Q.ANTUM TECHNOLOGY: LOW LEVELISED COST OF ELECTRICITY
Higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 19.5%.

INNOVATIVE ALL-WEATHER TECHNOLOGY
Optimal yields, whatever the weather, with excellent low-light and temperature behaviour.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology, Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance warranty.

STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology.

1 APT test conditions according to IEC/TS 62804-1:2015, method B (−1500 V, 168 h)
2 See data sheet on rear for further information.
**MECHANICAL SPECIFICATION**

- **Format**: 1740mm × 1030mm × 32mm (including frame)
- **Weight**: 19.9 kg
- **Front Cover**: 3.2 mm thermally pre-stressed glass with anti-reflection technology
- **Back Cover**: Composite film
- **Frame**: Black anodised aluminium
- **Cell**: 6 × 20 monocrystalline Q.ANTUM solar half cells
- **Junction box**: 53-101 mm × 32-60 mm × 15-18 mm Protection circuit [i.e. 607] with bypass diodes
- **Cable**: 4 mm² Solar cable; (+) ≥1150 mm, (−) ≥1150 mm
- **Connector**: Standard MC4, Hanwha Q CELLS HQC4; IP68

**ELECTRICAL CHARACTERISTICS**

**POWER CLASS** 330 335 340 345

<table>
<thead>
<tr>
<th>Minimum Performance at Standard Test Conditions, STC1 (Power Tolerance +5 W / −0 W)</th>
<th>330</th>
<th>335</th>
<th>340</th>
<th>345</th>
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</thead>
<tbody>
<tr>
<td>Power at MPP2: P_{MPP} [W]</td>
<td>2470</td>
<td>250.7</td>
<td>254.5</td>
<td>258.2</td>
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<tr>
<td>Short Circuit Current1: I_{SC} [A]</td>
<td>8.39</td>
<td>8.43</td>
<td>8.48</td>
<td>8.52</td>
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<tr>
<td>Open Circuit Voltage1: V_{OC} [V]</td>
<td>37.66</td>
<td>37.10</td>
<td>38.34</td>
<td>38.59</td>
</tr>
<tr>
<td>Current at MPP: I_{MPP} [A]</td>
<td>7.80</td>
<td>7.84</td>
<td>7.89</td>
<td>7.93</td>
</tr>
<tr>
<td>Voltage at MPP: V_{MPP} [V]</td>
<td>31.66</td>
<td>31.97</td>
<td>32.27</td>
<td>32.57</td>
</tr>
<tr>
<td>Efficiency1: η [%]</td>
<td>≥8.4</td>
<td>≥8.7</td>
<td>≥9.0</td>
<td>≥9.3</td>
</tr>
</tbody>
</table>

**Minimum Performance at Normal Operating Conditions, NMOT2**

<table>
<thead>
<tr>
<th>Minimum Performance at Normal Operating Conditions, NMOT2</th>
<th>330</th>
<th>335</th>
<th>340</th>
<th>345</th>
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</thead>
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<tr>
<td>Power at MPP: P_{NMOT} [W]</td>
<td>2470</td>
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<td>Voltage at MPP: V_{MPP} [V]</td>
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<td>32.27</td>
<td>32.57</td>
</tr>
<tr>
<td>Efficiency: η [%]</td>
<td>≥8.4</td>
<td>≥8.7</td>
<td>≥9.0</td>
<td>≥9.3</td>
</tr>
</tbody>
</table>

**Q CELLS PERFORMANCE WARRANTY**

**PERFORMANCE AT LOW IRRADIANCE**

At least 96% of nominal power during first year. Then latterly 0.54% degradation per year. At least 93.1% of nominal power up to 10 years. At least 85% of nominal power up to 25 years.

**TEMPERATURE COEFFICIENTS**

- Temperature Coefficient of I_{SC}: α [%/K] = +0.04
- Temperature Coefficient of V_{OC}: β [%/K] = −0.27
- Temperature Coefficient of P_{MPP}: γ [%/K] = −0.36

**PROPERTIES FOR SYSTEM DESIGN**

- Maximum System Voltage: V_{SYS} [V] 1000
- PV module classification: Class II
- Fire Rating based on ANSI/UL 61730 Class II
- Permitted Module Temperature on Continuous Duty: −40°C to +65°C
- C/TYPE 2

**QUALIFICATIONS AND CERTIFICATES**

- VDE Quality Tested, according to IEC 61215:2016; VDE Quality Tested, according to IEC 61730:2014
- IEC 62158:2018, IEC 62159:2018
- This data sheet complies with the warranty terms of the respective country.

**PACKAGING INFORMATION**

- **Horizontal packaging**: 1780 mm × 1080 mm × 1208 mm; 673.8 kg; 28 pallets; 26 pallets; 32 modules
- **Vertical packaging**: 1815 mm × 1150 mm × 1220 mm; 683 kg; 28 pallets; 24 pallets; 32 modules

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1. Measurement tolerances P_{NMOT} ± 3 %; I_{SC} ± 5 % at STC: 1000 W/m², 25±2°C, AM 1.5 G according to IEC 60904-3 • *800 W/m², NMOT, spectrum AM 1.5

2. Performance warranty is valid for 25 years. At least 98 % of nominal power during first year. Then latterly 0.54% degradation per year. At least 93.1 % of nominal power up to 10 years. At least 85 % of nominal power up to 25 years.

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Hanwha Q CELLS GmbH
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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 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. Routine maintenance of a module or panel shall not involve breaking or disturbing the bonding path of the system. All work must comply with national, state and local installation procedures, product and safety standards.

• 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.

• 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. Any components showing signs of corrosion or damage that compromise safety shall be replaced 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 modules, AC modules, microinverters and power optimizers.

• Review module and any 3rd party manufacturer’s documentation for compatibility and compliance with warranty terms and conditions.
RATINGS

UL 2703 LISTED

- Max Overcurrent Protective Device (OCPD) Rating: 40A
- Max Module Size: 30.5 ft²
- Module Orientation: Portrait or Landscape
- System Design Load Rating: 10 PSF downward, 5 PSF upward, 5 PSF lateral
- Actual system structural capacity including spans and cantilevers are defined by PE stamped certification letters.
- CAMO Specific Design Load rating: 50 PSF downward, 50 PSF upward, 15 PSF lateral

Certified to CSA STD LTR AE-001-2012 Photovoltaic Module Racking Systems
- Load Rating: 2400 P [50 PSF]
- Max Framed Module Size: 25.6 ft²
- Max Frameless Module Size: 21.5 ft²

CLASS A SYSTEM FIRE RATING PER UL 2703
- Any Roof Slope with Module Types 1, 2, 3, 13, 19, 25 & 29.
- 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.

WATER SEAL RATINGS:
- UL 441 (Flashfoot2, L-Mount, Flashvue, All Tile Hook, Knockout Tile)
- TAS 100(A)-95 (Flashfoot2, All Tile Hook, Knockout Tile, Flashvue, Qbase, L-Mount)
- Tested and evaluated without sealant.
- Any roofing manufacturer approved sealant is allowed. Ratings applicable for roof slopes between 2:12 and 12:12

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

FLORIDA PRODUCT APPROVAL #FL29843
- Conforms to TAS202, TAS100(A)
- Approved for installation both inside and outside High Velocity Hurricane Zones (HVHZ)
- Allowable design pressure up to +100/-100 PSF
- Additional details and full list of approved components can be found Here.

MARKINGS

Product markings are located on the Grounding Lug bolt head.
### Pre-Installation

- Verify module compatibility. See Page 21 for info.

### Tools Required

- Cordless Drill (non-impact)
- Impact Driver (for lag bolts)
- Torque Wrench (0-250 in-lbs)
- 7/16" Socket
- 1/2" Socket
- 9/16" Socket
- 7/32" Drill Bit

### Bonding Hardware Torque Values

Please refer to each attachment’s individual section for full details on all torque values and instructions.

- 3/8” Bonding Hardware Nuts (7/16" Socket): 250 in-lbs
- All Tile Hook Carriage Bolts (7/16" Socket): 132 in-lbs
- Flat Roof Attachment Nuts (9/16" Socket): 250 in-lbs
- Lynx Set Screw (3/16" Hex Drive): 150 in-lbs
- Lynx Flange Nut (1/2" Socket): 150 in-lbs

### Composition Shingle

- FlashFoot2
- FlashVue
- QM L-Mount
- QM QBase
- QM Classic Comp Mount
- Knockout Tile
- QM Tile Replacement
- All Tile Hook and Flashing (optional)
- QM Quick Hook and Flashing (optional)
- QM QBase Tile

### Additional Roof Types

- QM Qbase Shake - Slate - Metal Shingle
- QM Classic Mount Shake
- QM Lynx Metal Roof Attachment

### Low Slope Roof

- Flat Roof Attachment
- QM QBase Mount

—if using previous version of Integrated Grounding Mid Clamps, End Clamps, Expansion Joints and for a list of approved 3rd party components please refer to Alternate Components Addendum (Version 1.8)
COMPONENTS

PRE-INSTALLATION

☐ Verify module compatibility. See Page 21 for info.

TOOLS REQUIRED

☐ Cordless Drill (non-impact)
☐ Impact Driver (for lag bolts)
☐ Torque Wrench (0-250 in-lbs)
☐ 7/16" Socket
☐ 1/2" Socket
☐ 9/16" Socket
☐ 7/32" Drill bit

BONDING HARDWARE TORQUE VALUES

Please refer to each attachment's individual section for full details on all torque values and instructions.

