SunModo PV Rack Mounting System

UL2703 Compliant

Pub. D10100-V011

Please read carefully before installing

Product is tested to and recognized to UL 2703 standards for safety grounding and bonding equipment and meets UL 1703 fire standards.

SunModo PV Rack Mount System can be used to mount photovoltaic (PV) panels in a wide variety of locations. All installations shall be in accordance with NEC requirements in the USA. The self-bonding system is for use with PV modules that have a maximum series fuse rating of 30A. Mechanical design loads per UL 2703: Downward Pressure: 33.42 psf (1600.2 Pa), Upward Pressure: 33.42 psf (1600.2 Pa), Down-Slope: 5 psf (239.4 Pa). Mechanical test loads per LTR AE 2012: Downward Pressure: 50.125 psf (2400 Pa), Upward Pressure: 50.125 psf (2400 Pa).

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Installer Responsibility

Before ordering and installing materials, all system layout dimensions should be confirmed by field measurements. SunModo reserves the right to alter, without notice, any details, proposals or plans. Any inquiries that you may have concerning installation of the PV system should be directed to your SunModo Sales representative. Consult SunModo Sales for any information not contained in this manual. This manual is intended to be used as a guide when installing SunModo's SunTurf Ground Mount system. It is the responsibility of the installer to ensure the safe installation of this product as outline herein.

- Installer shall employ only SunModo products detail herein. The use of non SunModo components can void the warranty and cancel the letters of UL compliance.
- Installer shall guarantee that screws and anchors have adequate pullout strength and shear capacities.
- Installer shall adhere to the torque values specified in this Instruction Manual.
- Installer shall use anti-seize compound, such as Permatex anti-seize, lubricant is recommended for all threaded parts.
- Installer shall adhere to all relevant local or national building codes. This takes account of those that supplant this document's requirements.
- Installer shall guarantee the safe placement of all electrical details of the PV array.
- Installer shall comply with all applicable local, state and national building codes, including periodic re-inspection of the installation for loose components, loose fasteners and any corrosion, such that if found, the affected components are to be immediately replaced.
- Installer to ensure the structural support members or footings for mounting the array can withstand all code loading conditions. Consult with licensed professional engineer for the appropriate loading conditions.
- Installer to follow all regional safety requirements during installation.
- This racking system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.

Safety

Review relevant OSHA and other safety standards before following these instructions. The installation of solar PV systems is a dangerous procedure and should be supervised by trained and experienced personnel.

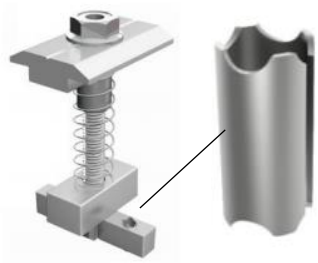
It is not possible for SunModo to be aware of all the possible job site situations that could cause an unsafe condition to exist. The installer of the ground system is responsible for reading these instructions and determining the safest way to install the ground system. These instructions are provided only as a guide to show a knowledgeable, trained erector the correct part placement one to another. If following any of the installation steps would endanger a worker, the erector should stop work and decide upon a corrective action.

SunModo Self-bonding system

SunModo developed a proprietary grounding and bonding system that is built into the mounting hardware for the rails, clamps and splices. We provide further bonding through all the SunTurf racking components including the Pipe Caps, Beams, Posts and Post Base Plates. All hardware meet UL 2703 Grounding and Fire Standards tested by ETL.

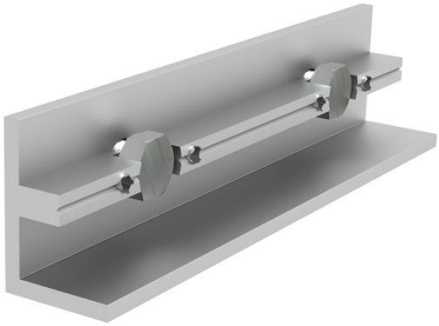
The basis of the system is our patented stainless steel floating grounding pin which is designed to be captive in the mounting components and provides a bonding path from the PV panel frames to the rails and rail splices, and finally to the ground lug. The self-bonding system is for use with PV modules that have a maximum series fuse rating of 30A. The maximum number of PV modules is limited by the system voltage, so if a system has multiple inverters, the SunModo racking system can theoretically go on forever.

Finally, we have added a spring and a threadlocker to our Mid Clamp assemblies. The spring keeps the Mid Clamp in the open position ready to receive the solar module. The threadlocker is a light bonding agent allowing the T-Bolt engagement into the Rail when the Collar Nut is turned from above. The threadlocker has the added benefit of being an anti-seize agent for stainless steel hardware in the area where it is applied. For additional anti-seize protection refer to the 'Tools Required for Installation' section of this document.



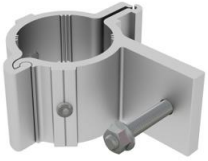
Mid Clamp with Ground Pins

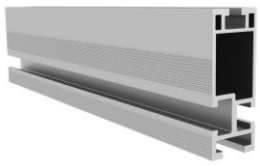
Similarly, the rail splices the grounding pins, eliminating the need for extra bonding components.



Ground Mount System Components

	Portrait End Clamp Kit, fits panel height from 30 to 50 mm. For last 3 digits, see table on last page.	K10224-1XX K10224-1XX-BK
	Universal End Clamp Kit, fits panel height from 33 to 50 mm.	K10299-001 K10299-BK1
	Grounding Mid Clamp Kit fits panel height from 30 to 50 mm. ***May be repositioned until torqued to final value.***	K10180-001 K10180-001-BK **For single-use only**
	Grounding End Clamp Kit with shared rail adaptor for standard rail; fits panel height from 30 to 50 mm. For last 3 digits, see table on last page. ***May be repositioned until torqued to final value.***	K10183-1XX K10183-1XX-BK **For single-use only**
	Grounding Mid Clamp Kit with shared rail adaptor for standard rail; fits panel height from 30 to 50 mm. ***May be repositioned until torqued to final value.***	K10182-001 K10182-001-BK **For single-use only**

	Grounding Lug Kit with Grounding Spacer and 1/4-20 T-Bolt. ***May be repositioned until torqued to final value.***	K10179-001 **For single-use only**
	Aluminum Pipe Clamp In order to prevent the galvanic reaction between dissimilar metals the PVC Insulator must be installed between the steel pipe and the aluminum rail.	K10298-002 2” Aluminum Pipe Clamp K10343-001 2.5” Aluminum Pipe Clamp
	T-Pipe Clamp Kit	K10296-001 2” T-Pipe Clamp Kit K10341-001 2.5” T-Pipe Clamp Kit
	Swivel Pipe Clamp Kit	K10373-001 2.5” Swivel Pipe Clamp Kit
	Pipe Clamp Kit	K10219-001 2” Pipe Clamp Kit K10222-001 2.5” Pipe Clamp Kit

