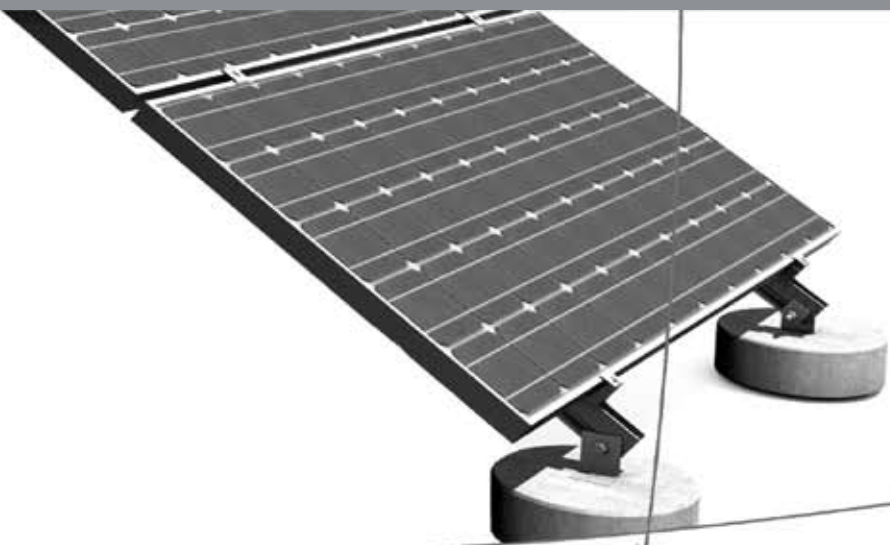


## Ground mount system Gamma

Installation manual



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# 1 Introduction

## 1.1 Short description

As a robust, long-life weatherproof mounting system, the Gamma corresponds to the field requirements of solar module mounting for photovoltaic solar power plants of different sizes.

The design of the frames was optimized for ecological concerns. It supports the specification of a favourable micro climate for habitats underneath the solar modules.

### Simple installation

All components are prepared according to the respective module size. Bolt connections and stops have been designed according to detailed usability tests in such a way that no special tools are required and connections are easily accessible.

### Intended use

The Gamma mounting system is to be used for the ground installation of solar modules only. Mounting Systems is not liable for damages resulting from failing to comply with the installation instructions, particularly the safety instructions, as well as misuse of the product.

### Service life warranty

Mounting Systems provides a 10-year warranty on its mounting systems. Please find the exact terms in the Mounting Systems warranty document.

### Durability

The aluminium and stainless steel construction provides extended durability. All components are corrosion-resistant and completely recyclable.

## Safety

If a building permit is required, Mounting Systems will design the mounting system according to an auditable assessment of the statics on request.

## 1.2 About this manual

### Subject

The subject of this manual is the installation and assembly of the photovoltaic mounting system Gamma.



### User group

The manual is intended for qualified personnel trained by the operator with a basic knowledge of mechanics and mechanical skills.

### Signposts

The following will assist you in finding your way around in this manual:

### Item numbers

In the illustrations, individual parts are labelled with item numbers and are shown in the form  and .

### Step-by-step procedure

Start of the step-by-step procedure is a description of the objective. Individually numbered steps follow which may be interspersed with background information or warnings.

### Headers

The headers display the heading of the current chapter.

## Footers

The footers display the product name, the name of the document and the page number.

## Pictograph



Identifies background and additional information for processes.

## 1.3 Standards and technical directives

When planned correctly, Gamma fulfills the following standards and technical directives:

- | EUROCODE 9 - Design of aluminium structures part 1.1 and local building codes

## 1.4 Maintenance

### Maintenance periods

The maintenance work described below must be performed **once every year** from the date of installation.

### Maintenance requirements

Maintenance is limited to visual inspections. For aluminium frames, bolted connections should not be retightened after the start of normal weathering of the aluminium on which the bolts bear.