☐ Bonded Splice Screws (5/16" Socket): 20 in-lbs
☐ Universal Fastening Object (7/16" Socket): 80 in-lbs
☐ Rail Grounding Lug Nut (7/16" Socket): 80 in-lbs
☐ Module Grounding Lug Nut (7/16" Socket): 60 in-lbs
☐ Grounding Lug Terminal Screws (7/16" Socket): 20 in-lbs
☐ Expansion Joint Nuts (7/16" Socket): 80 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 Nuts (7/16" Socket): 250 in-lbs

➢ Unless otherwise noted, all components have been evaluated for multiple use. They can be uninstalled and reinstalled in the same or new location.
1. PLACE ATTACHMENTS

The general installation method for attachments is to locate a rafter, drill a pilot hole and install the attachment. For composition roof attachments installation instructions refer to page 10. For tile roof attachments refer to page 12. For low slope roof attachments refer to page 14. When using approved third party attachments, refer to manufacturer’s install instructions.

Tested or evaluated third-party roof attachments:
- S-5! Standing Seam Metal Roof Clamps - Certification of metal roof clamps includes bonding to both painted and galvalume metal roofs. Tighten S-5! and S-5! Mini 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 160 in-lbs. Use the following fastening guidelines for other S-5! roof clamps: ProteaBracket™ - firmly seat roof screws and tighten hinge bolt to 225 in-lbs; RibBracket™ - firmly seat roof screws and tighten M8 bolt (M8-1.25 x 22mm sold separately) to 160 in-lbs; and SolarFoot™ - firmly seat roof screws and tighten M8 flange nut to 250 in-lbs.
- EcoFasten Green Fasten GF-1 Anchors

2. PLACE RAILS

A. CONNECT SPLICES

Use Classic Splice or BOSS (Bonded Structural Splice), as needed, to join multiple sections of Rail.

**Classic Splice**
Insert Classic 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 Classic Splice and secure with two more self-drilling screws.

➢ For Classic Splice, insert screws along the provided lines.
➢ Classic Splices may not be installed in the center 1/3rd of interior spans, or the outer 1/3 of end spans.
➢ Screws can be inserted on front or back of rails.

**BOSS - Bonded Structural Splice**
Insert BOSS into first Rail up until the Stop Tab. Slide second Rail fully into place.

➢ Rows using Classic Splice or BOSS and exceeding 100 feet of Rail must use Expansion Joints.
➢ Boss Splices may be installed in any location within a span.
➢ UFO and Bonding Hardware must be installed 1” away from the point where two Rails join together.

B. PREPARE HARDWARE

Slide square-headed bolts into side-facing rail slot. Space out bolts to match attachment spacing.

➢ Tape ends of rail, to keep bolts from sliding out while moving.
➢ If using T-bolts, carry hardware onto roof and proceed.

C. ATTACH RAILS

Drop rail with hardware into roof attachment. Level rail at desired height, then torque to 250 in-lbs.

➢ Rail can face either upslope or downslope on roof.
➢ When using attachments with longer slots, do not install Rail lower than the top of the L-Foot to avoid damage to modules.
3. SECURE LUGS

Grounding Lugs

Only one Grounding Lug (Rail or Module) required per continuous subarray, regardless of subarray size (Unless frameless modules are used, see Page 20).

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

Rail Grounding Lug

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.

- Module Grounding Lugs can be installed anywhere along the Rail and in either orientation shown.

Module Grounding Lug

Insert Bolt through Manufacturer approved grounding location and torque Hex nut to 60 in-lbs. One Module Grounding Lug may be installed to one module per row. Install a minimum 10 AWG solid copper or stranded grounding wire. Torque terminal screw to 20 in-lbs.

- If using Enphase microinverters or Sunpower AC modules, Grounding Lugs may not be needed. See Page 19 for more info.

- Refer to module manufacturer for mounting location and instructions.

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.
- If using CAMO instead of UFO + Stopper Sleeve, refer to Page 19 for CAMO installation procedure.

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.
- When UFOs are loosened and re-tightened, ensure UFO T-bolt bottoms out in rail channel before re-torquing UFO to achieve full engagement between T-bolt and rail.
- If using Wire Clips, refer to Page 18.

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, leaving a minimum 3/8” gap between rows.
- If using CAMO instead of UFO + Stopper Sleeve, refer to Page 6 for CAMO installation procedure.
CAMO

A. SLIDE INTO RAIL
Slide CAMO into rail channel far enough to clear the module frame. CAMO requires 6" of clearance from end of rail.

B. PLACE MODULE
Place module on rails (module cells not shown for clarity). When installing CAMO the module can overhang the rail no more than 1/4".

C. PULL TOWARDS END
Pull CAMO towards rail ends, at 45 degree angle, so the bonding bolt contacts the module flange edge.

D. SECURE TO FRAME
Rotate handle with an upwards motion until CAMO snaps into rail channel. Ensure CAMO bonding pins are fully seated on top of module frame.

FRAME COMPATIBILITY
CAMO has been tested or evaluated with all modules listed in the Module Compatibility section having frames within the referenced dimensions. Be sure the specific module being used meets the dimension requirements.

➢ For installations with Hanwha Q CELLS modules with 32 mm frame heights, the maximum ground snow is 45 PSF (33 PSF module pressure).

➢ CAMO is only compatible with Canadian Solar module CS1YxxxMS. “xxx” refers to the module power rating

8" BONDING JUMPER
8" Bonding Jumper is an electrical bonding jumper that can be used on the Flush Mount System for row to row bonding; making the module frames the medium for the equipment ground path.

➢ Bonding jumper is pushed onto the bottom flange of the module.

➢ New jumpers should be used if re-installation of jumper is required.

➢ Supports bottom flange thicknesses from 1.2mm to 3.1mm.
EXPANSION JOINTS

Expansion Joints are required every 100’ of continuous rail to allow for thermal expansion and contraction of the system.

➢ Do not install modules over expansion joints, either Classic Splice or BOSS.

Classic Splice
Insert Classic Splice 6” into first rail and secure with two self-drilling screws, spacing them approximately 1” apart and tightening to 20 in-lbs. Assemble and secure Grounding Strap 3/8” from rail end. Slide second rail over Classic 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.

➢ Only one Grounding Strap is required per break in row of modules.

BOSS
Insert BOSS into first Rail up to the Alignment Circle, Slide second Rail over BOSS to the second Alignment Circle, leaving a 1” gap between the Rails.

There must be a 1” of space between the edge of the Rail and the edge of the panel to allow proper installation of the UFO and Stopper Sleeve.
*One Module Grounding Lug or Rail Grounding lug is required per row of a system.

** The use of the 8" Bonding Jumper eliminates the need for row to row bonding. A minimum of one grounding lug per continuous array is required for earth ground.

Grounding Lugs and wire are not required in systems using certain Enphase microinverters or certain Sunpower modules. Equipment grounding is achieved with the Engage cable for Enphase or the AC module cable system for Sunpower via their integrated EGC.
**COMPOSITION SHINGLE**

**FLASHFOOT2**

Locate roof rafters and mark locations on roof. Drill 1/4" pilot holes perpendicular to the roof and back fill with roofing manufacturers' approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Line up with pilot hole and insert supplied lag bolt with washer through flashing. With a 7/16" Socket fully seat lag bolt. Place Cap onto flashing in desired orientation for E/W or N/S rails and rotate 180 degrees until it locks into place.

- Rail can be installed on either side of FlashFoot2 Cap.
- For additional details refer to the full FlashFoot2 Installation Manual.

**FLASHVUE**

Locate rafters and snap vertical and horizontal lines to mark locations of flashings. Drill 1/4" pilot holes, then backfill with an approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn't overhang the downhill shingle course. Line up pilot hole with View Port. Press Grip Cap onto flashing in desired orientation for E/W or N/S rails. Insert Lag Bolt with mechanically bonded washer through flashing. With a 7/16" Socket drive Lag Bolt until fully seated. FlashVue is now installed and ready for IronRidge XR Rails.

Attach rails to either side of the open slot using bonding hardware. Level rail at desired height, then torque to **250 in-lbs (21 ft-lbs)**.

When installing GripCap+ on roofs with undulations greater than 1 inch, install GripCap+ in low points across the array as required.

- For additional details refer to the full FlashVue Installation Manual.
- For additional details on the GripCap+ refer to the full GripCap+ Installation Manual.
COMPOSITION SHINGLE
QM L-MOUNT
Locate roof rafters and mark locations on roof. Drill 7/32” (Lag) or 1/8” (ST) pilot holes perpendicular to the roof and back fill with roofing manufacturers’ approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn’t overhang the downhill shingle course. Prepare lag bolt or structural screw with sealing washer. Use 1/2” socket to drive prepared lag bolt through L-foot until fully seated and L-foot can no longer rotate easily. Torque Nut to 156 in-lbs (13 ft-lbs) for ST. Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).
➢ Structural screw can be driven with T-30 hex head bit.
➢ For additional details refer to the full QM Installation Manual.

QM QBASE COMPOSITION MOUNT
Locate roof rafters and mark locations on roof. Align QBase vertical holes over center rafter and mark. Drill two pilot holes with 7/32” drill bit, perpendicular to roof and back fill with roofing manufacturers’ approved sealant. Set grade 8 cap screw through bottom of QBase, place QBase over drilled holes and secure lags. Screw Post to QBase. Proceed with roofing up until the flashing should be installed. Install flashing over mount. Allow roofing to proceed to the next course. Apply sealant where post and flashing meet, install EPDM counter flashing collar. Attach L-Foot on Standoff with hardware. Torque to 174 in-lbs (14.5 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).
➢ For additional details refer to the full QM Installation Manual.

