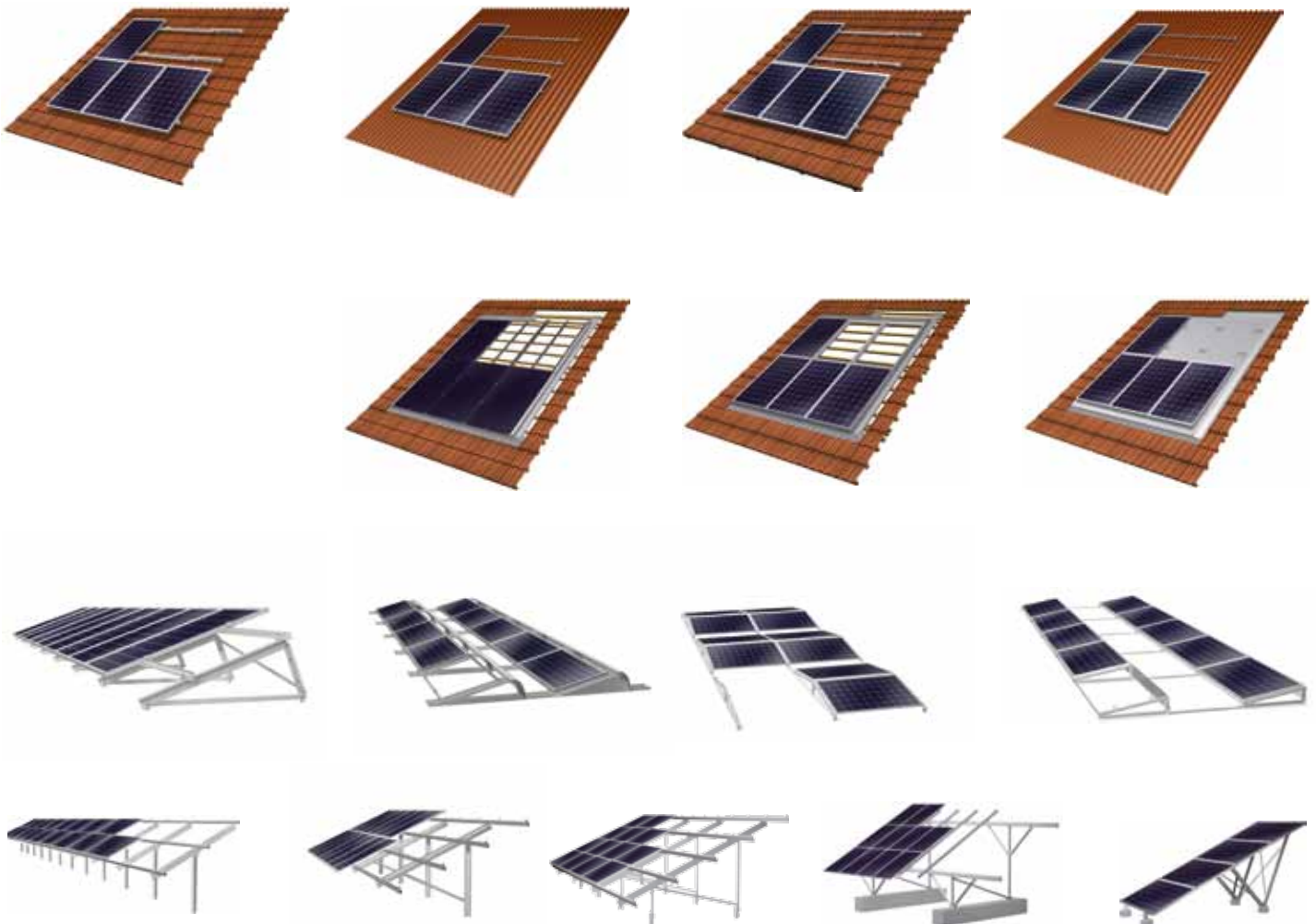




mounting
systems

Mounting systems

Installation manual – general information





Content

1	Introduction	1
2	Standards and technical directives	1
3	User Group	2
4	Meaning of the warnings and safety instructions	2
5	Safety instructions	3
5.1	Intended use	3
5.2	Obligations of the principal	4
5.3	General Safety Instructions	4
5.4	General safety instructions for working on roofs	5
5.5	Safety instructions for the general handling of Mounting Systems GmbH's PV mounting systems	6
6	Scope of delivery	10
7	Product specific installation manual	10
8	Storage and transportation	10
8.1	Safety instructions	10
8.2	Approach	11
9	Maintenance	11
10	Disassembly	13
11	Disposal	13

1. Introduction

This manual describes the universally valid aspects of handling Mounting Systems GmbH's products, above all with regard to safety. In addition to this manual, you will receive a product specific installation manual with every delivery of material. Both this general manual and the product specific manual are an integral part of the product and must be observed for every installation.

