curve at the rear of the large raiser (fig. B). Apply 15 Nm to tighten the terminating clamps. Push the next module onto the centre clamps of the previous module and apply 15 Nm to tighten the centre clamps. Mount the other modules in the same way.



#### Tip:

If ballast trays are required, mount them before placing the second module row. The procedure for mounting the ballast trays is described from page 17 onwards.

#### Second module row:

Place the first module horizontally on the lowered and raised centre legs so that it is flush with the end stop at the front of the small raiser (fig. A) and the characteristic curve at the rear of the large raiser (fig. B). Apply 15 Nm to tighten the terminating clamps. Push the next module onto the centre clamps of the previous module and apply 15 Nm to tighten the centre clamps. Mount the other modules in the same way.



Fig. A, end stop front



Fig. B, characteristic curve at rear



### 7 Alpine variant East/West (optional)

#### 7.1 Positioning + mounting of the legs

Install the raisers as described on page 9 according to the desired variant "long spacing or short spacing" and position the module fields as described on page 10. Attach additional raised front and centre legs and lowered centre legs to the middle of the module (fig. A, The sequence for module assembly is described on page 11).

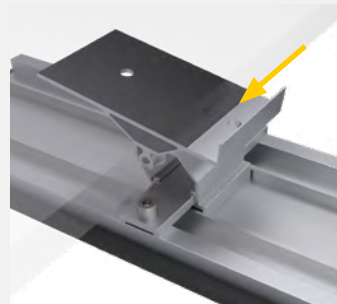
#### Caution:

Make sure on all legs that the modules are positioned flush with the characteristic curve on the small raiser (Detail A) and the characteristic curve on the large raiser (Detail B).

**Do not use the end stop on the small raiser!**



Fig. A, alpine variant East/West



Detail A, characteristic curve for the small raiser



Detail B, characteristic curve for the large raiser

#### 7.2 Mounting additional end clamps

Screw the additional end clamps into the pre-mounted raisers of the alpine legs. Apply 15 Nm to tighten them.



End clamp for the small raiser



End clamp for the large raiser



### 8 Assembly South 18°/25°

#### 8.1 Mounting the front leg

Position the small raiser on the central holes of the small plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.



8.1 Mounting the front leg

#### 8.2 Mounting the rear leg

Position the large raiser on the central holes of the small plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.



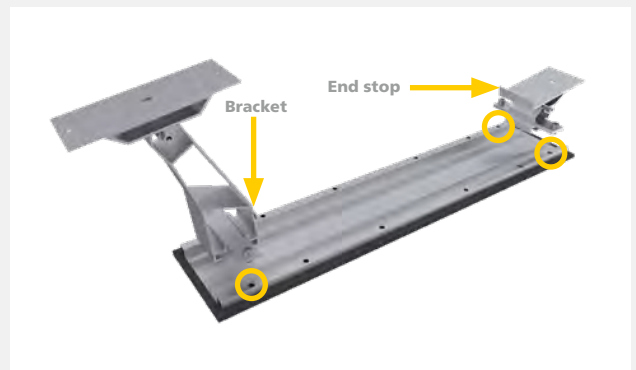
8.2 Mounting the rear leg

#### 8.3 18° angle for shading clearance

Position the large raiser on the outer holes on the left-hand side of the large plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.

Position the small raiser on the outer holes on the right-hand side of the large plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.

Make sure that the bracket for the large raiser and the end stop for the small raiser are each pointing towards the inside of the large plate.



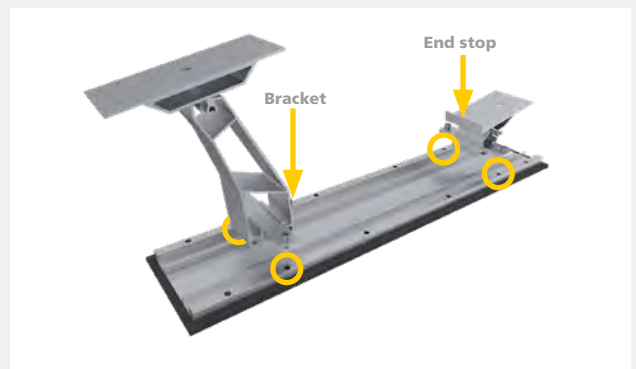
8.3 Mounting the centre leg 18° angle for shading clearance

#### 8.4 25° angle for shading clearance

Position the large raiser on the second of the outer holes on the left-hand side of the large plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.

