powered by Q.ANTUM DUO

# Q.PEAK DUO BLK-G6+

## 330-345

ENDURING HIGH PERFORMANCE

VDE 11/2016 Quality Tested – high reliability, low degradation, optimized durability, continous line monitoring – www.VDEinfo.com ID. 40032587

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2019

Q CELLS YIELD SECURITY – ANTI PID TECHNOLOGY (APT); HOT-SPOT PROTECT (HSP); TRACEABLE QUALITY (TRA.Q™); ANTI LID TECHNOLOGY (ALT)

25 YEAR Product and Performance Warranty Q CELLS

### Q.ANTUM TECHNOLOGY: LOW LEVELIZED 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 behavior.

### ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID and Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

### EXTREME WEATHER RATING

High-tech aluminum alloy frame, certified for high snow (5400 Pa) and wind loads (4000 Pa).

### A RELIABLE INVESTMENT

Inclusive 25-year product warranty and 25-year linear performance warranty[2].

### 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

### THE IDEAL SOLUTION FOR:

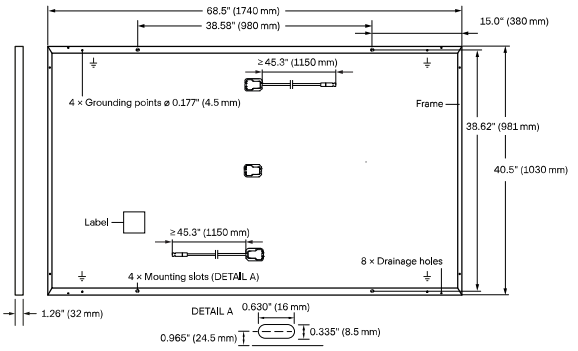
Rooftop arrays on residential buildings

Engineered in Germany

Q CELLS

## MECHANICAL SPECIFICATION

| | |
|---|---|
| Format | 68.5 × 40.6 × 1.26 in (including frame)<br>(1740 × 1030 × 32 mm) |
| Weight | 43.9 lbs (19.9 kg) |
| Front Cover | 0.13 in (3.2 mm) thermally pre-stressed glass<br>with anti-reflection technology |
| Back Cover | Composite film |
| Frame | Black anodized aluminum |
| Cell | 6 × 20 monocrystalline Q.ANTUM solar half cells |
| Junction Box | 2.09-3.98 × 1.26-2.36 × 0.59-0.71 in (53-101 × 32-60 ×<br>15-18 mm), Protection class IP67, with bypass diodes |
| Cable | 4 mm² Solar cable; (+) ≥45.3 in (1150 mm), (–) ≥45.3 in (1150 mm) |
| Connector | Stäubli MC4; IP68 |

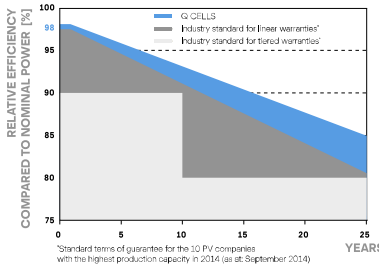



## ELECTRICAL CHARACTERISTICS

| POWER CLASS | | | | 330 | 335 | 340 | 345 |
|---|---|---|---|---|---|---|---|
| MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W) | | | | | | | |
| Minimum | Power at MPP[1] | $P_{MPP}$ | [W] | 330 | 335 | 340 | 345 |
| | Short Circuit Current[1] | $I_{SC}$ | [A] | 10.41 | 10.47 | 10.52 | 10.58 |
| | Open Circuit Voltage[1] | $V_{OC}$ | [V] | 40.15 | 40.41 | 40.66 | 40.92 |
| | Current at MPP | $I_{MPP}$ | [A] | 9.91 | 9.97 | 10.02 | 10.07 |
| | Voltage at MPP | $V_{MPP}$ | [V] | 33.29 | 33.62 | 33.94 | 34.25 |
| | Efficiency[1] | η | [%] | ≥18.4 | ≥18.7 | ≥19.0 | ≥19.3 |
| MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2] | | | | | | | |
| Minimum | Power at MPP | $P_{MPP}$ | [W] | 247.0 | 250.7 | 254.5 | 258.2 |
| | Short Circuit Current | $I_{SC}$ | [A] | 8.39 | 8.43 | 8.48 | 8.52 |
| | Open Circuit Voltage | $V_{OC}$ | [V] | 37.86 | 38.10 | 38.34 | 38.59 |
| | Current at MPP | $I_{MPP}$ | [A] | 7.80 | 7.84 | 7.89 | 7.93 |
| | Voltage at MPP | $V_{MPP}$ | [V] | 31.66 | 31.97 | 32.27 | 32.57 |

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

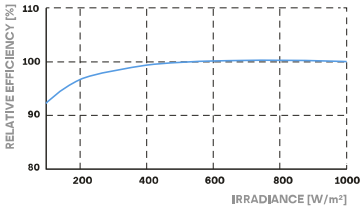
### Q CELLS PERFORMANCE WARRANTY




At least 98% of nominal power during first year. Thereafter max. 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.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organization of your respective country.

### PERFORMANCE AT LOW IRRADIANCE




Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²)

| 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 | Normal Module Operating Temperature | NMOT | [°F] | 109±5.4 (43±3 °C) |

## PROPERTIES FOR SYSTEM DESIGN

| | | | | |
|---|---|---|---|---|
| Maximum System Voltage $V_{SYS}$ | [V] | 1000 (IEC) / 1000 (UL) | Safety Class | II |
| Maximum Series Fuse Rating | [A DC] | 20 | Fire Rating based on ANSI / UL 1703 | C (IEC) / TYPE 2 (UL) |
| Max. Design Load, Push / Pull[3] | [lbs / ft²] | 75 (3600 Pa) / 55 (2667 Pa) | Permitted Module Temperature<br>on Continuous Duty | –40 °F up to +185 °F<br>(–40 °C up to +85 °C) |
| Max. Test Load, Push / Pull[3] | [lbs / ft²] | 113 (5400 Pa) / 84 (4000 Pa) | | |

[3] See Installation Manual

## QUALIFICATIONS AND CERTIFICATES

UL 1703, VDE Quality Tested, CE-compliant, IEC 61215:2016, IEC 61730:2016, Application Class II, U.S. Patent No. 9,893,215 (solar cells)

## PACKAGING INFORMATION

| | |
|---|---|
| Number of Modules per Pallet | 32 |
| Number of Pallets per 53' Trailer | 28 |
| Number of Pallets per 40' HC-Container | 24 |
| Pallet Dimensions (L × W × H) | 71.5 × 45.3 × 48.0 in (1815 × 1150 × 1220 mm) |
| Pallet Weight | 1505 lbs (683 kg) |

**Note:** Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

**Hanwha Q CELLS America Inc.**
400 Spectrum Center Drive, Suite 1400, Irvine, CA 92618, USA | **TEL** +1 949 748 59 96 | **EMAIL** inquiry@us.q-cells.com | **WEB** www.q-cells.us

# Enphase IQ 7 and IQ 7+ Microinverters

The high-powered smart grid-ready **Enphase IQ 7 Micro™** and **Enphase IQ 7+ Micro™** dramatically simplify the installation process while achieving the highest system efficiency.

Part of the Enphase IQ System, the IQ 7 and IQ 7+ Microinverters integrate with the Enphase IQ Envoy™, Enphase IQ Battery™, and the Enphase Enlighten™ monitoring and analysis software.

IQ Series Microinverters extend the reliability standards set forth by previous generations and undergo over a million hours of power-on testing, enabling Enphase to provide an industry-leading warranty of up to 25 years.


## Easy to Install

- Lightweight and simple
- Faster installation with improved, lighter two-wire cabling
- Built-in rapid shutdown compliant (NEC 2014 & 2017)

## Productive and Reliable

- Optimized for high powered 60-cell and 72-cell* modules
- More than a million hours of testing
- Class II double-insulated enclosure
- UL listed

## Smart Grid Ready

- Complies with advanced grid support, voltage and frequency ride-through requirements
- Remotely updates to respond to changing grid requirements
- Configurable for varying grid profiles
- Meets CA Rule 21 (UL 1741-SA)

* The IQ 7+ Micro is required to support 72-cell modules.

UL CERTIFIED
SAFETY US-CA E341165

To learn more about Enphase offerings, visit **enphase.com**

ENPHASE

# Enphase IQ 7 and IQ 7+ Microinverters

| INPUT DATA (DC) | IQ7-60-2-US / IQ7-60-B-US | IQ7PLUS-72-2-US / IQ7PLUS-72-B-US |
|---|---|---|
| Commonly used module pairings[1] | 235 W - 350 W + | 235 W - 440 W + |
| Module compatibility | 60-cell PV modules only | 60-cell and 72-cell PV modules |
| Maximum input DC voltage | 48 V | 60 V |
| Peak power tracking voltage | 27 V - 37 V | 27 V - 45 V |
| Operating range | 16 V - 48 V | 16 V - 60 V |
| Min/Max start voltage | 22 V / 48 V | 22 V / 60 V |
| Max DC short circuit current (module Isc) | 15 A | 15 A |
| Overvoltage class DC port | II | II |
| DC port backfeed current | 0 A | 0 A |
| PV array configuration | 1 x 1 ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit | |

| OUTPUT DATA (AC) | IQ 7 Microinverter | | IQ 7+ Microinverter | |
|---|---|---|---|---|
| Peak output power | 250 VA | | 295 VA | |
| Maximum continuous output power | 240 VA | | 290 VA | |
| Nominal (L-L) voltage/range[2] | 240 V / 211-264 V | 208 V / 183-229 V | 240 V / 211-264 V | 208 V / 183-229 V |
| Maximum continuous output current | 1.0 A (240 V) | 1.15 A (208 V) | 1.21 A (240 V) | 1.39 A (208 V) |
| Nominal frequency | 60 Hz | | 60 Hz | |
| Extended frequency range | 47 - 68 Hz | | 47 - 68 Hz | |
| AC short circuit fault current over 3 cycles | 5.8 Arms | | 5.8 Arms | |
| Maximum units per 20 A (L-L) branch circuit[3] | 16 (240 VAC) | 13 (208 VAC) | 13 (240 VAC) | 11 (208 VAC) |
| Overvoltage class AC port | III | | III | |
| AC port backfeed current | 0 A | | 0 A | |
| Power factor setting | 1.0 | | 1.0 | |
| Power factor (adjustable) | 0.7 leading ... 0.7 lagging | | 0.7 leading ... 0.7 lagging | |

| EFFICIENCY | @240 V | @208 V | @240 V | @208 V |
|---|---|---|---|---|
| Peak CEC efficiency | 97.6 % | 97.6 % | 97.5 % | 97.3 % |
| CEC weighted efficiency | 97.0 % | 97.0 % | 97.0 % | 97.0 % |

| MECHANICAL DATA | |
|---|---|
| Ambient temperature range | -40°C to +65°C |
| Relative humidity range | 4% to 100% (condensing) |
| Connector type (IQ7-60-2-US & IQ7PLUS-72-2-US) | MC4 (or Amphenol H4 UTX with additional Q-DCC-5 adapter) |
| Connector type (IQ7-60-B-US & IQ7PLUS-72-B-US) | Friends PV2 (MC4 intermateable).<br>Adaptors for modules with MC4 or UTX connectors:<br>- PV2 to MC4: order ECA-S20-S22<br>- PV2 to UTX: order ECA-S20-S25 |
| Dimensions (WxHxD) | 212 mm x 175 mm x 30.2 mm (without bracket) |
| Weight | 1.08 kg (2.38 lbs) |
| Cooling | Natural convection - No fans |
| Approved for wet locations | Yes |
| Pollution degree | PD3 |
| Enclosure | Class II double-insulated, corrosion resistant polymeric enclosure |
| Environmental category / UV exposure rating | NEMA Type 6 / outdoor |

| FEATURES | |
|---|---|
| Communication | Power Line Communication (PLC) |
| Monitoring | Enlighten Manager and MyEnlighten monitoring options.<br>Both options require installation of an Enphase IQ Envoy. |
| Disconnecting means | The AC and DC connectors have been evaluated and approved by UL for use as the load-break disconnect required by NEC 690. |
| Compliance | CA Rule 21 (UL 1741-SA)<br>UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01<br>This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC-2014 and NEC-2017 section 690.12 and C22.1-2015 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according manufacturer's instructions. |

