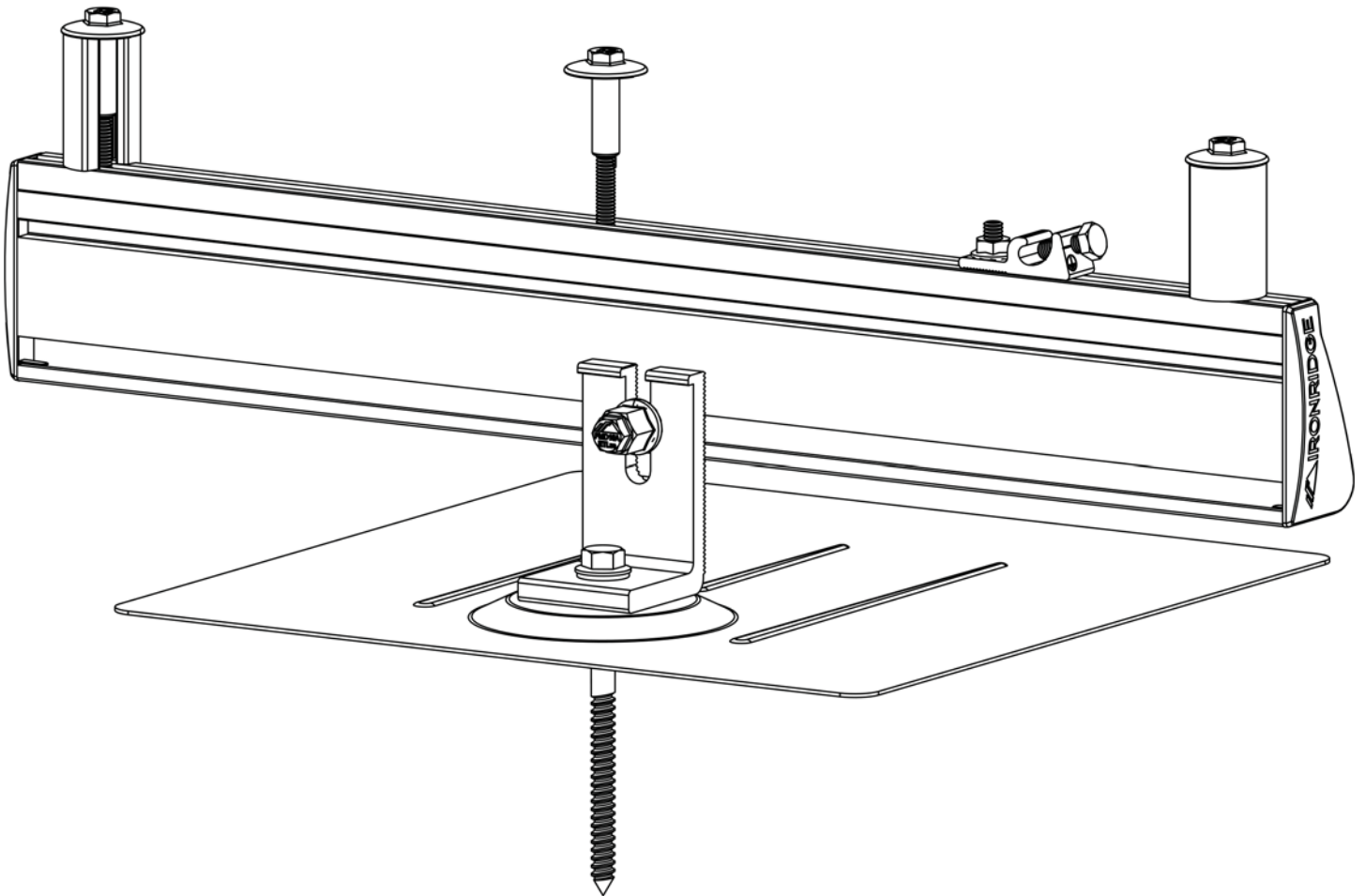


FLUSH MOUNT

INSTALLATION MANUAL

IRONRIDGE



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DISCLAIMER

This manual describes the proper installation procedures and provides minimum standards required for product reliability and warranty. Thoroughly understanding this manual is imperative to proper installation; failure to follow the guidelines set forth can result in property damage, bodily injury, or even death.

IT IS THE INSTALLER'S RESPONSIBILITY TO:

- All electrical installation and procedures should be conducted by a licensed and bonded electrician. Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system.
- Comply with all applicable local or national building and fire codes, including any that may supersede this manual.
- Ensure all products are appropriate for the installation, environment, and array under the site's loading conditions.
- Use only IronRidge parts or parts recommended by IronRidge; substituting parts may void any applicable warranty.
- Review the [Design Assistant](#), [Engineering Design Guide](#), and [Certification Letters](#) to confirm design specifications.
- Refer to Ironridge's Structural Certification letters for state specific design conditions including allowable rail spans, cantilever length, and splice location requirements.
- Comply with all applicable fire codes including, but not limited to, keeping walkways clear and avoiding obstacles
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installer's responsibility.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- If loose components or loose fasteners are found during periodic inspection, re-tighten immediately. If corrosion is found, replace affected components immediately.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.
- Disconnect AC power before servicing or removing microinverters and power optimizers.

RATINGS

UL 2703 LISTED



#5003288

#5003320

#5004376

- Conforms to ANSI/UL 2703 (2015) Standard for Safety First Edition: Mounting Systems, Mounting Devices, Clamping/Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels
- Max Overcurrent Protective Device (OCPD) Rating: 25A
- Max Module Size: 24ft²
- Module Orientation: Portrait or Landscape
- Mechanical Load Rating: meets minimum requirements of the standard (10 PSF downward, 5 PSF upward, 5 PSF lateral). Actual system structural capacity is defined by PE stamped certification letters.

