TILT MOUNT
**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:**

- 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.
- 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 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

UL

Intertek

#5003339

- 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 System Tilt with Modules Types 1, 2 & 3 on Low Slope Roofs (< 9.5 degrees)
- Any System Tilt with Module Types 1 & 2 on Steep Slope Roofs (> 9.5 degrees)
- 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 South Tilt Leg.
CHECKLIST

PRE-INSTALLATION
☐ Verify module compatibility. See Page 10 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
☐ 3/8” Socket (deep)
☐ String Line

TORQUE VALUES
☐ Tilt Leg Nuts (3/8” 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 Objects (7/16” Socket): 80 in-lbs
☐ Expansion Joint Nuts (7/16”): 80 in-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 1.10).
1. ATTACH BASES

Mark locations for roof attachments and attach per manufacturer’s instructions.

- 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.
  - QuickMount PV Tilt Standoffs - QMNC, QMLSH; Tighten 5/16” bolt on top of standoff to a minimum of 140 in-lbs.

2. ADD TILT LEGS

A. ASSEMBLE SOUTH LEGS

Mount South Tilt Leg Assembly to southern row of roof attachments. The IronRidge logo should face east to ensure proper South Leg orientation. Tighten assembly per roof attachment manufacturer's instructions.

B. SET ANGLE

Set top pivot bracket of South Tilt Leg to the desired angle using the angle indicator on the face of the leg. Finger tighten bolts to allow for adjustment if necessary.

C. ASSEMBLE NORTH LEGS

Mount U-foot to northern row of roof attachments. Tighten U-foot to attachment per manufacturer’s instructions. Mount North Tilt Leg to northern row of U-feet and loosely secure hardware.
3. 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 about 1” apart and torquing to **20 in-lbs**. Slide second rail over Bonded Splice and secure with two 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.

B. ATTACH SOUTH RAILS

Slide 1” long bonding bolt into side-facing rail slot. Mount rail to pivot bracket of South Legs and loosely tighten nuts.

C. ATTACH NORTH RAILS

Slide 2.25” bonding bolt into side-facing rail slot. Mount rail to top of North Legs. Tighten all 3/8” hardware to **250 in-lbs** once rails are square.

- Use a straight edge to ensure South and North rails are on the same plane. An extra section of rail works well.
- Rails can mount on either north or south side of North Tilt Leg.

4. 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 9).
- If using Enphase microinverters, Grounding Lugs may not be needed. See Page 9 for more information.
- Grounding Lugs can be installed anywhere along the rail and in either orientation shown.
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 the module to the rail with 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 the 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 on rail, ensuring it is hooked over the top of the 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.
**GROUNDING STRAP EXPANSION JOINT**

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

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

- Remaining Bonded Splice screws are **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 certain Enphase microinverters.*
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. Run electrical wire through open clip. Snap closed once all wires have been placed.
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, 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. If required to use slide prevention hardware, see module slide prevention addendum.
- Frameless modules require using a Grounding Lug on every rail.
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.