1. No enforced DC/AC ratio. See the compatibility calculator at https://enphase.com/en-us/support/module-compatibility.
2. Nominal voltage range can be extended beyond nominal if required by the utility.
3. Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

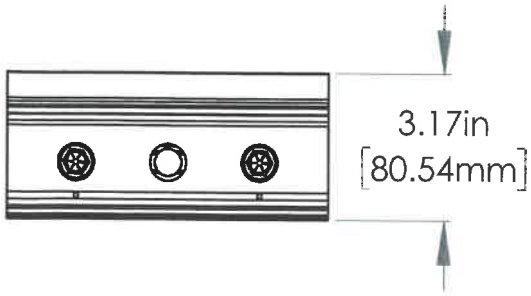
To learn more about Enphase offerings, visit **enphase.com**

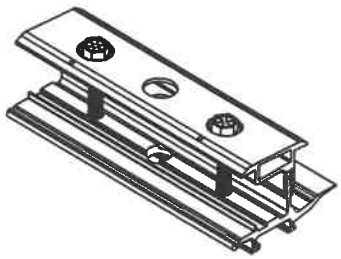
ENPHASE.

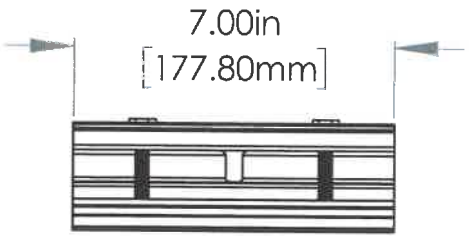

2018-05-24

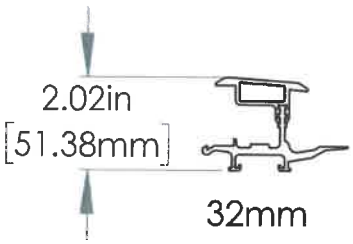
# Cut Sheet - Rock-It-4.0-Coupling

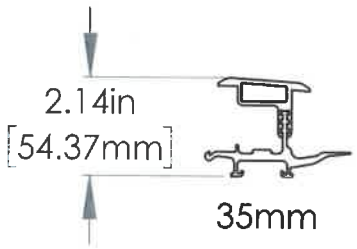
1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.

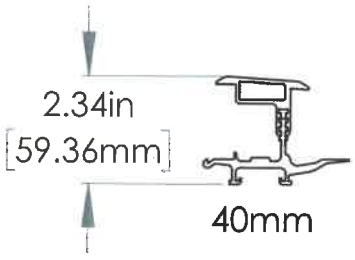


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EcoFasten Solar
Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

4741 W Polk Stree Ste. 4
Phoenix, AZ 85043

Material: See Spec Sheet
Scale: 1:4 | 6/28/2017 | ASG: - | EFS: x

# Cut Sheet - Rock-It-4.0-Hybrid Coupling

1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
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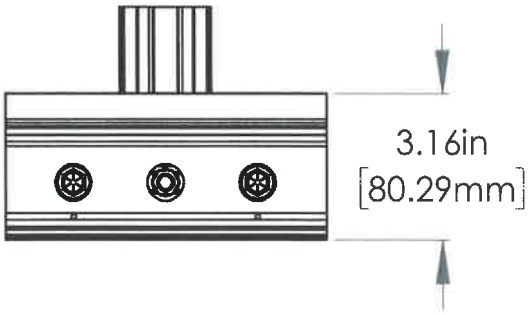


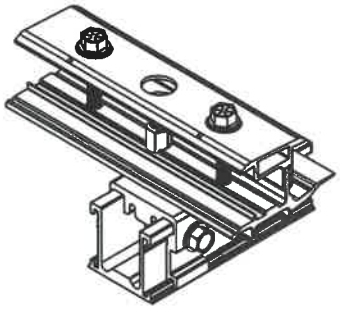

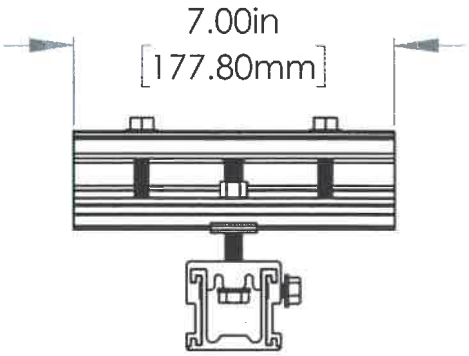


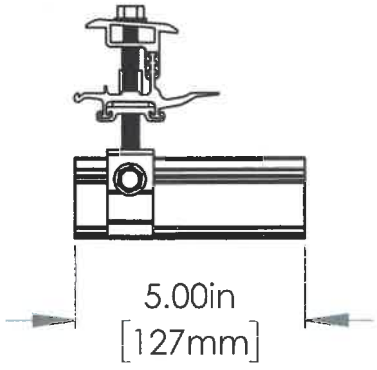


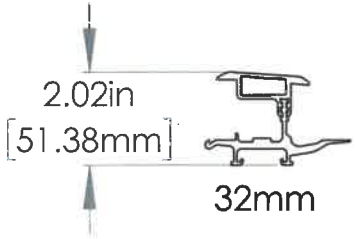


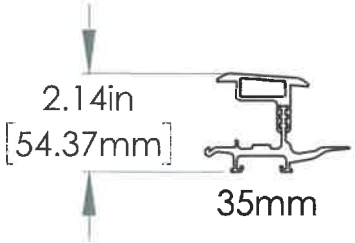


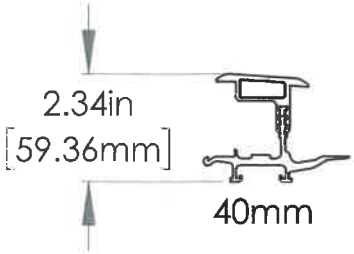


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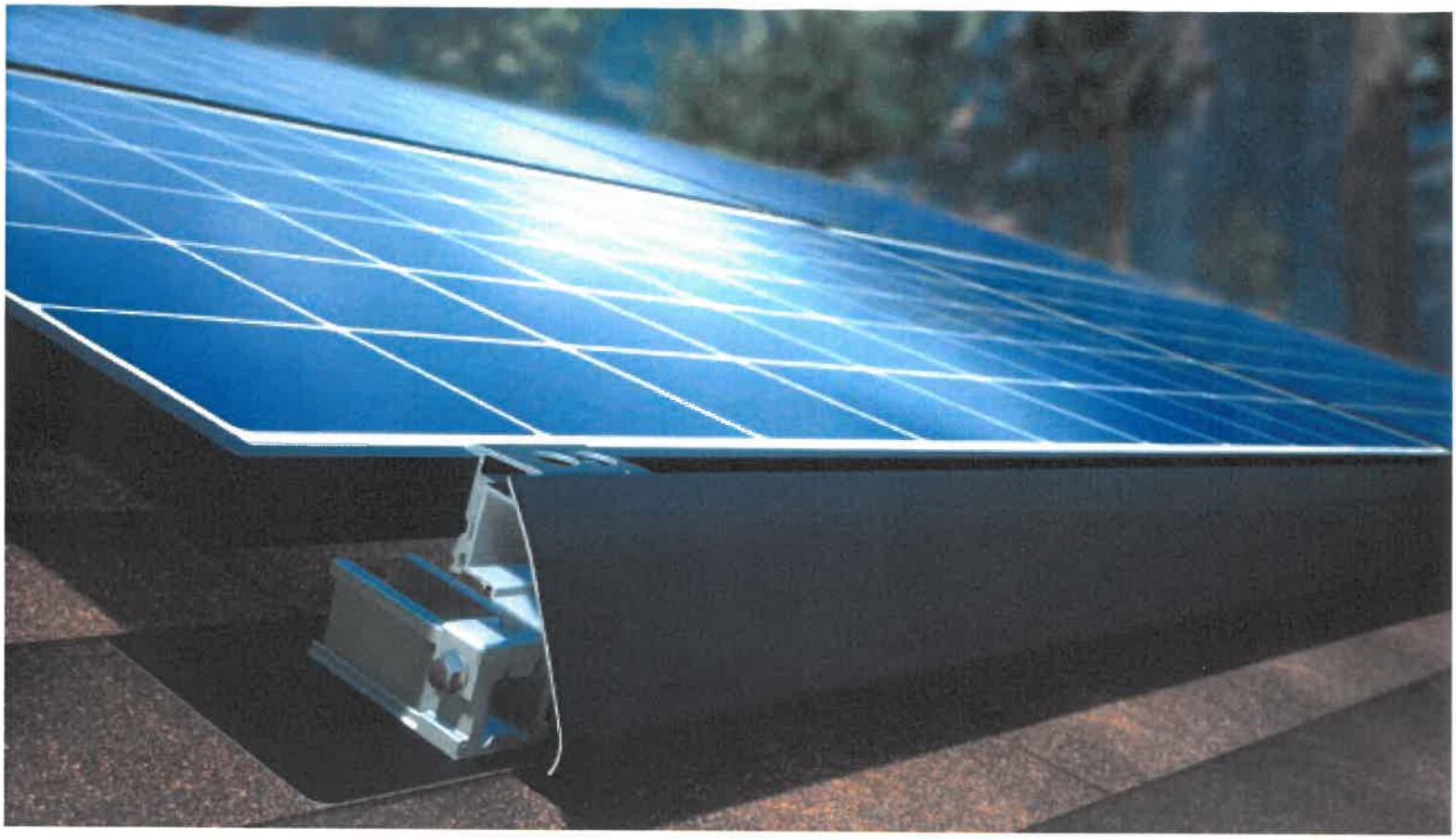

# ROCK-IT SYSTEM™ 4.0

## RAIL-FREE RACKING

UTILIZES ECOFASTEN SOLAR'S PATENTED TECHNOLOGY

EcoFasten Solar®


Document Date: 9.8.2017

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Evaluated, Compatible Modules

# ROCK-IT SYSTEM 4.0

Designed with the installer in mind.

