

PV-ezRackSolarTerrace MAC

Installation Guide V1.0

NO.:PZ051-IM01-10



Content

1. Introduction.....	1
2. Tools & Components.....	2
3. System Overview.....	4
4. Installation Planning.....	6
5. Installation Instructions.....	

1. Introduction

PV-ezRack SolarTerrace MAC (STMAC) is a ground mounting system for large-scale commercial and utility PV installations. The main components are manufactured from the Aluminized Magnesium Zinc Coating Steel with very good corrosive resistance. With the well-considered design, the system offers robust solution, and meantime is very cost-effective and convenient to install with large range adjustment.

Please review this manual thoroughly before installing STMAC. This manual provides the following contents: (1) Installation planning; (2) Installation instructions;

When installed in accordance with this guide, the mounting structure will be structurally adequate and adhere to GB50009-2012, ASCE7-10, ISO14713 standards. During installation, and especially when working on the ground, please comply with the appropriate occupational health and safety regulations. Please also pay attention to other relevant regulations in your local region. Please check that you are using the latest version of the installation manual by contacting Clenergy via email on sales@clenergy.com.cn, or contacting your local distributor.

The installer is solely responsible for:

- Complying with all building codes according to any applicable place or country that may supersede this manual;
- Ensuring that PV-ezRack and other products are appropriate for the particular installation and the installation environment;
- Using only PV-ezRack parts and installer-supplied parts as specified by Clenergy;
- Ensuring that anchor Bolts have adequate pull-out strength and shear capacities during installation;
- Recycling: according to local related statutes.
- Disassembly: reverse installation process.
- Ensuring that there are no less than two professionals working on panel installation at the one time;
- Ensuring that electrical related equipment is installed by a professional electrician.

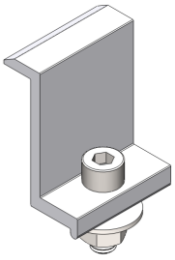

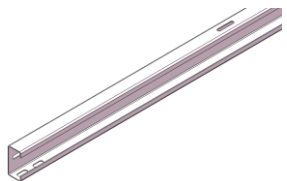

2. Tools and Components

2.1 Tools

Tools			
			
Allen Key 6 mm	BoxWrench(M8、M10、M12、M16)	Torque Wrench (M8、M10、M12、M16)	Electric Tool (can drill a hole with a diameter of 18mm)
			
5m Tape	Marking Pen	String	Total Station (or an instrument with similar functions)
			
Pile Driver			

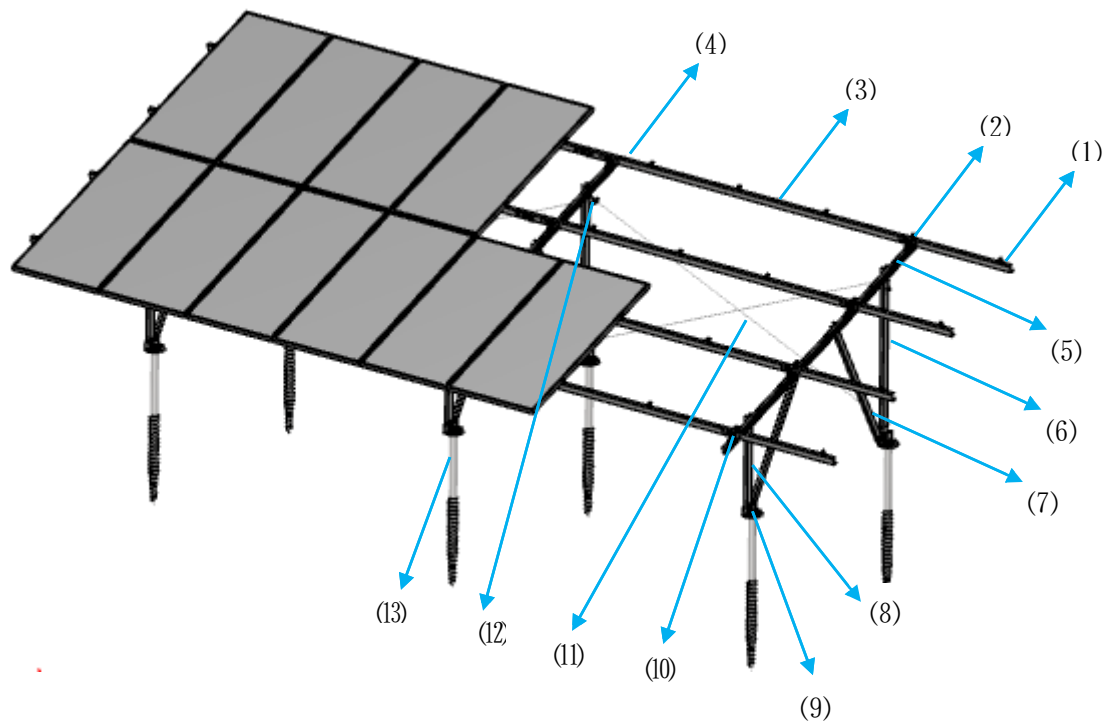
Note: The tools listed above are for the assembly of the mounting structure and are not included in Clenergy's supply scope; Please consult system installation personnel about electronic part installation tools.

