

***SunModo PV Rack Mounting System***  
***UL2703 Compliant***

**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-grounding and bonding system is for use with PV modules that have a maximum series fuse rating of less than 30A. Mechanical design loads per UL 2703: Downward Pressure: 10 psf (478.8 Pa), Upward Pressure: 5 psf (239.4 Pa), Down-Slope: 5 psf (239.4 Pa). Mechanical test loads per IEC 61215: Maximum Downward Pressure: 50 psf (2394 Pa); Maximum Upward Pressure: 33 psf (1580 Pa), Maximum Down-Slope: 35 psf (1675 Pa).

**TABLE OF CONTENTS**

Installer Responsibility: .....	4
Safety:.....	4
Specifications:.....	4
Lag Pull-Out Capacities: .....	5
SunModo Self-Grounding System .....	6
EZ Roof Mount System Components .....	7
List of Compliant PV Modules .....	12
Tools Required for Installation.....	14
Torque Values for Pitched Roof System.....	16
Flashing Placement:.....	17
Sealant Application: .....	17
Installation Instructions:.....	18
EZ Roof Mount Kit K10068-XXX.....	18
EZ Roof Mounting Standoff Kit K10070-XXX.....	19
EZ Roof Mount with C-Bracket Kit K12005-001 .....	19
EZ Roof Mount Kit K10068-B20.....	20
EZ Metal Roof Mount Kit K20051-XXX .....	21
EZ Metal Roof Mounting Standoff Kit K10064-XXX .....	22
EZ Metal Roof Mount with C-Bracket A22001-001.....	22
Portrait Panel Configuration: .....	23
Minimum Panel Height .....	24
End Clamp Attachment.....	24

Mid Clamp Attachment .....24

Landscape Panel Configuration: .....25

    Minimum Panel Height .....26

    End Clamp Attachment.....26



    Mid Clamp Attachment .....26

Ground Wire Attachment.....27

    Ground Lug Installation .....27

Rail End Covers .....27

Table of Clamp Bolt Lengths and Part Numbers .....28

<p><b>SunModo Corporation:</b>  Vancouver, Washington  www.SunModo.com  Ph: 360-844-0048  info@sunmodo.com</p>	<p>Document Number D10004-V015  ©2017 – SunModo Corp.</p>	 File 0248	 Intertek <b>5001753</b>
--	---	---	---

### **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 EZ Roof Mount System on pitched roofs. 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 is responsible to install EZ Pitched Roof System over a Fire Resistant roof covering rated for the application.
- Installer is responsible to determine that the roof, its rafters, connections, and other architectural support components can sustain the array under all code level loading conditions.
- 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 roof system is responsible for reading these instructions and determining the safest way to install the roof 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. Provide required safety railing, netting, or safety lines for crew members working on the roof.

### **Specifications:**

EZ Roof Mount K10068 is certified for International Building Code and International Residential Codes (IRC) by IAPMO. Evaluation Report is 0248, structural test per EC002-2011 and rain test per UL 441-96.

**Lag Pull-Out Capacities:**

Sources: American Wood Council, NDS 2005, Table 11.2 A, 11.3.2 A

Lag pull-out (withdrawal) capacities (lbs.) in typical lumber:	Specific Gravity	5/16" Shaft per 1" thread depth	5/16" Shaft per 2-1/2" thread depth
Douglas Fir, Larch	.50	266	665
Douglas Fir, South	.46	235	588
Engelmann Spruce, Lodgepole Pine (MSR 1650 f & higher)	.46	235	588
Hem, Fir	.43	212	530
Hem, Fir (North)	.46	235	588
Southern Pine	.55	307	768
Spruce, Pine, Fir	.42	205	513
Spruce, Pine, Fir (E of 2 million psi and higher grades of MSR and MEL)	.50	266	665

Notes:

- 1) **Actual test data in Southern Pine: Test Load at 0.250 inch deflection: 1,800 lbs. uplift (withdrawal); 240 lbs. lateral. Test Load at 0.125 inch deflection: 695 lbs. uplift (withdrawal); 130 lbs. lateral.**
- 2) Thread must be embedded in a rafter or other structural roof member.
- 3) See NDS Table 11.5.1 C for required edge distances.

### SunModo Self-Grounding System

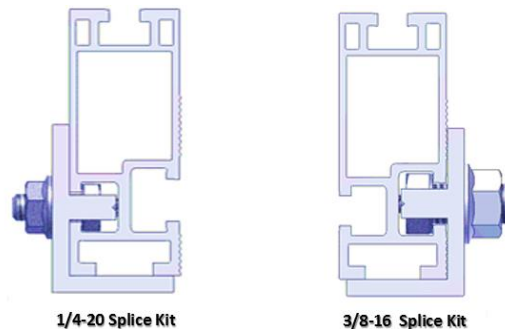
SunModo developed a proprietary grounding and bonding system that is built into the mounting hardware for the rails, clamps and splices. We provide further grounding through all of the SunBeam racking components including the Pipe Caps, Beams, Posts and Post Base Plates. All hardware meet UL 2703 Grounding 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-grounding and bonding system is for use with PV modules that have a maximum series fuse rating of less than 30A. The maximum number of PV modules is limited by the system voltage, so in a system has multiple inverters, the SunModo racking system can theoretically go on forever.