EcoFasten Solar specializes in solar roof attachments that are fast and easy to install, straightforward, secure and cost-effective. EcoFasten offers a wide variety of standard products as well as custom solutions, for a one-stop source for all of your rooftop anchoring needs. Products are rigorously tested and approved above and beyond industry standards in-house and by third party agencies. EcoFasten's patented conical sealing system has been in service in the snow guard and solar industries for two decades.

## Features

- New and improved design
- Fastest, easiest to level system on the market
- Integrated electrical bonding
- SIMPLE- only 4 components
- North-South adjustability
- Only one tool required (1/2" deep well socket)
- Vertical adjustment of 3"-4"

## SYSTEM COMPONENTS* - REQUIRED

ROCK-IT SLIDE
4" FOR COMP SHINGLE
8" FOR TILE

ROCK-IT 4.0 MOUNT

ROCK-IT 4.0 COUPLING & LOAD BEARING FOOT

ROCK-IT 4.0 ARRAY SKIRT

## SYSTEM COMPONENTS* - OPTIONAL

ROCK-IT 4.0 HYBRID MOUNT
(REFER TO PG. 5)

ROCK-IT CLIP SS
(REFER TO PG. 6)

ROCK-IT CLIP 2.0
(REFER TO PG. 6)

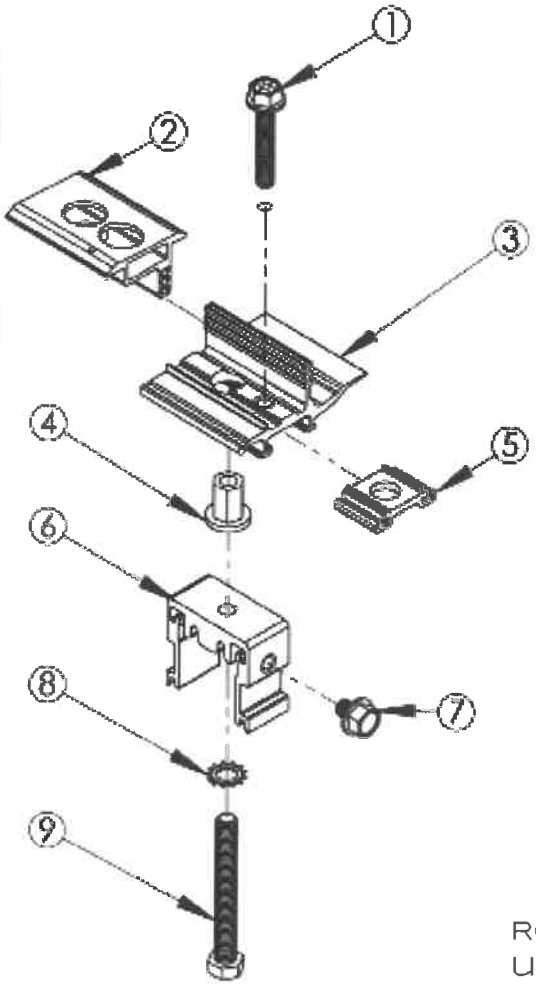
ROCK-IT 4.0 ARRAY SKIRT END CAPS
(END CAPS COME PRE-INSTALLED ON EAST END OF SKIRT SECTIONS)

EcoFasten Solar®

EcoFasten Solar products are protected by the following U.S. Patents:

8,151,522 8,153,700 8,181,398 8,166,713 8,146,299
8,209,914 8,245,454 8,272,174 8,225,557 9,010,038
9,134,040 9,175,478 9,212,833

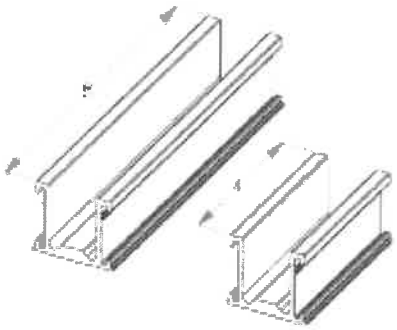
*Components for use with 32mm modules are available as special order. Components for use with 32mm modules are labeled as such on system packaging. Please refer to evaluated, compatible modules grid on page 15 to identify system compatible 32mm modules.




# ROCK-IT 4.0 MOUNT ASSEMBLY

## NOTE: ITEMS 1-7 SHIP ASSEMBLED

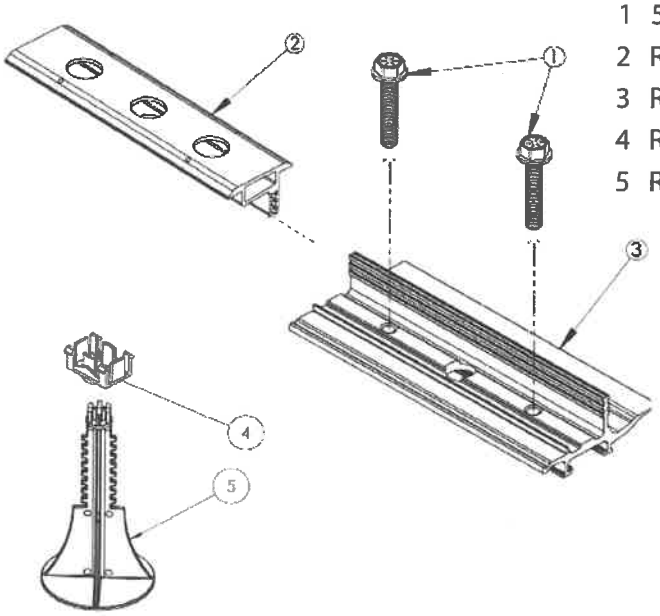
1 5/16"-18 x 1.75" Hex Serrated Flange Bolt 300 Series SS
2 Rock-It 4.0 Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Shelf 6000 Series AL
4 Flange Level Nut 300 Series SS
5 Rock-It 4.0 Tie Plate 6000 Series AL
6 Rock-It Pedestal 6000 Series AL
7 5/16"-18 x 3/8" Hex Serrated Flange Bolt 300 Series SS
8 3/8" ID Star Washer 300 Series SS
9 3/8"-16 x 3" Hex Tap Bolt 300 Series SS



ROCK-IT SLIDES ARE ACCEPTABLE BRACKETS FOR USE WITH ROCK-IT 4.0 (SOLD SEPARATELY)

# ROCK-IT 4.0 COUPLING ASSEMBLY

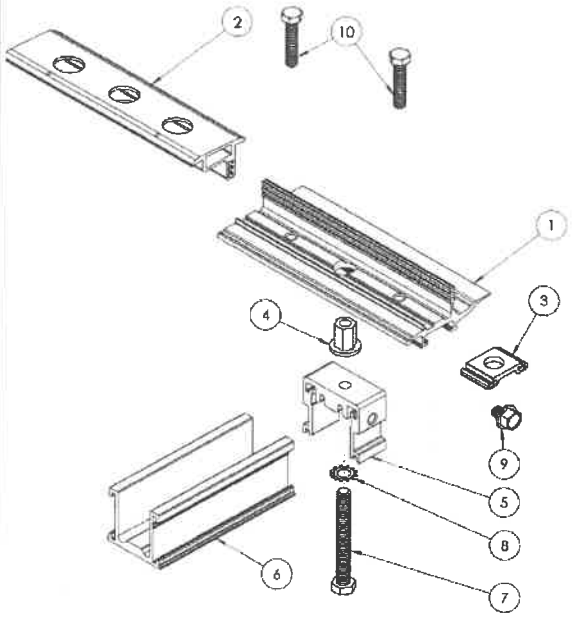
## NOTE: ITEMS 1-3 SHIP ASSEMBLED




1 5/16"-18 x 1.75" Hex Serrated Flange Bolt 300 Series SS
2 Rock-It 4.0 Coupling Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Coupling Shelf 6000 Series AL
4 Rock-It Load Bearing Foot Clip
5 Rock-It Load Bearing Foot Base

# ROCK-IT 4.0 HYBRID MOUNT ASSEMBLY

NOTE: ITEMS 1-10 SHIP ASSEMBLED

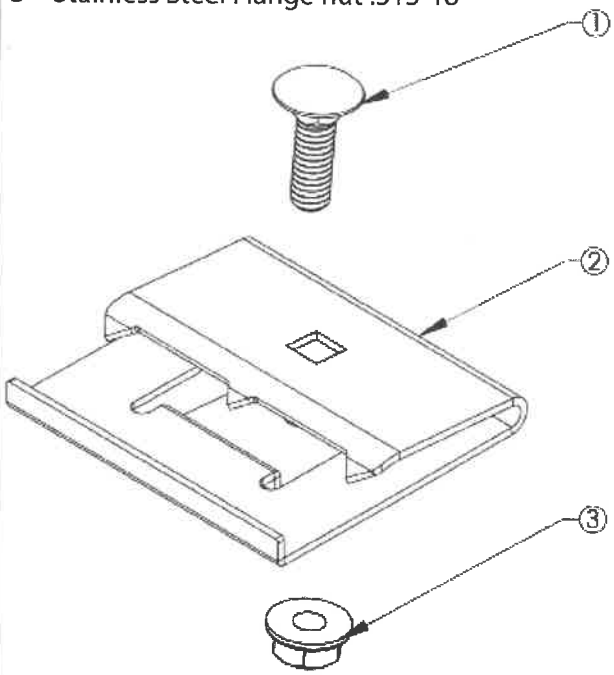



1 Rock-It 4.0 Shelf 6000 Series AL
2 Rock-It 4.0 Coupling Mid-Clamp 6000 Series AL
3 Rock-It 4.0 Coupling Tie Plate6000 Series AL
4 Flange Level Nut 300 Series SS
5 Rock-It Pedestal 6000 Series AL
6 Rock-It Slide 6000 Series AL
7 3/8"-16 x 3" Hex Tap Bolt 300 Series SS
8 3/8" ID Star Washer 300 Series S
9 5/16"-18 x 3/8" Hex Serrated Flange Bolt 300 Series SS
10 5/16"-18 x 1.5" Hex Serrated Flange Bolt 300 Series SS