Position the small raiser on the second of the outer holes on the right-hand side of the large plate. Apply 15 Nm to tighten the pre-mounted hexagon socket bolt.

Make sure that the bracket for the large raiser and the end stop for the small raiser are each pointing towards the inside of the large plate.



8.4 Mounting the centre leg 25° angle for shading clearance



### 8.5 Pre-mounting the clamps

If necessary, tighten the terminating and centre clamps with approx. 2 rotations on the pre-mounted raisers of the front, rear and centre legs.

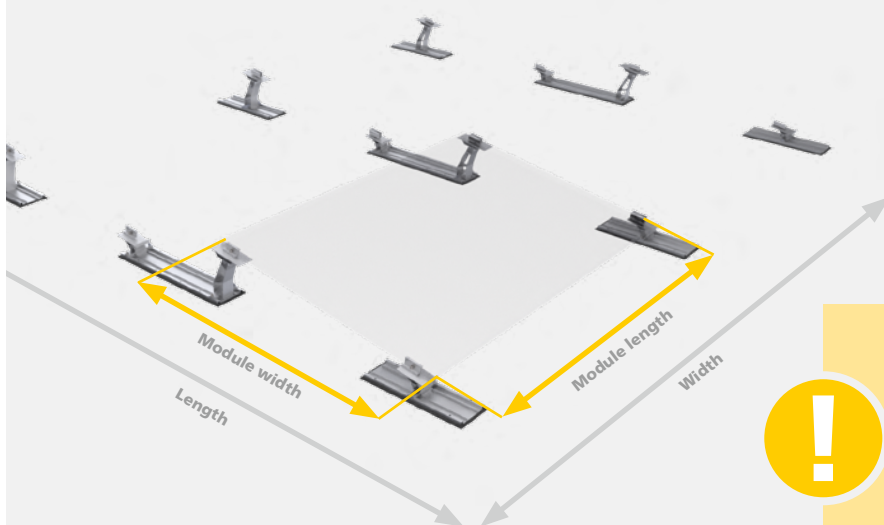
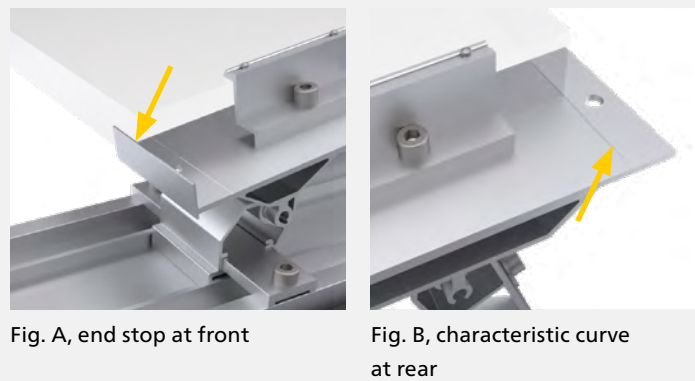
**Tip:**  
Check the orientation of the small and large raisers one more time.

## 9 Mounting details South 18°/25°

### 9.1 Positioning of the legs

Position the module panels on the selected roof surface according to the TRI-Design project report. To do so, measure the length and width of the module panel and position the front, centre and rear legs. The precise spacing between the legs depends on the length and width of the module.

When positioning the legs, pay attention to the end stop on the small raiser (fig. A) and the characteristic curve on the large raiser (fig. B).



**Caution:**  
Pay attention to the positioning of the front and centre legs when using the alpine variant! In this case the modules are positioned along the characteristic curve of all legs. The procedure for mounting the alpine variant is described from page 15 onwards.



### 9.2 Mounting the modules

#### First module row:

Place the first module horizontally on the front, centre and rear legs so that it is flush with the end stop at the front of the small raiser (fig. A) and the characteristic curve at the rear of the large raiser (fig. B). Apply 15 Nm to tighten the end clamps. Push the next module onto the middle clamps of the previous module and apply 15 Nm to tighten the middle clamps. Mount the other modules in the same way.