Mid Clamp with Ground Pins

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



Rail Splices with Grounding Pins

**EZ Roof Mount System Components**  
**Primary Materials**



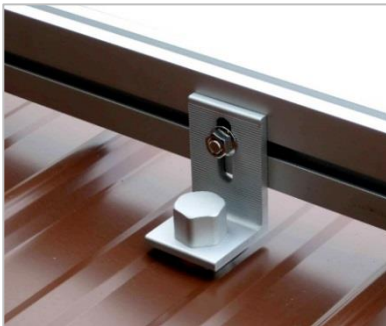
EZ Roof Mount Kit includes:

- Flashing
  - L-Foot
  - Roof Shoe and Gasket
  - 4" Lag Bolt
  - AL Hex Cap
  - 3/8" Flange Nut and Bolt
- K10068-XXX  
EZ Roof Mount with L-Foot  
(-001 as shown)



EZ Roof Mount Standoff Kit:

- Flashing
  - L-Foot
  - Roof Shoe and Gasket
  - 4" Lag Bolt
  - AL Hex Cap
  - 3/8" Flange Nut and Bolt
  - Standoff: 2" shown
- K10070-XXX  
EZ Roof Mount with Standoff  
(Standoff heights: 2", 3", 5"  
and 7")



EZ Metal Roof Mount Kit includes:

- L-Foot
  - Metal Roof Shoe and Gasket
  - 4" Lag Bolt
  - AL Hex Cap
  - 3/8" Flange Nut and Bolt
- K10082-001  
EZ Metal Roof Mount with L-Foot  
(as shown)
- K20082-002  
EZ Metal Roof Mount with L-Tall Foot

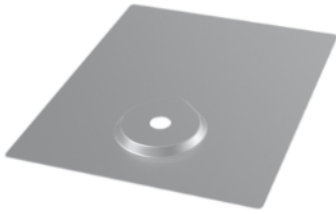
Both are available in black  
(-BK1 or BK2)



EZ Metal Roof Mount Standoff Kit:

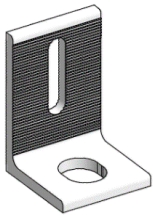
- L-Foot
  - Roof Shoe and Gasket
  - 4" Lag Bolt
  - AL Hex Cap
  - 3/8" Flange Nut and Bolt
  - Standoff: 2" shown
- K10064-XXX  
EZ Metal Roof Mount with Standoff  
(Standoff heights: 2", 3", 5"  
and 7")





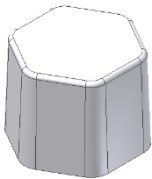
Aluminum Flashings are offered in two sizes: 10"X12.5" and 18"X18". Available in clear, black and brown anodize.

A20052-XXX  
AL Flashing



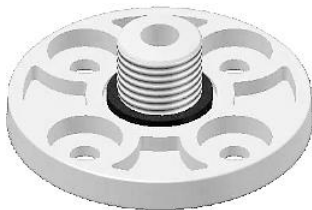
Aluminum L-Foot is offered in clear, black and brown.

A20064-XXX  
AL L-Foot



AL Hex Cap  
Available in clear and black

A20066-001 and -BK1  
AL Hex Cap



Aluminum Shoe is provided with EPDM Sealing Washer installed.

A20065-001  
AL Shoe  
C10006-001  
Sealing Washer



Aluminum Shoe (for metal roofs) is provided with EPDM Sealing Washer installed.

A20051-XXX  
AL Shoe  
C10007-001  
Sealing Gasket



5/16 Stainless Steel Lag Bolts are available lengths: 3.5", 4", 4.5" and 5"

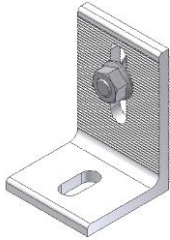
B15015-XXX  
5/16 Stainless Steel Lag Bolt





OMG XHD (Extra Heavy Duty)  
#15 Roofing Fastener

B15040-001 (4 reqd per  
mount)  
OMG 1/4 X 3" Decking Screw  
XHD003B #15X3



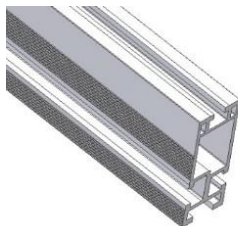
Aluminum L-Foot available in  
clear and black.

K10066-XXX  
Standard L-Foot Kit  
K10096-XXX  
Tall L-Foot Kit  
(3/8" Flange Nut and Bolt  
included)



Aluminum Standoff heights: 2", 3",  
5" and 7"  
(part of EZ Roof Kit K10070-XXX)

A20049-XXX  
Standoff (multiple lengths)



Helio Rails: Features both 1/4"  
and 3/8" side slots, and 1/4" top  
slot for clamping PV panels.  
Available in 84", 124", 164" 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)

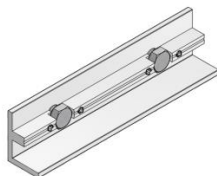
A20146-XXX (Clear)  
A20146-XXX-BK (Black)  
HR500 (Super Rail)



Rail End Caps available for Helio  
Standard and Heavy rails  
(optional)

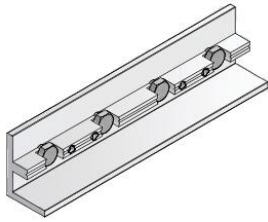
C10017-001 (Black)  
C10017-001-GR (Gray)  
Helio Standard

C10021-001 (Black)  
C10021-001-GR (Gray)  
Helio Heavy



3/8" Slot Rail Splice Kit with 2X  
3/8-16 hex bolts and flange nuts  
with integral grounding.  
**May be repositioned until  
torqued to final value.**

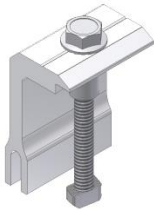
K10178-001  
HR250/HR350 3/8" Splice  
**For single-use only**



1/4" Slot Rail Splice Kit with 4X bolts and flange nuts with integral grounding. **May be repositioned until torqued to final value.**

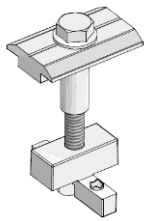
K10177-001  
K10177-BK1  
HR250/HR350 1/4" Splice  
**For single-use only**

K10250-001  
K10250-001-BK  
HR500 1/4" Splice  
**Requires bond jumper**



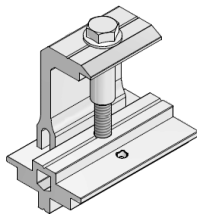
End Clamp Kit, fits panel height from 31 to 50 mm. For last 3 digits, see table on last page.

