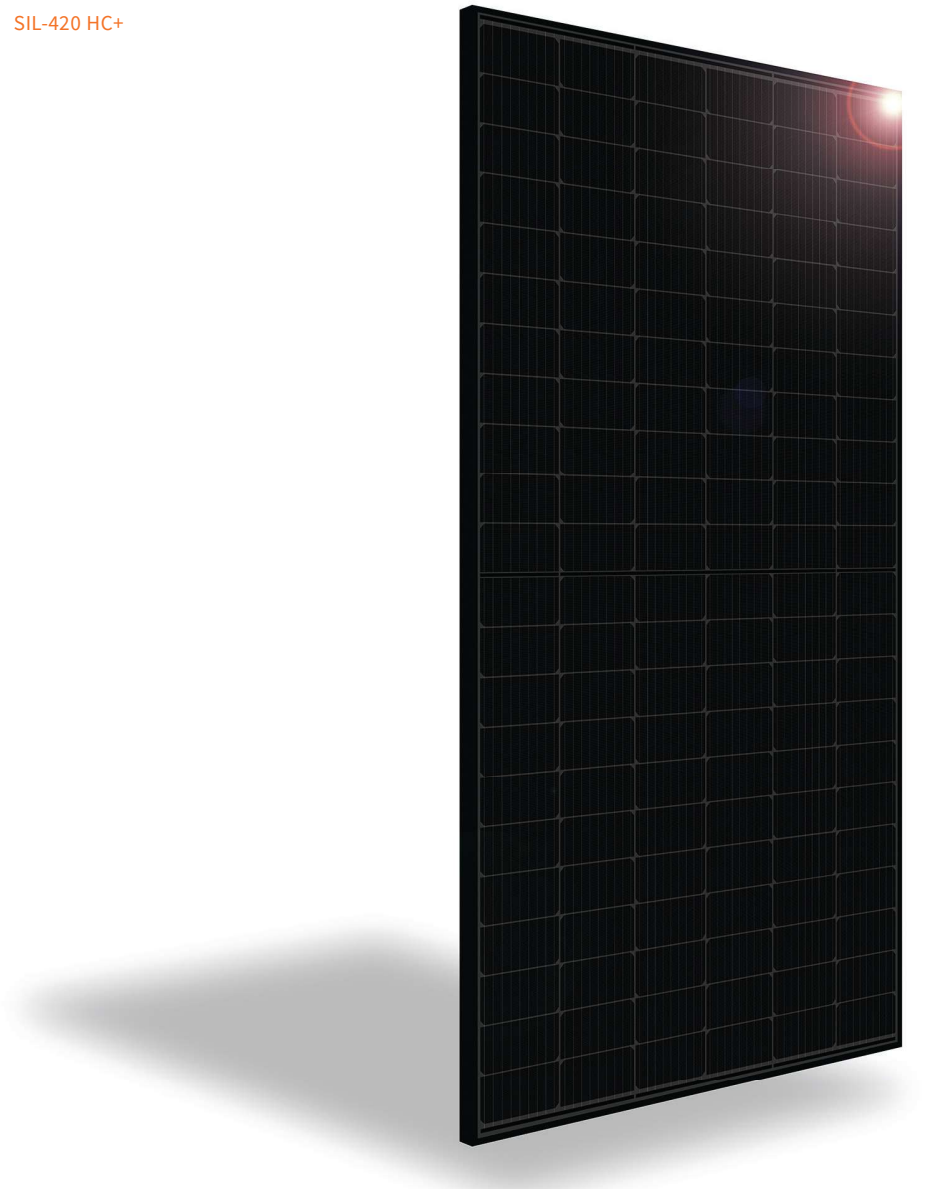
SILFAB PRIME

SIL-420 HC+

SILFAB SOLAR®



RELIABLE ENERGY. DIRECT FROM THE SOURCE.

Designed to outperform.

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

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TOP PERFORMER 2023 PVEL kiwa PV MODULE RELIABILITY SCORECARD

PV MODULE INDEX REPORT 2022 HIGH ACHIEVEMENT IN PERFORMANCE RETC

PROUD PARTNER OF

ION

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CHUBB®

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

ELECTRICAL SPECIFICATIONS		420	
Test Conditions		STC	NOCT
Module Power (Pmax)	Wp	420	313
Maximum power voltage (Vpmax)	V	39.19	36.42
Maximum power current (Ipmax)	A	10.72	8.59
Open circuit voltage (Voc)	V	45.67	42.84
Short circuit current (Isc)	A	11.46	9.24
Module efficiency	%	21.2%	19.7%
Maximum system voltage (VDC)	V	1000	
Series fuse rating	A	20	
Power Tolerance	Wp	±3%	

Measurement conditions: STC 1000 W/m² • AM 1.5 • Temperature 25 °C • NOCT 800 W/m² • AM 1.5 • Measurement uncertainty ≤ 3%
Sun simulator calibration reference modules from Fraunhofer Institute. Electrical characteristics may vary by ±5% and power by ±3%.

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/ft² rear load / 112.8 lb/ft² 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, anti-reflective coating	0.126 in high transmittance, tempered, anti-reflective 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	

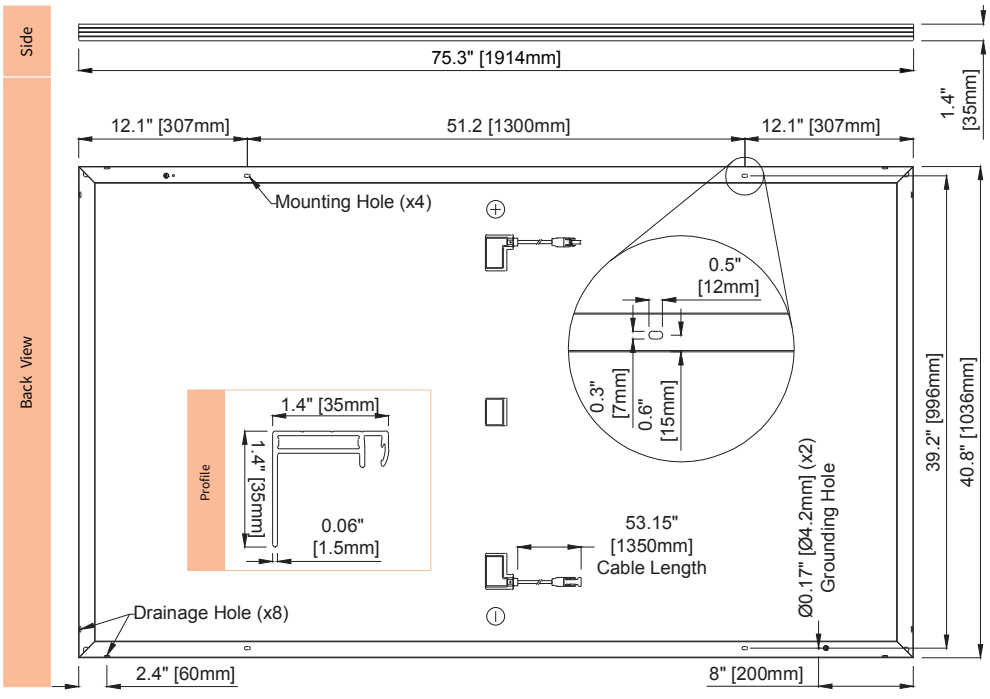
TEMPERATURE RATINGS	
Temperature Coefficient Isc	+0.064 %/°C
Temperature Coefficient Voc	-0.28 %/°C
Temperature Coefficient Pmax	-0.36 %/°C
NOCT (± 2°C)	45 °C
Operating temperature	-40/+85 °C

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), CEC Listing, UL Fire Rating: Type 2
Factory	ISO9001:2015

SHIPPING SPECS	
Modules Per Pallet:	26 or 26 (California)
Pallets Per Truck	32 or 30 (California)
Modules Per Truck	832 or 780 (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 in progress.



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Silfab - SIL-420-HC+-20230726

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 using advanced 55-nm technology with high-speed digital logic and has superfast 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 IQ Battery, 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-and-play MC4 connectors.

UL CERTIFIED SAFETY

IQ8 Series Microinverters are UL Listed as PV rapid shutdown equipment and conform with various regulations, when installed according to the manufacturer's instructions.

*Meets UL 1741 only when installed with IQ System Controller 2.
**IQ8 and IQ8+ support split-phase, 240 V installations only.

Easy to install

- Lightweight and compact with plug-and-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

- Compliant with the latest advanced grid support**
- Remote automatic updates for the latest grid requirements
- Configurable to support a wide range of grid profiles
- Meet CA Rule 21 (UL 1741-SA) and IEEE® 1547:2018 (UL 1741-SB 3rd Ed.)

NOTE:

- IQ8 Microinverters cannot be mixed with previous generations of Enphase microinverters (IQ7 Series, IQ6 Series, and so on) in the same system.
- IQ Gateway is required to change the default grid profile at the time of installation to meet local Authority Having Jurisdiction (AHJ) requirements.

IQ8 and IQ8+ Microinverters

INPUT DATA (DC)	UNITS	IQ8-60-2-US	IQ8PLUS-72-2-US
Commonly used module pairings[1]	W	235–350	235–440
Module compatibility	—	To meet compatibility, PV modules must be within maximum input DC voltage and maximum module I_{sc} listed below. Module compatibility can be checked at https://enphase.com/installers/microinverters/calculator	
MPPT voltage range	V	27–37	27–45
Operating range	V	16–48	16–58
Minimum/Maximum start voltage	V	22/48	22/58
Maximum input DC voltage	V	50	60
Maximum continuous input DC current	A	10	12
Maximum input DC short-circuit current	A	25	
Maximum module I_{sc}	A	20	
Overvoltage class DC port	—	II	
DC port backfeed current	mA	0	
PV array configuration	—	1 × 1 ungrounded array; no additional DC side protection required; AC side protection requires maximum 20 A per branch circuit.	

OUTPUT DATA (AC)	UNITS	IQ8-60-2-US	IQ8PLUS-72-2-US
Peak output power	VA	245	300
Maximum continuous output power	VA	240	290
Nominal grid voltage (L-L)	V	240, split-phase (L-L), 180°	
Minimum and Maximum grid voltage[2]	V	211-264	
Maximum continuous output current	A	1.0	1.21
Nominal frequency	Hz	60	
Extended frequency range	Hz	47–68	
AC short-circuit fault current over three cycles	Arms	2	
Maximum units per 20 A (L-L) branch circuit[3]	—	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	%	97.7	
CEC weighted efficiency	%	97	
Nighttime power consumption	mW	23	**25**

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 (H × W × D)	212 mm (8.3 in) × 175 mm (6.9 in) × 30.2 mm (1.2 in)
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

(1) No enforced DC/AC ratio.
(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.

IQ8 and IQ8+ Microinverters

COMPLIANCE	
Certifications	CA Rule 21 (UL 1741-SA), UL 62109-1, IEEE® 1547:2018 (UL 1741-SB 3rd Ed.), 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 shutdown equipment and conforms with NEC 2014, NEC 2017, NEC 2020, and NEC 2023 section 690.12 and C22.1-2018 Rule 64-218 rapid shutdown of PV Systems, for AC and DC conductors, when installed according to the manufacturer's instructions.

IQ8 and IQ8+ Microinverters

Revision history

REVISION	DATE	DESCRIPTION
DSH-00207-2.0	October 2023	Included NEC 2023 specification in the Compliance section
DSH-00207-1.0	September 2023	Updated module compatibility specification

IQ Combiner 4/4C

X-IQ-AM1-240-4C
X2-IQ-AM1-240-4C (IEEE 1547:2018)

X-IQ-AM1-240-4
X2-IQ-AM1-240-4 (IEEE 1547:2018)

The **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. It 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 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
- Supports Wi-Fi, Ethernet, or cellular connectivity
- Optional AC receptacle available for PLC bridge
- Provides production metering and consumption monitoring

Simple

- Mounts on single stud with centered brackets
- Supports bottom, back and side conduit entry
- Allows up to four 2-pole branch circuits for 240VAC 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
- X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C comply with IEEE 1547:2018 (UL 1741-SB, 3rd Ed.)

UL LISTED

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

ENPHASE

IQ Combiner 4/4C

MODEL NUMBER	
IQ Combiner 4 X-IQ-AM1-240-4 X2-IQ-AM1-240-4 (IEEE 1547:2018)	IQ Combiner 4 with 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 and IQ System Controller 2 and to deflect heat.
IQ Combiner 4C X-IQ-AM1-240-4C X2-IQ-AM1-240-4C (IEEE 1547:2018)	IQ Combiner 4C with IQ Gateway printed circuit board for integrated revenue grade PV production metering (ANSI C12.20 ± 0.5%) and consumption monitoring (± 2.5%). Includes 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)	
Supported microinverters	IQ6, IQ7, and IQ8. (Do not mix IQ6/7 Microinverters with IQ8)
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 - 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
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)
X-IQ-NA-HD-125A	Hold-down kit for Eaton circuit breaker with screws
Consumption monitoring CT (CT-200-SPLIT/CT-200-CLAMP)	A pair of 200A split core current transformers

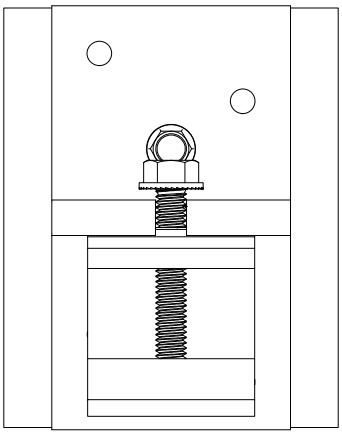
ELECTRICAL SPECIFICATIONS	
Rating	Continuous duty
System voltage	120/240VAC, 60 Hz
Eaton BR series busbar rating	125A
Max. continuous current rating	65A
Max. continuous current rating (input from PV/storage)	64A
Max. fuse/circuit rating (output)	90A
Branch circuits (solar and/or storage)	Up to four 2-pole 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	200A solid core pre-installed and wired to IQ Gateway

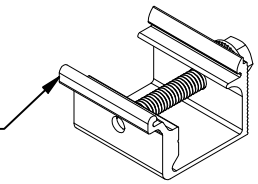
MECHANICAL DATA	
Dimensions (WxHxD)	37.5 cm x 49.5 cm x 16.8 cm (14.75 in x 19.5 in x 6.63 in). Height is 53.5 cm (21.06 in) with mounting brackets.
Weight	7.5 kg (16.5 lbs)
Ambient temperature range	-40°C to +46°C (-40°F to 115°F)
Cooling	Natural convection, plus heat shield
Enclosure environmental rating	Outdoor, NRTL-certified, NEMA type 3R, polycarbonate construction
Wire sizes	• 20A to 50A breaker inputs: 14 to 4 AWG copper conductors • 60A 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 3,000 meters (9,842 feet)

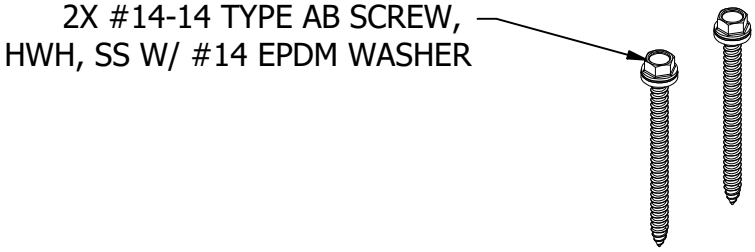
INTERNET CONNECTION OPTIONS	
Integrated Wi-Fi	IEEE 802.11b/g/n
Cellular	CELLMODEM-M1-06-SP-05, CELLMODEM-M1-06-AT-05 (4G based LTE-M1 cellular modem). Note that an Mobile Connect cellular modem is required for all Enphase Energy System installations.
Ethernet	Optional, IEEE 802.3, Cat5E (or Cat6) UTP Ethernet cable (not included)

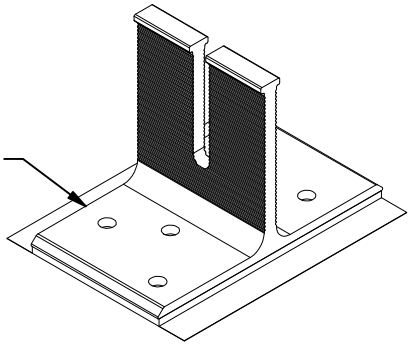
COMPLIANCE	
Compliance, IQ Combiner	CA Rule 21 (UL 1741-SA) IEEE 1547:2018 - UL 1741-SB, 3rd Ed. (X2-IQ-AM1-240-4 and X2-IQ-AM1-240-4C) CAN/CSA C22.2 No. 107.1, Title 47 CFR, Part 15, Class B, ICES 003 Production metering: ANSI C12.20 accuracy class 0.5 (PV production) Consumption metering: accuracy class 2.5
Compliance, IQ Gateway	UL 60601-1/CANCSA 22.2 No. 61010-1

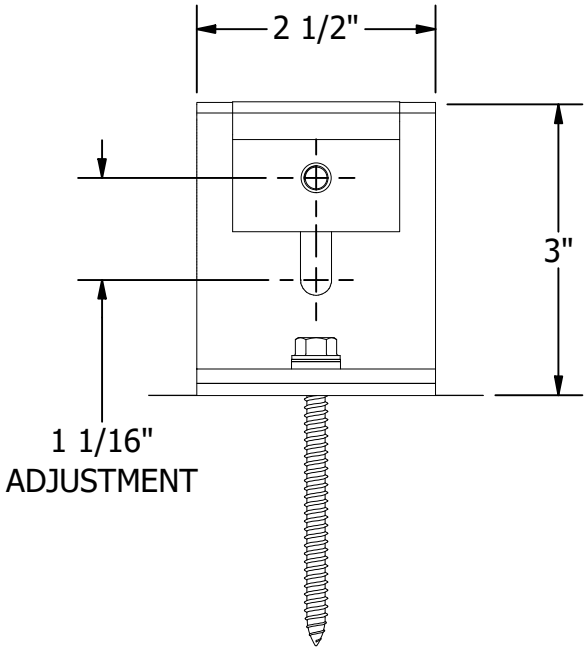
PART # TABLE	
P/N	DESCRIPTION
SHBUTYLM2	STRONGHOLD BUTYL ATT KIT #14S MILL
SHBUTYLD2	STRONGHOLD BUTYL ATT KIT #14S DARK

