ENPHASE

DATA SHEET

IQ8 and IQ8+ Microinverters

Our newest IQ8 Microinverters are the industry's first microgrid-forming, software-defined microinverters with split-phase power conversion capability to convert DC power to AC power efficiently. The brain of the semiconductor-based microinverter is our proprietary application-specific integrated circuit (ASIC) which enables the microinverter to operate in grid-tied or off-grid modes. This chip is built in advanced 55nm technology with high speed digital logic and has super-fast response times to changing loads and grid events, alleviating constraints on battery sizing for home energy systems.

Part of the Enphase Energy System, IQ8 Series Microinverters integrate with the Enphase IQ Battery, Enphase IQ Gateway, and the Enphase App monitoring and analysis software.

Enphase 25 year limited warranty

IQ8 Series Microinverters redefine reliability standards with more than one million cumulative hours of power-on testing, enabling an industry-leading limited warranty of up to 25 years.

Connect PV modules quickly and easily to IQ8 Series Microinverters using the included Q-DCC-2 adapter cable with plug-n-play MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV Rapid Shut Down Equipment and conform with various regulations, when installed according to manufacturer's instructions.

Easy to install

- Lightweight and compact with plug-n-play connectors
- Power Line Communication (PLC) between components
- Faster installation with simple two-wire cabling

High productivity and reliability

- Produce power even when the grid is down*
- More than one million cumulative hours of testing
- Class II double-insulated enclosure
- Optimized for the latest high-powered PV modules

Microgrid-forming

- Complies with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meets CA Rule 21 (UL 1741-SA) requirements

IQ8SP-DS-0002-01-EN-US-2022-03-17

* Only when installed with IQ System Controller 2, meets UL 1741.

** IQ8 and IQ8Plus supports split phase, 240V installations only.

IQ8 and IQ8+ Microinverters

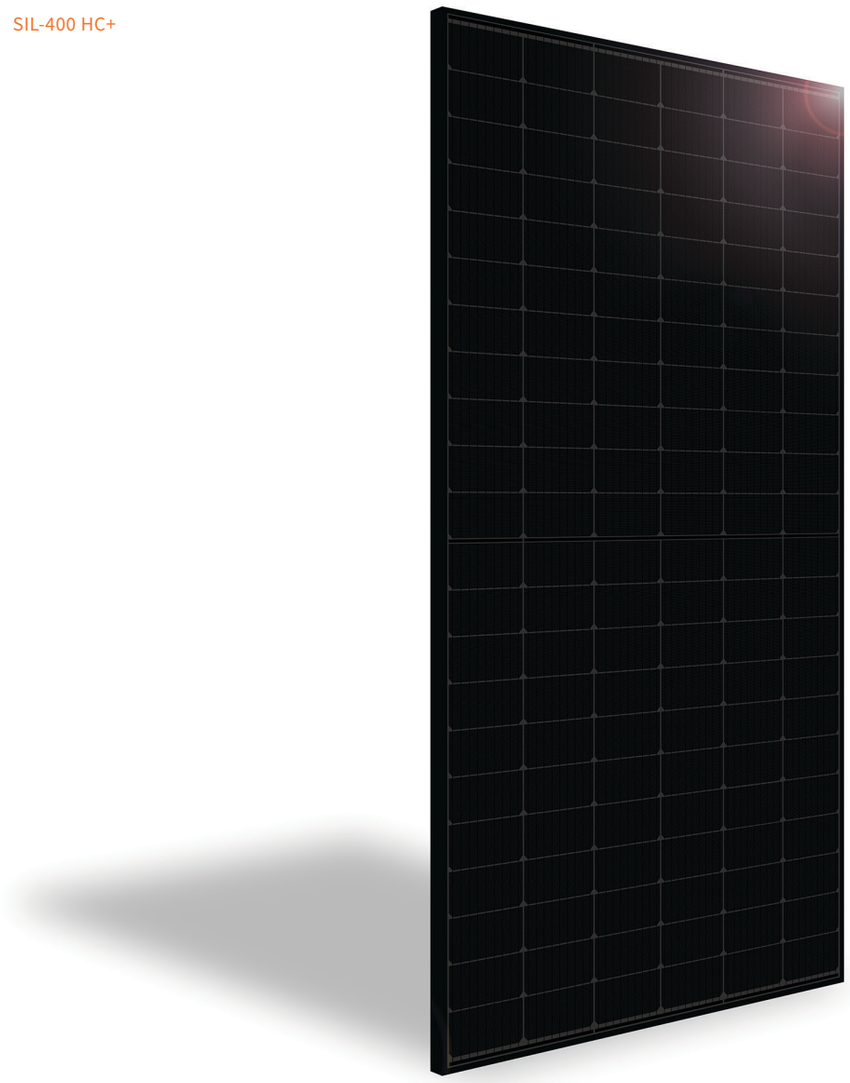
INPUT DATA (DC)		IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235 – 350	235 – 440
Module compatibility		60-cell/120 half-cell	60-cell/120 half-cell, 66-cell/132 half-cell and 72-cell/144 half-cell
MPPT voltage range	V	27 – 37	29 – 45
Operating range	V	25 – 48	25 – 58
Min/max start voltage	V	30 / 48	30 / 58
Max input DC voltage	V	50	60
Max DC current[2] [module Isc]	A	15	
Overvoltage class DC port		II	
DC port backfeed current	mA	0	
PV array configuration		1x1 Ungrounded array; No additional DC side protection required; AC side protection requires max 20A per branch circuit	
OUTPUT DATA (AC)		**IQ8-60-2-US**	**IQ8PLUS-72-2-US**
Peak output power	VA	245	300
Max continuous output power	VA	240	290
Nominal (L-L) voltage/range[3]	V	240 / 211 – 264	
Max continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	50 – 68	
AC short circuit fault current over 3 cycles	Arms	2	
Max units per 20 A (L-L) branch circuit[4]		16	13
Total harmonic distortion		<5%	
Overvoltage class AC port		III	
AC port backfeed current	mA	30	
Power factor setting		1.0	
Grid-tied power factor (adjustable)		0.85 leading – 0.85 lagging	
Peak efficiency	%	97.5	97.6
CEC weighted efficiency	%	97	97
Night-time power consumption	mW	60	
MECHANICAL DATA			
Ambient temperature range		-40°C to +60°C (-40°F to +140°F)	
Relative humidity range		4% to 100% (condensing)	
DC Connector type		MC4	
Dimensions (HxWxD)		212 mm (8.3”) x 175 mm (6.9”) x 30.2 mm (1.2”)	
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	
Environ. category / UV exposure rating		NEMA Type 6 / outdoor	
COMPLIANCE			
Certifications		CA Rule 21 (UL 1741-SA), UL 62109-1, UL1741/IEEE1547, FCC Part 15 Class B, ICES-0003 Class B, CAN/CSA-C22.2 NO. 107.1-01 This product is UL Listed as PV Rapid Shut Down Equipment and conforms with NEC 2014, NEC 2017, and NEC 2020 section 690.12 and C22.1-2018 Rule 64-218 Rapid Shutdown of PV Systems, for AC and DC conductors, when installed according to manufacturer’s instructions.	

(1) No enforced DC/AC ratio. See the compatibility calculator at https://link.enphase.com/module-compatibility
(2) Maximum continuous input DC current is 10.6A (3) Nominal voltage range can be extended beyond nominal if required by the utility. (4) Limits may vary. Refer to local requirements to define the number of microinverters per branch in your area.

SILFAB PRIME

SIL-400 HC+

SILFAB SOLAR®



RELIABLE ENERGY.
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Dependable, durable, high-performance solar panels engineered for North American homeowners.

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CHUBB®

* Chubb provides error and omission insurance to Silfab Solar Inc.

ELECTRICAL SPECIFICATIONS		400	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	400	298
Maximum power voltage (Vpmax)	V	36.05	33.50
Maximum power current (Ipmax)	A	11.10	8.90
Open circuit voltage (Voc)	V	43.02	40.35
Short circuit current (Isc)	A	11.58	9.34
Module efficiency	%	20.2%	18.8%
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	0 to +10	

Measurement conditions: STC 1000 W/m^2 • AM 1.5 • Temperature 25 °C • NOCT 800 W/m^2 • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by 0 to +10W.

MECHANICAL PROPERTIES / COMPONENTS	METRIC	IMPERIAL
Module weight	21.3kg ±0.2kg	47lbs ±0.4lbs
Dimensions (H x L x D)	1914 mm x 1036 mm x 35 mm	75.3 in x 40.8 in x 1.37 in
Maximum surface load (wind/snow)*	5400 Pa rear load / 5400 Pa front load	112.8 lb/ft^2 rear load / 112.8 lb/ft^2 front load
Hail impact resistance	ø 25 mm at 83 km/h	ø 1 in at 51.6 mph
Cells	132 Half cells - Si mono PERC 9 busbar - 83 x 166 mm	132 Half cells- Si mono PERC 9 busbar - 3.26 x 6.53 in
Glass	3.2 mm high transmittance, tempered, DSM antireflective coating	0.126 in high transmittance, tempered, DSM antireflective coating
Cables and connectors (refer to installation manual)	1350 mm, ø 5.7 mm, MC4 from Staubli	53 in, ø 0.22 in (12AWG), MC4 from Staubli
Backsheet	High durability, superior hydrolysis and UV resistance, multi-layer dielectric film, fluorine-free PV backsheet	
Frame	Anodized Aluminum (Black)	
Bypass diodes	3 diodes-30SQ045T (45V max DC blocking voltage, 30A max forward rectified current)	
Junction Box	UL 3730 Certified, IEC 62790 Certified, IP68 rated	

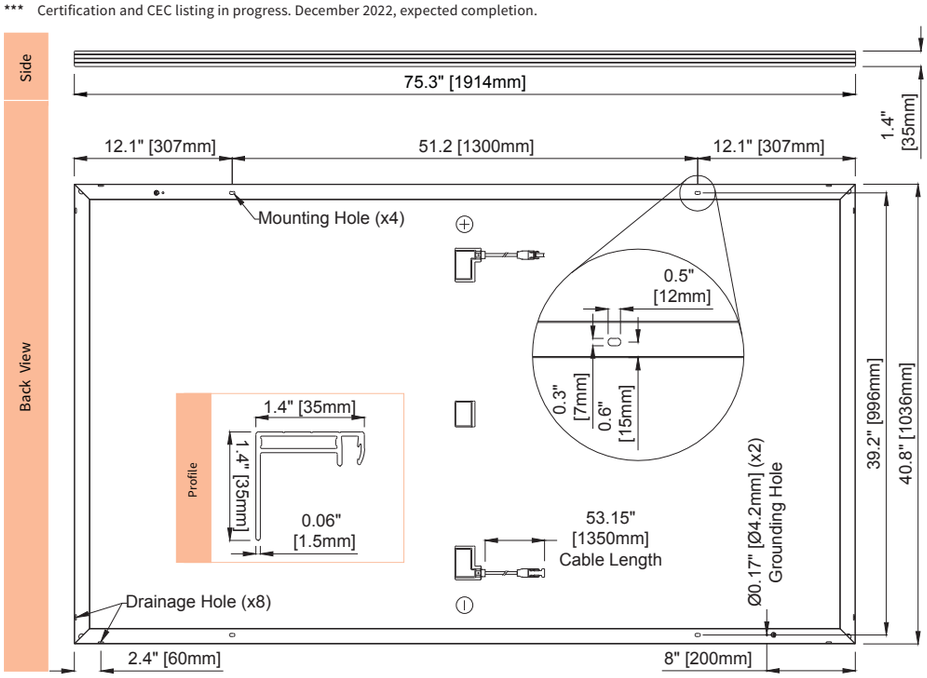
TEMPERATURE RATINGS	
Temperature Coefficient Isc	+0.064 %/°C
Temperature Coefficient Voc	-0.28 %/°C
Temperature Coefficient Pmax	-0.36 %/°C
NOCT (± 2°C)	45 °C
Operating temperature	-40/+85 °C

