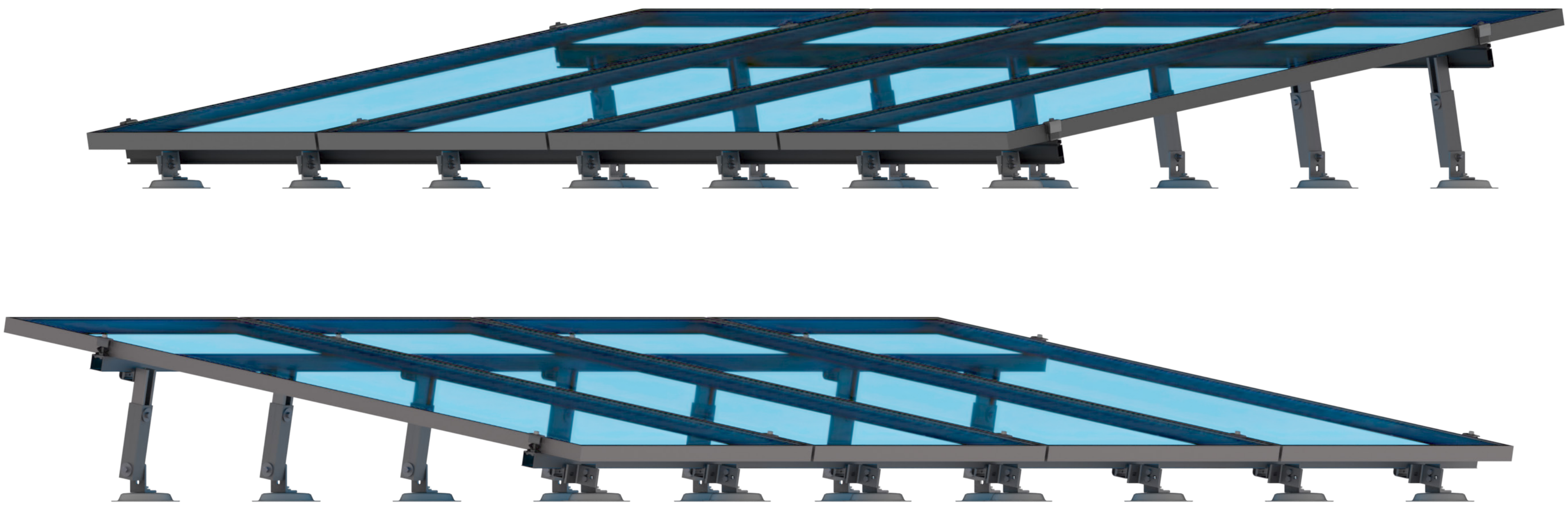
SM NXT TILT LEGS INSTALLATION GUIDE



UNIRAC Code-Compliant Installation Addendum

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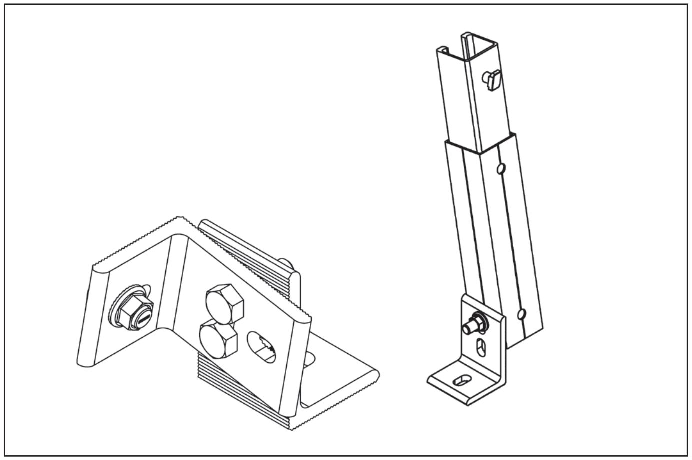
PUB2025SEP26

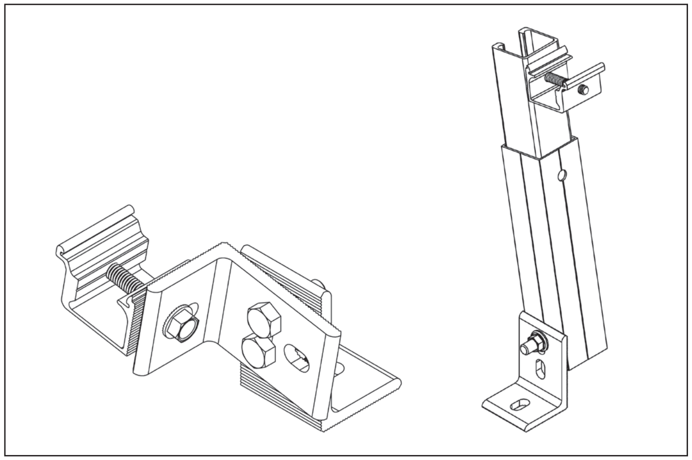
SM NXT TILT LEGS INSTALLATION GUIDE

TABLE OF CONTENTS

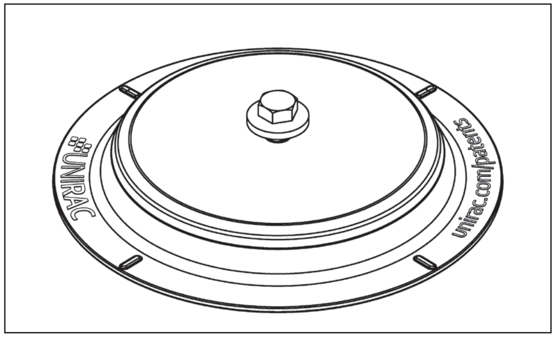
INTRODUCTION: This manual is an addendum to the SOLAR MOUNT and NXT UMOUNT installation manuals and outlines the installation procedures to install Tilt Legs for these sytsems. For installers to install SM or NXT Tilt Legs, it is imperative to thoroughly review and have a clear understanding of the installation procedures outlined in the SOLAR MOUNT installation manual, the NXT UMOUNT installation manual, and this installation manual. This will ensure that the SM & NXT Tilt Leg System is installed correctly and meet all regulatory requirements.