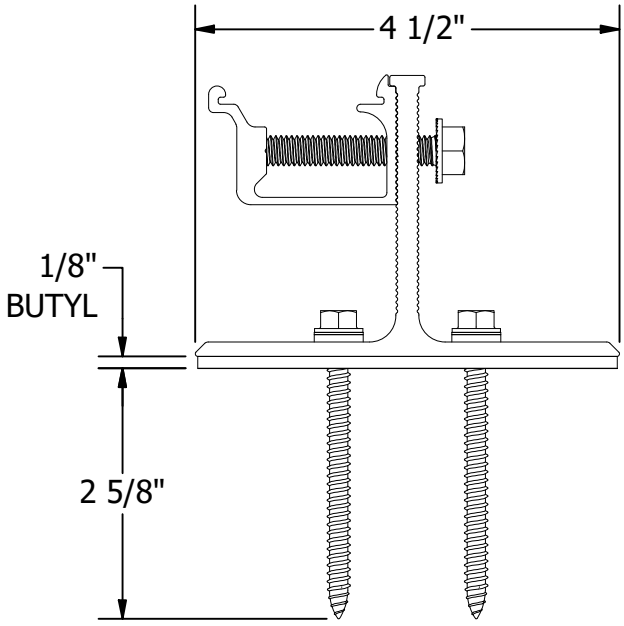












UNIRAC
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ALBUQUERQUE, NM 87102 USA
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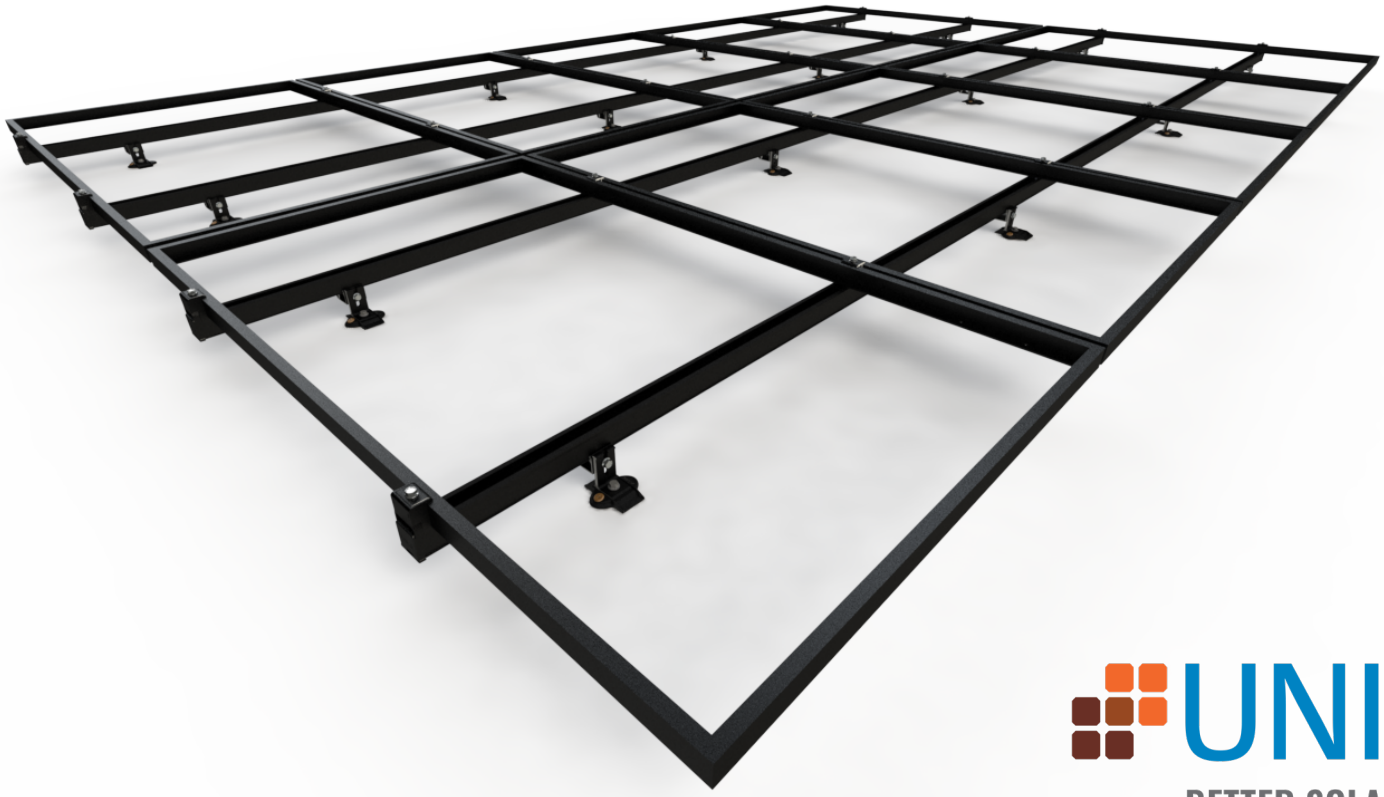
PRODUCT LINE:	NXT UMOUNT
DRAWING TYPE:	PARTS
DESCRIPTION:	SH BUTYL ATTACHMENT
REVISION DATE:	7/14/2023

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE NOMINAL

NU-A10-1
SHEET

NXT UMOUNT™ INSTALLATION GUIDE



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BETTER SOLAR STARTS HERE

UNIRAC Code-Compliant Installation Manual

UNIRAC welcomes input concerning the accuracy and user-friendliness of this publication. Please write to publications@unirac.com.

PUB2024JAN17

NXT UMOUNT™ INSTALLATION GUIDE

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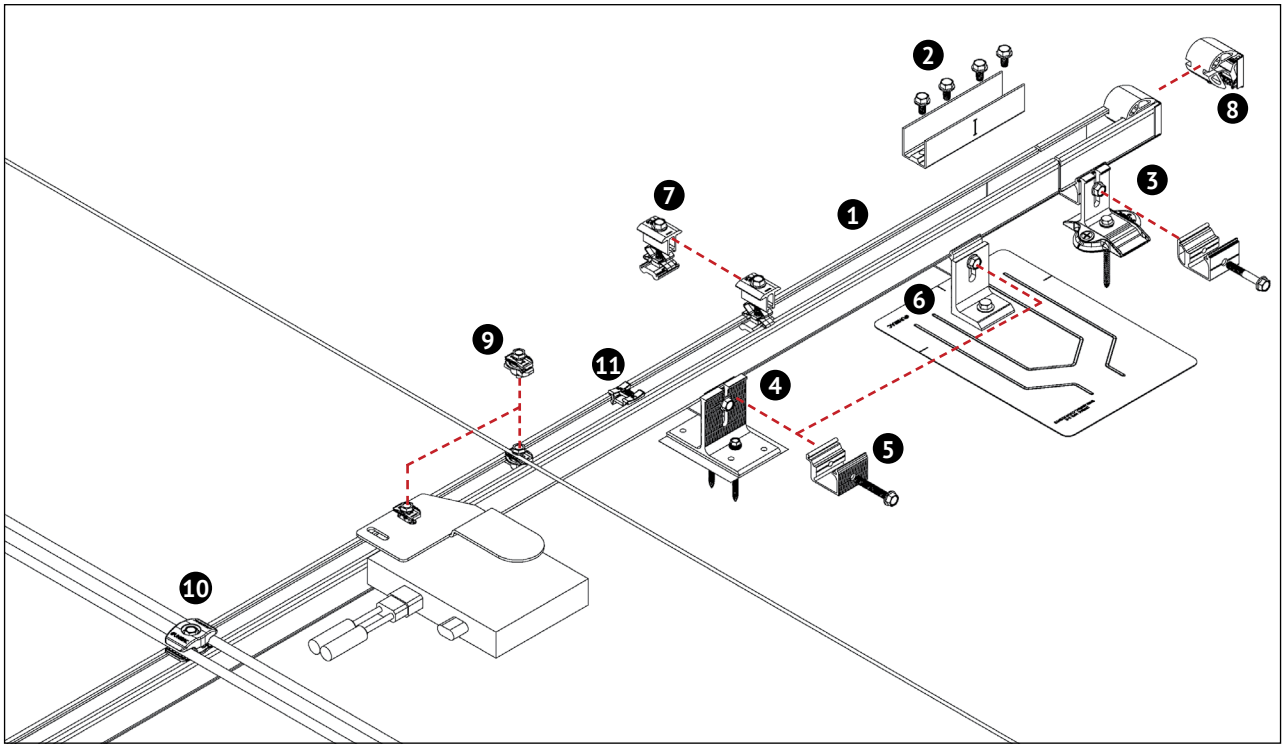


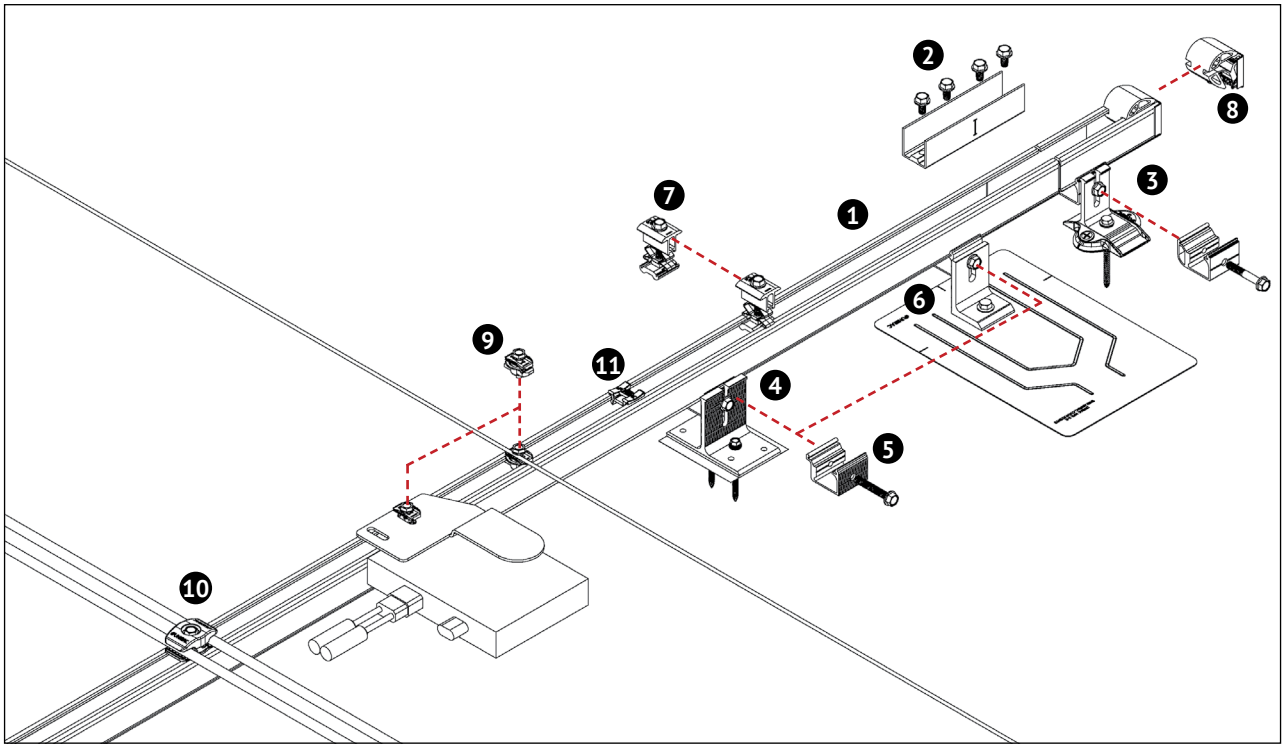
1. **RAIL**: Supports PV modules with built-in wire management. Use at least two rails per row of modules. Aluminum extrusion, available in mill, or dark anodized.
2. **RAIL SPLICE**: Internal Structural Splice joins, aligns, and electrically bonds rail sections into single length of rail. 6 inches long aluminum splice, pre-assembled with stainless-steel hardware.
3. **STRONGHOLD ATTACHMENT KIT**: Use to secure rails through roofing material to building structure. Supplied with the following:
   - **STRONGHOLD RAIL CLAMP**: Use to secure rails to L-feet. Pre-assembled aluminum clamp with stainless-steel bolt.
   - **STRONGHOLD Attachment Base**: Pre-assembled aluminum L-Foot with engineered roof seal.
   - **4" STAINLESS-STEEL LAG BOLT** with sealing EPDM washer.
   - **UNIRAC PROVIDED SEALANT** (if applicable)
4. **STRONGHOLD BUTYL ATTACHMENT KIT**: Use to secure rails through roofing material to building structure. Supplied with the following:
   - **STRONGHOLD RAIL CLAMP FOR BUTYL ATTACHMENT**: Use to secure rails to L-feet. Pre-assembled aluminum clamp with stainless steel bolt.
   - **STRONGHOLD ATTACHMENT WITH BUTYL BASE**: Pre-assembled aluminum attachment with butyl pad.
   - (2) 3" Screw, HWH, SS, #14-14, TYPE AB, W/#14 EPDM washer;
5. **STRONGHOLD RAIL CLAMP**: Use to secure rails to roof attachment. It is also available without the attachment kit for use with other mounting methods (Solarhooks, tilt legs, etc.)

⚠ CAUTION

Any components showing signs of damage that compromise safety shall be replaced immediately.

NOTE:

- **Extra butyl pad available as separate SKU**
- **Additional deck screws are available as separate SKU**



Wrenches and Torque

Component	Wrench or Socket Size	Recommended Torque (ft-lbs.)
Rail Splice ❷	1/2"	15
Stronghold Rail Clamp ❺	1/2"	20
Combo Mid-End Clamp ❼	1/2"	15
Hidden End Clamp ❽	1/2"	15
MLPE & Grounding Lug ❾	1/2"	10
NS Wire Management Clip ⓫	1/2"	3-7
Stronghold Attachment #14 Screw	3/8"	#N/A

❻ **FLASHKIT PRO**: Use with Stronghold Rail Clamp to secure rail through roofing material to building structure. Aluminum L-foot with EPDM grommet, aluminum flashing, and stainless-steel lag bolt

❼ **COMBO CLAMP**: Use as a mid clamp or an end clamp to secure and electrically bond modules to rails. Aluminum clamp with stainless-steel bonding pins, stainless-steel hex bolt, and plastic spring clip. Available in clear or dark finish.

❽ **HIDDEN END CLAMP KIT**: Used as an end clamp to secure the modules to rails. The aluminum clamp is assembled with a stainless steel hex bolt, and a plastic end cap using a twist tie.

❾ **MLPE AND GROUNDING LUG**: Use to secure MLPE devices and ground wires to rails. Pre-assembled T-nut with stainless-steel bolt, stainless-steel grounding plate, and plastic retention clip.

❿ **NS WIRE MANAGEMENT CLIP**: Pre-assembled clamp to secure wires between rails.

⓫ **WIRE MANAGEMENT CLIP:** Tool-less snap-in rail clip used to retain wires in rail or to secure wires between rails when used with a wire tie.

⚠ CAUTION

Any components showing signs of damage that compromise safety shall be replaced immediately.

PART	DESCRIPTION	PART NUMBER
RAIL	NXT UMOUNT RAIL - 168" MILL	168RLM1
	NXT UMOUNT RAIL - 168" DARK	168RLD1
RAIL SPLICE	NXT UMOUNT RAIL SPLICE	RLSPLCM2
STRONGHOLD ATTACHMENT KIT	STRONGHOLD ATT KIT COMP MILL	SHCPKTM1
	STRONGHOLD ATT KIT COMP DRK	SHCPKTD1
STRONGHOLD RAIL CLAMP	STRONGHOLD RAIL CLAMP MILL	SHCLMPM2
	STRONGHOLD RAIL CLAMP DRK	SHCLMPD2
STRONGHOLD BUTYL ATTACHMENT KIT	STRONGHOLD BUTYL ATT KIT #14S MILL	SHBUTYLM2
	STRONGHOLD BUTYL ATT KIT #14S DARK	SHBUTYLD2
FLASHKIT PRO	FLASHKIT PRO, DRK 10PK	004055D
	FLASHKIT PRO, MILL 10PK	004055M
COMBO CLAMP	NXT UMOUNT COMBO CLAMP - MILL	CCLAMPM1
	NXT UMOUNT COMBO CLAMP - DARK	CCLAMPD1
HIDDEN END CLAMP KIT	NXT HIDDEN END CLAMP W/ CAP	NUHECLMP1
MLPE AND GROUNDING LUG	NXT UMOUNT MLPE & GROUNDING LUG	NULGMLP1
NS WIRE MANAGEMENT CLIP	NXT UMOUNT NS WIRE MGMT CLIP	WRMCNSD1
WIRE MANAGEMENT CLIP	NXT UMOUNT WIRE MGMT CLIP	WRMCLPD1
N-S BONDING CLAMP	MODULE-TO-MODULE N-S BONDING CLAMP	008000U
WIRE BONDING CLIP W/ 8AWG	WIRE BONDING CLIP W/ 8AWG	008015S
EXTRA BUTYL PATCHES	EXTRA BUTYL PAD - SH, KIT	XTRABUTL-SH
DIRECT-TO-DECK SCREWS	#14-14 x 3.0 TYPE AB	003251W

PLANNING YOUR NXT UMOUNT INSTALLATIONS

The installation can be laid out with rails parallel to the rafters or perpendicular to the rafters. Note that NXT UMOUNT rails make excellent straight edges for doing layouts.

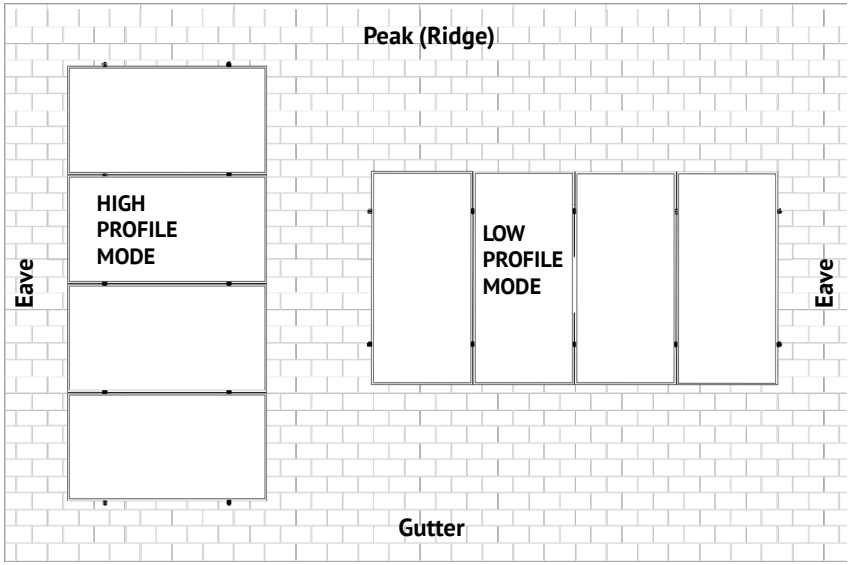
Center the installation area over the structural members as much as possible. Leave enough room to safely move around the array during installation. Some building codes and fire codes require minimum clearances around such installations, and the installer should check local building code requirements for compliance.

The length of the installation area is equal to:

- the total width of the modules,
- plus 1/2" for each space between modules (for mid- clamp),
- plus 2" minimum (1" minimum for each MODULE END) (This will not be included when we use the hidden end clamp.)