- | Inspect all frame connections once a year for deformation or tears at the modules and crossbeams. If damage is observed, the corresponding frame components must be replaced.
- | Also inspect mounting footers for washout.

## 2 Safety

### 2.1 Basic safety instructions

The following basic safety instructions and warning symbols form an essential part of this manual and are of fundamental importance when handling this product.

Regardless of the certified structural analysis, it must be ensured prior to every installation that the product meets the static requirements on site according to the local jurisdiction having authority for such installation.

- | Do not remove or disable any safety devices.
- | Wear work clothes in accordance with the regulations of the Employer's Liability Insurance Association.
- | Comply with the relevant safety regulations.
- | The presence of a second party who can provide help in the event of an accident is obligatory during the entire installation process.
- | Keep a copy of this installation manual in the immediate vicinity of the system.

### 2.2 Warnings

The warning symbols used in this installation manual indicate important information for safety. They consist of the following:

- | Warning symbol (pictograph)
- | Indicator word showing the level of risk
- | Details of the nature and source of the risk
- | Information on the possible consequences of disregarding the risk
- | Instructions on what to do to avert the risk and prevent injuries or damage to property

The warning notes identify one of the following danger levels:



#### **DANGER**

Denotes an immediately hazardous situation, failure to observe which could lead to serious injury or death.



#### **WARNING**

Denotes a potentially dangerous situation which may lead to serious or moderate physical injury.



#### **CAUTION**

Denotes a potential danger, which may cause damage to property.

### 2.3 Responsibilities of the operator

The system operator has the following safety-related responsibilities:

- | Performing recommended maintenance work.
- | Ensuring that the installation of the frame is performed by qualified personnel with adequate skill and knowledge.
- | Ensuring that the assigned installation personnel can evaluate the work assigned and recognize possible dangers.
- | Ensuring that the installation manual is available during the installation. The installation manual is part of the product.
- | Ensuring that the installation manual and particularly the safety instructions are read and understood by the authorized installation personnel prior to beginning the work.
- | Ensuring that work site safety regulations and requirements are observed.
- | Ensuring prior to installation that the footer/foundation work has been carried out appropriately for site soil conditions and structure loading.
- | Ensuring that suitable lifting devices and ladders are used for the installation.

## 3 Preparation

### 3.1 Installation site and foundation

The installation site must be level. Mounting Systems recommends mounting the Gamma structure on concrete footers.

Footers should be adapted to local site conditions and structure loading requirements as determined by qualified soil testing procedures and Mounting Systems - supplied point load analyses.

### 3.2 Tools

The following tools are required for installation:

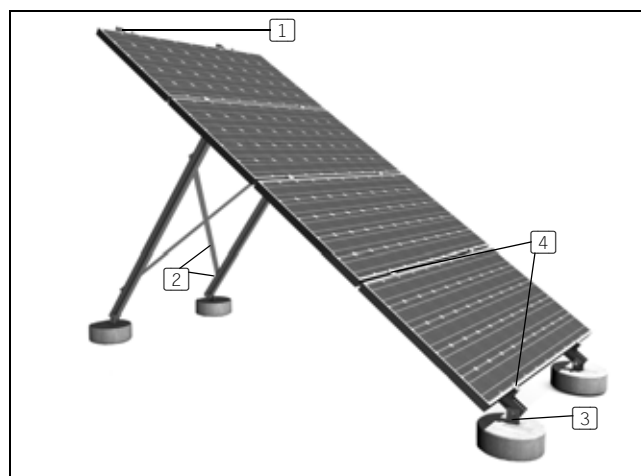
- | Battery operated drill
- | Wrenches/Socket (sizes 8-17)
- | Spanners (sizes 8-17)
- | Allen key 6 mm
- | Spirit level
- | Sledge

### 3.3 Modules per structure

Depending on the solar module width, a different number of them can be mounted in landscape mode on one Gamma ground mound structure. The following table indicates the number of solar modules that one Gamma structure can accommodate.