K10224-1XX



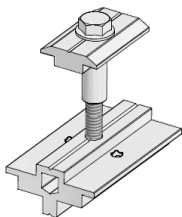
Grounding Mid Clamp Kit fits panel height from 31 to 50 mm. **May be repositioned until torqued to final value.**

K10180-001  
**For single-use only**



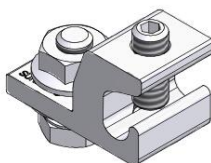
Grounding End Clamp Kit with shared rail adaptor for standard rail; fits panel height from 31 to 50 mm. For last 3 digits, see table on last page. **May be repositioned until torqued to final value.**

K10183-1XX  
**For single-use only**



Grounding Mid Clamp Kit with shared rail adaptor for standard rail; fits panel height from 31 to 50 mm. **May be repositioned until torqued to final value.**

K10182-001  
**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**



HR150 (Open Rail): Features wire management channel and both 1/4" and 3/8" side slots, and 1/4" top slot for clamping PV panels. Available in 84", 124", 164" and 206" lengths. Last 3 digits denote rail length. 4 stock sizes in clear and black.

A20242-XXX (Clear)  
 A20242-XXX-BK (Black)  
 HR150 (Open Rail)



1/4" Slot Open Rail Splice Kit with 4X 1/4-20 Bolts and Flange Nuts with integral grounding. **May be repositioned until torqued to final value.**

K10236-001  
 HR150 Splice Kit  
**For single-use only**



Rail End Cap available for HR150 rails (optional)

A20250-001 (Clear)  
 A20250-BK1 (Black)  
 HR150 Rail End Cover



HR150 Channel Clip: snaps into the open rail to manage wire bundles where needed. Available in clear and black.

A20252-001 (Clear)  
 A20252-BK1 (Black)  
 HR150 Wire Cover



The HR150 family of products are shown assembled above. Two HR150 Rails are spliced together with an HR150 Rail Splice. PV electrical wires are shown routed in the channels of the HR150 Rails, retained with two HR150 Channel Clips snapped into place.

**List of Compliant PV Modules**

**UL 2703 Qualified Modules for use with SunModo PV Racking Systems**

Evaluated PV Modules	
Module manufacturer	Model numbers
C-Sun	CSUN290-72P, CSUN295-72P, CSUN300-72P, CSUN305-72P, CSUN310-72P, CSUN285-72M, CSUN290-72M, CSUN295-72M, CSUN300-72M, CSUN305-72M, CSUN310-72M, CSUN315-72M, CSUN320-72M, CSUN235-60M, CSUN240-60M, CSUN245-60M, CSUN240-60P, CSUN245-60P, CSUN250-60P, CSUN255-60P, CSUN260-60P
Canadian Solar	CS6X-300P, CS6X-305P, CS6X-310P, CS6X-315P, CS6X-320P, CS6P-255P, CS6P-260P, CS6P-265P, CS6P-260M, CS6P-265M, CS6V-210P, CS6V-215P, CS6V-220M, CS6V-225M, CS6K-265M, CS6K-270M
ET Solar	ET-P672300WW, ET-P672305WW, ET-P672310WW, ET-P672315WW
Hanwha Q Cells	Q.PRO L-G2 305, Q.PRO L-G2 310, Q.PRO L-G2 315
Hareon	HR-280P-24/Ba, HR-285P-24/Ba, HR-290P-24/Ba, HR-295P-24/Ba, HR-300P-24/Ba, HR-305P-24/Ba, HR-310P-24/Ba
Itek Energy (50 mm frame)	IT250HE, IT255HE, IT260HE, IT265HE, IT270HE, IT275HE, IT280HE, IT285HE, IT290HE, IT295HE, IT300HE, IT305HE, IT310HE
LG	LG275S1C-G4, LG280S1C-G4, LG285S1C-G4, LG300N1C-G4, LG300N1K-G4, LG305N1C-G4, LG310N1C-G4, LG315N1C-G4, LG320N1C-G4, LG335S2W-G4, LG340S2W-G4, LG360N2W-B3, LG365N2W-B3, LG365N2W-G4, LG370N2W-G4, LG375N2W-G4
Panasonic	VBHN285J40
Phono Solar Tech	PS255M-20/U, PS260M-20/U, PS265M-20/U, PS270M-20/U, PS275M-20/U, PS280M-20/U PS300P-24T, PS305P-24T, PS310P-24T PS315P-24T, PS320P-24T, PS325P-24T
Sanyo	HIP-190BA3, HIP-195BA3, HIP-200BA3, HIP-205BA3, HIT-N215A01, HIT-N220A01, HIT-N225A01

SolarWorld (V2.5 frame)	<p>Sunmodule SW series:  SW 220 mono and poly,  SW 225 poly, SW 230 poly, SW 235 poly,  SW 240 mono and poly,  SW 245 mono and poly, SW 250 mono,  SW 255 mono, SW 260 mono, SW 265 mono, SW 270 mono</p> <p>Sunmodule Plus series:  285W mono, 280W mono, 275W mono,  270W mono, 265W mono, 260W mono,  255W mono, 250W mono  Sunmodule Protect 275W mono  Sunmodule Protect 270W mono  Sunmodule Protect 265W mono  Sunmodule SW 245 - 255 poly / Pro-Series</p>
SolarWorld (33mm frame)	<p>Sunmodule Pro-Series:  250W poly, 255W poly, 260W poly  315W XL mono, 320W XL mono,  325W XL mono,  Sunmodule Plus:  260W mono, 270W mono, 275W mono,  280W mono, 285W mono</p>
Stion	STO-135A, STO-140A, STO-145A, STO-150A
SunEdison	F310EzD, F315EzD, F320EzD, F325EzD, F330EzD, F335EzD, F310EzC, F315EzC, F320EzC, F325EzC, F330EzC, F335EzC, R330EzC, R335EzC, R340EzC, R345EzC, R350EzC, R355EzC
SunPower	X21-355-BLK, X21-345, SPR-E20-327, SPR-E19-320
Trina	TSM-225 PC/PA05, TSM-230 PC/PA05, TSM-235 PC/PA05, TSM-240 PC/PA05, TSM-245 PC/PA05
Yingli	YL230P-29b, YL235P-29b, YL240P-29b, YL245P-29b

### 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.*



Roofing Bar



Drill Bit for lag bolts, pilot hole 7/32" diameter for 5/16" lag bolt



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).