LAYING OUT ROOF ATTACHMENTS

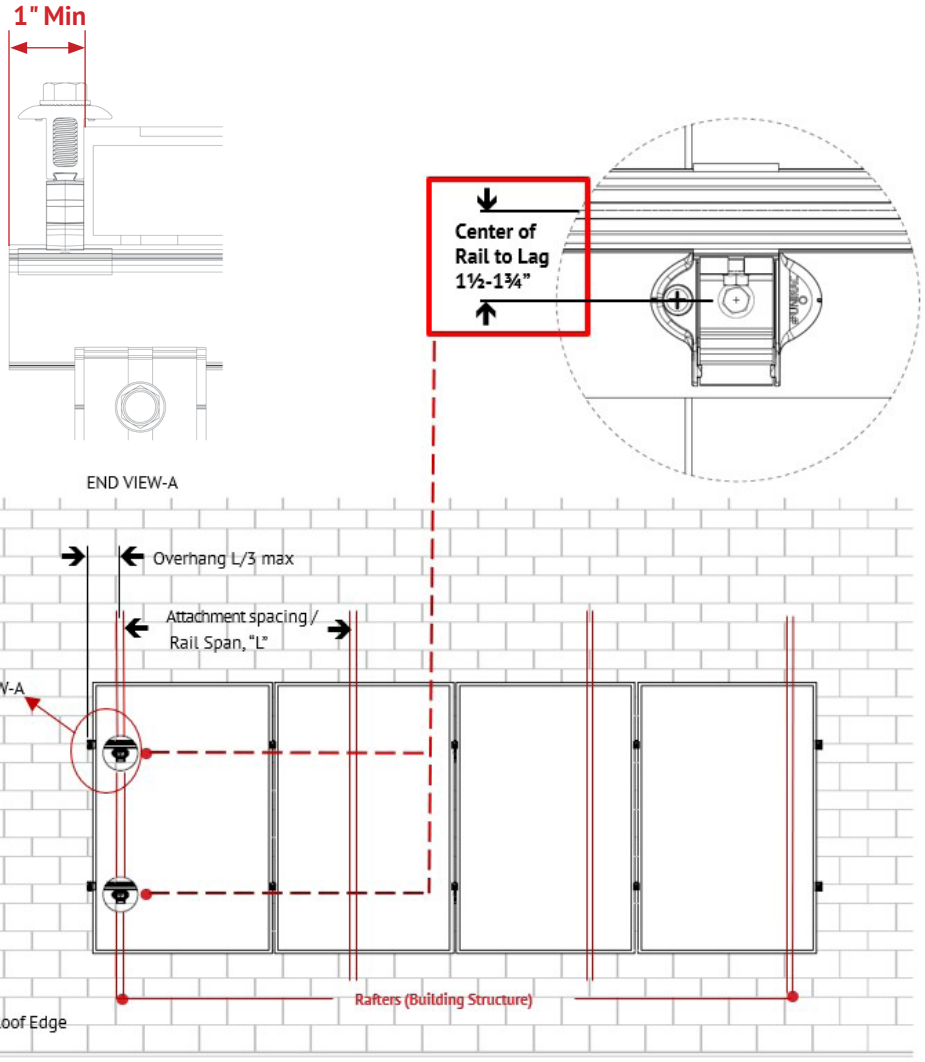
Locate and mark the position of the roof attachment within the installation area. Refer to Unirac NXT UMOUNT D&E Guide & U-Builder for rail spans and cantilevers. Follow module manufacturer installation requirements allowable spacing based on appropriate mounting locations. Modules should be placed such that they overhang the rails symmetrically.



NXT Rail Splices are fully structural and do not interfere with roof attachments or Combo Clamps. There is no need to determine splice locations at this stage.

⚠ CAUTION

Rail lengths and locations of L-feet for expansion joints will need to be determined at this stage in planning the array layout. For expansion joint requirements, See Page 5.

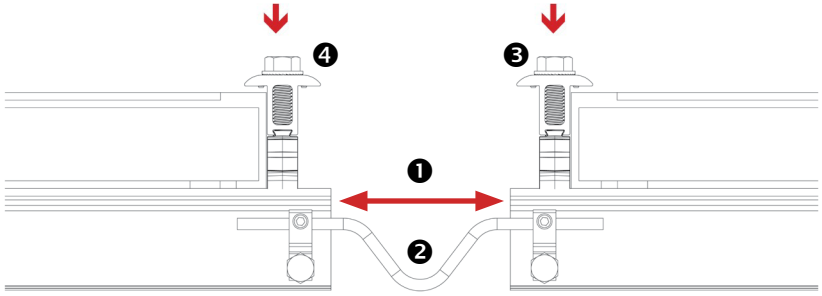


EXPANSION JOINT USED AS THERMAL BREAK

Expansion joints prevent buckling of rails or system connection failure due to thermal expansion. Determine location of expansion joints prior to installation of roof attachments and rails. To create a thermal expansion joint, provide a sufficient gap between rails for proper installation of end clamps and tooling to achieve required torque. A thermal break is required when a continuous length of spliced rails exceeds the maximum allowable lengths shown in the table to the right. For additional concerns on thermal breaks in your specific project, please consult a licensed structural engineer.

Rails in expansion joint configurations are considered cantilevered and must follow the cantilever rule on both sides of the expansion joint, which states that the maximum amount of rail that can be cantilevered is 1/3 the respective adjacent span. An expansion joint must not be spanned by a PV module. Installing a module over an expansion joint would defeat the goal of a thermal break and could result in damage to the array.

Bonding connection for splice used as a thermal break. Option shown uses two Ilsco lugs (Model No. GBL-4DBT P/N GBL-4DBT - see product data sheet for more details) and solid copper wire. Optional grounding may be achieved through NXT UMOUNT MLPE & Lug Clamp. See Page 17.



❶ Provide a sufficient gap between rails for proper installation of end clamps and tooling

❷ Connect rails with the bonding wire.

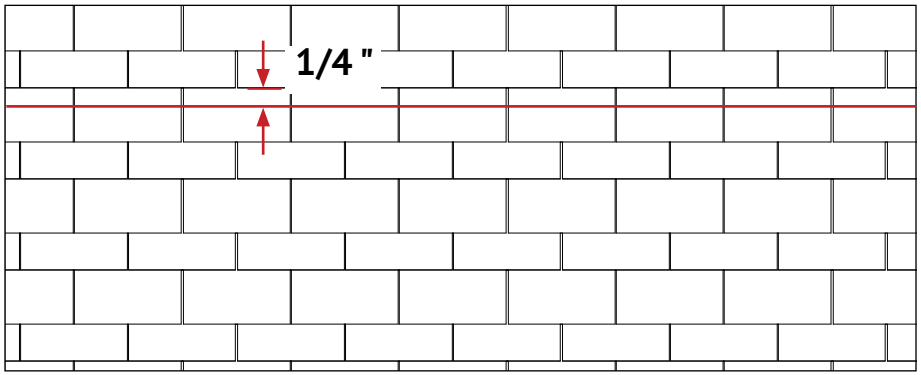
❸, ❹ Install end clamps. **See Page 20.**

	Maximum Continuous Length (ft.) of Spliced rails with Stronghold Attachments							
	FlashKit Attachment Span		Stronghold Attachment Span		Butyl Attachment W/#12 Screw		Butyl Attachment W/#14 Screw	
ΔT (°F)	48”	72”	48”	72”	48”	72”	48”	72”
0-40	100	126	92	114	76	90	84	102
40-50	92	114	84	102	68	78	68	90
50-60	84	102	76	90	60	78	68	78
60-70	76	90	68	78	52	66	60	66
70-80	68	90	60	78	52	60	52	66
80-90	68	78	60	66	44	54	52	60
90-100	60	78	52	64	44	48	52	54
100-120	60	66	52	53	40	40	44	45
120-140	52	57	44	45	34	34	36	39

The values displayed are the maximum allowed rail length, in feet, without a thermal break. If your span is less than 48”, refer to the NXT UMOUNT Design & Engineering Guide for max lengths of continuous rail before a thermal break is required.

Determine the maximum rail temperature difference (ΔT) between the time of installation and the extreme high or low temperature. The Extreme Annual Design Conditions table at the following URL can be used as a reference when determining ΔT. ***http://ashrae-meteo.info/***. The installer is responsible for determining the maximum temperature difference (ΔT) used to establish the maximum rail length.

As spans increase, so does the maximum reaction force that the rail exerts on the L-foot. Ensuring that the Maximum Reaction Forces do not exceed the shear capacity of the roof connection. See NXT UMOUNT Design & Engineering Guide for corresponding reaction forces.



MARK ARRAY LOCATION:
Clean roof surface of dirt, debris, snow, and ice. Mark array location and determine roof attachment locations based on array layout. Snap chalk lines to mark each row of roof attachment points. On shingle roofs, snap lines 1/4" below upslope edge of shingle course. Locate rafters and mark at intersection of attachment lines. Attachment spacing determined per Design and Engineering Guide or project specific U-Builder Engineering Report .

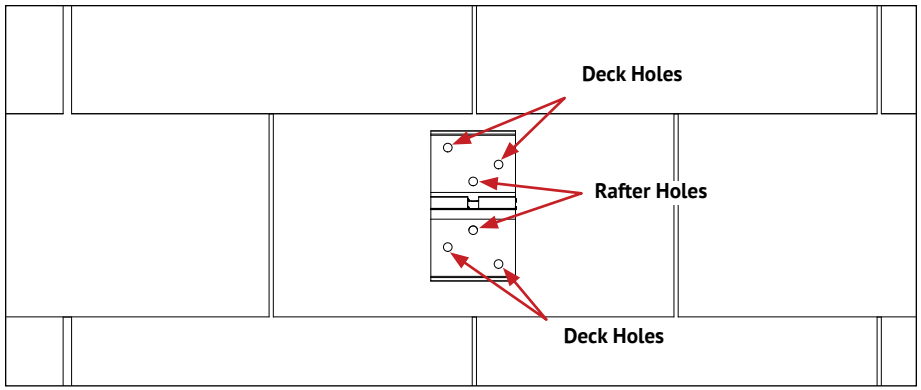
PRO TIP
Install the attachment within 1/4" of the chalkline to allow the rail to slide freely in the rail clamp.

⚠ WARNING

- **To maintain butyl flashing performance, Unirac does not recommend installing when ambient and/or roof temperatures are below 5°F or above 180°F.**
- **Stronghold Butyl must be installed on a clean, dry surface to ensure flashing integrity.**

NOTE:

- Stronghold Butyl is designed for use on Asphalt Shingle, Rolled Comp, EPDM, TPO, Polyethylene, Polypropylene, ABS, and Metal Roofs (including Galvalume, painted steel, and galvanized).
- Pilot holes are not necessary to be drilled for self-drilling screws. If holes are drilled to identify the rafter, they should be backfilled with sealant before installing the attachment.
- Stronghold Butyl attachments are designed for slopes ranging from 0 to 90-degrees. For installations over 45-degrees, contact Unirac engineering for design guidance.



PLACING STRONGHOLD ATTACHMENT WITH BUTYL BASE:
Identify the position of the attachment to install before peeling the release paper.
Ensure that the attachment lands on a flat surface. If the surface at the location of the attachment is uneven, add butyl patches to flatten the surface.

Note:

- Use rafter holes to install attachment on the rafter.
- Use all six holes to install attachment on the deck.

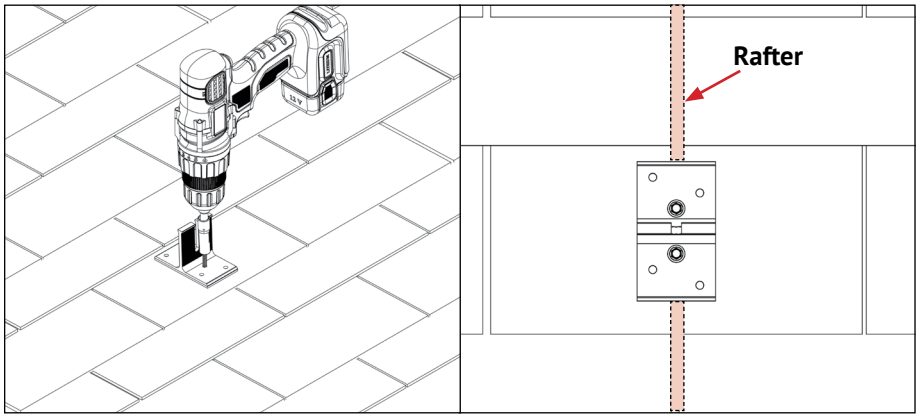
⚠ CAUTION

Do not peel the release paper from the butyl on attachment before identifying the position of attachment to install.

⚠ WARNING

Installing attachment on uneven surfaces, shingle gaps or overlaps, creates a risk for water leakage due to gap created between the adhesive and roof surface.

Note:
See Page 9 for instructions on placing extra butyl pads or contact Unirac team for further information.



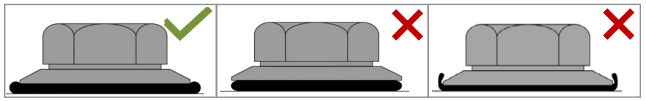
INSTALLING STRONGHOLD ATTACHMENT WITH BUTYL BASE TO RAFTER:
Peel-off the release paper from the underside of the attachment and place stronghold attachment with butyl over rafter location and align edge of mount with horizontal chalk line. Secure mount with the two (2) provided rafter screws in the rafter holes of the attachment.

Note:
Ensure to use drill extension or deep socket tool for installing rafter screws.

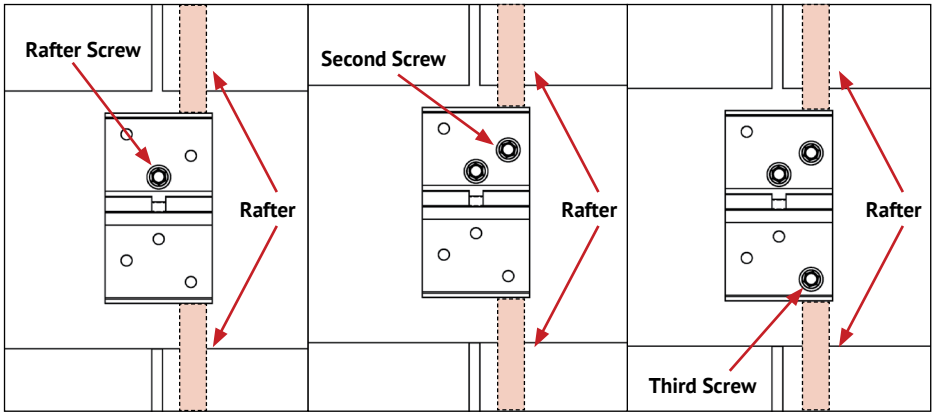
⚠ CAUTION

- **To determine if the screw is engaging the rafter, there should be resistance to driving the screw through the entire length. If the screws do not properly engage the rafter, refer to the pro tip mentioned.**
- **It is recommended to begin installation with the screws on the upslope side of the attachment and continue installing the screws on the downslope side of the attachment for best fit.**

⚠ WARNING

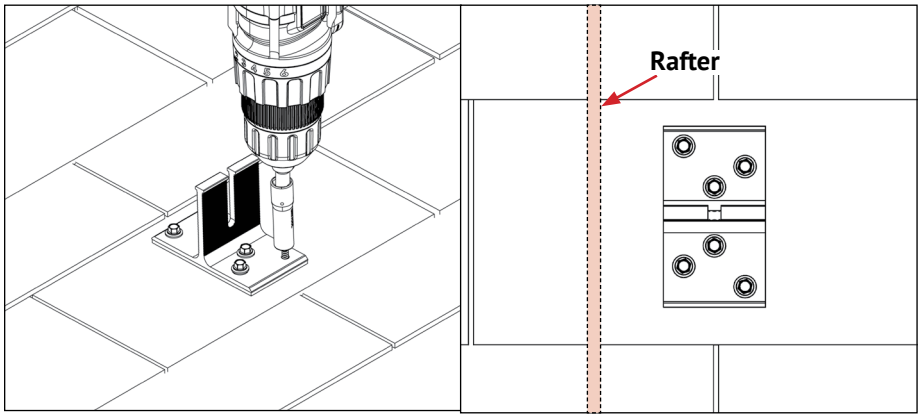


Do not over-torque the structural screw.
When proper torque is applied, the EPDM washer should slightly expand out from the sides as shown in the image.



PRO TIP:
If you miss the rafter while driving the first screw and the rafter is on the edge of the attachment, then follow the steps below:

1. Install a second screw into the adjacent hole that is closest to the rafter center.
2. If the second screw hits the rafter, install the corresponding third screw and complete the installation.
3. If three or more screws miss the rafter, then follow the direct to deck installation procedure and reduce the attachment spans as per Unirac direct-to-deck recommended spans for roof attachment.