Please read both this manual and the pertinent product-specific installation manual carefully prior to any installation, maintenance, and disassembly work. You will be provided with all information for safe and complete installation, maintenance, and disassembly. Should you have any questions after having read these manuals, please contact the Mounting Systems GmbH.

2. Standards and technical directives

When installing, maintaining and dismantling Mounting Systems GmbH's PV mounting systems in Germany, the following standards and directives may apply (depending on the type of mounting system, some standards may not be applicable) and must be observed

- DIN EN 1990:2002 (Eurocode 0) Basis of structural design
- DIN EN 1991-1-1:2010 (Eurocode 1) Actions on structures - part 1-1: General actions on structures, including national annex
- DIN EN 1991-1-3:2010 (Eurocode 1) Actions on structures - part 1-3: General actions - Snow loads, including national annex
- DIN EN 1991-1-4:2010 (Eurocode 1) Actions on structures - part 1-4: General actions - Wind actions, including national annex
- DIN EN 1993:2005 (Eurocode 3) Design of steel structures, including national annex
- DIN EN 1999-1-1:2010 (Eurocode 9) Design of aluminum structures, including national annex
- DIN 18339:2012 Plumbing work
- DIN 18331 Concrete and ferroconcrete work
- DIN 18360:2012 Metal work
- DIN 18807-3:1987 Trapezoidal sheets in building construction; trapezoidal steel sheets, stress analysis and structural design
- DIN 18807-9:1998 Trapezoidal sheets in building construction; trapezoidal aluminum sheets and their connections, application and construction
- DIN EN 12500:2000 corrosion protection of metallic construction materials

In addition, please observe the following for all installations:

- VDE 0100 – 712; IEC 64/1736. Low-voltage electrical installations
- VDE 0185 series, IEC 81/335. Protection against lightning

Please observe the corresponding national standards and directives during installation, maintenance, and disassembly outside of Germany.



3. User Group

Mounting Systems GmbH's installation instructions are intended for the following persons (user group):

- Skilled personnel
- Instructed personnel

Skilled personnel

Skilled personnel are persons who, on the basis of their professional training, are able to execute installation, maintenance, and disassembly work properly.

Instructed personnel

Instructed personnel are persons who have been instructed and taught appropriately regarding the assigned tasks and the possible risks in the event of improper conduct. An instructed person must have received instructions regarding the required safety devices, precautions, relevant regulations, accident prevention regulations, as well as operating conditions and must have demonstrated his/her competence. The implemented work must be accepted by skilled personnel.

4. Meaning of the warnings and safety instructions

The warnings and safety instructions used within this manual and in the product-specific installation manuals have the following meanings:



DANGER

Indicates a major exceptional danger. Failure to observe it can lead to severe or fatal injuries.



WARNING

Indicates a potentially dangerous situation that might lead to severe or moderate bodily injuries and to property damage.



CAUTION

Indicates a possibly dangerous situation that in case of non-compliance with the instructions can lead to slight or minor injuries and to property damage.



ATTENTION

Indicates a possible danger that could lead to property damage.

5. Safety instructions

5.1. Intended use

Unless explicitly stated otherwise, Mounting Systems GmbH's products are designed exclusively for the installation of PV modules.

The specific mounting systems shall only be used within their defined operating conditions. The concept of intended use also comprises the compliance with the specifications both within this manual and the respective product-specific installation manual. Mounting Systems GmbH shall not be liable for damages caused by the non-observance of the installation manuals, particularly the safety instructions, as well as improper use of the mounting systems.

Actions are covered by the concept of intended use, if:

- The mounting system is installed according to the installation manual or applicable technical standards
- The mounting system is installed by qualified personnel disposing of the know-how mentioned within the installation manual
- The mounting system is transported, installed, assembled, tested, repaired, or operated exclusively in accordance with the recognized rules of engineering
- The mounting system is used according to the stipulated technical specifications (project-specific overview drawing, bill of materials) or the designed purpose
- The mounting system is stored in accordance with the information provided within both this manual and the respective product specific installation manual prior to and after installation
- Interventions and/or modifications to the accessories are only implemented with the explicit consent of Mounting Systems GmbH
- Only genuine components or genuine accessories are used for installation or repair purposes
- The mounting system is inspected and maintained by qualified personnel once a year
- The defined operating conditions are complied with (Mounting Systems GmbH shall not assume any liability caused by these conditions being exceeded.)
- The mounting system is not exposed to unusual environmental impacts (over-voltage, magnetic fields, or similar)
- The mounting system is not installed in such a way that oxidation-susceptible metal combinations (e.g. aluminum – copper) influence the durability of the mounting system material
- The mounting system is used in an atmosphere that within the meaning of DIN EN 1999-1-1 (applicable in Germany ; outside of Germany, the national regulations must be observed) is rural, moderately industrialized, or moderately urban
- The mounting system is not used in an outdoor environment that can be assigned to the corrosion category class C4/C5 according to DIN EN 12500 (applicable in Germany; outside of Germany, the national regulations must be observed)
- The load-bearing capacity of the substructure (i.e. the building structure for roof applications or the soil for open terrain applications) is ensured prior to installation according to the recognized rules of engineering and according to the applicable technical standards



Note:

The mounting systems must only be installed, maintained, and disassembled in accordance with the pertinent installation manuals.



Note:

Any other use is deemed unintended. Any unintended use results in the forfeiture of any warranty claims.



5.2. Obligations of the principal

The principal of the photovoltaic system must ensure that:

- The installation of the specific mounting system is implemented by trained and authorized persons only;
- The commissioned persons are able to assess the work they were assigned with and to identify possible dangers
- The commissioned persons are familiar with the system parts and the assembly material
- Both this manual and the respective product-specific installation manual are available during installation
- The installation manuals and particularly the safety instructions were read and understood by the commissioned personnel prior to the installation
- The durability of the installed connections and the attachment of the mounting system are ensured
- Suitable lifting gear is used for installation purposes
- Only genuine system parts and assembly material from Mounting Systems GmbH are used even in the case of replacements
- Maintenance is implemented in the stipulated regular intervals.

Otherwise, any warranty claims will be forfeited.

5.3. General Safety Instructions

The following general safety instructions are an important part of this document and are of fundamental importance to the handling of Mounting Systems GmbH's PV mounting systems.

- Prior to assembly or installation, ensure that the product complies with the structural requirements on site.
- Prior to assembly or installation, ensure that the building can withstand the heightened loads caused by the PV installation.
- Observe occupational health and safety regulations at all times.
- Wear hard hat, protective gloves and safety shoes.
- For the entire duration of the installation, the presence of a second person is mandatory to provide first aid in the event of an emergency.
- Copies of both this manual and the respective product-specific installation instructions must be kept on site.

5.4. General safety instructions for working on roofs

When working on roofs, observe the following safety instructions:

- Respect the accident prevention regulations (APR) when working on roofs. Implement appropriate measures for protection against falling objects.
- Use scaffolding or individual protective equipment in accordance with the APR.
- Respect the relevant national health and safety regulations for works on the roof.
- Prior to accessing the roof, check and ensure the load bearing capacity of all areas subject to load.
- Use protective equipment against falling, even for short working times on the roof.
- Do not transport material via ladders but by using suitable lifting equipment.



5.5. Safety instructions for the general handling of Mounting Systems GmbH's PV mounting systems



Note:

In addition to the instructions listed below, please observe the specific safety instructions mentioned in the pertinent productspecific installation manual for any action you implement.



DANGER

Danger to life from damages to the roof

Too heavy loads can result in severe damage to the roof!

- Prior to any installation work, make sure that the building can withstand the heightened loads caused by the installation work and the PV system.
- Do not store the material, especially ballast material, centrally on one position on the roof prior to or during installation.
- Distribute the material according to the permissible additional weight on the roof.
- Take adequate measures to prevent damage to the roof surface (e.g. use building protection mats on flat roofs).



DANGER

Danger to life from falling objects!

Objects falling from the roof could lead to severe or fatal injuries!

- Prior to any installation work, make sure that the implemented material can withstand the loads occurring on-site.
- Prior to any installation work, make sure that the building can withstand the heightened loads imposed by the PV system and occurring during installation.
- Safeguard the danger area on the ground prior to starting the installation work to avoid personal injuries caused by falling objects.
- Do not linger in the danger area on the ground!
- Make sure all parts on the roof are protected against falling!
- Always wear the legally required protective clothing!
- Do not implement any work under extremely windy conditions!
- After the installation work, check and ensure the secure seat of both the mounting system and the modules!

**DANGER****Danger to life caused by falls!**

Falling from the roof could lead to severe or fatal injuries!

- Always use the legally required protective equipment.
- Secure yourself against falling.
- Do not implement any work under extremely windy conditions!