CLASS A SYSTEM FIRE RATING PER UL 1703

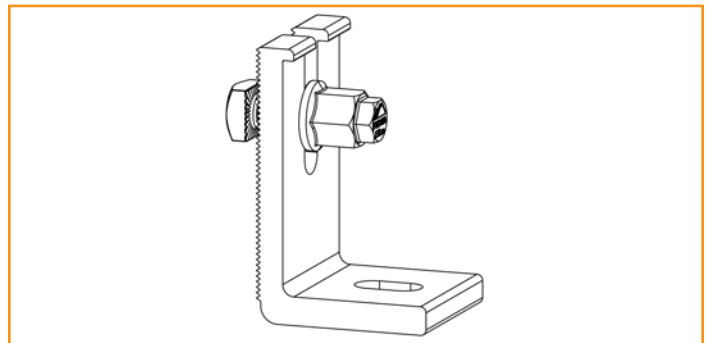
- Any Roof Slope with Module Types 1, 2, and 3
- Any module-to-roof gap is permitted, with no perimeter guarding required. This rating is applicable with any third-party attachment.
- Class A rated PV systems can be installed on Class A, B, and C roofs without affecting the roof fire rating.

STRUCTURAL CERTIFICATION

- Designed and Certified for Compliance with the International Building Code & ASCE/SEI-7

MARKINGS

Product markings are located on the 3/8" flange hex nut.



CHECKLIST

PRE-INSTALLATION

- ☐ Verify module compatibility. See [Page 9](#) for info.

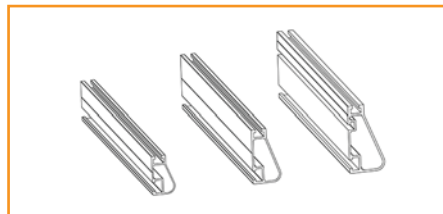
TOOLS REQUIRED

- ☐ Cordless Drill (non-impact)
- ☐ Impact Driver (for lag bolts)
- ☐ Torque Wrench (0-250 in-lbs)
- ☐ 5/16" Socket
- ☐ 7/16" Socket
- ☐ 1/2" Socket
- ☐ String Line

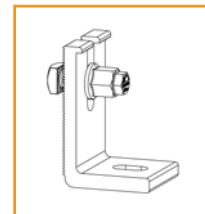
TORQUE VALUES

- ☐ FlashFoot Lag Bolts (1/2" Socket): Fully seat
If using LFT-002SE, use 7/16" Socket
- ☐ L-Feet Nuts (7/16" Socket): 250 in-lbs
- ☐ Bonded Splice Screws (5/16" Socket): 20 in-lbs
- ☐ Grounding Lug Nuts (7/16" Socket): 80 in-lbs
- ☐ Grounding Lug Terminal Screws (7/16 Socket): 20 in-lbs
- ☐ Universal Fastening Object (7/16" Socket): 80 in-lbs
- ☐ Expansion Joint Nuts (7/16" Socket): 80 in-lbs
- ☐ Flush Standoffs (1/2" Socket): 140 in-lbs
- ☐ Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs
- ☐ 3/8" Bonding Hardware Kit Nuts (7/16" Socket): 250 in-lbs