2.2 Components

Components			
			
ER-EC-N End Clamp	ER-IC-N/U18 Inter Clamp	R-C80/40-P C Steel 80*40*L (Girder)	R-C80/40-P C Steel 80*40*L (Front Post)
			
R-C80/40-P C Steel 80*40*L (Rear Post)	B-100 L Base	R-C60/40-P C Steel 60*40*L (Side support)	R-C60/40-P C Steel 60*40*L (Rail)
			
SP-C Splice for C Steel	AB-C60/100-2B Angle Bracket (with 2Bolts)	TR-12 Tie rod M12*L	ER-CN-100 Tie rod connector
			
GS-76-F1 Ø76*L Ground Screw (Continuous Small Blade)			

3. System Overview

3.1 Overview of PV-ezRackSTMAC



- 1) End Clamp
- 2) Inter Clamp
- 3) C Steel 60*40*L (Rail)
- 4) Splice for C Steel
- 5) R-C80/40-P (Girder)
- 6) R-C80/40-P (Rear Post)
- 7) C Steel 60*40*L (Side Support)
- 8) R-C80/40-P (Front Post)
- 9) L Base
- 10) Angle Bracket
- 11) Tie Rod
- 12) Tie Rod Connector
- 13) Ground Screw

3.2 Precautionary Measures for Stainless-Steel Fastener Installation

Improper operation may lead to the deadlock of Bolts and Nuts. Follow the steps below to reduce this risk.

1. Reduce the friction coefficient

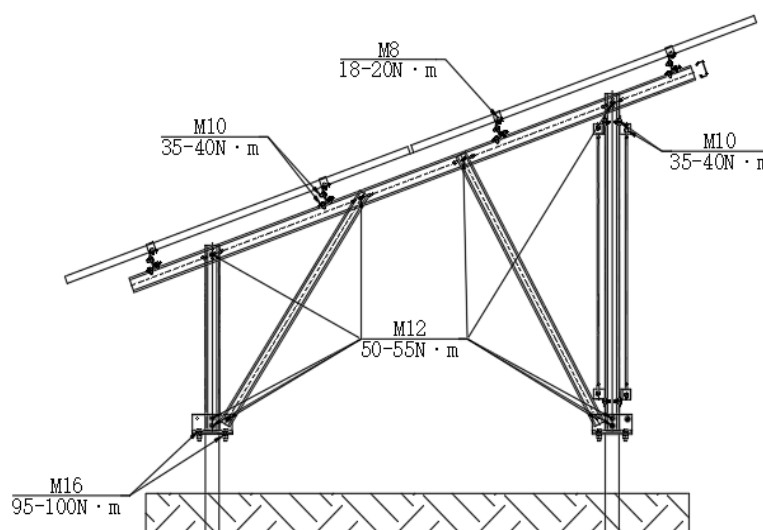
- (1) Ensure that the thread surface is clean (no dirt or contaminant).
- (2) Apply lubricant (grease or 40# engine oil) to fasteners prior to tightening to avoid galling or seizing in the threads.

2. General installation instructions

- (1) Apply force to fasteners in the direction of thread.
- (2) Apply force uniformly to maintain required torque.
- (3) Professional tools and tool belts are recommended.
- (4) Avoid using electric tools for final tightening.
- (5) Avoid working at high temperatures.

3. Safe Torques

Please refer to safe torques defined in this guide as shown in the figure below. If power tools are required, Clenergy recommends the use of low speed only. High speed and impact drivers increase the risk of Bolt galling (deadlock). If deadlock occurs and you need to cut fasteners, please make sure that there is no load on the fastener before you cut it. Avoid damaging the anodized or galvanized surfaces.