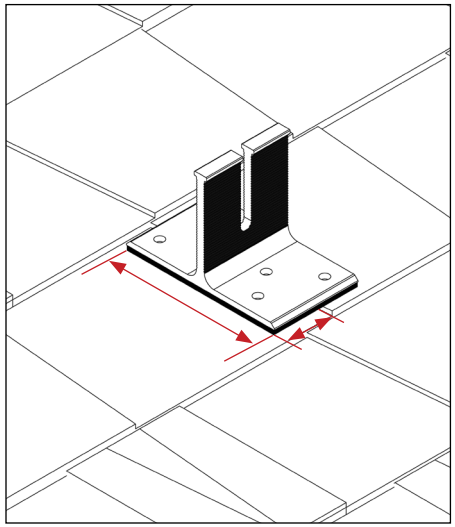
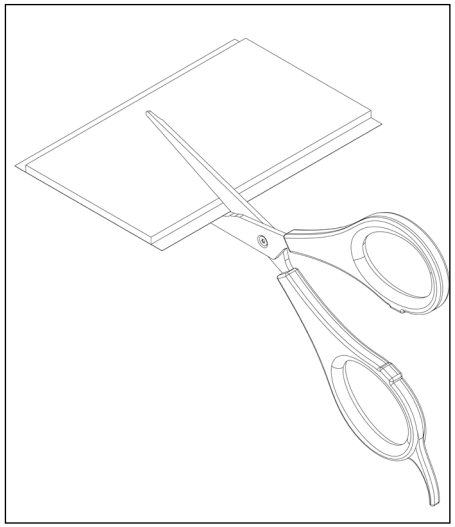
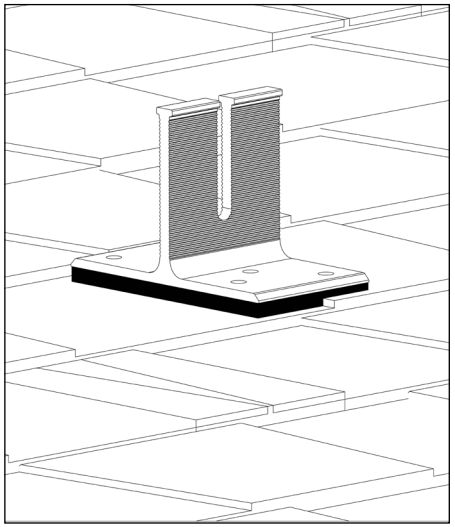
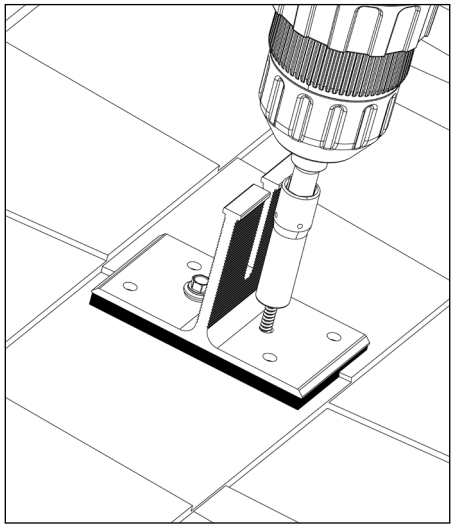
INSTALLING STRONGHOLD ATTACHMENT WITH BUTYL BASE TO DECK:
When installing the attachment to the decking instead of the rafter (direct-to-deck), install 4 additional screws on the remaining screw holes on the attachment

Note:

- **Additional deck screws are NOT included in the KIT. Must be purchased separately.**
- **Maintain stock of additional deck screws from Unirac Kits in case of direct-to-deck installation.**

⚠ CAUTION

1. **Allowable attachment spans may change for direct-to-deck applications.**
2. **Unirac recommended spans are only valid with Unirac supplied screws.**

INSTALLING STRONGHOLD DTD BUTYL ATTACHMENT OVER SHINGLE OVERLAP

If the attachment falls over a shingle overlap, level the surface by following below steps:

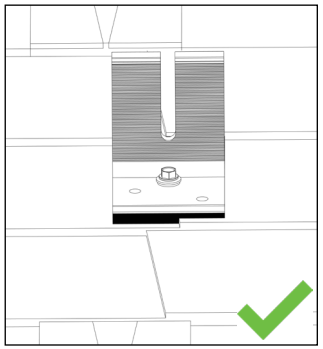
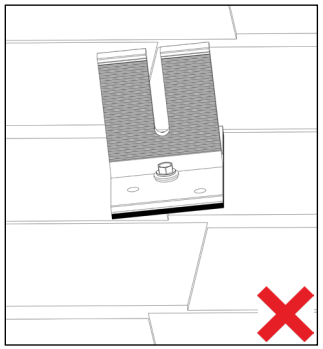
A. Measure the attachment overhang.
B. Cut the butyl pads to required size.
C. Stack extra butyl pad layers as necessary to level the roof and place the attachment.
D. Begin installation with the screws on the upslope side of the attachment and continue to install the screws on the downslope side of the attachment.

PRO TIP

- If the attachments overlap from one shingle course to the next shingle course in a rail-based system, reposition the attachment by moving up or down the shingle course along the same rafter line to avoid butyl layering.
- Additional butyl layering is not required while installing attachment over a gap in the same shingle course

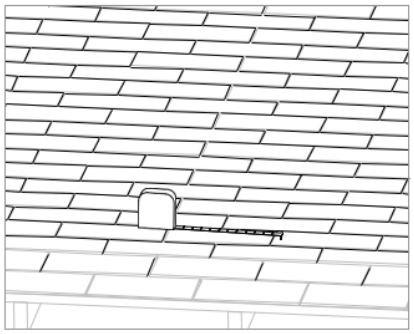
Note:

- **Extra butyl pads are NOT included in the KIT.**
- **Pre-stock with extra butyl pads from Unirac Kits in case installation is required over overlap or gap.**

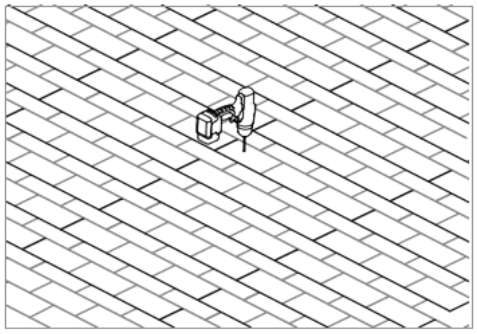



⚠ WARNING

Installing attachment on uneven surfaces, shingle gaps or overlaps, creates a risk for water leakage and rail clamp misalignment due to gap created between the adhesive and roof surface.



MARK ARRAY LOCATION:
Mark array location and determine roof attachment locations based on array layout. Snap chalk lines to mark each row of roof attachment points. On shingle roofs, snap lines 1-3/4" below upslope edge of shingle course. Locate rafters and mark at intersection of attachment lines. Attachment spacing determined per Design and Engineering Guide or project specific U-Builder Engineering Report .

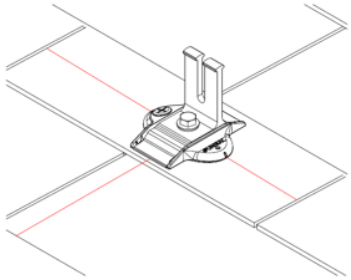


DRILL PILOT HOLES: Drill a 7/32" pilot hole at each roof attachment. Clean roof surface of dirt, debris, snow, and ice. Fill each pilot hole with sealant.

⚠ CAUTION

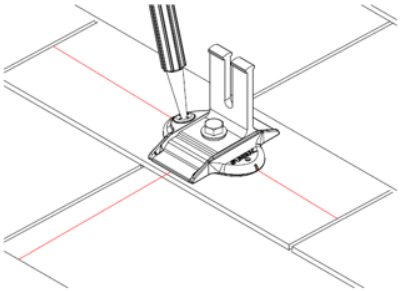
In case of missing a rafter, fill in the pilot hole with sealant.

Pro Tip:
Drill pilot holes within 1/4'" of chalkline to allow rail to slide freely in Rail Clamps. See Page 15.



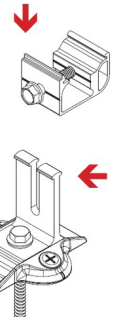
INSTALL STRONGHOLD ATTACHMENT BASE:
Place the Stronghold attachment base assembly over the pilot hole. Align indicator marks of mount with chalk line. Drive lag bolt until mount is held firmly in place. The EPDM washer should compress and expand slightly beyond the outside edge of the steel washer when the proper torque is applied.

Note: Rail clamp can be installed in four orientations. See Page 13 for a detailed view.



SEAL:
Insert tip of UNIRAC provided sealant into port. Inject until sealant exits vent. Follow sealant manufacturer's instructions and cold weather application guidelines, if applicable.

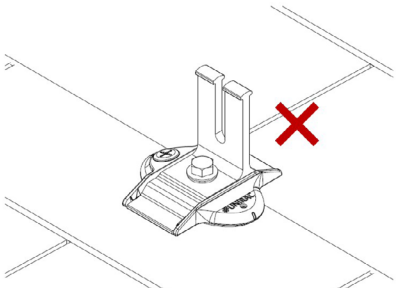
Note:
USE ONLY UNIRAC APPROVED SEALANTS: Chemlink Duralink 50, Chemlink M-1, Geocel 4500, Geocel S-4 or SealBond SB-500. Follow sealant manufacturer's instructions and cold weather application guidelines.



PLACE RAIL CLAMP ONTO L-FOOT:
Drop the rail clamp assembly into the open slot of L-Foot.

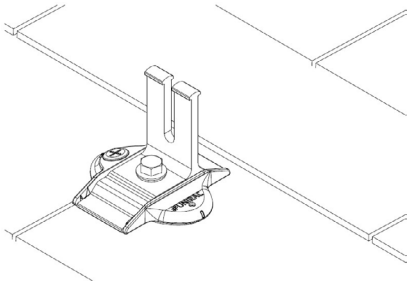
⚠ CAUTION

Do not tighten the rail clamp before putting in the rail.



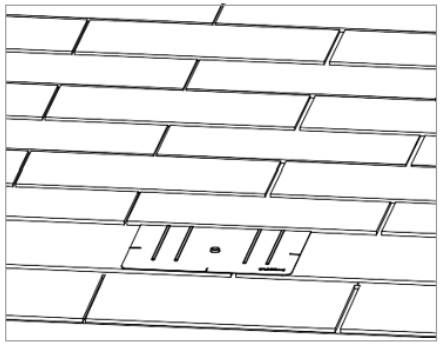
⚠ CAUTION

Avoid installing stronghold attachments across gaps or overlaps in roofing materials that are larger than 1/8 inch.

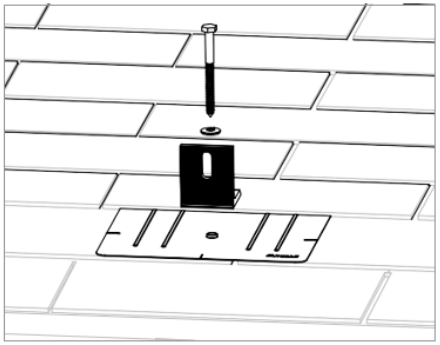


⚠ CAUTION

When installing the stronghold attachment over vertical joints, fill gap/joint with sealant between mount and upslope edge of shingle course.

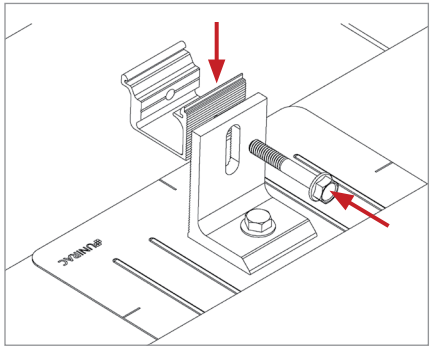


INSTALL FLASHKIT PRO FLASHING: Add a U-shaped bead of roof sealant to the underside of the flashing with the open side of the U pointing down the roof slope. Slide the aluminum flashing underneath the row of shingles directly up slope from the pilot hole as shown. Align the indicator marks on the lower end of the flashing with the chalk lines on the roof to center the raised hole in the flashing over the pilot hole in the roof. When installed correctly, the flashing will extend under the two courses of shingles above the pilot hole.



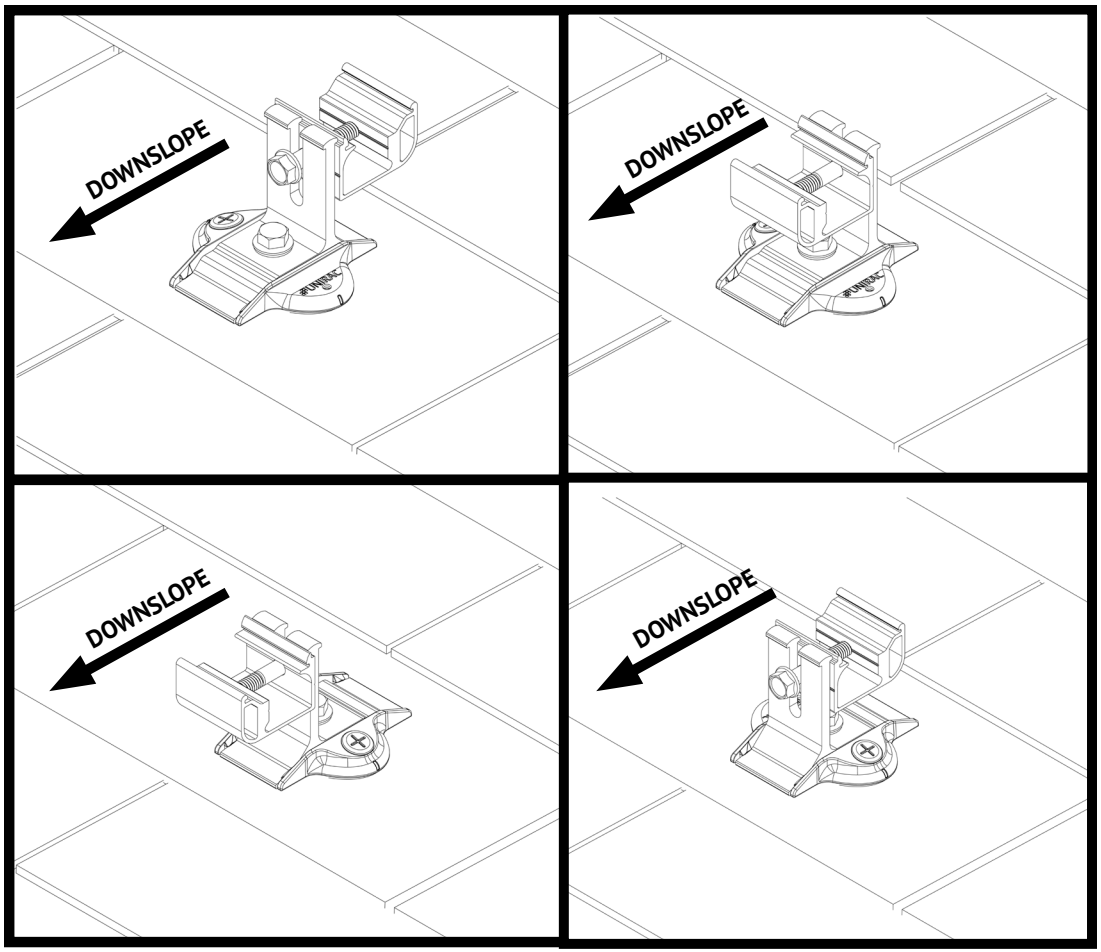
INSTALL L-FOOT: Fasten L-foot and flashing into place by passing the included lag bolt and pre-installed stainless steel-backed EPDM washer through the L-foot EPDM grommet, and the hole in the flashing, into the pilot hole in the roof rafter. Drive the lag bolt down until the L-foot is held firmly in place. The EPDM washer should compress and expand slightly beyond the outside edge of the steel washer when the proper torque is applied.

Note: FLASHKIT PRO L-FOOT can be installed in TWO orientations.
See Page 14 for detailed view.



FIX RAIL CLAMP ONTO L-FOOT: Remove bolt from rail clamp. Place bolt through slot in L-foot and though hole in Rail Clamp. Partially thread holt into rail clamp, leaving the bolt loose to accept the rail.

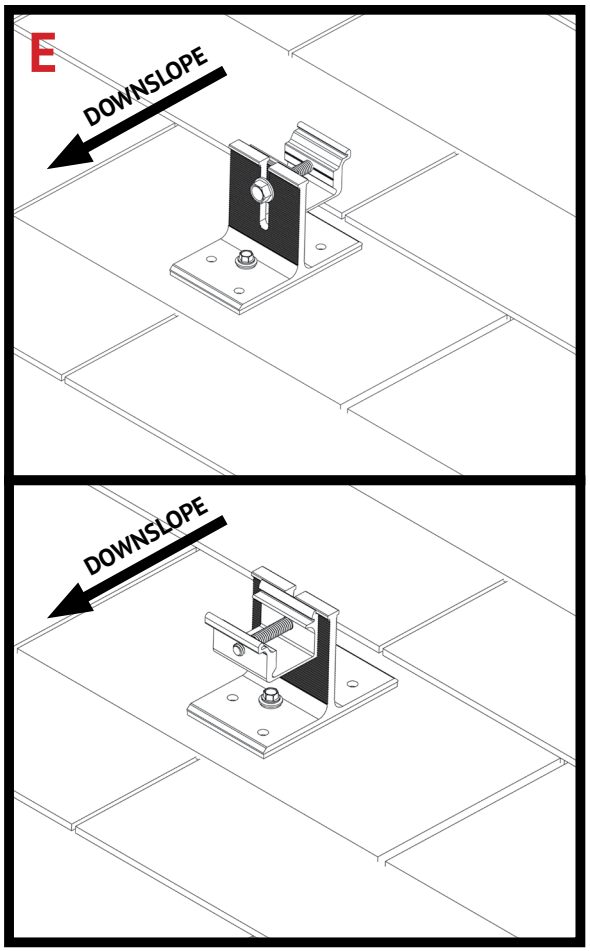
Note: Rail Clamp can be installed on any standard L-foot.



STRONGHOLD ATTACHMENT AND RAIL CLAMP ORIENTATIONS:

The Stronghold Attachment and Rail Clamp can be installed in any of four possible orientations, shown in images (A) through (D) above.

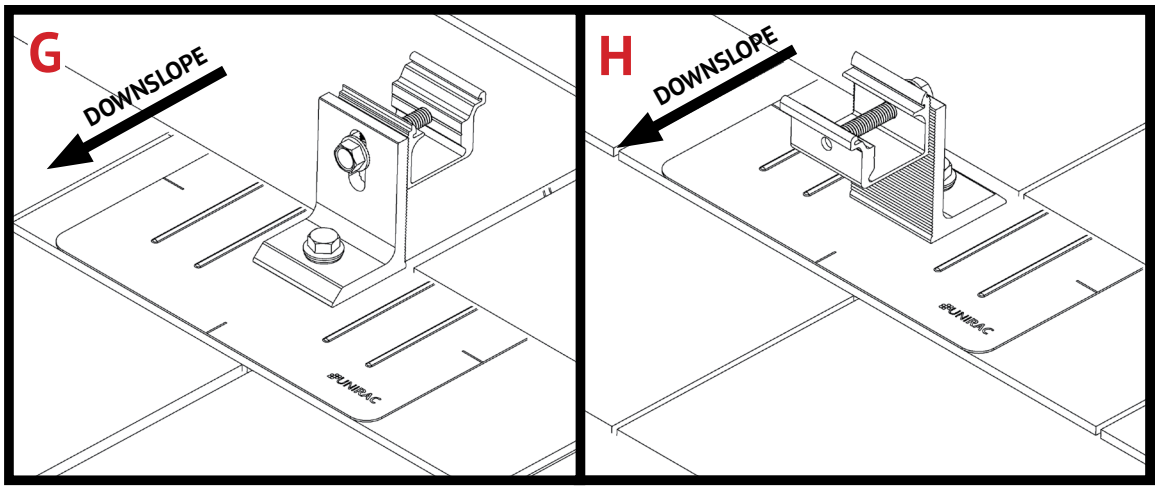
Note: For high snow loads, use orientations (C) or (D). Refer to NXT UMOUNT Design and Engineering Guide for specific requirements.



STRONGHOLD ATTACHMENT WITH BUTYL AND RAIL CLAMP ORIENTATIONS:

Stronghold Attachment with Butyl and Rail Clamp can be installed in either orientation shown in image (E) and (F) above.