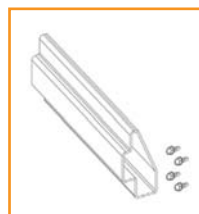
IRONRIDGE COMPONENTS



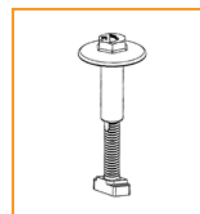
XR Rail



L-Foot



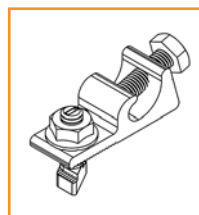
Bonded Splice



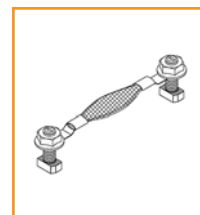
UFO



Stopper Sleeve



Grounding Lug



Expansion Joint



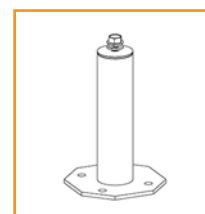
FlashFoot™



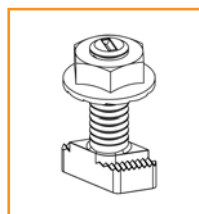
End Cap



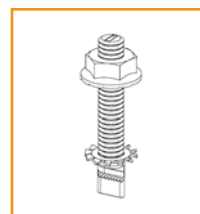
Wire Clip



Flush Standoff



Microinverter Kit



Frameless
Module Kit



3/8" Bonding
Hardware Kit

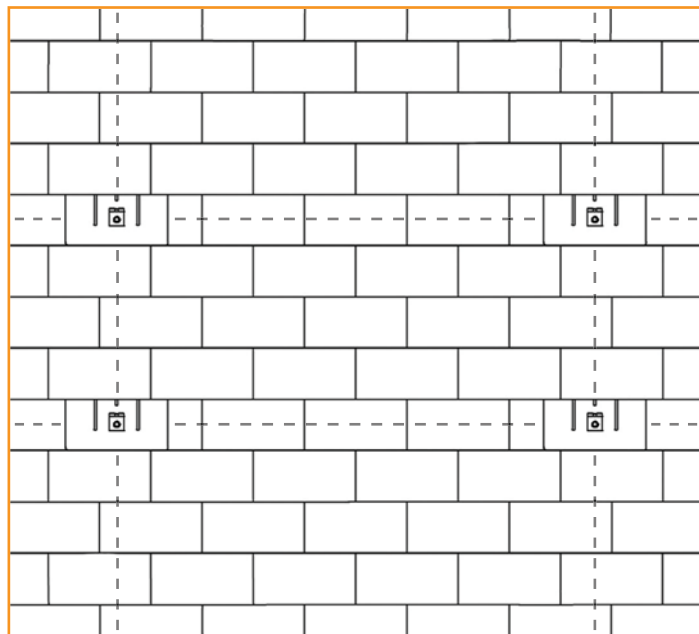
💡 If using previous version of: Integrated Grounding Mid Clamps, Grounding Lug, End Clamps, and Expansion Joints please refer to Alternate Components Addendum version 1.0

1. ATTACH BASES

Install roof attachments. Mount Slotted L-Feet on FlashFoot or other compatible roof attachments per manufacturer's instructions.

- 💡 IronRidge's all-in-one FlashFoot roof attachment is for pitched, composition shingle roofs. Refer to [Page 7](#) or [provided manual](#).
- 💡 Tested or evaluated third-party roof attachments:
 - [Anchor Products](#) - U-Anchor
 - S-5! [Standing Seam Metal Roof Clamps](#) - Certification of metal roof clamps includes bonding to both painted and galvalume metal roofs. Tighten clamp set screws to 130-150 in-lbs (≥ 24 gauge) or 160-180 in-lbs (22 gauge) roofs. Tighten S-5! M10 bolt to 240 in-lbs or S-5! Mini M8 bolt to 156 in-lbs.
 - EcoFasten [Green Fasten GF-1 Anchors](#)
 - QuickMount PV [Roof Mounts](#) and [Tile Hooks](#) - Tile Hook attaches to XR Rail using 3/8" Bonding Hardware Kit torqued to 250 in-lbs.
 - Quickscrews Solar Roof Hooks, Ejot Aluminum Roof Hooks, or Unirac Creotec Tile Hooks - Attach to XR Rails using either L-Foot Kit or 3/8" Bonding Hardware Kit torqued to 250 in-lbs.

💡 Refer to [Page 7](#) for installing Standoffs



2. PLACE RAILS

A. CONNECT SPLICES

Use Bonded Splices, when needed, to join multiple sections of rail. Insert Bonded Splice 6" into first rail and secure with two self-drilling screws, spacing them approximately 1" apart and tightening to **20 in-lbs**. Slide second rail over Bonded Splice and secure with two more self-drilling screws.

- 💡 Rows exceeding 100 feet of rail must use [Expansion Joints](#).
- 💡 For XR10 and XR100 rails, insert screws along the provided lines.
- 💡 Refer to Structural Certification letters for rail splice location requirements.
- 💡 Screws can be inserted on front or back of rails.
- 💡 If using Bonding Bolt Rail Splices, refer to addendum (version 1.0).

B. PREPARE HARDWARE

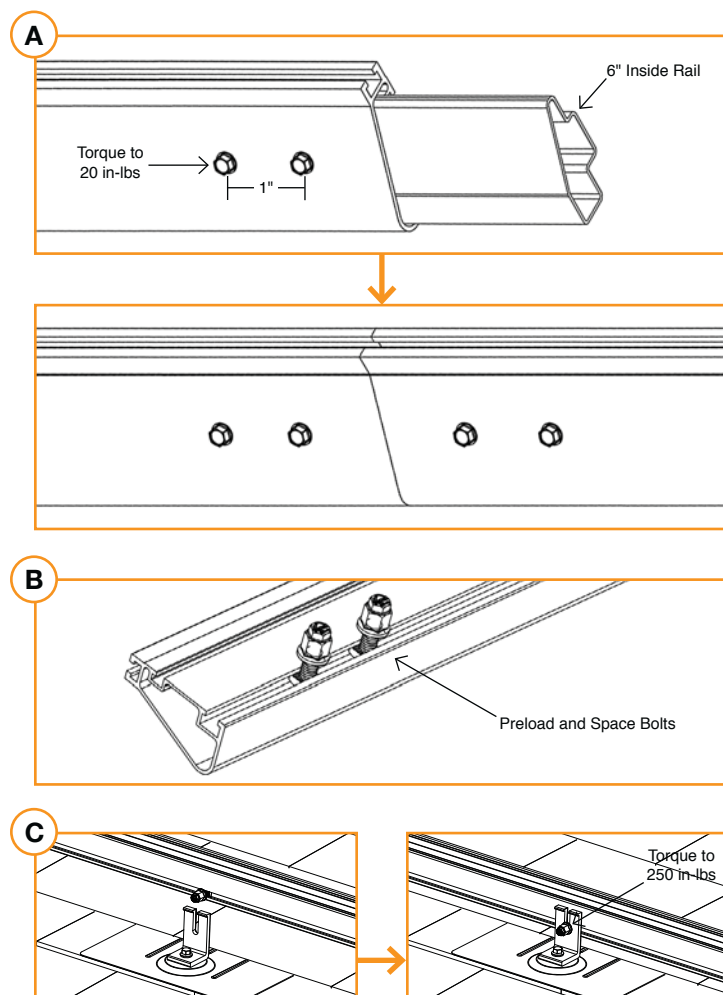
On the ground, slide square-headed 3/8"-16 hardware into side-facing rail slot. Space out bolts to match L-Feet spacing.

- 💡 Tape ends of rail, to keep bolts from sliding out while moving.

