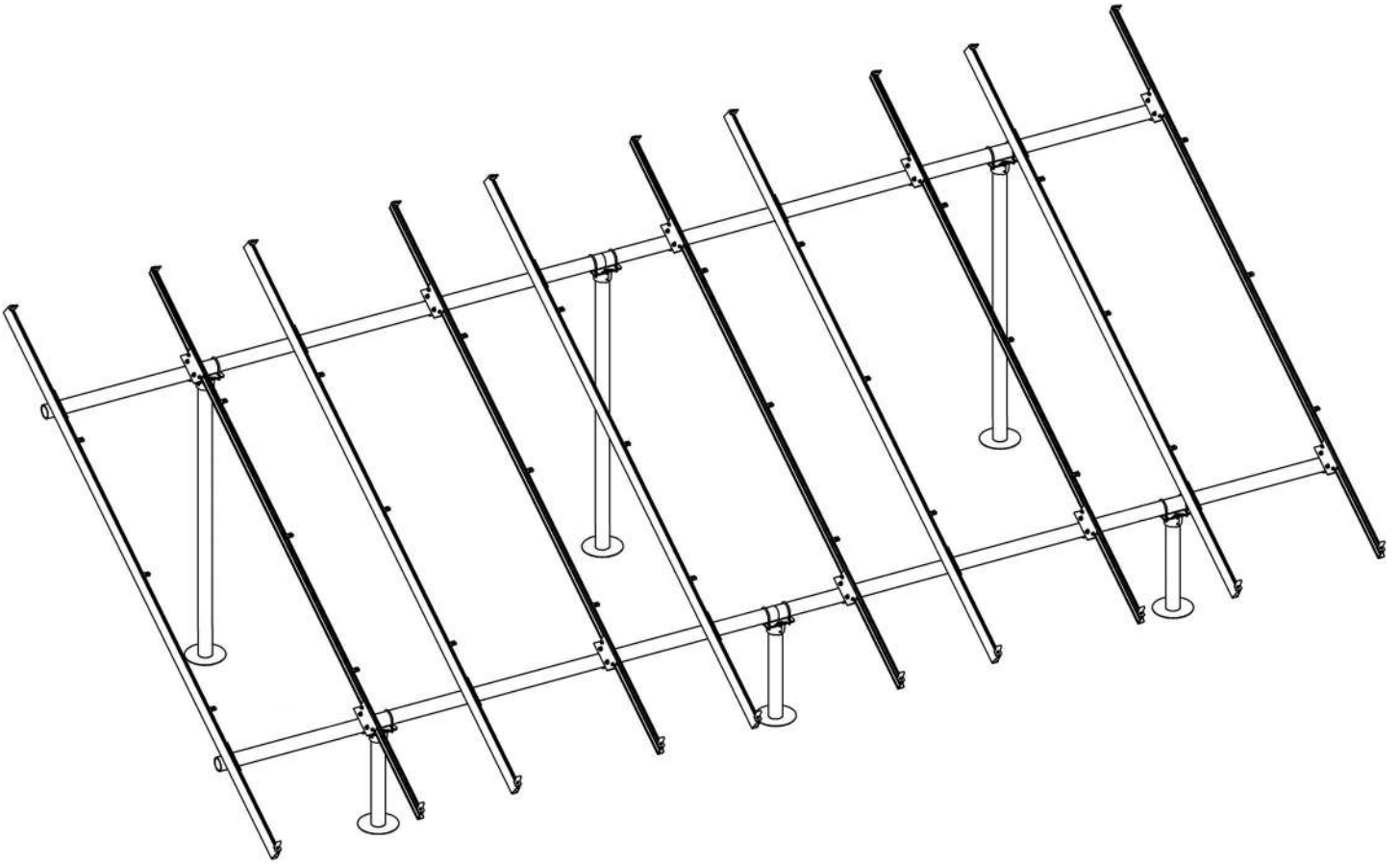


# GROUND MOUNT



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## DISCLAIMER

This manual describes proper installation procedures and provides necessary standards required for product reliability. Warranty details are [available on website](#). All installers must thoroughly read this manual and have a clear understanding of the installation procedures prior to installation. Failure to follow these guidelines may result in property damage, bodily injury or even death.

### IT IS THE INSTALLER'S RESPONSIBILITY TO:

- Ensure that the installation is completed by a licensed solar professional. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor. 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](#) and [Certification Letters](#) to confirm design specifications.
- 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.
- Validate foundation parameters prior to installation, as a local geotechnical report may be required to assess ground conditions. We recommend consulting with a local engineer familiar with local regulations and build site requirements, including soil conditions, terrain and load criteria. All parameters may impact foundation requirements.
- Ensure safe installation of all electrical aspects of the array. All electrical installation and procedures should be conducted by a licensed and bonded electrician or solar contractor. All work must comply with national, state and local installation procedures, product and safety standards.
- Ensure provided information is accurate. Issues resulting from inaccurate information are the installers' 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.
- Review module manufacturer's documentation to ensure compatibility and compliance with warranty terms and conditions.

## RATINGS

### UL 2703 LISTED



#5003225

Intertek

- Conforms to STD 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: 24ft<sup>2</sup>
- Allowable Design 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

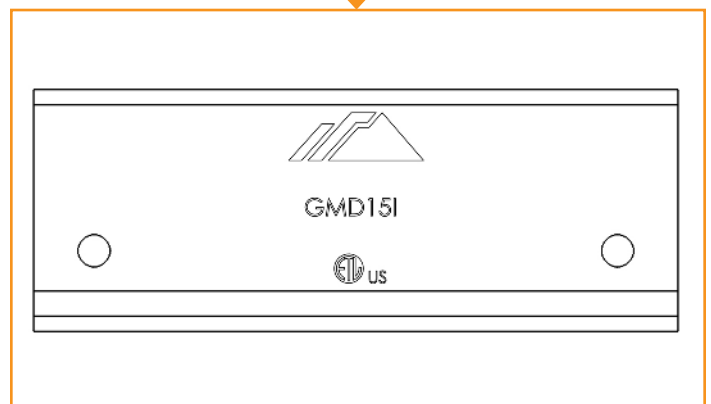
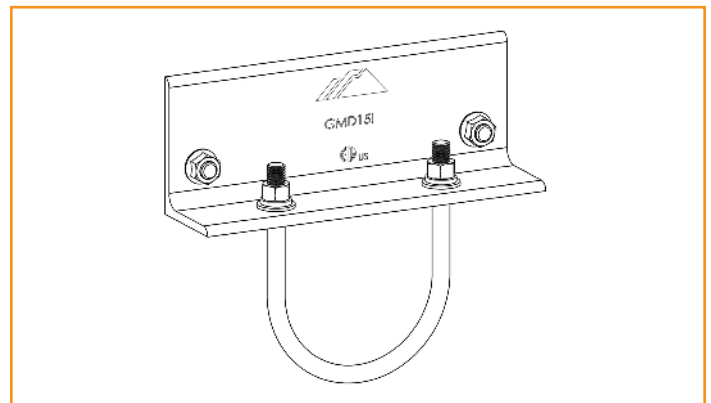
- Not Fire Rated

### STRUCTURAL CERTIFICATION

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

## MARKINGS

Product markings are located on the system's Rail Connectors.