	External Pipe Splice Kit	K10297-001 2” Pipe Splice Kit K10342-001 2.5” Pipe Splice Kit
	Internal Pipe Splice Kit	K10448-001 2.5” Pipe Splice Kit
	Diagonal Braces: A20164-XXX, AL Tube Brace, 1.5 x 2 x .16 Wall A50164-XXX, HSS Tube Brace, 1.5 x 1.5 x .083min Wall Last 3 digits denote tube length.	Various
	Helio Rails: Features both 1/4” and 3/8” side slots, and 1/4” top slot for clamping PV panels. Available in 124”, 166” and 206” lengths. Last 3 digits denote rail length. 4 stock sizes in clear and black.	A20144-XXX (Clear) A20144-XXX-BK (Black) HR250 (Standard Rail) A20145-XXX (Clear) A20145-XXX-BK (Black) HR350 (Heavy Rail) A20146-XXX (Clear) A20146-XXX-BK (Black) HR500 (Super Rail)

	Helio Rail: Features 1/4” top slot for clamping PV panels. Available in 124” and 166” lengths. Last 3 digits denote rail length. 4 stock sizes in clear and black.	A20288-166 (Clear) HR300 (Standard Rail)
	Metal Rail End Caps available for Helio Rails (optional)	A20284-001 A20284-BK1 (Black) HR250 (Helio Standard) A20297-001 (Clear) HR300 Rail End Cover A20285-001 HR350 (Helio Heavy) A20263-001 HR500 (Helio Super)
	2.5” Pipe End Cap	A20380-001
	2” and 2.5” Aluminum Post: A20189-XXX, Post, 2.0" x .12 Thk. A20209-XXX, Post, 2.5" x .12 Thk. A50190-XXX-ML, Pipe, 2" SCH 40 A50189-XXX-ML, Pipe, 2" SCH 10 Last 3 digits denote pipe length.	Various

	2” and 2.5” Galvanized Steel Pipe: A21165-XXX, Pipe, HSS, 2", 2.375" OD X 12 Gauge, G-90 A21168-XXX, Pipe, HSS,2.5", 2.875" OD X 12 Gauge, G-90 A21022-XXX Post, 2.0" SCH 40 A21023-XXX Post, 2.5" SCH 40 Last 3 digits denote pipe length.	Various
	Helical Earth Anchors with 10” blade available in 63” and 80” lengths.	A21146-063 A21146-080
	Ground Screw Anchors available in 63” and 80” lengths.	A21147-063 A21147-080
	Extension Couplers adds an additional 36” of depth	A21148-042
	Battered Anchor Adaptor used for bracing with anchors products.	A21031-003

	Concrete Embedment Rings are available for 2 and 2.5 pipe.	K10186-001 K10186-002
	2” Pipe Base Kit	K10268-001
	2" Aluminum Post Base Plate Kit	K10302-001
	3/8” Slot Rail Splice Kit with (2) 3/8-16 hex bolts and flange nuts with integral grounding. ***May be repositioned until torqued to final value.***	K10178-001 K10178-BK1 HR250/HR350 3/8” Splice **For single-use only**
	1/4” Slot Rail Splice Kit with (4) bolts and flange nuts with integral grounding**. *May be repositioned until torqued to final value.***	K10177-001 K10177-BK1 HR250/HR350 1/4” Splice **For single-use only**

List of Compliant PV Modules

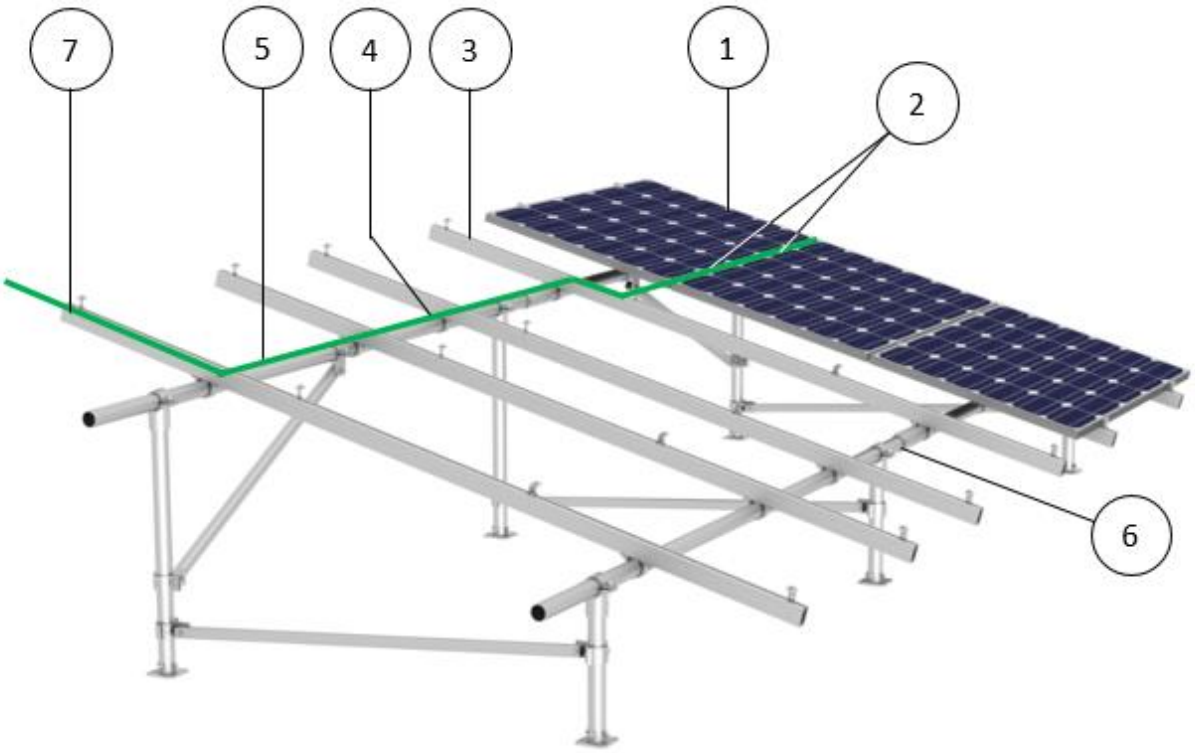
UL 2703 Qualified Modules for use with SunModo PV Racking Systems