WARRANTIES	
Module product workmanship warranty	25 years**
Linear power performance guarantee	30 years
	≥ 97.1% end 1st yr ≥ 91.6% end 12th yr ≥ 85.1% end 25th yr ≥ 82.6% end 30th yr

CERTIFICATIONS	
Product	UL 61215-1:2017 Ed.1***, UL 61215-2:2017 Ed.1***, UL 61730-1:2017 Ed.1***, UL 61730-2:2017 Ed.1 ***, CSA C22.2#61730-1:2019 Ed.2***, CSA C22.2#61730-2:2019 Ed.2***, IEC 61215-1:2016 Ed.1***, IEC 61215-2:2016 Ed.1***, IEC 61730-1:2016 Ed.2***, IEC 61730-2:2016 Ed.2***, IEC 61701:2020 (Salt Mist Corrosion), IEC 62716:2013 (Ammonia Corrosion), UL Fire Rating: Type 2, CEC Listing***
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	26 or 26 (California)
Pallets Per Truck	32 or 31 (California)
Modules Per Truck	832 or 806 (California)

* ⚠ Warning. Read the Safety and Installation Manual for mounting specifications and before handling, installing and operating modules.
** 12 year extendable to 25 years subject to registration and conditions outlined under "Warranty" at silfabsolar.com.
PAN files generated from 3rd party performance data are available for download at: silfabsolar.com/downloads.
*** Certification and CEC listing in progress. December 2022, expected completion.



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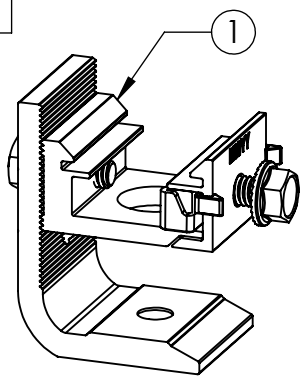
Silfab - SIL-400-HC+-20221114

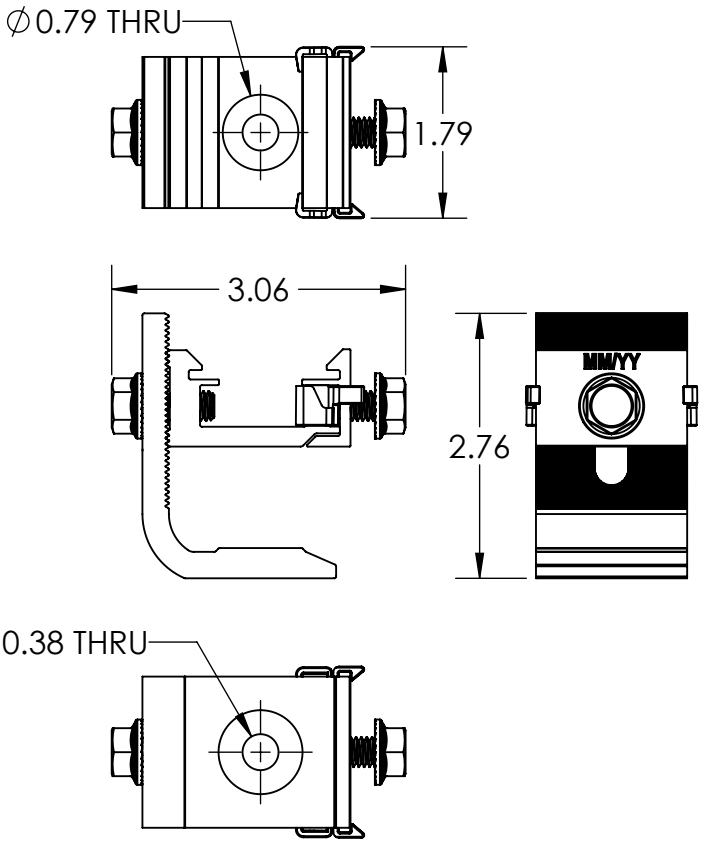
CF UNIV L-FOOT MLL 3"

PART NUMBER	DESCRIPTION
2012022	CF UNIV L-FOOT MLL 3"



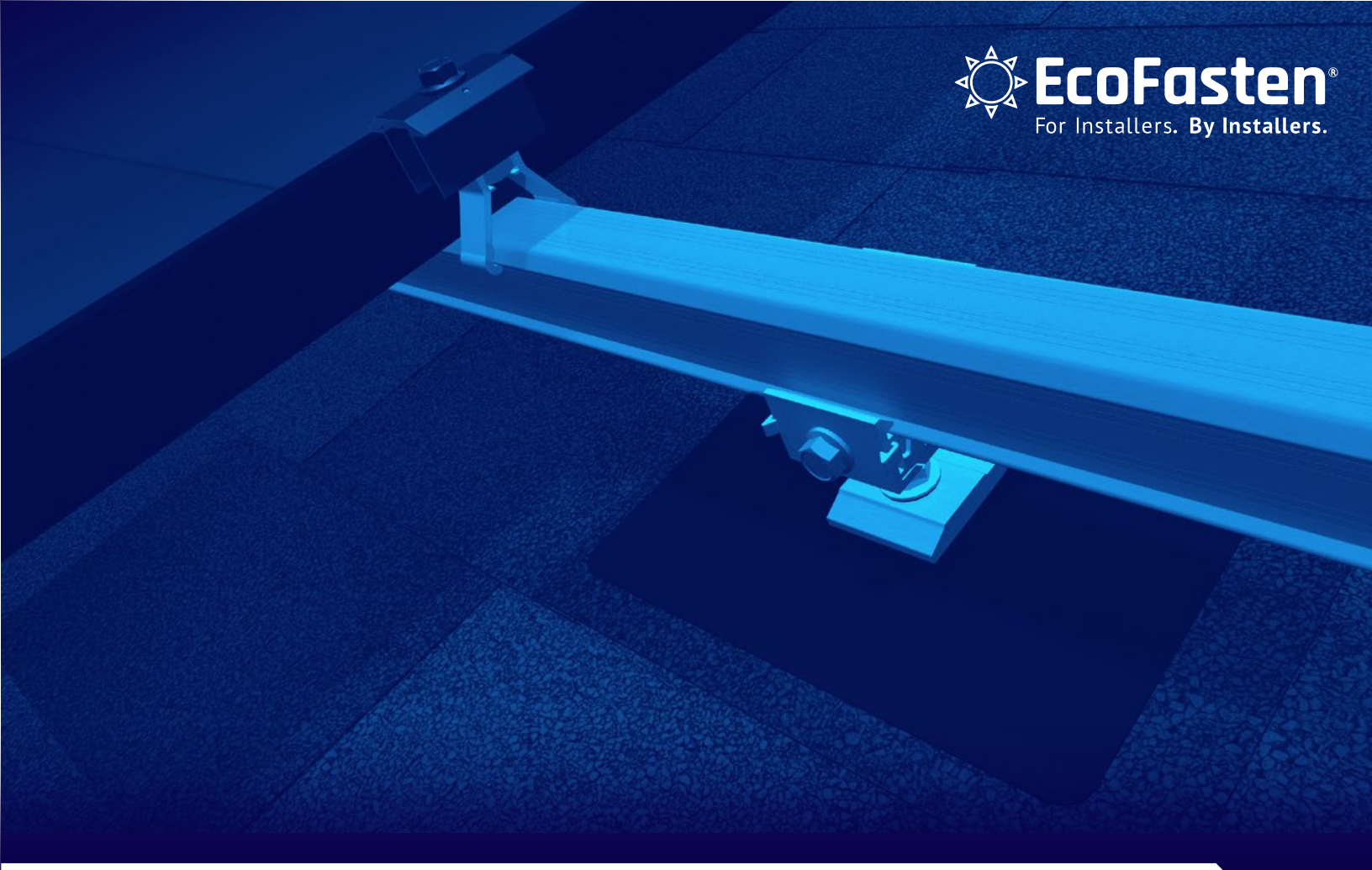
ITEM NO.	DESCRIPTION
1	CLICKFIT L FOOT ASSEMBLY

1) CLICKFIT L FOOT ASSEMBLY



Material	Aluminum/Stainless Steel
Finish	Mill

REV.- CS1



EcoFasten®
For Installers. By Installers.

CLICKFIT®

COMPLETE RAIL-BASED RACKING SYSTEM

INSTALLATION GUIDE

REVISION DATE: 06/15/23	**VERSION:** v3.2

CLICKFIT®

INSTALLATION GUIDE

EcoFasten®
For Installers. By Installers.

Clicking the page name will take you to that page

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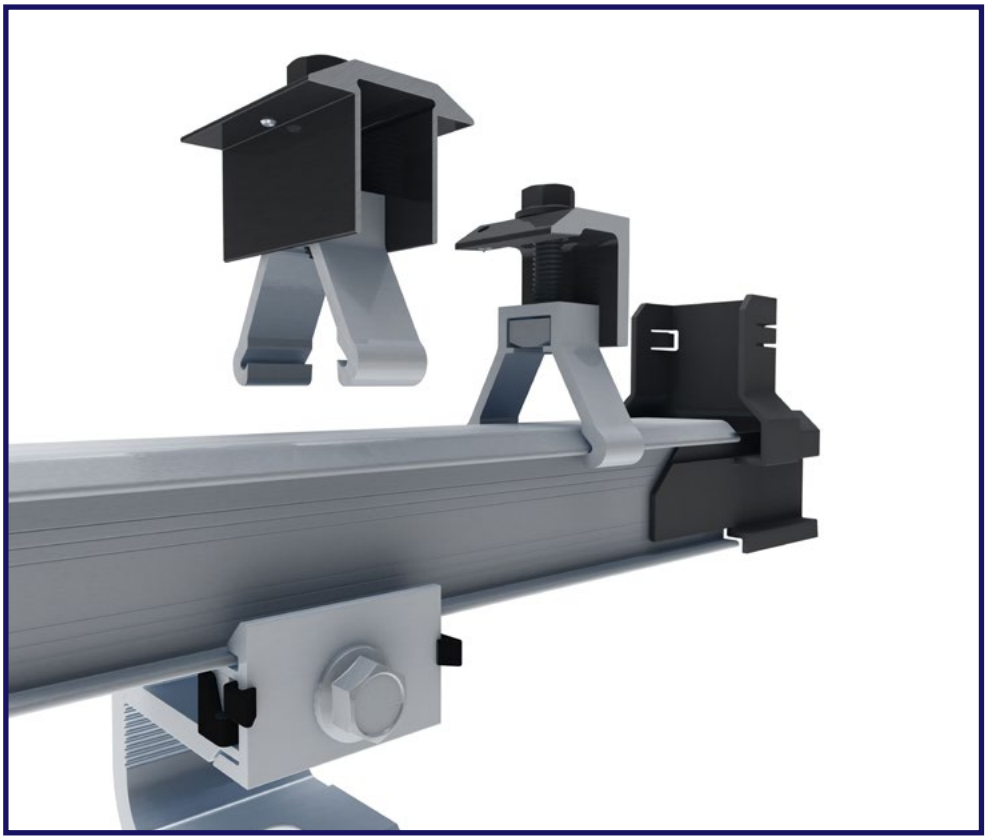


CLICKFIT

ClickFit conforms to UL 2703 and is one of the fastest installing rail-based systems in the industry. Thanks to its Click-In Rail assembly, the rails can be connected to any of EcoFasten's composition shingle, tile, and metal roof mounts in seconds without the need for fasteners or tools. The ClickFit system is made of robust materials, such as aluminum and coated steel, to ensure corrosion resistance and longevity. ClickFit has been tested in extreme weather conditions including wind, fire, and snow.

