SnapNrack™

Solar Mounting Solutions

RL Universal

Railless Residential Roof Mount System
Installation Manual

An Intro to SnapNrack RL Universal

SnapNrack's primary goal is to provide our customers with the lowest possible installed cost for mounting residential solar modules, without compromising the values the industry has come to expect: ease of use, quality, aesthetics, and safety. Designing with this goal in mind, we are proud to present the SnapNrack RL Universal Solar Mounting System.

SnapNrack has created a rail less system combining great features and benefits we are known for, with our Ultra Rail system and the most up to date technical innovation in the industry, thus reducing parts while driving down labor, material, and total installation costs. Designed to work with standard module frames, achieving UL 2703 Listing for Grounding/Bonding and Fire Classification, providing integrated wire management, aesthetics and our industry leading "Snap-In" features, SnapNrack is providing the simplest and most cost effective solar mounting solution on the market with RL Universal and SpeedSeal™ Track.

Benefits of Installing the SnapNrack RL Universal System

Install With Very Few Parts
This elimination of parts leads to a lower estimated system cost for both the installer and home owner.

Built in Wire Management and Aesthetics
Extensive wire management solutions have been designed specifically for the system that adapts to multiple possible mounting positions.

The system is designed to be aesthetically pleasing and sturdy with a skirt that provides considerable strength at the leading edge and an elegant look for those seeking high end looking systems.

Install RL Universal with SpeedSeal™ Track
SpeedSeal™ Track features an innovative design that incorporates flashing reliability into a single roof attachment. This eliminates loosening layers of composition and removing nails with a pry bar, leading to less damage to the roof, minimized potential roof leaks, and much faster installs.

Install RL Universal with SpeedSeal™ DeckTrack
As well as all of the benefits associated with the standard SpeedSeal™ Technology, SpeedSeal™ DeckTrack does not require rafter attachment. Simply attaching to the roof decking removes the requirement for pilot holes, and potential rafter misses that can cause leaks.

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Certification Details

SnapNrack RL Universal system has been evaluated by Underwriters Laboratories (UL) and Listed to UL Standard 2703 for Grounding/Bonding, and Fire Classification.

Grounding/Bonding

Only specific components have been evaluated for bonding, and are identified as being in the ground path. The RL Universal components that have been evaluated for bonding are the Mount Assembly, Ridge Mount Assembly, Link Assembly, Skirt, Flash Track, or SpeedSeal™ Track, SpeedSeal™ DeckTrack, Ground Lugs, and Smart Clips.

The following system components are not required to be bonded to the system based on the exceptions in clause 9.1 of UL 2703 1st Ed.: Skirt Spacer, Umbrella Bolt, Flashing and Positioning Springs. Wire management clips are utilized to route conductors away from these components and must be assembled according to the instructions.

This mounting system may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. See Appendix A for the list of modules tested with the RL Universal system for integrated grounding.

Ground Lugs have been evaluated to both UL 467 and UL 2703 Listing requirements. The following ground lugs have been approved for use: SnapNrack model 242-02101, 242-92202, and Ilsco models GBL-4DBT and SGB-4.

The following components have been evaluated for bonding as the fault current ground path: Mount Assembly, Ridge Mount Assembly, Link Assembly, Flash Track or SpeedSeal™ Track, SpeedSeal™ DeckTrack, and Ground Lugs. In order to maintain the Listing for bonding, wire management clips must be assembled to route conductors away from parts that have not been evaluated for bonding.

A Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-92202, is attached to the module frame flange, Flash Track, SpeedSeal™ Track, SpeedSeal™ DeckTrack or Ridge Mount Track for the normal attachment of a Grounding Electrode Conductor, which provides bonding within the system and eventual connection to a Grounding Electrode, as required by the U.S. NEC. Details of part no. 242-92202 can be found in Volume 1, Section 4, and Volume 2, Section 2. When this method is used, the grounding symbol is stamped onto the body of the ground lug to identify the grounding terminal.

An alternate method of grounding, A UL Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-02101 is attached to the Flash Track, SpeedSeal™ Track, or SpeedSeal™ DeckTrack. Details of part no. 242-02101 can be found in Volume 1, Section 4, and Volume 2, Section 1. When this method is used, the grounding symbol is stamped onto the body of the ground lug to identify the grounding terminal.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, Ilsco (E34440 and E354420) model SGB-4 is attached to the module frame flange, Flash Track, SpeedSeal™ Track, SpeedSeal™ DeckTrack, or Ridge Mount Track. When this method is used, the grounding terminal is identified by the green colored screws of the lug.

An alternate method of grounding, a UL Listed (KDER and QIMS) grounding lug, Ilsco (E34440 and E354420) model GBL-4BDT is attached to the module frame flange through the specified hardware and torque values. When this method is used, the grounding terminal is identified by the green colored set screw of the lug.

An alternate method of grounding, Enphase R/C (QIKH2)(QIMS2) model M250, M215 & C250 is bonded to the Listed PV module frame by the Enphase R/C (QIMS2) Model EFM-XXMM anodization piercing mounting/clamping kit. The total roof-mounted PV system is bonded (modules and microinverters)

together and the assembly is bonded to ground through the Enphase R/C (QIMS2) Engage Cables; Model ETXX-240, ETXX-208 or ETXX-277, when properly grounded at the service entrance. R/C (QIMS2), Dynoraxx (E357716) photovoltaic bonding device cat. no. Dynobond is an optional component that may be used with this system. The Dynobond device has been evaluated to provide module to module bonding. The Dynobond device attaches to the frame flange of adjacent modules Listed (QIMS), SnapNrack MLPE Frame Attachment Kit model 242-02151 has been investigated to bond approved MLPE device back plates to frames of modules.

Tested MLPE devices include the following:
- NRTL Listed, SolarEdge Optimizer Model P300-5NC4ARS, P320-5NC4ARS, P370-5NC4AFS, or P400-5NC4AFS
- Enphase R/C (QIKH2)(QIMS2) M250, M215 & C250
- Enphase – NRTL Listed Microinverter models IQ6-60-2-US, IQIQ7-60-2-US, IQ7-60-B-US
- Celestica International – Rapid Shutdown Device models DG-006-F001201x and DG-006-F001401x

The following MLPE devices have been evaluated for attachment to the Flash Track, SpeedSeal™ Track, and SpeedSeal™ DeckTrack using the SnapNrack MLPE Rail Attachment Kit, and the Flash Track, SpeedSeal™ Track, and SpeedSeal™ DeckTrack have been evaluated for use with Listed (QIMS) and Unlisted Component (KDER3) grounding lug, SnapNrack part no. 242-92202.
- SMA – Rapid Shutdown Device model RSB-2S-US-10
Additional MLPE devices were evaluated for attachment to the module with the SnapNrack MLPE Frame Attachment Kit model 242-02151 or through the device mounting means. These devices have not been evaluated for bonding, as the enclosures are entirely polymeric:
- Ginlong – Rapid Shutdown Device model Solis-MLRSD-R1-1G and Solis-MLRSD-R2-1G
- Tigo – Monitoring Device models TSR-4-F, TSR-4-M, TSR-4-O, TSR-4-S, TS4-R-M-DUO, TS4-R-O-DUO, TS4-R-S-DUO

When installing the MLPEs per the specifications in the MLPE Installation section of this manual, the system is bonded to the optimizer backing plate.

Fire

RL Universal has been investigated for a Class A System Fire Classification for a Steep-Sloped Roof with Type 1, Type 2 and Type 29 modules. Because the system was tested at 5 inches above the test roof fixture RL Universal can be installed without any height restrictions due to System Fire Classification. See Appendix A for potential module-specific height restrictions due to module temperature. The Skirt is considered an optional component with respect to Fire Classification, as RL Universal maintains the same Fire Classification Rating both with and without the skirt.

SnapNrack recommends a periodic re-inspection of the completed installation for loose components, loose fasteners, and any corrosion, such that if found, the affected components are to be immediately replaced.

Water Submersion Test

SnapNrack SpeedSeal™ Track has been evaluated for water penetration of composition shingle roofing systems by static water pressure head. Test method and apparatus were based on a version of ASTM Designation: E2140

Wind-Driven Rain Test

Only the following components have been evaluated for the Wind-Driven Rain Test per UL Subject 2582:
SpeedSeal™ Track, SpeedSeal™ DeckTrack, Comp Flashing, Composition Umbrella Flashing, Flash Track, Umbrella Bolt. Testing was conducted without roofing sealant and without the Umbrella Bolt Gasket.

Component Details

RL Universal Structural Components

Umbrella Lag

SnapNrack Umbrella Lag with Umbrella Sealing technology, assembly includes 5/16″ Lag screw with EPDM gasket and Umbrella washer

Composition Flash Track

SnapNrack Composition Flash Track to be installed with Composition Flashing and Umbrella Lag

5/16″ Lag Screw with Sealing Washer

SnapNrack 5/16″ Lag with Sealing Washer assembly including standard 5/16″ lag screw and sealing washer

SpeedSeal™ Track

SnapNrack SpeedSeal™ Track with advanced sealing technology, assembly includes SpeedSeal™ Track and foam Sealant Dam

SpeedSeal™ DeckTrack

SnapNrack SpeedSeal™ DeckTrack with advanced sealing technology, assembly includes SpeedSeal™ DeckTrack and Sealing Ring

Composition Flashing

SnapNrack Composition Flashing
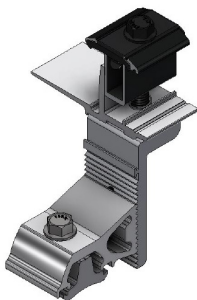
Mount

SnapNrack RL Universal Mount assembly including rock in channel nut, Riser, Leveler, Mount clamp, and spring
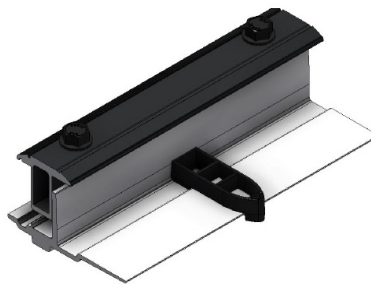
Link

SnapNrack RL Universal Link assembly including Link bottom, Link top, Link column spacer, and springs
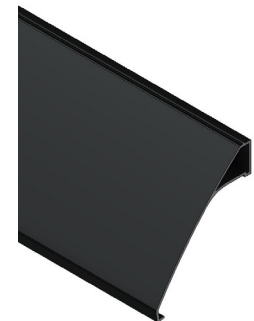
Skirt

SnapNrack RL Universal Skirt in double portrait or single landscape lengths

Component Details

RL Universal Structural Components
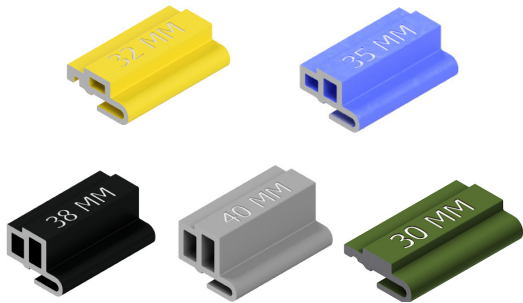
Skirt Spacers

SnapNrack RL Universal Skirt Spacer for 40mm, 38mm, 35mm, 32mm, and 30mm modules.

Ridge Mount

SnapNrack RL Universal Ridge Mount assembly including Ridge Mount Track, Ridge Mount Extension, Leveler, Mount Clamp, and spring

Wire Managements Components
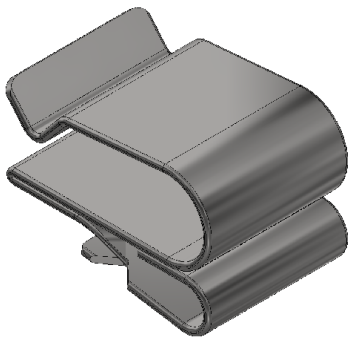
Smart Clip

Module frame cable clip, holds two PV wires or Enphase IQ-Cables
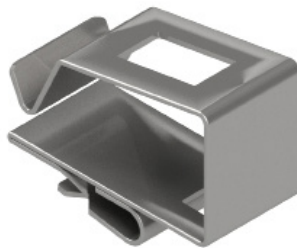
Smart Clip XL

Module frame cable clip, holds six PV wires or four Enphase IQ-Cable
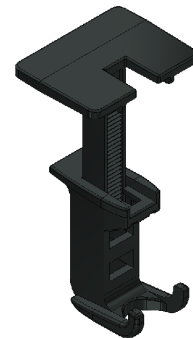
Wire Saver

Designed to secure conductors that become loose and hang below the array, holds one conductor

Grounding/MLPE Components
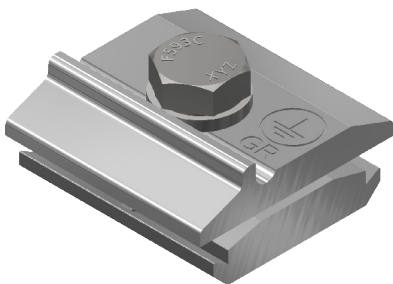
Ground Lug R

Ground Lug R including bonding channel nut, Ground Lug R PRC, bolt, and split lock washer.
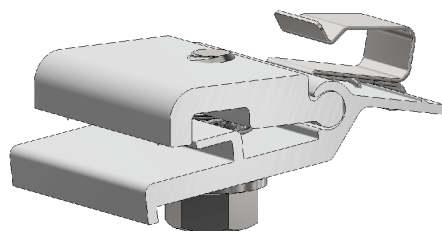
MLPE Frame Attachment Kit

Attaches MLPEs (Module Level Performance Enhancers) and other related equipment to the module frame.