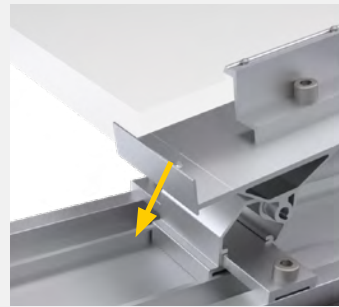
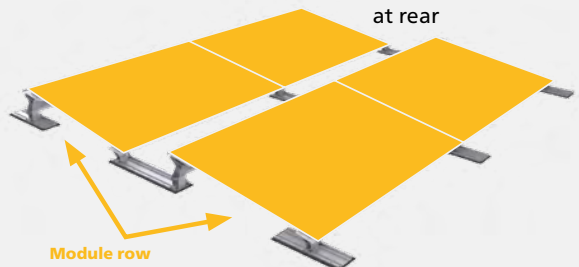


Fig. A, end stop at front



Fig. B, characteristic curve at rear



## 10 Alpine variant South 18°/25° (optional)

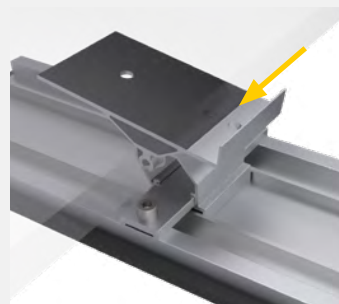
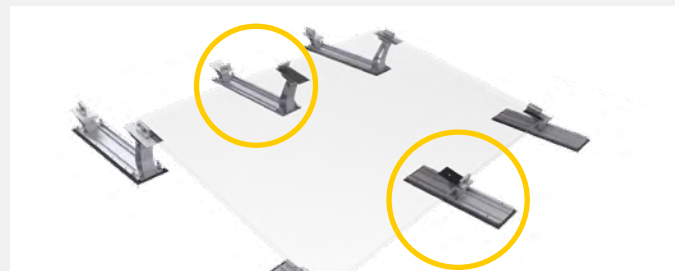
### 10.1 Positioning + mounting of the legs

Position the module panels as described on page 14. Attach additional front, centre and rear legs to the middle of the module. (Sequence see above, item 9.2, fig. A).

#### Caution:

Make sure on all legs that the modules are positioned flush with the characteristic curve on the small raiser (Detail C) and the characteristic curve on the large raiser (Detail D).

**Do not use the end stop on the small raiser!**



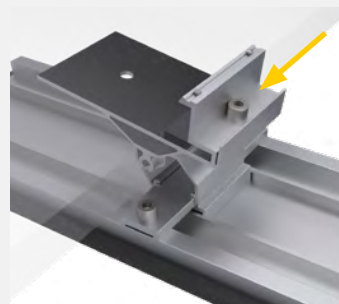
Detail C, characteristic curve for the small raiser



Detail D, characteristic curve for the large raiser

### 10.2 Mounting additional end clamps

Screw the additional end clamps into the pre-mounted raisers of the alpine legs. Apply 15 Nm to tighten them.



End clamp small raiser



End clamp large raiser



### 11 Mounting the wind deflector plate South 18°/25°

#### 11.1 Inserting the wind deflector plate into the bracket

Place the wind deflector plates into the brackets of the large raisers on the centre and rear legs (fig. A).

#### Caution:

Make sure that the wind deflector plates are flush with the adapters of the centre and rear legs at the beginning and end of a module row (fig. B).

#### 11.2 Screwing the wind deflector plate in place

Use washers and hexagon socket bolts to screw the wind deflector plates into the holes on the legs. Apply 15 Nm to tighten them (fig. C).

Wind deflector plates are mounted overlapping if they meet (fig. D).

#### Tip:

Additional clips should be attached where the wind deflector plates overlap.