## ROCK-IT CLIP SS ASSEMBLY

NOTE: ITEMS 1-3 SHIP ASSEMBLED

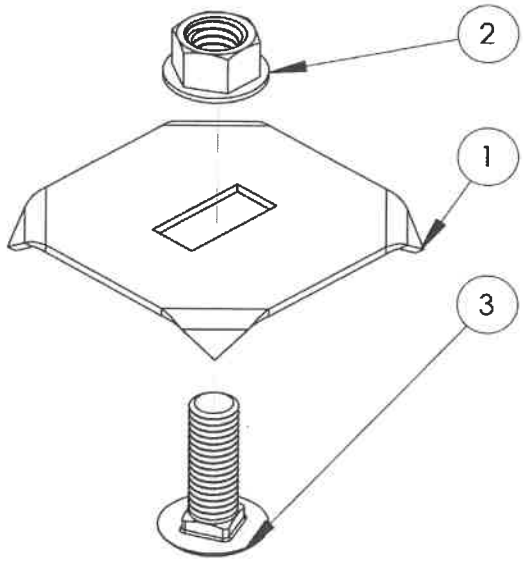
1 Stainless Steel Carriage Bolt - .313-18X.75
2 Rock-It Clip SS
3 Stainless Steel Flange nut .313-18




## ROCK-IT CLIP 2.0 ASSEMBLY

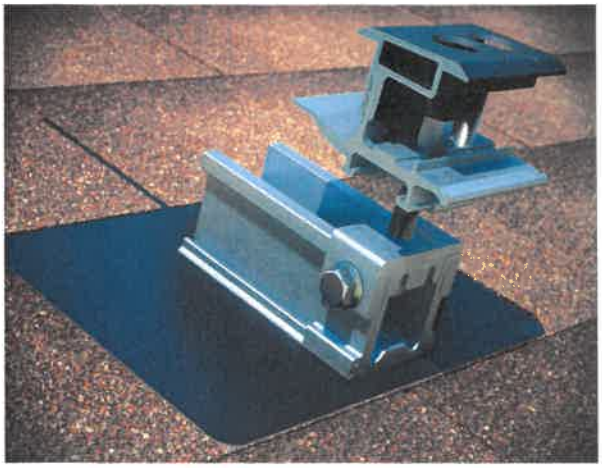
NOTE: ITEMS 1-3 SHIP ASSEMBLED

1 Rock-It Clip 2.0
2 Stainless Steel Flange nut .313-18
3 Bolt .3125-18x1x1-S



# Array Layout

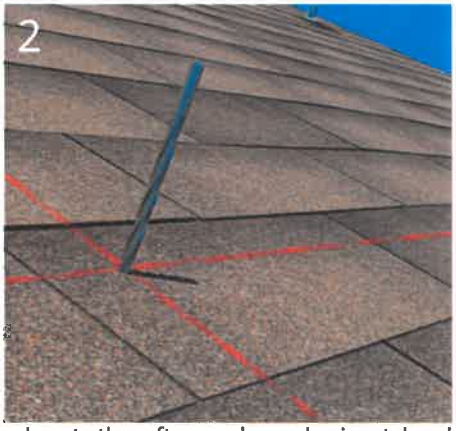
- Find the required structural attachment points. Mark these using a vertical (N-S) chalk line on the center of the rafters.
- Spacing may vary depending upon project specific structural requirements; i.e. high snow and wind load areas may require lesser bracket spacing in the E-W axis vs. the maximum spacing. Max spacing is 48" for portrait orientation and 72" for landscape orientation. Consult project layout diagram for project specific bracket spacing on the roof.
- Install Rock-It Mounts to predetermined mount spacing.



- The Rock-It Array Skirt sections are the width of a typical 60 cell module – use the Rock-It Array Skirt as a guide to lay out module placement.

Note: The distance between the rows of mounts is calculated by the module dimension N-S plus 1 3/8" (35mm). Lag screw should be installed as close to center of exposed shingle as possible. The minimum distance between the lag screw and the edge of the shingle is 1/2".

# GreenFasten™ Flashing Install




1 Locate the rafters and snap horizontal and vertical lines to mark the installation position for each GreenFasten flashing.

2 Drill a pilot hole (1/4" diameter) for the lag bolt. Backfill with sealant. EcoFasten Solar recommends an EPDM mastic.

3 Insert the flashing so the top part is under the next row of shingles and pushed far enough up slope to prevent water infiltration through vertical joint in shingles. The leading edge of flashing must butt against upper row of nails to prevent turning when torqued.

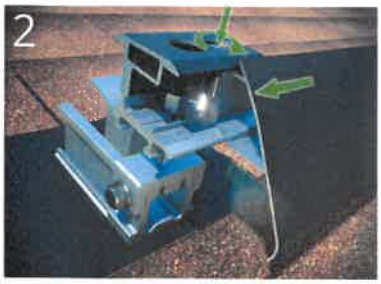
4 Line up pilot hole with GreenFasten flashing hole.

Insert the lag bolt through the EPDM bonded washer, the Rock-It slide, the gasketed hole in the flashing and into the rafter.

Torque: The range is between 100-140 torque inch-pounds depending on the type of wood and time of year. The visual indicator for proper torque is when the EPDM on the underside of the bonded washer begins to push out the sides as the washer compresses. If using an impact wrench to install the fasteners be careful not to over torque the fastener. You may need to stop and use a ratchet to finish the install.

*The Engineer of Record shall check capacity of rafter to support lag screw loading.

# ROCK-IT SYSTEM 4.0 INSTALL











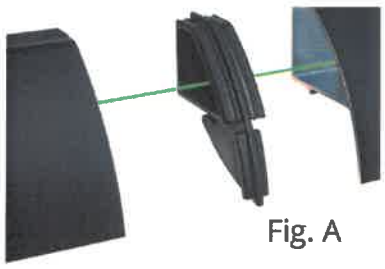


Fig. A

**1** Install EcoFasten Solar Flashing with Rock-It Mounts
- Follow EcoFasten Solar Install Instructions for flashing and bracket install (GreenFasten shown above).
- Optimum vertical distance between lag bolts is 1 3/8" plus module dimension.
- Set mounts on eave most row so that the Rock-It Pedestal is on the South end of Rock-It Slide.
- Set mounts on all upper rows so that the Rock-It Pedestal is on the North end of Rock-It Slide.

**2** Install Rock-It Array Skirt onto Eave Mounts
- Slide Rock-It Array Skirt into front channel on Rock-It Shelf.
- Array Skirt End Caps are pre-installed on the East end of each skirt section, and are used to couple the skirt sections where needed (see Fig. A ).
- Tighten Mid-Clamp bolt, clamping Rock-It Array Skirt to mount. Torque to 200 in-lbs. (130 in-lbs. when installing with 32mm modules).

**3-4** Install Rock-It Couplings (when joining 4 panels with a Coupling, the use of a load bearing foot is required)
- Prior to mounting on the roof, snap Load Bearing Foot into the bottom of Rock-It Coupling if required. (Each Load Bearing Foot is set to same height as the Rock-It Mounts - adjust accordingly)
- On eave row only, slide Rock-It Array Skirt onto Rock-It Coupling Shelf. Torque to specified value.
- NOTE: If a coupling lands on a rafter, the Hybrid Mount* should be used in place of the Rock-It Coupling (refer to image 3a). *Hybrid Mount can be made in the field by assembling a coupling to a mount pedestal, or by purchasing separately.

**5** Align and Straighten First Row of the Rock-It System with Rock-It Array Skirt
- Use North-South adjustment of the Rock-It Pedestal to straighten Rock-It Array Skirt and align module with Array Skirt.
- Torque screw on side of Rock-It Pedestal to 150 in-lbs to secure it to the Rock-It Slide.
- Adjust Flange Level Nut to level the system (optional – can be leveled during or after installation).

**6-9** Install 1st Row of PV Modules
- Slide upslope Rock-It Mounts down to engage top of first module.
- Install Rock-It Couplings on the upslope side of 1st row of panels.
- Torque 2nd row of Mid-Clamps on Rock-It Mounts and Rock-It Couplings to specified value.
- Install balance of PV modules, ensuring that the Rock-It Pedestals are in the appropriate position, then torque Mid-Clamps to secure modules.

**10** Level the Rock-It System
- When assembly is complete, level the entire system by adjusting Flange Level Nuts (Flange Level Nuts have no torque value).
- Height between roof surface and underside of modules should be 3" or less, when installed with Type 2 modules.

INSTALLATION NOTE: Modules should be installed so that the junction box is installed upslope, away from the leading edge of the array.

# Grounding Lug Install


## Necessary Components:

- One of the following ground lugs (or any UL 2703 compliant ground lug):
  Burndy CL50-1TN Ground Lug (UL 2703 - E351343 / UL 467 - E9999)
  ILSCO SGB-4 Ground Lug (UL 2703 - E354420 / UL 467 - E34440)
  ILSCO GBL-4DBT (UL 2703 - E354420 / UL 467 - E34440)
  ILSCO GBL-4DBTH (UL 2703 - E354420 / UL 467 - E34440)
  ILSCO GBL-4SS (UL 2703 - E354420 / UL 467 - E34440)

Note: Drill and deburr hole in Ground Lug prior to installation

- 14 AWG - 4 AWG Copper Ground Wire*
- 8-32 x 0.5" Serrated Flange Head Bolt (300 Series SS)
- 8-32 Serrated Flange Nut (300 Series SS)
- 11/32" and 1/4" wrenches or ratchets/sockets

Torque Values:
14-10 AWG= 20 in-lbs.
8 AWG= 25 in-lbs.
6-4 AWG= 35 in-lbs.

1 Insert the flange bolt into the module ground hole. Place Star Washer over bolt. Place ground lug over the bolt and Star Washer, and turn to desired orientation.

2 Install Flange Nut.

3 Tighten Flange Nut/Bolt.

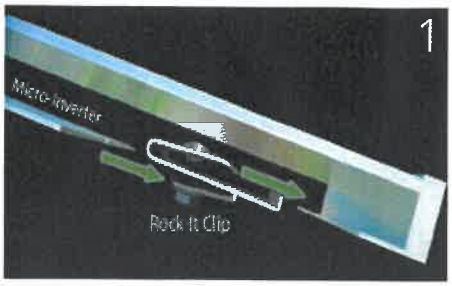
4 Place wire in Ground Lug channel and tighten set screw to complete assembly.

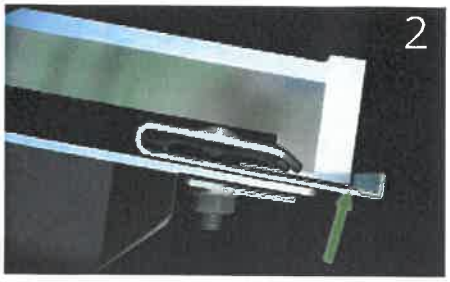
*Wire should be sized in accordance with the National Electrical Code, NFPA 70, Section 690.45, and a minimum of 1/4" clearance required between bare copper wire and aluminum.