Caulk gun and silicon sealant

- ChemLink M1 (or equivalent) for wood and composite roofs.
- ChemLink DuraLink (or equivalent) for metal roofs.



Tape measure



Saws for cutting aluminum posts and rails as necessary



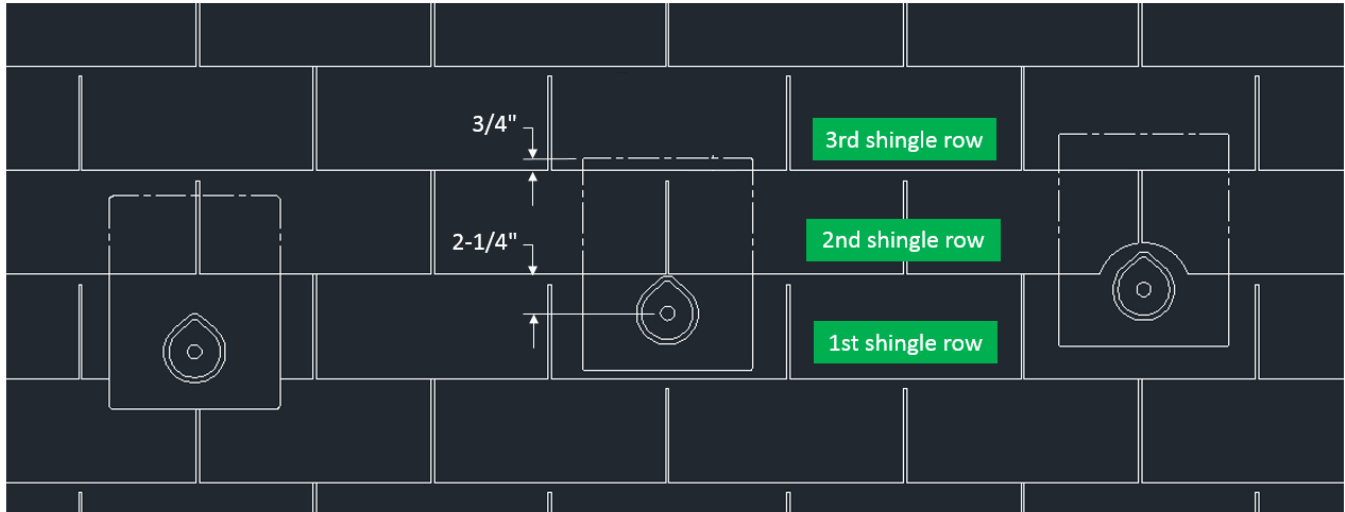


**Torque Values for Pitched Roof System**

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

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.
5/16 Lag Bolts	25 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.
1-1/16" Hex Cap	15 ft. lbs.

### Flashing Placement:



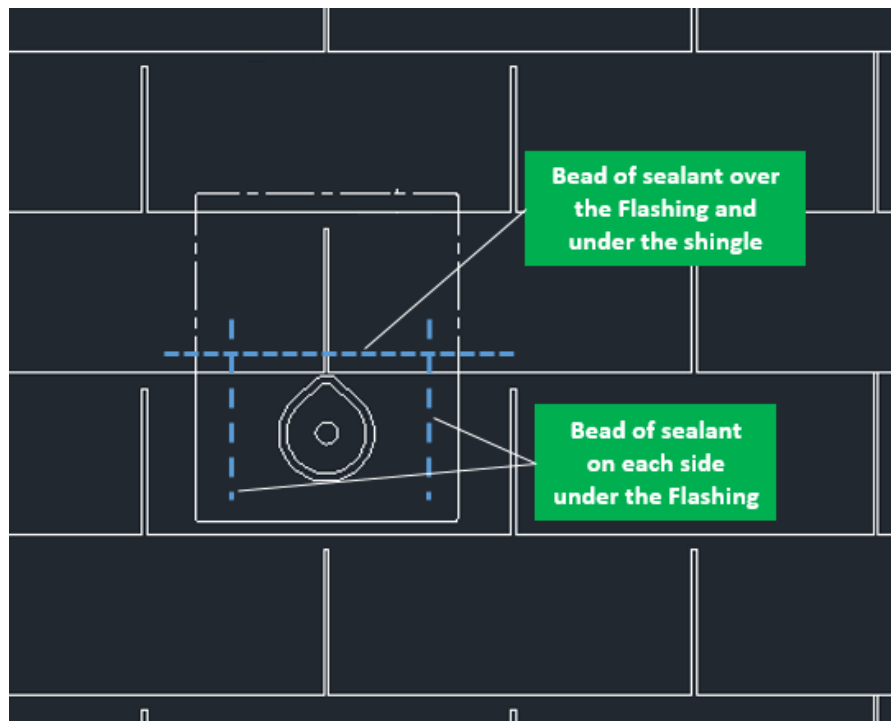
**INCORRECT Position**  
Moisture and debris can accumulate causing early shingle degradation

**CORRECT Position**  
No shingle cutting required

**Acceptable Position**  
If shingle cutting is required a 1/2" gap between the raised feature of the Flashing and the shingle is recommended

If cutting the shingle to reposition the flashing proves to be impractical, apply sealant around the edges of the flashing to prevent debris from accumulating under the shingle.