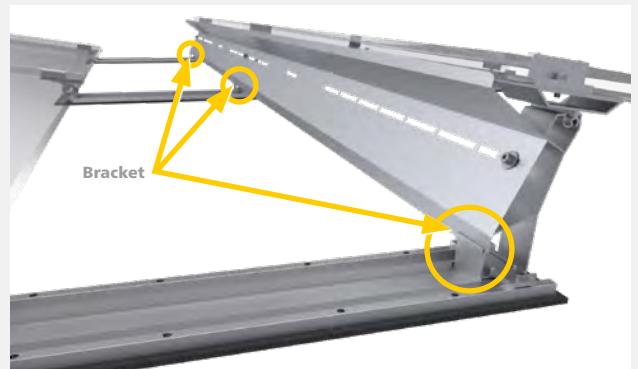


Fig. A, inserting the wind deflector plate into the bracket



Fig. B, flush with the adapter



Fig. C, screwing

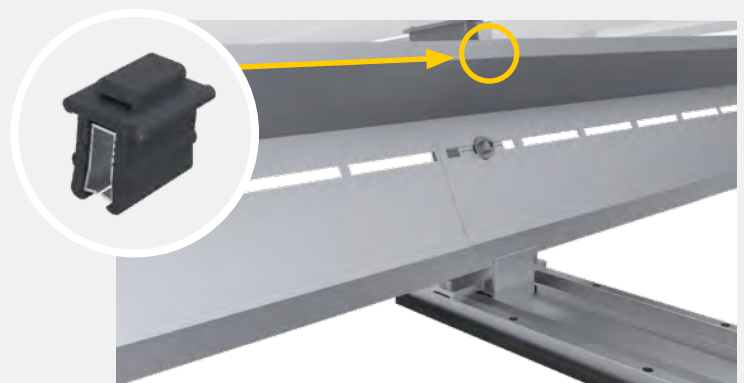


Fig. D, attach clip





### 12 Mounting the ballast trays

#### 12.1 Use of additional shims

The ballast trays are mounted on the small or large plates, depending on the system. Place additional shims under the ballast trays and attach them to the holes of the respective plates using washers and hexagon socket bolts.

#### Caution:

The ballast trays are mounted on the various legs, e.g. the front, rear or centre legs, depending on the system.

#### 12.2 Standard version

For more than 8 blocks or more than 64 kg, use two shims per ballast tray (fig. A).

Use only one shim per ballast tray if there are less than 8 blocks or less than 64 kg (fig. B).



Figure exemplary



Fig. A, more than 8 blocks or 64 kg



Fig. B, less than 8 blocks or 64 kg



# TRI-FLAT EASYSPEED

## Assembly instructions for flat roof



### 12.3 Alpine version

If there are less than 8 blocks or less than 64 kg no shims are necessary, as there is already an alpine support in the middle (fig. A).

For more than 8 blocks or more than 64 kg, use two shims per ballast tray (fig. B).

#### Caution:

The ballast trays are mounted on the various legs, e.g. the front, rear or centre legs, depending on the system.



Figure exemplary

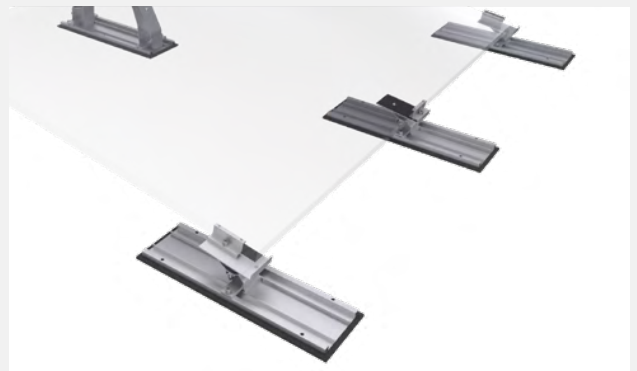


Fig. A, less than 8 blocks or 64 kg

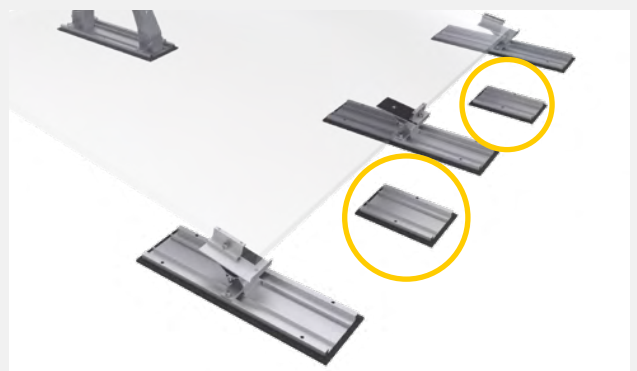


Fig. B, more than 8 blocks or 64 kg



### 13 Ballast

#### 13.1 Determination of the ballast

Ballast is calculated for each project exclusively by means of the TRI-Design. The number of blocks that are required to hold the system in place, and at which points, is calculated based on the dimensions and weight of the block. Use ballast trays or the ballast brace to hold the blocks in place.

#### 13.2 Ballasting by means of ballast tray

The blocks are placed directly in the ballast trays (fig. A).

**Caution:**

The project report contains a precise description of the number and positioning of the blocks.