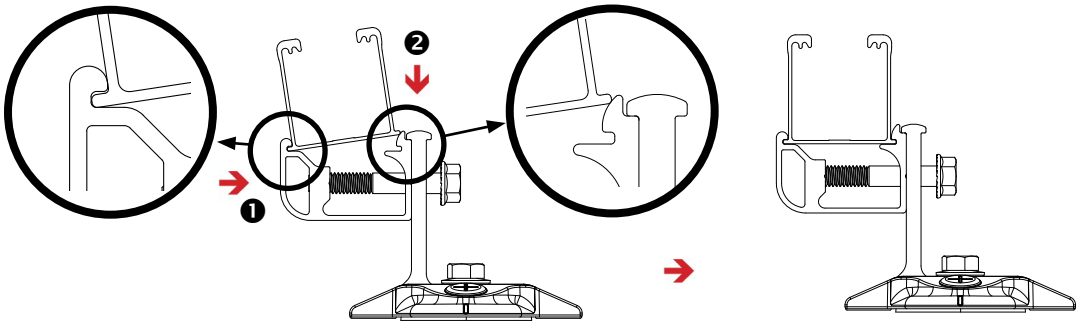
Note: For high snow loads, use orientation (F). Refer to NXT UMOUNT Design and Engineering Guide for specific requirements.



FLASHKIT PRO L-FOOT AND RAIL CLAMP ORIENTATIONS:

Flashkit Pro L-foot and Rail Clamp can be installed in either orientation shown in image (G) and (H) above.

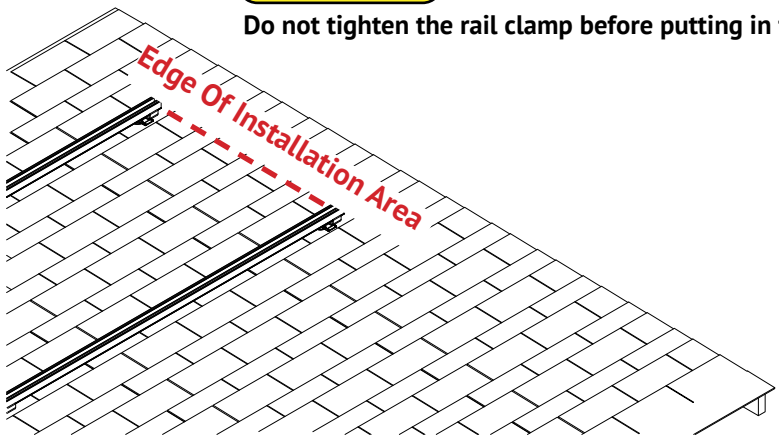
Note: For high snow loads, use orientation (H). Refer to NXT UMOUNT Design and Engineering Guide for specific requirements.



POSITION RAIL ONTO RAIL CLAMP:
With the bolt in the pre-assembled (loose) position, Insert the rail flange on one side of the clamp groove. Then click-in the other side of the rail into the clamp groove.

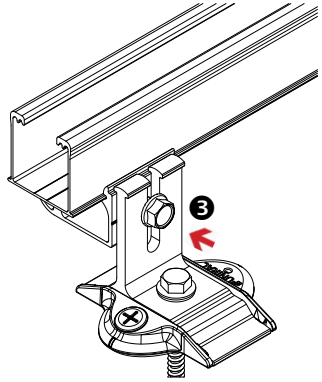
⚠ CAUTION

Do not tighten the rail clamp before putting in the rail.



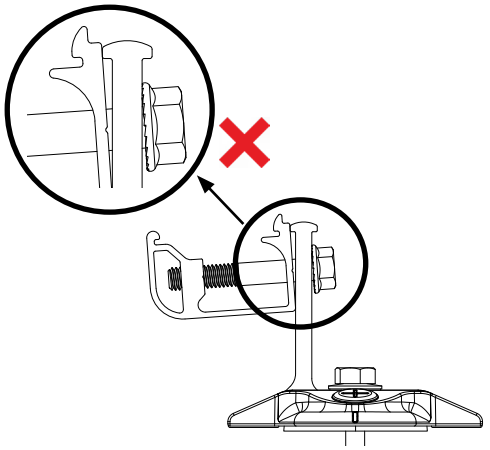
ALIGN RAILS: Align one pair of rail ends to the edge of the installation area. The opposite pair of rail ends will overhang installation area. Do not trim them off until the installation is complete. Install the first module at the aligned end. If the rails are parallel to the rafters, the aligned end of the rails should face the lower edge of the roof. Securely tighten all hardware after alignment is complete.

Mount modules to the rails as soon as possible. Large temperature changes may bow the rails within a few hours if module placement is delayed.



TIGHTEN RAIL ONTO RAIL CLAMP :
Adjust the rail height as needed until rail alignment is complete and tighten bolt.

TORQUE VALUE: 20 ft-lbs.



⚠ CAUTION

Rail clamp must be flush to the L-foot and positioned below the flange at the top of the L-foot.

SPLICE INSTALLATION (IF REQUIRED PER SYSTEM DESIGN)

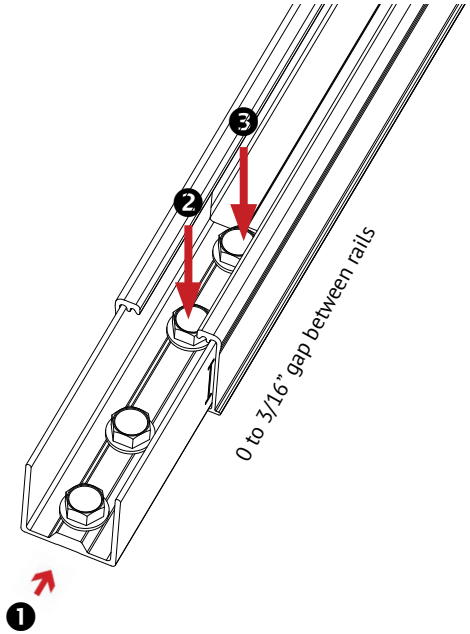
If your installation uses NXT UMOUNT Rail Splice, attach the rails together either before installing the rail or after. Use marking on the splice for centering the connection. To install, slide the splice into the rail on each rail and drag it to the center of the marking. Tighten both bolts on each rail with an impact drill, pressing firmly until the bolt-head is flush against the splice and torqued to 15 ft-lbs. Installation is complete when the bonding hardware penetrates the opposite side of the rail, and the assembly torque is achieved.

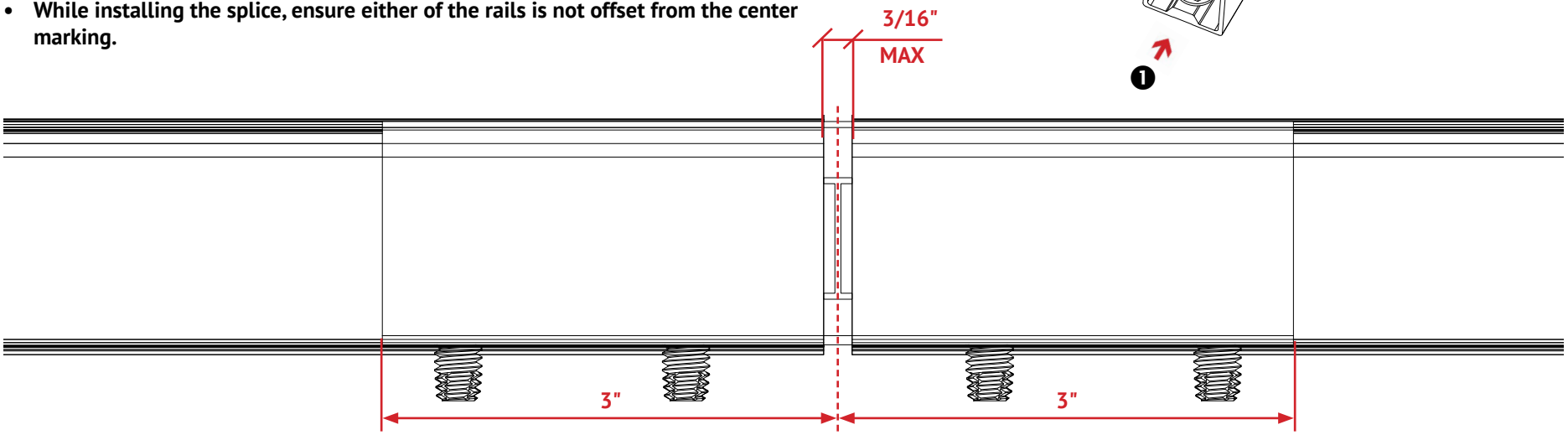
❶,❷,❸ are the steps of installation.

TORQUE VALUE: 15 ft-lbs. Do not use Anti-Seize.

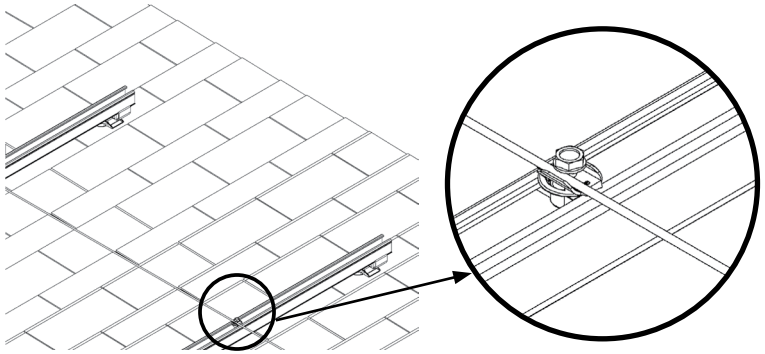
⚠ CAUTION

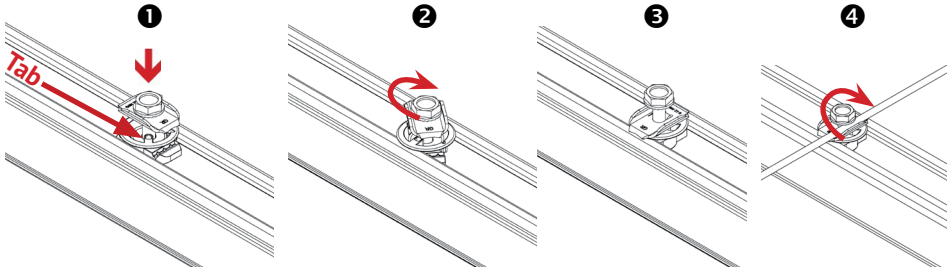
- **If assembling splice directly on roof, take care to prevent bolts from penetrating roof covering.**
- **While installing the splice, ensure either of the rails is not offset from the center marking.**





Note:
1. Maximum gap between rails should not exceed 3/16" at splice connection
2. Splice certified for single-use only





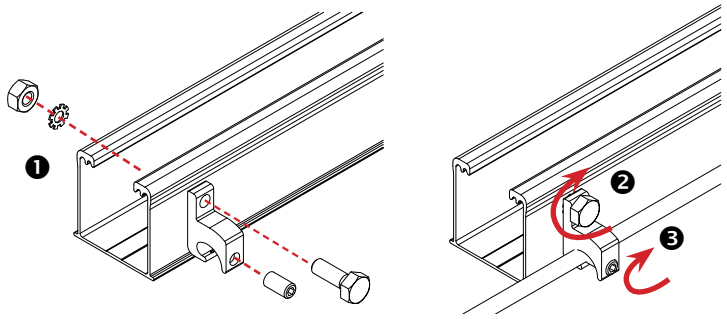
SYSTEM GROUNDING: Rails can be bonded using a MLPE & GROUNDING LUG (NULGMLP1), GROUND WEEBLUG #1 or ILSCO LAY IN LUG (GBL4DBT). At least one rail per row of modules in an array must be bonded to electrical ground. Each additional row of modules must be grounded with at least one rail lug per row or with a row-to-row bonding devise listed here.

Note: See Page 5 for additional lugs required for expansion joints.

SYSTEM GROUNDING WITH MLPE & GROUNDING LUG: Insert the T-nut in the rail by holding the plastic cone's tabs with thumb and middle finger. Rotate the clamp 90 deg in clockwise direction in the rail and release when aligned with rail. Ensure that the T-nut is engaged in the rail profile. **Place the grounding wire on the grounding plate on one of the sides of the bolt, parallel to the grounding plate flanges. Tighten bolt.**

TORQUE VALUE: 6-12 AWG SOLID COPPER: 10 ft lbs.

NOTE: MLPE & GROUNDING LUG is single use only

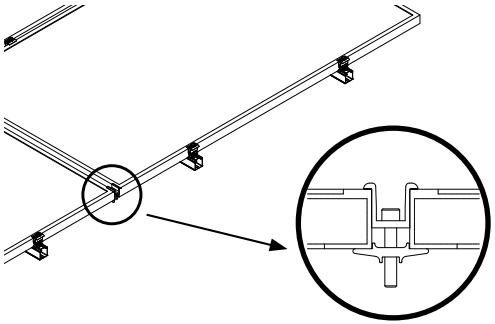


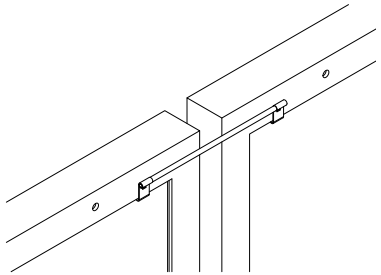
ALTERNATE SYSTEM GROUNDING WITH ILSCO LAY-IN LUG - UNIRAC P/N 008009P: Alternate Grounding Lug. Drill hole in rail 7/32" in diameter, deburr hole and bolt through one wall of rail.

BOLT TORQUE VALUE: 5 ft lbs.
TERMINAL TORQUE: 4-6 AWG: 35in-lbs, 8 AWG: 25 in-lbs.

⚠ WARNING

Ensure Copper does contact Aluminum to avoid corrosion.

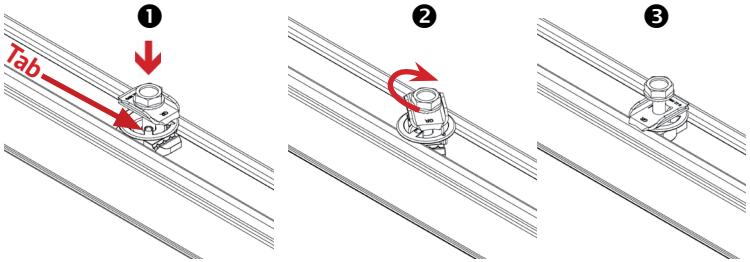




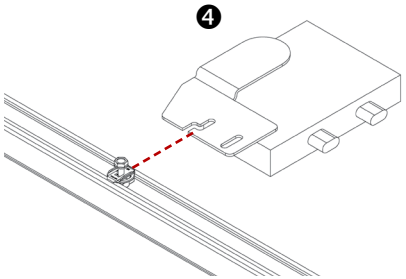
ALTERNATE ROW GROUNDING WITH N/S BONDING CLAMP:
Insert clamp between module rows and tighten bolt.

TORQUE VALUE: 20 ft-lbs.

ALTERNATE ROW GROUNDING WITH N/S BONDING CLIP:
Fully seat bonding clip on each module flange to provide bond across N/S module gap.

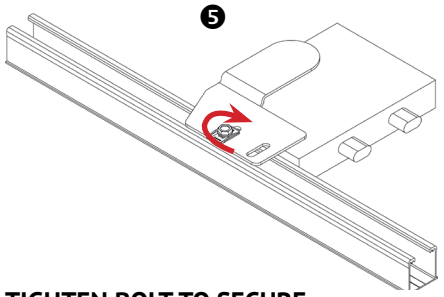


INSTALL MLPE & GROUNDING LUG: Insert the T-nut into the rail by holding the plastic cone's tabs with your thumb and middle finger. Rotate the grounding lug 90 degrees in a clockwise direction on the rail and release it when aligned with the rail. Ensure that the T-nut is engaged in the rail profile.



INSTALL MICROINVERTER:
Place the microinverter between the ground plate and the rail. Engage it to bolt.

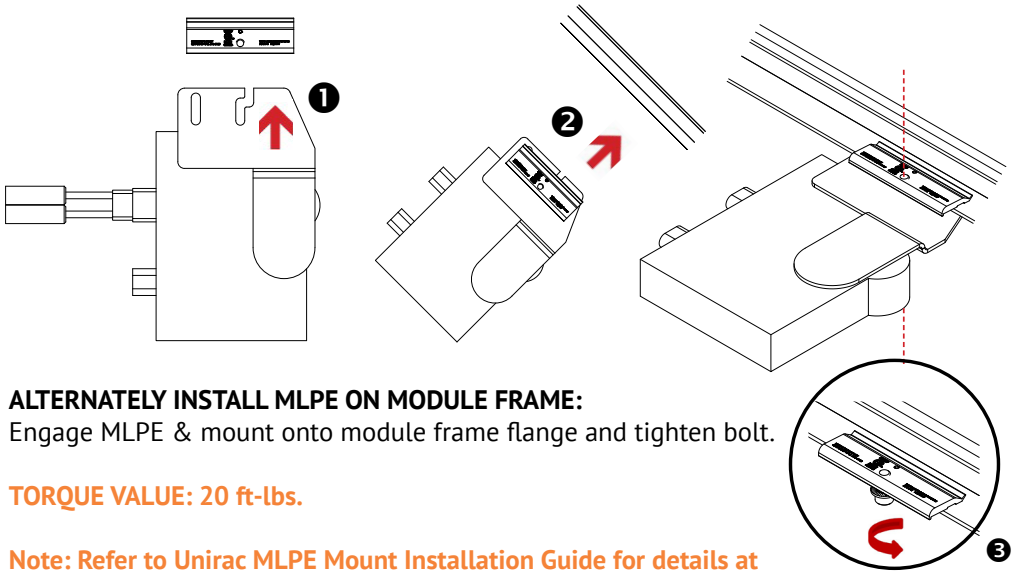
NOTE: MLPE & GROUNDING LUG is single use only



TIGHTEN BOLT TO SECURE:

TORQUE VALUE: 10 ft-lbs.

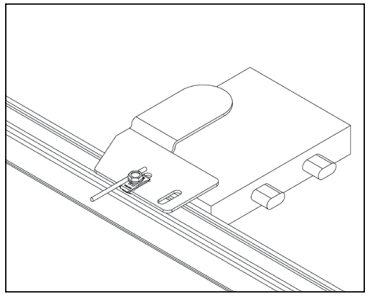
Quick Tip: To remove the MPLE & Grounding Lug from the rail, hold the plastic cone's tabs with your thumb and middle finger. Rotate anticlockwise by pressing downward.



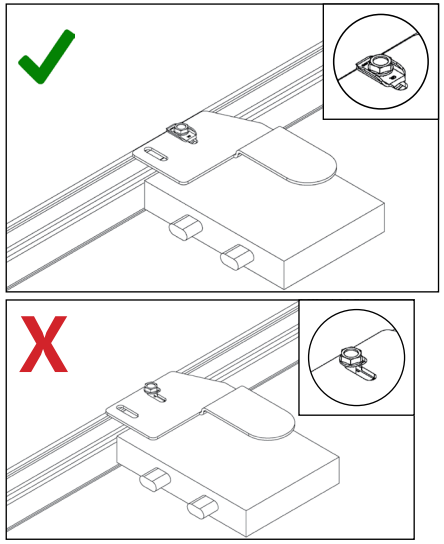
ALTERNATELY INSTALL MLPE ON MODULE FRAME:
Engage MLPE & mount onto module frame flange and tighten bolt.