### Sealant Application:



### Installation Instructions:

#### EZ Roof Mount Kit K10068-XXX

1. From the marked location, move down the roof 2-1/4" from the bottom of the shingle, and drill the pilot hole for the Lag Bolt with a 7/32" drill bit. For maximum strength, the hole should not be more than 3" in depth, and a drill stop may be used to insure this.
2. Clean sawdust, and fill hole with sealant, such as Chem-link M1 for wood and composite roofs, or ChemLink DuraLink for metal roofs. Install AL Shoe to roof by using 5/16" Lag Bolt. Tighten to 25 ft. lbs. torque.
3. Make sure the Sealing Washer is positioned correctly on the threaded shank of the AL Shoe. Use roofer bar to lift roof shingle, slide the flashing under shingle, and insert the Flashing on threaded shank as shown. For additional waterproofing apply beads of sealant as shown.
4. Insert L-Foot to AL Shoe on top of Flashing. Place AL Hex Cap on Shoe, and lightly hand tighten Hex Cap.
5. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8" Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.



### Installation Instructions:

#### **EZ Roof Mounting Standoff Kit K10070-XXX**

Mount the AL Shoe using steps 1-3 (shown above).

- A. Place AL Standoff on AL Shoe threads and tighten by hand, then by wrench. Use 15 ft.-lbs. nominal torque.
  
- B. Using the 3/8" Flange Bolt (supplied with AL L-Foot) attach to the top of the Standoff.
  
- C. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8" Flange Nut to 15 ft.-lbs. and Hex Cap to 15 ft.-lbs. torque.



### Installation Instructions:

#### **EZ Roof Mount with C-Bracket Kit K12005-001**

Mount the C-Bracket using steps 1-3 (shown above).

- D. Mount the C-Bracket instead of an L-Foot, using the Hex Nut. The C-Bracket can be used to mount a variety of rails and other rooftop equipment.



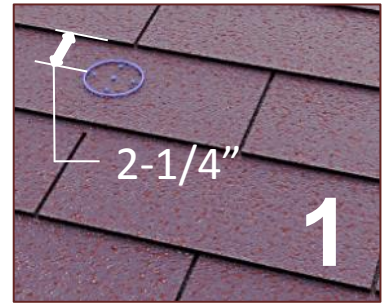


### Optional Mounting Instructions:

#### EZ Roof Mount Kit K10068-B20

1. From the desired location, move down the roof 2-1/4" from the bottom of the shingle, and locate the EZ Roof Mount AL Shoe center. The AL Shoe will be used as a template to locate the 4 screws.
2. Place a bead of Chem-link M1 for wood and composite roofs along the length of the screw four (4) 1/4" X 3" self-drilling Decking Screws. Mount the AL Shoe to the roof through the shingles using the four Decking Screws. The screws will penetrate the roof sheathing and should protrude through the sheathing at least 1/2". Maximum pullout strength requires that the threads extend below the sheathing.
3. Make sure the Sealing Washer is positioned correctly on the threaded shank of the AL Shoe. Use roofer bar to lift roof shingle, slide the flashing under shingle, and insert the Flashing on threaded shank as shown. For additional waterproofing apply beads of sealant as shown.
4. Insert L-Foot to AL Shoe on top of Flashing. Place AL Hex Cap on Shoe, and lightly hand tighten Hex Cap.
5. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8" Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.

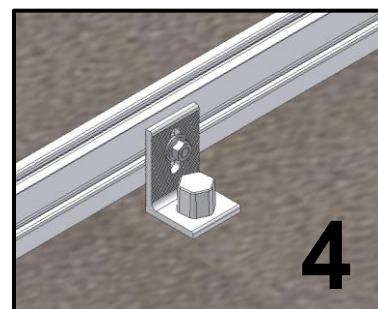
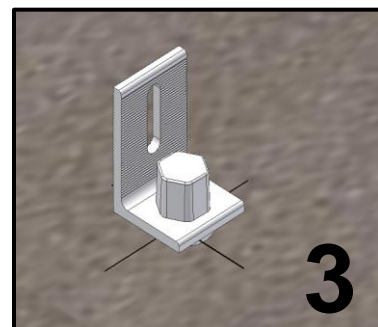
**Warning:** The self-drilling decking screw mount option is only suitable for roofs less than 5/12 pitch and should only be used with a direct L-Foot attachment.



### Installation Instructions:

#### EZ Metal Roof Mount Kit K20051-XXX

1. From the marked location drill the pilot hole for the Lag Bolt with a 7/32" drill bit. For maximum strength, the hole should not be more than 3" in depth, and a drill stop may be used to insure this.
2. To ensure a strong and water tight seal, wipe away excess grease or debris from the mounting location. Fill pilot hole with sealant, such as ChemLink DuraLink for metal roofs. Install AL Shoe to Metal Roof by using 5/16" Lag Bolt. Tighten to 25 ft. lbs. torque.
3. Install L-Foot to AL Shoe and lightly hand tighten Hex Cap.
4. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8" Flange Nut to 15 ft-lbs. and Hex Cap to 15 ft-lbs. torque.



### Installation Instructions:

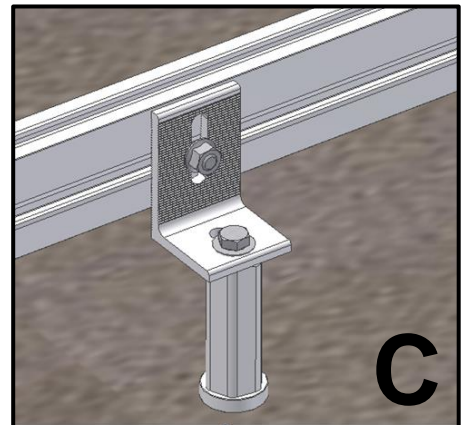
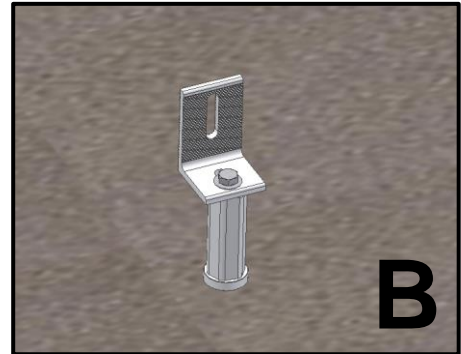
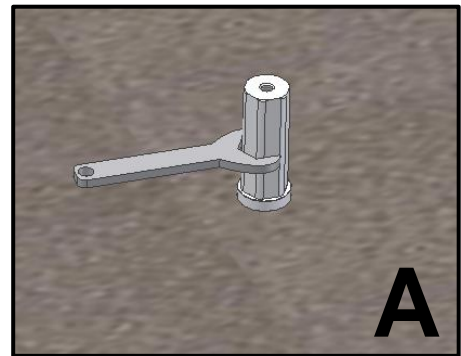
#### **EZ Metal Roof Mounting Standoff Kit K10064-XXX**

Mount the AL Shoe using steps 1 and 2 (shown above).