Evaluated PV Modules	
Module manufacturer	**Model numbers**
Aptos	DNA-144-BF26-xxxW, DNA-144-MF26-xxxW
Astronergy	CHSM6612M-xxx, CHSM6612M/HV-xxx
AXITec Solar	AC-xxxP/60S, AC-xxxMH/120S, AC-xxxMH/120V, AC-xxxMH/144S, AC-xxxMH/144V
Boviet Solar	BVM6610M-xxx, BVM6612M-xxx, BVM6610P-xxx, BVM6612P-xxx
C-Sun	CSUNxxx-60M, CSUNxxx-60P, CSUNxxx-72M, CSUNxxx-72P
Canadian Solar	CS3W-xxxPB-AG, CS6K-xxxM, CS6K-xxxMS, CS6P-xxxM, CS6U-xxxP, CS6V-xxxM, CS6V-xxxP, CS6X-xxxP
ET Solar	ET-P672xxxWW
Hansol	HSxxxSE-V01
Hanwha Q Cells	Q.PEAK DUO-L-G4.2 xxxW, Q.PEAK DUO L-G5.2 xxxW, Q.PEAK DUO-G5-BLK xxxW, Q.PEAK DUO-G5 xxxW, Q.PRO L-G2 xxxW, Q.PEAKDUOBLK-G6 xxx, Q.PEAKDUO L-G5.2 xxx, Q.PEAKDUO L-G5.3 xxx, Q.PEAKDUO L-G6.2 xxx, Q.PEAKDUOBLK ML-G9 xxx
Hareon	HR-xxxP-24/Ba
Heliene	72M-xxx, 72M-BLK-xxx, 72P-xxx, 96M-xxx
Hyundai	HiS-MxxxTI, HiS-SxxxTI
Itek Energy	ITxxxHE, ITxxxSE
JA Solar	JAM60D00-xxx/BP, JAM72S09-xxx/PR, JAP6 72-xxx/3BB, JAM72D00-xxx/PR, JAM72S09 -xxx/PR
Jinko	JKMxxxM-60HL, JKMxxxM-60L, JKMxxx-72L-V, JKMxxx-72HL-V, JKMxxxM-60HBL, JKMxxxM-72HL-V, JKMxxxM-72HL-TV, JKMxxx-7RL3-TV, JKMxxx-60HL4, JKMxxx-60HL4-V, JKMxxx-72HL4, JKMxxx-72HL4-V, JKMxxxM-72HL4-TV, JKMxxxM-72HL4-BDVP
Kyocera	KDxxxGX-LFB, KUxxx-6MCA, KDxxxGX-LFB2

LG	LGxxxA1C-A6, LGxxxM1C-A6, LGxxxM1K-A6, LGxxxN1C-A6, LGxxxN1C-E6, LGxxxN1C-G4, LGxxxN1C-N5, LGxxxN1K-A6, LGxxxN1K-B6, LGxxxN1K-E6, LGxxxN1K-G4, LGxxxN1K-V5, LGxxxN1T-G4, LGxxxN2T-E6, LGxxxN2W-A5, LGxxxN2W-B3, LGxxxN2W-E6, LGxxxN2W-G4, LGxxxN3K-A6, LGxxxQAC-A6, LGxxxQAK-A6, LGxxxQ1C-A6, LGxxxQ1C-V5, LGxxxQ1K-A6, LGxxxQ1K-V5, LGxxxS1C-G4, LGxxxS2W-G4
LONGi	LR6-60PE-BOW-xxxW, LR6-60HPH-BOB-xxxW, LR672HPH-SOW-xxxW
Mission Solar	MSExxxSQ5T, MSExxxSQ8T, MSExxxSO9J, MSExxxSQ9S, MSExxxSR8T, MSExxxSR9S, MSExxxSX5T, MSExxxSX5R, MSExxxSX6Z, MSExxxSX6W
Mitsubishi	PV-MLExxxHD
Panasonic	VBHNxxxKA01, VBHNxxxKA03, VBHNxxxKJ01, VBHNxxxSA16, VBHNxxxSA17
Phono Solar Tech	PSxxxM-20/U, PSxxxP-24T, PSxxxM1-24/TH, PSxxxM1H-24/TH, PSxxxM1-24/TH
REC Solar	RECxxxNP, RECxxxTP2, RECxxxTP2 BLK2, RECxxxTP2S 72, RECxxxTP2SM 72
Renesola	JC xxx M-24/Bbs, JC xxx M-24/Bb, JC xxx M-24/Abs, JC xxx S-24/Abs, JC xxx S-24/Bbs
Risen Solar	RSM40-8-xxxM, RSM120-8-xxxM, RSM144-6-xxxM, RSM150-8-xxxM, RSM156-6-xxxM
Sanyo	HIP-xxxBA3, HIT-NxxxA01
Seraphim	SRP-xxx-6MA, SRP-xxx-6MA-DG, SRP-xxx-6MB, SRP-xxx-6MB-DG, SRP-xxx-6MB-HV, SRP-xxx-6PA, SRP-xxx-6PA-DG, SRP-xxx-6PA-HV, SRP-xxx-6PB, SRP-xxx-6PB-DG, SRP-xxx-6PB-HV, SEG-xxx-BMA, SEG-xxx-BMA-HV, SEG-xxx-BMB-HV, SEG-6MA-xxxBB, SEG-6MA-xxxBW, SEG-6MA-xxxWB, SEG-6MA-xxxWW, SEG-6MB-xxxBB, SEG-6MB-xxxBW, SEG-6MB-xxxWB, SEG-6MB-xxxWW, SEG-BMA-xxxBB, SEG-BMA-xxxBW, SEG-BMA-xxxBB, SEG-BMA-xxxWB, SEG-BMA-xxxWW, SRP-xxx-BMA, SRP-xxx-BMA-HV, SRP-xxx-BMB, SRP-xxx-BMB-HV, SRP-xxx-BMZ, SRP-xxx-BMZ-HV, SRP-xxx-BPA, SRP-xxx-BPA-HV
Silfab	SLAxxxM, SLGxxxM, SLAxxxMCH, SLAxxxMWT, SLA-M xxx, SLA-X-xxx, SLG-X-xxx, SIL-xxx NL/BL/HL/NT/ML/BK/NX/NU
Solaria	PowerXT-xxxR-AC, PowerXT-xxxR-BX, PowerXT-xxxR-PX, PowerXT-xxxR-BD, PowerXT-xxxR-PD, PowerXT-xxxC-PD
SolarWorld (V2.5 frame)	Sunmodule SW series: SW xxx mono and poly, SW xxx mono, SW xxx poly Sunmodule Plus series: xxxW mono Sunmodule Protect xxxW mono, Sunmodule SW xxx poly / Pro-Series
SolarWorld (33mm frame)	Sunmodule Pro-Series: xxxW poly, xxxW XL mono Sunmodule Plus: xxxW mono