TORQUE VALUE: 20 ft-lbs.

Note: Refer to Unirac MLPE Mount Installation Guide for details at https://unirac.com

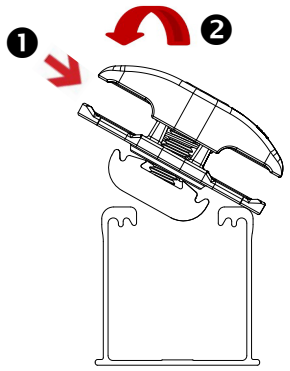


NOTE:
MLPE & Grounding Lug can be used simultaneously to mount MLPE device and grounding wire.

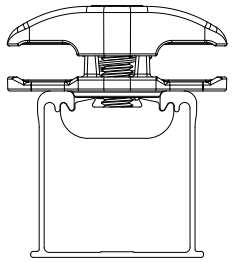


CAUTION

Ensure that grounding plate is always installed on the top of MLPE devices.

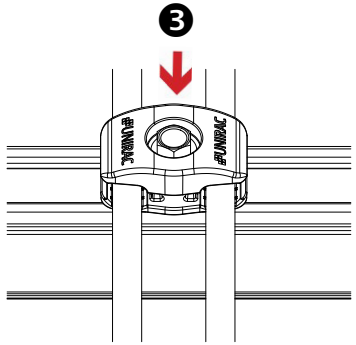


INSTALL NS WIRE MANAGEMENT CLIP:
Insert the wire clamp assembly into the rail by placing one end of the rail nut into the rail and clip in the other end.



INSTALL NS WIRE MANAGEMENT CLIP:
Ensure that the rail nut profile is seated in the rail profile.

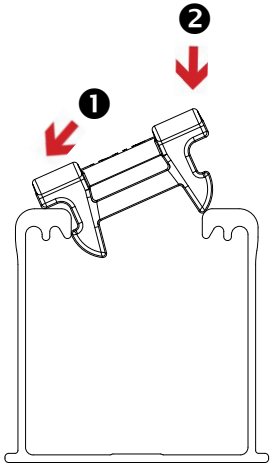
Note: Wire clip can be oriented along the rail or perpendicular to secure wires between rails.



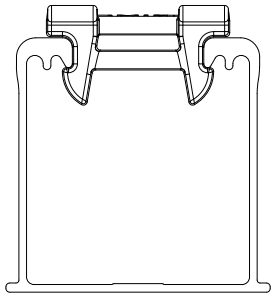
INSTALL NS WIRE MANAGEMENT CLIP:

Insert the wires into the groove of wire clamp and tighten it down to the suggested torque value.

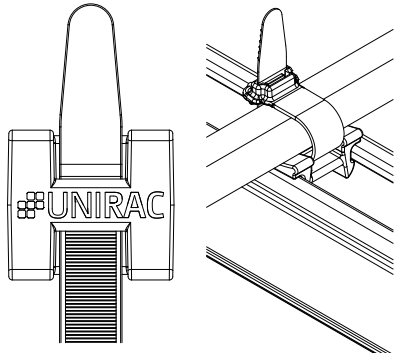
TORQUE VALUE: 3-7 ft-lbs.



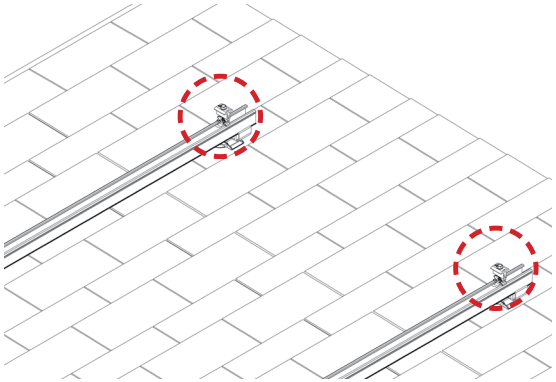
INSTALL WIRE MANAGEMENT CLIP:
Wire clip retains the wire in the rail channel. Press fit the clip onto the rail flanges to install.



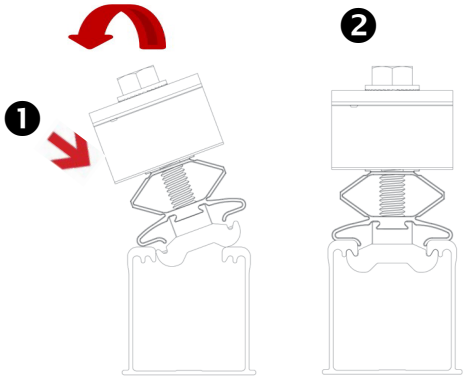
INSTALL WIRE MANAGEMENT CLIP:
Ensure that the clip base is seated on the rail flange



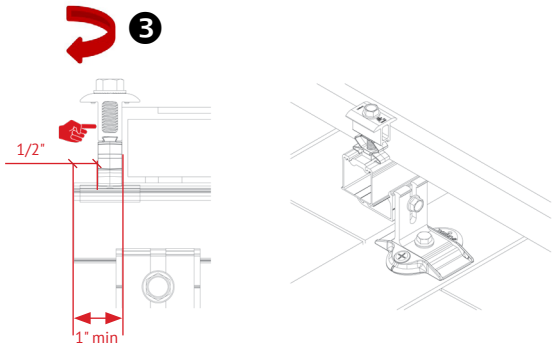
INSTALL WIRE MANAGEMENT CLIP:
Use the wire tie to strap the wires down on the seater provided in the wire clip.



INSTALL COMBO (END) CLAMPS:
Install Combo Clamps starting at the aligned end of rails.

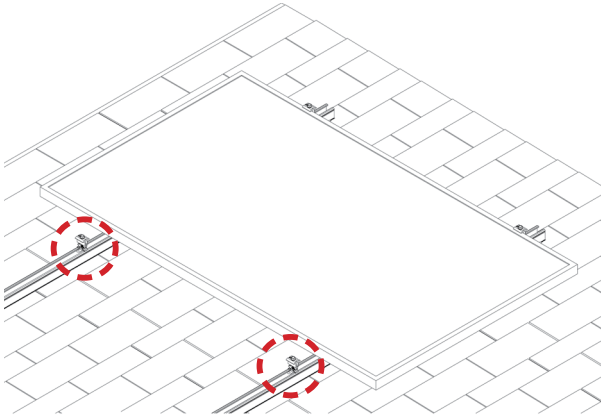


INSERT COMBO CLAMP:
Insert Combo Clamp from one side of the rail nut into the rail and click in the other side. Ensure that the rail nut profile is seated in the rail profile.



INSTALL END MODULE: Position first module onto rails and engage module frame with end clamps. Hold clamp in place against module while tightening bolt.
TORQUE VALUE: 15 ft-lbs.

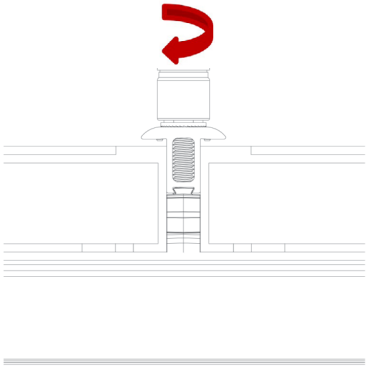
Note: Ensure a minimum distance of 1" from the end of the module to end of rail.



INSTALL COMBO (MID) CLAMPS:
Clamp assemblies may be positioned in rail near point of use prior to module placement.

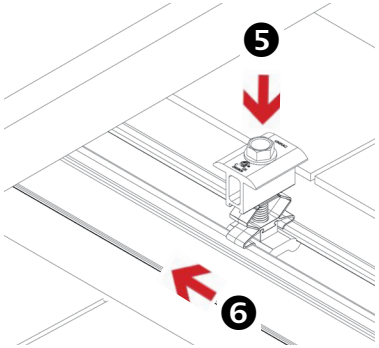
Note: The clamps may be installed above splice locations.

PRO TIP
Press the clamp assembly slightly into the rail to allow for easy sliding of clamp in the rail.



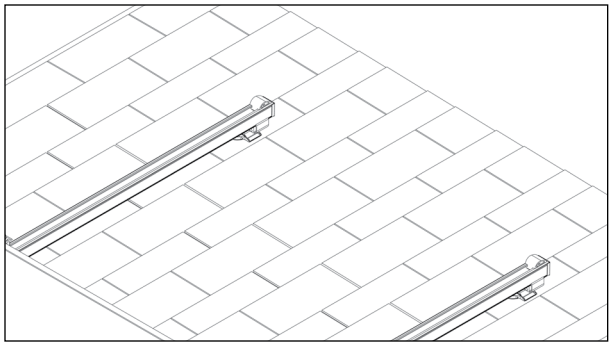
PLACE ADJACENT MODULE AGAINST CLAMPS:
Modules must be tight against clamps with no gaps. Tighten bolt to required torque.

TORQUE VALUE: 15 ft-lbs.

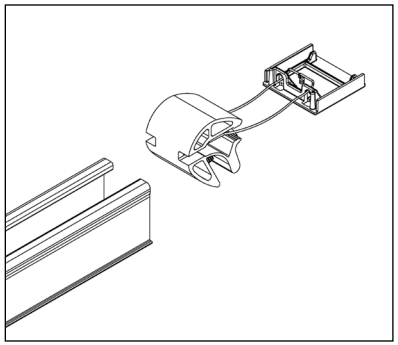


INSTALL REMAINING MODULES:
Proceed with module installation. Engage each clamp with previously positioned module.

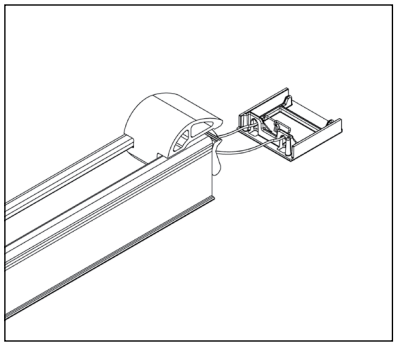
Note: Combo clamps are capable of securing module frames whose thickness varies from 30mm to 40mm.



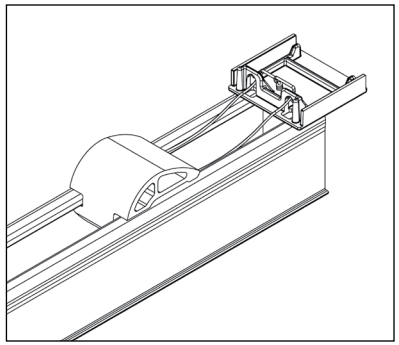
INSTALL MODULE END CLAMPS: The End clamp is supplied as kit with pre assembled end cap. The clamp should be installed on the rails prior to installing end modules.



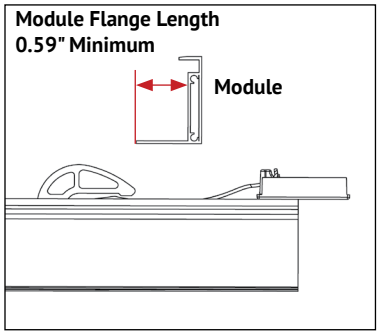
INSTALL END CLAMPS ON RAIL: Slide the end clamp assembly on to the rail by engaging grooves on both sides into the top flange of the rail.

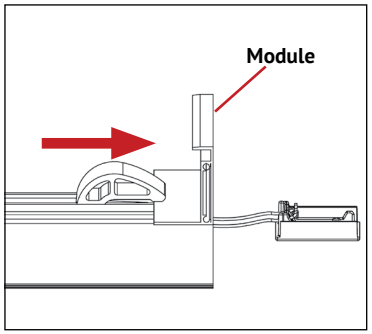


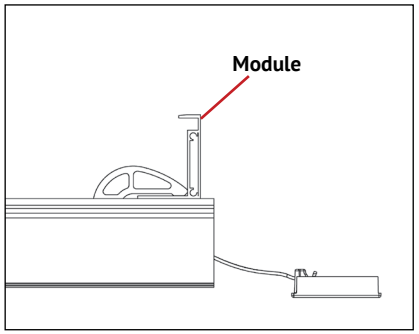
POSITION END CLAMPS: Slide the end clamp assembly onto the rail until the module return flange is cleared for placing the module



NOTE:
To assist insertion of the clamp into the rail, hold the twist ties together and slide the clamp. Place the end cap on the rail flange for smooth gliding of the clamp to the required position.

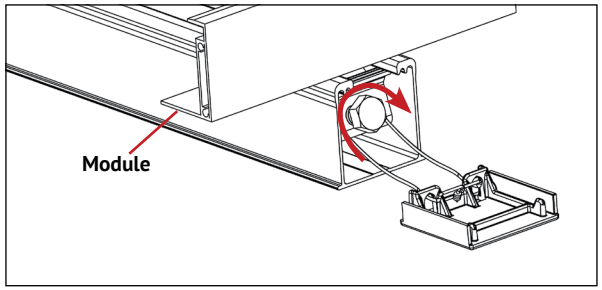






INSTALL FIRST MODULE:
Position first module onto rails with the clamp clear from the return flange of the module. Hold the end cap and drag the clamp onto the return flange of the module. Once the clamp is onto the return flange, drag the clamp till the edge of the clamp contacts the vertical wall of return flange.

Note:
- **Ensure to use a drill extension or deep socket for installing the clamp bolt.**
- **Requires a minimum return flange length of 0.59" and thickness of 1-2 mm for Hidden Endclamp to secure the module.**



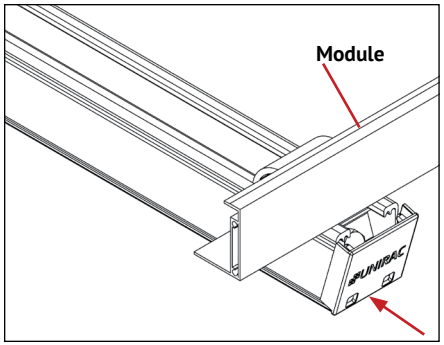
ENGAGE CLAMP: While holding the module in position and with the clamp in contact with the flange, tighten the end clamp bolt to the required torque.

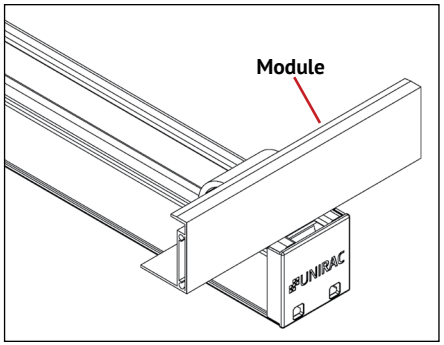
Torque End Clamp bolt to 15 ft-lbs, No anti-seize

⚠ CAUTION

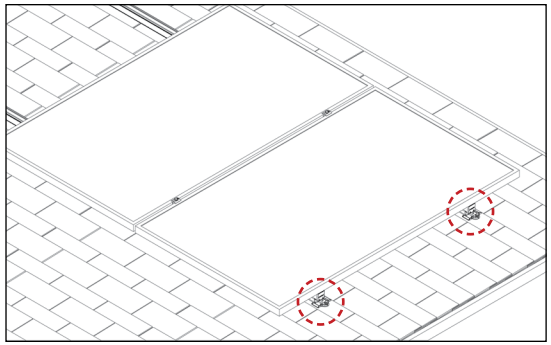
Ensure bolt is not over-torqued, use low torque setting on drill. If using an impact driver, stop rotation as soon as impact action of driver begins.

FOR HIDDEN CLAMP





END CAP INSTALLATION:
To install the end cap, tuck in the twist tie in the rail beside the bolt. Position the cap on the edge of the rail and press the cap onto the rail.



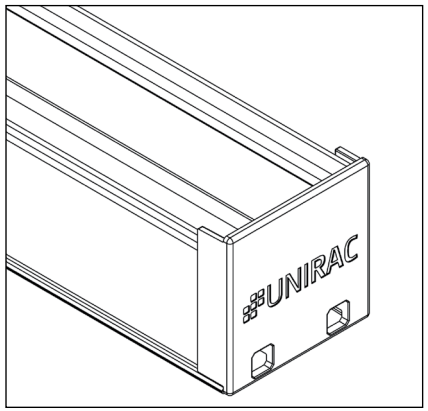
Place module, flush with rail ends. The bolt head of the clamp must not protrude beyond the rail edge. Modules must be fully supported by rails and cannot overhang at the ends of rails.

Pro Tip:
For best appearance, leave enough space for the bolt head while cutting the rail ends to perfectly snap fit the end cap.

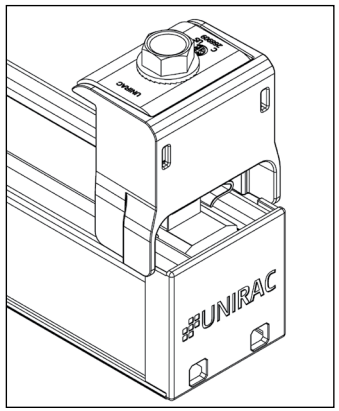
⚠ CAUTION

Ensure the clamp bolt head does not protrude outside of the rail while cutting the rails for end cap installation.

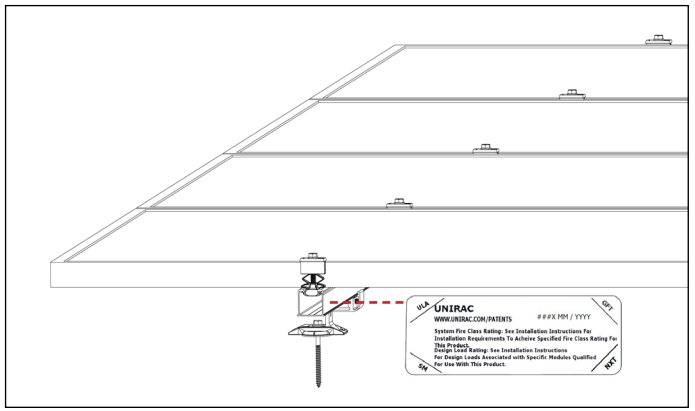
FOR COMBO CLAMP



OPTIONAL END CAP:
To install the end cap, place the cap on the edge of the rail and press the cap onto the rail.

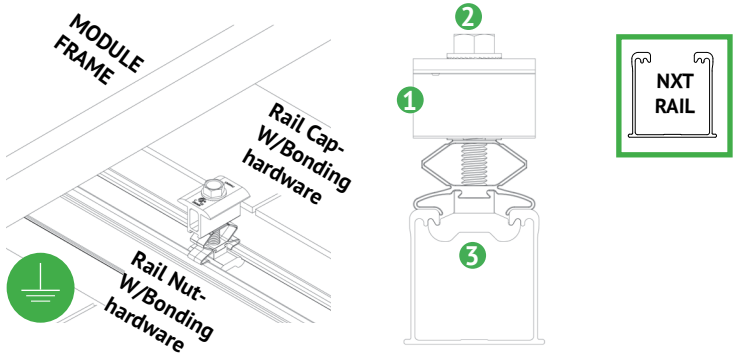


OPTIONAL COMBO CLAMP CAP:
To install the combo clamp cap, place the cap on the edge of the rail and press the cap onto the clamp.