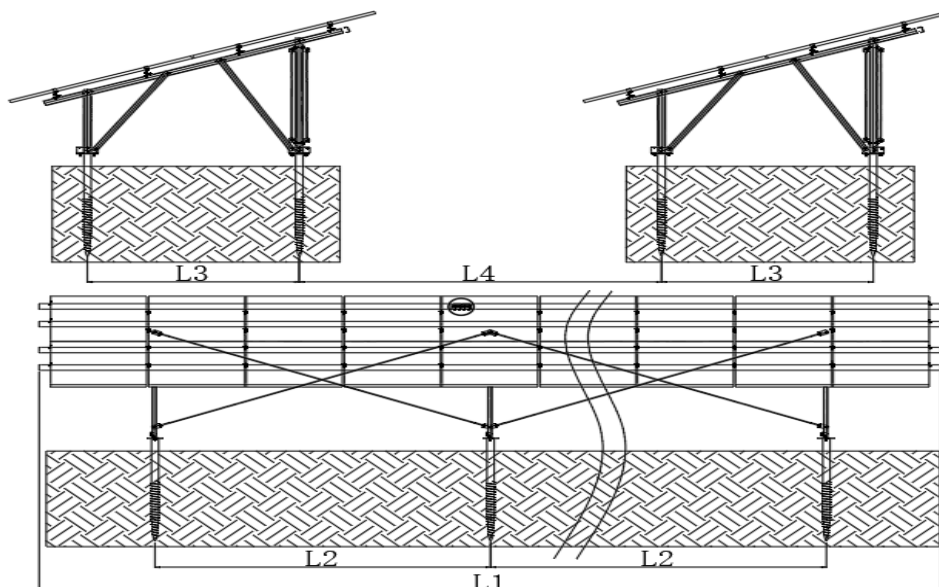


Note: Do not fasten Bolts tightly until each component is adjusted properly. Repeated fastening or unlocking will result in Bolt galling / deadlock.

3.3 Installation Dimensions

All drawings and dimensions in this installation guide are for generic reference. The PV-ezRack STMAC is to be optimized to suit specific conditions for each project and documented in engineering drawings. As a result, major components of the PV-ezRack STMAC may be provided in sectional sizes and lengths that vary from those shown in this guide. The installation operations detailed in this instruction guide remain the same regardless of the component size. In case you need to do any on-site modifications or alteration of the system in a way that would be different from engineering drawings, please provide marked up drawings/sketches for Clenergy's review prior to modification for comment and approval.

4. Installation Planning



According to the above figure, the installation plan details:

- 1) PV modules orientation: Portrait
- 2) Rail length per line : $L1 \approx (\text{module length} + 20\text{mm}) \times \text{line of module} + 200\text{mm}$
- 3) Distance between two adjacent Legs: L2 depends on the specific requirements of the project
- 4) Distance between Front Post and Rear Post: L3 depends on the specific requirements of the project.
- 5) Spacing between two tables: L4 depends on the specific requirements of the project.

5. Installation Instruction

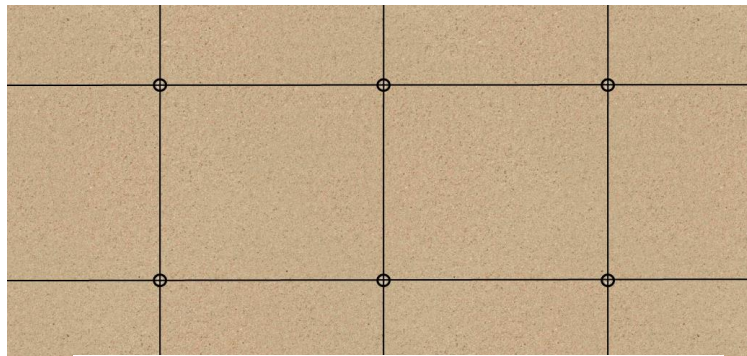
5.1 Ground Screw Installation

5.1.1 Before installation, please prepare the required installation tools and products, and confirm that the pile driver can work normally on the installation site. Read relevant engineering materials and obtain project layout information such as piling depth and span. If you have any questions, please contact and consult clenergy's customer service.

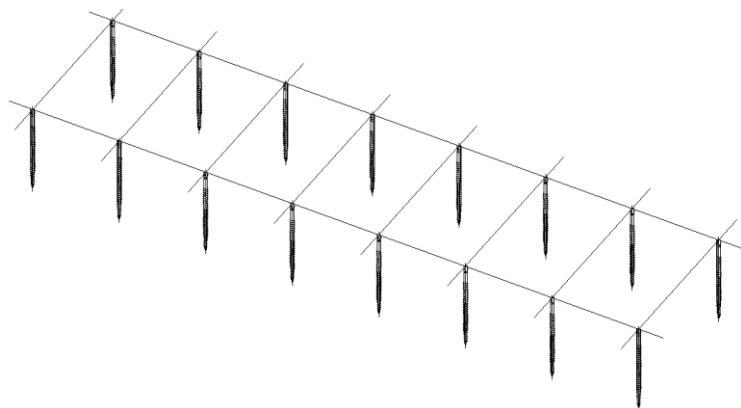
5.1.2 According to the installation plan, the relevant equipment such as the string, the total station (or the instrument with similar functions) is used to carry out the positioning mark, and the piling position of each Ground Screw is marked. Double-check the marking position of all Ground Screw before piling to ensure accuracy.