Stion	STO-xxxA
SunEdison	FxxxSMRD, FxxxSMRC, RxxxSMRC
SunPower	SPR-xxxE-WHT-D, SPR-Axxx, SPR-E19-xxx, SPR-E19-xxx-COM, SPR-E19-xxx, SPR-E20-xxx, SPR-E20-xxx, SPR-E20-xxx-COM, SPR-E20-xxx-D-AC, SPR-P17-xxx-COM, SPR-X20-xxx-BLK, SPR-X20-xxx-BLK-B-AC, SPR-X20-xxx-C-AC, SPR-X21-xxx-BLK, SPR-X21-xxx-BLK-D-AC, SPR-X21-xxx, SPR-X21-xxx-COM, SPR-X21-xxx-D-AC, SPR-X21-xxx-BLK, SPR-X21-xxx-BLK-D-AC, SPR-X21-xxx-BLK, SPR-X21-xxx-COM, SPR-X22-xxx, SPR-X22-xxx-COM, SPR-X22-xxx-D-AC, SPR-X22-xxx-D-AC
Trina	TSM-xxx PC/PA05, TSM-DE15M(II), TSM-DEG15MC.20(II), TSM-DE15H(II), TSM-DEG15HC.20(II), TSM-DE15V(II), TSM-DEG15VC.20(II), TSM-DE19, TSM-DEG19C.20, TSM-DE21, TSM-DEG21C.20
Yingli	YLxxxP-29b
ZnShine	ZXM6-NHLDD144 Series, ZXM6-NH120 Series, ZXM7-SHLDD144 Series, ZXM7-SH144 Series

Fault Current Path Diagram



Items are listed in the fault current path in order from the PV Panel to the Grounding Lug:

1. PV Panel
2. Mid Clamp Kit
3. Helio Rail
4. Pipe Clamp Kit with PVC Insulator
5. Horizontal Steel Pipe
6. Pipe Splice Kit (configuration dependent)
7. Grounding Lug

Fault Current Path

Note: All SunTurf metal structural components (Horizontal and Vertical Pipe, Pipe Splices, Post Caps, Pipe Clamps, Braces, Rail and Rail Splices) are electrically bonded together by design during the assembly of the racking.

Tools Required for Installation

Electric Drill or impact driver. *Note that the use of an impact driver is strongly discouraged for all stainless nut and bolt hardware.*	
3/8” Socket wrench	
Sockets for 3/8” drive sockets, 7/16”, 1/2”, 9/16” and 1-1/16”	
Torque Wrench 3/8” drive, 0 to 35 ft. lbs.	
Anti-seize compound (Permatex 80071 or equivalent).	
Tape measure	
Saws for cutting aluminum posts and rails as necessary	
Allen wrenches	

Torque Values for Components

These maximum torque values must be adhered to, both for mechanical strength and to insure the performance of the integral grounding and bonding features. It is recommended that anti-seize compound be applied to the screw threads and a torque wrench be used to measure the bolt torque during final assembly.

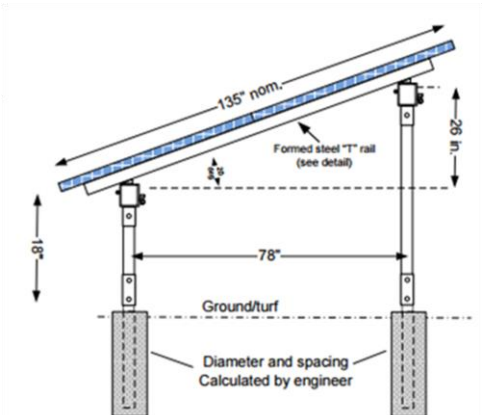
Hardware	Torque lbs.
1/4-20 Bolts and Hex Flange Nut	7.5 ft. lbs.
1/4-20 Ground Lug, Flange Nut with 7/16 Hex Head	7.5 ft. lbs.
1/4-20 Ground Lug, Setscrew with 1/8 Allen drive.	4.2 ft. lbs. (50 in. lbs.)
1/4-20 Mid or End Clamp, Female Standoff with 7/16" Hex Head Collar Nut	7.5 ft. lbs.
3/8-16 Bolts and Hex Flange Nuts	15 ft. lbs.
3/8-16 T-Bolts and Hex Flange Nuts	15 ft. lbs.
3/8-16 Setscrew with 3/16" Allen	20 ft. lbs.
1/2-13 Nut and Bolt	20 ft. lbs.
M10 Set screws with 5mm Allen	20 ft. lbs.
M16 Bolts and Flange Nuts.	20 ft. lbs
M16 Set Screws	44 ft. lbs

Ground Mount Overview

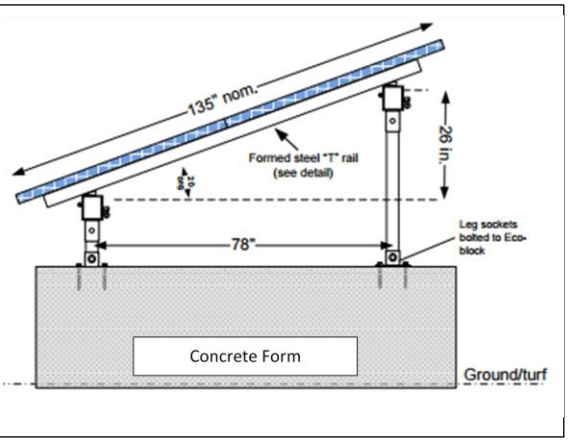
The Ground Mount system can be integrated with steel support for a scalable and simple ground mounted solution. Our unique drive-in earth anchors represent one of three choices for Ground Mounted Solar Arrays. Angles from 10º to 45º can easily be accommodated with the SunTurf racking system components. Portrait and landscape oriented PV panels are easy to configure.

In order to prevent the galvanic reaction between dissimilar metals the PVC Insulator must be installed between the steel pipe and the aluminum rail.

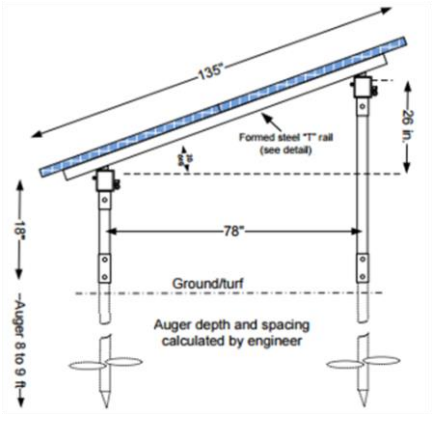
Post Ground Mount

The Concrete and Post mount showing typical configuration and dimensions with PV panels mounted at 20 degrees as viewed from the East.	