**WARNING****Risk of injuries and material damage due to improper inspection, maintenance, or repair!**

Omitted or improper inspection, maintenance, or repair may impair the operational safety of the photovoltaic system!

- Execute Maintenance in the stipulated intervals.
- Ensure that inspection, maintenance, and repair work is only implemented by a qualified skilled worker!!

**WARNING****Risk of burning!!**

The module surfaces will be hot during solar irradiation!

- Wear protective equipment!

**CAUTION****Crushing, stumbling against and getting caught on metal parts!**

When the assembly material is handled improperly, extremities may be crushed, get stuck, or hit!

- Observe the accident prevention regulations!
- Wear protective equipment!

**CAUTION****Cuts caused by sharp-edged and bulky metal parts!**

The transportation of sharp-edged and bulky metal parts may result in cuts to the hands!

- Observe the accident prevention regulations!
- Wear protective equipment!

**CAUTION****Personal damages caused due to assembly material toppling over!**

Assembly material may topple over and injure persons due to improper storage!

- Observe the accident prevention regulations by all means!
- Observe stable and slip-resistant storage!
- Wear protective equipment!



Personal and material damages caused by accessing the mounting system!

The process of accessing the mounting system may result in personal and material damages!

- Do not climb on the mounting system!



Water damage to the building

Inappropriately executed work on the roof can lead to leakage and water damage to the building!

- Observe the respective product specific installation manual when executing the roof connections!
- Observe the national guidelines and regulations for roofing and working on roofs!
- Prior to any installation work, assess whether the designated material is suitable for the specific conditions on-site and whether it can be installed properly, according to the pertinent rules and regulations. When in doubt, contact a roofer.
- Do not install unsuitable material. If necessary exchange unsuitable components for suitable ones.



Damages caused by improper transportation!

Improper transportation may result in damages to the mounting system and the PV modules and in impairments of their functionality!

- Check the packaging for externally visible damages!
- In the event of severe damages to the packaging, please inform the manufacturer immediately!
- In the event of minor or small transportation marks, unpack the material carefully!
- In the event of damages to the mounting system or PV modules, please inform the manufacturer immediately!



Material damage caused by faulty installation!

Incorrectly bolted or screwed connections of mounting systems can become instable and cause damages!

- Only use the materials specified by the manufacturer for all connections (screws/bolts, washers and nuts)!
- After the installation work, check and ensure the secure seat of both the mounting system and the modules!



ATTENTION

Material damages caused by improper tightening torque!

Screwed connections attached with a too high tightening torque might fail or break!
Screwed connections tightened with a too low tightening torque might come loose!

- Please comply with the tightening torque specified within the installation manual!



ATTENTION

Material damages caused by the failure of clamping connections!

Improperly installed clamping connections might fail!

- Install all clamping connections according to the respective installation manual!
- If specified in the respective installation manual, use the recommended tools to install the connection!



ATTENTION

Module breakage caused by temperature fluctuations!

PV Modules mounted over expansion joints may burst in the event of temperature fluctuations!

- Do not install PV modules over expansion joints!



ATTENTION

Damages to the PV modules!

Improper disassembly might result in damages to the PV modules!

- Have the disassembly implemented by skilled personnel!

6. Scope of delivery

After having unpacked the delivery, check whether it contains all parts and whether the assembly material are according to the BOM/delivery note and immediately inform the supplier in the event of discrepancies or visible damages.

7. Product specific installation manual

The planning and configuration of a PV system and the suitable mounting system depend largely on the installation site, the building type and the owner's specific requirements. Consequently, the installation steps are both project-specific and productspecific and can vary significantly. Mounting Systems offers product-specific installation manuals which contain information on

- The permissible conditions for use
- The specific components
- The preparation of the installation
- The secure and complete mechanical installation of the mounting system and the modules

The product specific installation manuals are valid only in combination with this document. In some cases, further necessary documents (e.g. overview drawings) are stated in the product specific installation manuals and must be observed.

8. Storage and transportation

8.1. Safety instructions



CAUTION

Personal damages caused due to assembly material toppling over!

Assembly material may topple over and injure persons due to improper storage!

- Observe the accident prevention regulations by all means!
- Ensure stable and slip-resistant storage!
- Wear protective equipment!



ATTENTION

Damages caused by improper transportation!

Improper transportation may result in damages to the mounting system and the PV modules and in impairments of the functionality!

- Check the packaging for externally visible damages!
- In the event of severe damages to the packaging, inform the manufacturer immediately
- In the event of minor or small transportation marks, unpack the material carefully!
- In the event of damages to the mounting system or PV modules, inform the manufacturer immediately!