Component Details

Hardware Torque Specifications

The recommended torque to be applied to components for proper assembly and bonding are as follows:

Hardware Description	Torque Specification
RL Universal ½" bolts; System Leveling Bolt, Drop In/Rock In Channel Nut, Mount Top-Down Clamp, Link Top-Down Clamp	12 ft-lb
Ground Lug model 242-92202 to Flash Track, SpeedSeal™ Track, Ridge Mount Track or Module Frame, and Ground Lug model 242-92202 to Grounding Electrode Conductor (6-12 SOL)	8 ft-lb
Ground Lug model 242-02101 to Flash Track or SpeedSeal™ Track (6-12 SOL)	16 ft-lb
MLPE Frame Attachment Kit, MLPE Rail Attachment Kit	10 ft-lb
SolarEdge Frame Mounted Microinverter Bracket to Module Frame	11 ft-lb
Enphase Frame Mounted Microinverter Bracket to Module Frame	13 ft-lb
Ground Lug model SGB-4 to module or Flash Track	75 in-lb
Ground Lug model SGB-4 to module, Flash Track or SpeedSeal™ Track	75 in-lb
Ground Lug model SGB-4 to Grounding Electrode Conductor (4-14 SOL or STR)	35 in-lb
Ground Lug model GBL-4DBT to module	35 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (10-14 SOL or STR)	20 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (8 SOL or STR)	25 in-lb
Ground Lug model GBL-4DBT to Grounding Electrode Conductor (4-6 SOL or STR)	35 in-lb

Pre-Installation Requirements

Site Survey

● Measure the roof surfaces and develop an accurate drawing, including any obstacles such as chimneys and roof vents.

● If plans for the roof structure are available, verify that the plans match the final structure.

● Identify any roof access or setback areas as required by the local AHJ.

● Identify any construction issues that may complicate the process of locating rafters from the roof surface.

● If you find structural problems such as termite damage or cracked rafters that may compromise the structure's integrity consult a structural engineer.

Image note: X-Axis described in this manual is cross-slope on the roof, Y-Axis is in line with the roof slope.

Design Guidance

● PV Designers should account for the 0.75 inch spacing between rows and columns of modules when creating the layout.

● Ridge Mounts are required if modules will be installed with the top edge of the modules less than 12 inches from the ridge peak.

● Draw the rafter location on the layout to identify where roof attachments can be installed.

● Determine site conditions for calculating the engineering values, confirm site conditions and code versions comply with local AHJ requirements.

● Reference site conditions and system specifications in RL Universal Structural Engineering Report to determine maximum attachment spacing and cantilever values

● Draw roof attachment locations on layout based on maximum attachment spacing and cantilever values

> ⚙ **Design Recommendation:**
> Four roof attachments per module are recommended for at least one module per row to provide rigidity in the array.

● Staggering rows of attachments on alternating rafters is acceptable, and may provide more evenly distributed loads on the roof structure.

● Identify homerun and Junction Box locations based on rooftop wiring requirements.

● Mark distance from array edge to identifiable roof feature in x and y axes.

● Mark distance from array edge to identifiable roof feature in x and y axes.

● Insert SnapNrack installation details into design plan set specific to the project requirements.

> ⚠ **Safety Guidance**
>
> ● Always wear appropriate OSHA approved safety equipment when at active construction site.
>
> ● Appropriate fall protection or prevention gear should be used. Always use extreme caution when near the edge of a roof.
>
> ● Use appropriate ladder safety equipment when accessing the roof from ground level.
>
> ● Safety equipment should be checked periodically for wear and quality issues.
>
> ● Always wear proper eye protection when required.

System Layout

Required Tools

● Roof Marking Crayon or Chalk   ● Tape Measure   ● Prybar (Not required with SpeedSeal™ Track)

LAYOUT INSTRUCTIONS

1) Transfer the layout to the roof using marking crayon or chalk and identify the outside corners of the array. Draw attachment locations on the roof positioned in the x-axis to land on a rafter and in the y-axis to land between modules rows.

2) **(Not required for SpeedSeal™ Track - Flash Track installation only)** Use a prybar to loosen layers of composition above proposed attachment locations in preparation for proper flashing placement
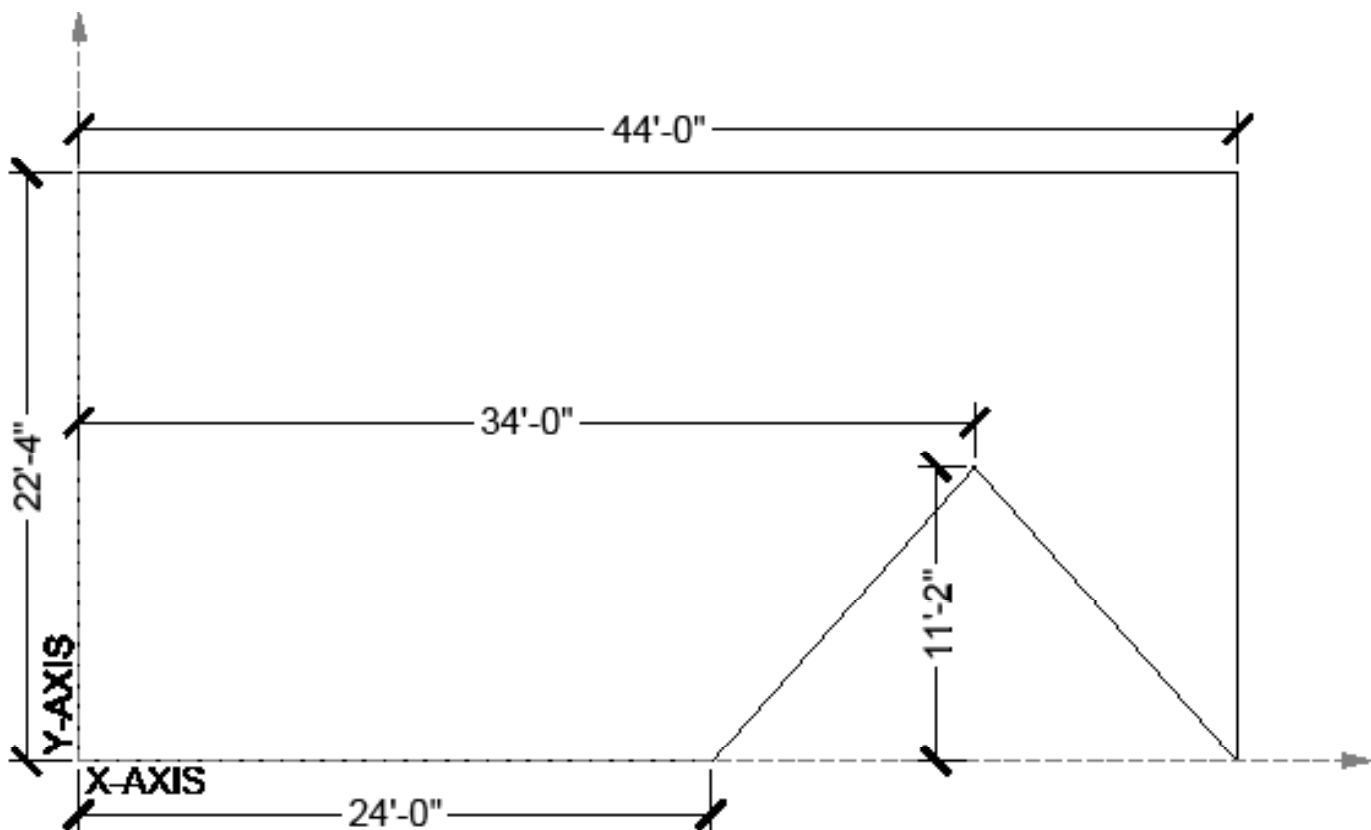
| ⚙ | Layout Note: | Ensure the final roof attachment locations do not exceed the maximum attachment spacing and cantilever specified in the design plan |

Composition Shingle Installation

Required Tools

- Hammer or Stud Finder
- Roof Sealant
- 1/2" Socket
- Roof Marking Crayon or Chalk
- Socket Wrench
- Pry Bar (Not required with SpeedSeal™ Track)
- Drill with 3/16" Drill Bit
- Torque Wrench

Materials Included - Flash Track & Composition Flashing

1. (1) SnapNrack Composition Flashing
2. (1) SnapNrack Flash Track
3. (1) SnapNrack 5/16" SS Umbrella Lag Screw
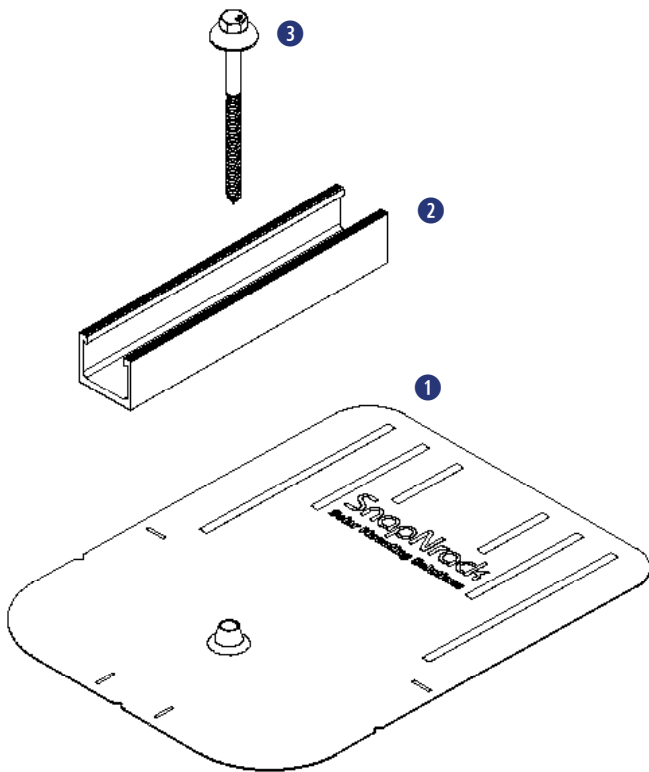
Materials Included - SpeedSeal™ Track

1. (1) SnapNrack SpeedSeal™ Track Sealing Base
2. (1) $\frac{5}{16}''$ SS Lag Screw
3. (1) $\frac{5}{16}''$ SS Washer (Sealing Washer is recommended)
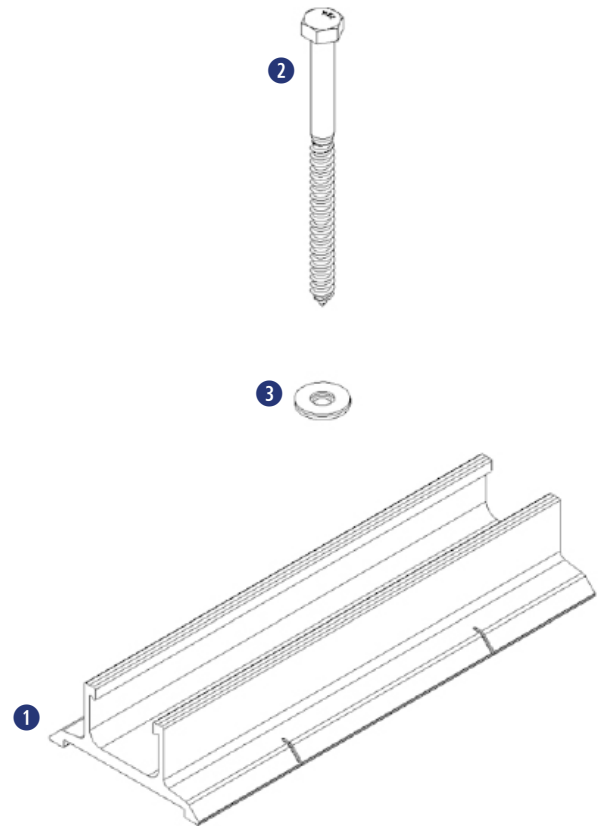
Materials Included - SpeedSeal™ DeckTrack

1. (1) SnapNrack SpeedSeal™ DeckTrack Sealing Base
2. (4) 1/4" x 20 SS Screw
3. (4) 1/4" SS Washer (Sealing Washer is recommended)
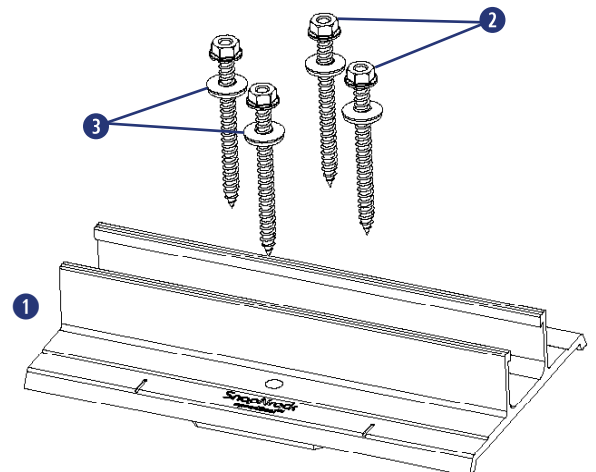
Composition Shingle Installation

INSTALLATION INSTRUCTIONS - FLASH TRACK & COMPOSITION FLASHING
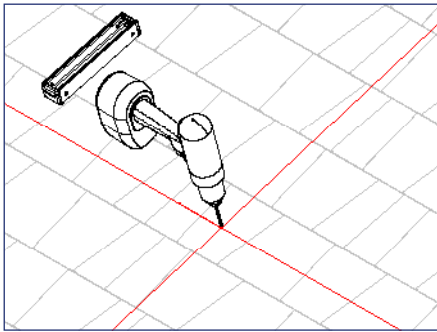
1) Using a Flash Track as a template, drill a pilot hole into the rafter with 3/16" drill bit.
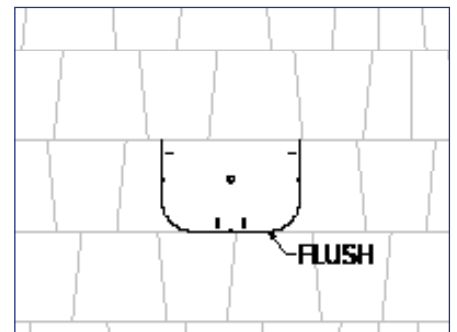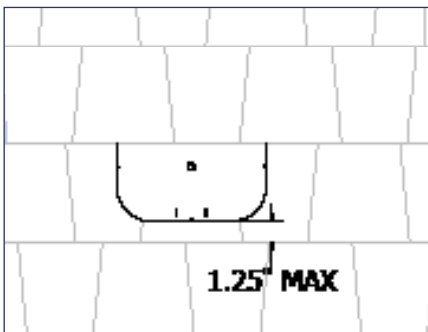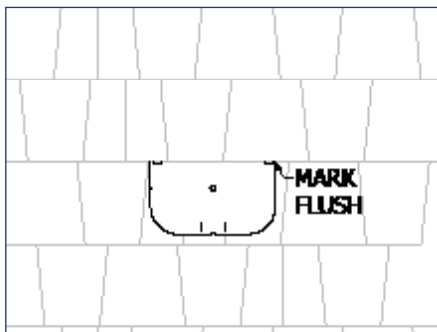
⚙ Install Note:

Composition Flashings should be installed in the nominal position; It is acceptable to install the flashing with leading edge of flashing 1-1/4" above the leading edge of first course of composition, or flush with the leading edge of the first course of composition.
Marks on flashing edge are a guide and may be used to simplify installation. Align overlapping composition leading edge with marks.