C. ATTACH RAILS

Drop rail with hardware into Slotted L-Feet. Level rail at desired height, then torque to **250 in-lbs**.

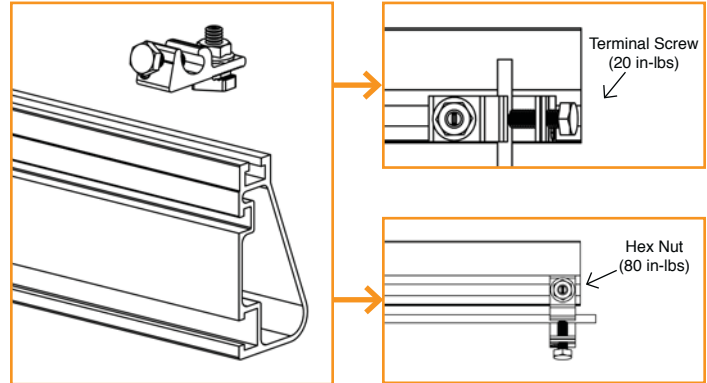
- 💡 Rail and L-Feet can face either upslope or downslope on roof.



3. SECURE LUGS

Insert T-bolt in top rail slot and torque hex nut to **80 in-lbs**. Install a minimum 10 AWG solid copper or stranded grounding wire. Torque terminal screw to **20 in-lbs**.

- 💡 Grounding Lugs are only needed on one rail per row of modules (unless frameless modules are being used, see [Page 8](#)).
- 💡 If using Enphase microinverters, Grounding Lugs may not be needed. See [Page 8](#) for more information.
- 💡 Grounding Lugs can be installed anywhere along the rail and in either orientation shown.

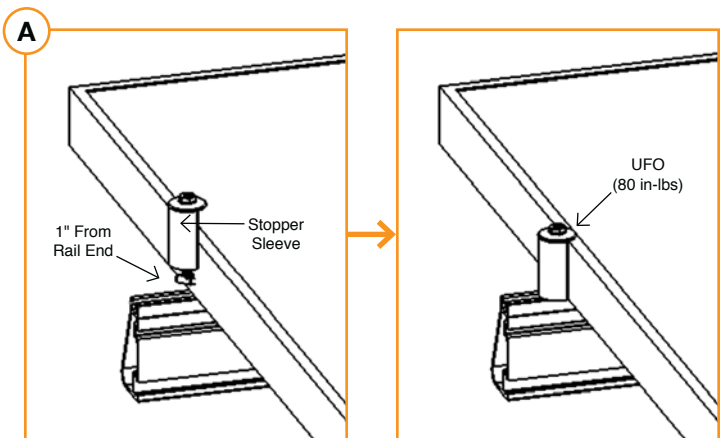


4. SECURE MODULES

A. SECURE FIRST END

Place first module in position on rails, a minimum of 1" from rail ends. Snap Stopper Sleeves onto UFO. Fasten module to rail using the UFO, ensuring that the UFO is hooked over the top of the module. Torque to **80 in-lbs**.

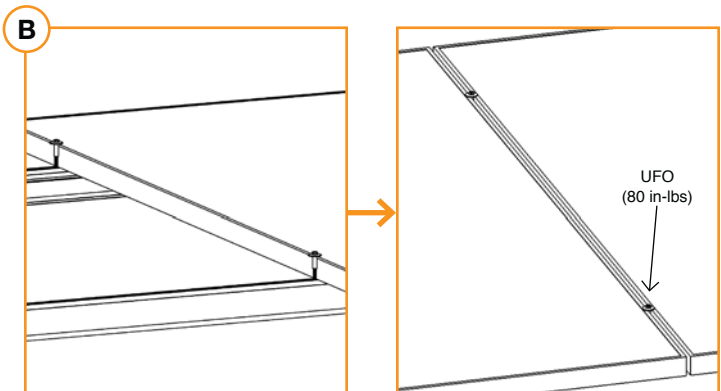
- 💡 Ensure rails are square before placing modules.
- 💡 Hold Stopper Sleeves on end while torquing to prevent rotation.



B. SECURE NEXT MODULES

Place UFO into each rail, placing them flush against first module. Slide second module against UFO. Torque to **80 in-lbs**. Repeat for each following module.

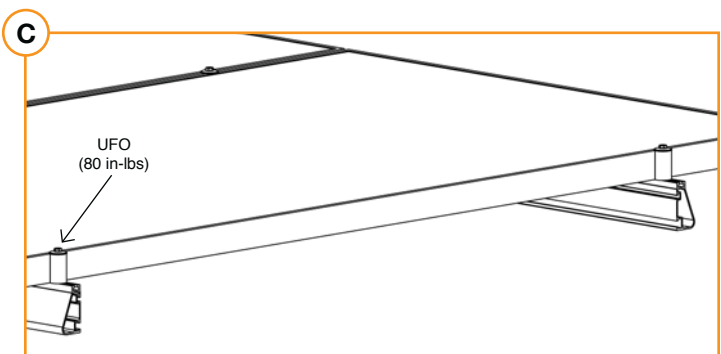
- 💡 When reinstalling UFO, move modules a minimum of 1/16" so UFOs are in contact with a new section of module frame.
- 💡 If using Wire Clips, refer to [Page 7](#).



C. SECURE LAST END

Place last module in position on rails, a minimum of 1" from rail ends. Snap Stopper Sleeves onto UFO. Secure UFO Clamps on rails, ensuring they are hooked over top of module. Torque to **80 in-lbs**.