CLASSIC COMP MOUNT
Locate roof rafters and mark locations on roof. Drill 7/32” pilot holes perpendicular to the roof and back fill with roofing manufacturers’ approved sealant. Slide flashing between 1st and 2nd course of shingles, ensuring both that the flashing reaches under the 3rd shingle course and doesn’t overhang the downhill shingle course. Prepare Hanger Bolt with Hex Nut and Sealing Washer, insert into hole and using 1/2” socket drive hanger bolt until fully seated and QBlock stops rotating easily. Insert EPDM rubber washer over hanger bolt into block, using Rack Kit hardware secure L-Foot to the mount. Torque to 156 in-lbs (13 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).
➢ For additional details refer to the full QM Installation Manual.
KNOCKOUT TILE

Remove tile and mark rafter. Use base as guide to drill 1/4” pilot hole and fill with roofing manufacturer’s approved sealant. Insert lag bolt with bonded washer through base and drive until fully seated. Insert Tile Replacement Flashing, lower onto base and apply pressure over the threaded post until it dimples the flashing. Place L-Foot over dimple and tap with hammer to punch threaded post through the flashing. Ensure punched pieces of flashing are cleared away. Form flashing as needed to sit flush with surrounding tiles, position L-Foot in desired orientation and torque hardware to 132 in-lbs (11 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).

➢ Base can be installed in any orientation relative to rafter.
➢ Ensure L-Foot does not extend above rail.
➢ If deck level flashing is required, approved flashing methods include user supplied adhesive backed flexible flashing.
➢ Standalone Knockout Tile manual available on website.

QM TILE REPLACEMENT

Remove tile and mark rafter. Measure up 8 3/4” from the adjacent tiles and mark horizontal across rafter. Align baseplate over rafter so that the lag holes align with the post groove. The orientation of the plate can be adjusted cross roof, mark location of lag holes on the roof. Drill two 1/8” Pilot holes and back fill with roofing manufacturers’ approved sealant. Waterproof at underlayment level according to roofing manufacturers’ instructions and the Tile Roofing Industry Alliance guidelines. Use T-30 Torx bit to lag base into position. Insert Grade 8 Serrated Flange Bolt into bottom of the Post, slide Post into Base channel. Line up post with the hole in the Tile Replacement Flashing. Leave loose for adjustments. Place Tile Replacement Flashing over the Post and Mount, allowing the flashing to properly interlock with surrounding tiles. Secure Post by tightening with channel lock pliers. Replace all tiles. Apply a bead of sealant where the post meets the flashing, slip EPDM collar over post and down to flashing. Attach L-Foot on Standoff with hardware. Torque to 174 in-lbs (14.5 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).

➢ If deck level flashing is required, approved flashing methods include user supplied adhesive backed flexible flashing.
➢ For additional details refer to the full QM Installation Manual.
TILE

ALL TILE HOOK

Remove tile and mark rafter. Position base over rafter, adjust arm if necessary and torque hardware to 132 in-lbs (11 ft-lbs). Use base as guide to drill 1/4" pilot holes, back fill with roofing manufacturer’s approved sealant, then insert lag bolts and tighten until fully seated. Replace tiles and notch as necessary to ensure proper fit. Attach rails to either side of slot using Bonding Hardware and torque to 250 in-lbs (21-ft-lbs).

➢ Position arm near the center of valley for curved tiles.
➢ Position arm away from seam of joining flat tiles.
➢ Ensure top of hook does not extend above rail.
➢ Standalone All Tile Hook manual available on website.

QM QUICK HOOK

Remove tile and mark rafter, use Base Plate to mark two holes on rafter. Drill two 7/32" pilot holes and back fill with roofing manufacturers’ approved sealant. Use 1/2" socket to drive lag into place. Slide hook into place and adjust to desired position. Drive self-tapping screw using a #3 Phillips bit to lock hook in place. Clean underlayment and apply a bead of sealant compatible with roofing manufacturer, install flashing over mount. Fasten sub-flashing to deck with one roofing nail in each corner. Waterproof at underlayment level according to roofing manufacturers’ instructions and the Tile Roofing Industry Alliance guidelines. Cut clearance notch in the weather guard of tile as needed or utilize QM Tile Replacement Flashings. Attach rails to either side of slot using Bonding Hardware and torque to 250 in-lbs (21-ft-lbs).

➢ Position arm near the center of valley for curved tiles.
➢ Position arm away from seam of joining flat tiles.
➢ Ensure top of hook does not extend above rail.
➢ For additional details refer to the full QM Installation Manual.
TILE

QM QBASE UNIVERSAL TILE MOUNT

Remove tile and mark rafter. Measure up 6 5/8” from bottom of tiles and mark horizontally. Align QBase over rafter center and drill two 7/32” pilot holes, back fill with roofing manufacturers’ approved sealant. Place grade-8 Cap Screw under QBase, lag QBase into rafter location. Install Sub-flashing, waterproof at underlayment level according to roofing manufacturers’ instructions and the Tile Roofing Industry Alliance guidelines. Cut tile with diamond blade to allow post to pass through. Place tile in position and then install Post. Install 18”x18” flashing, pre-bent to follow the contour of the tile as required. Apply sealant where Post and Flashing meet and install EPDM counter-flashing. Attach L-Foot on Standoff with hardware. Torque to 174 in-lbs (14.5 ft-lbs). Attach rails to L-Foot using Bonding Hardware and torque to 250 in-lbs (21-ft-lbs).

➢ For additional details refer to the full QM Installation Manual.

ADDITIONAL ROOF TYPES

QM CLASSIC SHAKE MOUNT

Locate roof rafters and mark locations on roof, remove shakes directly above mount if needed to expose felt paper. Level out installation area and location installation point, mark. Drill 7/32” pilot hole, back fill with roofing manufacturers’ approved sealant. Prepare Hanger Bolt with Hex Nut and Sealing washer, insert into QBlock hole and drive into rafter until fully seated and the QBlock no longer swivels easily. Insert EPDM washer over hanger bolt and then install L-Foot in desired orientation and torque hardware to 132 in-lbs (11 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).

➢ For additional details refer to the full QM Installation Manual.

QM QBASE METAL, SHAKE AND SLATE

The QM QBase can be used to install on multiple roofing types with different installation methods.

➢ For instructions on installing the QBase on Slate refer to the full QM Installation Manual.
➢ For instructions on installing the QBase on Shake refer to the full QM Installation Manual.
➢ For instructions on installing the QBase on Metal Shingle refer to the full QM Installation Manual.
LOW SLOPE ROOFS

FLAT ROOF ATTACHMENT

Flat Roof Attachment can be used with an L-foot for flush mounting modules on low sloped roofs. Mark locations for Flat Roof Attachment. Screws should be installed symmetrically to each other. If using a membrane flashing, remove the silicone washer’s protective liner prior to attaching the membrane. Attach L-foot with washers and 3/8” hardware torqued to 250 in-lbs (21 ft-lbs). Seal attachment and/or membrane per roofing manufacturer’s requirements.

➢ Type, size, and quantity of roof screws to be specified by Structural Engineer. Fastener size not to exceed #15.
➢ Membrane flashing available for TPO, PVC, and KEE roofs. Ensure membrane flashing is compatible with existing roofing material.
➢ If membrane flashing is not used, only washer on top of L-Foot is required.
➢ Standalone Flat Roof Attachment Manual available on website.

QM QBASE MOUNT

Locate the desired mount placement over a rafter. Using the base as a template, mark the two penetration points. Drill two 7/32” pilot holes, back fill with roofing manufacturers’ approved sealant. Place the grade-8 hex bolt in the bottom of the base and screw the Post. Attach L-Foot on Standoff with hardware. Torque to 174 in-lbs (14.5 ft-lbs). Attach rail to L-Foot with Bonding Hardware and torque to 250 in-lbs (21 ft-lbs).

The mount can be flashed with available 9”, 12” or 18” aluminum flashings, pitch pocket or curb, or with a membrane cone flashing. If using a membrane flashing utilize the services of a qualified roofer

➢ For additional details refer to the full QM Installation Manual.

METAL ROOF

QM LYNX

Locate the desired mount placement over a roofing seam, make sure block is fully seated on metal seam. Torque Set Screws to 150 in-lbs (12.5 ft-lbs) using 3/16” Hex Drive, alternate driving each bolt till required torque is met. Slide Hex Bolt into slot and to desired position. Place rail attachment bracket over Hex Bolt and secure with Flange Nut, torque Flange Nut to 150 in-lbs (12.5 ft-lbs) using 1/2” socket.

➢ For additional details refer to the full QM Installation Manual. (NEED LINK)
➢ Certification of Lynx clamp includes bonding to both painted and galvalume metal roofs.
CONDUIT PENETRATION FLASHINGS

QM CONDUIT PENETRATION FLASHING - COMP SHINGLE

Mark a drill point so that the flashing reaches up to the 3rd shingle course. Drill your conduit hole next to the rafter so you can secure the conduit below the roof surface. Cut shingle and remove nails as needed to center the drilled hole and flashing hole. Apply roofing manufacturer's approved sealant on the underside of the flashing in a Upside down U and to top of flashing. Under the 3rd course and through the second course secure flashing with 2 roofing nails, apply sealant over the nail heads. Cut EPDM collar to appropriate size. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts.

➢ Be sure to secure conduit to rafters below the roof surface per local building codes and NEC code requirements.
➢ Cut EPDM collar to appropriate size using the sizing chart in the installation manual, approved for 1/2" to 1" EMT.
➢ For additional details refer to the full QM Installation Manual.