Ballasted Ground Mount

The Ballasted concrete form mount showing typical configuration and dimensions with PV panels mounted at 20 degrees as viewed from the East.	

Auger Ground Mount

The Earth Auger system showing typical configuration and dimensions with PV panels mounted at 20 degrees as viewed from the East.	

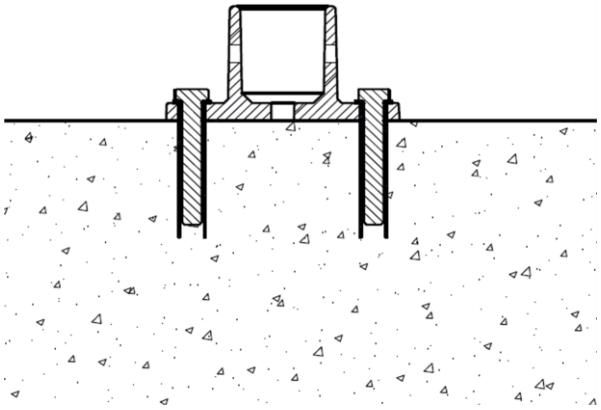
Installation Instructions:

Post Base Plate to Precast Concrete Block

There are many ways to attach structural members and fixtures to concrete, and the choice of anchoring system depends on a variety of factors. A Structural Engineer should specify the type of concrete fastener to be used.

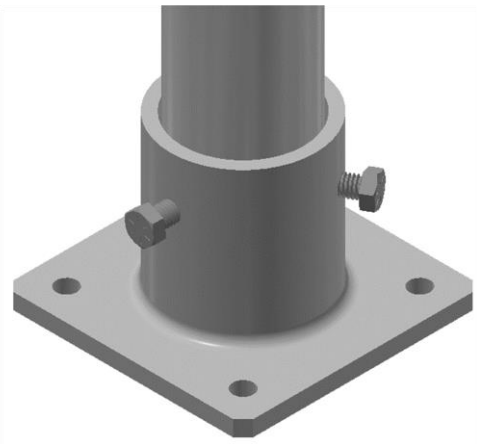
For new construction consult SunModo before starting your project.

Drill the holes in the concrete and follow the manufacturer's recommendation on the installation and torque to be used with a particular fastener type.

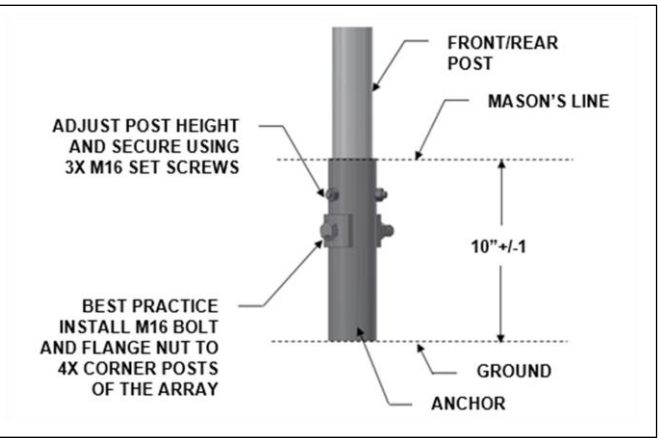


This cross section shows the mounting of a Post Base Plate to a precast concrete block.

Insert the Post into the Post Base and secure using the hardware provided.



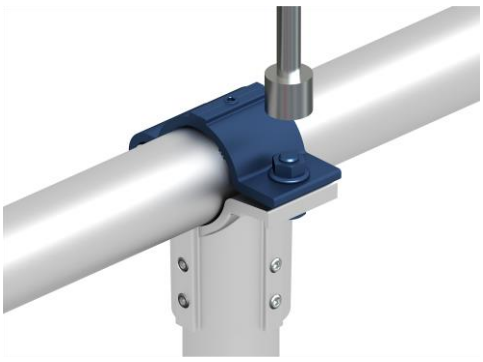
Helical Earth and Ground Screw Anchors Installation

Determine the anchor locations per SunModo layout drawing. Build two pairs of batter boards to hold the mason's lines: one pair for the front posts and other for the rear posts. Make sure the top ends of the front or rear Anchors are at the same height (within 1" high difference). Install the front/rear Post to the Anchors as shown and secure using 3X M16 Set Screws.	

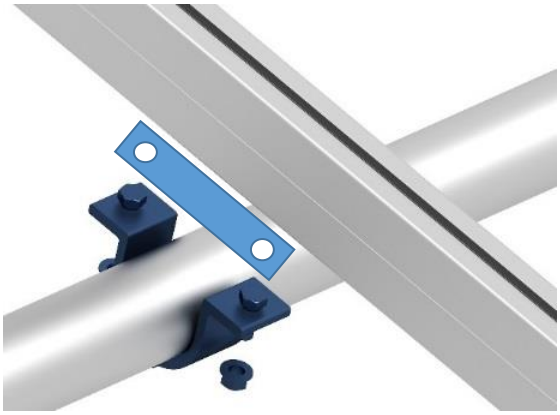
Pipe Cap to Post Attachment

Position the Pipe Cap on top of the Post and secure using the M10 Allen Screws provided. The Pipe Cap can be moved up and down approximately 2" to allow for leveling of the Pipe Cap. Torqued to 20 ft. lbs. with a 5mm Allen head drive.	

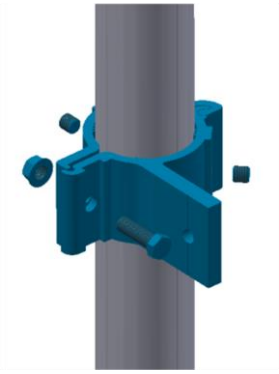
Pipe Beam to Pipe Cap Attachment

Lay the pipe beam into the saddle of the Pipe Cap assembly, and position the pipe clamp so that the mating grooves are properly aligned with the grooves on the bottom part of the Pipe Cap. Use the 1/2" Bolt & Nut to secure using 1/2" Flange Nuts. Torque to 20 ft. lbs.	