## PRE-INSTALLATION

- Verify module compatibility. See [Page 11](#) for info.
- Purchase 2" or 3" ASTM A53 Grade B Schedule 40 Pipe, galvanized to a min of ASTM A653 G90 or ASTM A123 G35, or 2" or 3" Allied Mechanical Tubing with Gatorshield or FlowCoat Zinc coating (ASTM A1057).

## TOOLS REQUIRED

- Post Hole Digger or Powered Auger
- Socket Drive (7/16", 9/16", and 1/2" Sockets)
- Torque Wrenches (0-240 in-lbs and 10-40 ft-lbs)
- Transit, String Line, or Laser Level
- 3/16" Allen Head

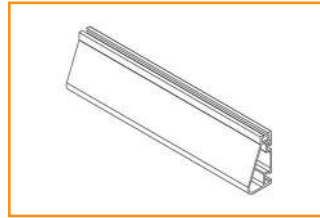
## TORQUE VALUES

- Top Cap Set Screws (3/16" Allen Head)
  - Schedule 40 Pipe: 20 ft-lbs
  - 2" Allied Mechanical Tubing: 11 ft-lbs
  - 3" Allied Mechanical Tubing: 16 ft-lbs
- Top Cap U-Bolt Nuts (9/16" Socket): 15 ft-lbs
- Rail Connector Bracket Nuts (9/16" Socket): 21 ft-lbs
- Rail Connector U-Bolt Nuts (9/16" Socket): 60 in-lbs
- Grounding Lug Nuts (7/16" Socket): 80 in-lbs
- Grounding Lug Terminal Screws (7/16 Socket): 20 in-lbs
- Universal Fastening Objects (7/16" Socket): 80 in-lbs
- Diagonal Brace Set Screws (1/2" Socket): 15 ft-lbs
- Diagonal Brace Bolts (1/2" Socket): 40 ft-lbs
- Microinverter Kit Nuts (7/16" Socket): 80 in-lbs
- Frameless Module Kit Nuts (7/16" Socket): 80 in-lbs

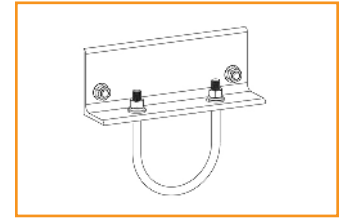
💡 If using previous version of: Integrated Grounding Mid Clamps, Grounding Lug, End Clamps, and Expansion Joints please refer to Alternate Components Addendum (Version 1.20).

💡 If installing on a low slope roof please refer to Ground Mount for Flat Roof Applications Addendum (Version 1.30).

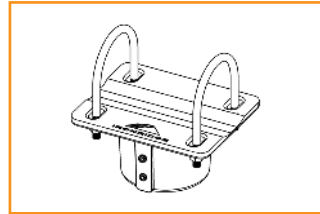
## IRONRIDGE COMPONENTS



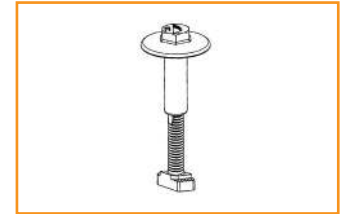
XR1000 Rail



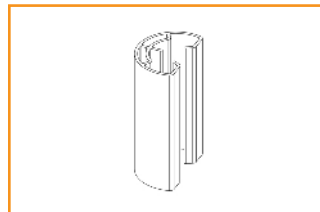
Rail Connector



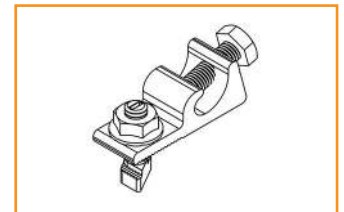
Top Cap



UFO



Stopper Sleeve



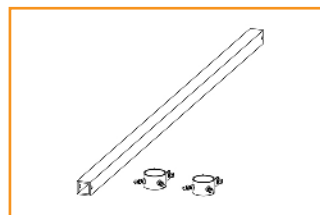
Grounding Lug



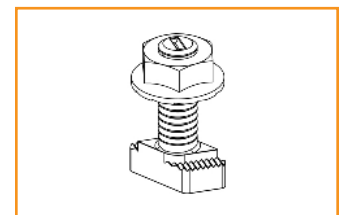
End Cap



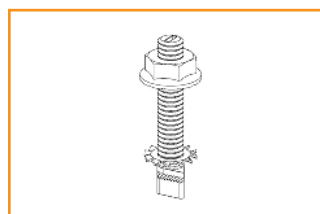
Wire Clip



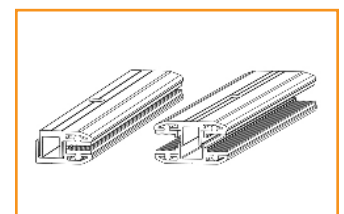
Diagonal Brace



Microinverter Kit



Frameless Module Kit



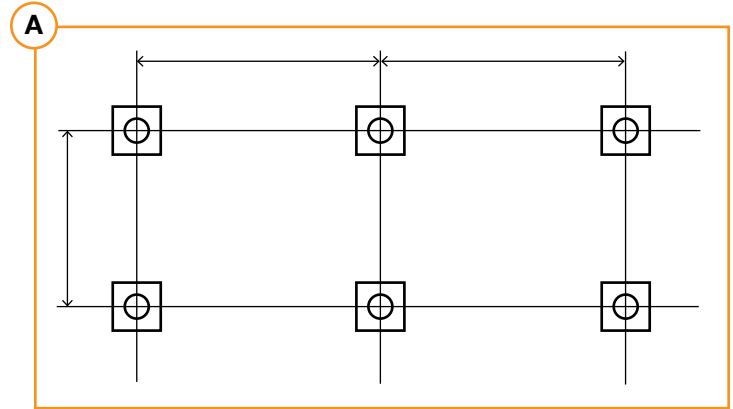
Frameless End/Mid Clamp

## 1. BUILD BASE

### A. MARK LOCATIONS

Establish pier locations. Once grid of pier locations has been set, verify all angles are square.

💡 Spacing varies with load conditions. Consult engineering specs.