#### 13.3 Ballasting by means of ballast clamps

The blocks can be positioned directly on the plates using ballast braces. Position each ballast brace on the edge of the block so that 3-point contact is established (fig. B).



Fig. A, exemplary

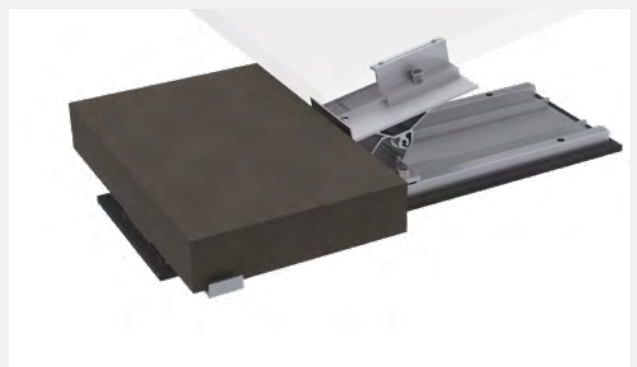


Fig. B, exemplary



### 14 Cable management

#### 14.1 Mounting

Insert the module cable into the cable cover. (fig. A). Position the cable cover on the edge of each plate so that it is flush with the plate and attach it to the holes in the plate using a hexagon socket bolt (fig. B). Apply 15 Nm to tighten the hexagon socket bolt (fig. C).



Fig. A, insert



Fig. B, fix



Fig. C, tighten



## 15 Notes

### Caution:

We recommend that you read the following instructions carefully, as they are very important for handling the product. Please also inform yourself about the safety instructions for the other system components.

The pitched roof system TRI-FLAT Easyspeed is designed exclusively for holding PV modules. Any other use is considered improper use. Intended use also includes compliance with the information in these installation instructions. TRITEC is not liable for damage resulting from non-observance of the installation instructions, in particular the safety instructions, or from misuse of the product.

**TRITEC accepts no liability whatsoever for loss of performance or damage to the module of any kind.**

For all work on the PV system, you should follow these instructions exactly. Installation, commissioning, maintenance, repair may only be carried out by persons who are appropriately qualified and authorised.

**Please observe the applicable regulations and safety instructions.**

**These accident prevention regulations you must observe:**

- BGV A 1 – General provisions
- BGV A 3 – Electrical installations and equipment
- BGV C 22 – Construction work  
(Personal protective equipment against falls from a height)
- BGV D 36 – Ladders and steps
- Employers' liability insurance association rules for safety and health at work BGR 203 (roof work) and DIN EN 516 Prefabricated accessories for roofing
- Provisions on work apparel and health and safety according to the regulations of the employers' liability insurance association.

**You must comply with the following DIN standards:**

- DIN 18299 – General rules applying to all types of construction work
- DIN 18338 – Roofing and roof waterproofing works
- DIN 18360 – Metal construction works, locksmith works
- DIN 4102 – Fire behaviour of building materials and building components

Work on the TRITEC (TRIENERGY Deutschland GmbH) systems may only be carried out by authorised personnel. **The operator of the system has the following safety-related duties:**



- We require an inspection and maintenance to be performed at least once a year on the installed components of the pitched roof system AS 2.1 and the roof cladding. This should include checking at least the following points:

1. correct fit and tightness of all mechanical connections
2. and deformation of the system position on the roof or of the system itself
3. flawless condition of the wiring
4. Damage to the PV modules



- The frame may only be mounted by persons with suitable qualifications, manual skills and basic knowledge of mechanics.
- It must be ensured that the persons assigned to the work are able to assess the tasks entrusted to them and to identify potential dangers.
- The mounting instructions are an integral part of the product and must be available during mounting.
- It must be ensured that the persons assigned to the work have read and understood the mounting instructions and in particular the safety instructions prior to mounting.
- The regulations of the employers' liability insurance association, the local occupational health and safety regulations and the rules of engineering must be adhered to.



- Suitable lifting equipment and ladders must be used during mounting. The use of straight ladders is prohibited.
- A specialised construction engineer must check the building statics to ascertain the additional load of the PV system.



- Any general load limitations imposed by TRITEC (TRIENERGY Deutschland GmbH) e.g. snow clearance requirement to limit the snow load, must be taken into account.



### 15.1 Warranty / Product liability (disclaimer)

The dimensioning information contained in these instructions merely reflects practical experience. The TRI-Design program can be used to prepare binding mounting frame statics.