Width of the module	Quantity
476 - 558 mm	6
559 - 573 mm	5
574 - 858 mm	4
859 - 1133 mm	3

### 3.4 System overview



- 1 Module supporting base rails
- 2 Legs and struttings
- 3 Footers
- 4 Inter-module clamps and module end clamps

### 3 Preparation

#### 3.5 Components List

The Gamma ground mount kit is provided with the following items:

Identification	Gamma 15°	Upgrade 15°	Gamma 25°	Upgrade 25°	Gamma 35°	Upgrade 35°	Gamma 45°	Upgrade 45°
Module support rail	2	2	2	2	2	2	2	2
Base rail 25/65 596 mm	2	2	0	0	0	0	0	0
Base rail 25/65 996 mm	0	2	2	2	0	0	0	0
Base rail 25/65 1430 mm	0	0	0	2	0	2	0	2
Base rail 25/65 1700 mm	0	0	0	0	2	2	0	0
Base rail 25/65 2010 mm	0	0	0	0	0	0	2	2
L-foot 75 x 50 x 4, 60 $\varnothing$ 11/13 A2	4	2	4	2	4	2	4	2
L-foot 75 x 50 x 4, 150 $\varnothing$ 11/13 A2	0	2	0	2	0	2	0	2
Joiner piece	4	8	4	8	4	8	4	8
Diagonal 1100 mm	2	2	0	0	0	0	0	0
Diagonal 1200 mm	0	2	2	2	0	0	0	0
Diagonal 1600 mm	0	0	0	2	2	4	0	2
Diagonal 1996 mm	0	0	0	0	0	0	2	2
Hex head bolt M8 x 80	4	8	4	8	4	8	4	8
Hex head bolt M10 x 80	6	10	6	10	6	10	6	10
Hex head bolt M8 x 25	4	8	4	8	4	8	4	8
Washer 8.4	8	16	8	16	8	16	8	16
Washer 10.5	12	20	12	20	12	20	12	20
Split washer 8	4	8	4	8	4	8	4	8
Split washer 10	6	10	6	10	6	10	6	10
Lock washer 8	4	8	4	8	4	8	4	8
Hex nut M8	4	8	4	8	4	8	4	8
Hex nut M10	6	10	6	10	6	10	6	10
Plate 40 x 40 x 3 leg	2	4	2	4	2	4	2	4
Plate 40 x 40 x 3 mounting rail	2	2	2	2	2	2	2	2
Quickstone	4	8	4	8	4	8	4	8
Concrete anchor M12	4	4	4	4	4	4	4	4

## 4 Installation

### 4.1 Installation procedure

The following pages list the individual steps for installing the Gamma in the correct sequence.

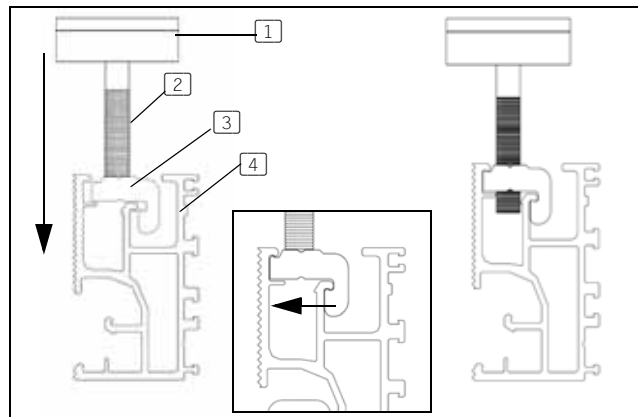
The pages feature three columns. Each column represents a complete sequence of actions. The sequence of actions consists of an illustration, the corresponding steps and additional information and safety instructions.

### 4.2 Quickstone

During the installation of Gamma, Quickstones are used. The Quickstone is a special nut used to connect several parts of the Gamma. The only tool needed for installation is a 6 mm Allen key.