FEATURES

- Tool and fastener free rail attachment
- Fully integrated bonding
- Click-on Mid & End Clamps
- Compatible with a variety of EcoFasten roof attachments

INTRODUCTION

This manual describes the installation of the ClickFit mounting system for photovoltaic modules on pitched roofs. Described within are details for composition shingle and tile, attachments for ClickFit System. Other roof types as well as all other installation manuals can be found for download at www.EcoFastenSolar.com.

GENERAL INSTALLATION CONDITIONS

Failure to observe the requirements in this document can lead to the exclusion of all guarantees and product liability. EcoFasten Solar reserves the right to amend this document without prior notice.

STABILITY & CONDITION OF THE ROOF

The roof must be in good condition and strong enough to support the weight of the modules, including the additional equipment, wind and snow loads. When in doubt, consult with the engineer of record, and/or the local building inspector.

APPLICATION RANGE OF CLICKFIT

Refer to the Compatible Module List at the end of this document. Please refer to the Ecofasten ClickFit span tables for system structural certification and allowable spans.

WARRANTY

Guarantee according to the warranty conditions and general terms and conditions of EcoFasten Solar. These conditions can be found on the website at www.EcoFastenSolar.com.

LIABILITY

EcoFasten Solar cannot accept any liability whatsoever for damage or injury caused by not taking adequate safety precautions or (accurately) following the instructions given, or resulting from negligence during the installation of the product and any corresponding accessories specified in this document.

OVERVIEW

The ClickFit mounting system consists of patented adjustable tile hooks and L feet, rails, and the installation materials required for the mounting of photovoltaic modules on composition shingle or tile roofs. For simplicity, tile hooks and L feet will be referred to as “attachments”.

ATTACHING TO THE ROOF

The attachments are secured to the roof. Attachments are height-adjustable to level the system on uneven roof surfaces.

ATTACHING THE RAIL

The rail assembles to the attachments with a Clicker. The rail simply clicks into place without the use of any tools.

ATTACHING THE MODULES

The modules are attached to the rails by means of mid clamps and end clamps.

Installer must review module and any 3rd party manufacturer’s documentation for compatibility and compliance with warranty terms and conditions.

WARNING: This product must be installed and used according to this written instruction. Any installation or use of this product not in accord with or not authorized by this written instruction shall void any and all warranties, express or implied, on the product or the use of the product and may cause failure, property damage and personal injury. EcoFasten is not liable for any unauthorized use. Install and use only with other EcoFasten products to ensure proper fit and function.

SYSTEM COMPONENTS REQUIRED

CLICKFIT RAIL

RAIL SPLICE

TILE HOOK

L-FOOT

END CAP

MID CLAMP

END CLAMP

SIMPLEBLOCK-U

SMART FOOT

SYSTEM COMPONENTS ACCESSORIES

JUNCTION BOX

MODULE JUMPER

MLPE MOUNT

WIRE MANAGEMENT CLAMP

CF WIRE MANAGEMENT CLIP

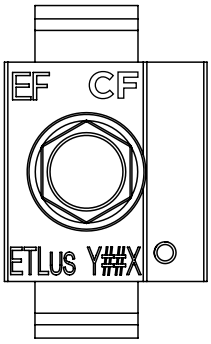
Refer to ClickFit Alternate Component Addendum for components not shown

RATINGS

Fire Rating	Class A* and B** System Fire Rating
Max System Voltage	1500 VDC
Max Fuse Rating	40A
Certification	Conforms to UL STD 2703 and UL SUBJECT 2703A
Warranty	25 Year Material and Workmanship
UL 2703 Markings	Product listing label is located on the End Clamp
Roof Pitch	1/2:12 – 21:12
UL 2703 Allowable Design Load Rating	10 psf downward, 5 psf upward, and 5 psf lateral
Max Module Size	25.6 sqft
Module Orientation	Portrait or Landscape
Multiple use Rated Components (Position Independent)	Mid Clamp, Frame MLPE Mount and MLPE Mount
Conforms to UL SUBJECT 2703A	Smart Foot on Steep Slope Asphalt Shingle Roof

*Class A System fire rating with Steep and Low Slope roofs and Type 1, 2, and 29 PV modules with no skirt required. Class A System fire rating with Steep Slope Roofs and Type 4 and 5 modules with south edge skirt required. Any roof-to-module gap is permitted. This rating is applicable with any roof attachment.
**Class B System fire rating with Steep Slope roofs and Type 4 and 5 modules, no skirt required. Any roof-to-module gap is permitted. This rating is applicable with any roof attachment.

UL 2703 MARKING EXAMPLE:

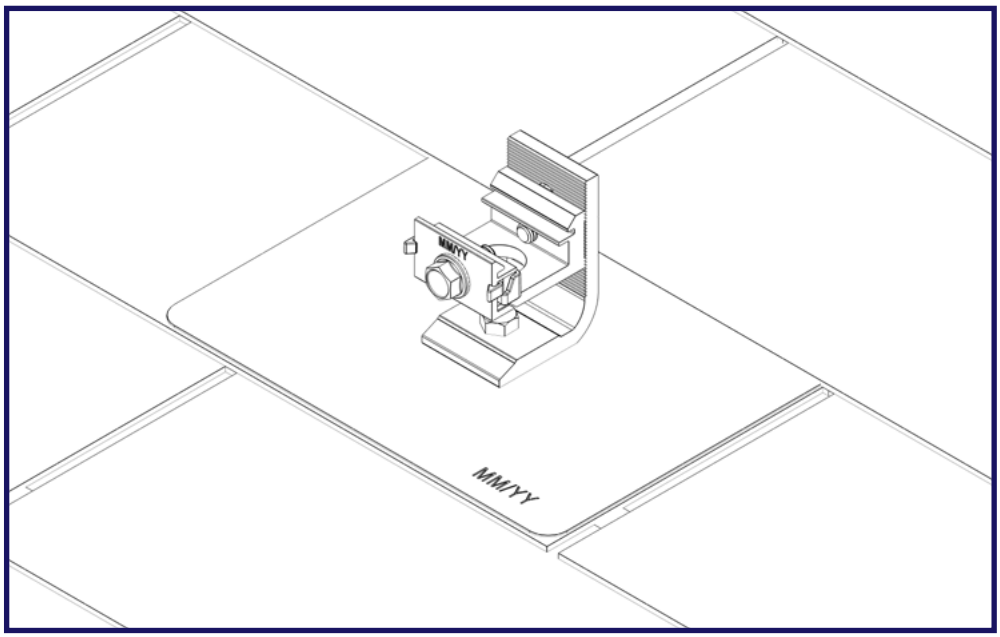


5017913
CONFORMS TO UL STD 2703

MARKINGS LOCATED ON END CLAMP

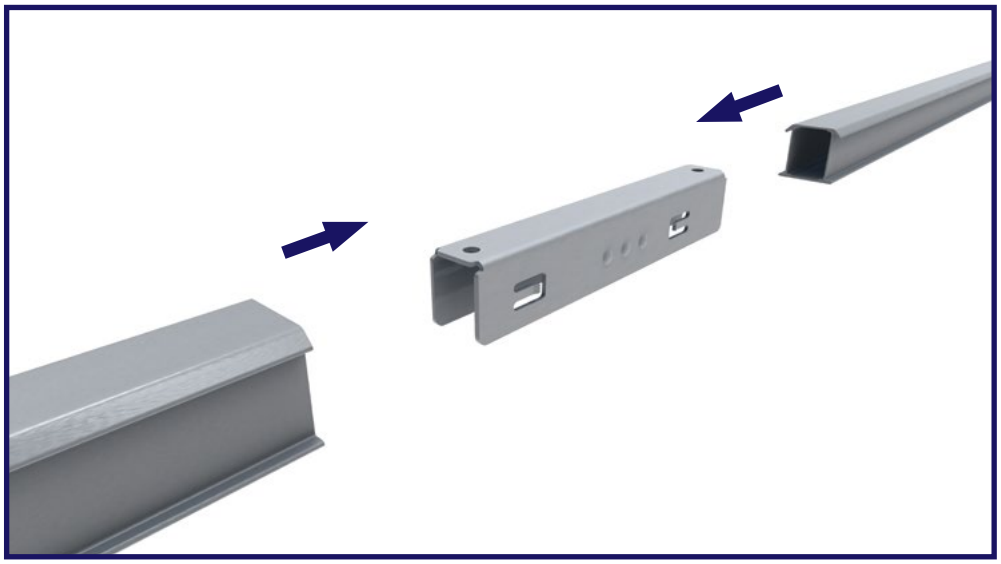
TORQUE SPECIFICATIONS

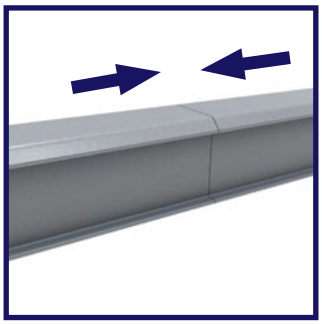
Component	Torque (in-lb)	Notes
Lag Screw	N/A	Fully Seat. Use visual indicator of the black EPDM ring around the bonded washer for torquing.
Mid-Clamp	144	
End-Clamp	144	
Rail Clicker Leveling Bolt	144	Pre-torqued upon delivery. Applies to Tile Hook and L-Foot/Clicker
Hook Height Bolt	N/A	Lightly clamp hook to flush with top of next tile row
Ground Lug	N/A	Refer to specific ground lug manufacturer's installation manual
MLPE Clip	144	
MLPE Mount	144	



- Refer to span tables, local jurisdiction, or engineer of record specifications when determining setbacks from roof edges, attachment spans, etc.
- Mark the perimeter and corners of the array on the roof surface.