SM ADJUSTABLE TILT LEG
(P/N: SMTILTLEG12/SMTILTLEG30)



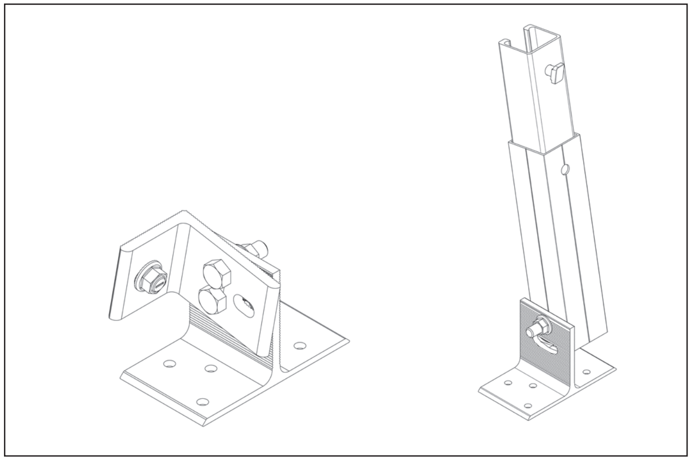
NXT UMOUNT ADJUSTABLE TILT LEG
(P/N: NUTILTLEG12/NUTILTLEG30)



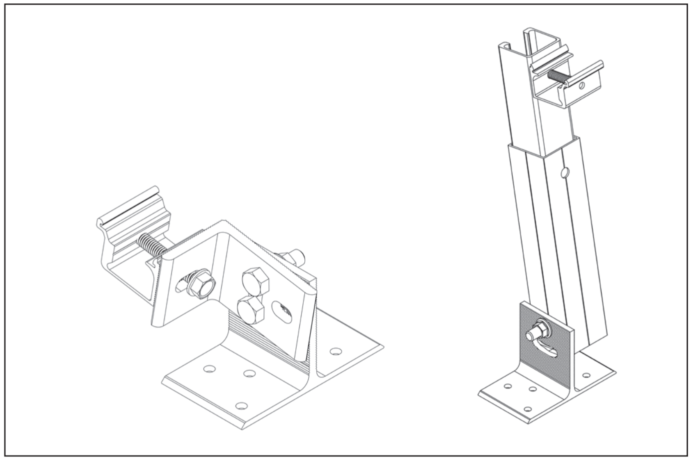
FLASHLOC RM KIT
(P/N: 310999)

NOTE: Refer to NXT UMOUNT and SOLAR MOUNT installation manuals for complete list of system components.

P/N stands for Part Number



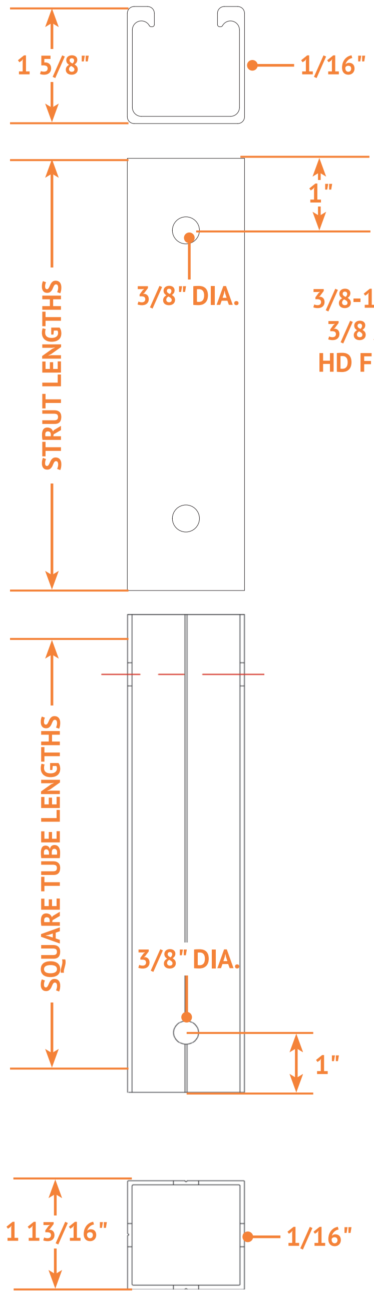
SM ADJUSTABLE TILT KIT, BUTYL
(P/N: SMBTILT12/SMBTILT30)