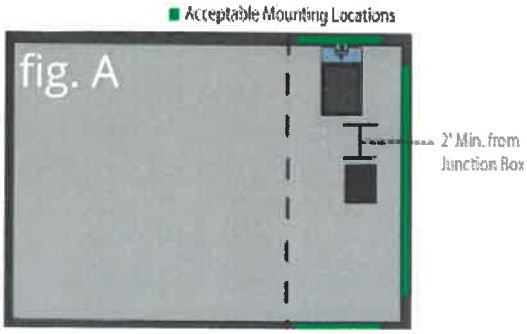

Drill hole per grounding lug manufacturers specifications in the upslope part of Rock-It Coupling for attaching grounding lug.

Note: Deburr hole in Ground Lug and Rock-It Coupling prior to installation.

# ROCK-IT CLIP SS INSTALL




1 Locate all parts

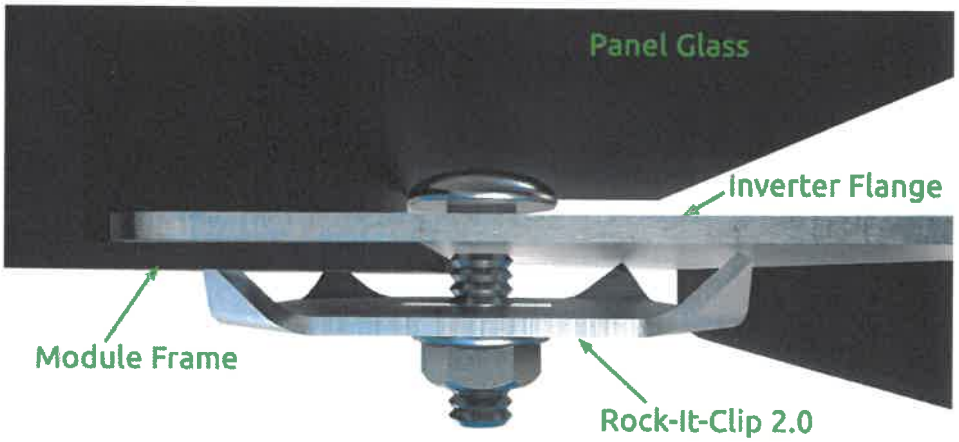
•Locate the Rock-It Clip SS, micro-inverter/power optimizer, and the section of the module frame in which you will be mounting the micro-inverter/power optimizer.

See fig. A for acceptable mounting locations.

2 Install the Rock-It Clip SS

- Slide the Rock-It Clip SS onto the lip of the module frame.
- Slide the micro-inverter/power optimizer into the opposite lip of the Rock-It Clip SS.
- Tighten the bolt to 150 in-lb minumum to clamp the Rock-It Clip SS to the module frame and the micro-inverter/power optimizer to the Rock-It Clip SS.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

# ROCK-IT CLIP 2.0 INSTALL




1 Locate all parts

•Locate the Rock-It Clip 2.0, micro-inverter/power optimizer, and the section of the module frame in which you will be mounting the micro-inverter/power optimizer.

2 Install the Rock-It Clip 2.0 (See below detail)

- Slide the Rock-It Clip 2.0 onto the lip of the micro-inverter/power optimizer.
- Slide the micro-inverter/power optimizer into the opposite lip of the module frame.
- Tighten the bolt to 150 in-lb to clamp the Rock-It Clip 2.0 to the module frame and the micro-inverter/power optimizer to the Rock-It Clip 2.0.
- Ensure that the lip on the clip is tight against the frame and that the micro-inverter/power optimizer flange is tight against the clip flange to avoid rotation during tightening.

## Snow Load 0-20 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 159 | 93 | 59 | 103 | 103 | 103 |
| | | C | 114 | 67 | 42 | 103 | 88 | 88 |
| | | D | 96 | 56 | 35 | 91 | 74 | 74 |
| 90 mph | 115 mph | B | 146 | 85 | 54 | 103 | 103 | 103 |
| | | C | 104 | 61 | 38 | 98 | 80 | 80 |
| | | D | 88 | 51 | 32 | 83 | 68 | 68 |
| 100 mph | 125 mph | B | 123 | 72 | 45 | 103 | 95 | 95 |
| | | C | 88 | 51 | 32 | 83 | 68 | 68 |
| | | D | 74 | 43 | 27 | 70 | 57 | 57 |
| 110 mph | 140 mph | B | 98 | 57 | 36 | 93 | 76 | 76 |
| | | C | 70 | 41 | 26 | 66 | 54 | 54 |
| | | D | 59 | 34 | 22 | 56 | 46 | 46 |
| 120 mph | 150 mph | B | 85 | 50 | 31 | 81 | 66 | 66 |
| | | C | 61 | 36 | 22 | 58 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 0-20 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 91 | 53 | 33 | 82 | 82 | 82 |
| | | C | 65 | 38 | 24 | 61 | 50 | 50 |
| | | D | 55 | 32 | 20 | 52 | 42 | 42 |
| 90 mph | 115 mph | B | 83 | 49 | 30 | 82 | 82 | 82 |
| | | C | 59 | 35 | 22 | 56 | 46 | 46 |
| | | D | 50 | 29 | 18 | 47 | 38 | 38 |
| 100 mph | 125 mph | B | 70 | 41 | 26 | 82 | 54 | 54 |
| | | C | 50 | 29 | 18 | 47 | 39 | 39 |
| | | D | 42 | 26 | 15 | 40 | 32 | 32 |
| 110 mph | 140 mph | B | 56 | 33 | 20 | 53 | 43 | 43 |
| | | C | 40 | 23 | 14 | 38 | 31 | 31 |
| | | D | 34 | 19 | 12 | 32 | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | 46 | 37 | 37 |
| | | C | 35 | 20 | 12 | 33 | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 21-30 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure Category | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 110 | 93 | 59 | 68 | 68 | 68 |
| | | C | 110 | 67 | 42 | 68 | 68 | 68 |
| | | D | 96 | 56 | 35 | 68 | 68 | 68 |
| 90 mph | 115 mph | B | 110 | 85 | 54 | 68 | 68 | 68 |
| | | C | 104 | 61 | 38 | 68 | 68 | 68 |
| | | D | 88 | 51 | 32 | 68 | 68 | 68 |
| 100 mph | 125 mph | B | 110 | 72 | 45 | 68 | 68 | 68 |
| | | C | 88 | 51 | 32 | 68 | 68 | 68 |
| | | D | 74 | 43 | 27 | 68 | 57 | 57 |
| 110 mph | 140 mph | B | 98 | 57 | 36 | 68 | 68 | 68 |
| | | C | 70 | 41 | 26 | 66 | 54 | 54 |
| | | D | 59 | 34 | 22 | 56 | 46 | 46 |
| 120 mph | 150 mph | B | 85 | 50 | 31 | 68 | 66 | 66 |
| | | C | 61 | 36 | 22 | 58 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing
2.) Maximum allowed spacing approved by EcoFasten Solar is 72"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module width of 40"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 21-30 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure Category | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 66 | 53 | 33 | 41 | 41 | 41 |
| | | C | 65 | 38 | 24 | 41 | 41 | 41 |
| | | D | 55 | 32 | 20 | 41 | 41 | 41 |
| 90 mph | 115 mph | B | 66 | 49 | 30 | 41 | 41 | 41 |
| | | C | 59 | 35 | 22 | 41 | 41 | 41 |
| | | D | 50 | 29 | 18 | 41 | 38 | 38 |
| 100 mph | 125 mph | B | 66 | 41 | 26 | 41 | 41 | 41 |
| | | C | 50 | 29 | 18 | 41 | 39 | 39 |
| | | D | 42 | 26 | 15 | 40 | 32 | 32 |
| 110 mph | 140 mph | B | 56 | 33 | 20 | 41 | 41 | 41 |
| | | C | 40 | 23 | 14 | 38 | 31 | 31 |
| | | D | 34 | 19 | 12 | 32 | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | 41 | 37 | 37 |
| | | C | 35 | 20 | 12 | 33 | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff
2.) Maximum allowed spacing approved by EcoFasten Solar is 48"
3.) Maximum allowed standoff capcity = 547# (per testing results)
4.) Includes additional factor of safety of 1.5 for lag pullout capacity
5.) Values based on a maximum module length of 70"
6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height
7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 31-40 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 83 | 83 | 59 | 51 | 51 | 51 |
| | | C | 83 | 67 | 42 | 51 | 51 | 51 |
| | | D | 83 | 56 | 35 | 51 | 51 | 51 |
| 90 mph | 115 mph | B | 83 | 83 | 54 | 51 | 51 | 51 |
| | | C | 83 | 61 | 38 | 51 | 51 | 51 |
| | | D | 83 | 51 | 32 | 51 | 51 | 51 |
| 100 mph | 125 mph | B | 83 | 72 | 45 | 51 | 51 | 51 |
| | | C | 83 | 51 | 32 | 51 | 51 | 51 |
| | | D | 74 | 43 | 27 | 51 | 51 | 51 |
| 110 mph | 140 mph | B | 83 | 57 | 36 | 51 | 51 | 51 |
| | | C | 70 | 41 | 26 | 51 | 51 | 51 |
| | | D | 59 | 34 | 22 | 51 | 46 | 46 |
| 120 mph | 150 mph | B | 83 | 50 | 31 | 51 | 51 | 51 |
| | | C | 61 | 36 | 22 | 51 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 31-40 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 50 | 50 | 33 | 31 | 31 | 31 |
| | | C | 50 | 38 | 24 | 31 | 31 | 31 |
| | | D | 50 | 32 | 20 | 31 | 31 | 31 |
| 90 mph | 115 mph | B | 50 | 49 | 30 | 31 | 31 | 31 |
| | | C | 50 | 35 | 22 | 31 | 31 | 31 |
| | | D | 50 | 29 | 18 | 31 | 31 | 31 |
| 100 mph | 125 mph | B | 50 | 41 | 26 | 31 | 31 | 31 |
| | | C | 50 | 29 | 18 | 31 | 31 | 31 |
| | | D | 42 | 26 | 15 | 31 | 31 | 31 |
| 110 mph | 140 mph | B | 50 | 33 | 20 | 31 | 31 | 31 |
| | | C | 40 | 23 | 14 | 31 | 31 | 31 |
| | | D | 34 | 19 | 12 | 31 | 26 | 26 |
| 120 mph | 150 mph | B | 49 | 28 | 18 | 31 | 31 | 31 |
| | | C | 35 | 20 | 12 | 31 | 27 | 27 |
| | | D | 29 | 17 | 10 | 28 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 41-50 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 66 | 66 | 59 | 51 | 51 | 51 |
| | | C | 66 | 66 | 42 | 51 | 51 | 51 |
| | | D | 66 | 56 | 35 | 51 | 51 | 51 |
| 90 mph | 115 mph | B | 66 | 66 | 54 | 51 | 51 | 51 |
| | | C | 66 | 61 | 38 | 51 | 51 | 51 |
| | | D | 66 | 51 | 32 | 51 | 51 | 51 |
| 100 mph | 125 mph | B | 66 | 66 | 45 | 51 | 51 | 51 |
| | | C | 66 | 51 | 32 | 51 | 51 | 51 |
| | | D | 66 | 43 | 27 | 51 | 51 | 51 |
| 110 mph | 140 mph | B | 66 | 57 | 36 | 51 | 51 | 51 |
| | | C | 66 | 41 | 26 | 51 | 51 | 51 |
| | | D | 59 | 34 | 22 | 51 | 46 | 46 |
| 120 mph | 150 mph | B | 66 | 50 | 31 | 51 | 51 | 51 |
| | | C | 61 | 36 | 22 | 51 | 47 | 47 |
| | | D | 51 | 30 | 19 | 49 | 40 | 40 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 41-50 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 40 | 40 | 33 | 25 | 25 | 25 |
| | | C | 40 | 38 | 24 | 25 | 25 | 25 |
| | | D | 40 | 32 | 20 | 25 | 25 | 25 |
| 90 mph | 115 mph | B | 40 | 40 | 30 | 25 | 25 | 25 |
| | | C | 40 | 35 | 22 | 25 | 25 | 25 |
| | | D | 40 | 29 | 18 | 25 | 25 | 25 |
| 100 mph | 125 mph | B | 40 | 40 | 26 | 25 | 25 | 25 |
| | | C | 40 | 29 | 18 | 25 | 25 | 25 |
| | | D | 40 | 26 | 15 | 25 | 25 | 25 |
| 110 mph | 140 mph | B | 40 | 33 | 20 | 25 | 25 | 25 |
| | | C | 40 | 23 | 14 | 25 | 25 | 25 |
| | | D | 34 | 19 | 12 | 25 | 25 | 25 |
| 120 mph | 150 mph | B | 40 | 28 | 18 | 25 | 25 | 25 |
| | | C | 35 | 20 | 12 | 25 | 25 | 25 |
| | | D | 29 | 17 | 10 | 25 | 22 | 22 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 51-60 psf