INSTALL UL2703 CERTIFICATION MARKING LABEL:
After the racking system is fully assembled, a single label should be applied to the rail at the edge of the array. One certification label is supplied in every box of 20 clamps.

Note:
- **The sticker label should be placed such that it is visible.**
- **Cutoff all corners except NXT before applying on rail.**



BONDING COMBO MID-END CLAMP ASSEMBLY

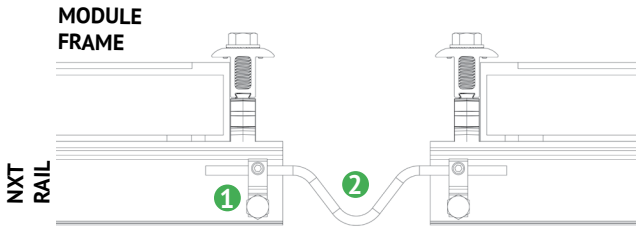
1. Aluminum combo mid-end clamp cap with stainless steel bonding pins that pierce module frame anodization to bond module to module through clamp
2. Stainless steel bolt bonds aluminum clamp to stainless steel Hex bolt
3. Aluminum combo mid-end clamp rail nut with stainless steel bonding pins that pierce rail anodization to bond module to module through clamp

NOTE: See Page 20 for installation details.

BONDING RAIL SPLICE

1. Bonding Hardware creates bond between Splice bar and each rail section.
2. Aluminum splice bar spans across rail gap to create rail to rail bond. Rail on at least one side of splice will be grounded.

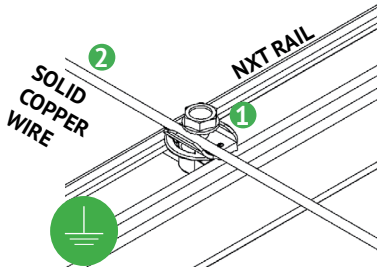
NOTE:
- See Page 16 for installation details
- Splice certified for single-use only



BONDING BETWEEN THERMAL BREAKS

1. Lug is connected at the end of each thermal break to the rail.
2. Solid copper wire is connected across the gap to bond the two ends.

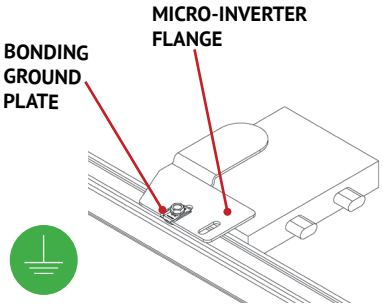
NOTE: See Page 5 for installation details.

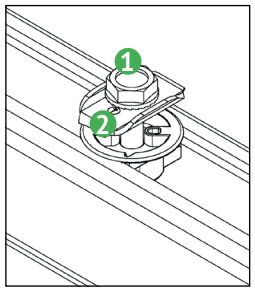


RACK SYSTEM GROUNDING

1. Tabs on the grounding plate pierce anodization on the rail to bond rail to ground wire.
2. Solid copper wire connected to lug is routed to provide final system ground connection.

NOTE: See Page 17 for installation details and alternate racking system grounding methods.

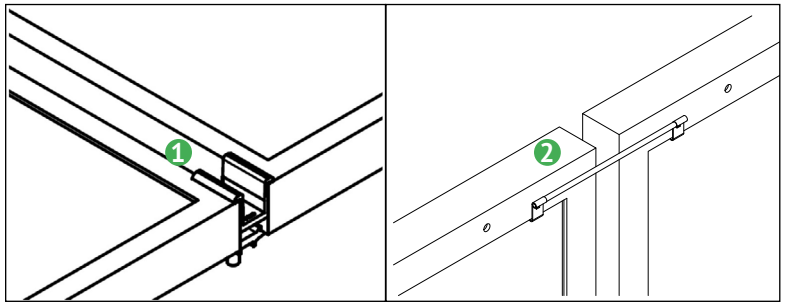




BONDING MICROINVERTER MOUNT

1. Serrations on the bolt head remove the anodization of MLPE flange and bonds.
2. Tabs on the stainless steel ground plate remove anodization on the rail and bonds.

NOTE: See Page 18 for installation details



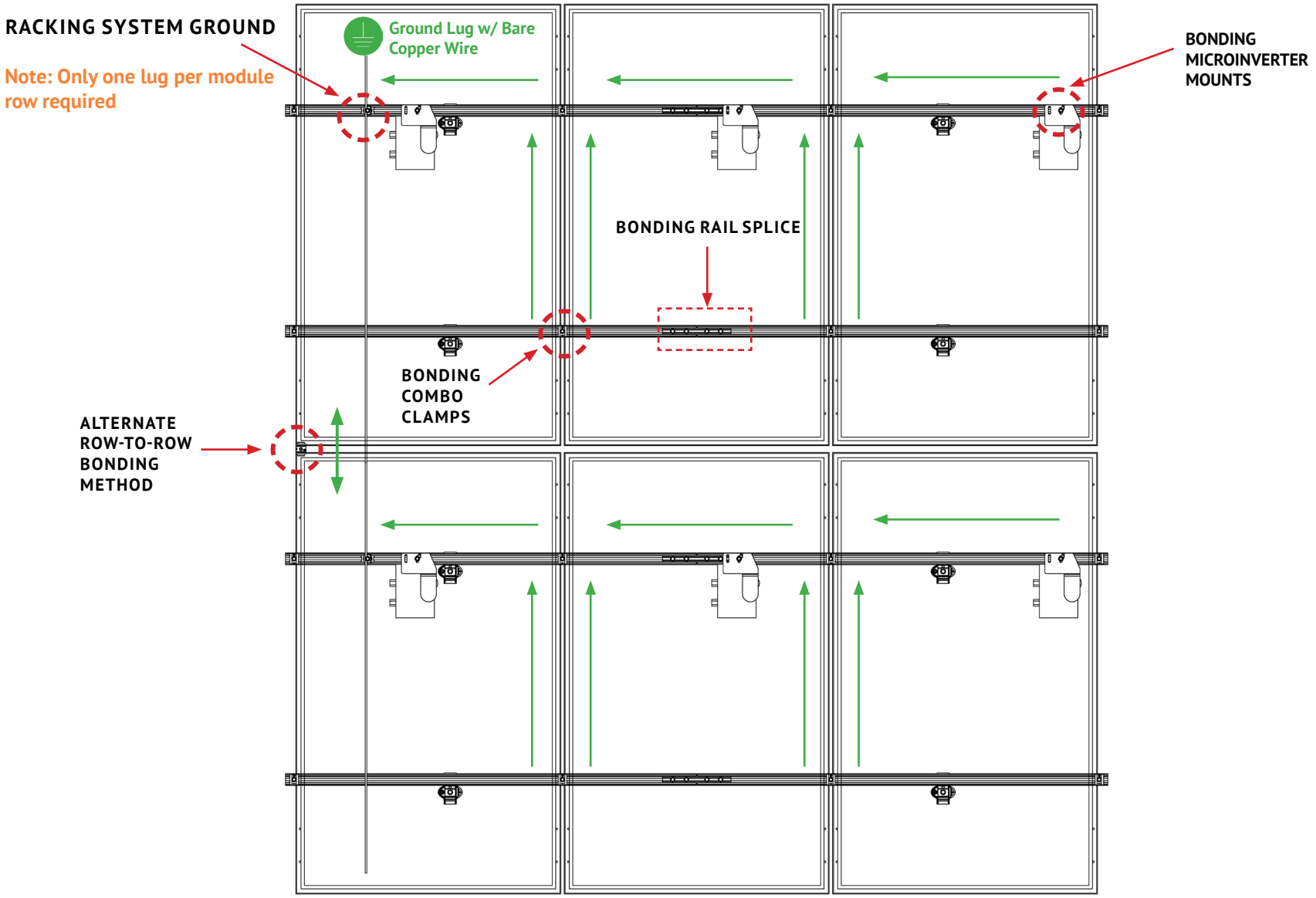
ALTERNATE ROW-TO-ROW BONDING PATHS

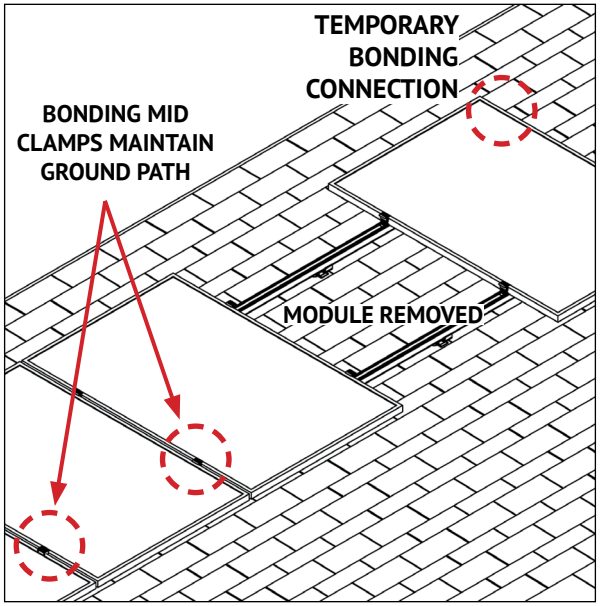
1. Row-to-row module bonding is accomplished with bonding clamp with 2 integral bonding pins.
2. Alternate method by connecting clips on either module to complete the bonding path.

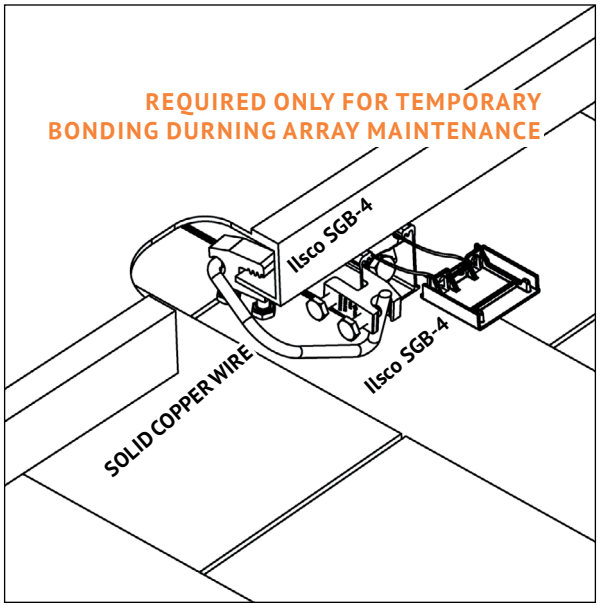
NOTE:
- See Page 17 for installation details
- Row-to-row module bonding certified for single-use only

⚠ CAUTION

- **If loose components or loose fasteners are found during periodic inspection, re-tighten immediately.**
- **Any components showing signs of corrosion or damage that compromise safety shall be replaced immediately.**


RACKING SYSTEM GROUND
Note: Only one lug per module row required
Ground Lug w/ Bare Copper Wire
BONDING MICROINVERTER MOUNTS
BONDING RAIL SPLICE
BONDING COMBO CLAMPS
ALTERNATE ROW-TO-ROW BONDING METHOD





TEMPORARY BONDING CONNECTION DURING ARRAY MAINTENANCE

When removing modules for replacement or system maintenance, any module left in place that is secured with a bonding Midclamp will be properly grounded. If a module adjacent to the end module of a row is removed or if any other maintenance condition leaves a module without a bonding mid clamp, a temporary bonding connection must be installed as shown

- Attach Ilsco SGB4 to wall of rail
- Attach Ilsco SGB4 to module frame
- Install solid copper wire jumper to Ilsco lugs

⚠ CAUTION

Module removal may disrupt the bonding path and could introduce the risk of electric shock. Follow above mentioned instructions to maintain the bonding path.

ELECTRICAL CONSIDERATIONS

NXT UMOUNT is intended to be used with PV modules that have a system voltage less than or equal to that allowable by NEC. For standard system grounding a minimum 10AWG, 105°C copper grounding conductor should be used to ground a system, according to the National Electric Code (NEC). It is the installer's responsibility to check local codes, which may vary. See below for interconnection information.

INTERCONNECTION INFORMATION

There is no size limit on how many NXT UMOUNT & PV modules can be mechanically interconnected for any given configuration, provided that the installation meets the requirements of applicable building and fire codes.

GROUNDING NOTES

The installation must be conducted by a licensed and bonded electrician or solar contractor in accordance with the National Electric Code (NEC) and the authority having jurisdiction. Please refer to these resources in your location for required grounding lug quantities specific to your project.

The grounding / bonding components may overhang parts of the array so care must be made when walking around the array to avoid damage.

Conductor fastener torque values depend on conductor size. See product data sheets for correct torque values.

PERIODIC INSPECTION

Conduct periodic inspections for loose components, loose fasteners or any corrosion, immediately replace any affected components.

The NXT UMOUNT system has been certified and listed to the UL 2703 standard (Rack Mounting Systems and Clamping Devices for Flat-Plate Photovoltaic Modules and Panels). This standard included electrical grounding, electrical bonding, mechanical load and fire resistance testing.

SYSTEM LEVEL FIRE CLASSIFICATION

The system fire class rating requires installation in the manner specified in the NXT UMOUNT Installation Guide. NXT UMOUNT has been classified to the system level fire portion of UL 2703. NXT UMOUNT has achieved system level performance for steep sloped roofs and low sloped roofs. System level fire performance is inherent in the NXT UMOUNT design, and no additional mitigation measures are required. See table below for definition of steep sloped and low sloped roofs. The system is to be mounted over fire resistant roof covering rated for the application. There is no required minimum or maximum height limitation above the roof deck to maintain the system fire rating for NXT UMOUNT. Approved Module Types & System Level Fire Ratings are listed below:

Roof Type	Module Type	System Level Fire Rating	Rail Direction	Module Orientation
Steep Slope - roof pitches ⩾ 2 in/ft	Type 1, 2, 3 with metal frame, 10 with metal frame, 19, 22, 25, 29, & 30	Class A	Parallel OR Perpendicular to Ridge	Landscape OR Portrait
Low Slope - roof pitches < 2in/ft	Type 1, 2, 29, & 30			

MECHANICAL LOAD TEST MODULES

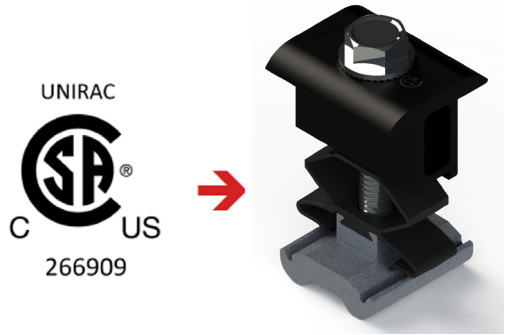
The modules selected for UL 2703 mechanical load testing were selected to represent the broadest range possible for modules on the market. The tests performed covers module frame thicknesses greater than or equal to 1.0 mm, single and double wall frame profiles (some complex frame profiles could require further analysis to determine applicability), and clear and dark anodized aluminum frames. PV modules may have a reduced load rating, independent of the NXT UMOUNT rating. Please consult the PV module manufacturer's installation guide for more information.

Tested Module	Design Load Ratings	Tested Loads	Tested Module Area
SunPower SPR-A440 -COM	Down: 50 psf, Up: 50 psf , Slope: 15 psf	Down: 75 psf, Up: 75 psf , Slope: 23 psf	21.86 sq ft
Jinko JKM-xxxM 72HL4-V	Down: 39.47 psf, Up: 22.28 psf, Slope: 8 psf	Down: 59.20 psf, Up: 33.42 psf, Slope: 12 psf	27.76 sq ft
Q Cells Q Peak Duo XL-G11.3/BFG	Down: 37.06 psf, Up: 20.97 psf, Slope: 7.53 psf	Down: 55.6 psf, Up: 31.46 psf, Slope: 11.3 psf	29.49 sq ft

UL2703 CERTIFICATION MARKING:

Unirac NXT UMOUNT is listed to UL 2703. Certification marking is embossed on all Combo Clamps as shown. Labels with additional certification information are provided with clamps and must be applied to the NXT UMOUNT Rail at the edge of the array.

Note: This racking system may be used to ground and/or mount a PV module complying with UL1703/UL61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.



Electrical Bonding and Grounding Test Modules

The list below is not exhaustive of compliant modules but shows those that have been evaluated and found to be electrically compatible with the NXT UMOUNT system.