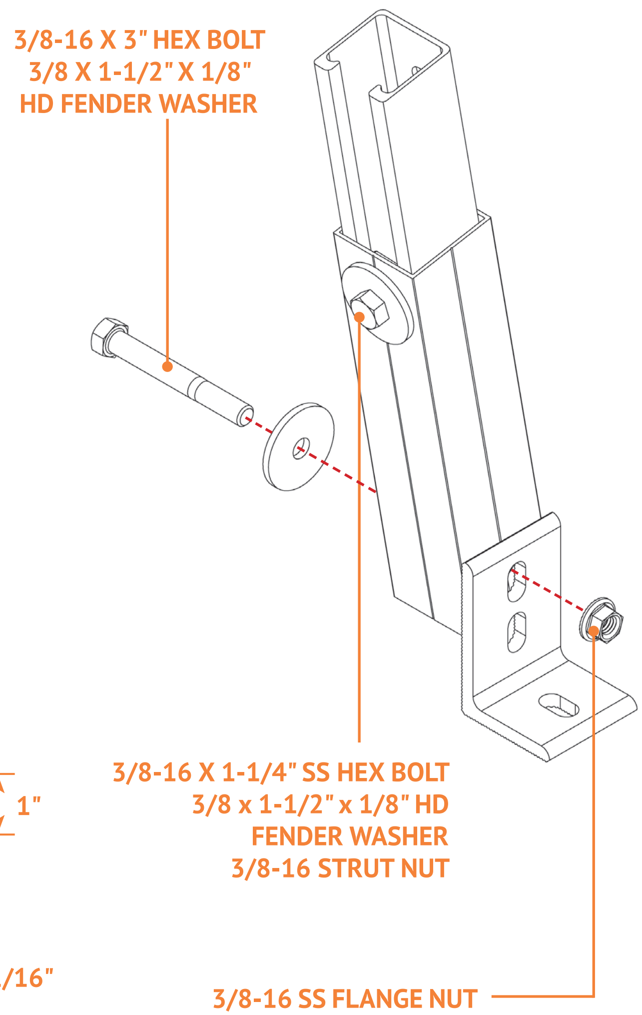


NXT UMOUNT ADJUSTABLE TILT KIT, BUTYL
(P/N: NUBTILT12/NUBTILT30)

NOTE: Refer to NXT UMOUNT and SOLAR MOUNT installation manuals for complete list of system components.