5.1.3 When piling, it must be ensured that the centres of the Ground Screws in the same line are aligned, the deviation is $\pm 10\text{mm}$; the top surface is at the same height, the tolerance is $\pm 10\text{mm}$.

5.1.4 The holes on the flange surface of Ground Screws that are towards north-south direction need to be aligned.



Piling depth, lateral and longitudinal position of the Ground Screw are determined by the engineering drawings



5.2 L Base Installation

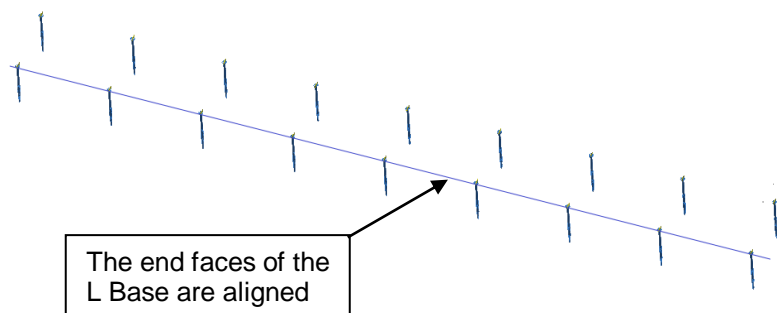
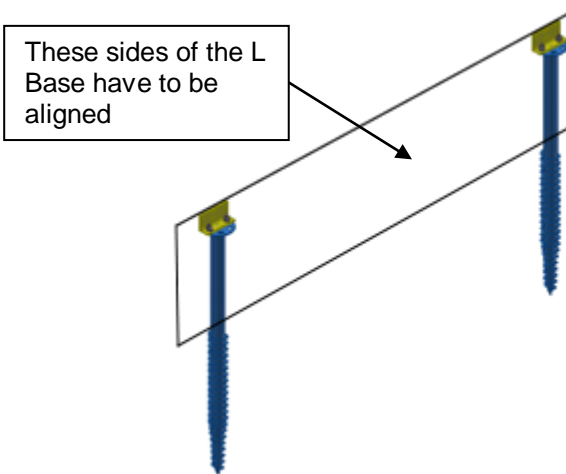
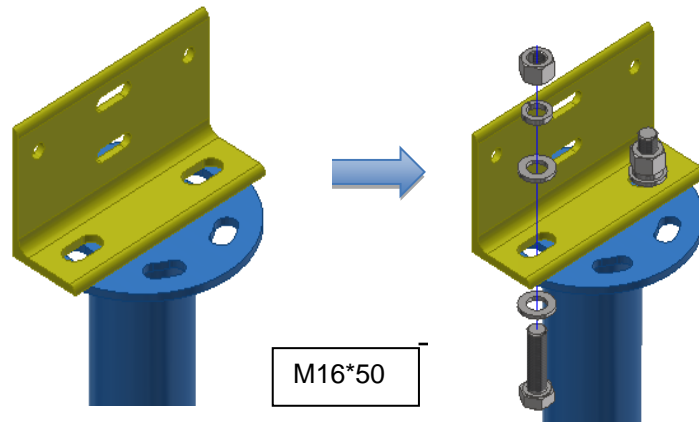
5.2.1 Before installing the L Base, the elevation, lateral and longitudinal axes of the Ground Screw should be re-confirmed and the holes on the front and rear Ground Screw flanges have to be adjusted to a straight line. If there is any error in the elevation and axis of the Ground Screw, please adjust in time.

5.2.2 Place the L Base on the flange surface of the Ground Screw and fasten it with M16*50 Bolts (1 Bolt, 2 Plain Washer, 1 Spring Washer and 1 Nut). Repeated above operations to complete the installation in one array.

Note: Ensure that the end faces of the L Bases of the same row (East-West) are on the same plane, and the Front and Rear (South-North) L bases are on the same plane.

Recommended torque of M16 Bolt: 95~100 N.m

Note: The torque might vary according to the actual situation, and the structure has no obvious deformation within the recommended torque.