  Add 3/4" to account for the gap between modules in each direction
- Draw or snap chalk lines where the rails will be installed, (refer to module manufacturer specs to determine allowable mounting locations).
- Locate rafters within the area of the array. It may be necessary to shift the array East or West on the roof in order to fall within the rail cantilever specs (1/3 of span).
- Stagger rafters every row if required by the local jurisdiction, engineer of record, or company policy.





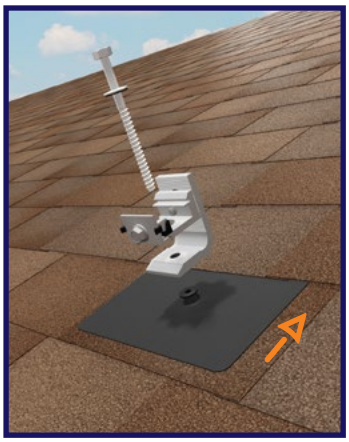
PRE-INSTALLING RAIL SPLICES

1. Determine the number of rails required per row of modules.
2. Insert a rail splice into one rail. **Do not push it past the center bump.**
3. Slide the next rail onto the rail splice until the two rail ends meet.
4. Repeat steps 2 and 3 until the desired length is achieved.

THERMAL EXPANSION

- A thermal expansion gap is required per each continuous 60' length of modules.
- Leave a 2" minimum gap in the ClickFit rail and also between the modules at that point.
- Bonding across the thermal gap should be accomplished with an approved ground lug for each array and an equipment grounding conductor

INSTALLATION OF FLASHING & L-FOOT



*Note the orientation of the L-Foot and clicker. The clicker should be facing downslope

- ClickFit for comp shingle roofs uses EcoFasten GF-1 watertight flashing system.
- Other roof types may use different EcoFasten attachments, visit ecofastensolar.com to learn about other applications.

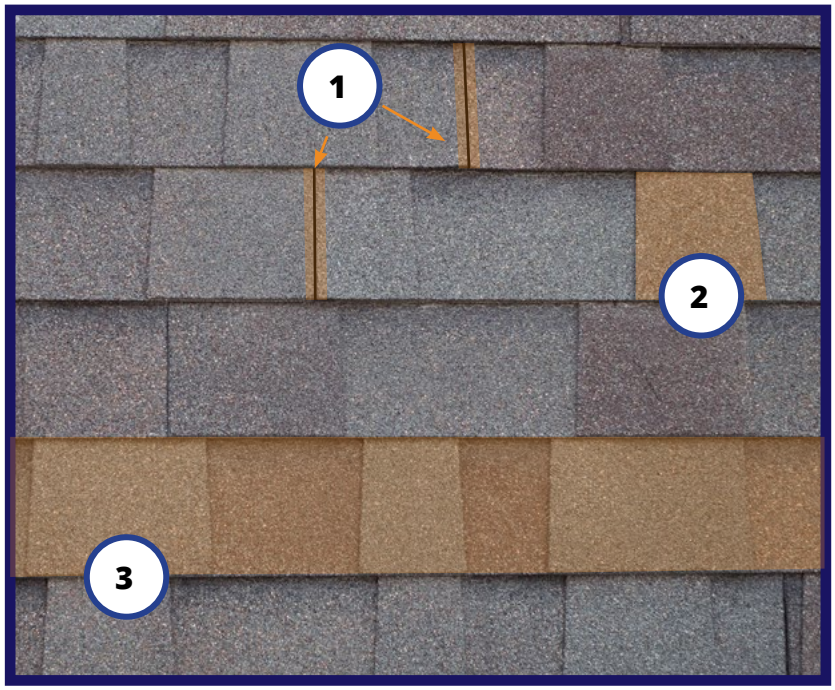
INSTALLATION STEPS:

1. Locate the rafter.
2. Drill 7/32" pilot holes at all attachment points and back fill using roof-compatible sealant.
3. Separate shingles where flashing is to be installed. Insert the flashing so the top portion is under the next row of shingles north of the pilot hole. Ensure the flashing is pushed to the third-course of shingle to prevent water infiltration through the vertical joints between shingles.
4. Align GF-1 flashing hole with pilot hole. Insert the lag bolt with pre-installed bonded washer through the L-Foot and flashing. Tighten the lag bolt until fully seated. The EPDM bonded washer ring visual indicator is the most effective way to ensure a watertight seal.

SMART FOOT INSTALLATION

1. ClickFit Clicker
2. #14x3 Screw with Bonded Washer (6)
3. Smart Foot

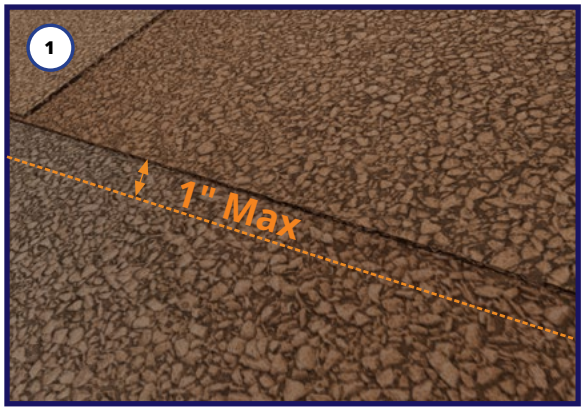
COMPOSITION SHINGLE INFORMATION



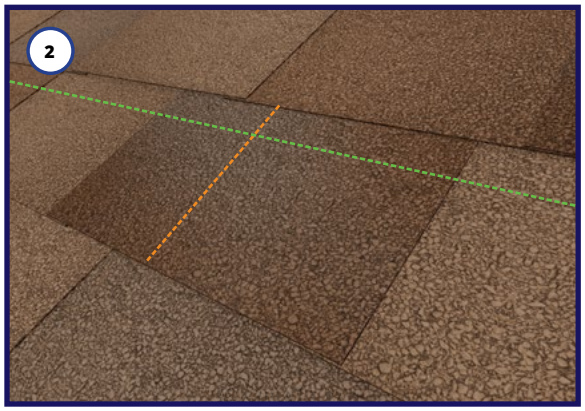
1. **Shingle Joint**
2. **Shingle Step**
3. **Shingle Course**

Keyways are the gaps between each tab of a 3-tab shingle Smart Slide. Attachments can be installed on most common shingle types.

SMART FOOT INSTALLATION - PREPARATION



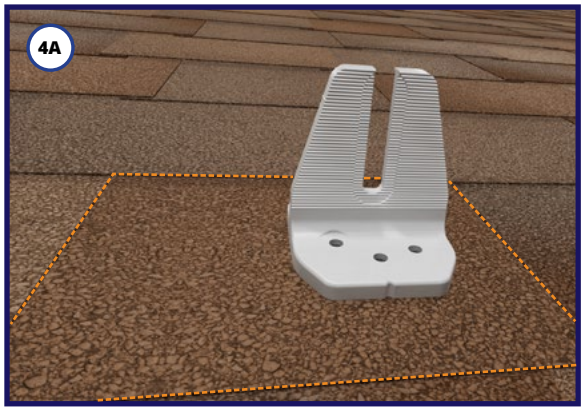
1. Snap chalk lines for attachment locations up to 1" below the drip edge of the upslope shingle course. Attachments can be installed anywhere along a shingle course, but should not overhang drip edge.



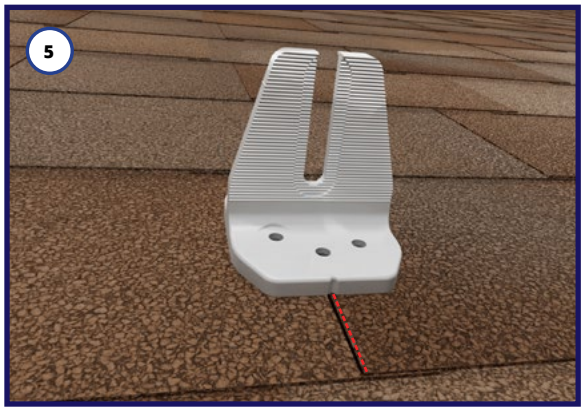
2. Mark Smart Foot locations based on the allowable span between attachments. Draw long vertical marks over Smart Foot locations which can be used to help align them during installation. Clean mounting location with brush to clear any dirt or debris. Make sure the roof is clear of ice and snow.

3. Install Smart Foot on individual shingle course, **DO NOT** straddle two different shingle courses. If the shingle course is wavy, it is acceptable to cut away the second course to properly align the mount.

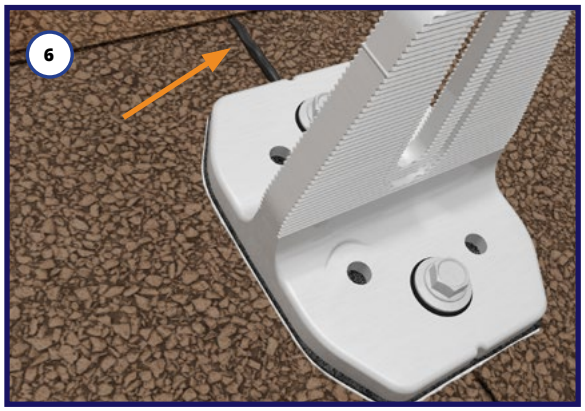
SMART FOOT INSTALLATION PREPARATION



4A Smart Foot should be installed on the flat part of the shingle when possible. Avoid installing Smart Foot on shingle steps taller than 1/8".

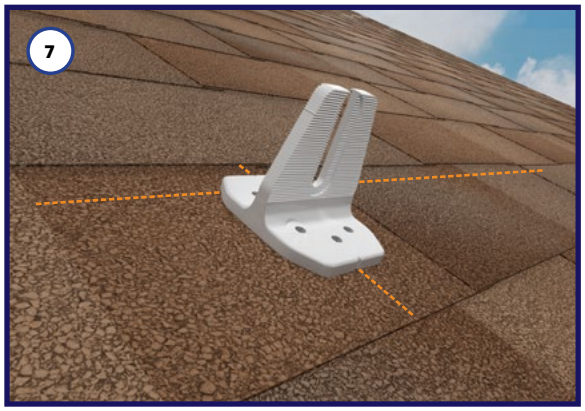


5 Avoid placing Smart Foot attachments directly over keyways or shingle joints. If they cannot be avoided, fill the exposed gap of the keyway or shingle joint above the mount with approved sealant.



6 Apply a bead of roof sealant over and exposed shingle joints north (upslope) of a mounting foot. Please reference our approved sealant list posted on our website.