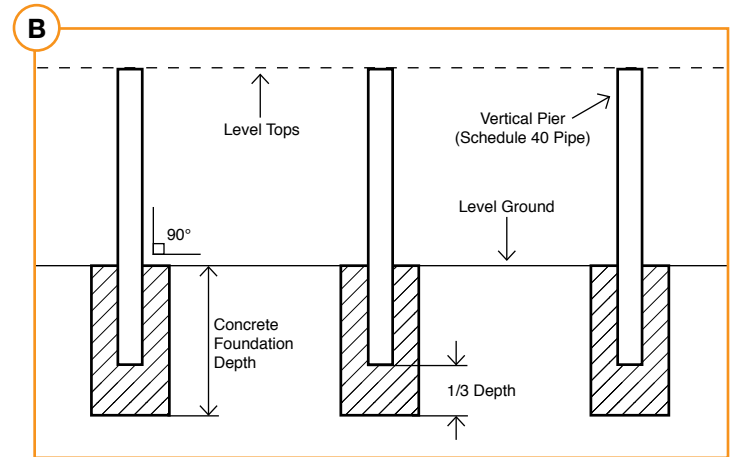


### B. POSITION PIERS

Excavate the foundation holes. Insert vertical piers into foundation holes, and pour in concrete mixture. Ensure vertical piers are plumb, level, square, and placed in parallel rows. Level the tops so they are even.

💡 Brace piers until concrete foundation has cured.

💡 In some cases, cross bracing is required to provide extra support for piers. If required, install [Diagonal Braces](#) at this time.

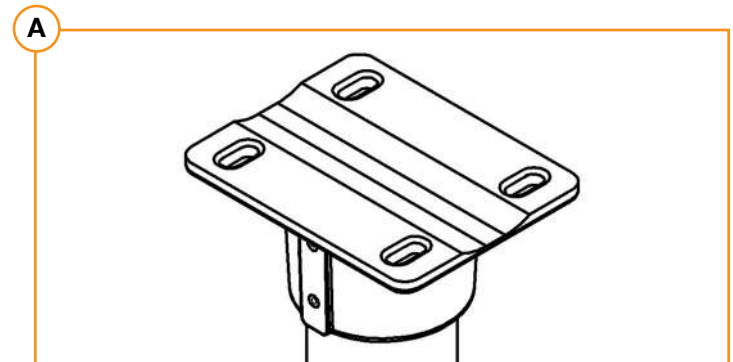


## 2. CONNECT SUBSTRUCTURE

### A. MOUNT TOP CAPS

Mount a Top Cap on each pier. Wait to tighten set screws.

💡 If using [Diagonal Braces](#), install them prior to Top Caps.

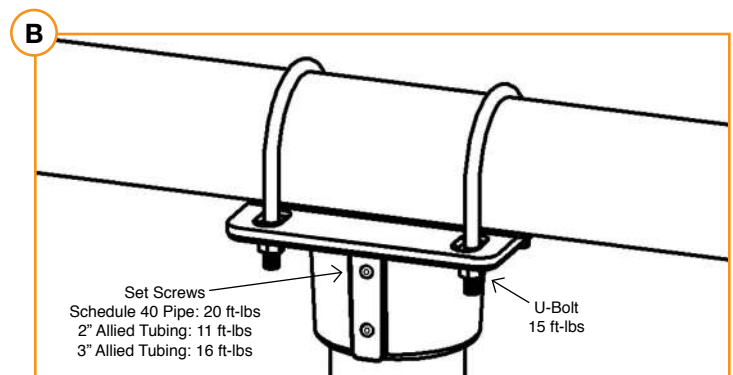


### B. LAY CROSS PIPE

Set cross pipes or tubing in Top Cap grooves. Attach with 3/8" U-bolts, flange nuts, flat washers, and lock washers. Torque U-bolts to **15 ft-lbs** and align assembly.

Torque Top Cap set screws to **20 ft-lbs** for Schedule 40 Pipe, **11 ft-lbs** for 2" Allied Mechanical Tubing, and **16 ft-lbs** for 3" Allied Mechanical Tubing.

💡 To join more than one section of cross pipe, see [Page 9](#).

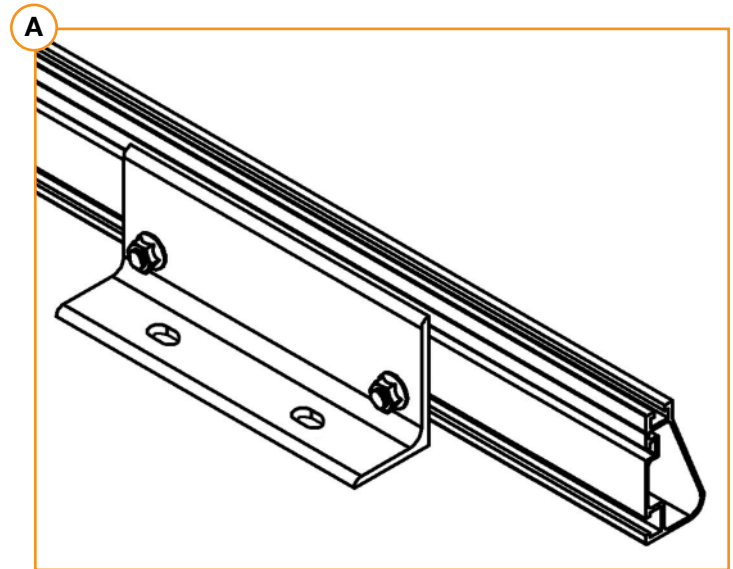


### 3. PLACE RAILS

#### A. ATTACH HARDWARE

On the ground, attach Rail Connector brackets to rail by sliding 3/8"-16 bonding bolts into side slot. Space out to match pier spacing. With brackets in place, finger tighten flange nuts onto bolts.

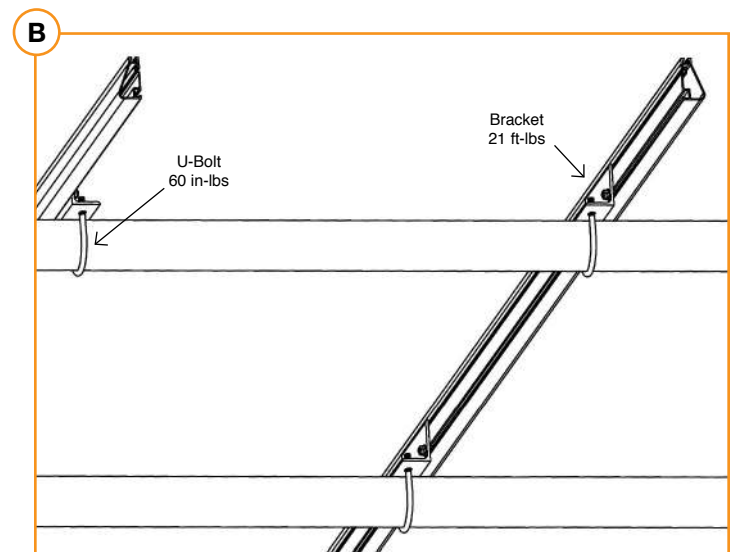
💡 Tape ends of rail, to keep bolts from sliding out while moving.