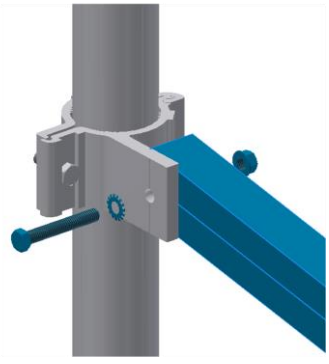
Rail to Pipe Attachment

Attach the rail to the pipe using the Aluminum Pipe Clamp Kit. Use the two supplied 3/8” T-Bolts and Flange Nuts to secure. Torque to 15 ft. lbs. In order to prevent the galvanic reaction between dissimilar metals the PVC Insulator must be installed between the steel pipe and the aluminum rail.	

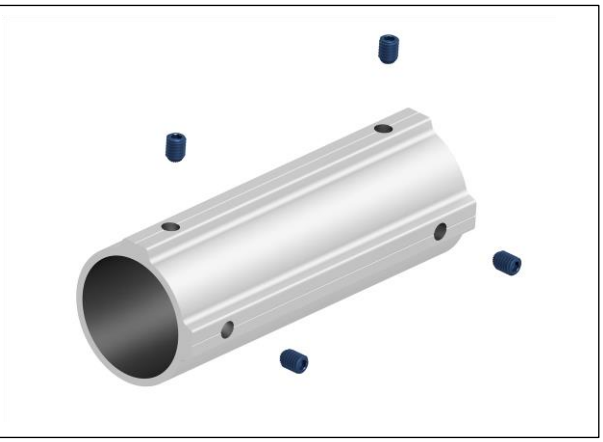
Pipe Clamp to Post or Beam Attachment

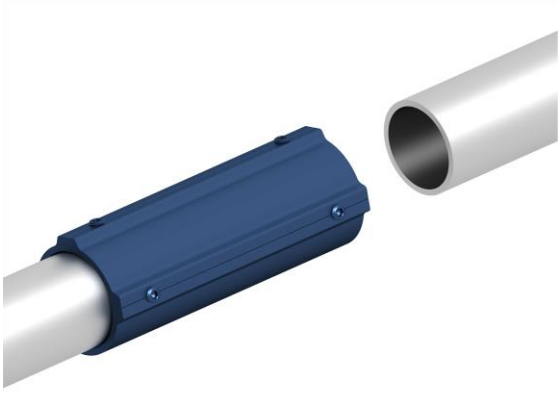
Where bracing is required to a post or beam, a sliding Pipe Clamp is installed as shown. The sliding Pipe Clamp is secured with a 3/8-16 X 2” Hex Bolt and Flange Nut. Torque to 15 ft. lbs. Install the two Grounding Setscrews in the Pipe Clamp as shown. Using a 5mm hex driver torque to 10 ft. lbs. The Brace can now be attached to the post or beam and Pipe Clamp.	

Pipe Clamp to Brace Attachment

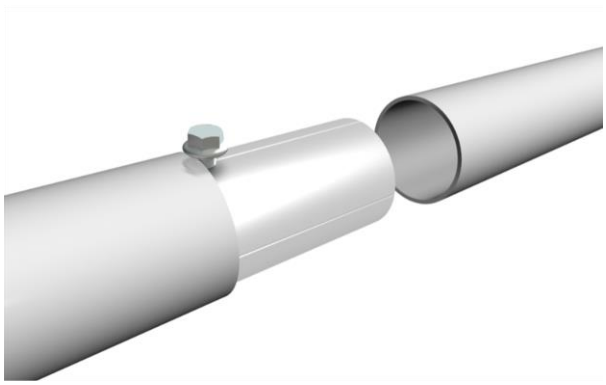
Where bracing is required to a post or beam, the Brace can be installed onto the Pipe Clamp attached to the Post as shown. A single 3/8-16 X 3-1/2” Hex Bolt and Flange Nut are required. The Star Washer supplied with the kit must be installed under the head of the bolt as shown. Torque to 15 ft. lbs.	

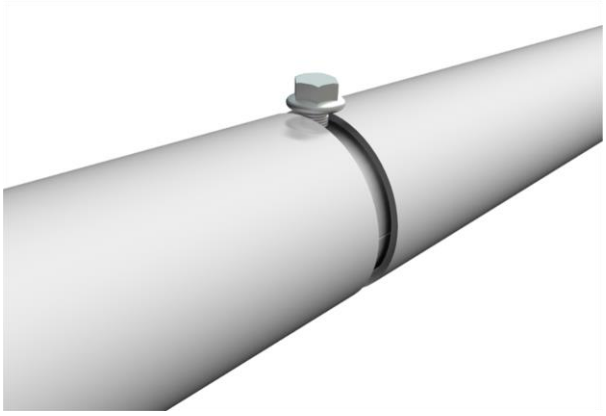
Pipe to Pipe External Splice

Where a splice is required for the horizontal pipe, the splice should be inserted before the pipes is fastened in place. Slide the Pipe Splice onto the end of the pipe beam.	

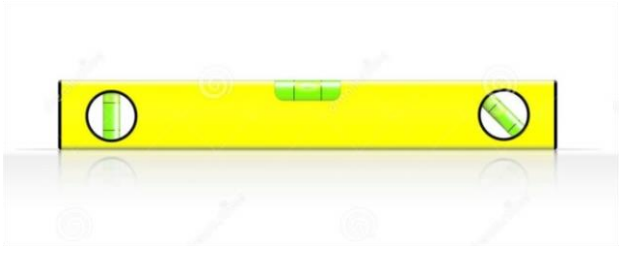
Complete the splice by sliding the pipe beam into the Pipe Splice as shown. Install the two Grounding Setscrews in the Pipe Clamp as shown. Using a 5mm hex driver torque to 20 ft. lbs.	

Pipe to Pipe Internal Splice

Where a splice is required for the horizontal pipe, the splice should be inserted before the pipes is fastened in place. Slide the Internal Pipe Splice into the end of the pipe beam.	

Complete the splice by sliding the pipe beam onto the Internal Pipe Splice as shown. Bond the two pipes together by tightening the 3/8 Serrated Hex Head Bolt. Torque to 15 ft. lbs.	

Rack Leveling

At this time during the installation, the spacing and leveling of the rack should be checked and adjusted as necessary.	