QM CONDUIT PENETRATION FLASHING - TILE

Drill your conduit hole next to the rafter so that you can secure the conduit below the roof surface. Apply roofing manufacturer approve sealant to the underside of the sub-flashing in the shape of an upside down U. Clear away any dust and debris to install sub-flashing. Waterproof at under laminate level according to roofing manufacturer instructions and Tile Roofing Institute Guidelines. Under the top layer of felt, secure the sub-flashing with two roofing nails. Cut EPDM collar to appropriate size. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts. With a diamond blade cut tile to allow conduit to pass through, replace all tiles. Bend the flashing to follow the contour of the tiles. Place flashing over the conduit and tuck up under the next course of tiles. Apply a bead of sealant compatible with the roofing manufacturer and EPDM rubber to anywhere the EPDM collar contacts. Slide collar onto conduit all the way down to the flashing.

➢ Be sure to secure conduit to rafters below the roof surface per local building codes and NEC code requirements.
➢ Cut EPDM collar to appropriate size using the sizing chart in the installation manual, approved for 1/2" to 1" EMT.
➢ For additional details refer to the full QM Installation Manual.
CONDUIT MOUNT

QM CONDUIT MOUNT - COMPOSITION SHINGLE

Place conduit mounts along path of conduit. Lift shingle above mount location and insert flashing into position. Mark center for drilling, remove flashing and drill pilot hole with 1/8" bit. Clean area, fill hole with roofing manufacturer's approved sealant. Lift shingle and slide Conduit Mount into place. Prepare the lag bolt with sealing washer and pipe clamp (not included). Insert lag through hole in block and drill with 7/16" socket until block is tight.

➢ Install mounts as required to support conduit across the roof.
➢ For additional details refer to the full QM Installation Manual.

QM CONDUIT MOUNT - TILE

Remove the tile that the mount will be installed on, and the tiles in the course above it. Lift the bottom of the tile and slide the bottom clamp over the bottom edge of the tile. Insert the 4" tap bolt through the slot into the threaded hole and use a 7/16" socket to thread the screw. Tighten until the top clamp hook end unbends and forms a 90 degree angle with the tile. Use the Cap Screw (included) to attach your pipe clamp (not included) to bottom clamp. Insert conduit and tighten with 7/16" socket.

➢ The clamp is reversible, use the wider hook end on tile greater than 1" thick and the thinner hook end on tiles less than 1" thick.
➢ The installation process is the same on curved tile, make sure that the Conduit Mount is installed on the crown(high point) of the tile.
➢ Install mounts as required to support conduit across the roof.
➢ For additional details refer to the full QM Installation Manual.
**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.

**QM QBOX**

The QBox™ is a flashed junction box with Quick Mount PV patented Elevated Water Seal Technology™, and provides a waterproof pass-through for conduit from the box enclosure to the attic. QBox comes equipped with fasteners to install to the roof deck, and fittings for optional through-the-deck conduit attachment. The QBox is designed to transition or combine up to two (2) strings of conductors utilizing user-supplied wiring components and water-tight fittings.

For more information and full instructions please refer to full QMPV Installation Manual.

➢ The QBOX is only certified for use on composition shingle roofs.
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.

- If installing in areas with ground snow loads greater than 40 psf, install MLPE devices directly next to module frame edge

**COMPATIBLE PRODUCTS**

**Enphase**
- M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ IQ7, IQ 7A, IQ 7+, IQ 7 PD, IQ 7X, Q Aggregator

**Darfon**
- MIG240, MIG300, G320, G640

**Solar Edge**
- M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P800p, P800u, P801, P850, P900, P950, P960, P1100

**SMA**
- RooftCommKit-P2-US, TS4-R Module Retrofit Kits (TS4-R-S, TS4-R-O, TS4-R-F)

**Tigo**
- Tigo Access Point (TAP)
- TS4-R-X (where X can be F, M, O, or S)
- TS4-R-X-DUO (where X can be M, O, or S)
- TS4-A-X (where X can be F, 2F, O, O-DUO, or S)

**AP Systems**
- QS1, YC600

- Remove Grounding Washer on AP Systems QS1 and YC600 inverters before installing to XR rails.

- Remove the Stainless Steel Clip on Tigo-"A" MLPE Devices before attaching to XR rails.

- Use the number of IronRidge Microinverter kits allowed by the MLPE mounting flange. Some will require 1 kit and others 2 kits.

**SYSTEMS USING ENPHASE MICROINVERTERS OR SUNPOWER AC MOD-**

IronRidge systems using approved Enphase products or SunPower modules 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.

**COMPATIBLE PRODUCTS**

**Sunpower**
- Modules with model identifier Ab-xxx-YY and InvisiMount (G5) 46mm frame; where “A” is either E, or X; “b” can be 17, 18, 19, 20, 21, or 22; and “YY” can be C-AC, D-AC, BLK-C-AC, or BLK-D-AC.

**Enphase**

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

- The microinverters or Sunpower AC modules must be used with a maximum 20 A branch rated overcurrent protection device (OCPD).

- If an AC module is removed from a circuit for maintenance, you must first disconnect AC power and then install a temporary EGC to bridge the gap by inserting an AC extension cable (or via other NEC-compliant means), in order to maintain effective ground continuity to subsequent modules.
Use IronRidge’s Microinverter Kit to bond compatible microstorage devices to the racking system. Insert Microinverter Kit T-bolt into top rail slot. Place compatible microstorage into position and tighten hex nut to 80 in-lbs.

**COMPATIBLE PRODUCTS**

**PHAZR**
PHAZR Devices PHAZR-X, where X is 6-12.

**Solpad**
Solpad Inverter model SI-1k
Solpad Battery Storage model SB-2K
Solpad Junction Box model SJB-4k

➢ Running a separate equipment grounding conductor to the PHAZR or Solpad devices is not required.

➢ If installing in areas with ground snow loads greater than 40 psf and underneath a module, install PHAZR and Solpad devices as close as possible to module frame edge.

➢ Solpad may only be installed on XR-100 and XR-1000

➢ Solpad may only be installed with modules having a frame thickness of 35mm or greater.

➢ Use the number of IronRidge Microinverter kits allowed by the microstorage mounting flange. Some will require 1 kit and others 2 kits.

**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.

**COMPATIBLE PRODUCTS**

**Sunforson**
Sunforson silver or black SFS-UTMC-200(B) mid and SFS-UTE-200(B) end clamps.

**Sunpreme**
Sunpreme silver or black mid and end clamps with part numbers 7500105X where “X” is 1, 5, 6 or 7.

**Ironridge**
IronRidge silver or black mid and end clamps with part numbers FMLS-XC-001-Y where “X” is E or M and “Y” is 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 Flush Mount System may be used to ground and/or mount a PV module complying with UL 2703 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.

## Framed Module List

<table>
<thead>
<tr>
<th>Make</th>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adani</td>
<td>Adani modules with 35 and 40mm frames</td>
</tr>
<tr>
<td></td>
<td>ASX-Y-ZZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “X” can be B, M or P; “Y” can be 6 or 7; and “ZZ” can be blank, PERC, B-PERC, or AB-PERC</td>
</tr>
<tr>
<td>Amerisolar</td>
<td>Amerisolar modules with 35, 40 and 50 mm frames</td>
</tr>
<tr>
<td></td>
<td>AS-xxYxxxZ</td>
</tr>
<tr>
<td></td>
<td>Where “b” can be 5 or 6; “Y” can be M, P, M27, P27, M30, or P30; and “Z” can be blank, W or WB</td>
</tr>
<tr>
<td>Aptos Solar</td>
<td>Aptos modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>DNA-yy-zzaa-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “yy” can be 120 or 144; “zz” can be MF or BF; and “aa” can be 23 or 26</td>
</tr>
<tr>
<td>Astronergy Solar</td>
<td>Astronergy modules with 30, 35, 40, and 45 mm frames</td>
</tr>
<tr>
<td></td>
<td>aaSMbbyyyCzz-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “aa” can be CH or A; “bb” can be 60, 66, or 72; “yy” can be blank, 10 or 12; “C” can M, P, M(BL), M-HC, M(BL)-HC, P-HC, M(DG), or M(DGT); and “zz” can be blank, HV, F-B, or F-BH</td>
</tr>
<tr>
<td>ASUN</td>
<td>ASUN modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>ASUN-xxx-YYZZ-aa</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be 60 or 72; “ZZ” can be M, or MH5; and “aa” can be blank or BB</td>
</tr>
<tr>
<td>Auxin</td>
<td>Auxin modules with 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>AXN6y6zAxxx</td>
</tr>
<tr>
<td></td>
<td>Where “y” can be M or P; “z” can be 08, 09, 10, 11, or 12; and “A” can be F or T</td>
</tr>
<tr>
<td>Axitec</td>
<td>Axitec Modules with 30, 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>AC-xxxYyaaZZb</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be M, P, MB or MH; “aa” can be blank, 125- or 156-; “ZZ” can be 54, 60, 72, 120, or 144; “b” can be S, X, V, VB, XV, or MX</td>
</tr>
<tr>
<td>Boviet</td>
<td>Boviet modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>BVMOOYYXYZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be 60 or 76; “ZZ” can be 9, 10 or 12; “X” can be M or P, and “Y” can be blank, L or S; and “cc” can be blank, H, H-BF, H-BF-DG, H-HC, H-HC-BF, H-HC-BF-DG, H-CF, or H-BF-DG</td>
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<tr>
<td>BYD</td>
<td>BYD modules with 35 mm frames</td>
</tr>
<tr>
<td></td>
<td>BYDxxXY-YY-ZZ</td>
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<tr>
<td></td>
<td>Where “A” can be M6, P6, MH or PH; “Y” can be C or K; and “ZZ” can be 30 or 36</td>
</tr>
<tr>
<td>Canadian Solar</td>
<td>Canadian Solar modules with 30, 32, 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>CSBy-xxxZ</td>
</tr>
<tr>
<td></td>
<td>Where “b” can be 1, 3 or 6; “Y” can be H, K, L, N, P, U, V, W, X or Y; and “Z” can be M, P, MS, PX, M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD</td>
</tr>
<tr>
<td>CertainTeed</td>
<td>CertainTeed modules with 35 and 40 frames</td>
</tr>
<tr>
<td></td>
<td>CTxxxYZZ-XX</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be M, P or HC; “ZZ” can be 00, 01, 10, or 11; and “AA” can be 01, 02, 03, 04 or 06</td>
</tr>
<tr>
<td>CSUN</td>
<td>CSUN modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>YYxx-zzzb</td>
</tr>
<tr>
<td></td>
<td>Where “YY” is CSUN or SST; “zz” is blank, 60, or 72; and “A” is blank, P, M or MM; “bb” is blank, BB, SBB, BW, or ROOF</td>
</tr>
<tr>
<td>Dehui</td>
<td>Dehui modules with 30, 35 and 40mm frames</td>
</tr>
<tr>
<td></td>
<td>DH-MYYYZ-xxx</td>
</tr>
<tr>
<td></td>
<td>Where “YYY” can be 760, 772, 860, 872; and “Z” can be B, F or W</td>
</tr>
</tbody>
</table>
## Module Compatibility