#### B. FASTEN CONNECTORS

Center rails on cross pipes, leaving equal distance on ends. Secure with Rail Connector hardware: 3/8"-16 U-bolts, flange nuts, flat washers, and lock washers. Torque U-bolt nuts to **60 in-lbs** and bracket to **21 ft-lbs**.

💡 Spacing between rails should align with module manufacturer recommended clamping locations.



### 4. SECURE LUGS

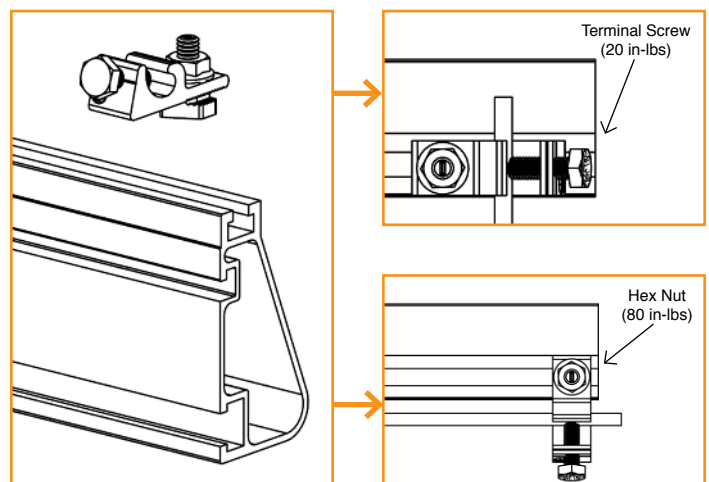
#### GROUNDING LUGS

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**.

💡 Only one Grounding Lug required per continuous subarray, regardless of subarray size (Unless frameless modules are used, see Page 10).

💡 Grounding Lugs can be installed anywhere along the rail and in either orientation shown.

💡 Grounding Lugs are intended to for use with one solid or stranded copper wire, conductor size 10-4AWG.





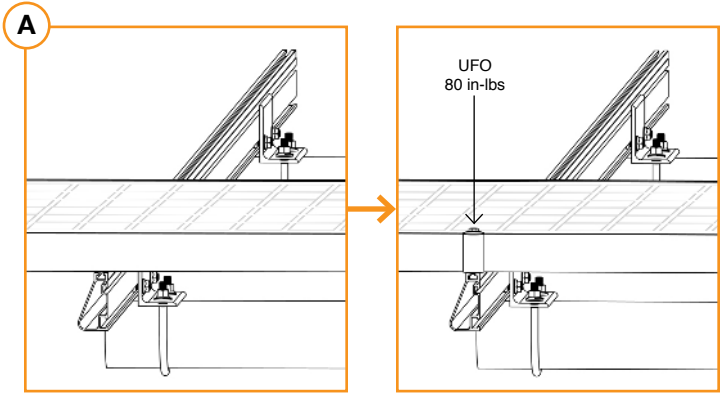
## 5. SECURE MODULES

### 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.

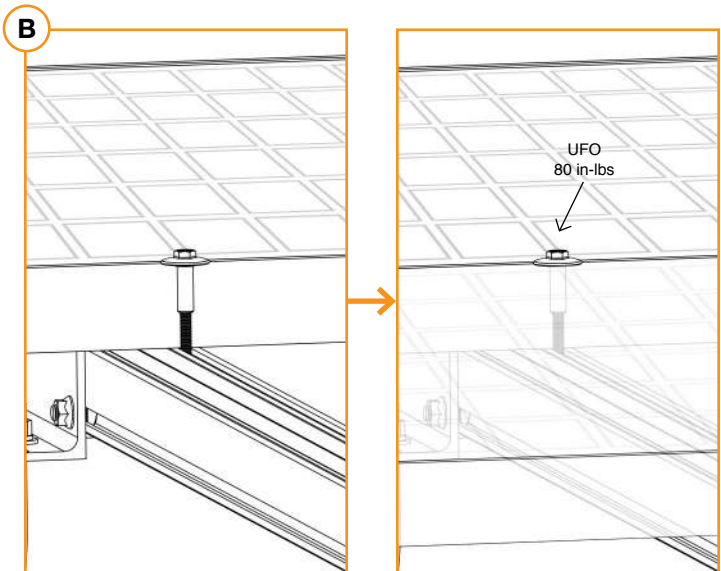


### B. SECURE NEXT MODULES

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.

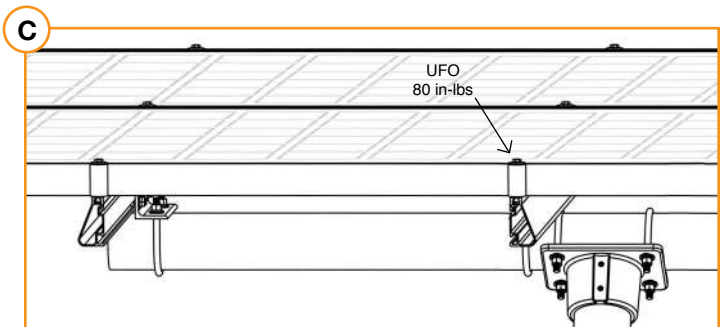
💡 If using Wire Clips, refer to [Page 8](#).



### 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**.

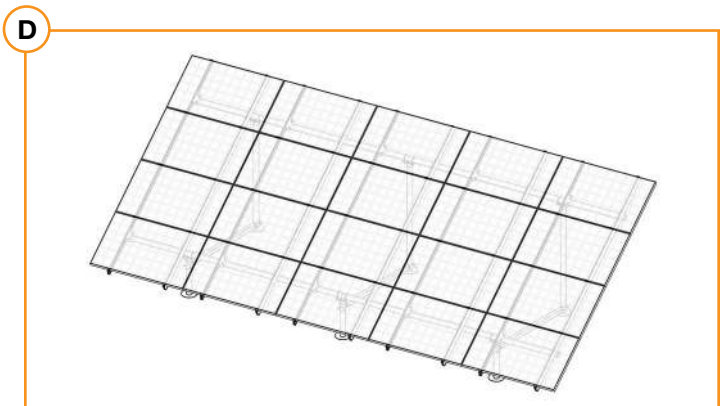
💡 Hold Stopper Sleeves on end while torquing to prevent rotation.