2) Apply roofing manufacturer's approved sealant to lag screw, apply sealant in a circle around pilot hole and fill pilot hole with sealant.
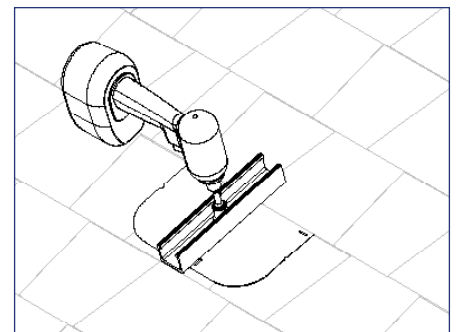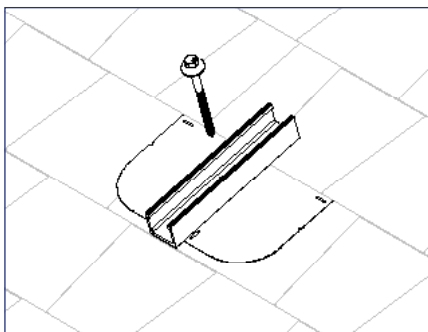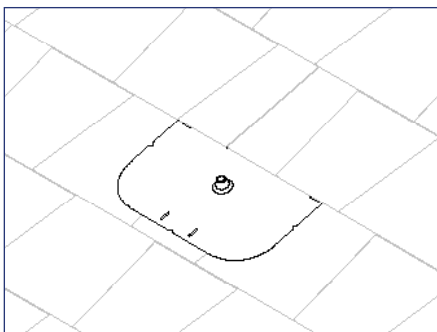
3) Install flashing underneath shingle course directly above pilot hole, align hole in flashing with pilot hole.

4) Place Flash Track over hole in flashing, drive Umbrella Lag through hole in Flash Track, flashing, and into pilot hole for minimum 2.5" embedment in rafter

⚙ Install Note:

Ensure flashing extends minimum (2) courses above base.

Best Practice: Apply a U-shape of sealant on top portion of flashing underside.

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Composition Shingle Installation

INSTALLATION INSTRUCTIONS - SPEEDSEAL™ TRACK
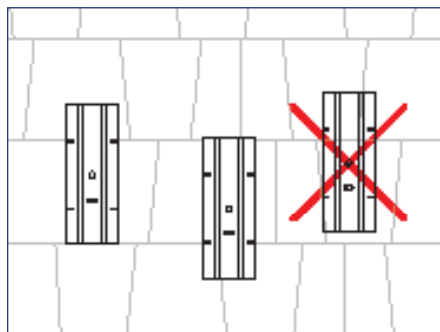
1) Position SpeedSeal™ Track. Tracks must be positioned with the portion between the lines entirely on one course of composition.
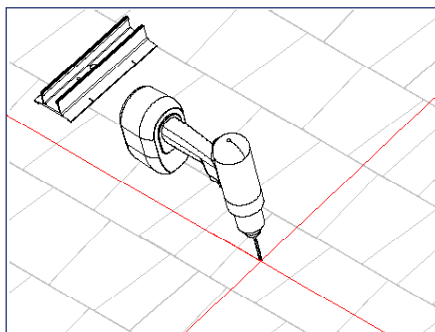
2) Using a SpeedSeal™ Track as a template, drill a pilot hole into the rafter with 3/16" drill bit
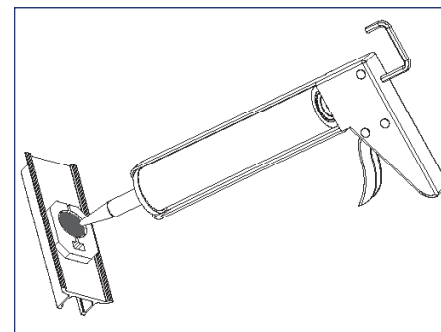
3) Turn SpeedSeal™ Track over and fill circular portion of dam created by foam with roof sealant
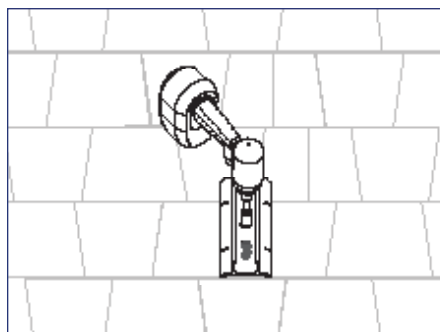
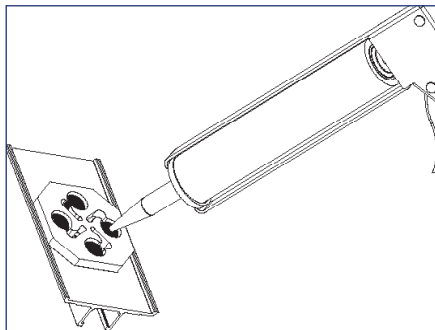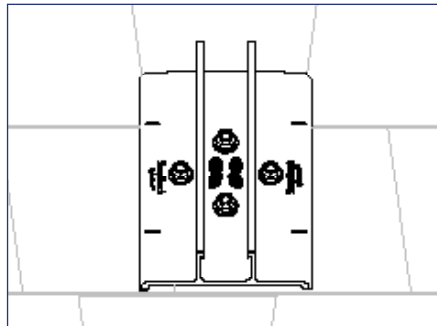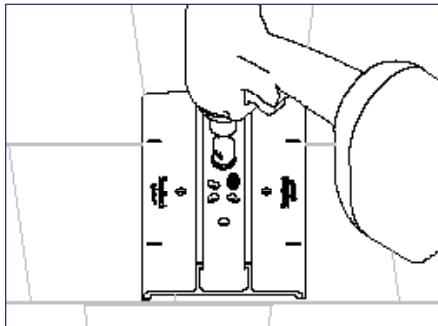4) Attach SpeedSeal™ Track to roof using a 5/16" SS lag screw and washer.

> ⚙️❓ **Install Note:**
>
> Roof sealant should be expelled from the vent of the SpeedSeal™ Track as it is installed to assure the proper amount of roof sealant has been applied. If no sealant is expelled, remove SpeedSeal™ Track and add more sealant to the cavity then reinstall on roof.

Composition Shingle Installation

INSTALLATION INSTRUCTIONS - SPEEDSEAL™ DECKTRACK FOR RAFTER & ROOF DECKING
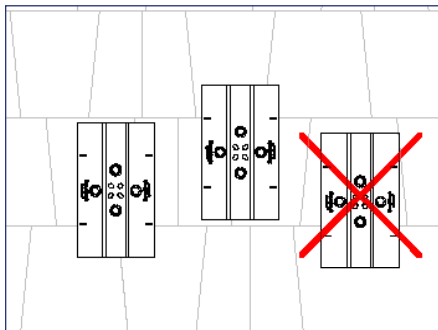
1) Position SpeedSeal™ DeckTrack. DeckTracks must be positioned with the portion between the lines entirely on one course of composition.

2) Fill all four cavities on bottom of SpeedSeal™ DeckTrack created by foam sealant gasket with roof sealant to ensure a watertight seal.

> ⚙ **Install Note:**
> Fill any seam in shingles within 4" of a deck screw with sealant prior to installing SpeedSeal™ DeckTrack.

3) Attach SpeedSeal™ DeckTrack to roof using four (4) ¼" x 2½" SS lag screws and washers.

> ⚙ **Install Note:**
> Roof sealant should be expelled from all four vents of the SpeedSeal™ DeckTrack as it is installed to assure the proper amount of roof sealant has been applied. If sealant is not expelled from all four vents, remove SpeedSeal™ DeckTrack and add more sealant to the cavity then reinstall on roof.
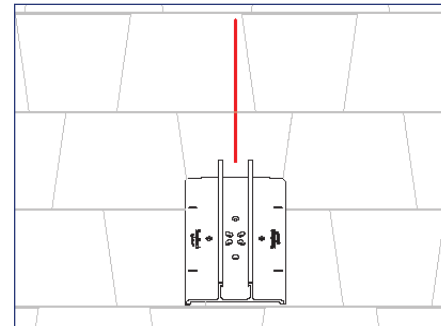
4) **Optional Rafter attachment step:** After locating and marking rafters on the roof use four (4) ¼" x 2½"SS lag screws and washers to attach the DeckTrack to rafters and decking by following steps 1-3 above. The two lag screws in the center of the DeckTrack must be embedded into the rafter.
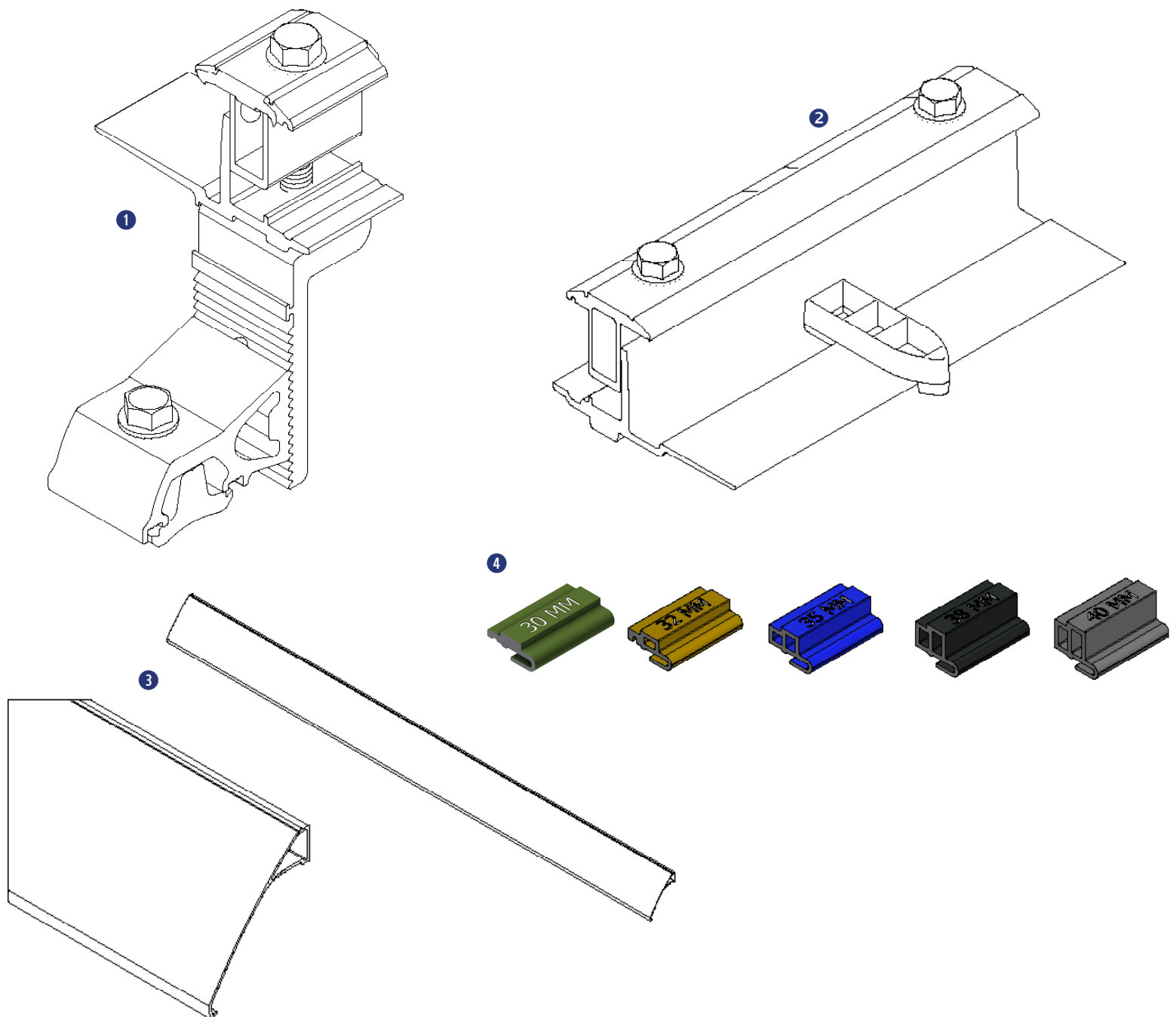
RL Universal Mount & Skirt Installation

Required Tools

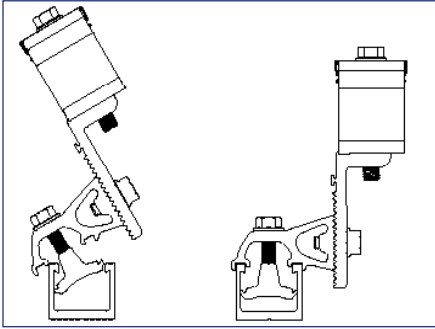● Socket Wrench   ● Torque Wrench   ● 1/2" Socket   ● String Line

Materials Included - RL Universal Mount

❶ (1) RL Universal Mount

❷ (1) RL Universal Link
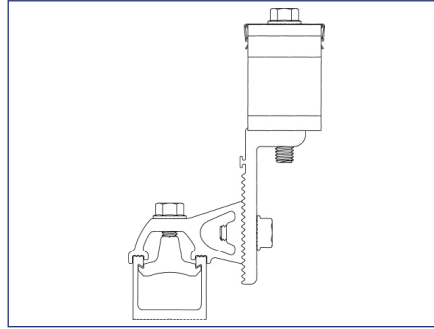
❸ (1) RL Universal Skirt

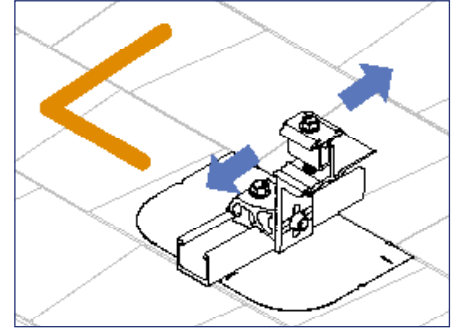❹ (1) RL Universal Skirt Spacers

❶

❷

❸

❹

30 MM   32 MM   35 MM   39 MM   40 MM

INSTALLATION INSTRUCTIONS

1) Install the font row of Mounts by rocking the channel nut on bottom of RL Universal Mount into Flash Track, or SpeedSeal™ Track.