<table>
<thead>
<tr>
<th>Module</th>
<th>Compatibility Details</th>
</tr>
</thead>
</table>
| Ecosolargy | Ecosolargy modules with 35, 40, and 50 mm frames  
**ECOXXXYzzA-bbD**  
Where “Y” can be A, H, S, or T; “zz” can be 125 or 156; “A” can be M or P; “bb” can be 60 or 72; and “D” can be blank or B |
| ET Solar | ET Solar modules with 30, 35, 40, and 50 mm frames  
**ET-YYYYzzzA**  
Where “Y” can be P, L, or M; “ZZZ” can be 660, 660BH, 672, 672BH, 754BH, 766BH, 772BH; and “AA” can be GL, TB, TW, WB, WW, BBG, WBG, WBAC, WBCO, WWCO, WWBCO or BBAC |
| Flex | Flex modules with 35, 40, and 50 mm frames  
**FXS-XXXYY-ZZ;**  
Where “YY” can be BB or BC; and “ZZ” can be MAA1B, MAA1W, SAA1B, SAA1W, SAC1B, SAC1W, SAD1W, SBA1B, SBA1W, SBC1B, or SBC1W |
| GCL | GCL modules with 35 mm and 40 mm frames  
**GCL-aaYY xxxx**  
Where “a” can be M or P; “b” can be 3 or 6; and “YY” can be 60, 72, 72H, or 72DH |
| GigaWatt Solar | GigaWatt modules with 40 mm frames  
**GWxxxxYY**  
Where “YY” can be either PB or MB |
| Hansol | Hansol modules with 35 and 40 frames  
**HSxxxxYY-ZZ;**  
Where “YY” can be PB, PD, PE, TB, UD, or UE; and “zz” can be AH2, AN1, AN3, AN4, HH2, HV1, or HJ2 |
| Hanwa Solar | Hanwha Solar modules with 40, 45, and 50 mm frames  
**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 CELL | Hanwha Q CELLS Modules with 32, 35, 40, and 42 mm frames  
**aaYY-ZZ-xxx**  
| Heliene | Heliene modules with 40 mm frames  
**YYZZxxxA**  
Where “YY” can be 36, 60, 72, 96, 120 or 144; “ZZ” can be HC, M, P, or MBLK; and “A” can be blank, HomePV, or Bifacial |
| HT-SAAE | HT-SAAE modules with 35 and 40 mm frames  
**HTYy-aaaZ-xx;**  
Where “yy” can be 60, 66, 72 or 78, “aaa” can be 18, 156 or 166, “Z” can be M, P, M-C, P-C, M(S), M(VS), M(VI), P(V), M(V)-C, P(V)-C, or X |
| Hyundai | Hyundai modules with 33, 35, 40 and 50 mm frames  
**HIy-SxxxZZ**  
Where “Y” can be A, D or S; “S” can be M or S; and “ZZ” can be GI, HG, HI, KI, MI, MF, MG, PI, RI, RG, RG(BF), RG(BK), SG, TI or TG |
| Itek | Itek Modules with 40 and 50 mm frames  
**IT-xxx-YY**  
Where “YY” can be blank, HE, or SE, or SE72 |
## Module Compatibility

<table>
<thead>
<tr>
<th>Module</th>
<th>Compatibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>JA Solar</td>
<td>JA Solar modules with 30, 35, 40 and 45 mm frames</td>
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<tr>
<td></td>
<td>JAyyzz-bbww-xxx/aa</td>
</tr>
<tr>
<td></td>
<td>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, 66, 72 or 78; “ww” can be D09, D10, D20, D30, S01, S02, S03, S06, S09, S10, S12, S20 or S30; and “aa” can be BP, MB, MR, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB</td>
</tr>
<tr>
<td>Jinko</td>
<td>Jinko modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>JKMyyzz-bbb-aa</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be either blank or S; “ZZ” can be M, P, or PP; and “aa” can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HB, 60HBL, 6HBL-EP, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 6RL3, 6RL3-B, 6TL3-B, 7RL3-V, 7RL3-TV, 72, 72B, 72-J4, 72B-J4, 72(Plus), 72-V, 72H-V, 72L-V, 72H4-V, 72H4-TV, 72-MX, 72H-DBVP, 72H-DB, 72H-L, or 72H-MX3</td>
</tr>
<tr>
<td>Kyocera</td>
<td>Kyocera Modules with 46mm frames</td>
</tr>
<tr>
<td></td>
<td>KYxxxZ-AAA</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be D or U; “ZZ” can be blank, GX, or SX; and “AA” can be LPU, LFU, UPU, LPS, LPB, LFB, LFB2, LPB2, 3AC, 3BC, 3FC, 4AC, 4BC, 4FC, 4UC, 5AC, 5BC, 5FC, 5UC, 6BC, 6FC, 6BC, 6MCA, or 6MPA</td>
</tr>
<tr>
<td>LG</td>
<td>LG modules with 35, 40, and 46 mm frames</td>
</tr>
<tr>
<td></td>
<td>LGxxxY-aa</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be A, E, M, N, Q, S; “a” can be A, 1, 2 or 3 “Z” can be C, K, T, or W; and “bb” can be A3, A5, A6, B3, B6, E6, G3, G4, J5, K4, L5, N5, V5 or V6</td>
</tr>
<tr>
<td>Longi</td>
<td>Longi modules with 30, 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>LRa-YYZ-xxxM</td>
</tr>
<tr>
<td></td>
<td>Where “a” can be 4, 5 or 6; “YY” can be blank, 60 or 72; and “ZZ” can be blank, BK, BP, HV, PB, PE, PH, HBD, HB, HIH, HB, HPB, HPH, or HIH</td>
</tr>
<tr>
<td>Mission Solar</td>
<td>Mission Solar modules with 33 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>MSEbbxxxZZaa</td>
</tr>
<tr>
<td></td>
<td>Where “bb” can be blank or 60A; “ZZ” can be blank, MM, SE, SO, SQ, SR, SX or TS; and “aa” can be blank, 1J, 4J, 4S, 5K, SR, ST, 60, 6J, 6S, 6W, 6Z, 8K, 8T, or 9S</td>
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<tr>
<td>Mitsubishi</td>
<td>Mitsubishi modules with 46 mm frames</td>
</tr>
<tr>
<td></td>
<td>PV-MYxxx-ZZZ</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be LE or JE; and “ZZ” can be either HD, HD2, or FB</td>
</tr>
<tr>
<td>Moltech</td>
<td>IM and XS series modules with 40, 45, and 50 mm frames</td>
</tr>
<tr>
<td>Next Energy Alliance</td>
<td>Next Energy Alliance modules with 35 and 40 mm frames</td>
</tr>
<tr>
<td></td>
<td>yyNEA-xxxZZZ</td>
</tr>
<tr>
<td></td>
<td>Where “yy” can be blank or US; “zz” can be M, MB or M-60</td>
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<td>Neo Solar Power</td>
<td>Neo Solar Power modules with 35 mm frames</td>
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<tr>
<td></td>
<td>D6YxxxZZaa</td>
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<tr>
<td></td>
<td>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)</td>
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<tr>
<td>Panasonic (HiT)</td>
<td>Panasonic modules with 35 and 40 mm frames</td>
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<tr>
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<td>VBNHxxxYYzzA</td>
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<td>Where “YY” can be either KA, RA, SA or ZA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank, E, G, or N</td>
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<td>Panasonic (EverVolt)</td>
<td>Panasonic modules with 30 mm frames</td>
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<td>EVPVxxxA</td>
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<td>Where “A” can be blank or K</td>
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<td>Peimar</td>
<td>Peimar modules with 40 mm frames</td>
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<tr>
<td></td>
<td>SbxxxYyy</td>
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<tr>
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<td>Where “b” can be G, M or P; “Y” can be M or P; and “zz” can be blank, (BF) or (FB)</td>
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<td>Philadelphia Solar</td>
<td>Philadelphia Solar modules with 35 and 40 mm frames</td>
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<td>PS-YzzAAA</td>
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<td>Where “Y” can be M or P; “zz” can be 60 or 72; and “AA” can be blank or (BF)</td>
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<td>Phono Solar</td>
<td>Phono Solar modules with 35, 40, and 45 mm frames</td>
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<td>PSxxxY-ZZ/A</td>
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<td>Where “Y” can be M, M1, MH, M1H, M4, M4H or P; “ZZ” can be 20 or 24; and “A” can be F, T, U, UH, or TH</td>
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<tr>
<td>Module Type</td>
<td>Compatibility Details</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------</td>
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</table>
| **Recom**   | Recom modules with 35 and 40 mm frames  
               RCM-xxx-6yy  
               Where "yy" can be MA, MB, ME or MF |
| **REC Solar** | REC modules with 30, 38 and 45 mm frames  
               RECxxxxYZZ  
               Where "YY" can be AA, M, NP, NP2, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, TP3M or TP4; and "ZZ" can be blank, Black, BLK, BLK2, SLV, 72, or Pure |
| **Renesola** | ReneSola modules with 35, 40 and 50 mm frames  
               AxxxxYZ-ZZ  
               Where "AA" can be SP(SLP) or JC; "Y" can be blank, F, M or S; and "ZZ" can be blank, Ab, Ab-b, Abh, Abh-b, Bbh, Bbv-b, BBv, Db, Db-b, or 24/Bb |
| **Renogy**  | Renogy Modules with 40 and 50 mm frames  
               RNG-xxxY  
               Where "xxx" is the module power rating; and "Y" can be D or P |
| **Risen**   | Risen Modules with 30, 35 and 40 mm frames  
               RSMyy-a-xxxZZ  
               Where "yy" can be 60, 72, 110, 120, 132 or 144; "a" can be 6, 7 or 8; and "ZZ" can be M, P or BMDG |
| **S-Energy** | S-Energy modules with 35 and 40 mm frames  
               SABE-CCYYY-xxxZ  
               Where "A" can be C, D, L or N; "BB" can be blank, 29, 25, 40 or 45; "CC" can be blank, 60 or 72; "YYY" can be blank, BDE, MAE, MAI, MBE, MBI, MCE or MCI; and "Z" can be V, M-10, P-10 or P-15 |
| **Seraphim Energy Group** | Seraphim modules with 30, 35 and 40 mm frames  
               SEG-aYY-xxxZZ  
               Where "a" can be blank, 6 or B; "YY" can be blank, MA, MB, PA, or PB; and "ZZ" can be blank, BB, BG, BW, HV, WB, WW, BMB, BMA-HV, BMA-BG, BMB-HV |
| **Seraphim USA** | Seraphim modules with 30, 35, 40 and 50 mm frames  
               SRP-xxx-YY-ZZ  
               Where "xxx" is the module power rating; and "YY" can be blank, BMA, BMD, 6MA, 6MB, 6PA, 6PB, 6QA-XX-XX, and 6QB-XX-XX; "ZZ" can be blank, BB, BG or HV |
| **Sharp**   | Sharp modules with 35 and 40 mm frames  
               NUYYxxx  
               Where "YY" can be SA or SC |
| **Silfab**  | Silfab Modules with 35 and 38 mm frames  
               SYY-Z-xxxAb  
               Where "YY" can be IL, SA, LA, SG or LG; "Z" can be blank, M, P, or X; "A" can be blank, B, H, M, N; and "b" can be A, C, L, G, K, T, U or X |
| **Solaria** | Solaria modules with 40 mm frames  
               PowerXT xxxY-ZZ  
               Where "Y" can be R or C; and "ZZ" can be AC, BD, BX, BY, PD, PM, PM-AC, PX, PZ, WX or WZ |
| **SolarCity (Tesla)** | SolarCity modules with 40 mm frames  
               SCxxxYY  
               Where "YY" can be blank, B1 or B2 |
| **SolarTech** | SolarTech modules with 40 and 42 mm frames  
               AAA-xxxYY  
               Where "AAA" can be PERCB-B, PERCB-W, HJTB-B, HJTB-W or STU; "YY" can be blank, PERC or HJT |
| **SolarWorld AG** | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames  
               SW-xxx |
| **SolarWorld Americas** | SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames  
               SWA-xxx |
| **Sonali**  | Sonali Modules with 40 mm frames  
               SSxxx |
| **Stion**   | Stion Thin film modules with 35 mm frames  
               STO-xxx or STO-xxxA |
## Module Compatibility