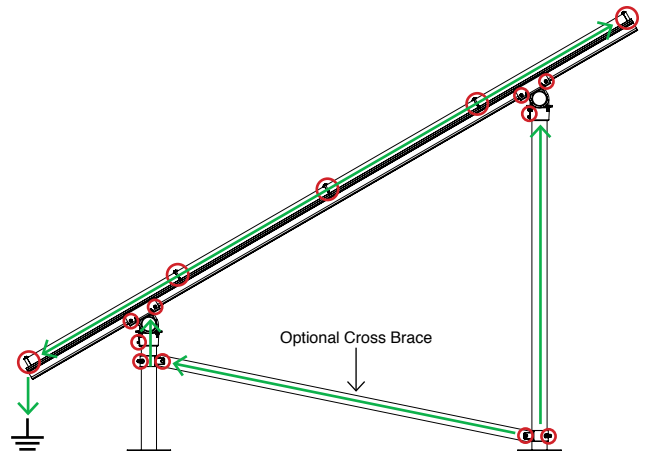
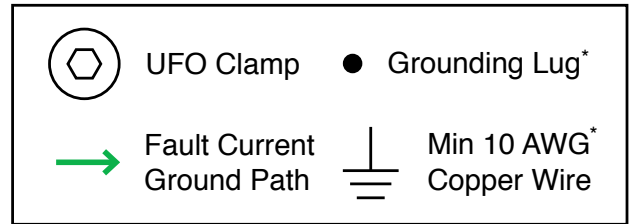
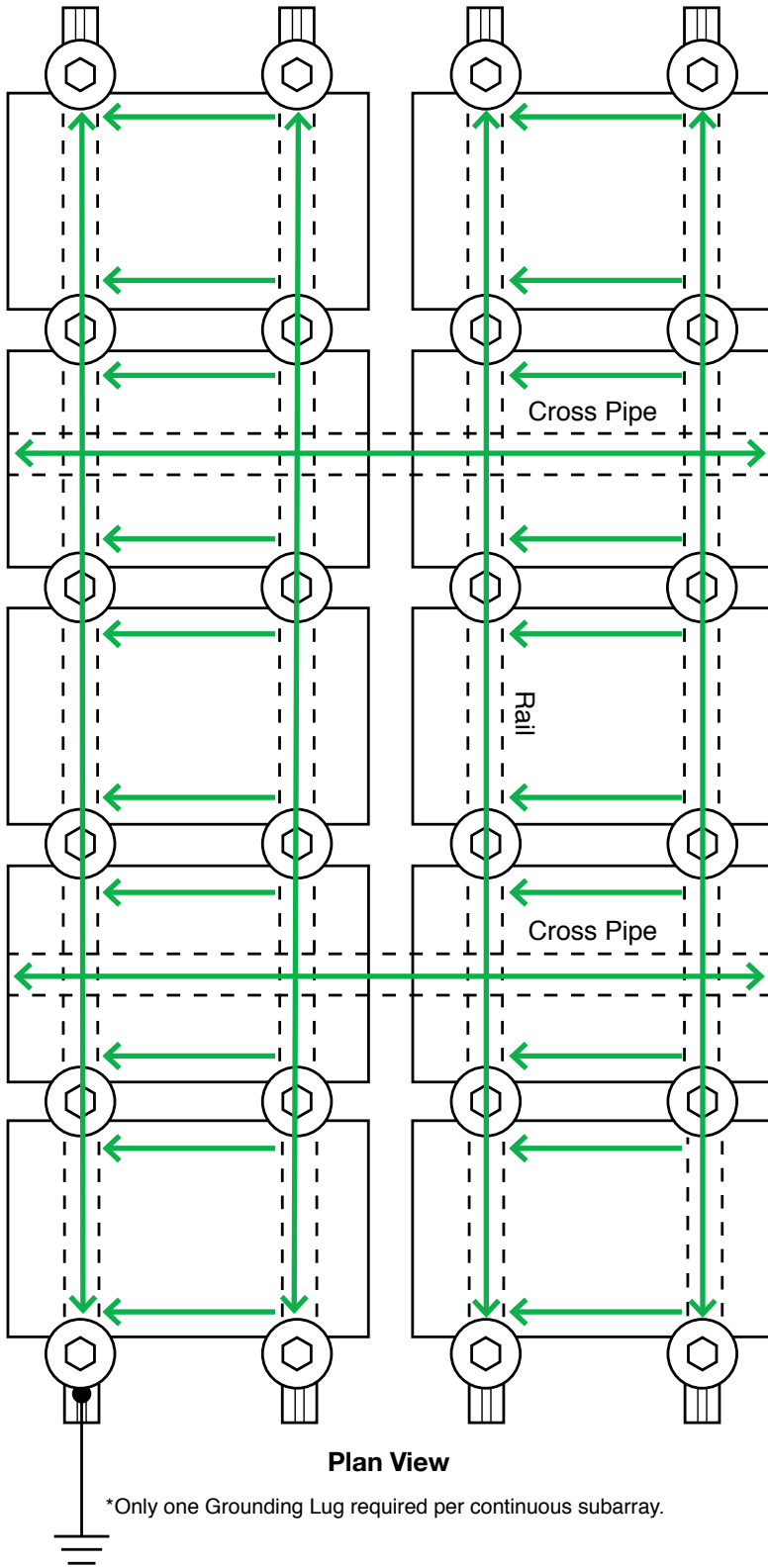




### D. REPEAT STEPS

Secure remaining module rows.

💡 If using End Caps, refer to [Page 8](#).





 Bonding Points     Fault Current Ground Path

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

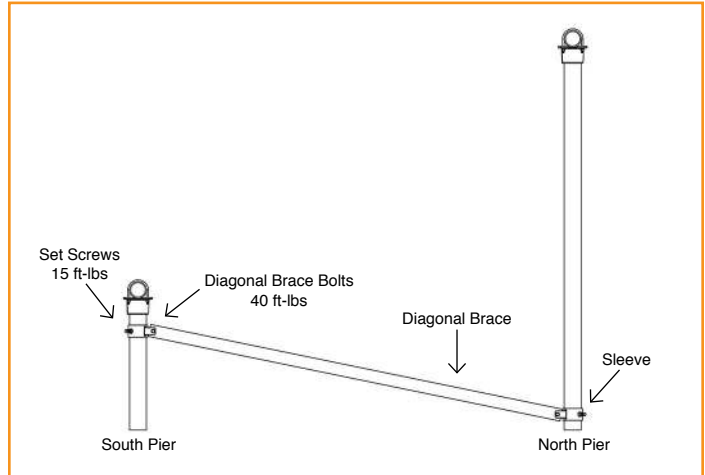


## DIAGONAL BRACES (OPTIONAL)

Slide sleeve on north pier 2-3" above the ground (6" max). Attach Diagonal Brace to sleeve with 1/2" hardware.

Slide second sleeve up on south pier 2-3" below top cap (6" max). Raise Diagonal Brace to align holes in sleeve and brace. Attach hardware and raise sleeve to full extent.

Torque Diagonal Brace bolts to **40 ft-lbs**. Torque set screws to **15 ft-lbs**.