SMART FOOT INSTALLATION

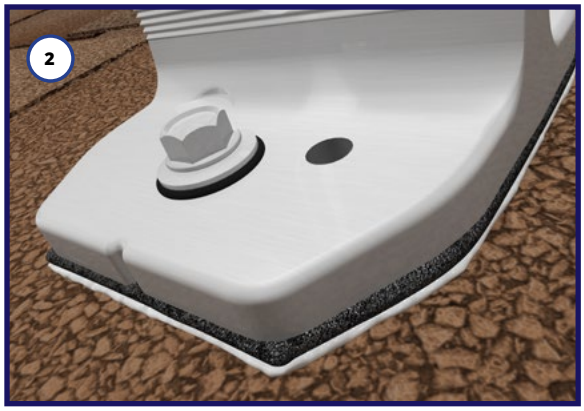


6 Remove release liner from bottom of Smart Foot attachments before installing.

7 Place Smart Foot attachment into position on roof. Minimal force is required when pressing Smart Foot into position. There is no need to apply excessive pressure. Smart Foot attachments will be difficult to relocate after applying pressure.

ALWAYS DOUBLE CHECK THE ATTACHMENTS POSITIONS BEFORE PLACING ON ROOF!

SMART FOOT INSTALLATION - RAFTER ATTACH



1 All rafter attached installations require two #14x3" Structural Screws:

1A For rails running East to West on the roof, use the two holes in the center of Smart Foot.

1B For rails running North to South on the roof, use two holes on one side of the rail attachment slot mount.

2 Drive each screw, checking to make sure the EPDM washer is fully compressed.

3 If the first screw misses the rafter or feels like it's on the edge of a rafter, follow the rafter friendly process shown in steps 3a-3c.

NOTE: DO NOT REMOVE ANY SCREWS THAT HAVE MISSED THE RAFTER

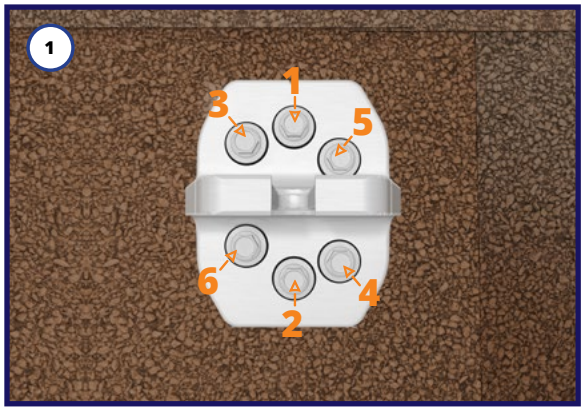
SMART FOOT INSTALLATION - RAFTER ATTACH

3A Drive a second screw through the adjacent hole either to the left or right of center, whichever is closest to the rafter.

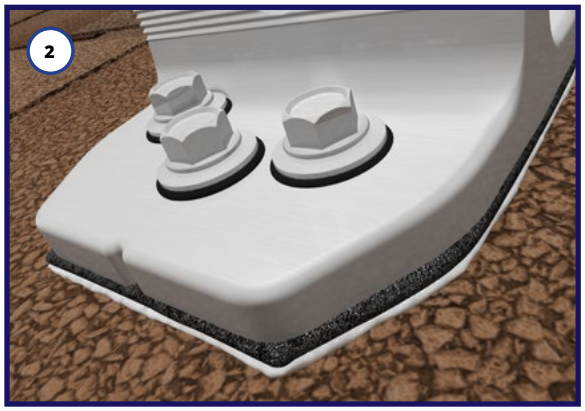
3B If the rafter is hit with the second screw, drive a third screw into the rafter directly below to complete the attachment installation. Two #14x3" Structural Screws MUST be installed into the rafter.

3C If more than three screws miss the rafter, follow the deck attaching procedure and reduce attachment spacing as required to meet site specific engineering. Note that for North / South rails if the first two screws miss the rafter the deck installation procedure should be followed.

SMART FOOT INSTALLATION - DECK ATTACH



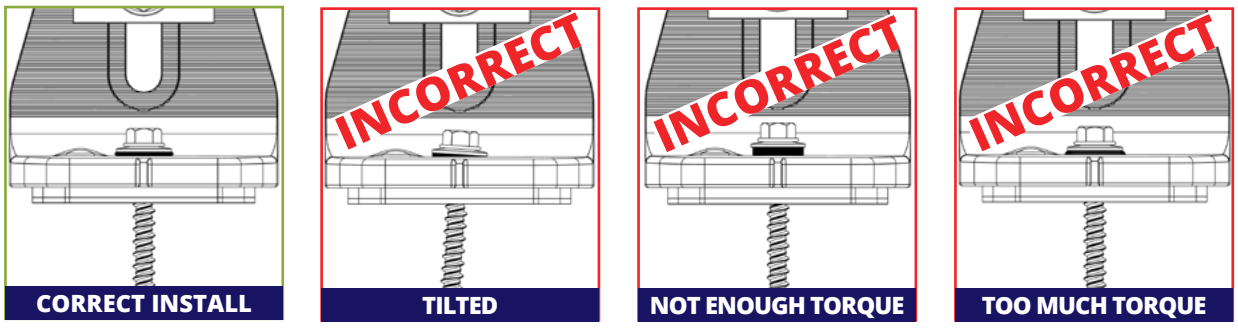
1. Install six #14x3" Structural Screws in an alternating pattern. This helps ensure even compression of the Smart Foot attachment.



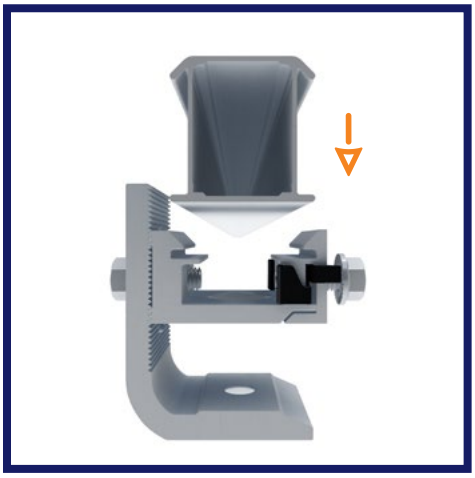
2. After initial tightening, check to make sure all EPDM washers are properly compressed.

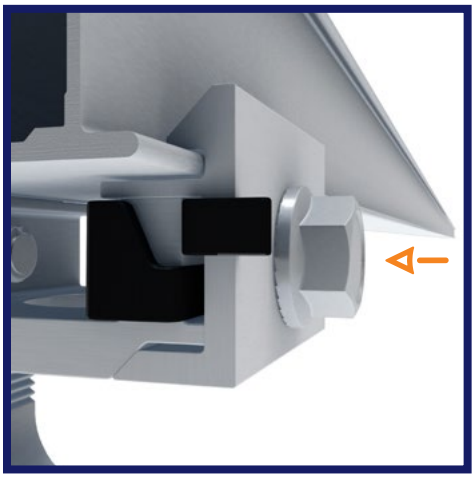
NOTE: If three or more screws are stripped during installation, leave the Smart Foot installed and install another attachment within the acceptable attachment spacing for the project.

Proper Torque for EPDM Washers



INSTALLING THE RAIL





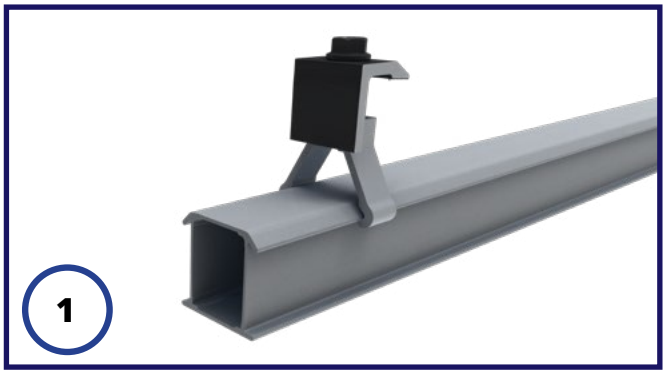
1. Place the rail in the Clickers.

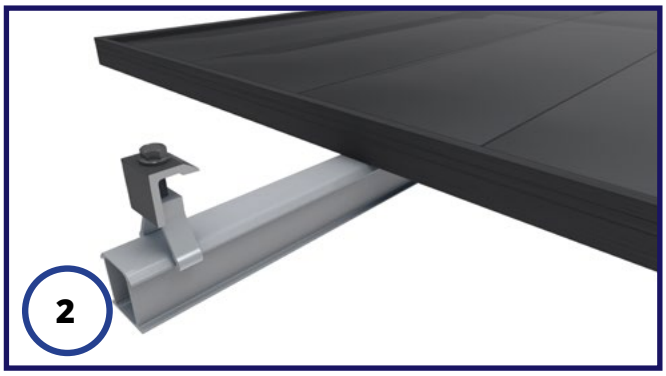
2. Ensure the rails extend a minimum of 2” past the last attachments in each row.

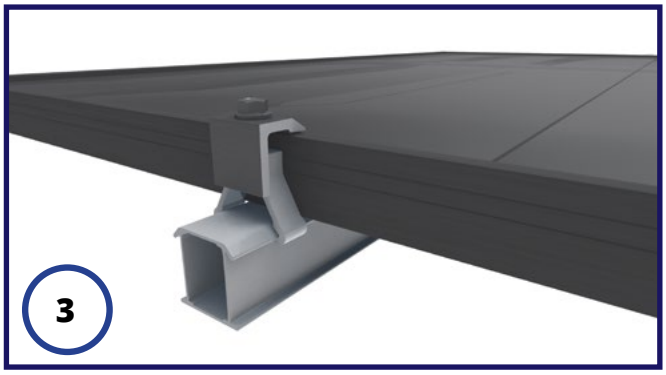
3. Push the rail into the L-foot clicker starting on the side with the plastic clips first, then roll the rail into seated position. Verify the rail is sitting flush with both ledges. If attachments are extremely misaligned it may be necessary to loosen the leveling bolt and adjust the height of the L-foot. Tighten the clamping bolt to 144 in-lbs.

4. Level the rail if necessary by loosening the bolt attaching the Clicker to the L-foot or tile hook.

FIRST MODULE INSTALLATION





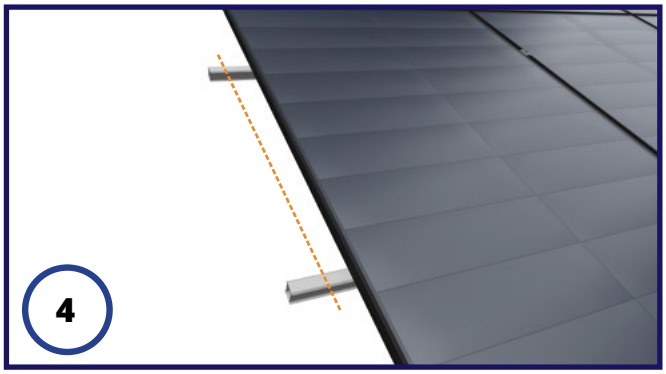


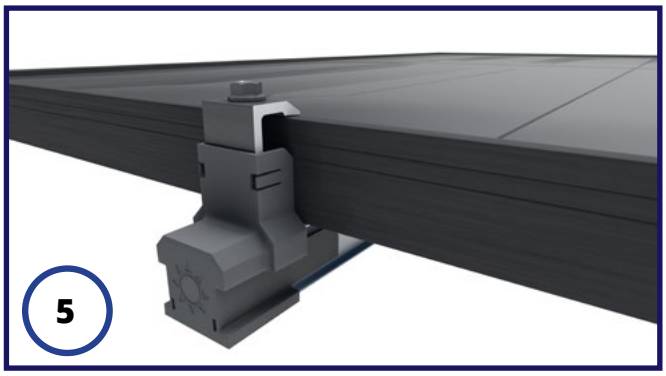
1. With the rails in position and leveled, start by clicking on the end clamps.