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<tr>
<th>Company</th>
<th>Modules with 35, 40 &amp; 50 mm frames</th>
<th>Compatibility Details</th>
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<td>SunEdison</td>
<td>SunEdison Modules with 35, 40 &amp; 50 mm frames</td>
<td>SE-YxxxZABCDE</td>
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<td>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;</td>
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<td>“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</td>
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<tr>
<td>Suniva</td>
<td>Suniva modules with 35, 38, 40, 46, and 50 mm frames</td>
<td>OPTxxx-AAA-B-YYY-Z</td>
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<tr>
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<td>Where “AA” is either 60 or 72; “B” is either 4 or 5; “YYY” is either 100,101,700,1B0, or 1B1; and</td>
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<td></td>
<td>“Z” is blank or B</td>
<td>MVxxx-AAA-B-YYY-Z</td>
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<tr>
<td>Sunpower</td>
<td>Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames</td>
<td>SPR-Zb-xxx-YY</td>
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<td>Where “Z” is either A, E, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; and “YY” can be</td>
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<tr>
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<td>blank, BLK, COM, C-AC, D-AC, E-AC, BLK-E-AC, G-AC, BLK-C-AC, or BLK-D-AC</td>
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<tr>
<td>Sunspark</td>
<td>Sunspark modules with 40 mm frames</td>
<td>STY-xxxxZ-A</td>
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<tr>
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<td>Where “YY” can be MX or ST; and “Z” can be M, MB, M3, M3B, P or W; and “A” can be 60 or 72</td>
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<td>Suntech</td>
<td>Suntech modules with 35, 40 and 50mm frames</td>
<td>STP-xxx-xx-aa</td>
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<td>Where “y” is blank or S; “z” can be 20, 24, A60 or A72U; and “aa” can be Vd, Vfu, Vfh, Wdb,</td>
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<td>Wde, Wdh, or Wtbb</td>
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<tr>
<td>Talesun</td>
<td>Talesun modules with 30, 35 and 40mm frames</td>
<td>TA6yZZaaaa-b</td>
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<td>Where “A” can be D or P; “y” can be blank, F, G, H, I or L; “ZZ” can be 60 or 72; “aa” can be</td>
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<td></td>
<td>M, M(H), or P; and “b” can be blank, B, T, or H</td>
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<tr>
<td>Tesla</td>
<td>Tesla modules with 40 mm frames</td>
<td>TxxxY</td>
</tr>
<tr>
<td></td>
<td>Where “Y” can be H or S</td>
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<tr>
<td>Trina</td>
<td>Trina Modules with 30, 35, 40 and 46mm frames</td>
<td>TSM-xxxYYZZ</td>
</tr>
<tr>
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<td>Where “YY” can be DD05, DD06, DD14, DE14, DE15, DE15V, DE15G, DE15VC, DE19, DE19C.20, DE06X,</td>
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<tr>
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<td>PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15; and “ZZ” can be blank, .05, .05(II),</td>
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<td>.08, .10, .18, .08D, .18D, .082, .002, .00S, .05S, .08S, .20(II), A, A.05, A.08, A.10, A.18,</td>
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<td></td>
<td>(II), A(A), A(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II),</td>
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<td>H.082(II), H.20(II), HC.20(II), HC.20(II), M, M(II), M.05(II), M.C.20(II)</td>
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<tr>
<td>URE</td>
<td>URE modules with 35 mm frames</td>
<td>DyZxxxxa</td>
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<tr>
<td></td>
<td>Where “D” can be D or F; “y” can be A, 6 or 7; “Z” can be K or M; and “aa” can be H3A, H4A,</td>
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<tr>
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<td>H8A, E7-G-BB, E8G or E8B-BG</td>
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<tr>
<td>Vikram</td>
<td>Vikram solar modules with 40 mm frames</td>
<td>VSy.Y.ZZZAAA.bb</td>
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<td>Where “yy” can be M, P, MBB, MH, MS, MHBB, or PBB; “ZZ” can be 60 or 72; “AAA” is the module</td>
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</tr>
<tr>
<td></td>
<td>power rating; and “bb” can be 03, 04 or 05</td>
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<tr>
<td>VSUN</td>
<td>VSUN modules with 35 and 40 mm frames</td>
<td>VSUNAAA-YYz-aa</td>
</tr>
<tr>
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<td>Where “YY” can be 60, 72, 120, or 144; “z” can be M, P, MH, PH, or BMH; and “aa” can be blank,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BB, BW, or DG</td>
<td></td>
</tr>
<tr>
<td>Waaree</td>
<td>Waaree modules with 40mm frames</td>
<td>WSyy-xxx</td>
</tr>
<tr>
<td></td>
<td>where “yy” can be blank, M, or MB</td>
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</tr>
<tr>
<td>Winaico</td>
<td>Winaico modules with 35 and 40 mm frames</td>
<td>Wsy-xxxZa</td>
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<tr>
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<td>Where “y” can be either P or T; “Z” can be either M, P, or MX; and “a” can be blank or 6</td>
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<tr>
<td>Yingli</td>
<td>Yingli modules with 35 and 40 mm frames</td>
<td>YLxxZ-yy</td>
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<td>Where “Z” can be D or P; “yy” can be 29b, 30b, 34d, 35b, 36b or 40d</td>
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<tr>
<td>ZN Shine</td>
<td>ZN Shine modules with 35mm frames</td>
<td>ZXMY-AAA-xxx/M</td>
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<tr>
<td></td>
<td>Where “Y” can be 6 or 7, “AAA” can be 72, NH120, NH144 or SHDB144</td>
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</tbody>
</table>

