Installation of C Module support rail
Installation Manual
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1. Introduction

1.1 Short description

The ground mount systems Sigma I XL and Sigma II are robust single and double post systems. For reasons of material optimization and structural stability, there exists the option of using a C module rail. The ground mounting systems can be fixed in place using rammed, screwed, or concrete foundations. It consists of zinc-magnesium-coated steel components and hot-dip galvanized steel accessories.

1.2 About these instructions

Validity of the instal manual
Please read through these instructions carefully. In addition to this document, each product delivery also includes the following:

• The document "Installation manual for PV mounting systems: general part". This document states the general information on Mounting Systems products with regard to standards, safety, transport, maintenance, disassembly and disposal.


• The document "Sigma installation manual" in its various variants. It describes all basic installation steps. When using a C module support rail, these installation instructions must be used after installing the rafters.

• A project-specific overview drawing (Ger.: POD). It contains project-specific dimensions and any deviations from the standard (where applicable). In this case, the overview drawing (POD) takes precedence over the installation instructions.

• The supplied material according to the bill of materials (BOM).

Please read both this installation manual and the above mentioned documents carefully prior to any installation, maintenance and disassembly work. You will be provided with all information for safe and complete installation, maintenance and disassembly. However, if you have any questions after having read these documents, please contact Mounting Systems GmbH.

Users group
These 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 inspected and accepted by skilled personnel.

Guidance notes
The following guidance notes enhance the orientation when handling this installation manual:

Pictograms:

This symbol points out important information and useful notes.

This symbol points out tips and tricks which help facilitate workflows.

These installation instructions as well as the "Installation manual for PV mounting systems: general part", "Sigma installation manual" and the project-specific overview drawing (POD) with parts list are all integral parts of the assembly systems and must be adhered to during each installation.
1.3 Warnings

The following warnings are used in these Installation Instructions to indicate safety-related information. They include:

- Warning symbols (pictograms)
- Signal words which identify the hazard level
- Information about the type and source of the hazard
- Information about the potential consequences if the hazard is disregarded
- Measures for the prevention of hazards and the prevention of injuries or damage to property.

The signal words of the warnings respectively indicate one of the following hazard levels:

- **DANGER**: Indicates a potentially mortal danger, disregard for which may result in death or serious injury.
- **WARNING**: Indicates a potentially dangerous situation which may result in serious injury or damage to property.
- **CAUTION**: Indicates a potentially dangerous situation which may result in injuries or damage to the property if ignored.
- **ATTENTION**: Indicates potential danger which can result in damage to the property.

1.4 Safety

All universally valid safety instructions for products of Mounting Systems GmbH are listed in the document “Installation manual for PV mounting systems – general part”. Please read this document carefully and observe the instructions given therein: Do not use the product in a manner other than intended, comply with the obligations of the owner and observe all general and specific safety instructions. In addition, please observe the specific safety instructions given in this installation manual for all installation work. The specific safety instructions are positioned in each case directly with the respective installation step.
2. Technical description

Upon receiving the delivery, please verify that all parts and components described in the parts list and the project drawings are accounted for. If a part is missing or damaged, please document this discrepancy and contact Mounting Systems.

2.1 System overview

The major system components are presented in the following. Moreover, variations can be implemented depending on:

- Type of module
- Number and configurations of modules
- Local conditions

Figure 2.1 – 1 Single-post system with C module rail

Sigma components:

a  Module rail 
b  Crossbar connector 
c  Module clamp 
d  Connector 
e  Small parts *

* Not shown in this overview
2.2 Components

Figure 2.2 - 1 Module rail

Figure 2.2 - 2 Crossbar connector

Figure 2.2 - 3 Module rail connector

Figure 2.2 - 4 Module clamp (framed modules)
3. Project Drawings and Bill of Materials

Project-specific documentation is supplied as part of the ground mounting system. It contains all the information necessary to install the system.

The documentation includes:

- Bill of Material (BOM)
- System overview drawing(s), which shows:
  - the exact module configuration for the project
  - Component variations specific to the project
  - Specific foundation information for the project
  - the parts supplied for bolted connections specific to the project
  - Dimension and tolerances

4. Basic Installation Requirements

4.1 System units

The ground mounting system is designed in separate system units which can be up to 40m long. The Bill of Materials and dimensions of the specific system unit are listed in the POD. The system units can be interconnected by rail connectors installed as expansion joints.

4.2 Installation aids and required tools

For the installation of the support system, you will require the following tools:

- Power drill/electric screwdriver
- Try square
- Spirit level or laser level
- Allen key (5 mm)
- Wrench: Width AF 8 mm and 13 mm for module rail clamps

4.3 Tightening torques

A good quality torque wrench should be used to tighten bolted connections to the torque requirements. These values will be specified in your POD.
5. Installation of a C module rail

5.1 Installation of module rail

Attach the cross-connectors to the pre-drilled rafters. Depending on the applicable load, use between 4 to 6 screws per cross-connector. Screw the cross-connectors firmly in place with the tightening torque specified. See Figure 5.1 - 1.

Lay the module rail across the cross-connector and tighten it in place. See Figure 5.1 - 2.

Offsets (+/- 50 mm) and lateral inclinations (east-west direction) of up to 10° can be realized via the slotted holes in the cross-connector and the module rail. See Figure 5.1 - 3.