As an installation firm, you are responsible for ensuring that mounting is performed correctly. TRITEC (TRIENERGY Deutschland GmbH) is not liable for dimensioning information contained in commercial system quotes.



As an installation firm, you are responsible for the mechanical durability of the installed port connections on the building envelope and for their tightness in particular. The components from TRITEC (TRIENERGY Deutschland GmbH) GmbH are designed for the anticipated loads and according to the current state of the art. For this purpose, you must notify TRITEC (TRIENERGY Deutschland GmbH) in writing of all general technical conditions (information concerning the support structure, snow load zone, building heights, wind loads, etc.) in your enquiry/order.

TRITEC (TRIENERGY Deutschland GmbH) shall not be liable if the mounted components are handled improperly.

The systems must not be mounted close to the sea due to the risk of corrosion.

TRITEC (TRIENERGY Deutschland GmbH) grants a 2-year product warranty on the service life and durability of the rack systems, provided they are handled properly, dimensioned correctly to suit the general statics and exposed to normal environmental and ambient conditions. This applies to the prevailing weather and environmental conditions in particular.

Warranty on material and workmanship: TRITEC (TRIENERGY Deutschland GmbH) extends a 10-year material and workmanship warranty on all used materials. Refer to the separate warranty terms for more information.

### 15.2 Instructions for electrical installation



You may only perform electrical works if you are a qualified electrician. The applicable DIN standards, VDE regulations, VDEW guidelines, VDN guidelines, accident prevention regulations and regulations of the local electricity supply companies are authoritative in this regard.

- DIN VDE 0100 (Erection of power installations with rated voltages below 1000)
- VDEW Guideline – Parallel operation of self-generating systems with the low-voltage grid of the electricity supply company
- VDI 6012 Guideline – Integration of decentralised and regenerative energy systems in buildings: Photovoltaics
- Leaflet on the VDEW Guideline “Self-generating systems in the low-voltage grid”
- VDN Guideline “Self-generating systems in the low-voltage grid”
- DIN/VDE regulations, DIN/VDE 0100 “Erection of power installations with rated voltages below 1000”, in particular VDE 0100 Part 410 “Protection against direct and indirect contact” (DC voltages > 120 V, < 1000 V DC) and the „Accident prevention regulation of the industrial employers’ liability insurance associations” VBG4 „Electrical installations and equipment”.
- DIN VDE 0100-540 Selection and erection of electrical equipment – Earthing arrangements and protective conductors
- VDE 0185 Installation of a lightning protection system and VDS 2010



### 15.3 Grounding/equipotential bonding



All internal system connections are electrically conductive and have cross-sections sufficient for standard grounding. When using the TRI-FLAT Easyspeed module terminal with grounding pins, the internal potential connection of the PV system is guaranteed for the entire module field. For the integration of the module array into the equipotential bonding system, it is therefore sufficient to connect the array at one point with an earth conductor of sufficient cross-section.

### 15.4 Lightning protection



Ideally, the lightning protection system is installed in such a way that the required separation distance to the PV modules can be maintained everywhere. The possible impact points are defined by attaching interception rods, and the modules are located within the protective range of the interception rods.

If it is not possible to comply with the proximity regulations, the UK of the modules is connected to the lightning protection system - however, the module manufacturer must guarantee that the module frames are capable of carrying lightning current. If this is not possible, the parts of the TRI-FLAT Easyspeed system that are only connected to each other via the module frames must also be connected by a lightning protection cable.



The lightning protection of a PV system or the underlying building must always be planned and implemented by a lightning protection specialist.

The term lightning current carrying capacity is used for connections, terminals, etc. that must actively discharge lightning currents as part of the lightning protection system. Each of these components must be tested and certified for this purpose as part of a separate test.

The lightning current carrying capacity of a rack system is generally not relevant because the support system is not used as an arrester or interception rod within the scope of external lightning protection.

### 15.5 Important warning instructions



Solar modules generate electricity as soon as they are exposed to light, which means that they are always live. Although the fully insulated plug contacts offer contact protection, you must pay attention to the following when handling the solar modules:

- Do not insert any electrically conductive parts into the plugs and sockets.
- Do not mount solar modules and cables if the plugs and sockets are wet.
- Always exercise great care when working on the cables.
- Never perform any electrical installation in damp conditions.