A. Place AL Standoff on AL Shoe threads and tighten by hand, then by wrench. Use 15 ft.-lbs. nominal torque.

B. Using the 3/8" Flange Bolt (supplied with AL L-Foot) attach to the top of the Standoff.

C. Install AL Rail to L-Foot to the specific orientation. Then, tighten 3/8" Flange Nut to 15 ft.-lbs. and Hex Cap to 15 ft.-lbs. torque.



### Installation Instructions:

#### **EZ Metal Roof Mount with C-Bracket A22001-001**

Mount the C-Bracket using steps 1 and 2 (shown above).

D. Mount the C-Bracket instead of an L-Foot, using the Hex Nut. The C-Bracket can be used to mount a variety of rails and other Metal Rooftop equipment.



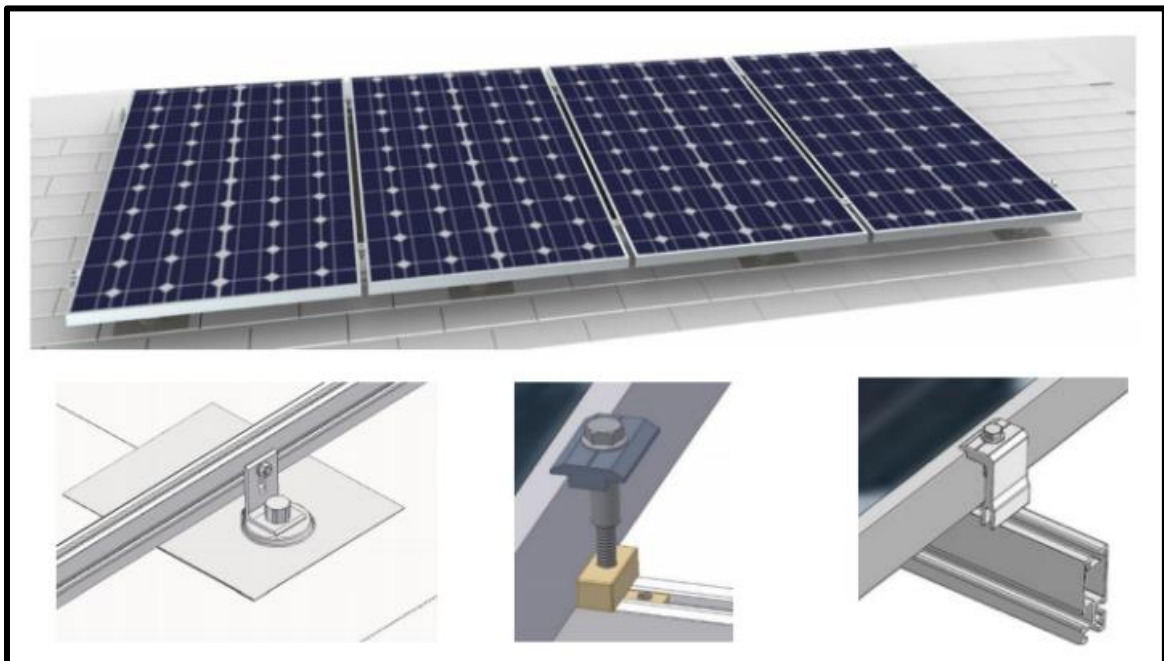


### **Portrait Panel Configuration:**

With a full range of components the Pitch Roof System can be configured in an endless variety of designs. The system is IBC compliant for roof waterproofing tested by IAPMO, UL 1703 compliant for Class-A Fire Rated for Type 1 and 2 PV Modules and UL 2703 compliant for electrical bonding tested by ETL.

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 mounting.

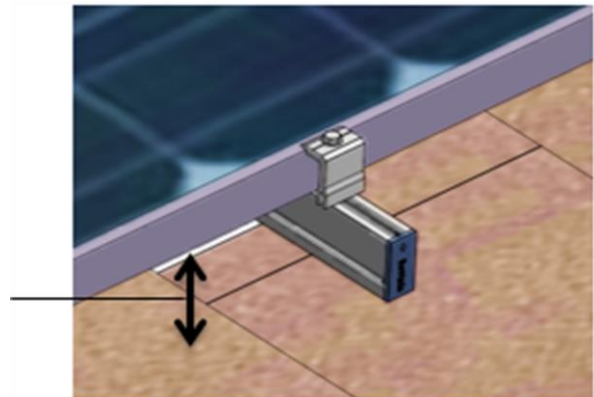
A typical portrait roof layout features two East-West rails mounted to North-South roof rafters with an L-Foot. Mid Clamps are used between PV panels, they will produce 1/2" spacing between PV panel frames. End Clamps are used to secure PV panels at the ends of a row.



### Minimum Panel Height

Minimum leading edge height to meet a UL1703 PV module fire standard is 3 inches.