- 💡 Hold Stopper Sleeves on end while torquing to prevent rotation.
- 💡 Repeat all steps for each following row of modules.



EXPANSION JOINTS

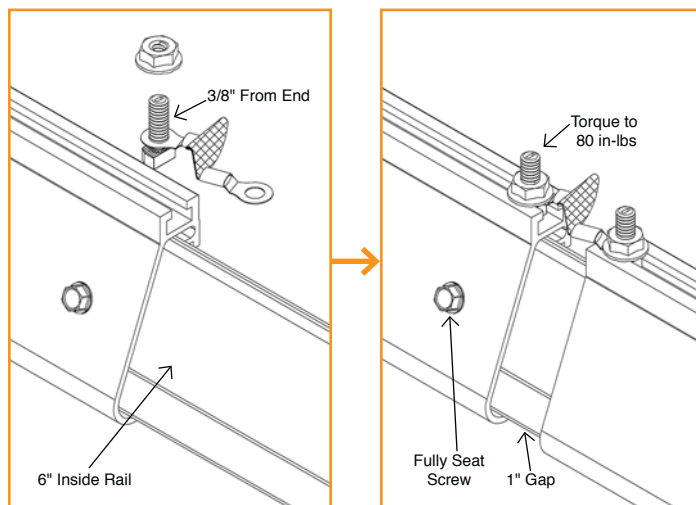
GROUNDING STRAP EXPANSION JOINT

Grounding Strap Expansion Joints are required for thermal expansion of rows exceeding 100 feet of rail.

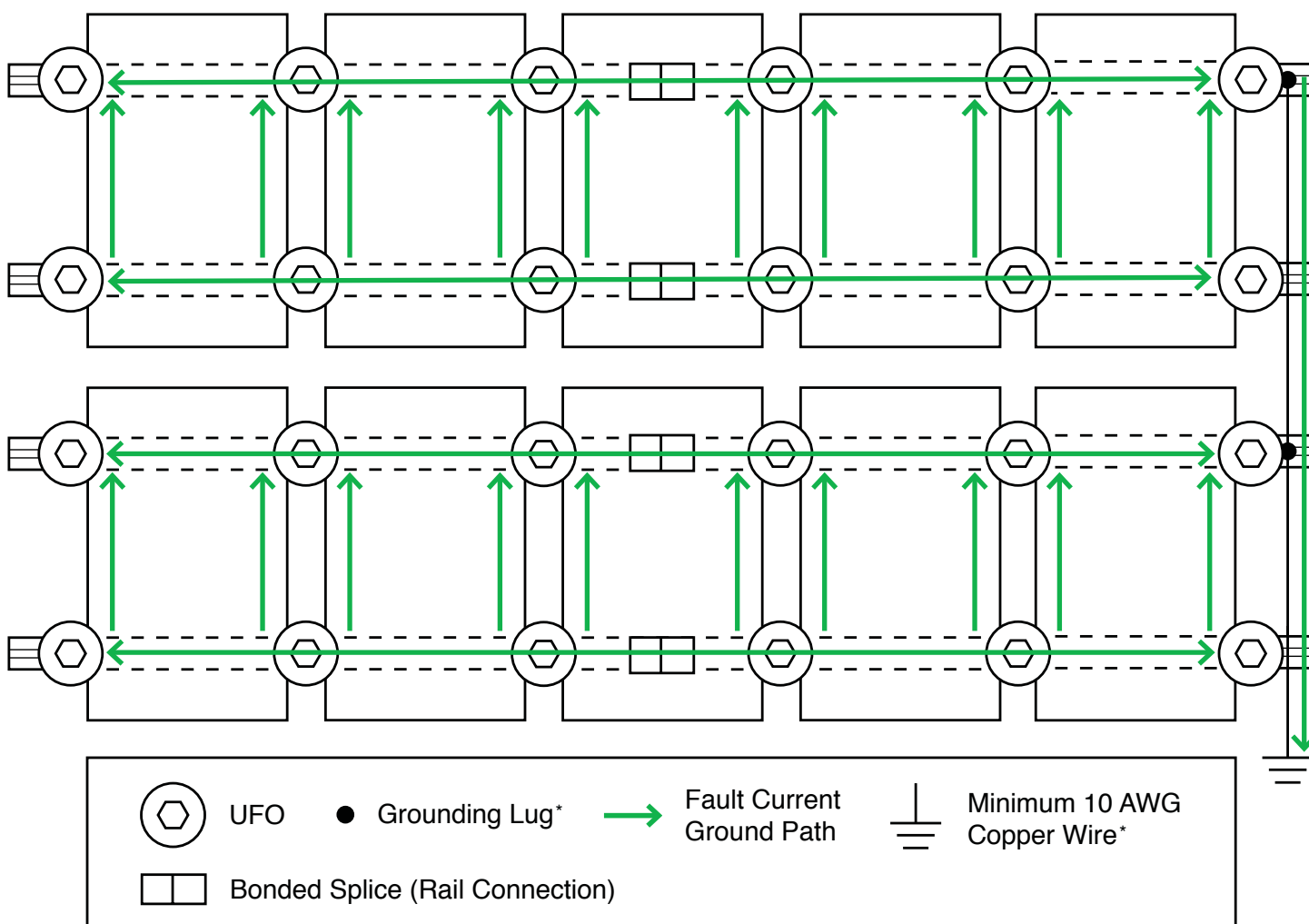
Insert Internal Splice into first rail and secure with screw. Assemble and secure Grounding Strap 3/8" from rail end. Slide second rail over Internal Splice leaving 1" gap between rails. Attach other end of Grounding Strap with hardware, and torque hex nuts to **80 in-lbs**.