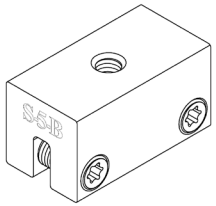
Manufacture	Module Model / Series
Q Cells	Plus, Pro, Peak, G3, G4, Peak G5(SC) , G6(+)(SC)(AC), G7, G8(+), Plus, Pro, Peak L-G2, L-G4, L-G5 Peak L-G5, L-G6, L-G7, L-G8(BFF) Q.PEAK DUO(BLK)-G6+ Q.PEAK DUO BLK-G6+/TS Q.TRON M-G2+ SERIES Q.TRON BLK M-G2+ SERIES Q.PEAK DUO XL-G11S.3 / BFG Q.PEAK DUO (BLK)-G7 Q.PEAK DUO L-(G7/G7.1/G7.2/G7.3/G7.7) Q.PEAK DUO (BLK) G8(+) Q.PEAK DUO L-(G8/G8.1/G8.2/G8.3) Q.PEAK DUO L-G8.3 (BFF/BFG/BGT) Q.PEAK DUO (BLK) ML-G9(+) Q.PEAK DUO XL-(G9/G9.2/G9.3) Q.PEAK DUO XL-G9.3/BFG Q.PEAK DUO-G10+ Q.PEAK DUO BLK G10(+) Q.PEAK DUO BLK G10+ /AC Q.PEAK DUO (BLK) ML-G10(a)(+) Q.PEAK DUO BLK ML-G10+ / t Q.PEAK DUO BLK ML-G10+ / TS Q.PEAK DUO XL-(G10/G10.2/G10.3/G10.c/G10.d) Q.PEAK DUO XL-G10.3/BFG Q.PEAK DUO XL-G10.d/BFG Q.PEAK DUO XL-G11S Q.PEAK DUO XL-(G11.2/G11.3) Q.PEAK DUO XL-G11.3/BFG

Manufacture	Module Model / Series
REC	RECxxxAA (BLK/Pure/Pure-R/ Pure-RX/ Pure 2/ Pro M) RECxxxNP (N-PEAK) RECxxxNP2 (Black) RECxxxNP3 Black RECxxxPE, RECxxxPE72 RECxxxTP, RECxxxTP72 RECxxxTP2(M/BLK2) RECxxxTP2S(M)72 RECxxxTP3M (Black) RECxxxTP4 (Black)
Renesola	All 60-cell modules
Risen	RSM Series, RSM110-8-xxxBMDG
SEG Solar	SEG-xxx-BMD-HV SEG-xxx-BMD-TB SEG-XXX-BMB-TB
S-Energy	SN72 & SN60 Series SL45-60BGI/BHI SL45-60MBI-xxxZ
Seraphim	SEG-(6PA/6PB/6MA/6MA-HV/6MB/E01/E11) SRP-(6QA/6QB) SRP-xxx-6MB-HV, SRP-320-375-BMB-HV, SRP-xxx-BMC-HV, SRP-390-450-BMA-HV, SRP-xxx-BMZ-HV, SRP-390-405-BMD-HV
Sharp	NU-SA & NU-SC Series
Silfab	SLA-M, SLA-P, SLG-M, SLG-P & BC Series SILxxx(BG/BK/BL/HC/HC+/HL/HM/HN/ML/NL/NT/NX/NU)

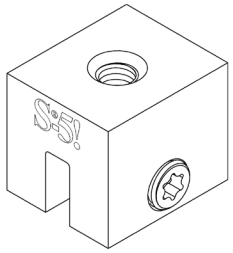
Manufacture	Module Model / Series
Solar4America	S4Axxx-108MH10BB, S4Axxx-72MH5BB
SolarEver USA	SE-166*83-xxxM-120N SE-182*91-xxxM-108N
Solaria	PowerXT-xxxR-(AC/PD/BD) PowerXT-xxxC-PD PowerXT-xxxR-PM (AC) PowerX-400R
Solartech	STU HJT, STU PERC & Quantum PERC
SolarWorld	Sunmodule Protect, Sunmodule Plus/Pro
Sonali	SS-M-360 to 390 Series SS-M-390 to 400 Series SS-M-440 to 460 Series SS-M-430 to 460 BiFacial Series
Sun Edison	F-Series, R-Series
Suniva	MV Series & Optimus Series (35mm)
Sunmac Solar	M754SH-BB Series
SunPower	AC, X-Series, E-Series & P-Series SPR E20 435 COM (G4 Frame) Axxx-BLK-G-AC, SPR-Mxxx-H-AC
SunTech	STP, STPXXXS - B60/Wnhb
Talesun	TP572, TP596, TP654, TP660 TP672, Hipor M, Smart TD6I72M, TP7G54M(H)
Tesla	SC, SC B, SC B1, SC B2, TxxxS, TxxxH
Thornova	TS-BG54

- The frame profile must not have any feature that might interfere with the bonding devices that are integrated into the racking system
- Use with a maximum over current protection device OCPD of 30A
- Unless otherwise noted, all modules listed above include all wattages and specific models within that series. Variable wattages are represented as "xxx"
- Items in parenthesis are those that may or may not be present in a compatible module's model ID
- Slashes "/" between one or more items indicates that either of those items may be the one that is present in a module's model ID
- **Listed models can be used to achieve a Class A fire system rating, for steep slope or low slope applications, only when modules of fire typed mentioned in Appendix A, Page 27 are used.**

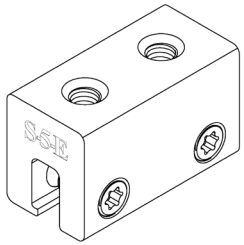
S-5! COMPONENTS



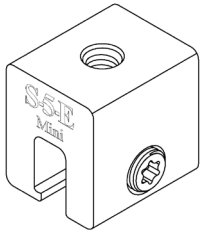
S-5-B



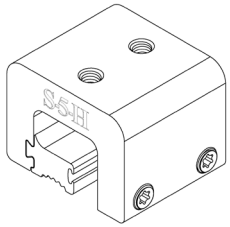
S-5-B Mini



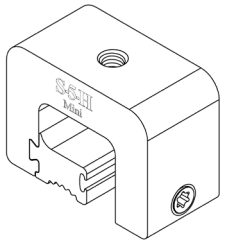
S-5-E



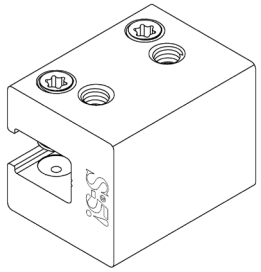
S-5-E Mini



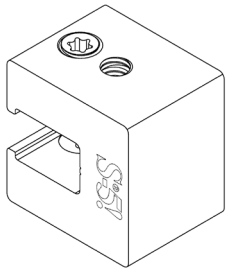
S-5-H



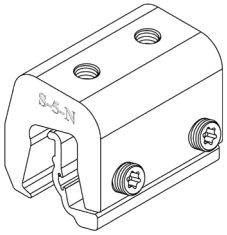
S-5-H mini



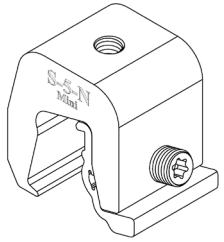
S-5-H90



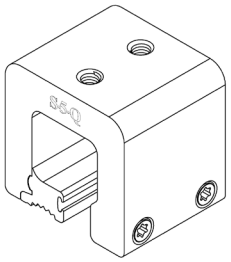
S-5-H90 Mini



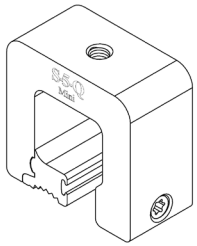
S-5-N



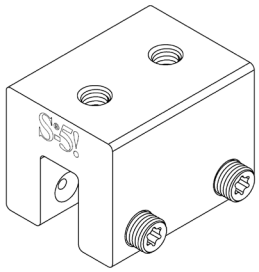
S-5-N Mini



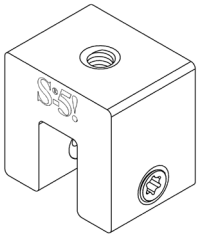
S-5-Q



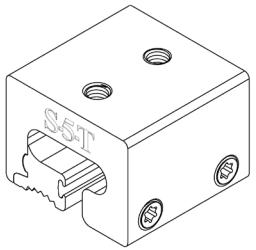
S-5-Q Mini



S-5-S

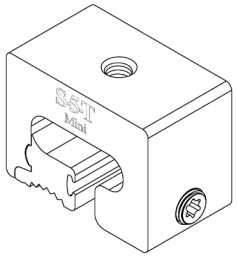


S-5-S Mini

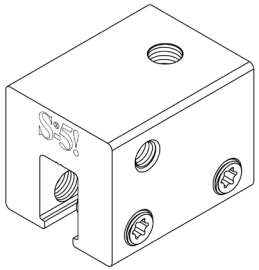


S-5-T

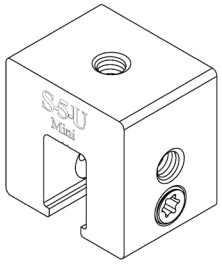
S-5! COMPONENTS



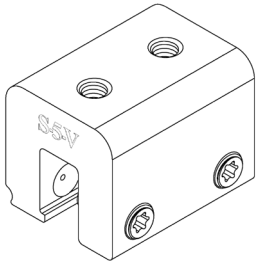
S-5-T mini



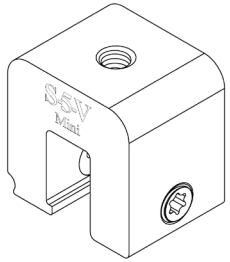
S-5-U



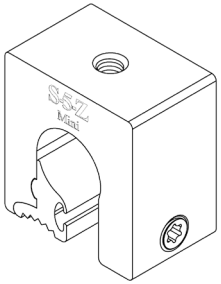
S-5-U Mini



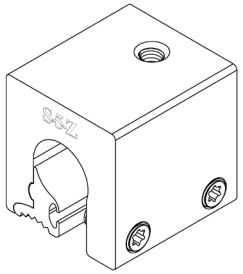
S-5-V



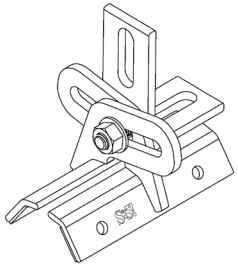
S-5-V Mini



S-5-Z



S-5-Z mini



Protea Bracket

S-5! STANDING SEAM CLAMPS AND PROTEA BRACKET INSTALLATION

STEP 1: Follow the instructions provided on ***https://buys-5.com/*** for installing the S-5! standing seam clamps and Protea bracket to the metal roof.

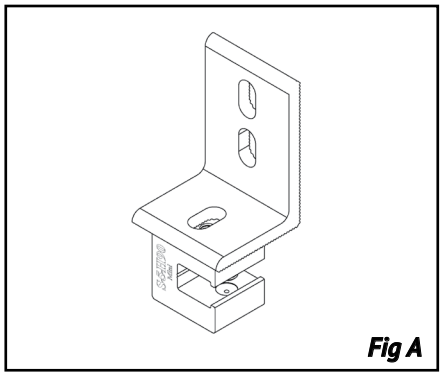


Fig A

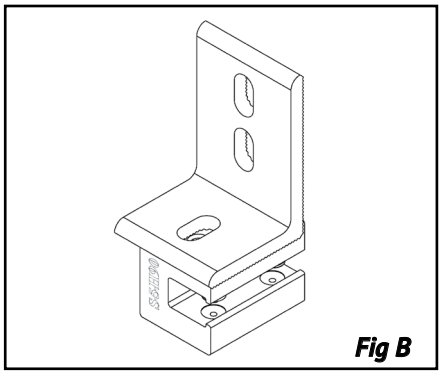
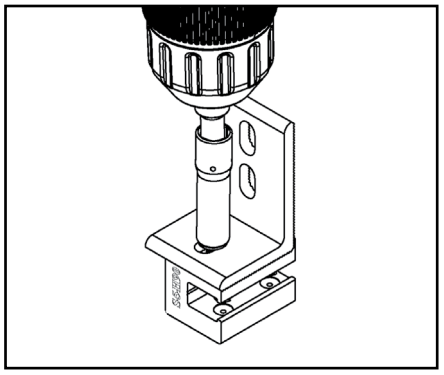


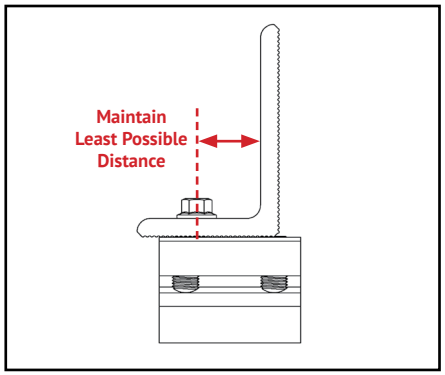
Fig B

STEP 2: POSITION L-FOOT

Position L-foot on S-5-H90 Mini clamp or S-5-H90 clamp to align holes as shown in Fig A and Fig B respectively.

Similarlly, position L-Foot on any S-5! clamps mentioned on ***pages 32 & 33***



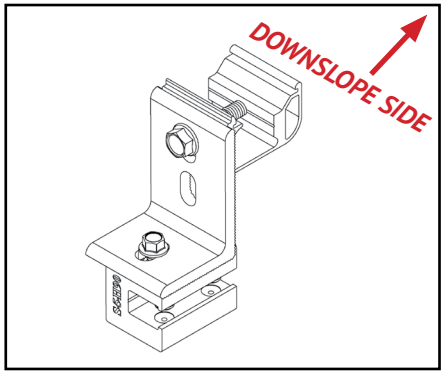


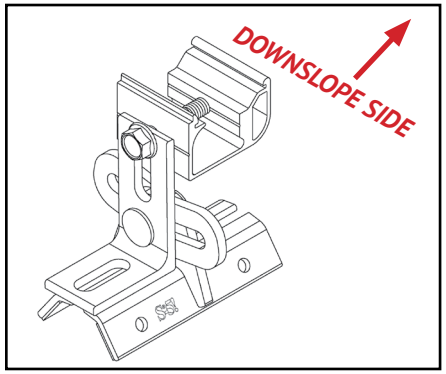
STEP 3: SECURE L-FOOT

Use M8-1.25 x 17 mm bolt to secure the L-Foot to the clamp.

Torque bolt to 13 ft-lbs

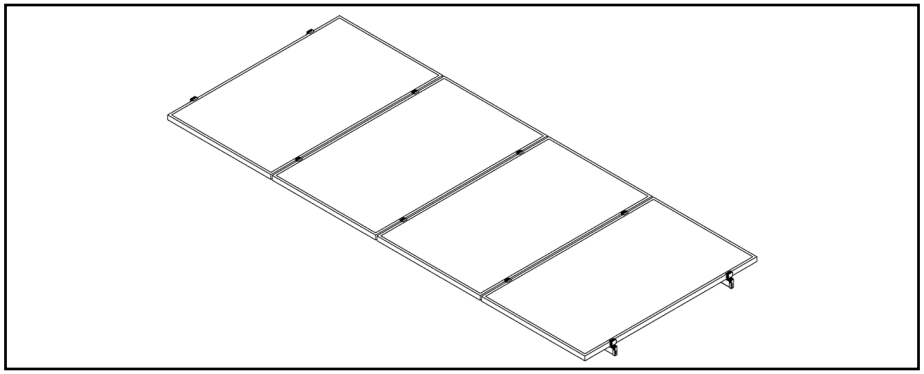
NOTE:
It is recommended to maintain least possible distance between the upright leg of the L-foot and the bolt center.





STEP 4: SECURE RAIL CLAMP TO L-FOOT OR PROTEA BRACKET

Follow the steps mentioned on ***Page 12*** to secure Rail to L-Foot or Protea Bracket



STEP 5: COMPLETE SYSTEM INSTALLATION

Complete NXT UMOUNT installation as per instructions from Rail Installation on ***Page 15*** to Finishing Touches on page 22. Ensure the system is properly grounded and bonded as per Bonding Connections & Grounding Paths section on ***pages 23-26.***

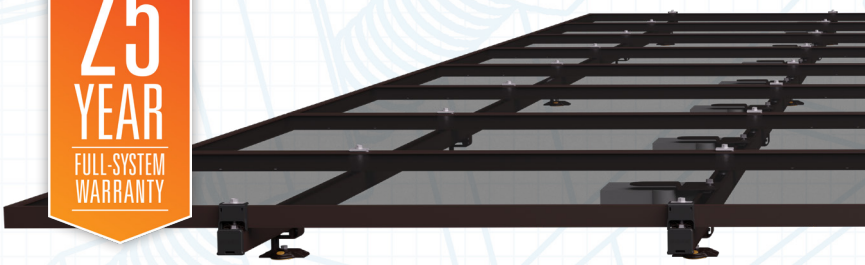
NXT UMOUNT™

UNIRAC
BETTER SOLAR STARTS HERE

DESIGN & INTEGRATION

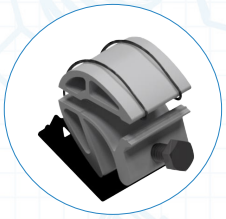
- Seamless, integrated wire management system elevates the install via the new open channel rail.
- State-of-the-art internal splice is interference free and offers true structural integrity that can even be installed in a cantilever!

UNIRAC 25 YEAR FULL-SYSTEM WARRANTY

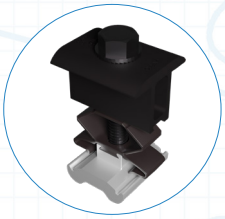


VERSATILITY & AESTHETICS

- Unparalleled versatility supporting a vast array of roof attachments. Whether it's flashing or no flashing, the NXT UMOUNT™ system has got you covered!
- Refined finishing touches are visually sleek and functionally superior.



NXT UMOUNT™ HIDDEN END CLAMP

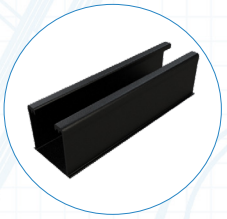


NXT UMOUNT™ COMBO CLAMP
Available in Dark and Mill

STRONGHOLD™ RAIL CLAMP
Available in Dark and Mill

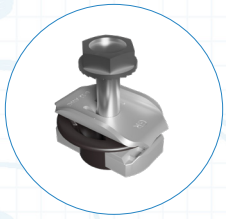
EFFICIENCY & EASE OF INSTALLATION

- Universal module clamps and combo lug / MLPE mounts result in fewer SKUs and maximum component value.
- Open-slot STRONGHOLD attachments deliver quick, reliable, waterproof installations via Flashloc or pre-applied butyl sealants.
- With our click-in rail & clamps, you'll spend significantly less time on the roof, making installations quicker and hassle-free.



NXT UMOUNT™ RAIL
Available in Dark and Mill

NXT UMOUNT™ RAIL SPLICE



NXT UMOUNT™ MLPE & LUG CLAMP

STRONGHOLD™ ATTACHMENT KIT
Available in Dark and Mill

STRONGHOLD™ BUTYL ATTACHMENT KIT
Available in Dark and Mill

WHY NXT UMOUNT ?

Introducing NXT UMOUNT™, a revolutionary product by Unirac that stands as the ultimate testament to over two decades of engineering experience. Its thoughtful design, backed by rigorous engineering, world-class support, and a reliable supply chain, encapsulates the best of DESIGN, SIMPLICITY, and VALUE.
This innovative solar racking solution brings unparalleled versatility to solar installations, effectively representing the NXT level of solar mounting systems.

FOR QUESTIONS OR CUSTOMER SERVICE CONTACT:
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PUB2024JAN01-V1

CONFORMS TO UL2703

ISO 9001:2015 14001:2015 CERTIFIED

TÜV Rheinland PTL

Business Stream Products
Renewable and Solar Technology

Attn: Ben Stuart
Ecolibrium Solar Inc.
340 W State St, Unit 22
Athens, OH 45701

Email:
agunnoe@us.tuv.com

July 22, 2016

Letter of Compliance for UL 1703 System Fire Test

Type of Equipment: PV Module Mounting System
Model Designation: Ecofoot2+ (black resin, Resin 2)
TÜV Rheinland Project Number: ELS151221
Test Requirement: UL 1703 October 2015, §31.2

This letter is confirmation that the **Ecolibrium Solar Inc. Ecofoot2+ (black resin, Resin 2)**, when installed over a Class A Low Slope roof deck, has successfully completed fire testing according to UL 1703 ed. 3 R20151012, §31.2.

Congratulations on this achievement.

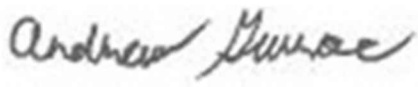
The Ecofoot2+ (black resin, Resin 2) PV Mounting System has demonstrated compliance with a Class A Fire Rating when installed with the following PV module Fire Classification Types:

- Type 1
- Type 2

Complete test results, including any necessary mitigation measures for the fire rating, can be found in report R1-ELS151221.

This correspondence may be used as a Letter of Compliance (LOC) indicating the **Ecolibrium Solar Inc. Ecofoot2+** has met the relevant system fire requirements. Resin 2 was used in this letter to further differentiate the tested product from the non-tested product of the similar model name. This letter is not intended to replace a certification nor is it an authorization to mark.

Sincerely,



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