2) Partially tighten Riser bolt to seat the channel nut into the Flash Track, or SpeedSeal™ Track.
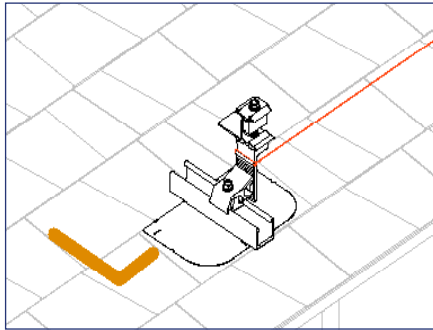
> **⚙ Install Note:**
> Mounts can be installed on either the left or right side of the Flash Track, or SpeedSeal™ Track to avoid any interference with Links

3) Slide the bottom two corner Mounts up or down in the SpeedSeal™ Track, or Flash Track until aligned with the bottom edge of array as marked on the roof, then tighten the Riser bolt.

> **⚙ Install Note:**
> Channel nuts must be fully engaged in track and must not extend beyond either end of the track
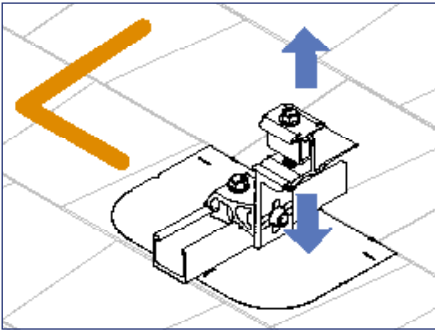
4) To set the RL Universal Mount level loosen the Leveler bolt and move the Leveler up or down, then tighten the Leveler bolt and torque to 12 ft-lb.

5) Run string line along bottom row to align and level RL Universal Mounts between the corner mounts
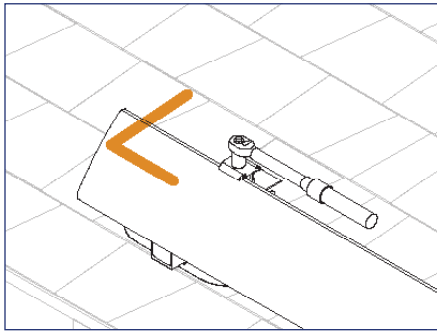
> **⚙ Install Note:**
> Use the string line catch and alignment feature on Mounts to hold the string line in place to level and align the Mounts
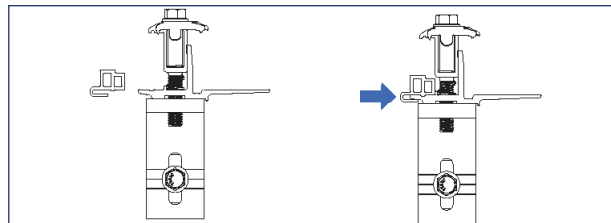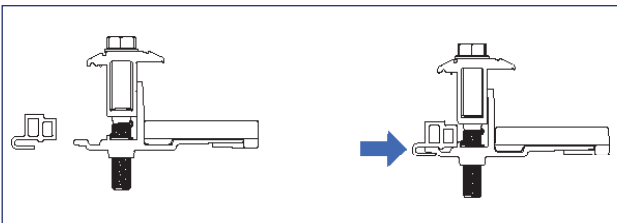
6) RL Universal Spacers will need to be added to Mounts and Links where Skirt will be installed
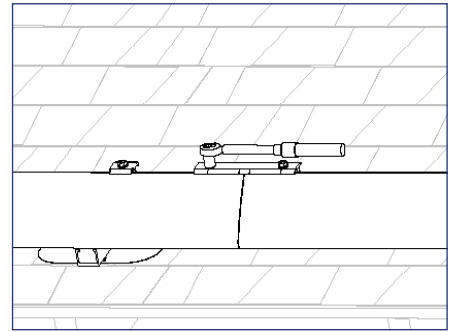
RL Universal Skirt Installation

7) Install RL Universal Skirt by holding the skirt in Mount, sliding Skirt to align with array layout marks, and clamping skirt into mount
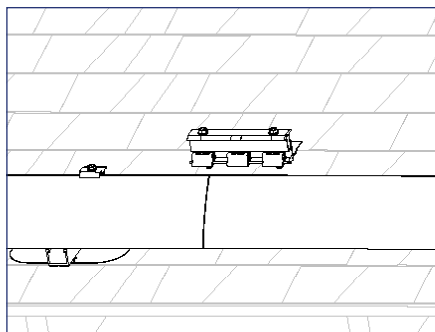
8) Use RL Universal Links to connect multiple lengths of Array Skirt
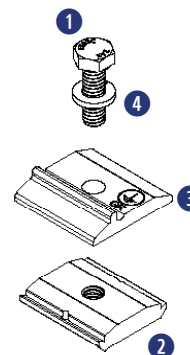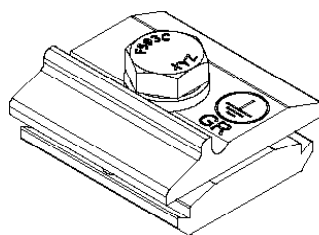
Wire Management

Required Tools

● Socket Wrench   ● Torque Wrench   ● 1/2" Socket   ● Electrician Tools
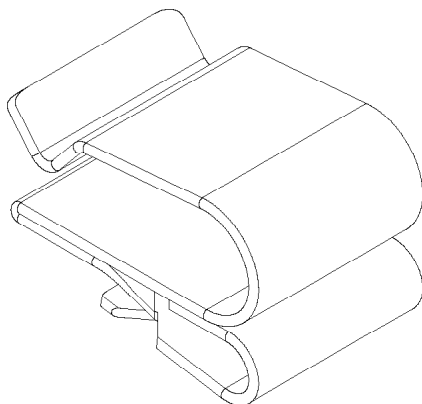
Materials Included

SnapNrack Ground Lug R (242-92101)

1 (1) Bolt, Hex Cap, 5/16" - 18" X 1", SS

2 (1) SnapNrack Bonding Channel Nut

3 (1) SnapNrack Ground Lug R PRC
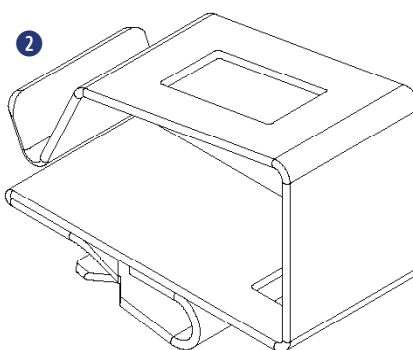
4 (1) 5/16" SS Split Lock Washer
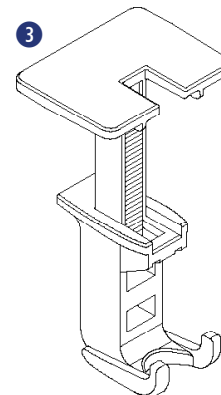
Smart Clips

1 (1) Smart Clip ((2) PV Wire, (1) Enphase IQ Cable

2 (1) Smart Clip XL ((6) PV Wire, (4) Enphase IQ)

3 (1) Wire Saver ((1) PV Wire)

Smart Clip   Smart Clip XL   Wire Saver
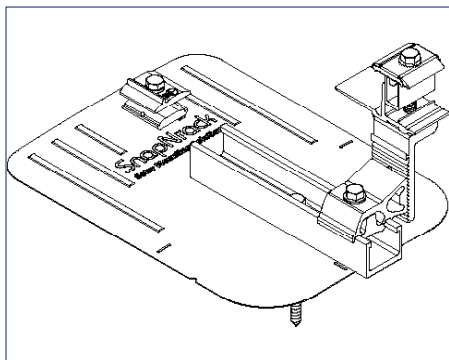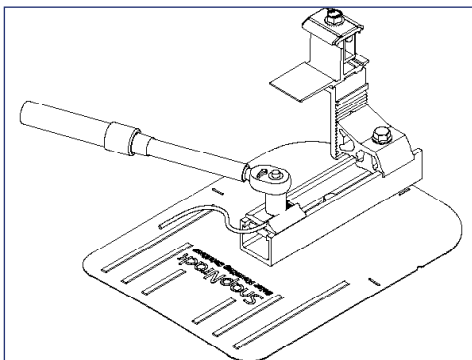
Wire Management

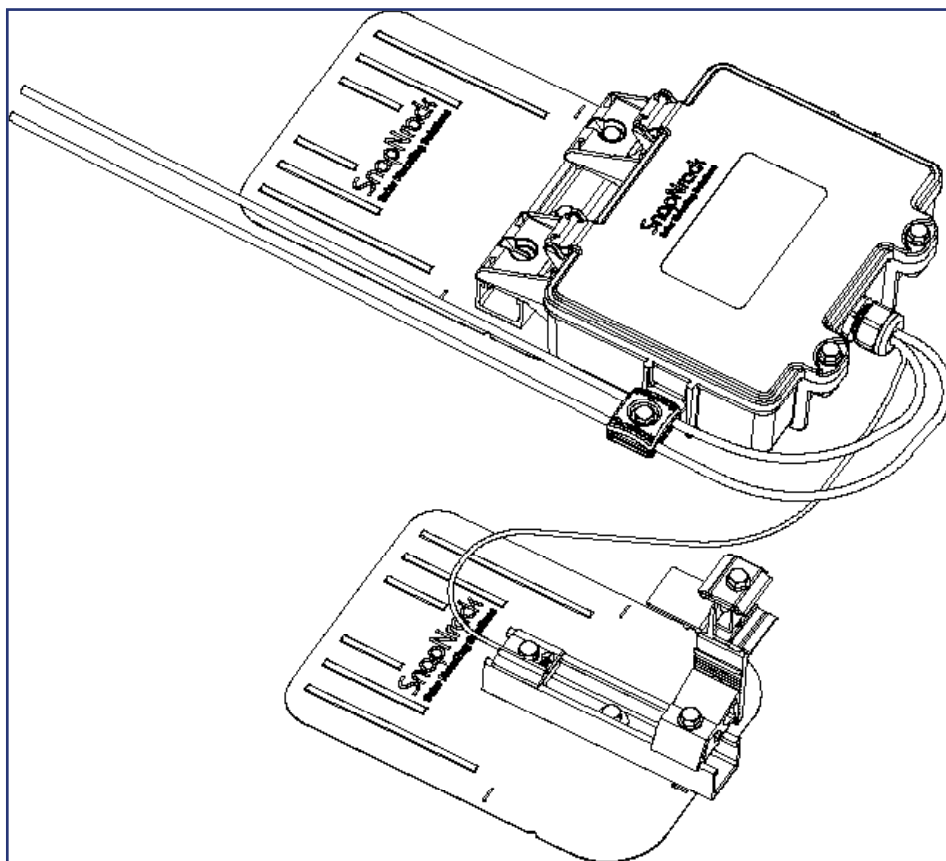## INSTALLATION INSTRUCTIONS - RL GROUND LUG

The RL Ground Lug to be used in accordance with the National Electric Code, ANSI/NFPA 70.

1) Ground Lug R can be attached to any Flash Track, or SpeedSeal™ Track near the Junction Box. Insert Ground Lug R into Flash Track, or SpeedSeal™ Track.

2) Run 10 – 6 AWG, solid, bare copper GEC into Ground Lug R channel, torque clamping bolt to 16 ft-lb


3) Run bare, solid EGC from Ground Lug R to Junction Box, bond bare EGC to stranded EGC in Junction Box. For details on installing the Junction Box reference the **RL Universal Junction Box Installation Manual.**

Wire Management

INSTALLATION INSTRUCTIONS - SMART CLIPS

Route all conductors away from A Mounts and B Mount Bases and Flashings. SmartClips should be used to keep conductors routed away from non-bonded components.