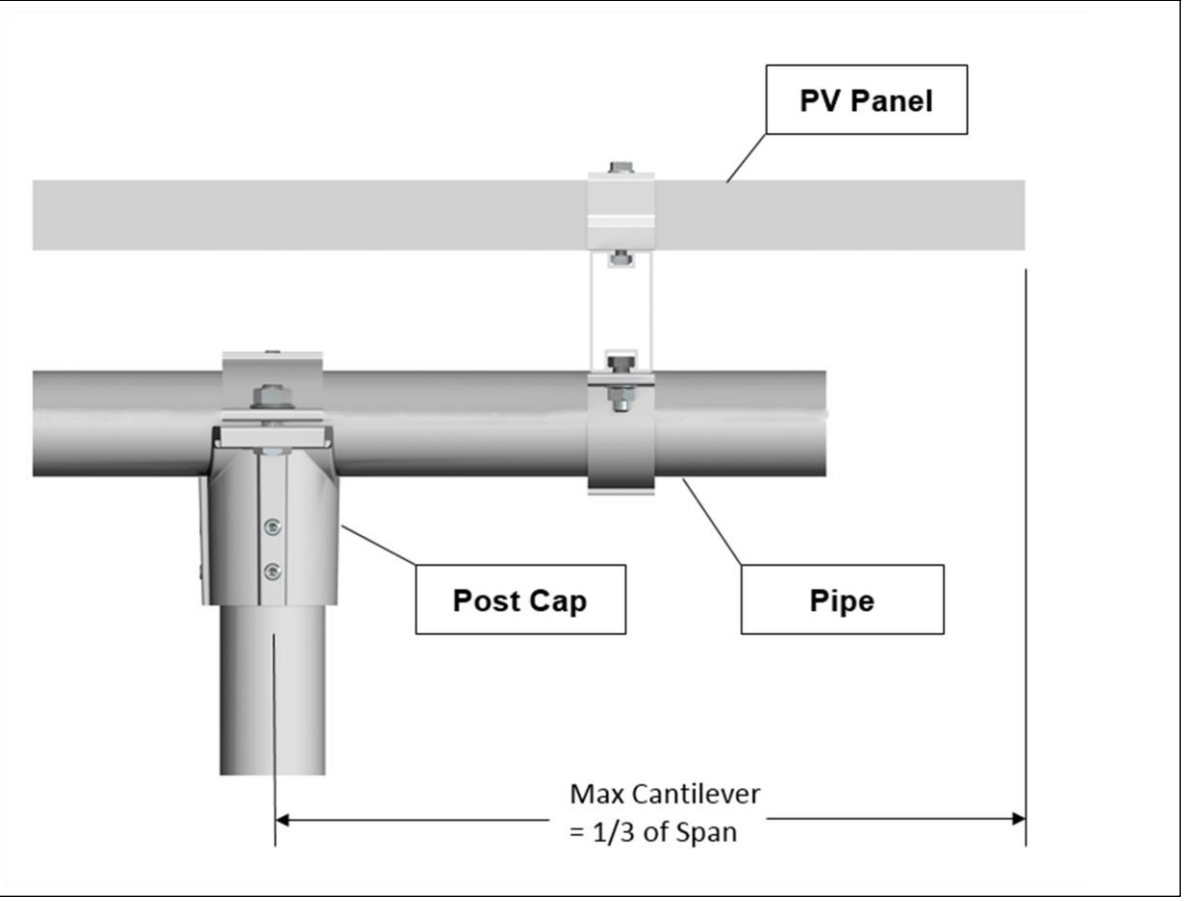
PV Panel Landscape Mounting

PV Panel Overhang

For PV panels installed in the Landscape orientation the panels can extend beyond the E-W Beam a maximum of 25% of the panel length (Check panel manufacturers mounting requirements).

For a SunBeam system the E-W Beam can extend beyond the Post a maximum of 25% of the E-W span length.

The combined maximum cantilever of the PV panel and E-W Beam is 1/3 of the post span.

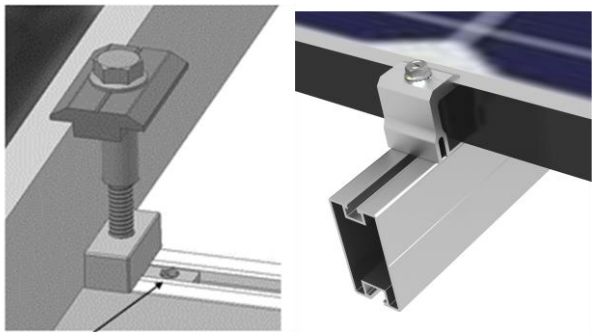


Clamp Installation – Landscape Orientation

Proceed with the mounting of the PV panels using the mid and end clamps. Specific mounting instructions are shown in the following sections for Portrait and Landscape mounting.

Installing Mid Clamps: A mid clamp is used between PV panels. It will produce 1/2" spacing between PV panel frames.

An End Clamp is used to secure PV panels at the ends of a row.

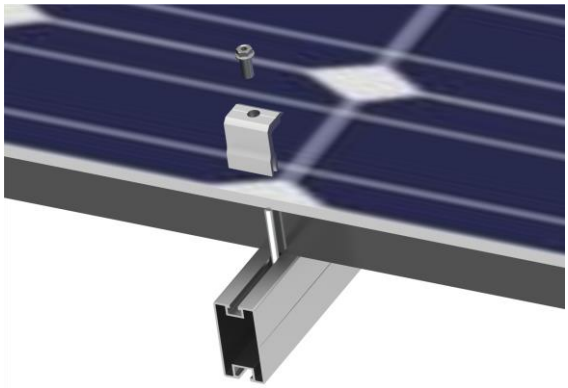


End Clamp Installation

There must be a minimum of 1.5 inches of Rail extending beyond the PV panel frame.

Clamp the PV panel frame by inserting the T-Bolt into the Rail slot. Position the End Clamp firmly against the PV panel frame and secure using the 1/4-20 Collar Bolt. Using a 7/16" socket, torque to 7.5 ft. lbs.

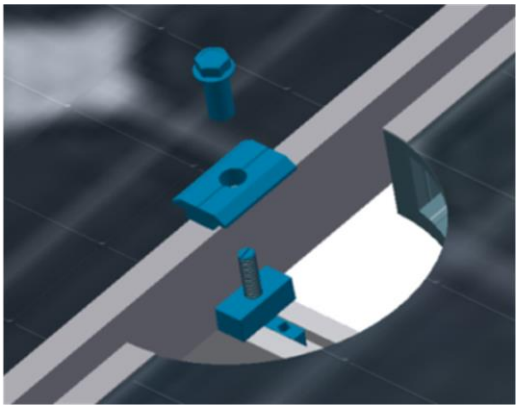
Note: When two or more PV panels are installed grounding via the End Clamp is optional. For a single panel configuration (shown), insert the T-Bolt into a T-Bolt Holder for grounding the panel to the Rails.



Mid Clamp Attachment

Insert the T-Bolt in the Rail slot and turn clockwise 90° to engage the head into the slot. Insert Grounding T-Bolt Holder to lock T-Bolt in place.

Thread the 1/4-20 Collar Bolt onto the top of the T-Bolt as shown. After positioning the Mid Clamp firmly against the PV panel frame, using a 7/16" socket, tighten to 7.5 ft. lbs.