The Quickstone can be used on both channels of the base rail.

### Installing the Quickstone



- 1 Element to be fixed (e.g. module clamp)
- 2 Allen bolt
- 3 Quickstone
- 4 Base rail



CAUTION

#### Material damage through faulty installation

Incorrectly installed Quickstone connections can rip out of the profile.

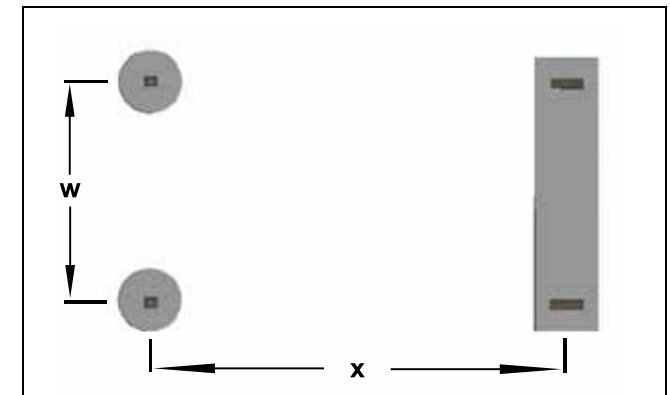
| Install all Quickstone connections as described below.

- | If necessary, adjust the bolt so that it does not protrude the Quickstone
- | Fit the Quickstone from above into the profile channel so that it wedges underneath the protruding rail hooks. When fitted correctly, the Quickstone matches the form of the profile exactly.
- | Tighten the bolt with a torque of 8 Nm.

### 4.3 Determining foundation spacing

It is recommended that the installation site be cleared and made as level as possible in a horizontal plain. The table below assumes the ground is both level and horizontal. Use the following table and diagram to determine footing spacings.

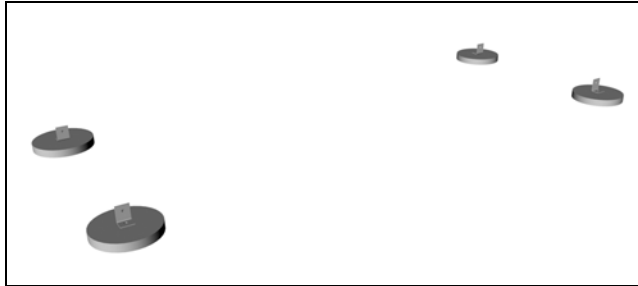
	Module Length (mm)	Foundation Length X (mm) Standard   Upgrade	Foundation Width W (mm)
SunForte	>700<1210 mm	2350   2300	766
15°	>1210 mm	2350   2300	1050
SunForte	>700<1210 mm	2200   2300	766
25°	>1210 mm	2200   2300	1050
SunForte	>700<1210 mm	2950   2500	766
35°	>1210 mm	2950   2500	1050
SunForte	>700<1210 mm	2800   2000	766
45°	> 1210 mm	2800   2000	1050



## 4 Installation

### 4.4 Installing the Gamma standard structure

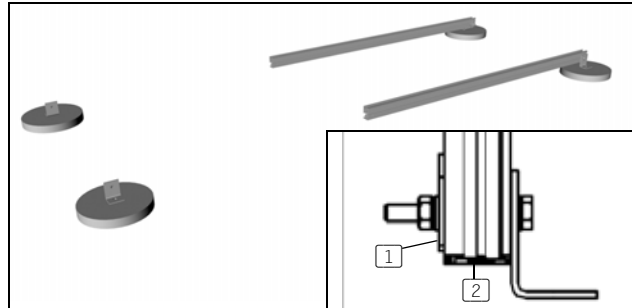
#### Fix L-brackets to the foundation bolts



Each foot L-bracket has one 11 mm diameter hole and another 13 mm diameter hole.