▲ **SMART CLIP**
— **HOME-RUN/TRUNK CABLE**
— **PV CONDUCTORS**
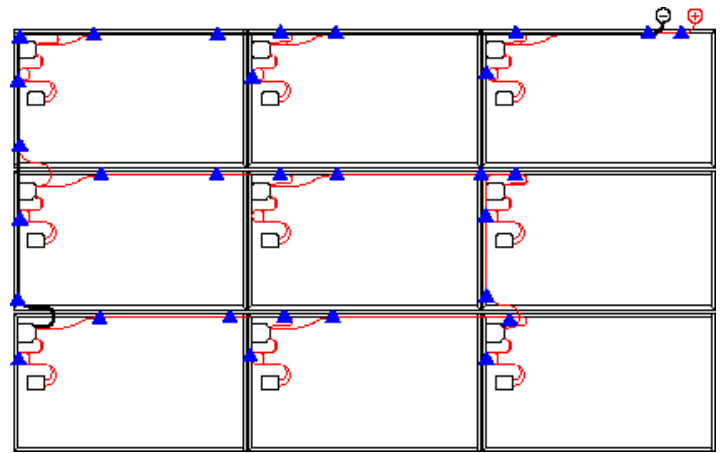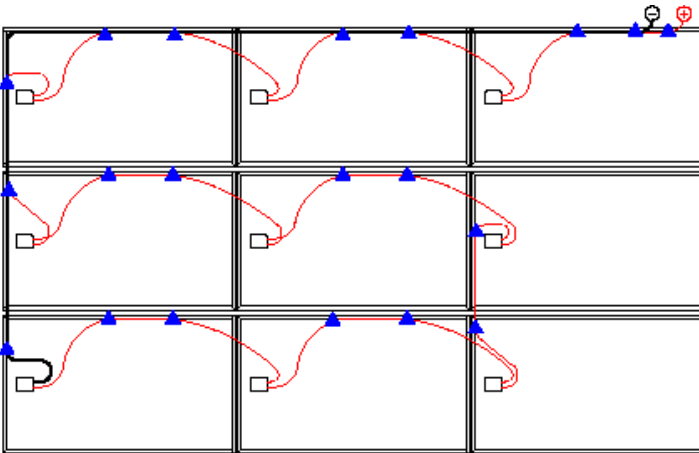
1A) For central inverter and DC to DC MLPE systems: Identify where PV string poles are located, use SnapNrack Smart Clips to manage conductors in route from far pole to the Junction Box

> ⚙ **Install Note:**
> Use Smart Clips to manage PV module leads connected to the MLPE
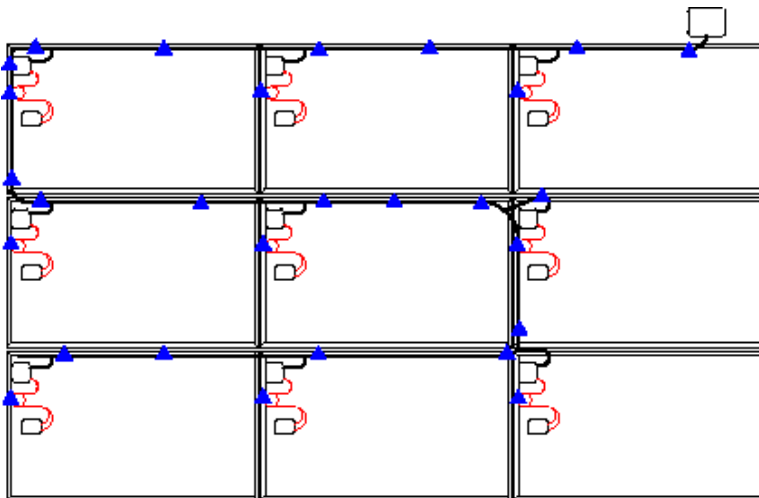
1B) For microinverter systems: Identify route from furthest microinverter to Junction Box, use Smart Clips to manage AC trunk cables and multiple PV wires.

MLPE & RSD Installation

Required Tools

● Socket Wrench   ● Torque Wrench   ● 1/2" Socket
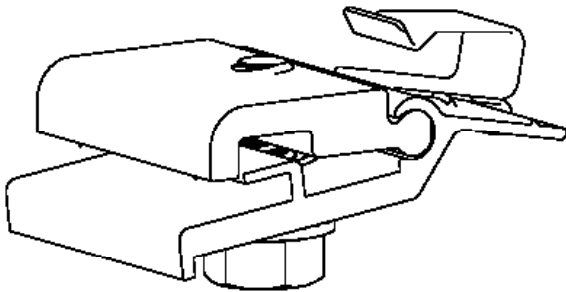
Materials Included - MLPE Rail Attachment Kit

❶ (1) SnapNrack MLPE Frame Attachment Top

❷ (1) SnapNrack MLPE Frame Attachment Bottom

❸ (1) 5/16"-18 X 3/4" Serrated Flange Bolt SS

❹ (1) SnapNrack Smart Clip

❺ (1) SnapNrack MLPE Frame Attachment Coil Spring SS
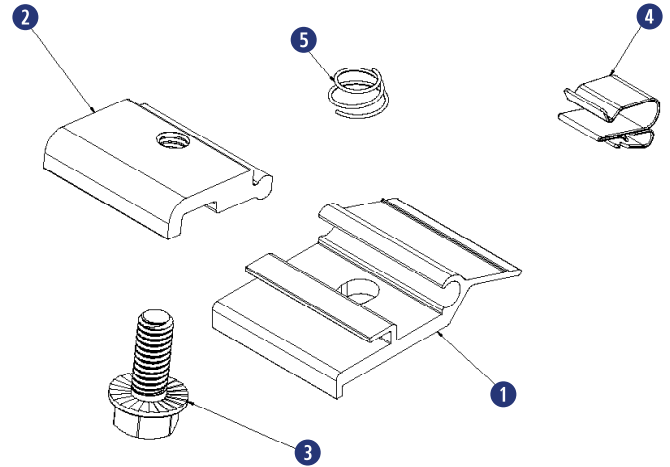
Materials Included

SolarEdge Frame Mount

❶ (1) SolarEdge Optimizer w/ Frame-Mounted Module

Add-On

Enphase Frame Mount

❶ (1) Enphase Microinverter

❷ (1) Enphase Frame Mount

MLPE & RSD Installation

INSTALLATION INSTRUCTIONS - SNAPNRACK MLPE FRAME ATTACHMENT KIT

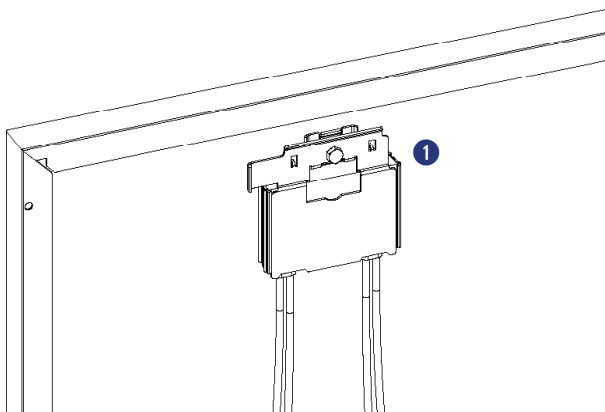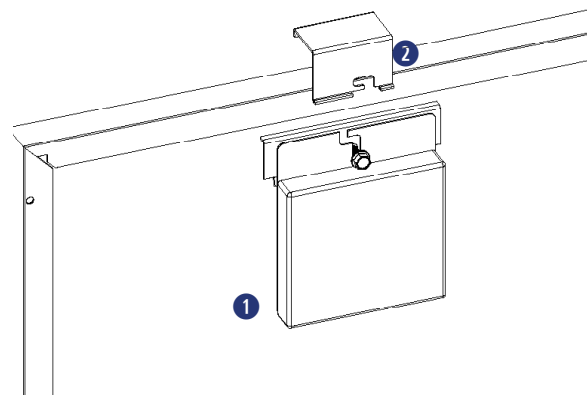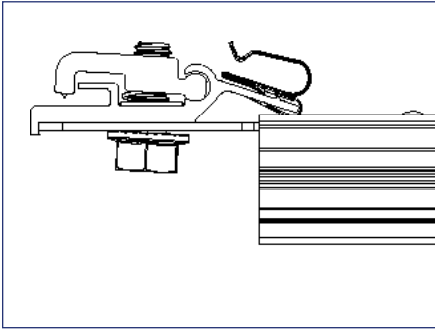SnapNrack MLPE Frame Attachment kit are used to attach module level performance enhancing devices, and other devices such an SRD (rapid shutdown device), directly to module frames, and provide integrated grounding/bonding for Devices grounded through metal back plate. (Refer to the list of tested MLPE devices on page 4 of this manual)

1) Slide the backplate channel of the MLPE device under the MLPE Frame Attachment Kit bolt. The MLPE mounting plate should rest against the MLPE mounting plate backstop on the MLPE Frame Attachment Kit
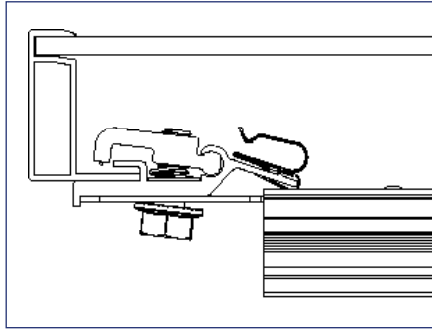
2) Position the MLPE Frame Attachment Kit on the module frame flange in a location that will not interfere with mounting system components. The module frame flange should rest against the module flange backstop on the MLPE Frame Attachment Kit.

> ⚙ **Install Note:**
> Avoid blocking module frame drainage holes when installing the MLPE Frame Attachment Kit.
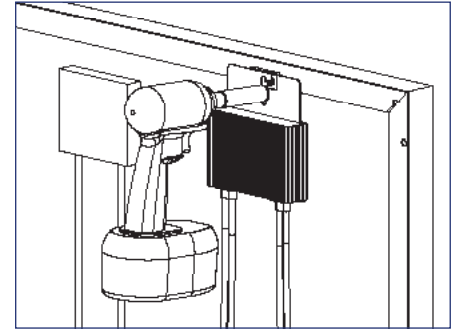
3) Tighten the mounting bolt on the MLPE Frame Attachment Kit to 10 lb-ft (120 lb-in).

> ⚙ **Install Note:**
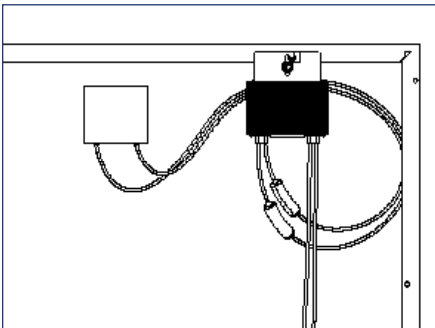> The MLPE Frame Attachment Kit bonds the following components: Module Frame, MLPE backplate and Smart Clip.
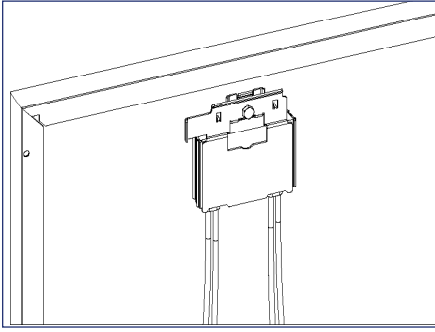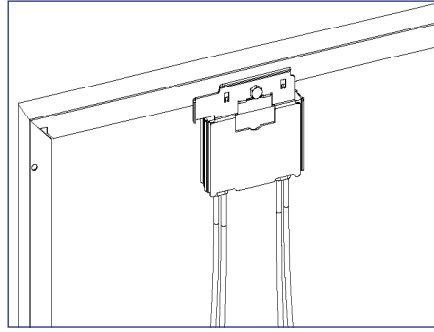

4) Connect the module leads to the input connectors on the MLPE device and manage conductors with the integrated Smart Clip.

MLPE & RSD Installation

INSTALLATION INSTRUCTIONS - SOLAREDGE FRAME MOUNT

1) Locate the SolarEdge optimizer with Frame-Mounted Module Add-On at a location on the module frame that will not interfere with the RL Universal Mounts.

2) Install the optimizer mounting plate onto the module frame and tighten hardware to 11 ft-lbs.
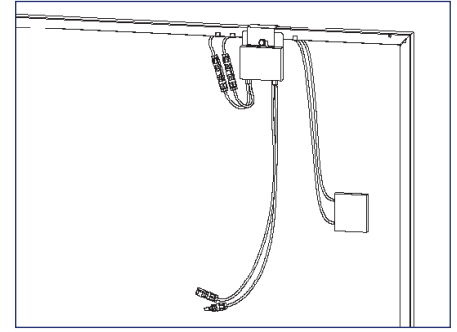
3) Connect the module leads to the input connectors on the optimizer and manage conductors with SnapNrack Smart Clips.

⚙ Install Note:
If module is mounted in portrait, install MLPE on long side, short side for landscape.

INSTALLATION INSTRUCTIONS - ENPHASE FRAME MOUNT
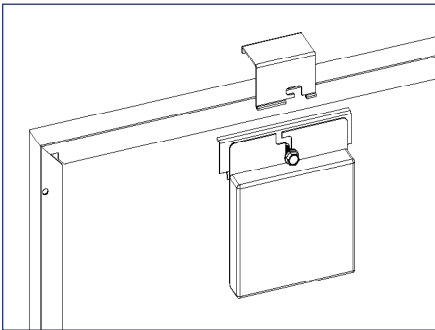
1) Locate the Enphase Frame Mount bracket clamp at a location on the module frame that will not interfere with the RL Universal Mounts.
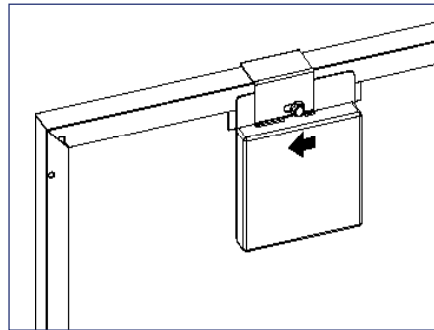
2) Slide the microinverter unit onto the bracket clamp, then move it slightly to the left.

⚙ Install Note:
The microinverter mounting flange should be on the outside of the module frame.
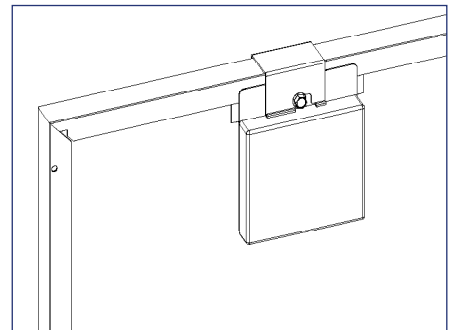
3) Tighten the hardware to 13 ft-lbs

4) Connect module leads to microinverter DC connectors.

⚙ Install Note:
Refer to the Enphase Frame Mount installation guide for additional instructions.