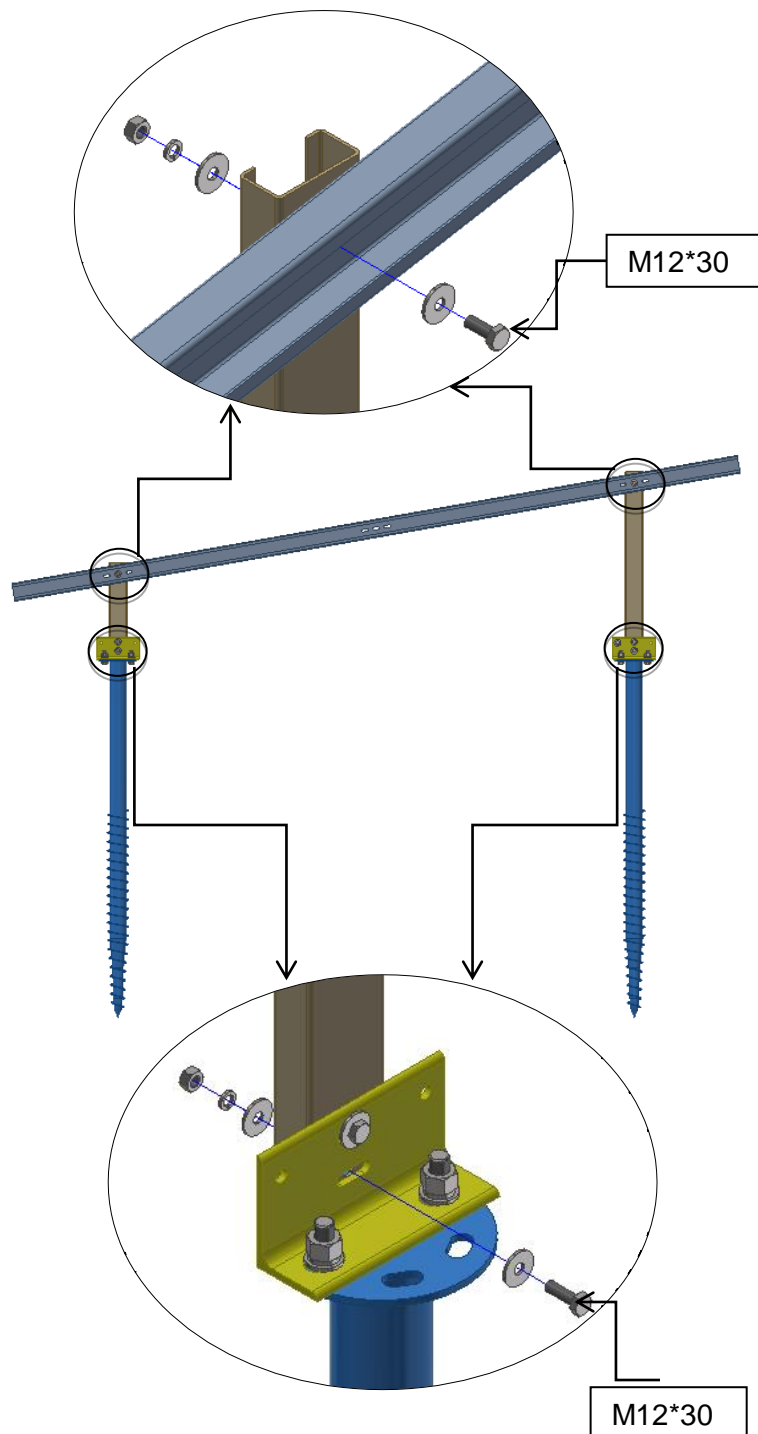
5.3 Front and Rear Post and Girder Installation

5.3.1 Place the Front Post against the L base (south facing) and fasten it with M12*30 Bolts (1 Bolt, 2 Plain Washer, 1 Spring Washer, 1 Nut). Keep all M10*30 Bolt heads aligned in same direction.

5.3.2 Place the Rear Post against the L base (north facing) and fasten it with M12*30 Bolts (1 Bolt, 2 Plain Washer, 1 Spring Washer, 1 Nut). Keep all M10*30 Bolt heads aligned in same direction.

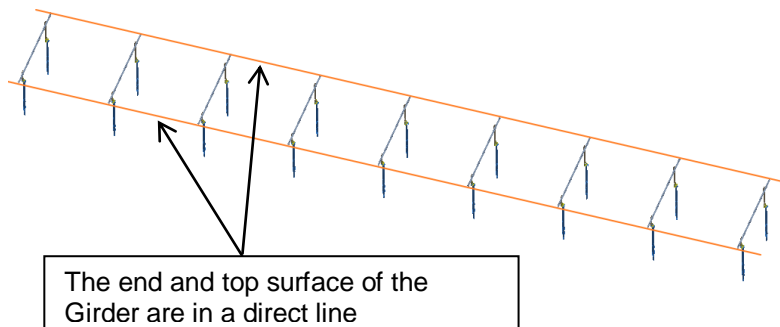
5.3.2 Place the Girder against the Front and Rear Posts) and fasten it with M12*30 Bolts (1 Bolt 2 Plain Washer 1 Spring Washer 1 Nut). Keep all M10*30 Bolt heads aligned in same direction.