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### MODULE COMPATIBILITY

#### FRAMELESS MODULE LIST

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<tr>
<th>MAKE</th>
<th>MODELS</th>
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<tbody>
<tr>
<td>Astronergy Solar</td>
<td>Astronergy frameless modules</td>
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<td>CHSM6610P(DG)-xxx</td>
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<tr>
<td>Canadian Solar</td>
<td>Canadian Solar frameless modules</td>
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<td></td>
<td>CSbY-xxx-Z</td>
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<td>Where “b” can be 3 or 6; “Y” is K, P, U, or X; and “Z” can be M-FG, MS-FG, P-FG, MB-FG, or PB-FG</td>
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<tr>
<td>Heliene</td>
<td>Heliene frameless modules</td>
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<tr>
<td></td>
<td>YYZZxxxA</td>
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<td></td>
<td>Where “YY” can be 72; “ZZ” can be M; and “A” can be GH</td>
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<tr>
<td>Jinko</td>
<td>Jinko frameless modules</td>
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<td>JKMxxxPP-DV</td>
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<td>Prism Solar</td>
<td>Prism Solar frameless modules</td>
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<td>BZYY-xxxAAA</td>
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<tr>
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<td>Where “Z” can be i or N; “YY” can be 48, 60, 60S, 72 or 72S; and “AAA” can be blank or BSTC</td>
</tr>
<tr>
<td>Risen</td>
<td>Risen frameless modules</td>
</tr>
<tr>
<td></td>
<td>RSMyy-6-xxxZZ</td>
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<tr>
<td></td>
<td>Where “yy” can be 60, 72, 120 or 144; and “ZZ” can be MDG or PDG</td>
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<td>Stion</td>
<td>Stion frameless modules</td>
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<td>STL-xxx or STL-xxxA</td>
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<td>Sunpreme</td>
<td>Sunpreme frameless modules</td>
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<td></td>
<td>GXB-xxxYY</td>
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<tr>
<td></td>
<td>Where “YY” can be blank or SL</td>
</tr>
<tr>
<td>Trina</td>
<td>Trina frameless modules</td>
</tr>
<tr>
<td></td>
<td>TSM-xxxYY</td>
</tr>
<tr>
<td></td>
<td>Where “YY” can be either DEG5(II), DEG5.07(II), DEG5.40(II), DEG5.47(II), DEG14(II), DEG14C(II), DEG14C.07(II), DEG14.40(II), PEG5, PEG5.07, PEG5.40, PEG5.47, PEG14, or PEG14.40</td>
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</table>
cable lug, terminal end  
KRN-M8/-35

The use of insulated connectors guarantees users consistent electrical connection quality in the long term.

- Wide range of insulated and non-insulated cable lugs and connectors
- Tubular cable lugs according to current market standards (Euroseries)
- Compression cable lugs acc. to DIN 46235
- Sheet metal cable lugs acc. to DIN 46234
- Insulated ring cable lugs to DIN 46237
- Insulated pin cable lugs to DIN 46231

General ordering data

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<td>Order No.</td>
<td>1496550000</td>
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<td>Version</td>
<td>cable lug, terminal end,35 mm²</td>
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<td>GTIN (EAN)</td>
<td>4060118305913</td>
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<tr>
<td>Qty.</td>
<td>100 pc(s.)</td>
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# Data sheet

cable lug, terminal end
KRN-M8/-35

Weidmüller Interface GmbH & Co. KG
Klingenbergrstraße 26
D-32758 Detmold
Germany
 Fon: +49 5231 14-0
 Fax: +49 5231 14-292083
www.weidmueller.com

## Technical data

### Dimensions and weights

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<thead>
<tr>
<th>Weight</th>
<th>2.18 g</th>
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<td>Net weight</td>
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### Technical data

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<th>Version</th>
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### Connectors

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<th>Conductor cross-section</th>
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<td>Flange width (b)</td>
<td>17 mm</td>
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<td>Inside diameter of flange (d2)</td>
<td>8.4 mm</td>
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<td>Insulation</td>
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<td>Shaft length (a)</td>
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| Connection length (l)    | 34 mm |
| Hole                     | M8    |
| inside diameter of shaft (d1) | 8.5 mm |
| Outside diameter of shaft (d3) | 12 mm |

### Classifications

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<th>ETIM 6.0</th>
<th>EC001051</th>
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<td>eClass 9.0</td>
<td>27-40-02-05</td>
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<td>eClass 10.0</td>
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### Approvals

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<td>ROHS</td>
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### Downloads

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<tr>
<th>Brochure/Catalogue</th>
<th>CAT 6 TOOLS 15/16 EN</th>
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<td>Engineering Data</td>
<td>EPLAN</td>
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<td>Engineering Data</td>
<td>STEP</td>
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Creation date May 28, 2020 1:08:42 PM CEST
cable lug, terminal end
KRN-M8/-35

Weidmüller Interface GmbH & Co. KG
Klingenbergrstraße 26
D-32758 Detmold
Germany
Fon: +49 5231 14-0
Fax: +49 5231 14-292083
www.weidmueller.com
**Data sheet**

**cable lug, terminal end**

**KRN-M8/-35**

---

**Accessories**

**Tools**

Crimping tools for cable lugs, connectors and wire-end ferrules with interchangeable inserts

- extremely fast processing thanks to hydraulic support
- large processing range up to 300 mm²
- 270° revolving quick-action crimping head
- automatic pressure limitation and monitoring via pressure sensor
- electronic control and monitoring of the crimping process
- Saving of all crimping cycles and error messages to internal memory
- Reading of all cycles and error messages via USB
- Li-ion rechargeable battery with charge status indicator: 18 V, 1.5 Ah

**General ordering data**

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<td>4050118468434</td>
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<tr>
<td>Qty.</td>
<td>1 pc(s).</td>
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</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>EPG 45</th>
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<tr>
<td>Order No.</td>
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<td>GTIN (EAN)</td>
<td>4050118309317</td>
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<td>Qty.</td>
<td>1 pc(s).</td>
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</tr>
</tbody>
</table>

---

**Crimping tool for tubular (EN 13600) and compression cable lugs (DIN 46235)**

Crimping tools for tubular and compression cable lugs with swivel crimping star.

- Integrated crimping star for different cross-sections
- Hexagon crimping tools for compression cable lugs
- WM-From crimping tools for tubular cable lugs
- wide processing range up to 70 or 120 mm²

**General ordering data**

<table>
<thead>
<tr>
<th>Type</th>
<th>PZ RK 10/120</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>Order No.</td>
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<tr>
<td>GTIN (EAN)</td>
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<td>Qty.</td>
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<table>
<thead>
<tr>
<th>Type</th>
<th>PZ RK 6/70</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
<td>Order No.</td>
<td>1500440000</td>
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<tr>
<td>GTIN (EAN)</td>
<td>4050118309058</td>
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<tr>
<td>Qty.</td>
<td>1 pc(s).</td>
<td></td>
</tr>
</tbody>
</table>

---
# Data sheet

## cable lug, terminal end
### KRN-M8/-35

---

## Accessories

## Tools

Crimping tools for cable lugs, connectors and wire-end ferrules with interchangeable inserts
- extremely fast processing thanks to hydraulic support
- large processing range up to 300 mm²
- 270° revolving quick action crimping head
- automatic pressure limitation and monitoring via pressure sensor
- Additional features for APG series:
  - electronic control and monitoring of the crimping process
  - Saving of all crimping cycles and error messages to internal memory
  - Reading of all cycles and error messages via USB

---

### General ordering data

<table>
<thead>
<tr>
<th>Type</th>
<th>Order No.</th>
<th>GTIN (EAN)</th>
<th>Qty.</th>
<th>Version</th>
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<tr>
<td>HPG 60</td>
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<td>APG 80</td>
<td>1502390000</td>
<td>4050118310627</td>
<td>1 pc(s).</td>
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</table>

---

*Tools image*
PV power optimization at the module-level

- Specifically designed to work with SolarEdge inverters
- Mitigates all types of module mismatch losses from manufacturing tolerance to partial shading
- Flexible system design for maximum space utilization
- Fast installation with a single bolt
- Next generation maintenance with module-level monitoring
- Meets NEC requirements for arc fault protection (AFCI) and Photovoltaic Rapid Shutdown System (PVRSS)
- Module-level voltage shutdown for installer and firefighter safety
- Up to 25% more energy
- Superior efficiency (99.5%)
- Mitigates all types of module mismatch losses

Power Optimizer
For North America
P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