MLPE & RSD Installation

INSTALLATION INSTRUCTIONS - DECK MOUNTED MLPE & RSD
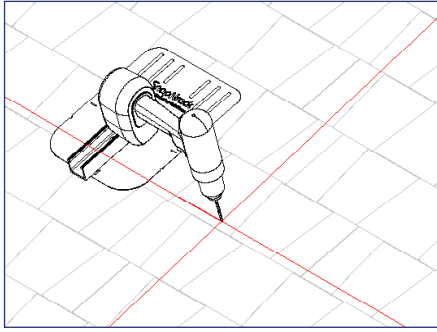
1) Drill pilot hole into decking with 3/16" drill bit, and apply roofing manufacturer's approved sealant to lag screw, in a circle around pilot hole, and fill pilot hole with sealant
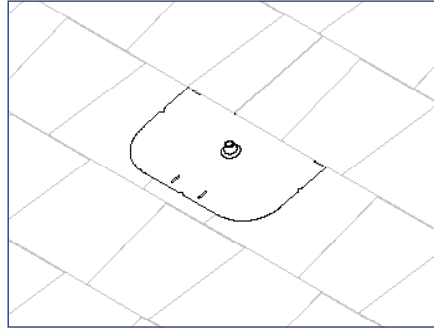
2) Install flashing underneath shingle course directly above pilot hole aligning hole in flashing with pilot hole.
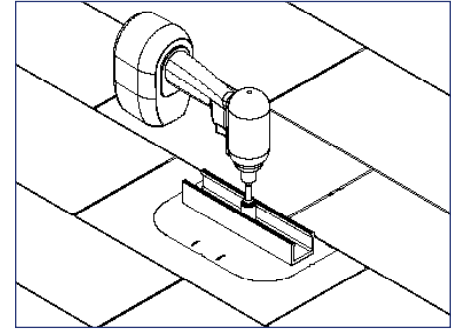
3) Place Flash Track over hole in flashing parallel with composition course, drive 2½″ Umbrella Lag through hole in Flash Track, flashing, and into pilot hole
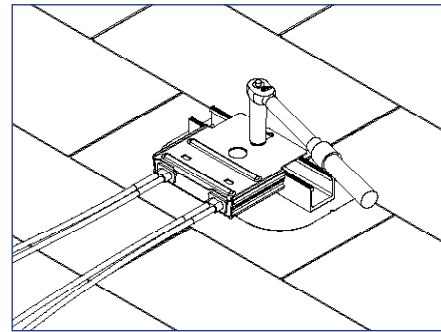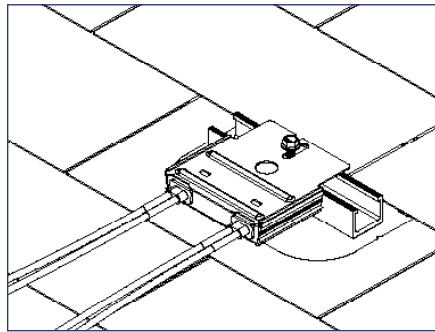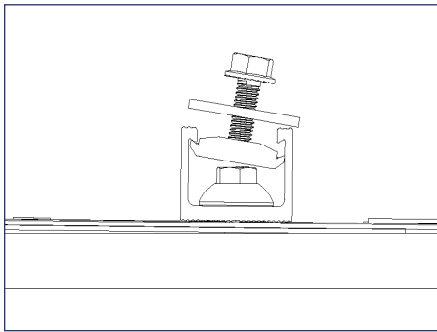
4) Insert channel nut of MLPE Attachment Kit into Flash Track, insert back plate of device over the large fender washer, and tighten bolt to 10-16 ft-lb

> ⚙ **Install Note:**
>
> The RL Universal SpeedSeal™ Track can also be used as a means of attaching RSDs, junction boxes, and other hardware to the roof.

Module Installation

Required Tools

● Socket Wrench   ● Torque Wrench   ● 1/2" Socket

Materials Included

❶ SnapNrack RL Universal Link

❷ RL Universal Mount
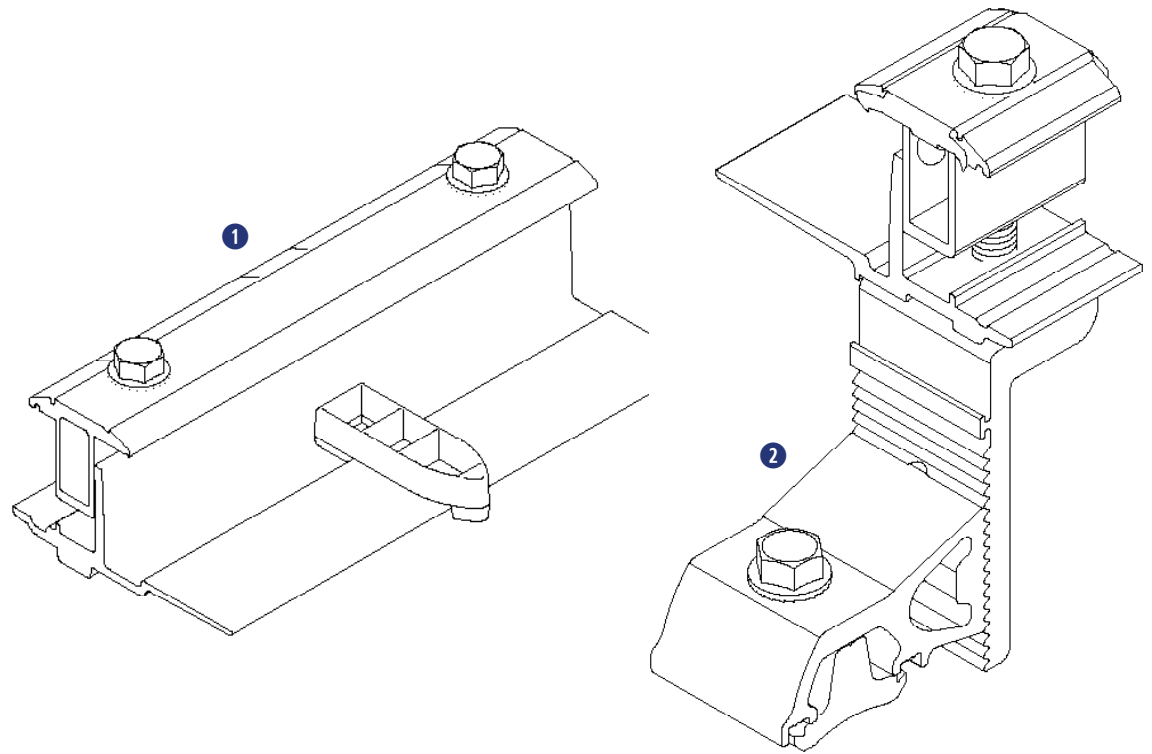
Other Materials Required

② **SnapNrack Smart Clip (2-5 per module)**

③ **SnapNrack Smart Clip XL (10-20 per array)**
   See Wire Management section for details
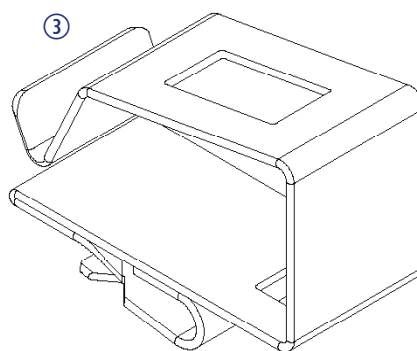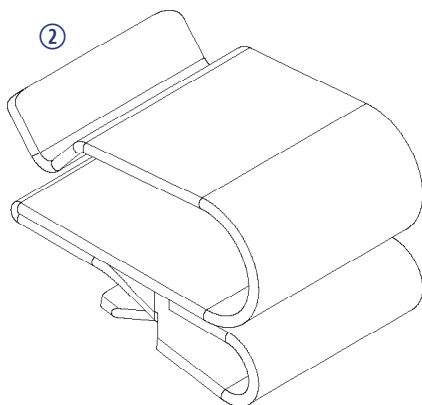
Module Installation

INSTALLATION INSTRUCTIONS - BOTTOM ROW

> ⚙️ **Install Note:**
>
> It is recommended that module leads and connectors are prepared for installation using SnapNrack Smart Clips before being brought to the rooftop.
> * With no MLPE, secure module leads to module frame to allow access to connectors while modules are installed
> * Secure MLPE device to module frame with SnapNrack MLPE Frame Attachment Kit and connect module leads to MLPE, and manage leads by positioning connectors to allow access during installation
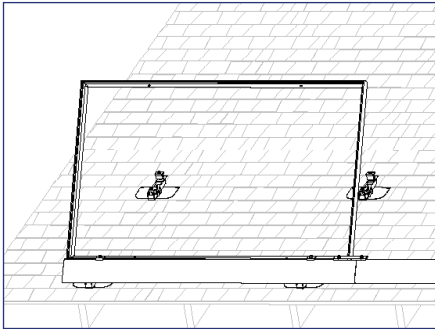
1) Rest downslope edge of module on the Mounts and/or Links position module so side edge is flush with marked edge of array layout
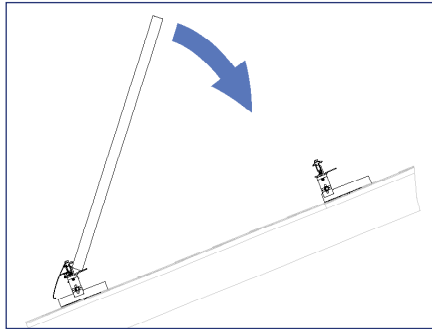
2) Lower upslope edge of module while simultaneously applying slight pressure to seat module into Mounts and/or Links
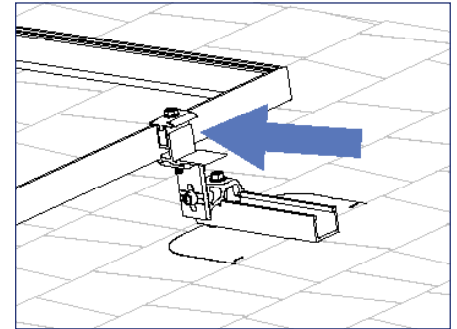
3) When module is level with roof slide Mount down the Flash Track, SpeedSeal™ Track, or SpeedSeal™ DeckTrack, and engage Mount clamp on upslope edge of module
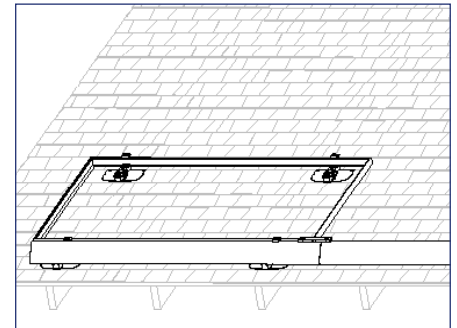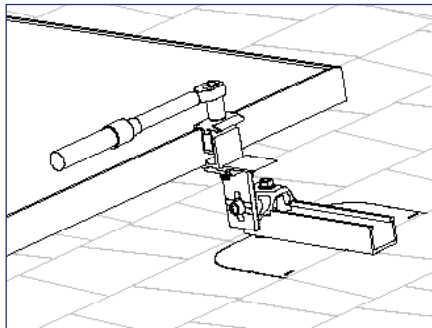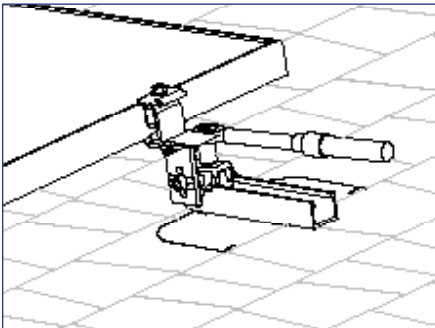
4) With the Mount fully engaged on the module frame first tighten channel nut bolt, then tighten Mount clamp bolt

> ⚙️ **Install Note:**
>
> Channel nuts must be fully engaged in track and must not extend beyond either end of the track.

Module Installation

INSTALLATION INSTRUCTIONS - BOTTOM ROW
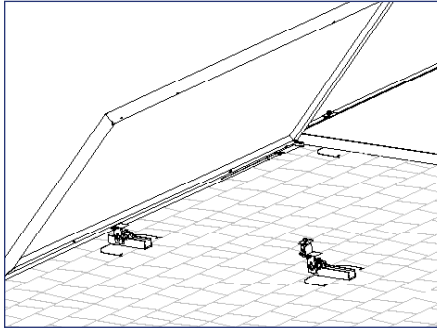
5) Install next module in row by placing downslope edge of module onto Links and Mounts then lower upslope edge of module until level with roof

> ⚙ **Install Note:**
> Push modules together so they are tight against the Link module spacer
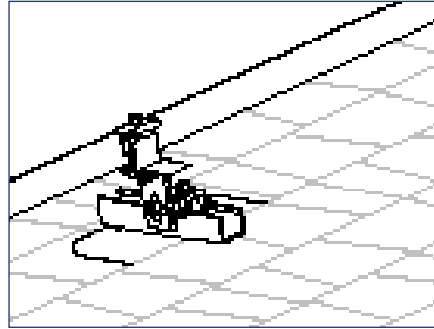
6) Slide Mount down the Flash Track, SpeedSeal™ Track or SpeedSeal™ DeckTrack, and position the Mount to support the Module
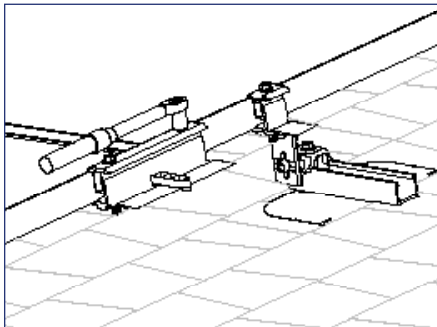
7) Attach Link to upslope side of modules tighten clamp bolts to engage both modules.
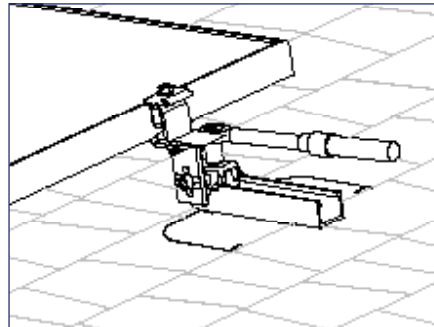
8) Engage Mounts on the module frame and tighten channel nut bolt, then tighten Mount clamp bolt.
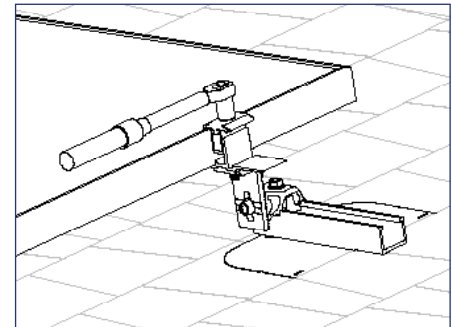
9) Repeat steps 5-7 for additional rows of modules in array