3 inch minimum  
from bottom of PV module frame to the roof  
covering

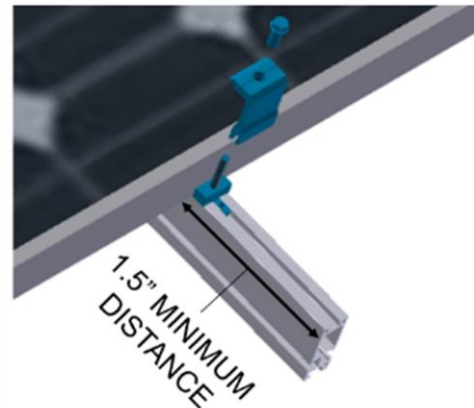


### End Clamp Attachment

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.

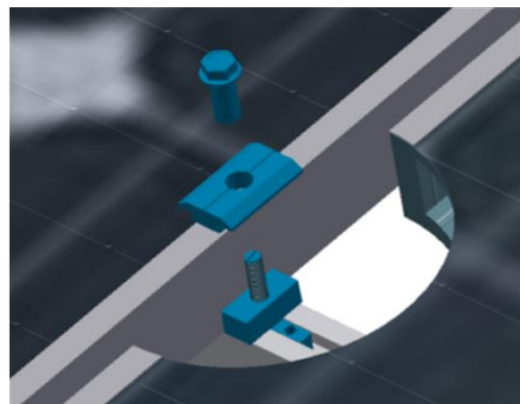
Note: When two or more PV panels are installed grounding via the End Clamp is optional. For a single panel configuration (shown), insert the T-Bolt into a T-Bolt Holder for grounding the panel to the Rails.



### 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.

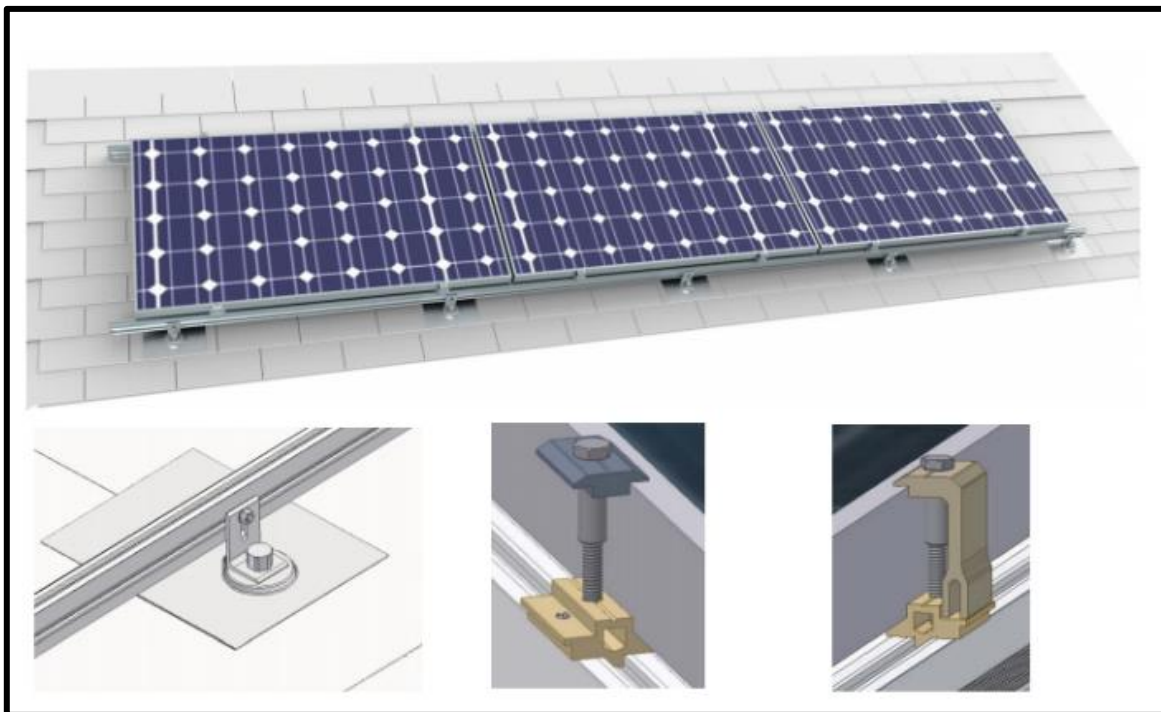
Thread the 1/4-20 Collar Bolt onto the top of the T-Bolt as shown. After positioning the Mid Clamp firmly against the PV panel frame, using a 7/16" socket, tighten to 7.5 ft. lbs.



### **Landscape Panel Configuration:**

The Pitched Roof System conveniently accommodates landscape configurations to minimize roof time and parts required. The system is IBC compliant for roof waterproofing tested by IAPMO, UL 1703 compliant for Class-A Fire Rated for Type 1 and 2 PV Modules and UL 2703 compliant for electrical bonding tested by ETL.

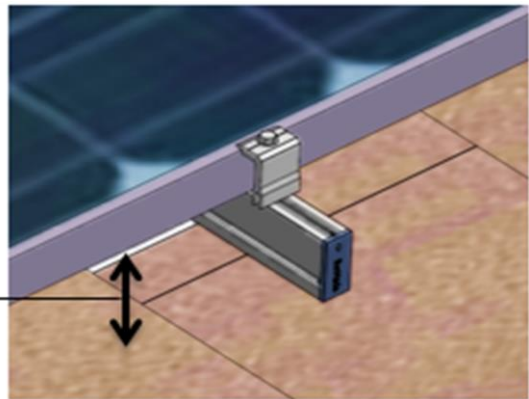
Proceed with the mounting of the PV panels using the Mid and End Clamps. Specific mounting instructions are shown in the following section for landscape mounting. Mid Clamps are used between PV panels, they will produce 1/2" spacing between PV panel frames. End Clamps are used to secure PV panels at the ends of a row. Note that the PV panels are clamped on the long edges as required by most manufacturers.



### Minimum Panel Height

Minimum leading edge height to meet a UL1703 PV module fire standard is 3 inches.