| Modules in Landscape | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 55 | 55 | 55 | 34 | 34 | 34 |
| | | C | 55 | 55 | 42 | 34 | 34 | 34 |
| | | D | 55 | 55 | 35 | 34 | 34 | 34 |
| 90 mph | 115 mph | B | 55 | 55 | 54 | 34 | 34 | 34 |
| | | C | 55 | 55 | 38 | 34 | 34 | 34 |
| | | D | 55 | 51 | 32 | 34 | 34 | 34 |
| 100 mph | 125 mph | B | 55 | 55 | 45 | 34 | 34 | 34 |
| | | C | 55 | 51 | 32 | 34 | 34 | 34 |
| | | D | 55 | 43 | 27 | 34 | 34 | 34 |
| 110 mph | 140 mph | B | 55 | 55 | 36 | 34 | 34 | 34 |
| | | C | 55 | 41 | 26 | 34 | 34 | 34 |
| | | D | 55 | 34 | 22 | 34 | 34 | 34 |
| 120 mph | 150 mph | B | 55 | 50 | 31 | 34 | 34 | 34 |
| | | C | 55 | 36 | 22 | 34 | 34 | 34 |
| | | D | 51 | 30 | 19 | 34 | 34 | 34 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff, however the designer must round down to meet appropriate rafter spacing

2.) Maximum allowed spacing approved by EcoFasten Solar is 72"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module width of 40"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

## Snow Load 51-60 psf

| Modules in Portrait | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Wind Speed | | Exposure | 2:12 < Roof Pitch < 6:12 | | | 7:12 < Roof Pitch < 12:12 | | |
| ASCE 7-05 | ASCE 7-10 | Category | Zone 1 | Zone 2 | Zone 3 | Zone 1 | Zone 2 | Zone 3 |
| 85 mph | 110 mph | B | 33 | 33 | 33 | 21 | 21 | 21 |
| | | C | 33 | 33 | 24 | 21 | 21 | 21 |
| | | D | 33 | 32 | 20 | 21 | 21 | 21 |
| 90 mph | 115 mph | B | 33 | 33 | 30 | 21 | 21 | 21 |
| | | C | 33 | 33 | 22 | 21 | 21 | 21 |
| | | D | 33 | 29 | 18 | 21 | 21 | 21 |
| 100 mph | 125 mph | B | 33 | 33 | 26 | 21 | 21 | 21 |
| | | C | 33 | 29 | 18 | 21 | 21 | 21 |
| | | D | 33 | 26 | 15 | 21 | 21 | 21 |
| 110 mph | 140 mph | B | 33 | 33 | 20 | 21 | 21 | 21 |
| | | C | 33 | 23 | 14 | 21 | 21 | 21 |
| | | D | 33 | 19 | 12 | 21 | 21 | 21 |
| 120 mph | 150 mph | B | 33 | 28 | 18 | 21 | 21 | 21 |
| | | C | 33 | 20 | 12 | 21 | 21 | 21 |
| | | D | 29 | 17 | 10 | 21 | 21 | 21 |

Notes:

Spacing Governed by Snow Load

1.) Values in above table represent the maximum allowable spacing in inches for pullout forces only on EcoFasten Solar standoff

2.) Maximum allowed spacing approved by EcoFasten Solar is 48"

3.) Maximum allowed standoff capcity = 547# (per testing results)

4.) Includes additional factor of safety of 1.5 for lag pullout capacity

5.) Values based on a maximum module length of 70"

6.) Based on Risk Category II (ASCE 7-10) structures less than 30 feet in height

7.) All adjustment factors are set to 1. No site specific engineering is included in this table

# Grounding Information

The rail-free Rock-It System may be used to mount and ground PV modules that comply with UL 1703, only when that specific module has been evaluated for mounting and grounding, in compliance with the included installation instructions.

Note: Grounding lug must be visible to inspectors from the entire perimeter of the PV array.

Multiple Use Grounding Pins

Grounding pins within the Mid-Clamp are multiple use bonding/grounding devices. Modules will need to be adjusted if the Mid-Clamps are loosened to ensure there is "new" metal to pierce into upon retightening.

**Grounding Method**

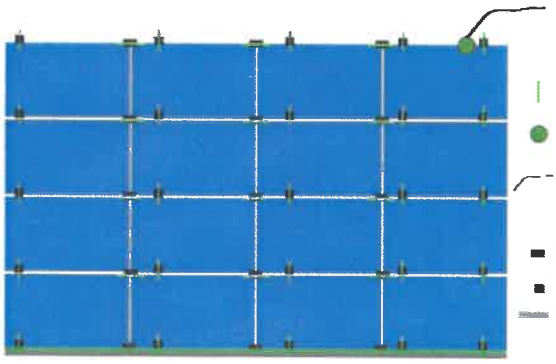
Rock-It 4.0 Mount bonds N-S rows of modules

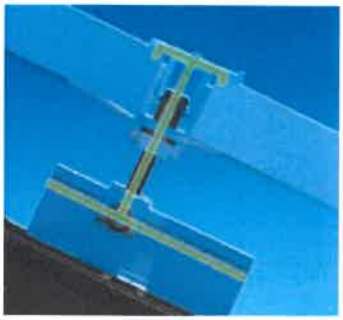
Rock-It 4.0 Coupling bonds E-W rows of modules

Rock-It Array Skirt bonds E-W along the entire array when installed

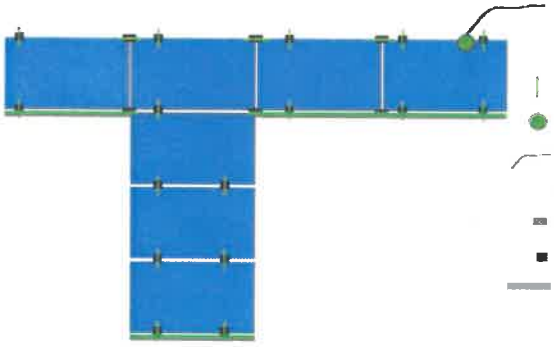
One Burndy CL50-1TN ground lug is required per PV array, limited to 300 modules placed in either portrait or landscape orientation.

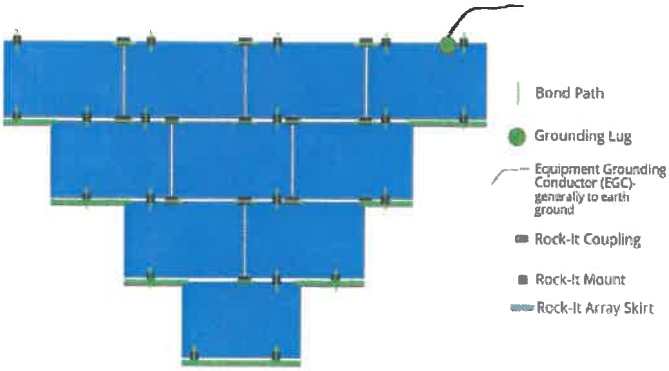
## Bonding Assembly and Bonding Path



Integrated Bonding

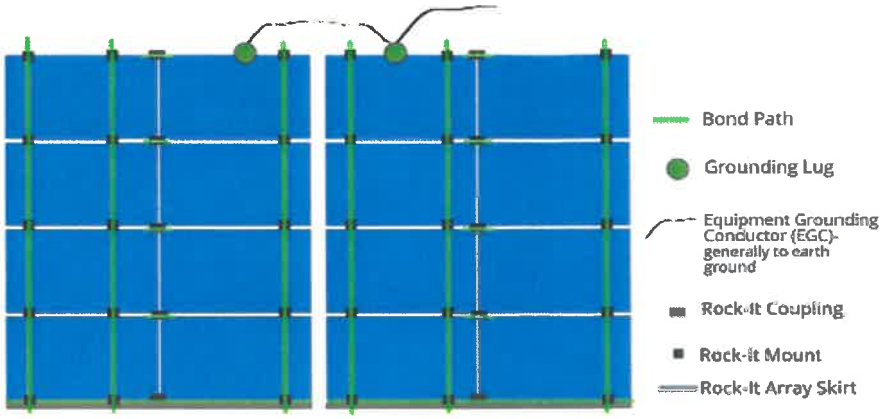


# Thermal Expansion and Bonding

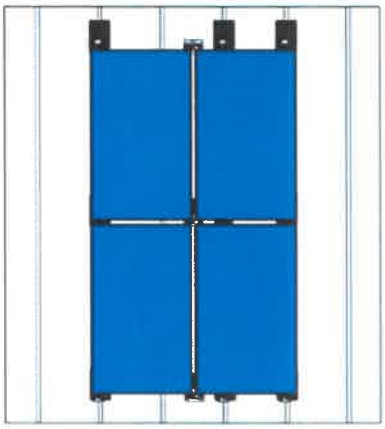
A thermal expansion gap is required per each continuous 40' length of modules.