Ridge Mount Installation

INSTALLATION INSTRUCTIONS - RIDGE MOUNT

> ⚙ **Install Note:**
> RL Ridge Mounts should not be used to extend modules beyond the ridge. Overhanging an adjacent roof is not approved by SnapNrack.
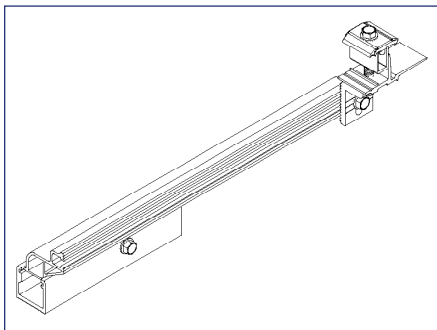
1) Attach Ridge Mount Track with minimum 2-½" of embedment in to structural member and minimum 5" from Ridge to end of Composition Flashing
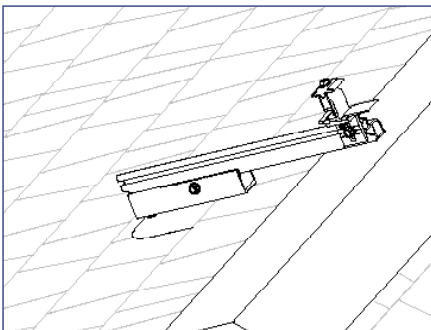
2) Slid Ridge Mount Extension into Ridge Mount Track and hand tighten Extension bolt
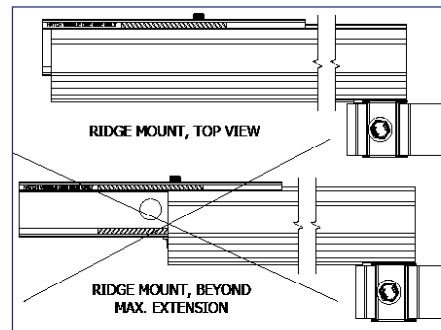
3) Align up-slope end of Ridge Mount Extension with allay layout as drawn on roof, positioning Extension so that hatched pattern is visible on one side only
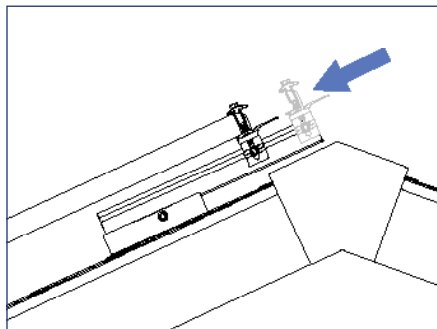
4) As the module is lowered into place slide Leveler and clamp assembly down Extension to engage module frame.
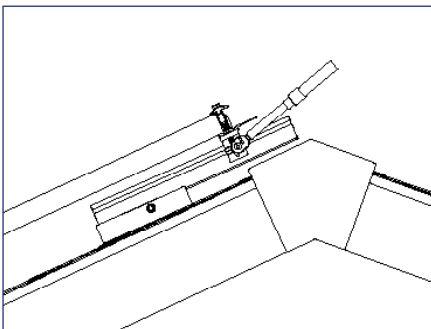
5) With Module Clamp seated on module frame, first tighten the Leveler bolt then tighten the clamping bolt.
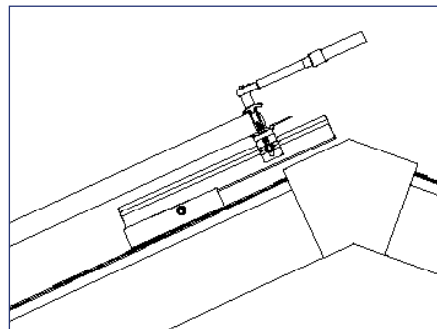
Grounding Specifications

GROUND PATH DETAILS

All RL Universal components in the fault current ground path have been Certified to be used multiple times for grounding/bonding. The UL 2703 Listing does not specify a maximum number of uses for the Mount, Link, or Ground Lug. Review the requirements of the National Electrical Code (NEC) Article 250 to select the appropriate Equipment Grounding Conductor size based on the short-circuit current of the PV system

When using Ground Lug R the following components are part of the fault current ground path:
- SnapNrack, SpeedSeal™ Track
- SnapNrack, Flash Track
- SnapNrack, Mount Assembly
- SnapNrack, Ridge Mount Assembly
- SnapNrack, Link
- SnapNrack, Skirt

GROUND PATH DETAILS

LINK   MOUNT   ◇ GROUND LUG
GROUND PATH   EQUIPMENT GROUNDING CONDUCTOR
TO EGC
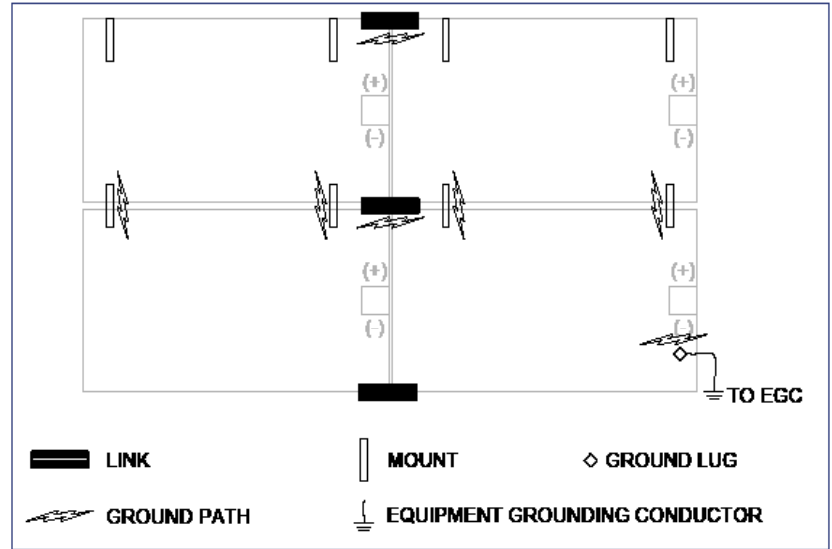
GROUNDING METHOD DETAILS
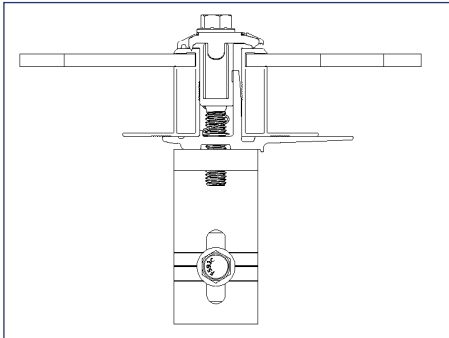
1) Row to row module bonding provided by bonding clip in Mount assembly
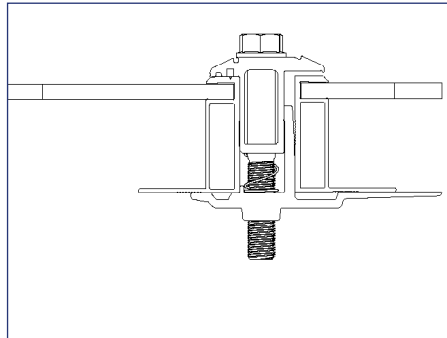
2) Column to column bonding provided by bonding clamp in Link assembly.
Module heights evaluated for bonding with Link Bonding Clamps: 40mm, 38mm, 35mm, 32mm, 30mm
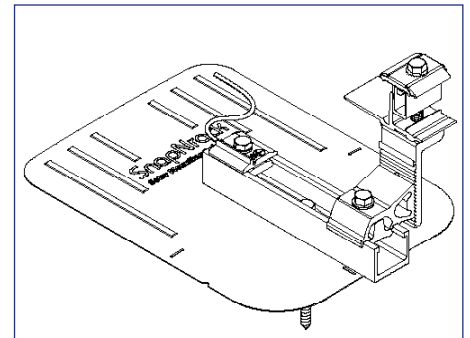
3) Each continuous array is connected to Equipment Grounding Conductor through Ground Lug R installed on one Flash Track, SpeedSeal™ Track, or SpeedSeal™ DeckTrack per array
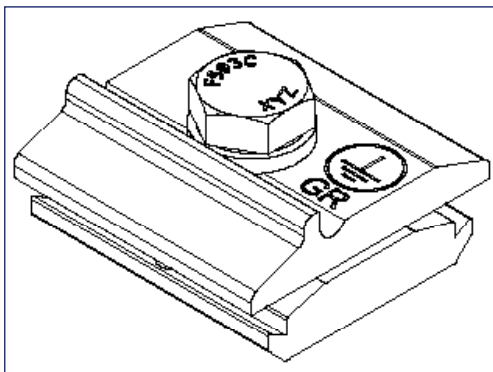
GROUNDING MARKING DETAILS

The Ground Lug R is marked with the ground symbol.

Maintaining the Grounding Bonding When Removing a Module

INSTRUCTION FOR MAINTAINING THE GROUNDING BONDING WHEN REMOVING A MODULE FOR SERVICING

CAUTION: Module removal may disrupt the bonding path and could introduce the risk of electric shock. Additional steps may be required to maintain the bonding path. Modules should only be removed by qualified persons in compliance with the instructions in this manual.

Module removal is not presented as a frequently expected occurrence and will not be required as part of routine maintenance.

Scenarios that could result in a disruption of the bonding path are described, for example irregularly-shaped arrays, arrays consisting of individual rows, and any other scenario where module removal could disrupt the bonding path. In most cases, the removal of a module for servicing will not disturb or break grounding continuity. If a module is to be removed that will break continuity, these are the steps that must be taken to maintain a continuously bonded SnapNrack RL Universal System.

Required Tools

● Socket Wrench   ● Torque Wrench   ● 1/2" Socket   ● 7/16" Socket

Required Materials

1 #10 Or Larger Bare Copper Conductor

2 SnapNrack SKU 242-02101

3 Ilsco Part No. SGB-4

4 DnoRaxx Dynobond™
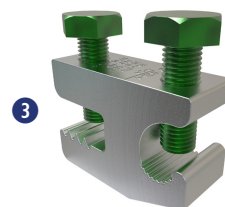
Maintaining the Grounding Bonding When Removing a Module

JUMPER ASSEMBLY INSTRUCTION & INSTALLATION

CAUTION: Do Not Remove the Module until the Jumper is installed

1) Identify the existing ground path at the location of module removal and choose an appropriate length of #10 bare copper to bridge the soon to be broken ground path.
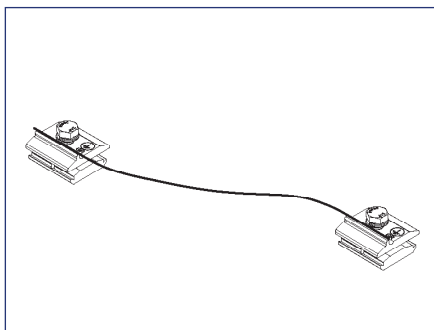
Example of assembled bonding jumper using (2) SnapNrack Ground Lugs

2) Attach one ground lug to each end of #10 bare copper wire. See recommended options below:
1. (2) SnapNrack SKU: 242-02101
2. (2) Ilsco part no. SGB-4
3. (1) SnapNrack part no. 242-02101 & (1) Ilsco part no. SGB-4
4. (1) DroRaxx DynoBond™
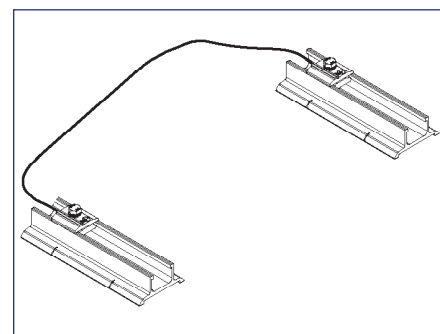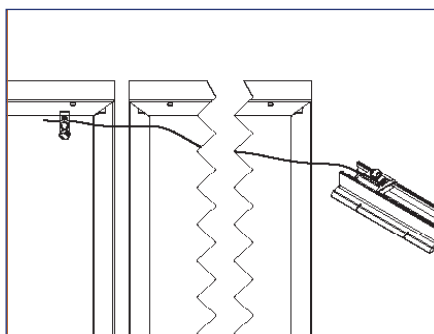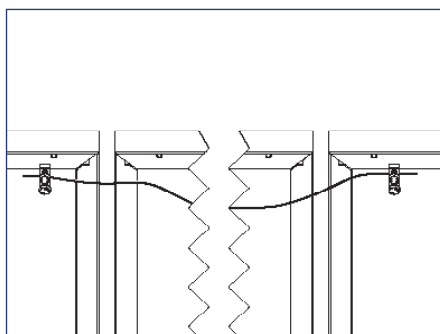
3) Before the module is removed, attach the assembled bonding jumper. Depending on where the module will be removed and choice of ground lug, jumper attachment locations will vary.

- Ilsco SGB-4 lugs can be attached to RL Universal Tracks, Mounts, or module frames

- The SnapNrack Ground Lug can only be attached to SnapNrack RL Universal tracks including; Flash Tracks, Speedseal™ Tracks, SpeedSeal™ DeckTracks.

- DynoRaxx DynoBond™ is approved and appropriate when a short bonding jumper is needed from module to module.