5.3.3 Measure whether the angle of the fixed Girder is identical to the design requirements. If not, adjust the height difference between the Front and Rear Posts to obtain the proper angle.



5.3.4 After the installation of an array is completed, measure whether all the Girder end faces are in a direct line and the top faces of the Girder are in a direct line also. If not, adjust accordingly. If all faces are directly aligned, proceed to the next step.

Recommended torque of M12 Bolt: 50~55N.m

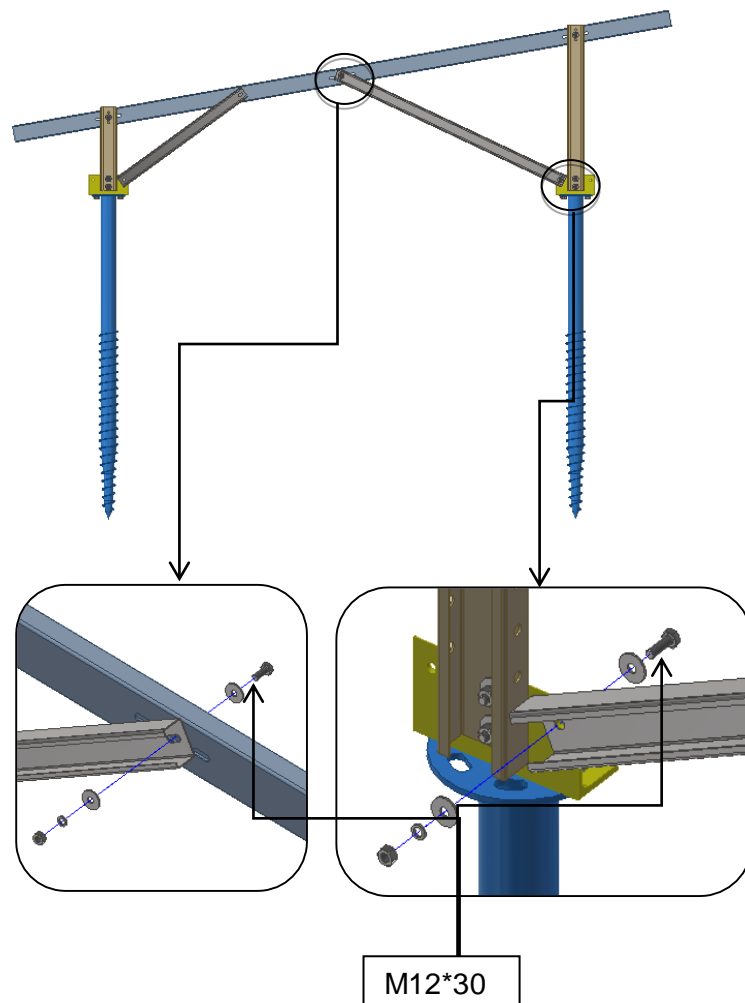


5.4 Side Support Installation

5.4.1 Place the Side Support on the rail and the L base and fasten it with M12*30 Bolts (1 Bolt, 2 large Plain Washer, 1 Spring Washer, 1 Nut). Keep all M12*30 Bolt heads aligned in same direction.