- | Mark the exact fixing points on the foundations.
- | Place the foot L-brackets, 13 mm holes downwards, on the marks.
- | Pre-drill a hole for the anchors through the L-brackets into the concrete foundation (drilling depth 90 mm, drill hole diameter 12 mm)
- | Clear the hole of remaining material
- | Set one concrete anchor into each hole and use sledge to push the anchor downwards until only the metric thread protrudes the bracket.
- | Use the M 12 washers and nuts supplied to secure the L-brackets to the concrete anchors. Tighten the connection to a torque of 50 Nm.
- | The horizontal sides of the L-brackets should be facing outwards (back to back).

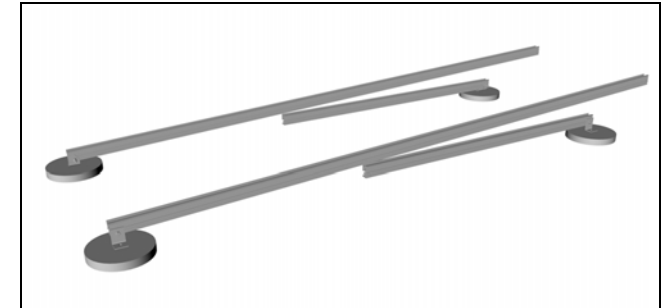
#### Fix rear legs to the rear feet



- 1 Plate
- 2 Module support rail

- | Use the M 10 x 80 bolt assemblies and plates supplied to attach the rear legs to the rear foot L-brackets, extending the legs frontwards.
- | Use plate 40 x 40 x 3 (one per assembly) as basis on the inner side of the profile.
- | Do not tighten the bolt assembly yet, to allow the rear legs to pivot on the L bracket.

#### Fix module rails to the front feet

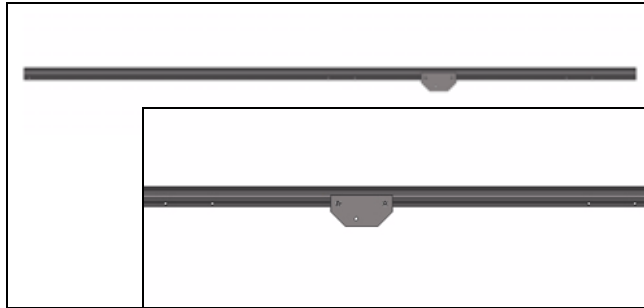


- | Using M 10 x 80 bolt assemblies and plates supplied, attach the module rails to the inside of the front foot L brackets.
- | Use plate 40 x 40 x 3 (one per assembly) as basis on the inner side of the profile.
- | The module rails should extend backwards.
- | Do not tighten the bolt assembly yet, to allow the module rail to pivot.