<table>
<thead>
<tr>
<th>MAKE</th>
<th>MODELS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astronergy Solar</td>
<td>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). Frameless modules with model identifier CHSM6610P</td>
</tr>
<tr>
<td>Axitec</td>
<td>Modules with 35 and 40mm frames and model identifier AC-xxxY</td>
</tr>
<tr>
<td>Canadian Solar</td>
<td>Modules with 40mm frames and model identifier CS86-xxxZ; where “Y” can be K, P, U, V, or X; and “Z” can be M, P, PX, or P-SD. Frameless modules with model identifier CS86-xxxP</td>
</tr>
<tr>
<td>ET Solar</td>
<td>Modules with 35, 40, and 50mm frames and model identifier ET-YEZxx</td>
</tr>
<tr>
<td>Flex</td>
<td>Modules with 35, 40, and 50mm frames and model identifier FXS-xxxYY-ZZ; where “xxx” is the module power rating; “YY” can be BB or BC; and “ZZ” can be MAA1B, MAAlW, MBA1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W.</td>
</tr>
<tr>
<td>Gigawatt Solar</td>
<td>Modules with 40mm frames and model identifier GWxx</td>
</tr>
<tr>
<td>Hanwha Solar</td>
<td>Modules with 40, 45, and 50mm frames and model identifier HSlaap6P</td>
</tr>
<tr>
<td>Helien</td>
<td>Modules with 40 frames and model identifier YYZZxx; where “YY” can be 36, 60, 72, or 96; and “ZZ” can be M, P, or MBLK.</td>
</tr>
<tr>
<td>Hyundai</td>
<td>Modules with 35 and 50mm frames and model identifier Hi</td>
</tr>
<tr>
<td>Itek</td>
<td>Modules with 50mm frames and model identifier IT-xxx-YY; where “YY” can be blank, HE, or SE.</td>
</tr>
<tr>
<td>JA Solar</td>
<td>Modules with 40 and 45mm frames and model identifier JAYyy</td>
</tr>
<tr>
<td>Kyocera</td>
<td>Modules with 35 and 40mm frames and model identifier JKM</td>
</tr>
<tr>
<td>LG</td>
<td>Modules with 46mm frames and model identifier KYYxxxZ</td>
</tr>
<tr>
<td>Mitsubishi</td>
<td>Modules with 35, 40, and 46mm frames and model identifier LGxxxYYZ; where “YY” can be M or S; “ZZ” can be blank or B.</td>
</tr>
<tr>
<td>Motech</td>
<td>Modules with 40 and 50mm frames and model identifier PV-MYxxxZ</td>
</tr>
<tr>
<td>Panasonic</td>
<td>Modules with 35mm frames and model identifier VBHNxxxY</td>
</tr>
<tr>
<td>Phono Solar</td>
<td>Modules with 35, 40, or 45mm frames and model identifier PSxxxY-ZZ</td>
</tr>
<tr>
<td>Prism Solar</td>
<td>Frameless modules with model identifier BIYY</td>
</tr>
<tr>
<td>REC Solar</td>
<td>Modules with 38 and 45mm frames and model identifier RE</td>
</tr>
<tr>
<td>Renesola</td>
<td>Modules with 35, 40 and 50mm frames and model identifier JC</td>
</tr>
<tr>
<td>Renogy</td>
<td>Modules with 40 and 50mm frames and model identifier RNG-xxx; where “YY” can be blank or B.</td>
</tr>
<tr>
<td>Sharp</td>
<td>Modules with 35 and 40mm frames and model identifier NUYYxxx; where “YY” can be SA or SC.</td>
</tr>
<tr>
<td>Silfab</td>
<td>Modules with 38mm frames and model identifier SYY-Z-xxx; where “YY” can be SA or LA; SG or LG; and “Z” can be M, P, or X.</td>
</tr>
<tr>
<td>SolarWorld</td>
<td>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.</td>
</tr>
<tr>
<td>Stion</td>
<td>Thin film modules with 35mm frames and model identifier STI-xxx or STO-xxx. Thin film frameless modules with model identifier STL-xxx or STL-xxxA.</td>
</tr>
<tr>
<td>SunEdison</td>
<td>Modules with 35, 40, and 50mm frames and model identifier SE-</td>
</tr>
<tr>
<td>Suniva</td>
<td>Modules with 35, 38, 40, and 46, 50mm frames and model identifiers OPT</td>
</tr>
<tr>
<td>Sunpower</td>
<td>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.</td>
</tr>
<tr>
<td>Sunpreme</td>
<td>Frameless modules with model identifier GXB-xxxYY; where “YY” can be blank or SL.</td>
</tr>
<tr>
<td>Suntech</td>
<td>Vd, Vem, Wdb, Wde, and Wd series with modules 35, 40, and 50mm frames.</td>
</tr>
<tr>
<td>Trina</td>
<td>Modules with 35, 40, and 46mm frames and model identifier TSM-xxxYYZZ; where “YY” can be PA05, PC05, PD05, PA14, PC14, PD14, PE14, or DD05; and “ZZ” can be blank, A, A.05, A.08, A.10, A.18, .05, .08, .10, .18, .0BD, .1BD, .8BD, A.08</td>
</tr>
<tr>
<td>Winaico</td>
<td>Modules with 35 and 40mm frames and model identifier Wsy-xxx</td>
</tr>
<tr>
<td>Yingli</td>
<td>Panda, YGE, and YGE-U series modules with 35, 40, and 50mm frames.</td>
</tr>
</tbody>
</table>
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.

Refurbished Product may be used to repair or replace the defective components. Transportation, installation, labor, or any other costs associated with Product replacement are not covered by these warranties and are not reimbursable. These warranties additionally do not cover (h) normal wear, or damage resulting from misuse, overloading, abuse, improper installation (including failure to follow professional instruction and certification), negligence, or accident, or from force majeure acts including any natural disasters, war or criminal acts; and (i) Products that have been altered, modified or repaired without written authorization from IronRidge or its authorized representative; and (j) Products used in a manner or for a purpose other than that specified by IronRidge. A formal document proving the purchase and the purchase date of the Product is required with any warranty claim.

Except as set forth above, IronRidge sells the Products on an “AS IS” basis, which may not be free of errors or defects, and ALL EXPRESS OR IMPLIED REPRESENTATIONS AND WARRANTIES, INCLUDING ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUALITY, WORKMANLIKE EFFORT, CORRESPONDENCE TO DESCRIPTION, DESIGN, TITLE OR NON-INFRINGEMENT, OR ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE OR TRADE PRACTICE, ARE HEREBY DISCLAIMED.