3 inch minimum  
from bottom of PV module frame to the roof  
covering

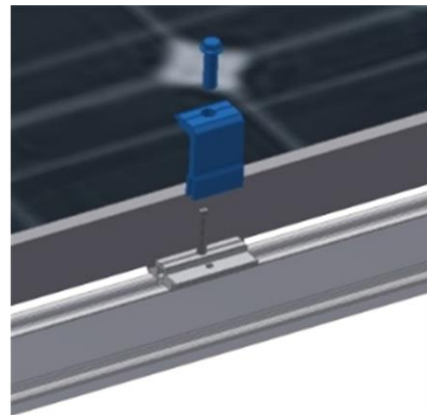


### End Clamp Attachment

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.

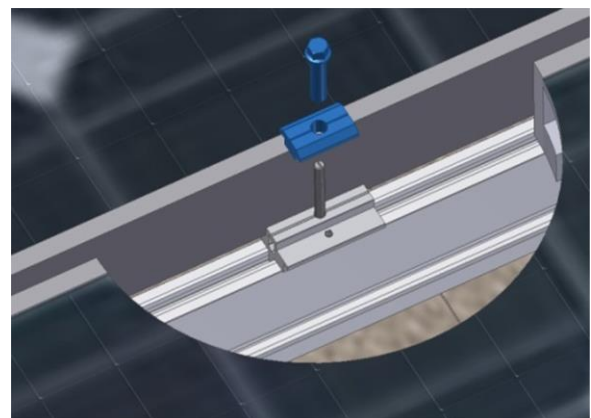
Thread the 1/4" Collar Bolt onto the top of the T-Bolt as shown. After positioning the End Clamp firmly against the PV panel frame, using a 7/16" socket, tighten to 7.5 ft. lbs.



### Mid Clamp Attachment

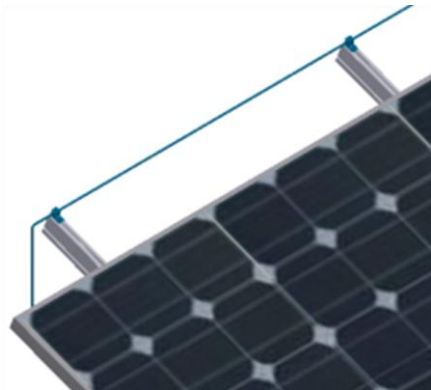
Insert the T-Bolt in the Rail slot and turn clockwise 90° to engage the head into the slot. Insert Grounding T-Bolt Holder to lock T-Bolt in place.

Thread the 1/4" 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.



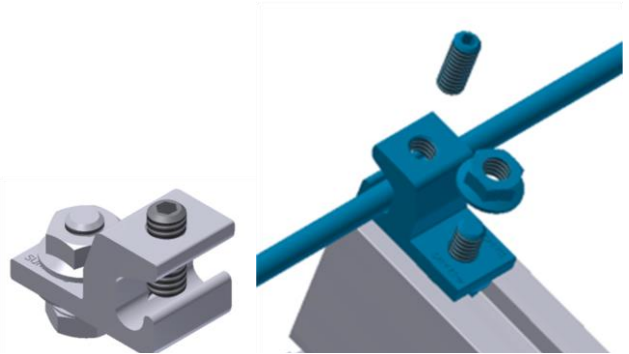
### Ground Wire Attachment

The picture shows a grounding lug mounted on both Rails at the end of each row and a #6 solid copper grounding wire connecting the Ground Lugs to the building ground per NEC 690.47.



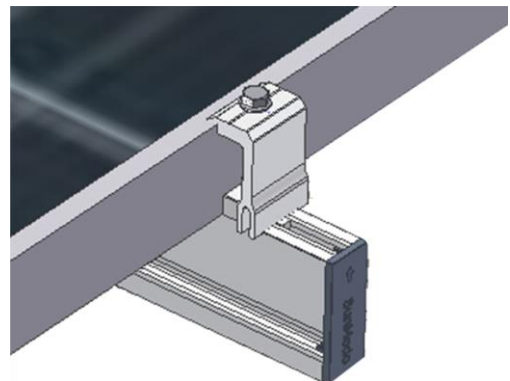
### Ground Lug Installation

At the end of the row, both Rails 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.





**Table of Clamp Bolt Lengths and Part Numbers**

<b>Clamps</b>	<b>Part # End</b>	<b>Part # Mid</b>	<b>Size</b>	<b>"T" Bolt in.</b>	<b>"T" Bolt PN</b>
Portrait	K10224-131	K10180-001	31 mm	1.77	B20015-012
Portrait	K10224-133	K10180-001	33 mm	1.77	B20015-012
Portrait	K10224-140	K10180-001	40 mm	1.77	B20015-012
Portrait	K10224-142	K10180-001	42 mm	1.77	B20015-012
Portrait	K10224-144	K10180-001	44 mm	1.77	B20015-012
Portrait	K10224-146	K10180-001	46 mm	1.77	B20015-012
Portrait	K10224-150	K10180-001	50 mm	1.77	B20015-012

<b>Clamps</b>	<b>Part # End</b>	<b>Part # Mid</b>	<b>Size</b>	<b>"T" Bolt in.</b>	<b>"T" Bolt PN</b>
Landscape	K10183-131	K10182-001	31 mm	2.10	B20015-002
Landscape	K10183-133	K10182-001	33 mm	2.10	B20015-002
Landscape	K10183-140	K10182-001	40 mm	2.10	B20015-002
Landscape	K10183-142	K10182-001	42 mm	2.10	B20015-002
Landscape	K10183-144	K10182-001	44 mm	2.10	B20015-002
Landscape	K10183-146	K10182-001	46 mm	2.10	B20015-002
Landscape	K10183-150	K10182-001	50 mm	2.10	B20015-002

Collar Nut					B20025-001
------------	--	--	--	--	------------

This table shows the nominal T-Bolt lengths for various PV Panels commonly used in the industry.

See [www.sunmodo.com](http://www.sunmodo.com) for current warranty documents and information.

SunModo Corporation  
Ph: 360-844-0048