2. Place the first module on the rails and slide the module to the end clamps. Ensure the end of each rail extends between 0.75” and 1.75” past the module (cut rail if necessary.)

3. Tighten the end clamp to 144 in-lbs.

LAST MODULE INSTALLATION

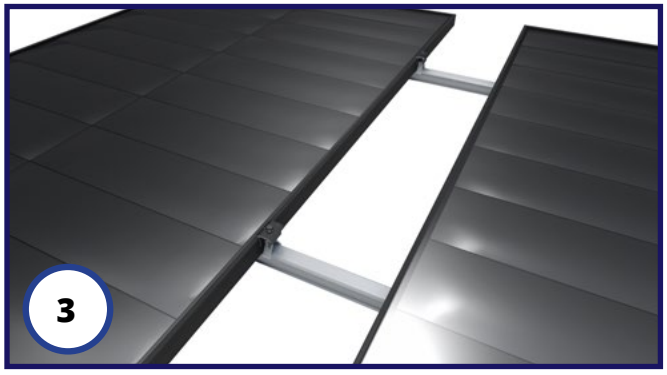




4. Repeat steps 1-4 above for the other end of the row, ensuring that the end of the rail extends between 0.75” and 1.75” past the module (cut rail if necessary.)

5. If using the end cap, slide the end cap onto the rail and snap on to the back on the end clamps. End caps can be installed at any phase of the installation after the End Clamps have been installed.

INSTALLING ADDITIONAL MODULES



1 CLICK IT ON

Click a mid clamp onto each rail.

2 SLIDE IT UP

Slide the mid clamps until they are flush with the side of the existing module.

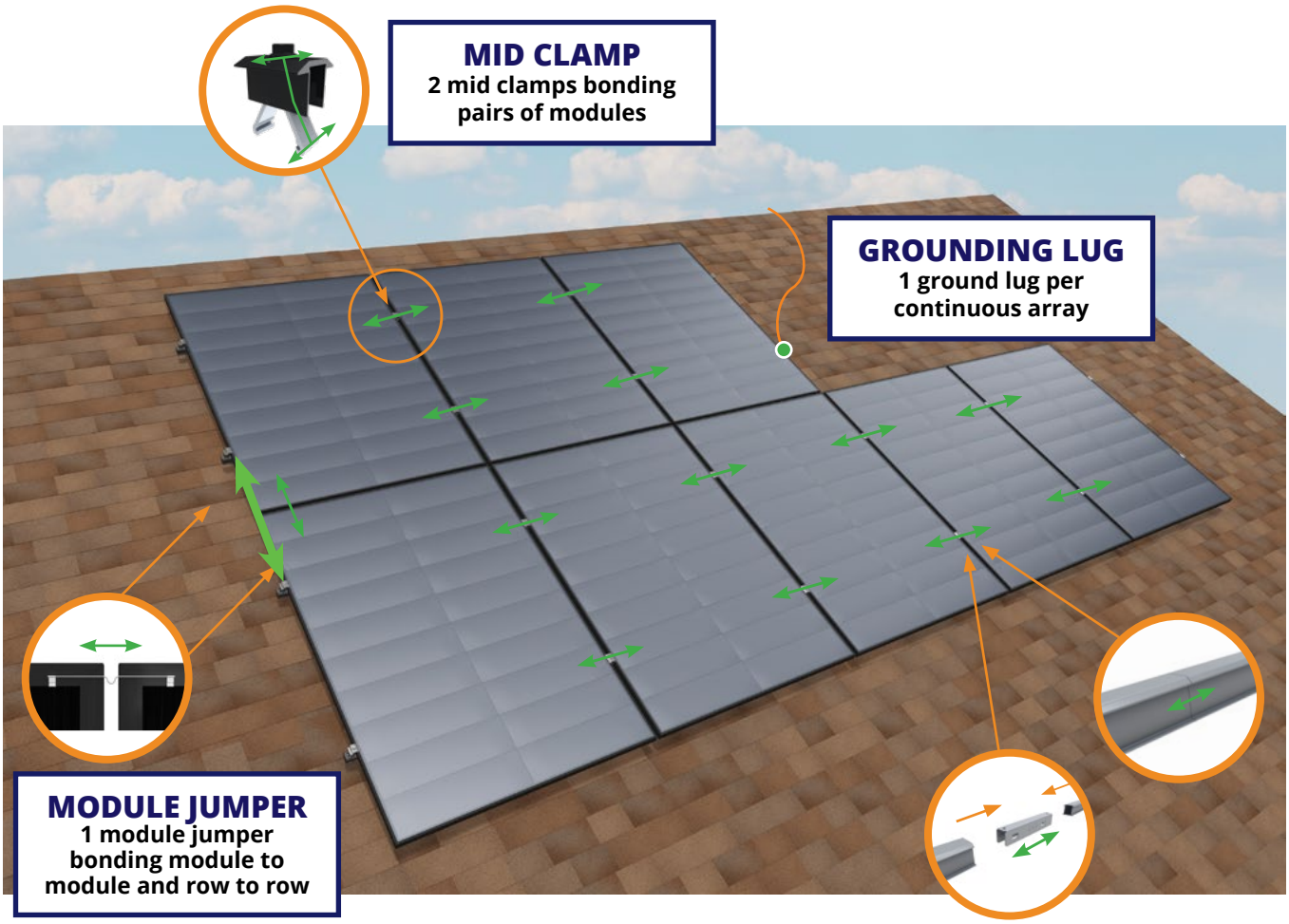
3 PLACE AND TIGHTEN

Place and slide the next module firmly against the mid clamps. Align the bottom edges of the modules. Tighten mid clamps to 144 in-lb.

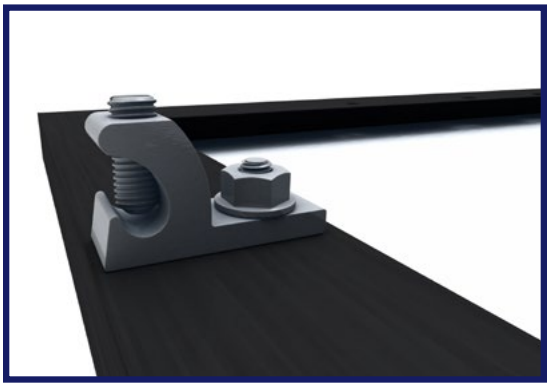
BONDING AND GROUNDING

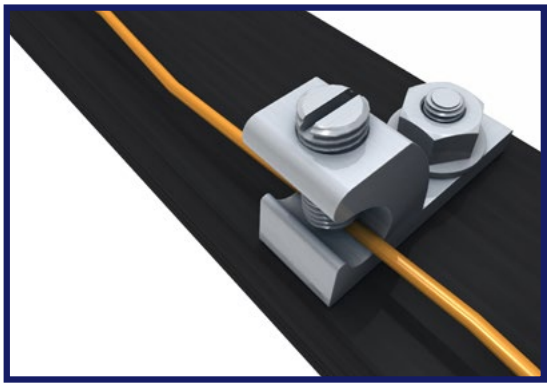
BONDING PATHS

Bonding paths are carried throughout the array in a variety of ways. They are carried module-to-module and module-to-rail through mid clamps, carried at rail-to-rail connections through the splices, and carried row-to-row using module jumpers or grounding lugs with bare copper. For easy row to row bonding, EcoFasten recommends using our Module jumper.



GROUNDING

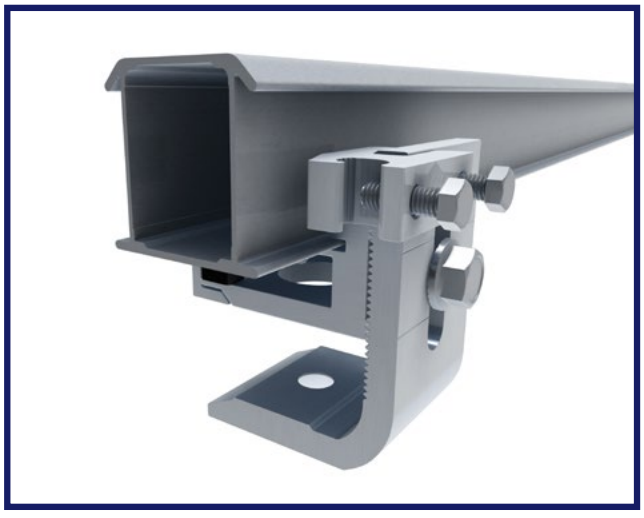




NECESSARY COMPONENTS

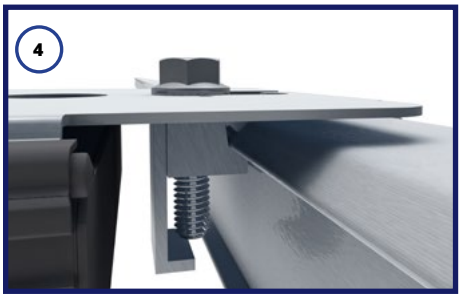
One of the following grounding lugs (or any UL 2703 Compliant ground Lug):

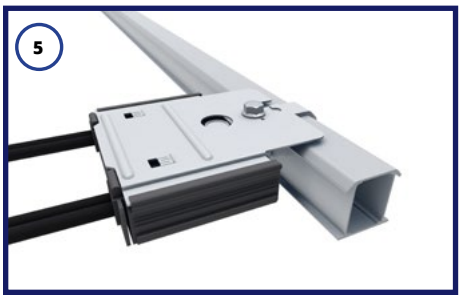
- BurndyCL50-1TN Ground Lug
  (UL 2703 - E3514343 / UL 467-E9999)
- ILSCO SGB-4 Ground Lug
  (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-4DBT
  (UL 2703 - E354420 / UL467 - E34440)
- ILSCO GBL-4DBTH
  (UL 2703 - E354420 / UL 467 - E34440)
- ILSCO GBL-4SS
  (UL 2703 - E354420 / UL 467 - E34440)



*Equipment grounding wire should be sized in accordance with the National Electrical Code, NFPA70 and a minimum of 1/4" clearance is required between bare copper wires and aluminum components.