P/N stands for Part Number

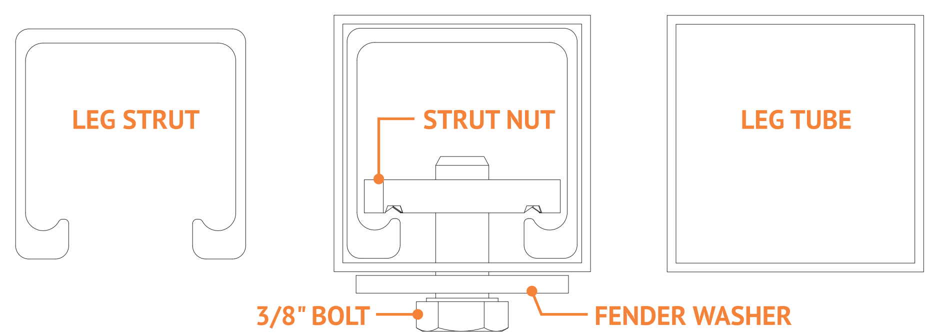


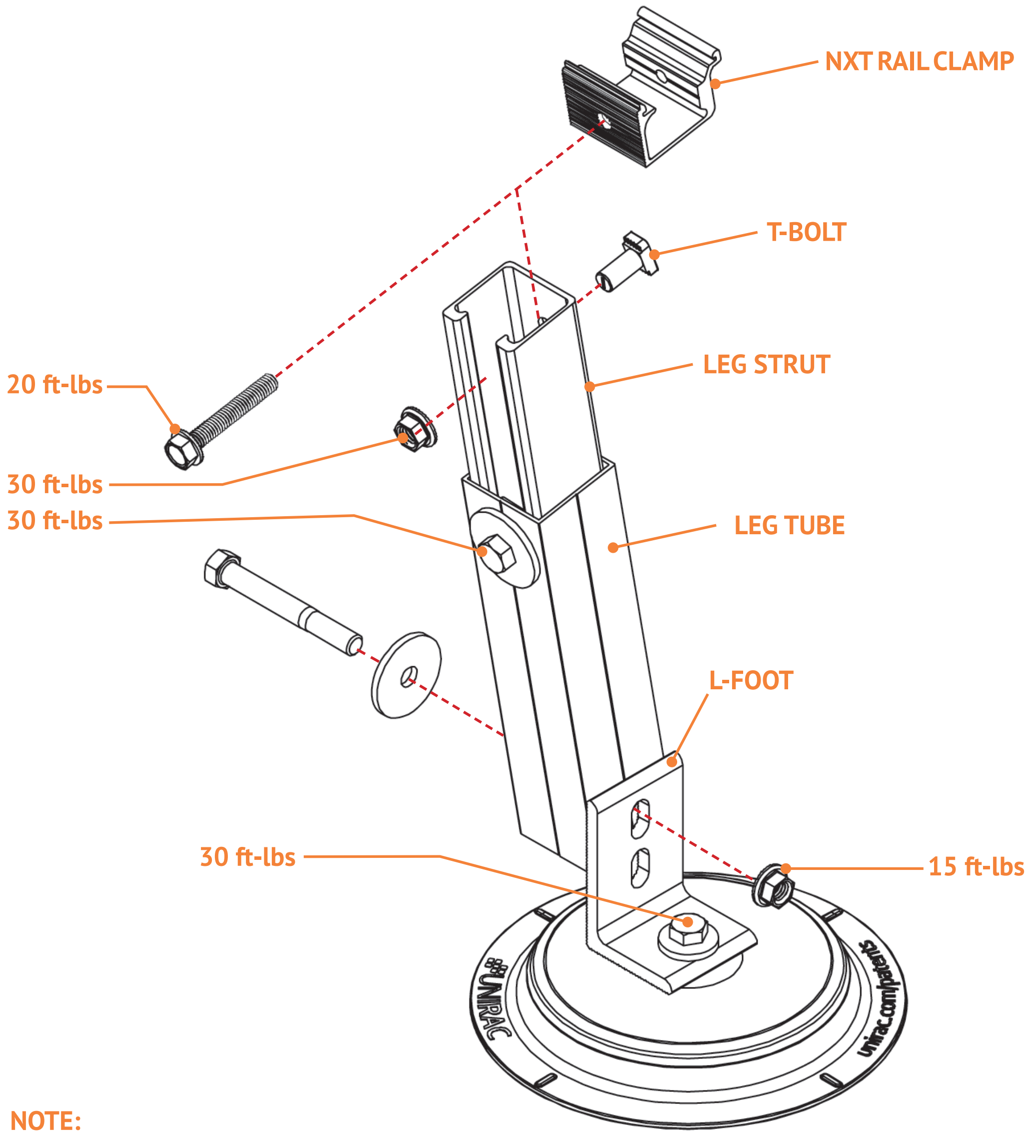


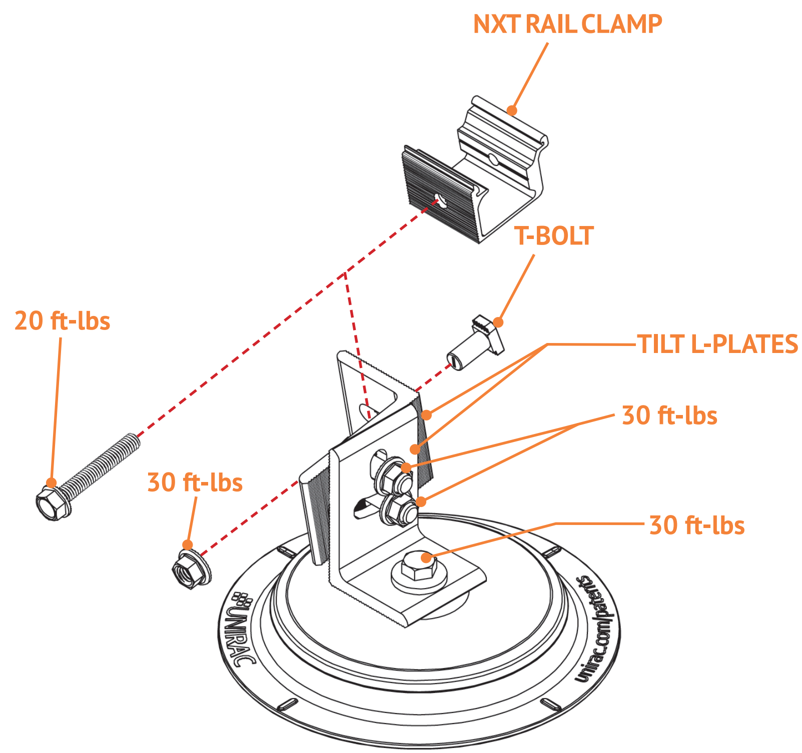
TILT LEG LENGTHS		
Total Adjustable Lengths	**Square Tube**	**Strut**
8" to 12"	8"	8"
18" to 30"	18"	18"

Properties	Tilt Leg Strut Channel	Square Tilt Leg Tube	Units
Area	0.515	0.4884	in2
Weight	0.57	0.56	plf
Width	1.625	1.82	in
Height	1.625	1.82	in
Section Modulus (X-axis)	0.236	0.275	in3
Section Modulus (Y-axis)	0.261	0.275	in3
Moment of Inertia (X-axis)	0.201	0.2498	in4
Moment of Inertia (Y-axis)	0.213	0.2498	in4
Radius of Gyration (X-axis)	0.625	0.7152	in
Radius of Gyration (Y-axis)	0.643	0.7152	in

Wrenches and Torque	Wrench Size	Recommended Torque
3/8" Hardware	9/16"	Refer to page 4



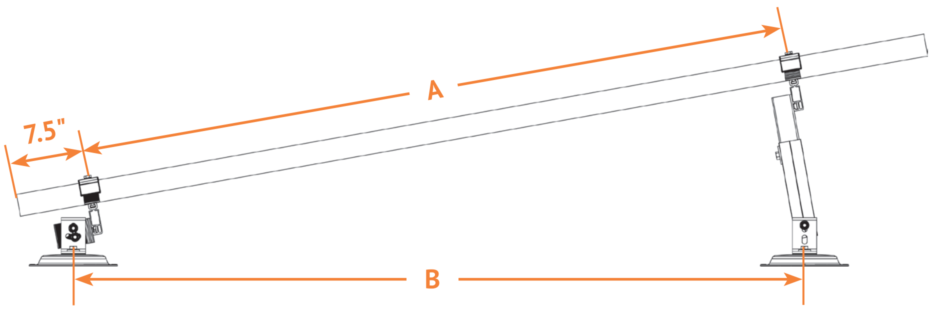




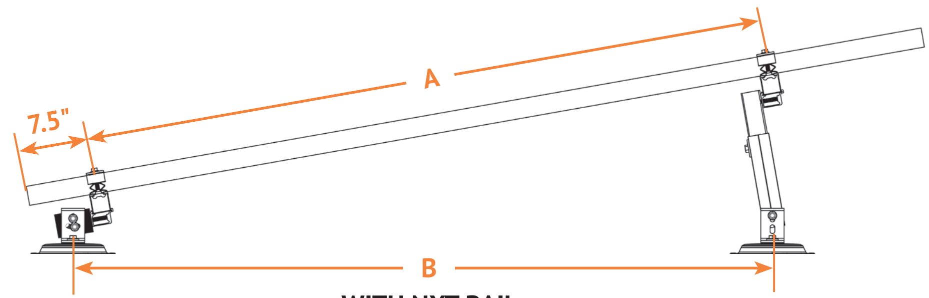
NOTE:

- Use T-Bolts with SM Rails
- Use NXT Rail Clamps with NXT Rails

CORRECT TILT LEG ORIENTATION



WITH SM RAIL



WITH NXT RAIL

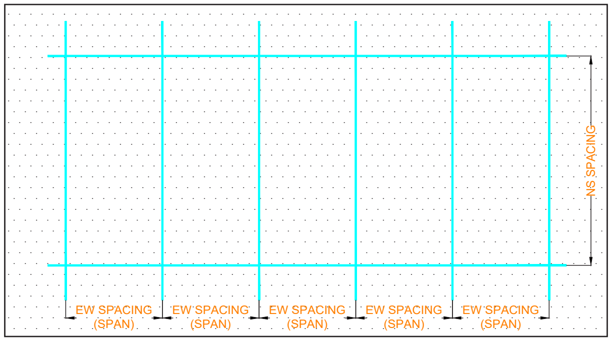
North/South distance along the attachement surface (B) can be obtained using Unirac's U-Builder design & layout tool.

It is approximately equal to the distance (A) between Tilt Foot Rail and Tilt Leg Rail

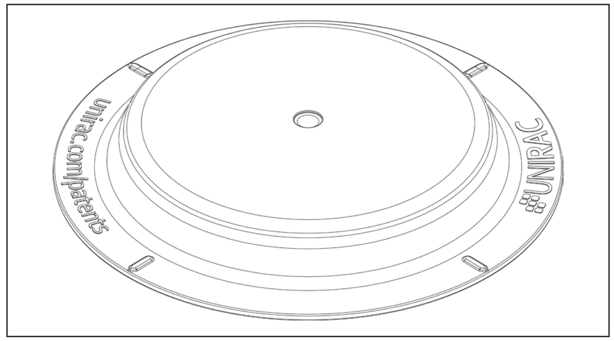
PRO TIP

Experienced installers have been very successful with SOLARMOUNT Tilt by utilizing an easily made brace during installation. The brace is comprised of a beam (supplied by others such as a piece of strut, but could also be a piece of SOLARMOUNT rail) and four (4) L-feet. The purpose of the brace is to temporarily, but firmly, position rails perpendicular to module frame and parallel to each other at the desired tilt angle. Once modules have been properly fastened to the SOLARMOUNT rail top slot, the braces can be removed. This saves time by keeping rails positioned correctly as module installation begins.

For more information on module placement please refer to the SOLARMOUNT & NXT UMOUNT installation guide.
Remember to comply with module manufacturer clamping requirements

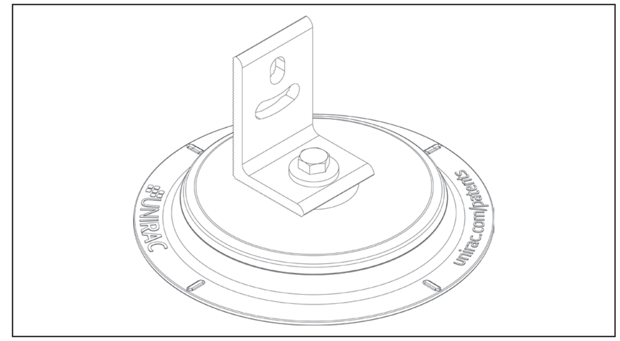


ARRAY LAYOUT
Refer to the U-Builder report for details of EW span and NS spacing. Mark the locations for the FLASHLOC RM attachments.

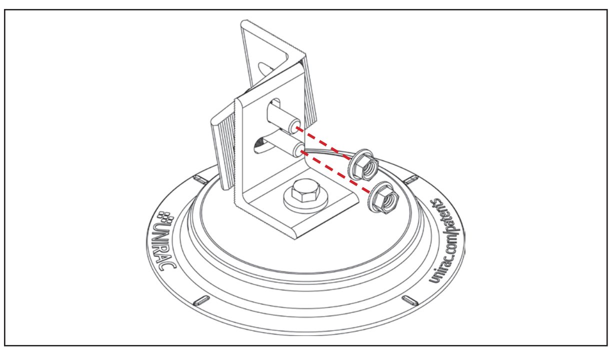


INSTALL FLASHLOC RM
Follow the instructions mentioned in FLASHLOC RM installation guide to install the FLASHLOC RM attachment.

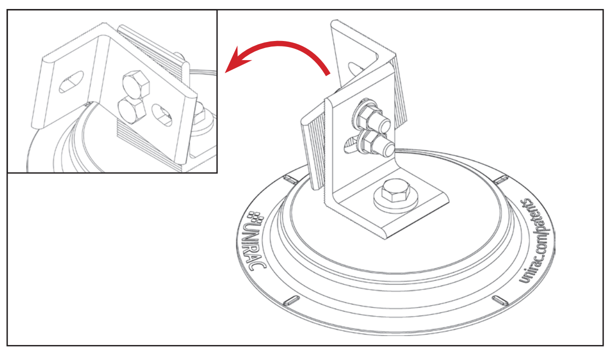
NOTE: Follow the manufacturer's installation instructions when replacing the FLASHLOC RM attachment with a compatible roof attachment.