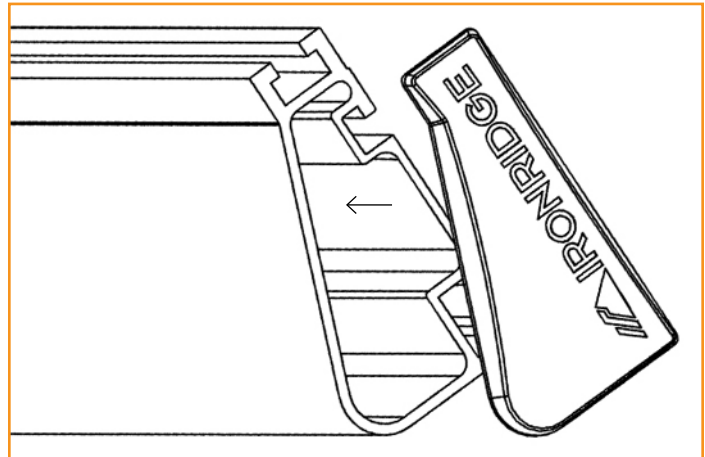
## END CAPS

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.

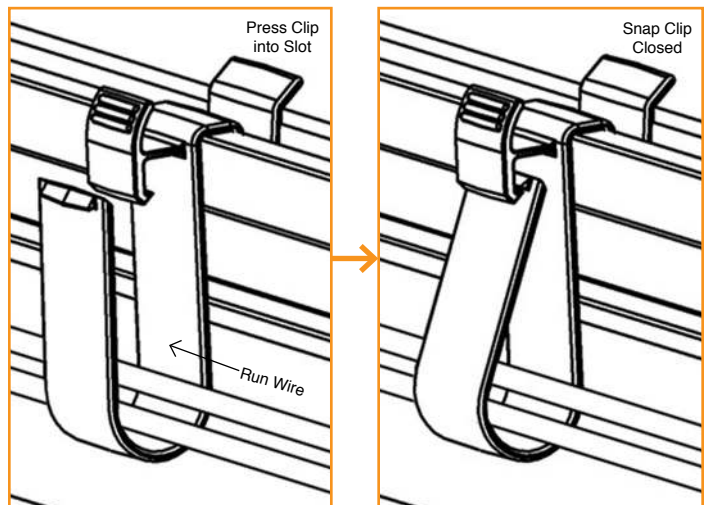
💡 For open-structure installations, you can use adhesive to secure the End Caps.



## WIRE CLIPS

Wire Clips offer a simple wire management solution.

Firmly press Wire Clip into top rail slot. Open clip and insert electrical wire accordingly. Close clip once complete.



## SPLICING CROSS PIPE

The following instructions should be followed, when required, to join more than one section of cross pipe together to ensure bonding is maintained throughout the system.

### A. ALLIED MECHANICAL TUBING SPLICES

Mechanical tube splices shown in the table below shall be of equivalent Allied Flowcoat or Gatorshield zinc coating.

Mechanical Tube Size of the Structure	Splice Tube Size
2.375" OD, 12 Gauge	2.000" OD, 9 Gauge, Minimum 12" Long
3.500" OD, 8 Gauge	3.000" OD, 12 Gauge, Minimum 12" Long

Insert splice tube 6" into first section of cross pipe and secure with 2 self-drilling screws (1/4"-14 x 3/4"), spacing them approximately 1.25" from end of pipe and approximately 3.50" apart, tightening screws to 9 ft-lbs.

Slide second section of cross pipe over splice tube and secure with two more self-drilling screws. Tighten screws to 9 ft-lbs.

### B. SCHEDULE 40 PIPE SPLICES

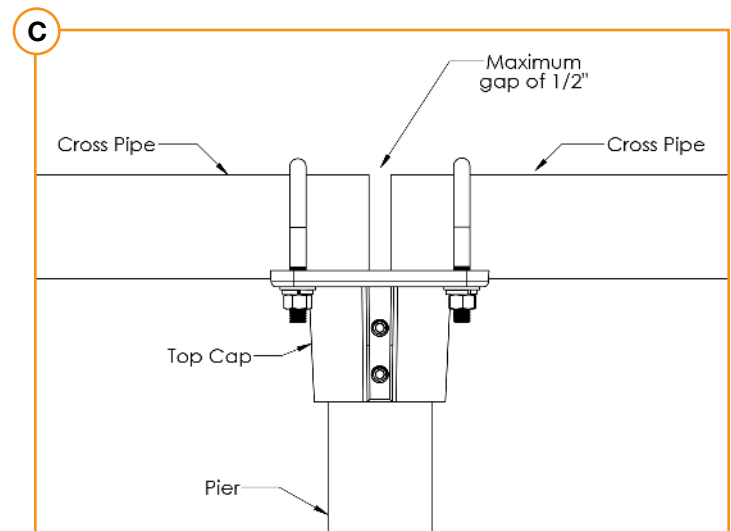
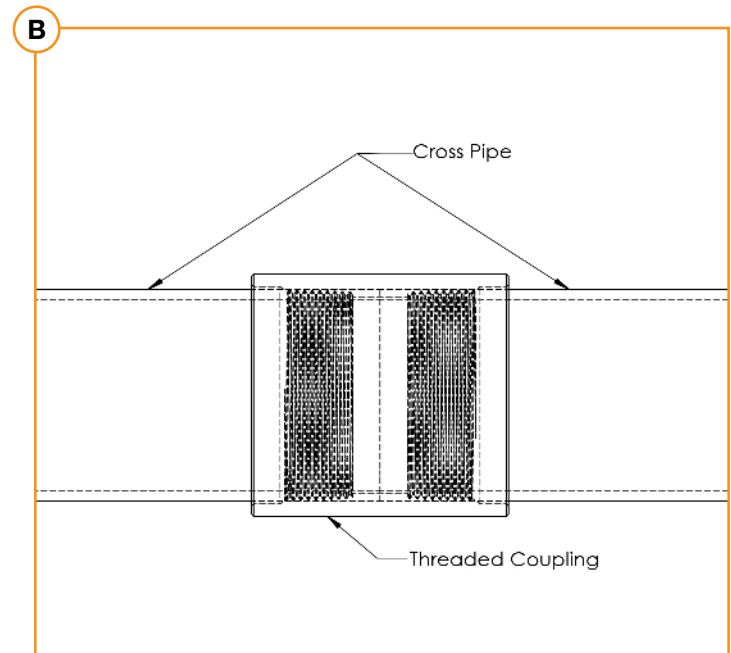
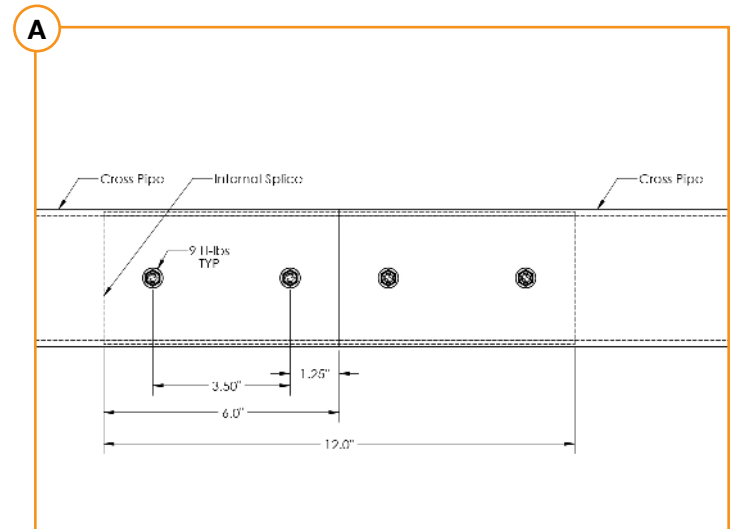
Use galvanized threaded pipe couplings that match the pipe size used for the structure. Threaded Schedule 40 pipe must be used when splicing cross pipe together.