25 YEAR WARRANTY

solaredge.com
# Power Optimizer

## For North America

### P320 / P340 / P370 / P400 / P401 / P405 / P485 / P505

<table>
<thead>
<tr>
<th>Optimizer model (typical module compatibility)</th>
<th>P320 (for 60-cell modules)</th>
<th>P340 (for higher-power 60-cell modules)</th>
<th>P370 (for 72 &amp; 96-cell modules)</th>
<th>P400 (for higher-power 60 and 72-cell modules)</th>
<th>P401 (for high-power 60 and 72 cell modules)</th>
<th>P405 (for high-voltage modules)</th>
<th>P485 (for high-voltage modules)</th>
<th>P505 (for higher current modules)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Rated Input DC Power*</td>
<td>320 W</td>
<td>350 W</td>
<td>370 W</td>
<td>400 W</td>
<td>405 W</td>
<td>485 W</td>
<td>505 W</td>
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<tr>
<td>Absolute Maximum Input Voltage (Voc at lowest temperature)</td>
<td>60</td>
<td>80</td>
<td>60</td>
<td>125</td>
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<tr>
<td>MPPT Operating Range</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td>8% - 48%</td>
<td></td>
</tr>
<tr>
<td>Maximum Short Circuit Current (Isc)</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>11</td>
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<td></td>
</tr>
<tr>
<td>Maximum DC Input Current</td>
<td>13.5A</td>
<td>14.65A</td>
<td>14.65A</td>
<td>14.65A</td>
<td>14.65A</td>
<td>14.65A</td>
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</tr>
<tr>
<td>Maximum Efficiency</td>
<td>99.5%</td>
<td></td>
<td></td>
<td>98.8%</td>
<td>98.6%</td>
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<td>Weighted Efficiency</td>
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<tr>
<td>Overvoltage Category</td>
<td>I</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### OUTPUT DURING OPERATION (POWER OPTIMIZER CONNECTED TO OPERATING SOLAREDGE INVERTER)

| Safety Output Voltage per Power Optimizer | 1 ± 0.1 Vd |                               |                               |                                     |                                     |                               |                               |                               |

### OUTPUT DURING STANDBY (POWER OPTIMIZER DISCONNECTED FROM SOLAREDGE INVERTER OR SOLAREDGE INVERTER OFF)

### STANDARD COMPLIANCE

<table>
<thead>
<tr>
<th>EMC</th>
<th>FCC Part 15 Class A / IEC61000-6-2, IEC61000-6-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>IEC62109-1 (Class II safety), UL1741</td>
</tr>
<tr>
<td>Material</td>
<td>UL94 V-0 / UV Flame Resistant</td>
</tr>
<tr>
<td>RoHS</td>
<td>Yes</td>
</tr>
</tbody>
</table>

### INSTALLATION SPECIFICATIONS

| Maximum Allowed System Voltage | 1000 Vd |
| Compatible inverters | All SolarEdge Single-Phase and Three Phase Inverters |
| Dimensions (W x L x H) | 129 x 153 x 27.5 / 5.1 x 6 x 1.1 |
| Weight (including cables) | 630 / 1.4 |
| Input Connector | MC4 (3) |
| Input Wire Length | 0.16 / 0.52 |
| Output Type / Connector | Double Insulated / MC4 |
| Output Wire Length | 0.9 / 2.95 |
| Operating Temperature Range* | -40 to +85°C / -40 to +185°F |
| Protection Rating | IP66 / Type 6P |
| Relative Humidity | 0 - 100 % |

*(1) Rated power of the module at STC will not exceed the optimizer “Rated Input DC Power”. Modules with up to +5% power tolerance are allowed.
(2) NEC 2017 requires max input voltage be not more than 80V.
(3) For other connector types please contact SolarEdge.
(4) For dual version for parallel connection of two modules use P485-4NMDMRM. In the case of an odd number of PV modules in one string, installing one P485 dual version power optimizer connected to one PV module. When connecting a single module seal the unused input connectors with the supplied pair of seals.
(5) Longer input wire length are available for use. For 0.9m input wire length order P401-090XXX.
(6) For ambient temperature above +85°C / +185°F power de-rating is applied. Refer to Power Optimizers Temperature De-Rating Technical Note for more details.

### PV System Design Using a SolarEdge Inverter**

<table>
<thead>
<tr>
<th>Minimum String Length (Power Optimizers)</th>
<th>P320, P340, P370, P400, P401, P405, P485, P505</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Phase HD-Wave</td>
<td>8</td>
</tr>
<tr>
<td>Single phase</td>
<td>6</td>
</tr>
<tr>
<td>Three Phase for 208V grid</td>
<td>25</td>
</tr>
<tr>
<td>Three Phase for 277/480V grid</td>
<td></td>
</tr>
<tr>
<td>Maximum Power per String</td>
<td>5700 (6000 with SE7600-US / SE11400-US)</td>
</tr>
</tbody>
</table>

* For detailed string sizing information refer to: http://www.solaredge.com/sites/default/files/string_sizing_na.pdf
** For string with more than 30 optimizers does not meet NEC rapid shutdown requirements; safety voltage will be above the 30V requirement.
** For 208V grid: it is allowed to install up to 6,500W per string when the maximum power difference between each string is 1,000W.
** For 277/480V grid: it is allowed to install up to 11,000W per string when the maximum power difference between each string is 2,000W.
Single Phase Inverter with HD-Wave Technology
for North America

- Optimized installation with HD-Wave technology
- Specifically designed to work with power optimizers
- Record-breaking 99% weighted efficiency
- Quick and easy inverter commissioning directly from a smartphone using the SolarEdge SetApp
- Fixed voltage inverter for longer strings
- Integrated arc fault protection and rapid shutdown for NEC 2014, NEC 2017 and NEC 2020 per article 690.11 and 690.12
- UL1741 SA certified, for CPUC Rule 21 grid compliance
- Small, lightweight, and easy to install both outdoors or indoors
- Built-in module-level monitoring
- Optional: Faster installations with built-in consumption metering (1% accuracy) and production revenue grade metering (0.5% accuracy, ANSI C12.20)

12-25 YEAR WARRANTY
### Single Phase Inverter with HD-Wave Technology for North America


#### TABLE 1: Specifications

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>APPLICABLE TO INVERTERS WITH PART NUMBER</td>
<td>SEXXXXH-XXXXXBX4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### OUTPUT

- **Rated AC Power Output**:
  - 3000 @ 240V
  - 3300 @ 208V
  - 5000 @ 240V
  - 5000 @ 208V
  - 6000 @ 240V
  - 6000 @ 208V
  - 7600 @ 240V
  - 7600 @ 208V
  - 10000 @ 240V
  - 10000 @ 208V

- **Maximum AC Power Output**:
  - 3000 @ 240V
  - 3300 @ 208V
  - 5000 @ 240V
  - 5000 @ 208V
  - 6000 @ 240V
  - 6000 @ 208V
  - 7600 @ 240V
  - 7600 @ 208V
  - 10000 @ 240V
  - 10000 @ 208V

- **AC Output Voltage Min.-Nom.-Max.**:
  - (211 - 240 - 264) Vac
  - (183 - 208 - 229) Vac

- **AC Frequency (Nominal)**:
  - 59.3 - 60 - 60.5 Hz

- **Maximum Continuous Output Current @240V**:
  - 12.5 A
  - 16 A
  - 21 A
  - 25 A
  - 32 A
  - 42 A
  - 47.5 A

- **Power Factor**:
  - 1, Adjustable - 0.85 to 0.85

- **Utility Monitoring, Islanding Protection, Country Configurable Thresholds**:
  - Yes

- **GFDI Threshold**:
  - 1 A

- **Input Monitoring**:
  - Adjustable - 0.85 to 0.85

#### INPUT

- **Maximum DC Power @240V**:
  - 4650 W
  - 5900 W
  - 7750 W
  - 7750 W
  - 11800 W
  - 15500 W
  - 17650 W

- **Maximum DC Power @208V**:
  - 5100 W
  - 7750 W
  - 11800 W
  - 15500 W

- **Transformer-less, Ungrounded**:
  - Yes

- **Maximum Input Voltage**:
  - 8.5 Vac

- **Nominal DC Input Voltage**:
  - 380 Vac

- **Maximum Input Current @240V**:
  - 10.5 A
  - 13.5 A

- **Maximum Input Current @208V**:
  - 9 A
  - 13.5 A

- **Max. Input Short Circuit Current**:
  - 45 Adc

- **Reverse-Polarity Protection**:
  - Yes

- **Ground-Fault Isolation Detection**:
  - 500 kV sensitivity

- **Maximum Inverter Efficiency**:
  - 99%

- **CEC Weighted Efficiency**:
  - 99%

- **Nighttime Power Consumption**:
  - < 2.5 W

(1) For other regional settings please contact SolarEdge support
(2) A higher current source may be used; the inverter will limit its input current to the values stated.
Single Phase Inverter with HD-Wave Technology for North America


ADDITIONAL FEATURES

- Supported Communication Interfaces: RS485, Ethernet, ZigBee (optional), Cellular (optional)
- Revenue Grade Metering: ANSI C12.20
- Consumption metering: Optional
- Inverter Commissioning: With the SetApp mobile application using Built-in Wi-Fi Access Point for Local Connection

STANDARD COMPLIANCE

- Safety: UL1741, UL1741 SA, UL1699B, CSA C22.2, Canadian AFCI according to T.I.L. M-07
- Grid Connection Standards: IEEE1547, Rule 21, Rule 14 (Hi)
- Emissions: FCC Part 15 Class B

INSTALLATION SPECIFICATIONS

- AC Output Conduit Size / AWG Range: 1" Maximum / 14-6 AWG
- DC Input Conduit Size / # of Strings / AWG Range: 1" Maximum / 1-2 strings / 14-6 AWG, 1" Maximum / 1-3 strings / 14-6 AWG
- Dimensions with Safety Switch (HxWxD): 17.7 x 14.6 x 6.8  / 450 x 370 x 174 in / mm
- Weight with Safety Switch: 22 / 10 lb / kg, 25.1 / 11.4 lb / kg, 26.2 / 11.9 lb / kg, 38.8 / 17.6 lb / kg
- Noise: < 25 dB
- Cooling: Natural Convection
- Operating Temperature Range: -40 to +140˚F / -40 to +60˚C
- Protection Rating: NEMA 4X (Inverter with Safety Switch)

How to Enable Consumption Monitoring

By simply wiring current transformers through the inverter’s existing AC conduits and connecting them to the service panel, homeowners will gain full insight into their household energy usage helping them to avoid high electricity bills.