5.4.2 Install all the Side Support as described above.

Recommended torque of M10 Bolt: 50~55N.m



5.5 Angle Bracket, Rail and Splice for C Steel Installation

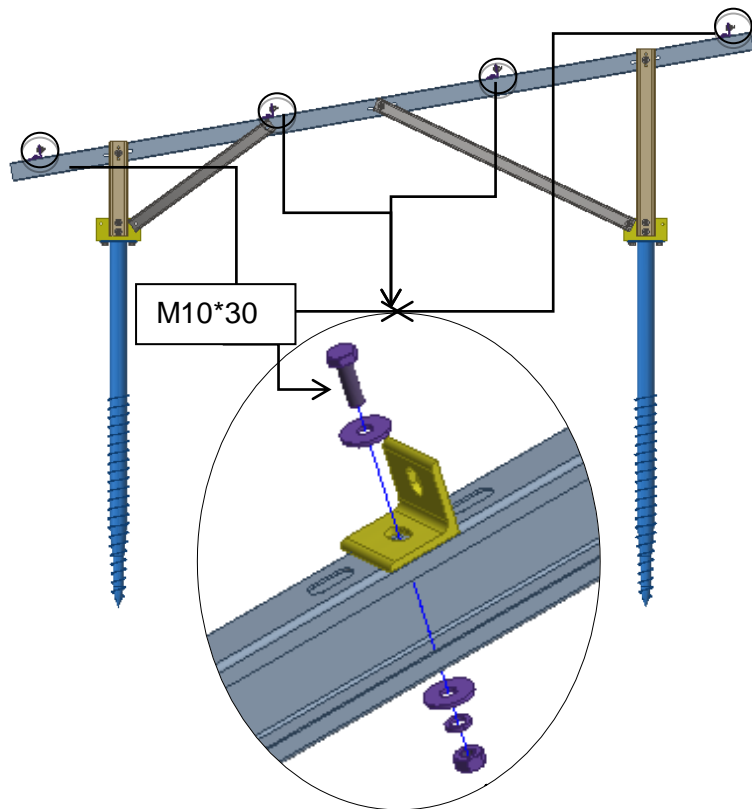
5.5.1 Angle Bracket installation: Install the Angle Bracket with M10*30 (1 Bolt 2 Plain Washer 1 Spring Washer 1 Nut) on the corresponding hole on the upper surface of the Girder.

5.5.2 Rail installation: According to the design drawing, the different lengths of the Rails are mounted one by one against the Angle Bracket and fastened by M10*30 (1 Bolt 2 large flat mat 1 Spring Washer 1 Nut).

Note: The installation order of the Rails should be installed in the order of the length of the Rails on the engineering drawing to avoid mistakes, and meanwhile it is ensured that the four Rails are in a straight line.

Make sure that each row of Rails is on the same horizontal line. After adjusting the horizontal position, lock the Nuts.

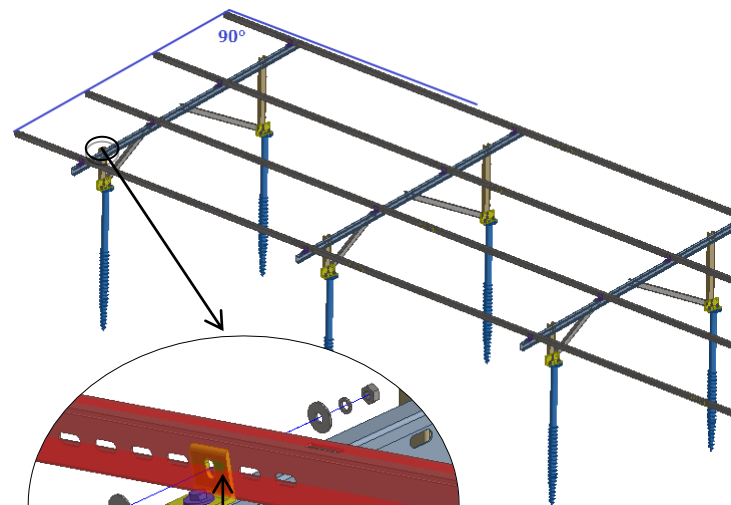
Recommended torque of M10 Bolt: 35~40 N.m



5.5.3 When installing the Rails, the two Rails are connected by a Splice for C Rails. As shown on the right figure, two sets of M8*25 hexagon socket screw (1 Bolt, 2 large Plain Washer, 1 Spring Washer and 1 Nut) are locked on the bottom and sides of the adjacent two Rails. That is, the Splice for C Rails has a total of 8 sets of hexagon socket screw.

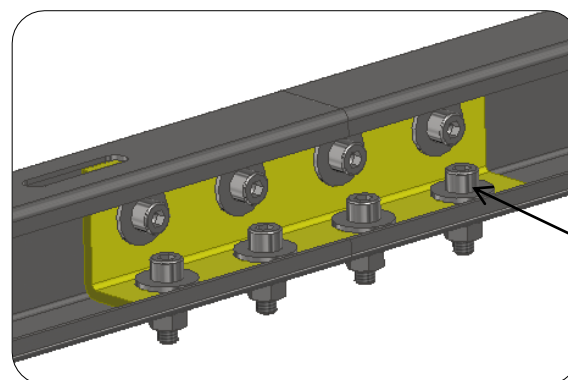
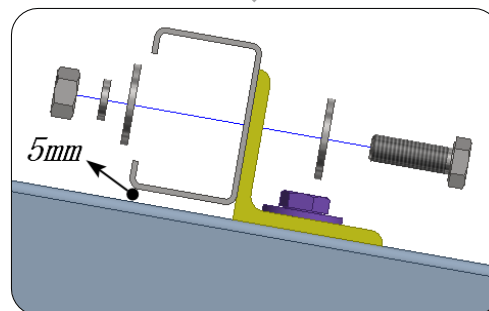
Note: The installation position and connection of different Rails should meet the requirements of the engineering drawings.