💡 **Second Bonded Splice screw is not used with Expansion Joints.**

💡 **Do not install module over top of expansion joint location.**



ELECTRICAL DIAGRAM

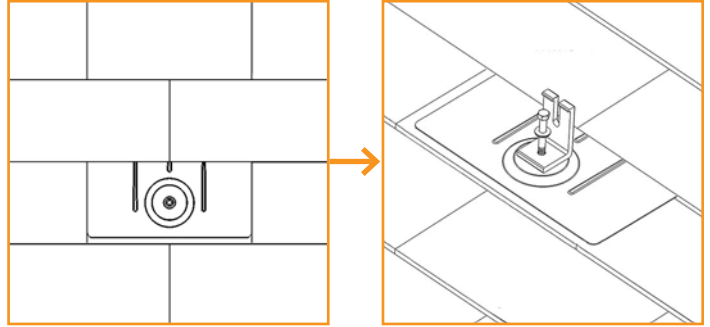


*Grounding Lugs and Wire are not required in systems using Enphase microinverters.

FLASHFOOT

Locate roof rafters and mark locations on roof. Drill 1/4" pilot holes and backfill with approved sealant. Slide flashing between 1st and 2nd course of shingles ensuring flashing doesn't overhang the downhill shingle. Line up pilot hole and insert supplied 5/16 x 4.5" stainless steel lag bolt through washer, L-Foot, and flashing. Fully seat lag bolt.

💡 L-Foot can face either upslope or downslope on roof.

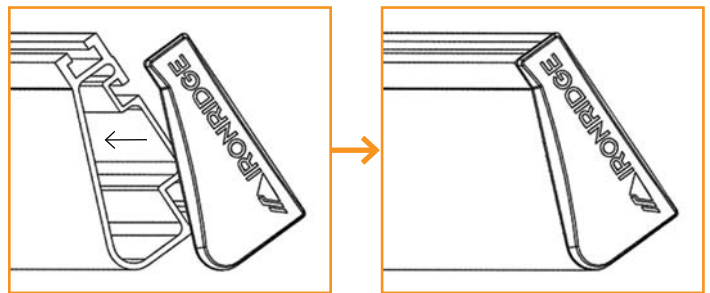


END CAPS

End Caps add a completed look and keep debris and pests from collecting inside rail.

Firmly press End Cap onto rail end.

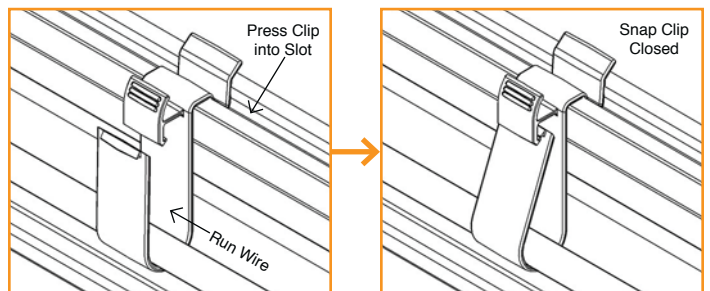
💡 End Caps come in sets of left and right. Check that the proper amount of each has been provided.



WIRE CLIPS

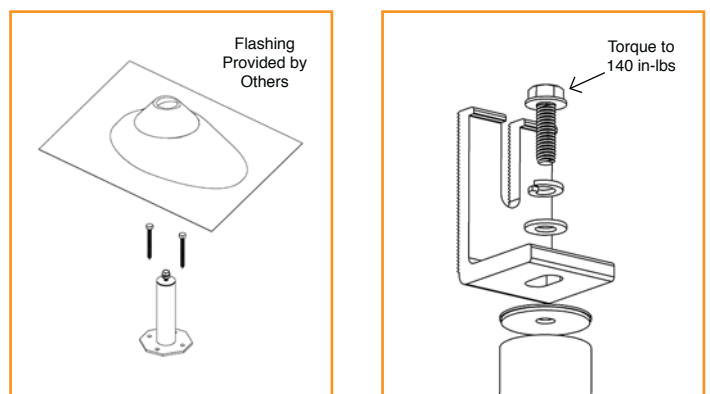
Wire Clips offer a simple wire management solution.

Firmly press Wire Clip into top rail slot. Run electrical wire through open clip. Snap closed once all wires have been placed.



FLUSH STANDOFFS

Attach Standoffs to roof locations with lag bolts (not included). Place flashing over Standoff. Attach L-Foot on Standoff washer with hardware. Torque to **140 in-lbs**.



MICROINVERTER KITS

Use IronRidge's Microinverter Kit to bond compatible microinverters and power optimizers to the racking system.

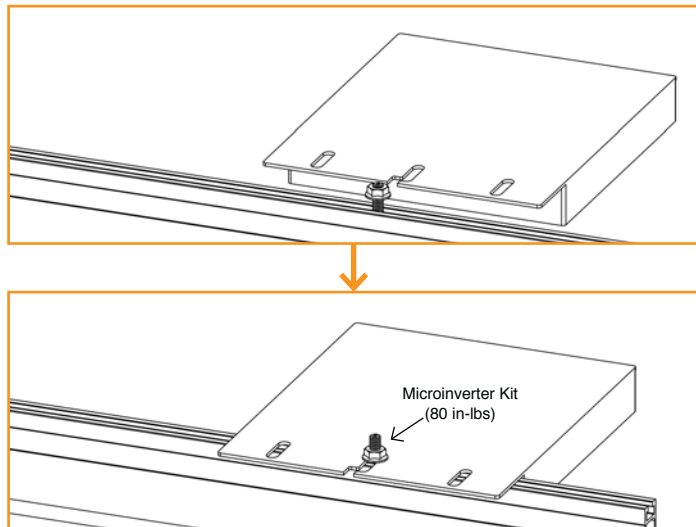
Insert Microinverter Kit T-bolt into top rail slot. Place compatible microinverter or power optimizer into position and tighten hex nut to **80 in-lbs**.