8.2. Approach

Implement storage and transportation in a way that:

- The stored material cannot topple over and persons cannot be injured.
- Transportation, lifting, and lowering are only implemented with suitable lifting gear and lifting means appropriate for the weight.
- The permissible additional load on any part of the roof is not exceeded.

9. Maintenance

Mounting Systems GmbH stipulates for its PV mounting systems a yearly maintenance of the below listed scope, both to ensure the longevity of the system and to notice and repair eventual damage at an early stage, thereby avoiding subsequent damages.

We recommend carrying out the maintenance in the spring when the snow has already thawed. If an increase in the number of damages is detected during the inspection, the maintenance intervals are to be shortened accordingly. Additional maintenance work should be done, if necessary, after severe storms, floods, earthquakes or other natural disasters. The scope of the below listed maintenance work is limited to the mechanical security. Matters of electrical performance are not included. These are to be checked and serviced separately, in accordance with the module manufacturer's specifications.



Risk of injuries and material damage due to improper inspection, maintenance, or repair!

Omitted or improper inspection, maintenance, or repair may impair the operational safety of the solar photovoltaic system!

- Execute Maintenance in the stipulated intervals!
- Please ensure that inspection, maintenance, and repair work is only implemented by a qualified skilled worker!

Observe for each maintenance step all pertinent safety instructions in the product specific installation manual.



The annual maintenance should, for all mounting systems, comprehend visual inspection of the installation with special attention to:

- Damage on any of the components
- Marked degradation of materials, e.g. corrosion of metallic components (slight surface corrosion or tarnishing of the aluminum parts excluded, as these superficial reactions are normal and harmless)
- Secure hold of all components
- Secure hold of all module fixations, screws and bolts
- Soiling of the system

Following the visual inspection, appropriate subsequent measures are to be taken, for example:

- In case of observed damage or material degradation, appropriate repair or replacement work is to be executed after consultation of Mounting Systems GmbH.
- Displaced modules and loose bolts are to be re-fixed in the proper positions.
- Major soiling, e.g. through fallen leaves, is to be removed.

In addition to the general inspection points, some product specific details have to be minded and appropriate counter-actions to be executed if necessary:

On-roof (Alpha, Alpha+ & Tau, Tau+)

- Condition and fit of the roof fixations, for example the roof hooks, as well as the bordering roofing tiles/ roof covering

In-roof (Theta, Zeta & Kappa)

- Soiling of the PV installation, especially in those parts intended for water drainage, i.e. at the vertical module joints and at the transitions between the module field and the rest of the roof.
- Leakages, especially at the fixing points and at the transitions between the module field, the flashings and the rest of the roof.

Flat roof (Lambda & Lambda Light)

- Condition of the roof surface, especially at ballast points or roof fixation points
- Uniform arrangement of the ballast material
- Shift of the whole installation or of the layer between the roof surface and the installation: In case of shifted ballast, installation or interlayer, appropriate rearrangement is to be carried out. When noticing larger displacements of the installation (>50 mm) the installer is to be contacted.

Open terrain (Sigma-Systems, Omega & Gamma)

- Marked degradation of materials, for example corrosion of metal parts and Sigma posts on an area of > 1cm² (slight surface corrosion or tarnishing of the aluminum parts excluded, as these superficial reactions are normal and harmless)
- Inspection of the ramming posts (or other method of foundation) on soil erosion, above-average setting and deflection
- When determining soil erosion and above-average setting or deflection of the posts, appropriate countermeasures are to be taken after consultation with the originator of the ground appraisal.
- Inspection of the installation (spot tests with a scope of 0.1%): Secure hold of all module fixations and bolts; When discovering defects during the spot tests, the test batch is to be augmented by the factor 10. If the defect rate for the second test batch amounts to more than 1%, tests on the entire installation are to be carried out.

Repair or replacement measures are to be taken immediately.

Questions or claims are to be brought to the installer's notice who, in turn, can contact the manufacturer Mounting Systems GmbH under:
sales-de@mounting-systems.com

10. Disassembly



ATTENTION

Damages to the modules!

Improper disassembly might result in damages to the modules!

- Have the disassembly implemented by skilled personnel!



Note:

Disconnect all electrical cables of the PV modules from the mounting system before starting any disassembly activities.

Implement the following basic disassembly steps:

- Remove additional attachments.
- Remove and safely store the modules.
- Disassemble the mounting system and safely store all parts.

11. Disposal

Please dispose of the mounting system with a waste management company (WMC) only. Please observe the standards and directives applicable on national level.



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