Recommended torque of M8 Bolt: 18~20 N.m



M10*30

Normally, when the first 5100mm rail is connected to the purline, use the fifth hole.



M8*25

5.6PV Modules Installation

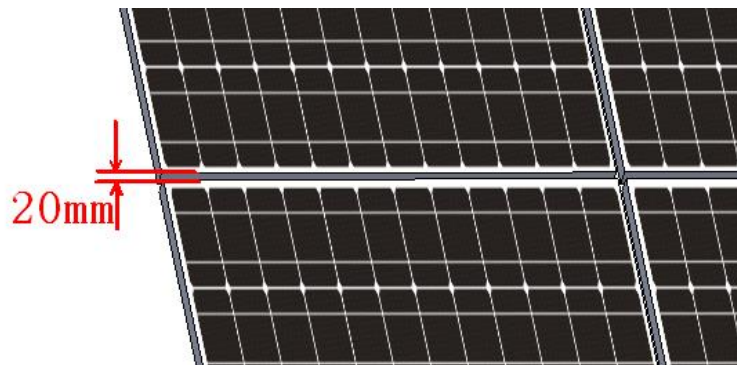
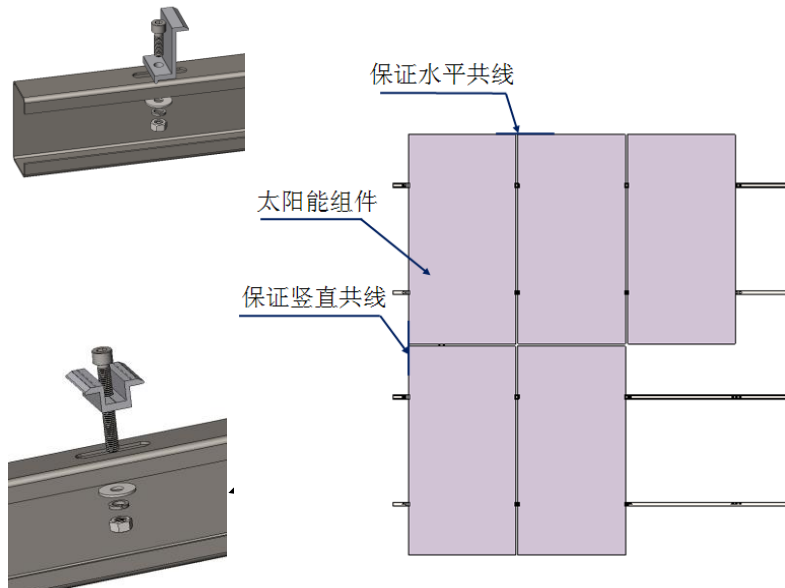
5.6.1 The PV Module is fixed by End Clamp and Inter Clamp on the corresponding holes of the Rail. During installation, adjust positions of the PV Modules to make sure they are directly aligned in both horizontal and vertical directions and fasten the End and Inter clamps within recommended torque.

Note: Deadlock will occur when the stainless-steel bolts are tightened repeatedly. Do not fasten the bolts tightly before the components are installed properly.

Recommended torque of M8 Bolt: 18~20 N.m

5.6.2 The remaining PV Modules are installed from top to bottom and from left to right. Keep a 20mm gap between two adjacent PV Modules as shown in the right figure.

Note: Use an Inter Clamp between two adjacent PV Modules to maintain a 20mm gap. After the PV Module is fixed, remove the Inter Clamp.



5.7 Tie Rod Installation

5.7.1 Attach the Tie Rod connectors to each end of the Tie Rod with an M10 nut, plain washer and spring washer. Do not fasten the nuts tightly in this step.

5.7.2 Confirm the installation position of the Tie rod assembly according to the installation plan. Use the M10*30 Bolt (1 Bolt, 2 Plain Washer, 1 Spring Washer and 1 Nut) to fix the Tie rod connector and the Tie rod to the Rear Post according to the drawing. Two Tie rods are cross-mounted. Keep the head of the installed M10 Bolt aligned in same direction. Recommended torque of M10 Bolt: 5~40 N.m

5.7.3 Lock the two M10 nuts at both ends of the Tie Rod, so that the Tie Rods maintain tension.

Recommended torque of M10 Bolt: 35~40 N.m

5.7.4 After the above operations are completed, make sure all bolts are fastened tightly according to the recommended torque. A completed installation for one array is shown on the right.