- Very high direct voltages occur at the series connection of solar modules – even with low illumination – which are potentially fatal when touched. Pay particular attention to the possibility of secondary damage in the event of electric shocks.

High contact voltages may occur in the inverter, even when disconnected:

- Exercise particular care when working on the inverter and the cables.
- Make sure that you observe the time intervals specified by the manufacturer between switching off the inverter and carrying out further work so that the high-voltage components can discharge.
- Please also adhere to the mounting instructions issued by the inverter manufacturer.



A fatal flashover may occur when opening a closed string (e.g. when disconnecting the DC line from the live inverter):

- Never disconnect the solar generator from the inverter while it is connected to the grid.



### 15.6 Instructions for frame installation

You must observe the currently applicable rules of construction technology, in particular the requirements set out in the DIN standards and the "Rules and Regulations of the German Roofing Trade" for mounting in the roof area.



- Check that all screw connections are tightened properly.
- Adhere to the specified torques.
- Besides obtaining a verifiable structural analysis, you must make sure that the product meets the local structural requirements according to DIN EN 1991 before it is mounted.
- DIN standard EN 1991 "Actions on structures" – and all associated national application documents

1. Part 1-1: Densities, self-weight, imposed loads for buildings
2. Part 1-3: Snow loads
3. Part 1-4: Wind loads

- DIN standard EN 1990: "Basics of structural design" – and all associated national application documents
- The mounting frame is designed in accordance with DIN EN 1993 "Design of steel structures" and DIN EN 1999 "Design of aluminium structures".
- Make sure that the load-bearing capacity (dimensioning, condition, material parameters), load-bearing structure and other affected layers (e.g. insulation layer) of the substructure is suitable.



- Make sure that the drainage of precipitation is not obstructed.
- Take aspects of building physics into account (e.g. possible condensation when making holes in insulation layers).

### 15.7 Product liability

The technical documentation is an integral part of the product. TRITEC (TRIENERGY Deutschland GmbH) is not liable for damage caused by non-compliance with the mounting instructions, in particular the safety instructions, or from misuse of the products.

### 15.8 Standards and guidelines

All listed standards and guidelines are issued and applicable for Germany. Their most recent version must be consulted. In addition, adhere to the national standards and guidelines when mounting the systems outside of Germany.



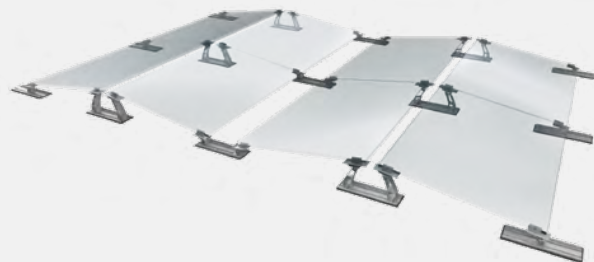


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TRI-FLAT Easyspeed for flat roof

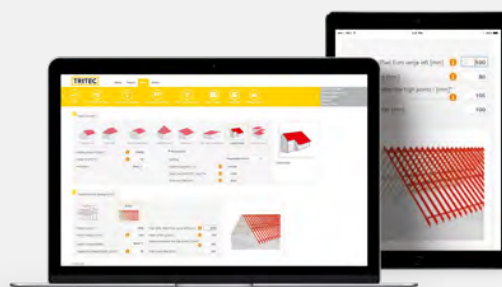
# TRITEC

## 16 Contact



Simply scan the QR code or visit the following link to get more information about TRI-FLAT Easyspeed for flat roof.

[www.tritec-energy.com/en/pv-mounting-systems/flat-roof/](http://www.tritec-energy.com/en/pv-mounting-systems/flat-roof/)



Just scan the QR code or visit the following link to watch the training video on our TRI-DESIGN planning software.

[www.tritec-energy.com/en/training/tri-design-basic/](http://www.tritec-energy.com/en/training/tri-design-basic/)

### The optimal mounting solution for every roof

TRITEC mounting systems combine over 30 years of photovoltaic experience. Our own products TRI-STAND, TRI-ROOF+, TRI-CLIP and TRI-FLAT Easyspeed offer optimum PV mounting solutions for the various requirements of different roof types and alignments. We attach great importance to the high-quality processing of the components as well as to the durability of the substructure.

Further information and the download of the assembly instructions you will find on our homepage [www.tritec-energy.com](http://www.tritec-energy.com).

Or just talk to us directly. Our experts are at your disposal to answer all your questions.

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