COMPATIBLE PRODUCTS

Enphase - M250-72, M250-60, M215-60, and C250-72

Darfon - MIG240, MIG300, G320, G640

Solar Edge - P300, P320, P400, P405, P600, P700, P730



SYSTEMS USING ENPHASE MICROINVERTERS

IronRidge systems using approved Enphase products eliminate the need for lay-in lugs and field installed equipment grounding conductors (EGC). This solution meets the requirements of UL 2703 for bonding and grounding and is included in this listing.

The following Enphase products are included in this listing: Microinverters M250-72, M250-60, M215-60, C250-72, and Engage cables ETXX-240, ETXX-208, ETXX-277.

💡 A minimum of two inverters mounted to the same rail and connected to the same Engage cable are required.

💡 The microinverters must be used with a maximum 20 A branch rated overcurrent protection device (OCPD).

FRAMELESS MODULE KITS

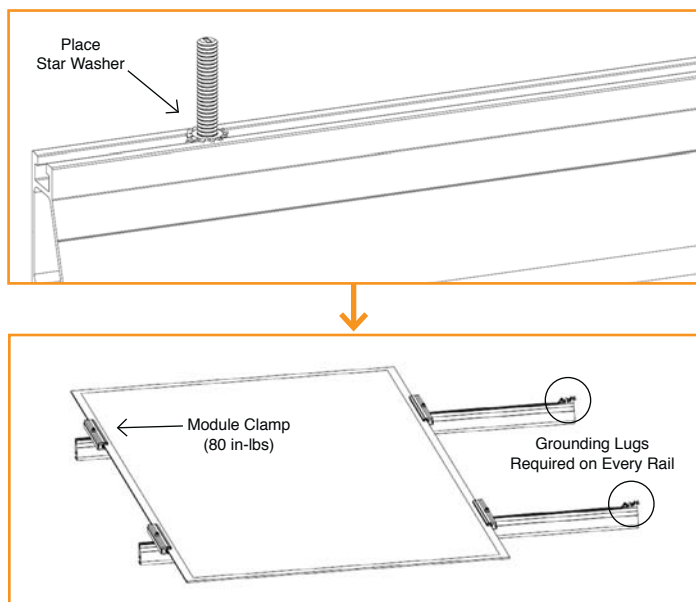
Insert Frameless Kit T-bolt in top rail slot. Place star washer over T-bolt, allowing it to rest on top of rail. Secure module clamps with a hex nut and torque to **80 in-lbs**.

💡 Tested or evaluated third-party module clamps:

- Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTEC-200(B) end clamps.
- Sunpreme silver or black mid and end clamps with part numbers 7500105X where X can be 1,5,6 or 7

💡 Follow module manufacturer's installation instructions to install the module clamps.

💡 Frameless modules require using a Grounding Lug on every rail.



MODULE COMPATIBILITY

The Flush Mount 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. Unless otherwise noted, “xxx” refers to the module power rating and both black and silver frames are included in the certification.