MLPE MOUNT INSTALLATION





1. Lower the MLPE Mount to the rail. Tilt and hook the mount around the top “dog ear” of the rail
2. Set the MLPE Mount flush with the top of the rail
3. Slide the microinverter flange between the MLPE Mount and the serrated bolt flange
4. Tighten the bolt to 144 in-lbs
5. Repeat this process for all other microinverter and/or optimizer installations

MLPE MOUNT IS COMPATIBLE WITH THE FOLLOWING MLPE DEVICES:

AP SYSTEMS: DS3, QS1, QT2 and YC600

(Remove star washer prior to installation)

ENPHASE: M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ7, IQ 7A, IQ 7+, IQ7 PD, IQ 7X, Q Aggregator; IQ8-60, IQ8PLUS-72, IQ8A-72, IQ8H-208-72, IQ8H-240-72, IQ8M-72, may be followed by -2-US

HOYMILES: HM-xxxNT where xxx can be 300, 350, 400, 600, 700 and 800

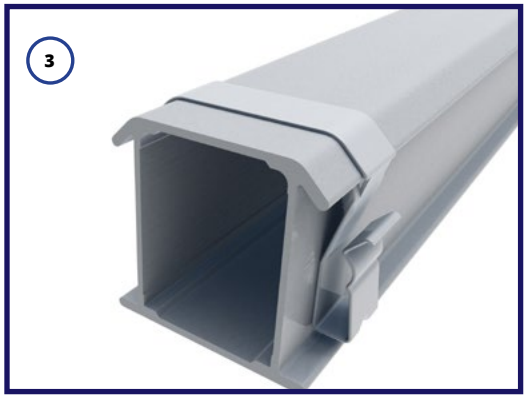
NEP: BDM-300, BDM-300X2, BDM-550, BDM-650 and BDM-800

SOLAREGE: M1600, P300, P320, P340, P370, P400, P401, P405, P485, P505, P600, P700, P730, P750, P800p, P800s, P801, P850, P860, P950, P960, P1100, P1101, S440, S500, S500B, S650B, S1200, S1201

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)

YOTTA: DPI 208/480 (Remove star washer prior to installation)

WIRE CLIP INSTALLATION



1. With the ClickFit Rail in place and the Wire Clip in hand, place the wire end on either side of the rail.

2. With the wire end touching the bottom lip of the rail, roll and click-in the Wire Clip to the opposite end of the rail.

3. You will hear an audible click when the Wire Clip is set in place.

WIRE MANAGEMENT CLAMP

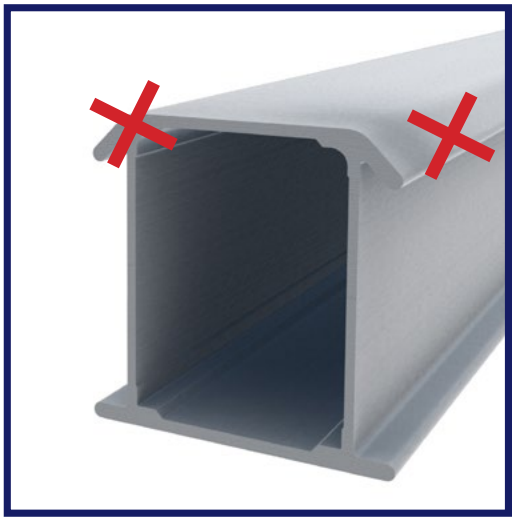
The following components have been tested and evaluated with Ecofasten's ClickFit System. The ratings described in the ClickFit Installation Manual apply when using this component.

WIRE MANAGEMENT CLAMP

The components referenced in this addendum conform to STD UL 2703 (2015) Standard for Safety First Edition: Mounting Systems, Mounting Devices, Clamping/ Retention Devices, and Ground Lugs for Use with Flat-Plate Photovoltaic Modules and Panels.

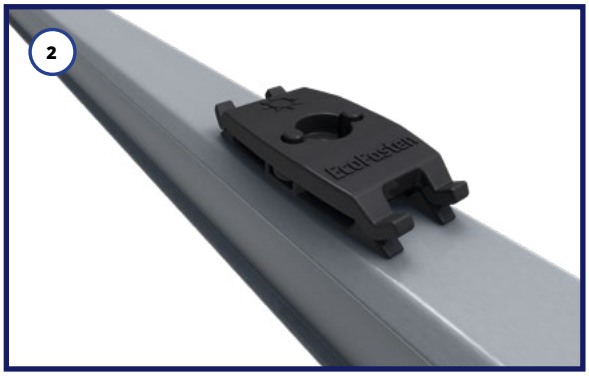
STRIPPING THE SCREWS

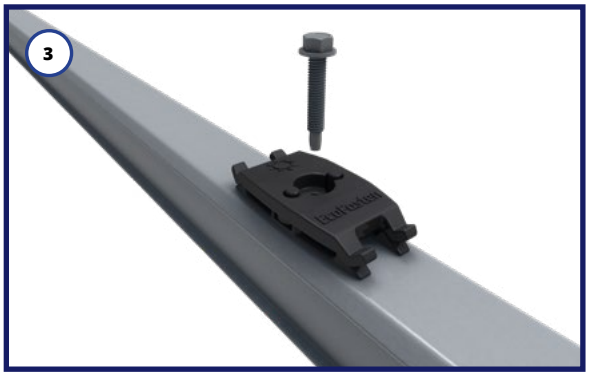
Be careful not to over torque the screws as this will eliminate any amount of downforce on the clamp. In the event of a stripped screw into the rail, back out the screw and drive the screw into a new location on the rail.

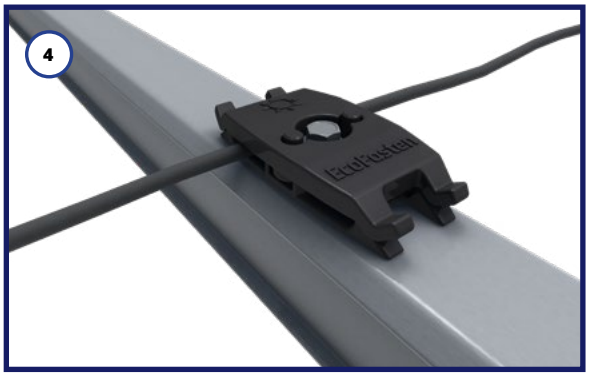


Avoid placing the screw on the dog ears of the rail

INSTALLING WIRE MANAGEMENT CLAMP







1. Collect the screw, top clamp, and bottom clamp from the box and assemble.

   NOTE: The bottom clamp has two vertical columns which help guide and align the top clamp during installation.

2. Once assembled, the clamp can be placed anywhere on the top or side of the rail depending on where wire management is needed.

   OPTION: If desired, PV wires or Trunk cables can be inserted at this time before driving down the screw.

3. Using an 5/16” socket and an impact or drill, drive the self-tapping screw through the assembly and into the ClickFit rail where desired for wire management.

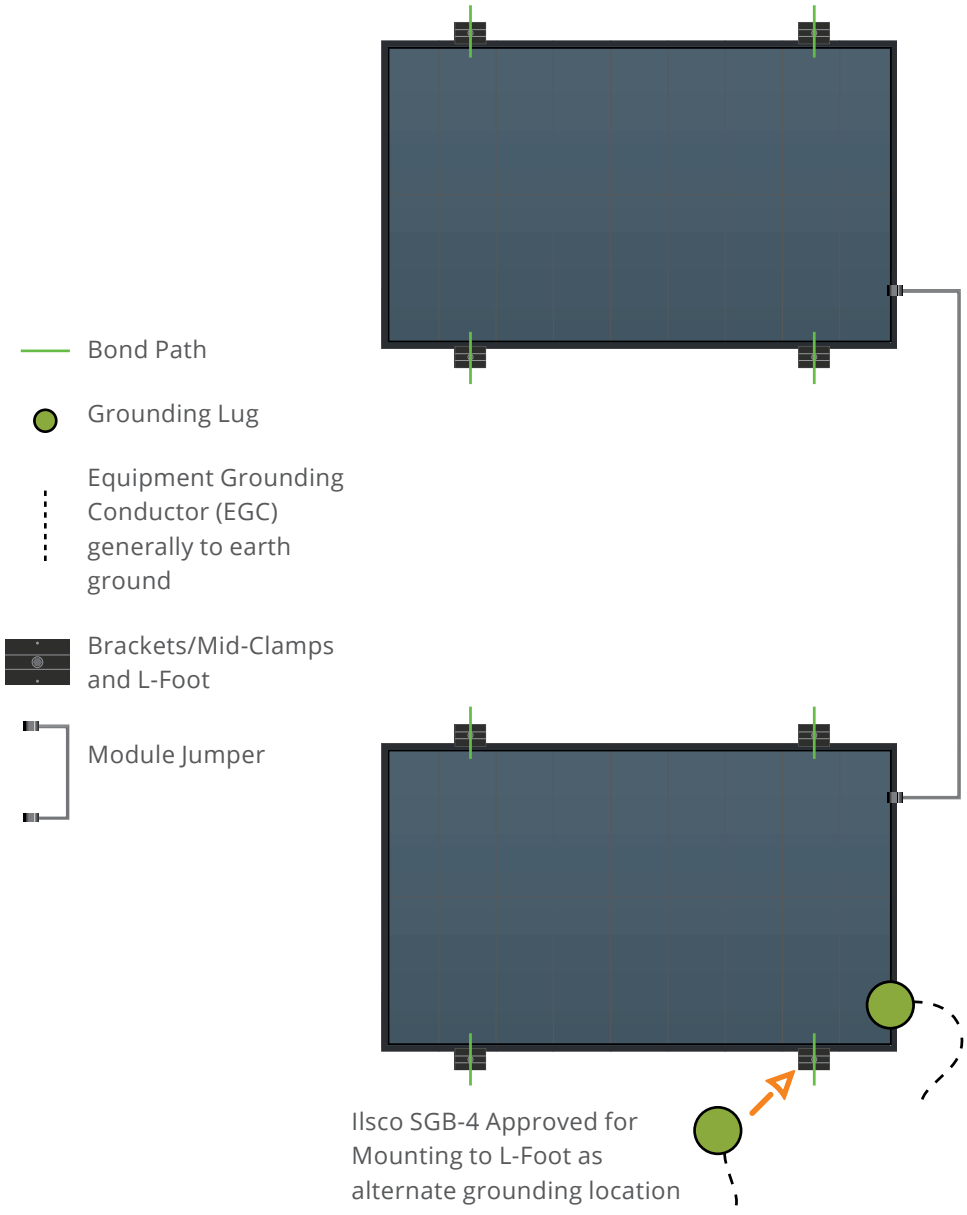
   OPTION: If PV wires or Trunk cables have already been inserted into the clamp assembly, the installation is complete.

4. Insert the PV wires or Trunk cables into the assembly on either side and fully tighten the self-tapping screw making sure not to strip out the screw into the rail. (If screws are over torqued into the rail, see notes on “Stripping the Screws”). Be sure that the clamp is not pinching the wires when fully seated to the rail.

   NOTE: The wire clamp can hold up to 4 PV wires or 2 trunk cables. Although easiest to install the wires after the screw has been slightly inserted into the rail, installers have the flexibility to place wires in the clamp before or after the screw has been drilled through the rail.