Omit a coupling and leave a 2" gap in the Rock-It Array Skirt and also between the modules at that point.




# Bracket Spacing

## Portrait Orientation



Maximum east/west bracket spacing is 48" OC.

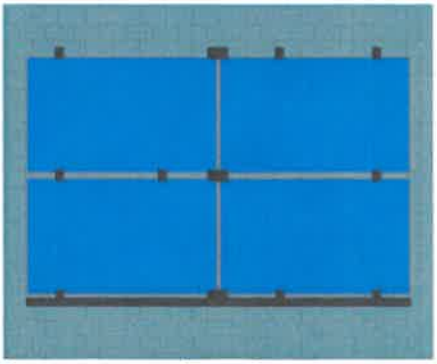
## Landscape Orientation

Max east/west bracket spacing is 72" OC.
32mm modules: Max east/west bracket spacing is 48" OC.

Spacing may vary depending upon project specific structural requirements; i.e. high snow and wind load areas may require lesser spacing E-W than the maximum.

# Staggered Layout

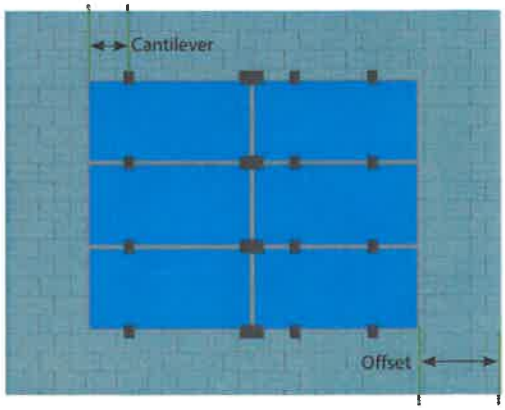
## Staggered Mounting Points



Rock-It Mount  Rock-It Coupling

The array layout instructions in this installation manual offer a general overview of layout. Periodically, due to a variety of factors (roof obstacles, shading, etc.) other layouts are required.

# Cantilever and Offset




Cantilever: Maximum cantilever is 1/3 bracket spacing. For portrait orientation installations, check layout prior to installing.

Offset: Offset from all roof edges depends on wind speed, snow loads, local fire and building codes per location

# ROCK-IT SYSTEM 4.0

## SYSTEM SPECIFICATIONS

| | | | |
|---|---|---|---|
| Max No. of Panels | 300 Modules per ground lug | Materials | 300 Series Stainless,<br>6000 Series Aluminum |
| Max System Voltage | 1000VDC | Coating | Black Andodization/Mill Finish |
| Class A Fire Rating | With UL1703 Type 1 Rated Modules, see note below. | Lug Specifications | Burndy CL50-1TN Ground Lug (UL Listing #KDER E9999) |
| Leveling Range | 3-4" | Ground Wire<br>Per above Lug spec. | 14 AWG- 4 AWG Copper Ground Wire |
| Rock-It Slide Comp Range<br>Rock-It Slide Tile | 3"<br>7" | Max Module Size | 64.96"(1650mm) x 39.05"(992mm) x 2"(50mm) |
| Min/Max Roof Slope | 1/2:12/12:12 | Max Downforce/Uplift Rating | 45 PSF |
| Max Anchor Spacing (35mm/40mm)<br>Max Anchor Spacing (32mm) | 72"<br>48" | Rock-It Mount Load Rating | 547lbs with Single 5/16" Lag 3.0 Safety Factor |
| Skirt Box QTY | 6 units | Slide Fastening Hole | 5/16" diameter |
| Mount Box QTY<br>Rock-It Slide Box QTY | 12 units<br>50 units | Module Cantilever | Maximum cantilever is 1/3 bracket spacing |
| Coupling Box QTY | 12 units | Warranty | 20 Year Material and Workmanship |

Codes: National Electric Code, ANSI/NFPA 70, NEC 250, NEC 690, IRC, IBC

Standards: UL 2703: First Edition, UL 1703



The EcoFasten Solar Rock-It System is a rooftop PV racking system consisting of 6000 Series Aluminum and 300 Series Stainless Steel components. The Rock-It System includes the rack components but does not include the PV panels, inverters or electrical components. The PV modules to be used with Rock-It shall be certified under UL 1703. The system shall be used on steep slope roofs mounted over a Class A fire rated roofing material and attached to the roof structure using 5/16" diameter, minimum 4" long 300 series Stainless Steel lag bolts with minimum thread embedment depth of 2 1/2" into the roof structure.

## Periodic re-inspection for loose components

The system is subject to re-inspection as required by the PV module manufacturer or by the Authority Having Jurisdiction. Re-inspection, as required, should include evaluation of any loose components or loose fasteners. All loose components and fasteners should be secured in accordance with these instructions. The system should also be evaluated for any evidence of corrosion. Any corrosion should be removed. Any affected part should be cleaned or replaced in accordance with these instructions.

# Features

- New and improved design
- Fastest, easiest to level system on the market
- Integrated electrical bonding
- SIMPLE- only 4 components
- North-South adjustability
- Only one tool required (1/2" deep well socket)
- Vertical adjustment of 3"-4"

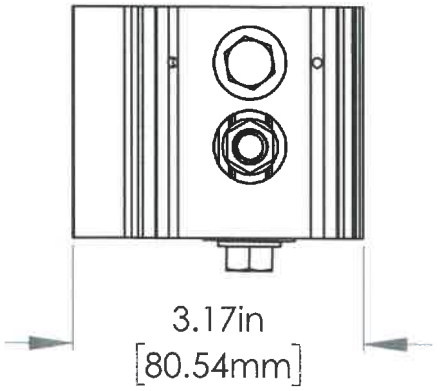
# Evaluated, Compatible Modules

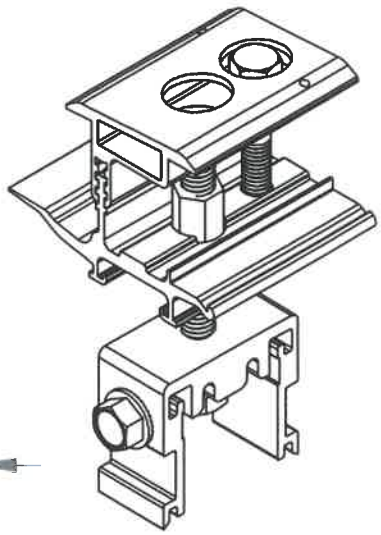
| Module Manufacturer | Model Type ("x" used to indicate variable test) | Module Dimensions (mm) | Module Dimensions (in) | Downward Pressure Design Load (psf) | Upward Pressure Design Load (psf) | Down-slope Design Load (psf) | Maximum Clamp Spacing (in) |
|---|---|---|---|---|---|---|---|
| Trina Solar | TSM-xxx-PX05.08 | 1640 x 992 x 40 | 64.95"x39.05"x1.57" | 33.3 | 33.3 | 20 | 72 |
| Canadian Solar | CS6P-xxxM | 1638 x 922 x 40 | 64.48"x38.66"x1.57" | 33.3 | 33.3 | 20 | 72 |
| Canadian Solar | CS6P-xxxP | 1638 x 982 x 40 | 64.5"x38.7"x1.57" | 33.3 | 33.3 | 20 | 72 |
| Jinko Solar | JKMxxxP-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 30 | 30 | 20 | 72 |
| Jinko Solar | JKMxxxM-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 30 | 30 | 20 | 72 |
| Jinko Solar | JKMxxxPP-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 30 | 30 | 20 | 72 |
| Jinko Solar | JKMxxxMM-60 | 1650 x 992 x 40 | 64.96"x39.05"x1.57" | 30 | 30 | 20 | 72 |
| Yingli Solar | YL2xxP-29b | 1650 x 990 x 40 | 64.96"x38.97"x1.57" | 30 | 30 | 20 | 72 |
| LG Elcetronics | LG300N1C-B3 | 1640 x 1000 x 35 | 64.57"x39.37"x1.38" | 30 | 30 | 20 | 72 |
| LG Elcetronics | LG300N1K-G4 | 1640 x 1000 x 40 | 64.57"x39.37"x1.57" | 30 | 30 | 20 | 72 |
| Axitec Solar | AC-xxxM/156-60S | 1640 x 992 x 40 | 64.5"x39.06"x1.38" | 30 | 30 | 20 | 48 |
| RECOM | RCM-2xx-6MB | 1640 x 992 x 35 | 64.56"x39.05"x1.37" | 30 | 30 | 20 | 72 |
| Silfab | SLA2xxP | 1650 x 990 x 38 | 64.96"x38.97"x1.49" | 30 | 30 | 20 | 72 |
| Solaria | PowerXT xxxR-BX | 1621 x 1056 x 40 | 63.89"x41.53"x1.57" | 30 | 30 | 20 | 48 |
| Hanwha - Q Cells* | Q.PRO G4 2xx | 1670 x 1000 x 32 | 65.75"x39.37"x1.25" | 30 | 30 | 20 | 48 |
| Hanwha - Q Cells* | Q.PRO G4 2xx | 1670 x 1000 x 32 | 65.75"x39.37"x1.25" | 30 | 30 | 20 | 72 |
| Sunpreme | GxB-3xxT | 1670 x 997 x 40 | 65.75"x39.25"x1.57" | 30 | 30 | 20 | 48 |
| REC | REC-xxx-6MB | 1675 x 997 x 38 | 65.94"x39.25"x1.5" | 20 | 20 | 20 | 72 |
| REC | REC-xxx-6MB | 1675 x 997 x 38 | 65.94"x39.25"x1.5" | 30 | 30 | 20 | 48 |
| SolarWorld | SW xxx Mono Black | 1675 x 961 x 33 | 65.95"x37.8"x1.30" | 20 | 20 | 20 | 72 |
| SolarWorld | SW xxx Mono Black | 1675 x 961 x 33 | 65.95"x37.8"x1.30" | 30 | 30 | 20 | 48 |

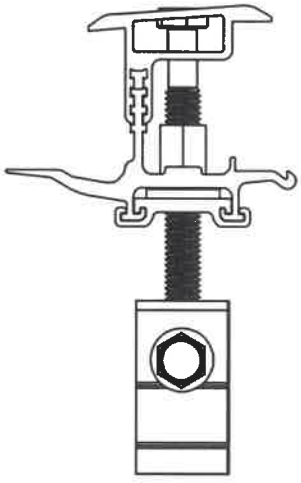
*Hanwha Q- Cells 32mm modules to be used with special order Rock-It System components. Call for details.