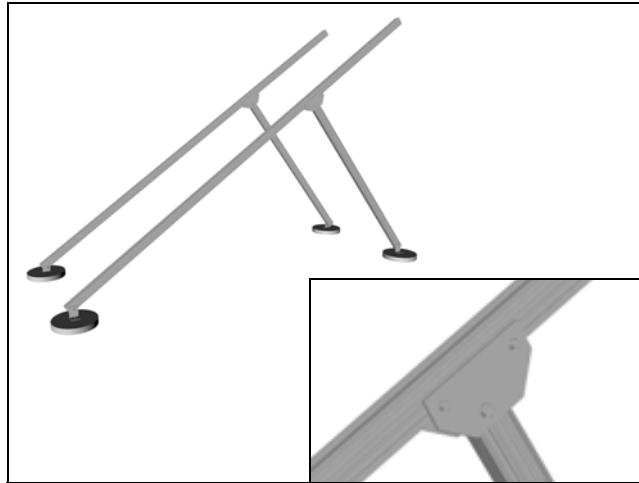
## 4 Installation

### Fix joiner plates to the module rails



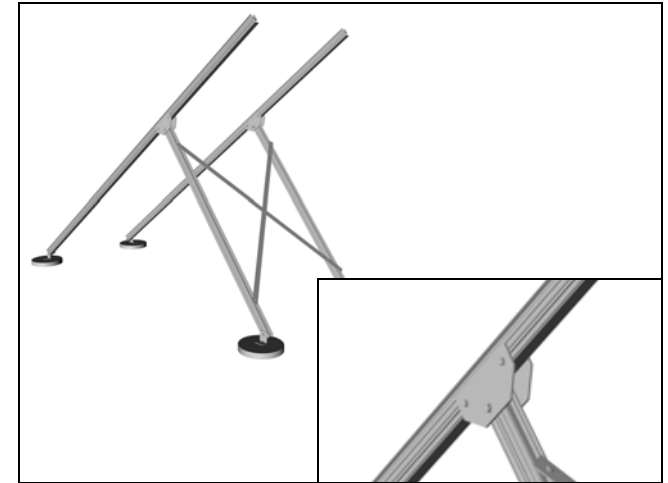
- | Use the M 8 x 70 bolt assemblies to attach two joiner plates to each of the module rails (4 joiner plates in total).
- | Use the middle drill hole pair in the module rail.

### Fix module rails to the rear legs



- | Rotate the module rail up while rotating the rear leg around to intersect with the joiner plate location and attach the rear leg to the joiner plate using the M 10 x 80 bolt assemblies through the 11 mm diameter hole in the joiner plates.
- | Take care when lifting the structural members.

### Attach diagonal struts to rear legs



- | Using two quickstones with M 8 x 25 bolts, attach a flat strut diagonally to the rear legs of the structure.
- | Repeat this process for the second diagonal strut.
- | If you have prepared the foundation spacing with a width of 766 mm then you need to cut the struts to suit. A pre-drilled hole will indicate the attachment point for the strut in this situation. In this case, cut the strut approximately 25 mm beyond the hole centre.
- | For large area modules there is no need to shorten the struts. Install the struts as they are.



#### Material damage through faulty installation

Incorrectly installed Quickstone connections can rip out of the profile.

- | Install all Quickstone connections as described in chapter 4.2 Quickstone p.8.

#### Tighten bolts

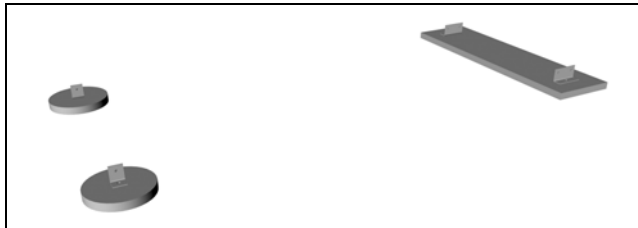
- | Once structure assembling is complete ensure that all connector bolts are tightened to a torque of 8 Nm to avoid the possibility of non warrantable damage.

## 4 Installation

### 4.5 Installing the Gamma upgrade structure

The following installation is for the upgraded Gamma structure only. For installation of the standard Gamma base structure, reference must be made to section 4.4 above.

#### Fix L-brackets to the foundation bolts

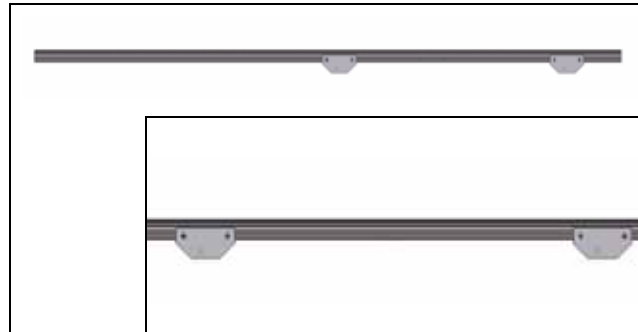


Each front L-bracket has an 11 mm diameter hole and a 13 mm diameter hole.

The rear L-bracket is different to the base structure as it has two 11 mm diameter holes and one 13 mm diameter hole.