MANUFACTURER	MODELS
Astronergy Solar	Modules with 35, 40, and 45mm frames and model identifier aaSM66yyPzz-xxx; where “aa” can be CH or A; “yy” can be either 10 or 12; “zz” can be blank or (BL). Unframed modules with model identifier CHSM6610P(DG)-xxx.
Canadian Solar	Modules with 40mm frames and model identifier CS6Y-xxxZ; where “Y” can be K, P, V, or X; and “Z” can be M, P, PX, or P-SD. Unframed modules with model identifier CS6Y-xxxP-FG; where “Y” is K or X.
ET Solar	Modules with 35, 40, and 50mm frames and model identifier ET-Y6ZZxxxAA; where “Y” can be P, L, or M; “ZZ” can be 60 or 72; and “AA” can be WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC.
GigaWatt Solar	Modules with 40mm frames and model identifier GWxxxYY; where “YY” can be either PB or MB.
Hanwha Solar	Modules with 40, 45, and 50mm frames and model identifier HSLaaP6-YY-1-xxxZ; where “aa” can be either 60 or 72; “YY” can be PA or PB; and “Z” can be blank or B.
Hanwha Q CELLS	Modules with 32, 35, 40, and 42mm frames and model identifier Q.YY-ZZ-xxx; where “YY” can be PLUS, PRO, or PEAK; and “ZZ” can be G3, G4, L-G2, L-G3y, L-G4y, BFR-G3, BLK-G3, BFR-G4, BFR-G4.1, or G4.1/SC.
Hyundai	Modules with 35 and 50mm frames and model identifier HiS-YxxxZZ; where “Y” can be M or S; and “ZZ” can be MI, MF, MG, SG, RI, RG, TI, or TG.
JA Solar	Modules with 40 and 45mm frames and model identifier JAyyzz-bb-xxx/aa; where “yy” can be M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L)(TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 60, or 72; and “aa” can be MP, SI, PR, 3BB, 4BB, 4BB/RE.
Jinko	Modules with 35 and 40mm frames and model identifier JKMxxxZZ; where “Y” can either be blank or S; and “ZZ” can be M, P, PP, P-B, or P-V. Unframed modules with model identifier JKMxxxPP-DV.
Kyocera	Modules with 46mm frames and model identifier KYxxxZZ-AA; where “Y” can be D or U; “ZZ” can be blank, GX, or SX; and “AA” can be LPU, LFU, UPU, LPS, LPB, LFB, LFBs, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, or 8BC.
LG	Modules with 35, 40, and 46mm frames and model identifier LGxxx1z-bb; where “y” can be A, N, or S; “z” can be C or K; and “bb” can be A3, B3, G3, C4 or K4.
Mistubishi	Modules with 46mm frames and model identifier PV-MYYxxxZZ; where “YY” can be LE or JE; and “ZZ” can be either HD, HD2, or FB.
Motech	IM and XS series modules with 40, 45, and 50mm frames.
Panasonic	Modules with 35mm frames and model identifier VBHNxxxSAyy; where “yy” can be either 06, 06B, 11, 11B, 15, 15B, 16 or 16B.
Phono Solar	Modules with 35, 40, and 45mm frames and model identifier PSxxxY-ZZ/A; where “Y” can be M or P; “ZZ” can be 20 or 24; and “A” can be F, T or U.
Prism Solar	Unframed modules with model identifier BiYY-xxxBSTC; where “YY” can be 48 or 60.
REC Solar	Modules with 38 and 45mm frames and model identifier RECxxxYYZZ; where “YY” can be M, PE or TP; and “ZZ” can be blank, BLK, SLV, or 72.
Renesola	Modules with 35, 40 and 50mm frames and model identifier JCxxxY-ZZ; where “Y” can be F, M or S; and “ZZ” can be Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, or Db-b.
SolarWorld	Sunmodule Plus, Protect or XL mono or poly modules with 31, 33 or 46mm frames and model identifier SW-xxx.
Stion	Thin film modules with 35mm frames and model identifier STO-xxx. Thin film unframed modules with model identifier STL-xxx.
SunEdison	Modules with 35, 40, and 50mm frames and model identifier SE-YxxxABCDE; where “Y” can be B, F, H, P, R, or Z; “Z” can be 0 or 4; “A” can be B, C, D, E, H, I, J, K, L, M, or N; “B” can be B or W; “C” can be A or C; “D” can be 3, 7, 8, or 9; and “E” can be 0, 1 or 2.
Suniva	Modules with 35, 38, 40, 46, and 50mm frames and model identifiers OPTxxx-AA-B-YYY-Z or MVXxxx-AA-B-YYY-Z; where “AA” is either 60 or 72; “B” is either 4 or 5; “YYY” is either 100,101,700,1B0, or 1B1; and “Z” is blank or B.
Sunpower	SPR-A-xx series with standard (G3) or InvisiMount (G5) 46mm frames; where “A” is either E or X; and “xx” is the series number.
Sunpreme	Unframed modules with model identifier GXB-xxxYY; where “YY” can be blank or SL.
Suntech	Vd, Vem, Wdb, Wde, and Wd series modules with 35, 40, and 50mm frames.
Trina	Modules with 35, 40 and 46mm frames and model identifier TSM-xxxYYZZ; where “YY” can be PA05, PC05, PD05, PA14, PC14, or PD14; and “ZZ” can be blank or A or A.05 or A.08. Unframed modules with model identifier TSM-xxxYY; and “YY” can be either PDG5 or PEG14.
Winaico	Modules with 35 and 40mm frames and model identifier Wsy-xxxz6; where “y” can be either P or T; and “z” can be either M or P.
Yingli	Panda, YGE, and YGE-U series modules with 35, 40, and 50 mm frames.

WARRANTY

Effective for Products manufactured after April 1st, 2012, IronRidge provides the following warranties, for Products installed properly and used for the purpose for which the Products are designed:

(a) Products with finishes (ie excluding without limitation Products that are mill finished) shall be free of visible defects, peeling, or cracking, under normal atmospheric conditions, for a period of three years from the earlier of (i) the date of complete installation of the Product or (ii) 30 days after the original purchaser's date of purchase of the Product ("Finish Warranty"); (b) components shall be free of structurally-related defects in materials for a period of ten years from the earlier of (i) the date of complete installation of the Product or (ii) 30 days after the original purchaser's date of purchase of the Product; and (c) components shall be free of functionally-related manufacturing defects for a period of 20 years from date of manufacture.

The Finish Warranty does not apply to: (d) surface oxidation of the galvanized steel components or any foreign residue deposited on Product finish; and (e) Products installed in corrosive atmospheric conditions, as defined solely by IronRidge; corrosive atmospheric conditions include, but are not limited to, conditions where Product is exposed to corrosive chemicals, fumes, cement dust, salt water marine environments or to continual spraying of either salt or fresh water.

The Finish Warranty is VOID if (f) the practices specified by AAMA 609 & 610-02 – "Cleaning and Maintenance for Architecturally Finished Aluminum" (www.aamanet.org) are not followed by Purchaser for IronRidge's aluminum based components; and (g) if the practices specified by ASTM A780 / A780M - 09 "Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings" are not followed by Purchaser for IronRidge's galvanized steel-based components.

The warranties above do not cover any parts or materials not manufactured by IronRidge, and exclude non-functionally-related defects, as defined solely by IronRidge. The warranties do not cover any defect that has not been reported to IronRidge in writing within 20 days after discovery of such defect.

In the event of breach of or non-compliance with the warranties set forth above, IronRidge's sole obligation and liability, and the sole and exclusive remedy for such breach or non-compliance, shall be correction of defects by repair, replacement, or credit, at IronRidge's sole discretion. Such repair, replacement or credit shall completely satisfy and discharge all of IronRidge's liability with respect to these warranties.

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