4) Service the array. With the bonding jumper installed, it is now safe to remove the module for service or maintenance.

5) After Servicing the array reinstall the module and original ground path. Only then Remove the bonding jumper.

Caution: Do not remove the bonding jumper until original ground path is established.

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Appendix A

APPROVED MODULE INFORMATION

SnapNrack RL Universal has been tested with the following UL Listed module series: The SnapNrack RL Universal system employs top-down clamps and links which have been evaluated for frame-to-system bonding, at specific mounting torques and with the specific module series listed below. All wattage values are covered.

Module manufacturer approval letters can be found at www.snapnrack.com.

Note:
Modules with an asterisk* have a fire rating that is different than Type 1, Type 2 or Type 29. SNR systems have only been evaluated for use with Type 1, Type 2, or Type 29 modules. Modules with a different fire type rating should be considered to not have been evaluated for use with SNR systems with respect to a system fire rating.

Manufacturer	Model
Aptos Solar	DNA-120-MF23-XXX
	DNA-120-BF23-XXX
	DNA-144-MF23-XXX
	DNA-144-BF23-XXX
	DNA-120-MF26-XXXW
	DNA-144-MF26-XXXW
	DNA-120-BF26-XXXW
	DNA-144-BF26-XXXW
Canadian Solar	CS6K-XXX-M
	CS6K-XXX-M-SD
	CS6K-XXX-P
	CS6K-XXX-P-SD
	CS6K-XXX-MS
	CS3K-XXX-P
	CS3K-XXX-MS
	CS3U-XXX-MS
	CS3U-XXX-P
	CS1K-XXX-MS
	CS1H-XXX-MS
	CS1H-XXX-MS-AB
	CS3W-XXX-P
	CS3N-XXX-MS
	CS1Y-XXX-MS
CertainTeed	CTXXXHC11-06
Chint Solar	CHSM6612M-XXX
	CHSM6612M(BL)-XXX
	CHSM6612M/HV-XXX
	CHSM72M-HC-XXX* (Astro 4)
	CHSM72M-HC-XXX* (Astro 5)

Appendix A

Manufacturer	Model
Dehui Solar	DH-M760B-XXXW
	DH-M760W-XXXW
	DH-M772W-XXXW
	DH-M760F-XXXW
	DH-M772F-XXXW
Hanwha Q Cells	Q.PEAK DUO-G5-XXX
	Q.PEAK DUO-BLK-G5-XXX
	Q.PLUS DUO-G5-XXX
	Q.PEAK DUO-G7-XXX
	Q.PEAK DUO-BLK-G7-XXX
	Q.PEAK DUO-G7.2-XXX
	Q.PEAK DUO-G6+-XXX
	Q.PEAK DUO-BLK-G6+-XXX
	Q.PEAK DUO-G6-XXX
	Q.PEAK DUO-BLK-G6-XXX
	Q.PEAK DUO-G8+-XXX
	Q.PEAK DUO-BLK-G8+-XXX
	Q.PEAK DUO-G8-XXX
	Q.PEAK DUO-BLK-G8-XXX
	Q.PEAK DUO BLK-G6+/AC-XXX
	Q.PEAK DUO-ML-G9-XXX
	Q.PEAK DUO-BLK-ML-G9-XXX
	Q.PEAK DUO-BLK-G9-XXX
	Q.PEAK DUO-BLK-ML-G9+-XXX
	Q.PEAK DUO-ML-G9+-XXX
	Q.PEAK DUO-BLK-ML-G9+-XXX
	Q.PEAK DUO XL-G9.2-XXX
	Q.PEAK DUO XL-G9.3-XXX
	Q.PEAK DUO XL-G9.3/BFG-XXX
	Q.PEAK DUO XL-G10.2-XXX
	Q.PEAK DUO XL-G10.3/BFG-XXX
	Q.PEAK DUO XL-G10.3-XXX
	Q.PEAK DUO XL-G10.c-XXX
	Q.PEAK DUO XL-G10.d-XXX
	Q.PEAK DUO L-G8.3/BFG-XXX
	Q.PEAK DUO L-G8.3/BGT-XXX
	Q.PEAK DUO ML-G10-XXX
	Q.PEAK DUO BLK ML-G10+-XXX
	Q.PEAK DUO ML-G10+-XXX
	Q.PEAK DUO BLK ML-G10-XXX
	Q.PEAK DUO ML-G10.a+-XXX
	Q.PEAK DUO BLK ML-G10.a+-XXX
	Q.PEAK DUO ML-G10.a-XXX

Appendix A

Manufacturer	Model
Hanwha Q Cells	Q.PEAK DUO BLK ML-G10.a-XXX
	Q.PEAK DUO G10-XXX
	Q.PEAK DUO BLK G10-XXX
	Q.PEAK DUO G10+-XXX
	Q.PEAK DUO BLK G10+-XXX
HT-SAAE	HT60-166M-XXX
	HT60-182M-XXX
Heliene	60M-XXX
	60P-XXX
	72M-XXX
	72P-XXX
Hyundai	HiA-SXXXMS
	HiS-SXXXXY
	HiS-SXXXYI
	All may be followed by (BK)
JA Solar	JAM60S09-XXX/PR
	JAM60S10-XXX/MR
	JAM60S10-XXX/PR
	JAM60S12-XXX/PR
	JAM72S09-XXX/PR
	JAM72S10-XXX/MR
	JAM72S10-XXX/PR
	JAM72S12-XXX/PR
	JAM60S17-XXX/MR
	JAM54S30-XXX/MR
	JAM54S31-XXX/MR
Jinko Solar	JKMXXXM-60
	JKMXXXM-60L
	JKMXXXM-60HL
	JKMXXXM-60HBL
	JKMXXXP-60
	JKMXXXP-60-J4
	JKMXXXP-60-V
	JKMXXXP-60B-J4
	JKMXXXPP-60
	JKMXXXPP-60-V
	JKMXXXM-72
	JKMXXXM-72L-V
	JKMXXXP-72
	JKMXXXP-72-V
	JKMXXXPP-72
	JKMXXXPP-72-V
	JKMSXXXP-72

Appendix A

Manufacturer	Model
Jinko Solar	JKMXXXM-72HL-V
	JKMXXXM-72HL-TV
	JKMXXXM-72HBL
	JKMXXXM-6TL3-B
	JKMXXXM-6RL3-B
	JKMXXXM-7RL3-V
	JKMXXXM-7RL3-TV
	JKMXXXM-72HL4-V
	JKMXXXM-72HL4-TV
LG	LGXXXN1C-A5
	LGXXXN1K-A5
	LGXXXQ1C-A5
	LGXXXQ1K-A5
	LGXXXS1C-A5
	LGXXXN2C-B3
	LGXXXN2W-B3
	LGXXXN1C-G4
	LGXXXN1K-G4
	LGXXXS1C-G4
	LGXXXN2C-G4
	LGXXXN2K-G4
	LGXXXN2W-G4
	LGXXXS2C-G4
	LGXXXS2W-G4
	LGXXXN1C-V5
	LGXXXN1W-V5
	LGXXXN2T-V5
	LGXXXN2T-J5
	LGXXXN1T-V5
	LGXXXA1C-V5
	LGXXXM1C-L5
	LGXXXM1K-L5
	LGXXXN1C-N5
	LGXXXN1K-L5
	LGXXXN1K-A6
	LGXXXN1C-A6
	LGXXXN1W-A6
	LGXXXQ1C-A6
	LGXXXQ1K-A6
	LGXXXM1K-A6
	LGXXXM1C-A6
	LGXXXA1C-A6
	LGXXXQAC-A6
	LGXXXQAK-A6

Appendix A

Manufacturer	Model
LG	LGXXXN1K-B6
	LGXXXN2W-E6
	LGXXXN2T-E6
	LGXXXN1K-E6
	LGXXXN3K-V6
Longi	LR6-60-XXXM
	LR6-60BK-XXXM
	LR6-60HV-XXXM
	LR6-60PB-XXXM
	LR6-60PE-XXXM
	LR6-60PH-XXXM
	LR6-60HPB-XXXM
	LR6-60HPH-XXXM
	LR4-60HPB-XXXM
	LR4-60HIB-XXXM
	LR4-60HPH-XXXM
	LR4-60HIH-XXXM
	LR6-60HIH-XXXM
	LR6-60HIB-XXXM
	LR4-72HPH-XXXM
Meyer Burger	Meyer Burger Black*
	Meyer Burger White*
Mission Solar	MSEXXXSO5T
	MSEXXXSO5K
	MSEXXXSQ5T
	MSEXXXSQ5K
	MSEXXXMM4J
	MSEXXXMM6J
	MSEXXXSO6W
	MSEXXXSO4J
	MSEXXXSO6J
	MSEXXXSQ6S
	MSEXXXSQ4S
	MSEXXXSR8K
	MSEXXXSR8T
	MSEXXXSR9S
	MSE60AXXX
	MSEXXXSX5K
	MSEXXXSX5T
	MSEXXXSX6S
	MSEXXXSX6W

Manufacturer	Model
Next Energy Alliance	USNEA-XXXM3-60
	USNEA-XXXM3B-60
	USNEA-XXXM3-72
	USNEA-XXXM3B-72
Panasonic	VBHNXXXKA03
	VBHNXXXKA04
	VBHNXXXSA17
	VBHNXXXSA18
	VBHN325SA17E
	VBHXXXRA18N
	VBHXXXRA03K
	EVPVXXX(K)
Phono Solar	PSXXXM-20/U
	PSXXXMH-20/U
REC	RECXXXTP2
	RECXXXTP2-BLK
	RECXXXNP
	RECXXXTP2M
	RECXXXTP2M 72
	RECXXXTP2M 72 BLK
	RECXXXTP2M 72 BLK2
	RECXXXTP2SM 72
	RECXXXTP2SM 72 BLK
	RECXXXTP2SM 72 BLK2
	RECXXXAA
	RECXXXTP3M
	RECXXXTP4
	RECXXXAA Pure
	RECXXXNP2
	All may be followed by BLK or BLACK
Silfab	SLAXXX-M
	SLAXXX-P
	SSAXXX-M
	SSAXXX-P
	SILXXXBL
	SILXXXML
	SILXXXNL
	SLGXXX-M
	SLGXXX-P
	SSGXXX-M
	SSGXXX-P
	SILXXXNT
	SILXXXHL

Manufacturer	Model
Silfab	SILXXXBK
	SILXXXNX
	SILXXXNU
	SILXXXHC
Solaria	Solaria PowerXT-XXXR-PX
	Solaria PowerXT-XXXR-BX
	Solaria PowerXT-XXXR-AC
	Solaria PowerXT-XXXR-PM
	Solaria PowerXT-XXXR-PM-AC
Sunpower	SPR-AXXX-G-AC
	SPR-AXXX
	SPR-AXXX-BLK-G-AC
	SPR-AXXX-BLK
	SPR-MXXX-H-AC
	SPR-MXXX
	SPR-MXXX-BLK-H-AC
	SPR-MXXX-BLK
SunSpark	SST-XXXM3-60
	SST-XXXM3B-60
	SST-XXXM3-72
	SST-XXXM3B-72
Talesun	TP660M-XXX
	TP660P-XXX
	TP672M-XXX
	TP672P-XXX
Trina	TSM-XXXDD05(II)
	TSM-XXXDD05A.05(II)
	TSM-XXXDD05A.08(II)
	TSM-XXXDD05A.082(II)
	TSM-XXXPA05
	TSM-XXXPA05.05
	TSM-XXXPA05.08
	TSM-XXXPD05
	TSM-XXXPD05.002
	TSM-XXXPD05.05
	TSM-XXXPD05.05S
	TSM-XXXPD05.08
	TSM-XXXPD05.082
	TSM-XXXPD05.08D
	TSM-XXXPD05.08S
	TSMXXXDD05H.05(II)
	TSM-XXXDD06M.05(II)
	TSM-XXXDE15H(II)

Manufacturer	Model
Trina	TSM-XXXDE15M(II)
	TSMXXXDE06X.05(II)
	TSMXXXDE09.05
Vikram Solar	SOMERA VSMHBB.60.XXX.05
ZNShine	ZXM6-60-XXX/M
	ZXM6-NH120-XXXM
	ZXM6-NH144-XXXM

SnapNrack RL Universal has been tested with the following Module Level Power Electronic (MLPE) devices:

SnapNrack RL Universal mounting systems has been tested with the following UL/NRTL Listed Module Level Power Electronic (MLPE) Devices. The back plates of the MLPEs have been evaluated for bonding to RL Universal through the SnapNrack MLPE Frame Attachment Kit, model 242-02151.

Note:
Ginlong Solis-MLRSD-R1-1G and Solis-MLRSD-R2-1G, AP Smart RSD-S-PLC and all Tigo models have not been investigated for bonding since the enclosures are constructed entirely of polymeric materials.

MLPE Manufacturer	Model	
AP Smart	RSD-S-PLC	
Celestica International	DG-006-F001201x	DG-006-F001401x
Delta Electronics	GPI00010105	
Enphase	C250	IQ7PLUS-72-2-US
	M215	IQ7PLUS-72-B-US
	M250	IQ8-60
	IQ6-60-2-US	IQ8PLUS-72
	IQ6PLUS-72-2-US	IQ8A-72
	IQ7-60-2-US	IQ8H-208-72
	IQ7-60-B-US	IQ8H-240-72
Generac	S2502	
Ginlong Technologies	Solis-RSD-1G	
	Solis-MLRSD-R1-1G	Solis-MLRSD-R2-1G
SolarEdge	P300-5NC4ARS	P320-5NC4ARS
	P370-5NC4AFS	P400-5NC4AFS
	P320	P340
	P370	P400
	P401	P405
	P485	P505
	P730	P800p
	P850	P860
	P950	
SMA	RSB-2S-US-10	
Tigo	TS4-R-F	TS4-R-M
	TS4-R-O	TS4-R-S
	TS4-R-M-DUO	TS4-R-O-DUO
	TS4-R-S-DUO	TS4-A-F
	TS4-A-2F	TS4-A-O
	TS4-A-S	