**NOTE**
Do not exceed 8 Nm of tightening torque!
5.2 Connector

Connector for the module rail:

• In order to connect two module rails, align them on the rafters as shown in Figure 5.2 - 1.

• Place the connector against the rear of the module rails facing in the opposite direction, and fix the connector in place using the screws and nuts provided.

Please refer to the project drawing for the points at which a thermal separation is necessary in the system. For thermal separation, there is a variable module rail connector:

• Various module rail distance can be realized using the slotted holes. See Figure 5.2 - 2.

• Place the connector against the rear of the module rails facing in the opposite direction.

• Screw one side of the connector (the side with the screw holes) to the module rail with the same screws and nuts as with the fixed module rail connector.

• Screw the other side of the connector (with slotted holes) to the other module rail with the screws and cap nuts provided.
6. Assembly of module

6.1 Portrait installation

The following steps describe installation of modules in a row. This procedure begins on the left edge (west) of the module system and proceeds to the right (east). However, the modules can also be installed in the opposite direction.

Variant 1

- Click an end clamp into place into the outermost side slot of each module rail.

- Place the first module on the module rails and slide it up to the end clamp. When the modules are positioned such that they are up against the clamping areas of the module, they can be tightened.

- Click a mid clamp into each module rail right next to the module. Ensure that the mid clamp is up against the previously installed module. See Figure 6.1 - 2.

- Place the next module on the module rails and slide it up to the mid clamp. Screw the mid clamp in place with the tightening torque specified.

- Repeat these steps until you reach the end of the row. After the last module, a mid clamp is mounted to complete the row.
Variant 2

The following installation steps apply if the modules already have holes drilled into the module frames and the modules are to be screwed directly onto the module rails:

• Place the module onto the module rails and slide it over the pre-drilled holes in the module rail.

• Hold the module tight and use the screws and nuts provided to screw the module onto the module rail. See Figure 6.1 - 3.

• Repeat these steps until modules cover the entire module substructures.

Figure 6.1 - 3 Screw-and-nut module connection
Variant 3

The following installation steps apply if project-specific instructions require two vertical modules to be installed using three module rails:

- Click the end clamps into place in the upper and lower module support rail and turn the mid clamp into the center module support rail two to three threads.

- Place the first module on the module rails and slide it up to the end clamp. Screw the end clamp firmly in place with the tightening torque specified.

- Place the second module on the module rails and slide it up to the other end clamp. Ensure that the clamps are up against with the clamping area of the modules. Once this is the case, the end and mid clamps can be tightened.

- For the installation of the other modules, mid clamps are clicked into place in the top and bottom module rails. Repeat these steps until you reach the end of the row. After the last module, end clamps are mounted to complete the row.

**NOTE**

Do not exceed 8 Nm of tightening torque!

Incorrectly installed modules may fall down and become damaged.

- Ensure that the module clamps are correctly clicked into place and/or screwed into place.

- Ensure that the modules are up against both sides of the clamps.

- Ensure that the correct tightening torques are used.
6.2 Landscape installation

The following steps describe installation of modules in a row. This procedure begins on the bottom edge (south) of the module substructure and proceeds to the top (north).

- Screw the end clamp using one or two turns of the screw into the bottom module rail.

- Place the module on the module rails and slide it up to the end clamp. When doing so, position the modules at a right angle to the module rails. The modules can be screwed into place when they are positioned so that the clamps are up against the clamping area of the module.

- Pre-mount the mid clamp on the next module rail with one or two turns of the screw. Place the next module on the module rails and slide it up to the pre-mounted mid clamp. Screw the mid clamp in place with the tightening torque specified.

- Repeat these steps until you reach the end of the row. After the topmost module, an end clamp is mounted to complete the row.

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**Material damages due to incorrect installation**

Incorrectly installed modules may fall down and become damaged.

- Ensure that the module clamps are correctly screwed into place.

- Ensure that the modules are up against both sides of the clamps.

- Observe and adhere to the recommended torque specifications.

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**NOTE**

Do not exceed 8 Nm of tightening torque!

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Figure 6.2 - 1 Landscape installation

Figure 6.2 - 2 End clamp
When properly assembled, the ground mounting system is a reliable and troublefree system and should require little in the way of ongoing repair. Nevertheless, Mounting Systems recommends maintaining a regular inspection and maintenance schedule. Such a program can detect and address potential problems before they become serious and help ensure the system's excellent long-term durability and reliability.

The following procedure pertains only to the Sigma IIST mounting system structure. Maintenance and repair of other PV system components should be carried out in accordance with the respective manufacturers' recommendations.

7.1 Inspection

At least annually the system should be visually inspected for obvious loose connections, missing components, modules which appear to have shifted, vegetation overgrowth, wind-blown debris and other indications of abnormality. Any problems detected at this time should be addressed and repaired as necessary.

7.2 Testing

After one year in service, it is a good practice to check the torque settings of a representative sample of system connections including module clamps and rail clamps. Do not exceed the recommended torque settings. If a disproportionate number of loose connections (more than 10% of connections) are found, it may be an indication of improper assembly and it may be necessary to take comprehensive corrective action.

A smaller sampling of connections can be tested annually thereafter. Mounting Systems recommends keeping records of the connections sampled each year and testing and, if necessary, adjusting previously untested connections in succeeding years. After all connections have been tested, sample sizes and test frequency can be reduced.