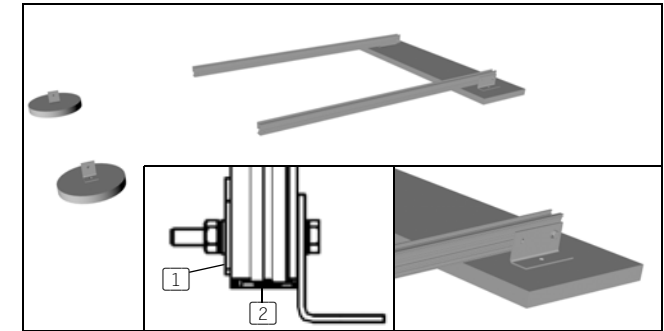
- | Mark the exact fixing points on the foundations.
- | Place the foot L-brackets, 13 mm holes downwards, on the marks.
- | Pre-drill a hole for the anchors through the L-brackets into the concrete foundation (drilling depth 90 mm, drill hole diameter 12 mm)
- | Clear the hole of remaining material
- | Set one concrete anchor into each hole and use sledge to push the anchor downwards until only the metric thread protrudes the bracket.
- | Use the M 12 washers and nuts supplied to secure the L-brackets to the concrete anchors. Tighten the connection to a torque of 50 Nm.
- | The horizontal sides of the L-brackets should be facing outwards (back to back).

#### Fix joiner plates to the module rails



- | Attach two joiner plates as mid-support and another two rear-support joiner plates to each of the module support rails (8 joiner plates in total).
- | Use two M 8 x 70 bolt assemblies to fix each joiner plate into the channel.
- | Use the first and the third drill hole pair.

#### Fix rear legs to rear feet



- 1 Plate
- 2 Module support rail

- | Use the M 10 x 80 bolt assemblies and plates supplied to attach the rear legs to the inside of the rear foot L-brackets, extending the legs frontwards.
- | Attach the leg to the rear hole in the L-bracket.
- | Use plate 40 x 40 x 3 (one per assembly) as basis on the inner side of the profile.
- | Do not tighten the bolt assembly yet, to allow the rear legs to pivot on the L-bracket.

## 4 Installation

### Fix module rails to the front feet



- | Use the M 10 x 80 bolt assemblies and plates supplied, to attach the module rail assembly to the inside of the front foot L-brackets.
- | Use plate 40 x 40 x 3 (one per assembly) as basis on the inner side of the profile.
- | The module rails should extend backwards.
- | Do not tighten the bolt assembly yet, to allow the module rail to pivot on the L-bracket.

### Fix module rails to the rear legs



- | Pivot the module rail up while rotating the rear leg around to intersect with the joiner plate location and attach the rear leg to the rear joiner plate using the M 10 x 80 bolt assemblies through the 11 mm hole in the joiner plates.
- | Take care when lifting these structural members.

### Attach diagonal struts to rear legs



- | Using 2 Quickstones and bolts M 8 x 25, attach a flat strut diagonally to the rear legs of the structure.
- | Repeat this process for the second diagonal strut.
- | If you have prepared the foundation spacing with a width of 766 mm then you need to cut the struts to suit. A pre-drilled hole will indicate the attachment point for the strut in this situation. In this case, cut the strut approximately 25 mm beyond the hole centre.
- | For large area modules there is no need to shorten the struts. Install the struts as they are.



#### **Material damage through faulty installation**

Incorrectly installed Quickstone connections can rip out of the profile.

Install all Quickstone connections as described in chapter 4.2 Quickstone p.8.

## 4 Installation

### Attach mid support legs and diagonal struts



- | In the same way as for the rear, attach the mid support legs and their diagonal struts. (see pages 11 and 12 for details)
- | Use the free front holes on the rear foot L-brackets and the lower set of joiner plates for the attachment.

### Tighten bolts

- | Once structure assembling is complete ensure that all connector bolts are tightened to a torque of 8 Nm to avoid the possibility of non warrantable damage.