Fully thread coupling onto both sections of pipe being spliced together.

⚠ To ensure structural integrity of cross pipes, mechanical tube or coupling splices are not permitted in end spans or in middle 1/3 of interior cross pipe spans.

### C. CROSS PIPES CAN BE JOINED OVER AN INTERIOR TOP CAP WITH A MAXIMUM GAP OF 1/2"

⚠ To avoid potential problems from the effects of thermal expansion, a maximum total continuous cross pipe length of 100 ft is recommended.



## 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

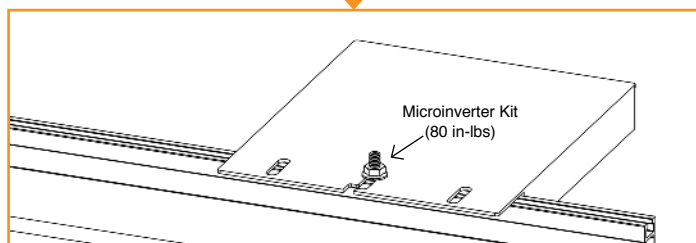
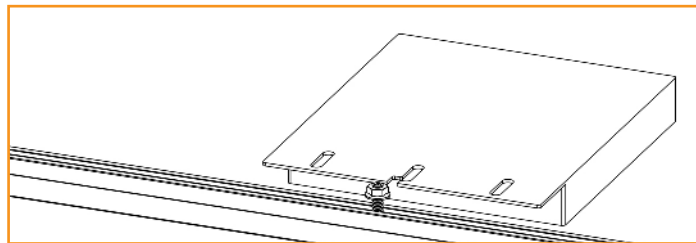
M250-72, M250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6 PLUS, Q Aggregator

#### Darfon

MIG240, MIG300, G320, G640

#### Solar Edge

P300, P320, P370, P400, P405, P600, P700, P730, P800p, P800s



## 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**.

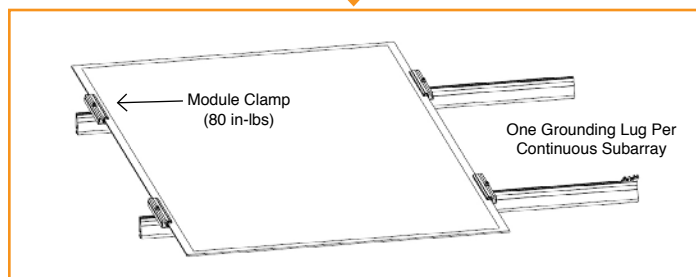
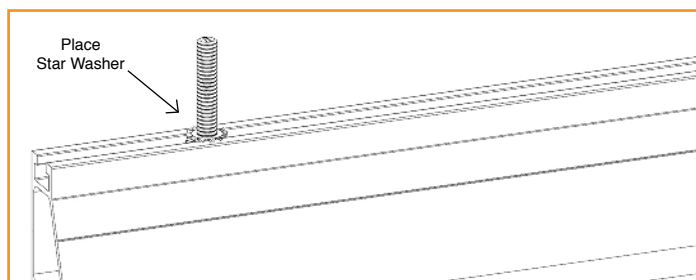
💡 Tested or evaluated module clamps:

- 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.
- IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where X can be "E" or "M" and Y can be "B" or blank.

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

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

💡 For Sunpreme Modules Only: If required to use slide prevention hardware, see Module Slide Prevention Addendum (Version 1.10).



## MODULE COMPATIBILITY

The Ground 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.

MAKE	MODELS
Astronergy Solar	Modules with 35, 40, or 45mm frames and model identifier aaSM66yyPzz-xxx; where “aa” is CH or A; “yy” is either 10 or 12; and “zz” is blank or (BL). Frameless modules with model identifier CHSM6610P(DG)-xxx.
Axitec	Modules with 35 or 40mm frames and model identifier AC-xxxY/aa-ZZ; where “Y” is M or P; “aa” is 125 or 156; and “ZZ” is 54S, 60S or 72S.
Canadian Solar	Modules with 35 and 40mm frames and model identifier CSbY-xxxZ; where “b” can be 1, 3 or 6; “Y” can be K, P, U, V, or X; and “Z” can be M, P, AG, MS, PX, M-SD, P-AG, P-FG or P-SD, MS-AG, MS-FG, or MS-SD. Frameless modules with model identifier CSbY-xxx-FG; where “b” can be 3 or 6; “Y” is K, X, or P; and “Z” can be M-FG or P-FG.
ET Solar	Modules with 35, 40, or 50mm frames and model identifier ET-Y6ZZxxxAA; where “Y” is P, L, or M; “ZZ” is 60 or 72; and “AA” is WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC.
Flex	Modules with 35, 40, or 50mm frames and model identifier FXS-xxxYY-ZZ; where “xxx” is the module power rating; “YY” is BB or BC; and “ZZ” is MAA1B, MAA1W, MAB1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W.
GCL	Modules with 35 and 40mm frames and model identifier GCL-a6/YY xxx; where “a” can be M or P; and “YY” can be 60, 72, or 72H.
GigaWatt Solar	Modules with 40mm frames and model identifier GWxxxYY; where “YY” is either PB or MB.
Hanwha Solar	Modules with 40, 45, or 50mm frames and model identifier HSLaaP6-YY-1-xxxZ; where “aa” is either 60 or 72; “YY” is PA or PB; and “Z” is blank or B.
Hanwha Q CELLS	Modules with 32, 35, 40, and 42mm frames and model identifier aaYY-ZZ-xxx; where “aa” can be Q. or B.; “YY” can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, or PEAK DUO; and “ZZ” can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, BLK-G5, L-G5.2, or L-G5.2/H.
Heliene	Modules with 40mm frames and model identifier YYZZxxx; where “YY” is 36, 60, 72, or 96; and “ZZ” is M, P, or MBLK.
Hyundai	Modules with 35, 40 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(BF), RG(BK), TI, or TG.
Itek	Modules with 40 or 50mm frames and model identifier IT-xxx-YY; where “YY” is blank, HE, or SE, or SE72.
JA Solar	Modules with 35, 40 and 45mm frames and model identifier JAyyzz-bb-xxx/aa; where “yy” can be M, P, 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, 72, 60S01 or 72S01; and “aa” can be MP, SI, SC, PR, RE, 3BB, 4BB, 4BB/RE, 5BB.
Jinko	Modules with 40mm frames and model identifier JKMYxxxZZ-aa; where “Y” is blank or S; “ZZ” is P, PP, M; and “aa” is 60, 60B, 60-J4, 60B-J4, 60(Plus), 60-V, 72, or 72-V. Frameless modules with model identifier JKMxxxPP-DV.
Kyocera	Modules with 46mm frames and model identifier KYxxxZZ-AA; where “Y” is D or U; “ZZ” is blank, GX, or SX; and “AA” is LPU, LFU, UPU, LPS, LPB, LFB, LFBs, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 8BC, 6MCA, or 6MPA.
LG	Modules with 35, 40, and 46mm frames and model identifier LGxxxYaZ-bb; where “Y” is A, E, N, Q, S; “a” is 1 or 2; “Z” is C, K, T, or W; and “bb” is A3, A5, B3, G3, G4, or K4.
Longi	Modules with 40mm frames and model identifier LR6-YY-xxxM; where “YY” can be 60, 72, or 72HV.
Mission Solar	Modules with 40mm frames and model identifier MSeXXXZZaa; where “ZZ” can be MM, SE, SO or SQ; and “aa” can be 1J, 4J, 4S, 5K, 5T, 6J, 6S, or 6W.