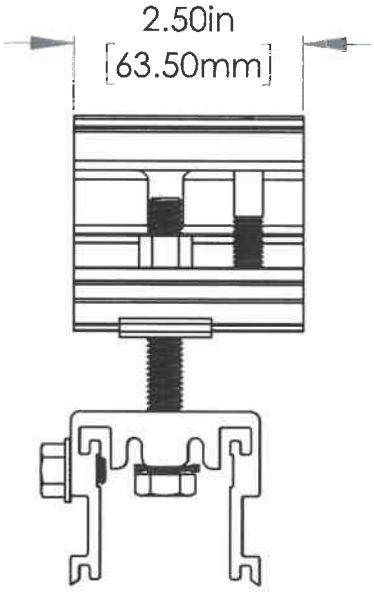
# Cut Sheet - Rock-It-4.0-Mount

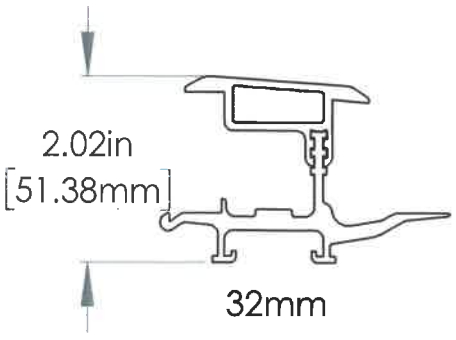
1. Installation to be completed in accordance with manufacturer's written specifications and installation instructions.
2. See spec sheet or contact manufacturer for detailed material, finishes, and configuration options.
3. Contact manufacturer for detailed layout.
4. Do not scale drawings.
5. Subject to change without notice.

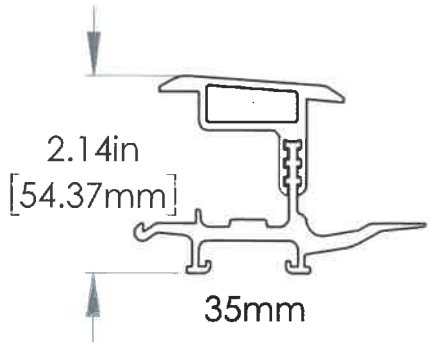


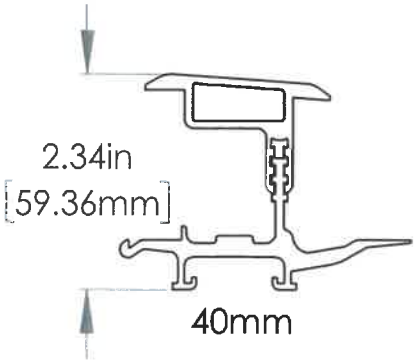








ALPINE SNOWGUARDS
Toll Free Phone 1.888.766.4273
Toll Free Fax 1.888.766.9994

EcoFasten Solar
Toll Free Phone 1.877.859.3947
Toll Free Fax 1.888.766.9994

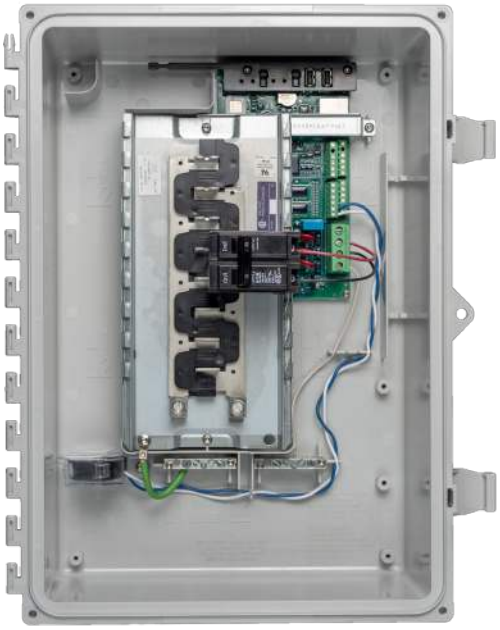
4741 W Polk Street Ste. 4
Phoenix, AZ 85043

Material: See Spec Sheet
Scale: 1:2 | 6/28/2017 | ASG: - | EFS: x

# Enphase IQ Combiner 3

(X-IQ-AM1-240-3)

The **Enphase IQ Combiner 3**™ with Enphase IQ Envoy™ consolidates interconnection equipment into a single enclosure and streamlines PV and storage installations by providing a consistent, pre-wired solution for residential applications. It offers up to four 2-pole input circuits and Eaton BR series busbar assembly.



## Smart

- Includes IQ Envoy for communication and control
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and optional consumption monitoring

## Simple

- Reduced size from previous combiner
- Centered mounting brackets support single stud mounting
- Supports back and side conduit entry
- Up to four 2-pole branch circuits for 240 VAC plug-in breakers (not included)
- 80 A total PV or storage branch circuits

## Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year warranty
- UL listed

UL LISTED

To learn more about Enphase offerings, visit **enphase.com**

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# Enphase IQ Combiner 3

| **MODEL NUMBER** | |
|---|---|
| IQ Combiner 3 X-IQ-AM1-240-3 | IQ Combiner 3 with Enphase IQ Envoy™ printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and optional* consumption monitoring (+/- 2.5%). |
| **ACCESSORIES** and **REPLACEMENT PARTS** (not included, order separately) | |
| Enphase Mobile Connect™<br>CELLMODEM-03 (4G / 12-year data plan)<br>CELLMODEM-01 (3G / 5-year data plan)<br>CELLMODEM-M1 (4G based LTE-M / 5-year data plan) | Plug and play industrial grade cellular modem with data plan for systems up to 60 microinverters. (Available in the US, Canada, Mexico, Puerto Rico, and the US Virgin Islands, where there is adequate cellular service in the installation area.) |
| Consumption Monitoring* CT<br>CT-200-SPLIT | Split core current transformers enable whole home consumption metering (+/- 2.5%). |
| Circuit Breakers<br>BRK-10A-2-240<br>BRK-15A-2-240<br>BRK-20A-2P-240 | Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers.<br>Circuit breaker, 2 pole, 10A, Eaton BR210<br>Circuit breaker, 2 pole, 15A, Eaton BR215<br>Circuit breaker, 2 pole, 20A, Eaton BR220 |
| EPLC-01 | Power line carrier (communication bridge pair), quantity 2 |
| XA-PLUG-120-3 | Accessory receptacle for Power Line Carrier in IQ Combiner 3 (required for EPLC-01) |
| XA-ENV-PCBA-3 | Replacement IQ Envoy printed circuit board (PCB) for Combiner 3 |
| **ELECTRICAL SPECIFICATIONS** | |
| Rating | Continuous duty |
| System voltage | 120/240 VAC, 60 Hz |
| Eaton BR series busbar rating | 125 A |
| Max. continuous current rating (output to grid) | 65 A |
| Max. fuse/circuit rating (output) | 90 A |
| Branch circuits (solar and/or storage) | Up to four 2-pole Eaton BR series Distributed Generation (DG) breakers only (not included) |
| Max. continuous current rating (input from PV) | 64 A |
| Max. total branch circuit breaker rating (input) | 80A of distributed generation / 90A with IQ Envoy breaker included |
| Production Metering CT | 200 A solid core pre-installed and wired to IQ Envoy |
| **MECHANICAL DATA** | |
| Dimensions (WxHxD) | 49.5 x 37.5 x 16.8 cm (19.5” x 14.75” x 6.63”). Height is 21.06" (53.5 cm with mounting brackets). |
| Weight | 7.5 kg (16.5 lbs) |
| Ambient temperature range | -40° C to +46° C (-40° to 115° F) |
| Cooling | Natural convection, plus heat shield |
| Enclosure environmental rating | Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction |
| Wire sizes | • 20 A to 50 A breaker inputs: 14 to 4 AWG copper conductors<br>• 60 A breaker branch input: 4 to 1/0 AWG copper conductors<br>• Main lug combined output: 10 to 2/0 AWG copper conductors<br>• Neutral and ground: 14 to 1/0 copper conductors<br>Always follow local code requirements for conductor sizing. |
| Altitude | To 2000 meters (6,560 feet) |
| **INTERNET CONNECTION OPTIONS** | |
| Integrated Wi-Fi | 802.11b/g/n |
| Ethernet | Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included) |
| Cellular | Optional, CELLMODEM-01 (3G) or CELLMODEM-03 (4G) or CELLMODEM-M1 (4G based LTE-M) (not included) |
| **COMPLIANCE** | |
| Compliance, Combiner | UL 1741<br>CAN/CSA C22.2 No. 107.1<br>47 CFR, Part 15, Class B, ICES 003<br>Production metering: ANSI C12.20 accuracy class 0.5 (PV production) |
| Compliance, IQ Envoy | UL 60601-1/CANCSA 22.2 No. 61010-1 |

* Consumption monitoring is required for Enphase Storage Systems.

To learn more about Enphase offerings, visit **enphase.com**


2018-09-13

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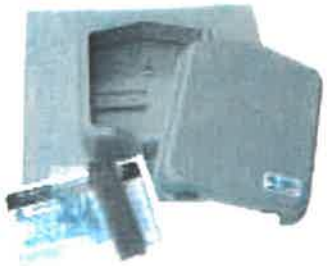
# SolaDeck

**FLASHED PV ROOF-MOUNT COMBINER/ENCLOSURE**

## Basic Features

- Stamped Seamless Construction
- 18 Gauge Galvanized Steel
- Powder Coated Surfaces
- Flashes into the roof deck
- 3 Roof deck knockouts .5", .75", 1"
- 5 Centering dimples for entry/exit fittings or conduit
- 2 Position Ground lug installed
- Mounting Hardware Included

SolaDeck Model SD 0783



## SolaDeck UL50 Type 3R Enclosures

Available Models:
Model SD 0783 - (3" fixed Din Rail)
Model SD 0786 - (6" slotted Din Rail)

## SolaDeck UL 1741 Combiner/Enclosures

Models SD 0783-41 and SD 0786-41 are labeled and ETL listed UL STD 1741 according to the UL STD 1741 for photovoltaic combiner enclosures.

Max Rated - 600VDC, 120AMPS

**Model SD 0783-41** 3" Fixed Din Rail fastened using Norlock System

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
1- Power Distribution Block 600VDC 175AMP
1- Bus Bar with UL lug

**Model SD 0786-41** 6" Slotted Din Rail fastened using steel studs

****Typical System Configuration**

4- Din Rail Mounted Fuse Holders 600VDC 30 AMP
4- Din Rail Mounted Terminal Blocks
Bus Bars with UL lug

****Fuse holders and terminal blocks added in the field must be UL listed or recognized and meet 600 VDC 30 AMP 110C for fuse holders, 600V 50 AMP 90C for rail mounted terminal blocks and 600 V 175 AMP 90C for Power Distribution Blocks. Use Copper Wire Conductors.**

Cover is trimmed to allow conduit or fittings, base is center dimpled for fitting locations.

Model SD 0783-41, wired with Din Rail mounted fuse holders, bus bar and power distribution block.

Model SD 0786-41, wired with Din Rail mounted fuse holders, terminal blocks and bus bars.

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