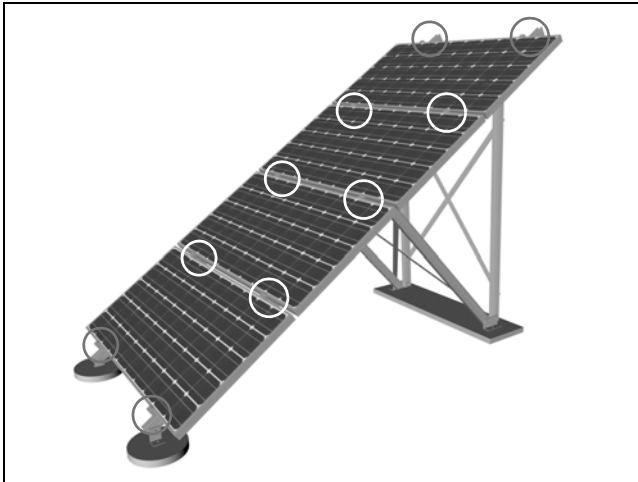
## 4 Installation

### 4.6 Installing solar modules

To position modules correctly and easily, it is better to start by placing the bottom module first.

Alternatively, start at the top allowing the upper module clamp to sit approximately 5 mm off the end of the module rail and work back down the length of the module rails.

Ensure that the modules are mounted square to the mounting rails and that each module is parallel to its adjacent one above and below.



CAUTION

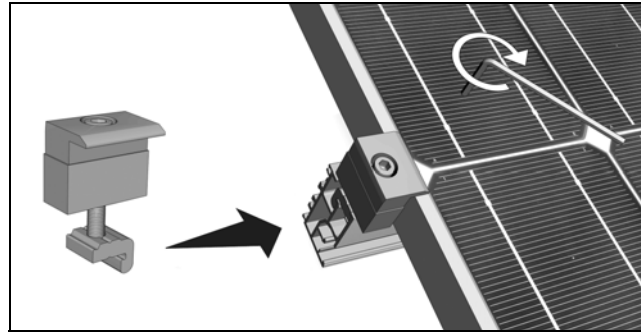
#### Material damage through faulty installation

Incorrectly installed Quickstone connections can rip out of the profile.

Install all Quickstone connections as described in chapter 4.2 Quickstone p.8.

### Installing module end clamps

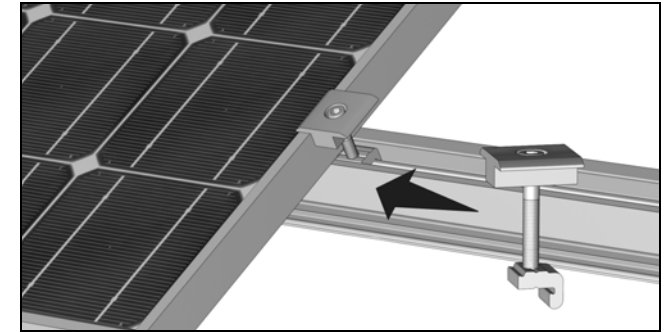
Module end clamps are used at the top and bottom ends of the Gamma structure (4 end clamps in total, see gray circles on the lefthand drawing)



- | Slide module end clamp into the mounting rail flush against the module.
- | Secure the end clamp by tightening the cylinder head bolt using an Allen key tightening it to a limit of **8 Nm**.

### Installing inter-module clamps

Inter-module clamps are used inbetween the modules on the Gamma structure (see white circles on the lefthand drawing). The total number of inter-module clamps depends on the number of modules on the structure.



- | Slide inter-module clamp into the mounting rail flush against the module.
- | The next module can be pushed toward the one previously mounted.
- | The module clamp forms a spacer keeping the modules approximately 17 mm apart.
- | Secure the clamp by tightening the cylinder head bolt using an Allen key tightening it to a torque limit of **8 Nm**.

For technical questions you can reach us by telephone at:

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