# MODULE COMPATIBILITY

MAKE	MODELS
Mitsubishi	Modules with 46mm frames and model identifier PV-MYYxxxZZ; where "YY" is LE or JE; and "ZZ" is either HD, HD2, or FB.
Motech	IM and XS series modules with 40, 45, or 50mm frames.
Neo Solar Power	Modules with 35mm frames and model identifier D6YxxxZZaa; where "Y" can be M or P; "ZZ" can be B3A, B4A, E3A, E4A, H3A, H4A; and "aa" can be blank, (TF), ME or ME (TF).
Panasonic	Modules with 35 or 40mm frames and model identifier VBHNxxxYYzz; where "YY" is SA or KA; and "zz" is 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18.
Phono Solar	Modules with 35, 40, or 45mm frames and model identifier PSxxxY-ZZ/A; where "Y" is M or P; "ZZ" is 20 or 24; and "A" is F, T or U.
Prism Solar	Frameless modules with model identifier BiYY-xxxBSTC; where "YY" is 48 or 60.
REC Solar	Modules with 30, 38 and 45mm frames and model identifier RECxxxYYZZ; where "YY" is M, PE, TP, or TP2S; and "ZZ" is blank, BLK, SLV, or 72.
Renesola	Modules with 35, 40 or 50mm frames and model identifier JCxxxY-ZZ; where "Y" is F, M or S; and "ZZ" is Ab, Ab-b, Abh, Abh-b, Abv, Abv-b, Bb, Bb-b, Bbh, Bbh-b, Bbv, Bbv-b, Db, or Db-b.
Renogy	Modules with 40 or 50mm frames and model identifier RNG-xxxY; where "Y" is D or P.
S-Energy	Modules with 40mm frames and model identifier SNxxxY-ZZ; where "Y" is M or P; and "ZZ" is 10, or 15.
Seraphim Energy Group	Modules with 40mm frames and model identifier SEG-6YY-xxxZZ; where "YY" can be MA, MB, PA, PB; and "ZZ" can be BB, WB, or WW.
Seraphim USA	Modules with 40 and 50mm frames and model identifier SRP-xxx-6YY; where "YY" can be MA, MB, PA, PB, QA-XX-XX, and QB-XX-XX.
Sharp	Modules with 35 or 40mm frames and model identifier NUYYxxx; where "YY" is SA or SC.
Silfab	Modules with 38mm frames and model identifier SYY-Z-xxx; where "YY" is SA or LA; SG or LG; and "Z" is M, P, or X.
Solaria	Modules with 40mm frames and model identifier PowerXT xxxY-ZZ; where "Y" can be R or C; and "ZZ" is BX, BY, PX, PZ, WX or WZ.
SolarTech	Modules with 42mm frames and model identifier STU-xxxYY; where "YY" can be PERC or HJT.
SolarWorld	Sunmodule Plus, Protect, XL, Bisun, Bisun XL, may be followed by mono, poly or duo and/or black or bk; modules with 31, 33 or 46mm frames and model identifier SW-xxx.
Stion	Thin film modules with 35mm frames and model identifier STO-xxx or STO-xxxA. Thin film frameless modules with model identifier STL-xxx or STL-xxxA.
SunEdison	Modules with 35, 40, or 50mm frames and model identifier SE-YxxxZABCDE; where "Y" is B, F, H, P, R, or Z; "Z" is 0 or 4; "A" is B, C, D, E, H, I, J, K, L, M, or N; "B" is B or W; "C" is A or C; "D" is 3, 7, 8, or 9; and "E" is 0, 1 or 2.
Suniva	Modules with 35, 38, 40, 46, or 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	Modules with model identifier Ab-xxx-YY and standard (G3) or InvisiMount (G5) 46mm frame; where "A" is either E, P or X; "b" can be 17, 18, 19, 20, 21, or 22; and "YY" can be blank, NE, BLK, COM, C-AC, D-AC, BLK-C-AC, or BLK-D-AC.
Sunpreme	Frameless modules with model identifier GXB-xxxYY; where "YY" is blank or SL.
Suntech	Vd, Vem, Wdb, Wde, and Wd series modules with 35, 40, or 50mm frames.
Trina	Modules with 35, 40 or 46mm frames and model identifier TSM-xxxYYZZ; where "YY" is PA05, PC05, PD05, PA14, PC14, PD14, PE14, or DD05; and "ZZ" is blank, A, A.05, A.08, A.10, A.18, .05, .08, .10, .18, .08D, .18D, 0.82, A.082(II), .002, .00S, 05S, 08S, A(II), A.08(II), A.05(II), A.10(II), or A.18(II). Frameless modules with model identifier TSM-xxxYY; and "YY" is either PEG5, PEG5.07, PEG14, DEG5(II), DEG5.07(II), or DEG14(II).
Winaico	Modules with 35 or 40mm frames and model identifier Wsy-xxxz6; where "y" is either P or T; and "z" is either M or P.
Yingli	Panda, YGE, and YGE-U series modules with 35, 40, or 50 mm frames.