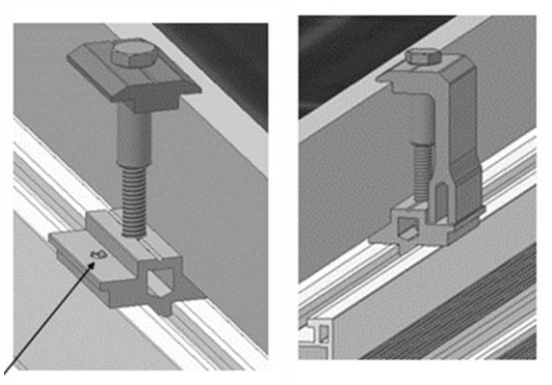


Clamp Installation – Portrait Orientation

Proceed with the mounting of the PV panels using the mid and end clamps. Specific mounting instructions are shown in the following sections for Portrait and Landscape mounting.

Installing Mid Clamps: A mid clamp is used between PV panels. It will produce 1/2" spacing between PV panel frames.

An End Clamp is used to secure PV panels at the ends of a row.

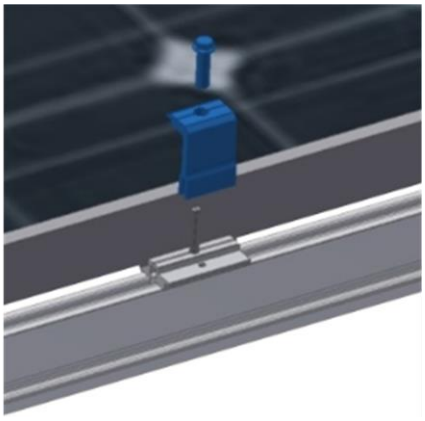


End Clamp Installation

End Clamps are used at the ends of a row of PV panels.

Insert the T-Bolt in the Rail slot and turn clockwise 90° to engage the head into the slot. Insert Grounding T-Bolt Holder to lock T-Bolt in place.

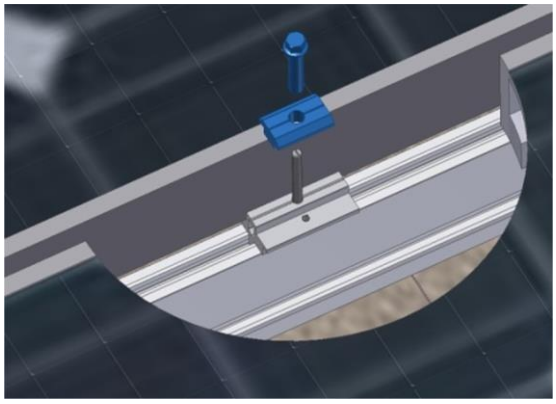
Thread the 1/4" Collar Bolt onto the top of the T-Bolt as shown. After positioning the End Clamp firmly against the PV panel frame, using a 7/16" socket, tighten to 7.5 ft. lbs.



Mid Clamp Installation

Insert the T-Bolt in the Rail slot and turn clockwise 90° to engage the head into the slot. Insert Grounding T-Bolt Holder to lock T-Bolt in place.

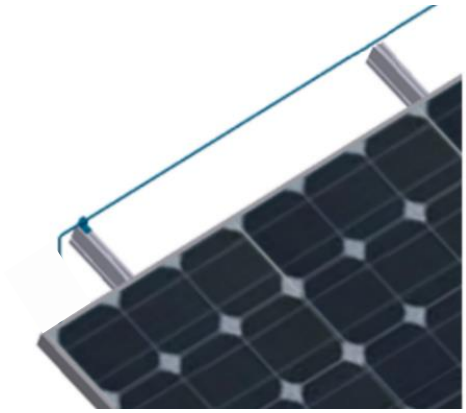
Thread the 1/4" Collar Bolt onto the top of the T-Bolt as shown. After positioning the Mid Clamp firmly against the PV panel frame, using a 7/16" socket, tighten to 7.5 ft. lbs.



Ground Wire Attachment

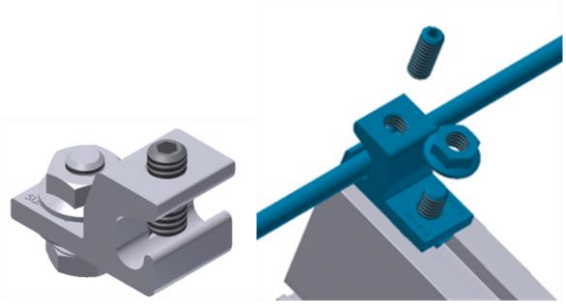
The picture shows a single grounding lug mounted on one Rail and a #6 solid copper grounding wire connecting the Ground Lug to the building ground per NEC 690.47.

The self-bonding system is for use with PV modules that have a maximum series fuse rating of 30A.



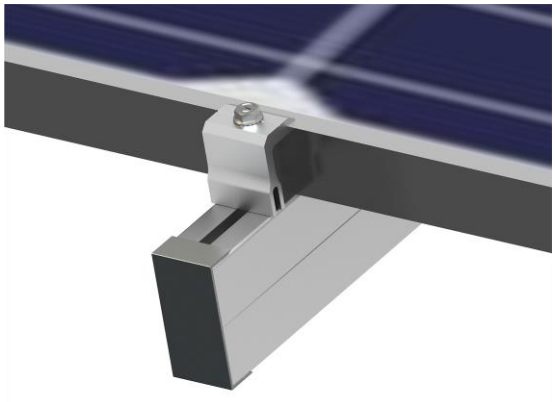
Ground Lug Installation

One Rail should have a Ground Lug for fastening the ground conductor to the array. The Ground Lug is mounted on the top or side of the Rail using a special 1/4" T-Bolt, Grounding Spacer, and Flange Nut. Grounding Lugs K10179-001, and detailed installation document D10003 are available from SunModo separately.



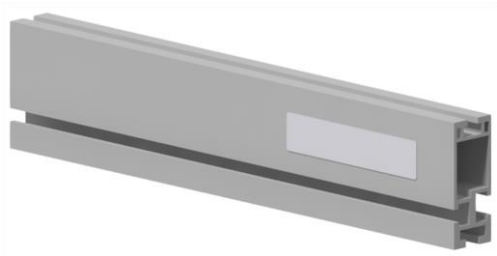
Rail End Covers

Rail End Covers can be attached to the mounting rails as shown.



UL 2703 Label Placement

When requested the UL 2703 Label can be located on the Rail or Rail Splice.



See www.sunmodo.com for current warranty documents and information.

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