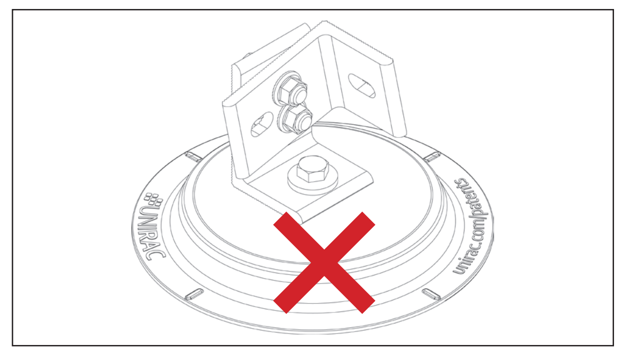
INSTALL TILT L-PLATE TO FLASHLOC RM
Place Tilt L-plate on the FLASHLOC RM attachment and secure it with the 3/8" bolt and washer included in the FLASHLOC RM kit.
Torque Value: 30 ft-lbs.



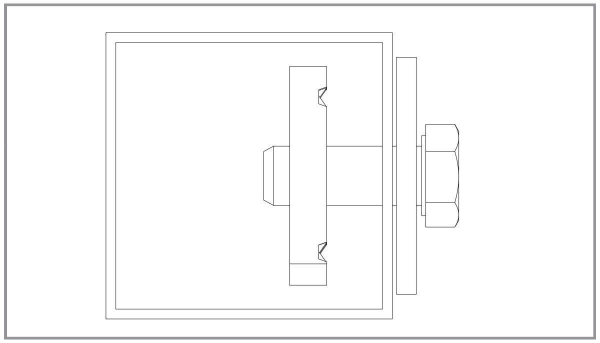
INSTALL TILT L-PLATE FOR FRONT TILT CONNECTION
Place the second Tilt L-Plate against the first Tilt L-Plate to mate the serrations.



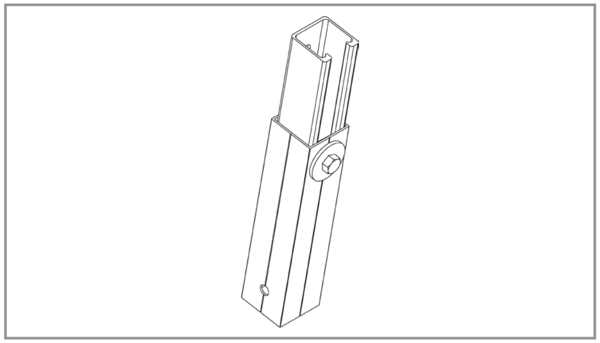
SECURE TILT L-PLATES
Insert two 3/8"-16 bolts provided with kit in each slot as shown above and align second Tilt L-Plate to required tilt angle. Secure second Tilt L-Plate to first Tilt L-Plate using 3/8" flange nut.
Torque Value: 30 ft-lbs.



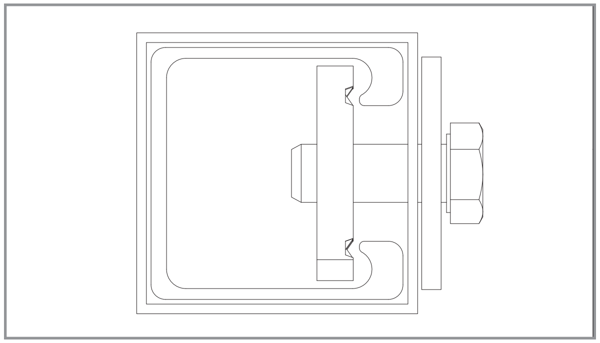
CAUTION
Do not install Tilt L-Plate as shown above.



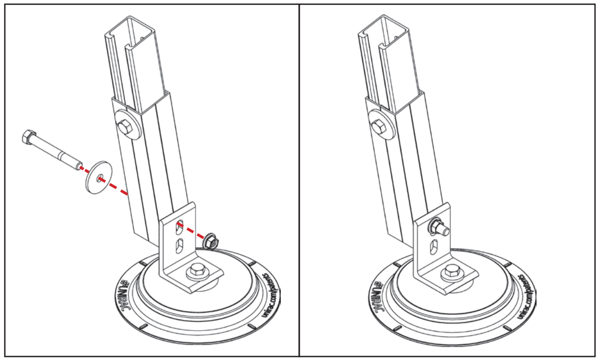
ASSEMBLE TILT LEG:
1) Place fender washer on 3/8" bolt
2) Loosely attach strut nut to bolt



ASSEMBLE TILT LEG (CONT):
3) Slide strut into tube with nut positioned as shown
4) Tighten bolt at desired leg length