MODULE MAINTENANCE AND SERVICING

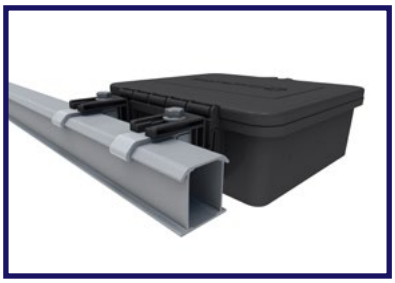
During servicing or maintenance, module removal may disrupt the bonding path and could introduce the risk of electric shock. If module removal is required for servicing, then a Module Jumper shall be installed to the adjacent modules to maintain the bond path. Modules should only be removed by qualified persons in compliance with the instructions in this manual.



JUNCTION BOX INSTALLATION

JUNCTION BOX PREPARATION

Prior to installation, use step drill bit to place pass through holes for conduits or water-tight connectors. Drill bit starter locations are provided on the sides and front of enclosure. Do not install conduit facing up roof.

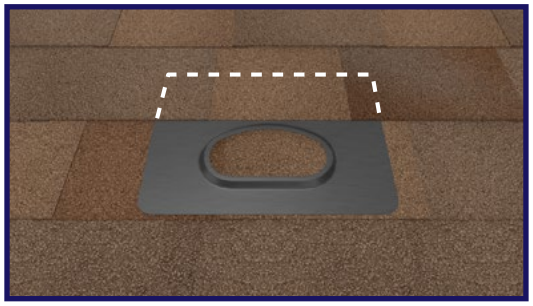


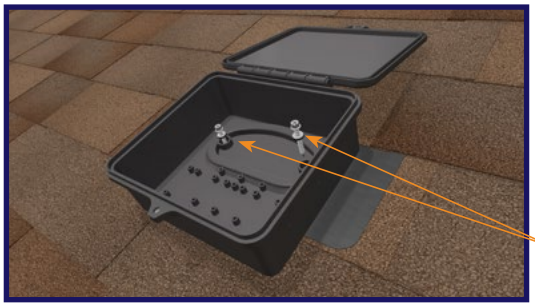
RAIL INSTALLATION

Use rail-specific MLPE mounting hardware to attach Rail Hangers to rail. Ensure junction box is pushed as close to the rail as possible. Torque to 80-in lbs(1/2” or 7/16” socket), do not overtighten.

**If installing in areas with ground snow loads greater than 40 psf, install Junction Box under module directly next to module frame edge.*

JUNCTION BOX INSTALLATION





DECK MOUNTED INSTALLATION

For conduit that will go into the attic, place the box and flashing in a position that avoids rafters and single joints. Slide the flashing under the shingle course and align the bottom of the box with the flashing. an EPDM foam gasket is pre installed to the underside of the junction box to seal the box and flashing together once compressed. no additional sealant is required. secure the supplied (2x) #12x3" deck screws until the junction box is pulled tight to the flashing. Do not over torque screws to avoid stripping the screws in the decking.

**If installing pass through fittings, ensure that the Junction Box and roof deck are both properly prepared. Complete installation process before attaching the Junction box to the deck.*

FINALIZING INSTALLATION

Install wiring, conduit and fittings per NEC requirements and following local AHJ guidance. Using Philips Head Driver tighten the bolt.

For additional details refer to the full Junction Box Installation Manual.

SKIRT INSTALLING (OPTIONAL)

The skirt is designed to give the rows of the array facing the eave of the roof a uniform appearance.

- If the snow load is greater than 20psf in your region two skirt clamps are required per module and skirt coupling must be used. Contact EcoFasten for information on the skirt coupling.
- EcoFasten offers three options for skirts: "**A**", "**B**" and "**C**". "**A**" skirt are design for panel thickness of 35mm and 40mm. "B" Skirt are design for panel thickness of 32mm and 38mm. "**A**" and "**B**" skirt can be identified by their inner channel. "**B**" skirt will have a ribbed inner channel where "**A**" skirts will have a smooth inner channel. "**C**" skirts are only design for 30mm panels and do not have an inner channel and do NOT have an inner channel.

SKIRT COMPONENTS

SKIRT & END CAP

SKIRT CLAMP

INSTALLATION

1. Once the first row of modules is installed (or after the array is complete), located the appropriate skirts and skirt clamps. Our 65" skirts typically cover one landscape module and our 80" and 81" skirts typically cover 2 portrait modules.
2. Place the skirts making sure to align them with the array edge for a clean look. two clamps are needed for each skirt. place the skirt clamp within 10" of the skirt on both ends making sure that the skirt clamp is fully seated on to the module and skirt. Tighten to 12 ft/lbs.
3. With the first skirt in position tap the end cap into the skirt and place the second skirt into the cap as well. The cap will now double as a splice or coupling for proper alignment. Again, place two skirt clamps within 10" of the skirt on both ends.
4. Repeat steps for each skirt.
5. Be sure to install end caps at each end of the array for a clean look.
6. If the skirt needs to be cut for perfect alignment, you may do so using an appropriate tool.

CLAMP PART NUMBERS

END CLAMPS

Frame Thickness	Article Number
30-40 mm	2099039

MID CLAMPS

Frame Thickness	Article Number
30-40 mm	2099022
40-50 mm	2099023

INSTALLER RESPONSIBILITIES

Periodic re-inspection of components shall be performed to verify that there is no corrosion detrimental to system strength and electrical conductivity, no loose bolts, and/or other variables that could compromise array safety. Any corroded or damaged components shall be immediately replaced.

MANUFACTURER	LIST OF UL 2703 APPROVED TYPE 1, 2 & 29 PV MODULES*
SEG Solar	SEG Solar modules with 35 and 40 mm frames SEG-aYY-xxx-ZZ 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-TB, BMB-HV, BMB-TB, BMD-HV
Seraphim USA	Seraphim modules with 35, 40 and 50 mm frames SRP-xxx-YYY-ZZ Where “xxx” is the module power rating; and “YYY” can be 6MA, 6MB, 6PA, 6PB, BMD, 6QA-XX-XX, and 6QB-XX-XX; ZZ is blank, BB or HV
Sharp	Sharp modules with 35 and 40 mm frames NUYYxxx Where “YY” can be SA or SC
Shinsung E&G	Shinsung Modules with 35 mm frames SSVxxx-144MH
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, C+, G, K, L, M, N, T, U or X
Solar4America	Solar4America modules with 30, 35 and 40 mm frames S4Axxx-ZZyyAA Where “ZZ” can be 72 or 108; “yy” can be MH5 or MH10; and “AA” can be blank, BB or SW
Solarever	Solarever modules with 35 mm frames SE-zzz*yy-xxxM-aaa Where “zzz” can be 166 or 182; “yy” can be 83 or 91; and “aaa” can be 108 or 144
Solaria	Solaria modules with 35 and 40 mm frames PowerA-xxxY-ZZ Where “A” can be X or XT, “Y” can be R or C; and “ZZ” can be blank, AC, BD, BX, BY, PD, PL, 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

Enphase IQ Combiner 4/4C

X-IQ-AM1-240-4
X-IQ-AM1-240-4C

X-IQ-AM1-240-4C

X-IQ-AM1-240-4

The **Enphase IQ Combiner 4/4C** with IQ Gateway and integrated LTE-M1 cell modem (included only with IQ Combiner 4C) consolidates interconnection equipment into a single enclosure and streamlines IQ microinverters 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 Gateway for communication and control
- Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), included only with IQ Combiner 4C
- Includes solar shield to match Enphase IQ Battery aesthetics and deflect heat
- Flexible networking supports Wi-Fi, Ethernet, or cellular
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

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

Reliable

- Durable NRTL-certified NEMA type 3R enclosure
- Five-year limited warranty
- Two years labor reimbursement program coverage included for both the IQ Combiner SKU's
- UL listed

UL LISTED

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

ENPHASE

Enphase IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 (X-IQ-AM1-240-4)	IQ Combiner 4 with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes a silver solar shield to match the IQ Battery system and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C (X-IQ-AM1-240-4C)	IQ Combiner 4C with Enphase IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 +/- 0.5%) and consumption monitoring (+/- 2.5%). Includes Enphase Mobile Connect cellular modem (CELLMODEM-M1-06-SP-05), a plug-and-play industrial-grade cell modem 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.) Includes a silver solar shield to match the IQ Battery and IQ System Controller and to deflect heat.
ACCESSORIES AND REPLACEMENT PARTS	(not included, order separately)
Ensemble Communications Kit COMMS-CELLMODEM-M1-06 CELLMODEM-M1-06-SP-05 CELLMODEM-M1-06-AT-05	- Includes COMMS-KIT-01 and CELLMODEM-M1-06-SP-05 with 5-year Sprint data plan for Ensemble sites - 4G based LTE-M1 cellular modem with 5-year Sprint data plan - 4G based LTE-M1 cellular modem with 5-year AT&T data plan
Circuit Breakers BRK-10A-2-240V BRK-15A-2-240V BRK-20A-2P-240V BRK-15A-2P-240V-B BRK-20A-2P-240V-B	Supports Eaton BR210, BR215, BR220, BR230, BR240, BR250, and BR260 circuit breakers. Circuit breaker, 2 pole, 10A, Eaton BR210 Circuit breaker, 2 pole, 15A, Eaton BR215 Circuit breaker, 2 pole, 20A, Eaton BR220 Circuit breaker, 2 pole, 15A, Eaton BR215B with hold down kit support Circuit breaker, 2 pole, 20A, Eaton BR220B with hold down kit support
EPLC-01	Power line carrier (communication bridge pair), quantity - one pair
XA-SOLARSHIELD-ES	Replacement solar shield for IQ Combiner 4/4C
XA-PLUG-120-3	Accessory receptacle for Power Line Carrier in IQ Combiner 4/4C (required for EPLC-01)
XA-ENV-PCBA-3	Replacement IQ Gateway printed circuit board (PCB) for Combiner 4/4C
X-IQ-NA-HD-125A	Hold down kit for Eaton circuit breaker with screws.
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240 VAC, 60 Hz
Eaton BR series busbar rating	125 A
Max. continuous current rating	65 A
Max. continuous current rating (input from PV/storage)	64 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. total branch circuit breaker rating (input)	80A of distributed generation / 95A with IQ Gateway breaker included
IQ Gateway breaker	10A or 15A rating GE/Siemens/Eaton included
Production metering CT	200 A solid core pre-installed and wired to IQ Gateway
Consumption monitoring CT (CT-200-SPLIT)	A pair of 200 A split core current transformers
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 x 49.5 x 16.8 cm (14.75” x 19.5” 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 • 60 A breaker branch input: 4 to 1/0 AWG copper conductors • Main lug combined output: 10 to 2/0 AWG copper conductors • Neutral and ground: 14 to 1/0 copper conductors Always follow local code requirements for conductor sizing.
Altitude	Up to 3000 meters (9,842 feet)
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Enphase Mobile Connect cellular modem is required for all Ensemble installations.
Ethernet	Optional, 802.3, Cat5E (or Cat 6) UTP Ethernet cable (not included)
COMPLIANCE	
Compliance, IQ Combiner	UL 1741, CAN/CSA C22.2 No. 107.1, 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

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