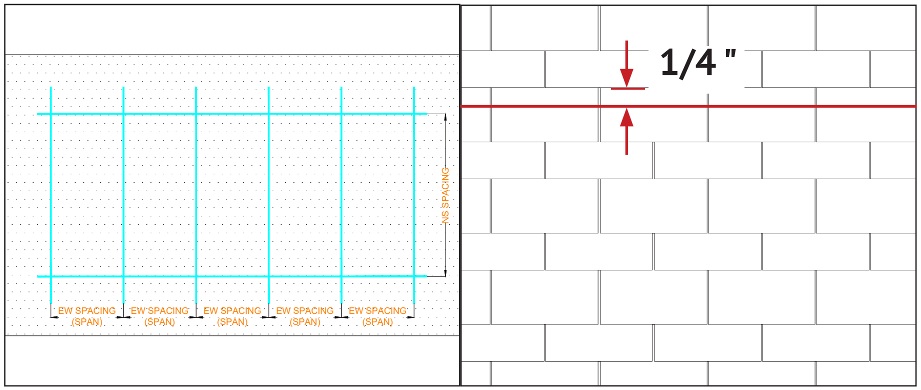


Torque Value: 30 ft-lbs.



ATTACH TILT LEG TO L-FOOT:
Insert 3" hex bolt with a fender washer in the bottom hole of the square tube and secure it to the L-foot at the required tilt angle.

TORQUE VALUE EXCEPTION:
3/8” nut to 15 ft-lbs
(Lower torque required to avoid crushing tube)



MARK ARRAY LAYOUT

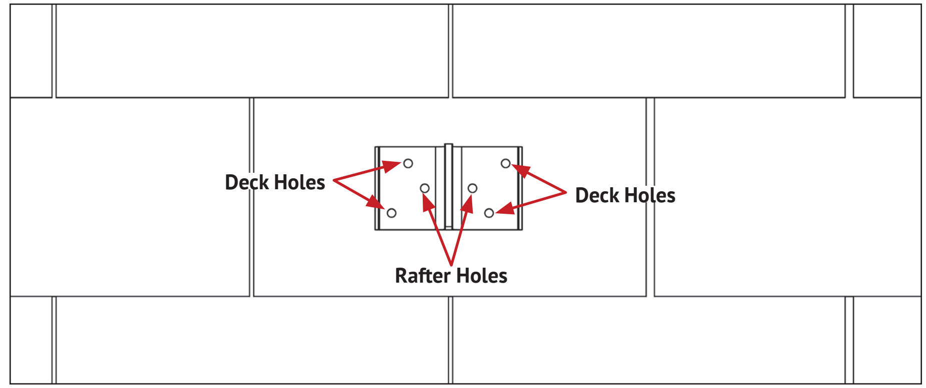
- Clean roof surface of dirt, debris, snow, and ice.
- Refer to the U-Builder report for details of EW span and NS spacing.
- Mark the locations for the roof attachments.
- Snap chalk lines to mark each row of roof attachment points. On shingle roofs, snap lines 1/4" below upslope edge of shingle course.

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.**
- **SM Butyl attachment must be installed on a clean, dry surface to ensure flashing integrity.**

NOTE:

- **Butyl attachment 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.**
- **SM Butyl attachment is designed for slopes ranging from 0 to 90-degrees. For installations over 45-degrees, contact Unirac engineering for design guidance.**



PLACE SM BUTYL ATTACHMENT 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 secure attachment to the rafter.**
- **Use all six holes to secure attachment to the deck.**

CAUTION

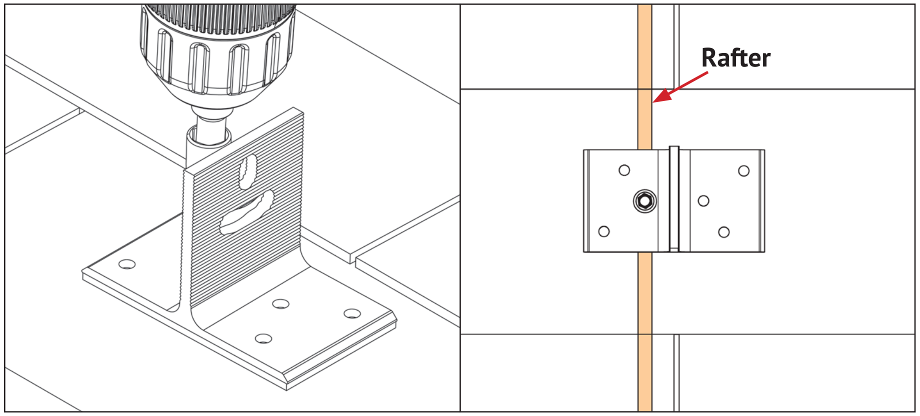
Do not peel the release paper from the butyl until you identify the attachment's installation position.

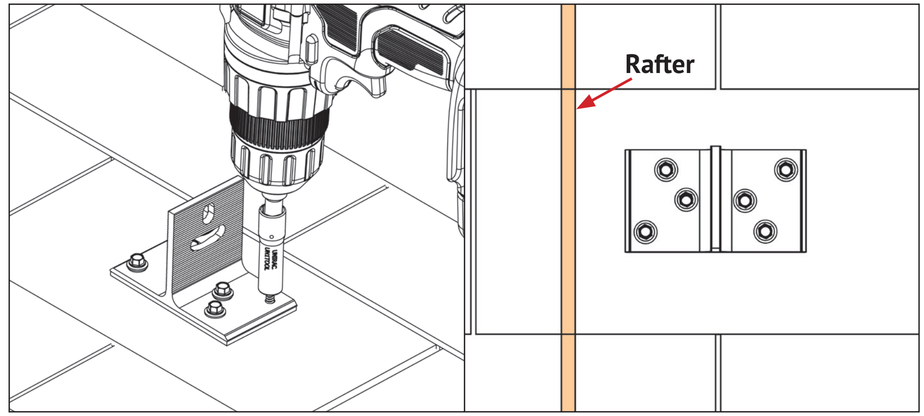
WARNING

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

Note:

- **To place extra butyl pads follow instructions provided on *page 10***
- **If you need any further information contact Unirac team.**





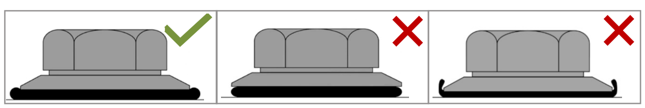
CASE-1: INSTALLING BUTYL ATTACHMENT AT RAFTER LOCATION

- Peel-off the release paper of the butyl attachment and place the attachment at location.
- Secure the attachment to the roof using one rafter screw through the rafter hole closest to the rafter.

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

IMPORTANT
To determine if the screw is engaging with the rafter, there should be resistance to driving the screw through the entire length. If the screws do not properly engage to the rafter, Install as per **Case-2**.

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.

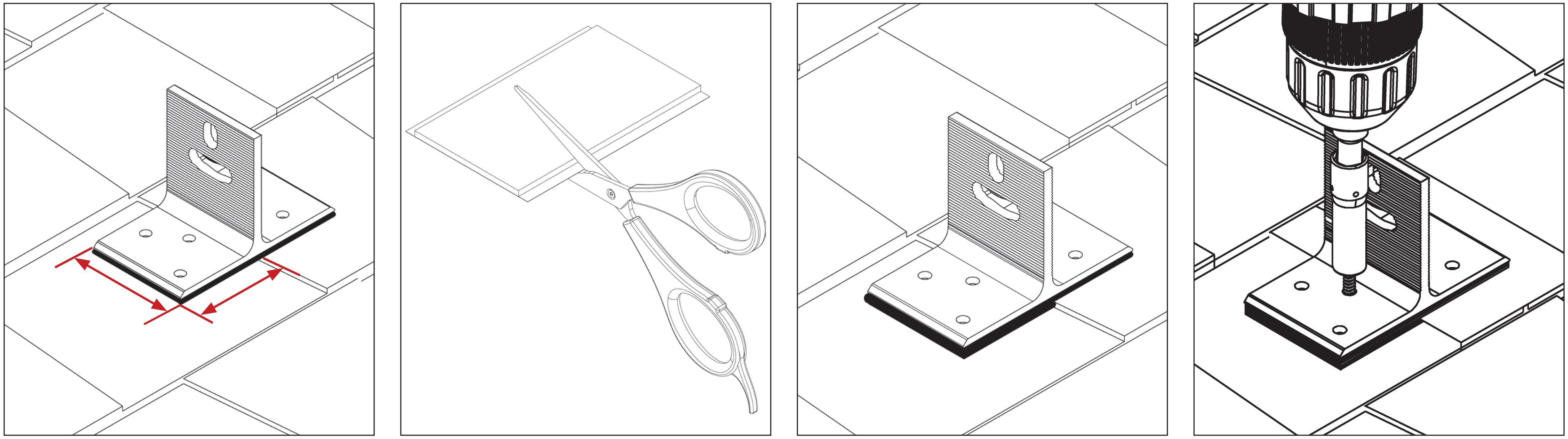
CASE-2: INSTALLING BUTYL ATTACHMENT AT DECK LOCATION / ON FLAT ROOF

While installing the attachment to the deck instead to the rafter (direct-to-deck), install all 6 screws to secure roof attachment to roof.

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 or flat roof 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 SM BUTYL ATTACHMENT OVER SHINGLE OVERLAP

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

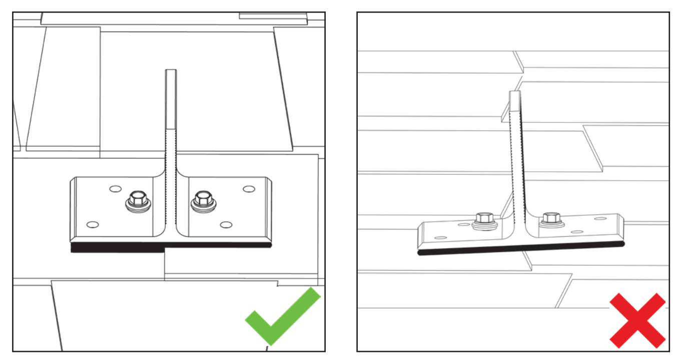
A. Measure the attachment overhang.
B. Cut the butyl pads to required size.
C. Stack extra butyl pad layers as necessary to level the roof and place the attachment.
D. Begin installation with the screws on the upslope side of the attachment and continue to install the screws on the downslope side of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

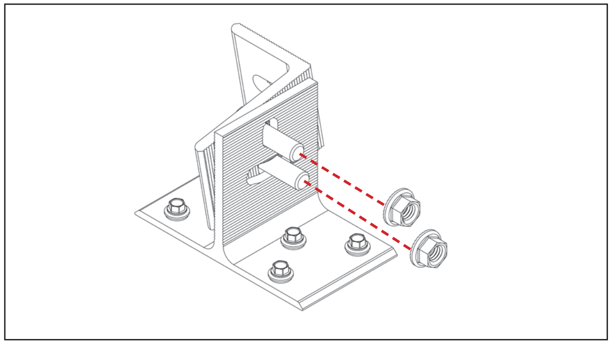
Note:

- **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.**

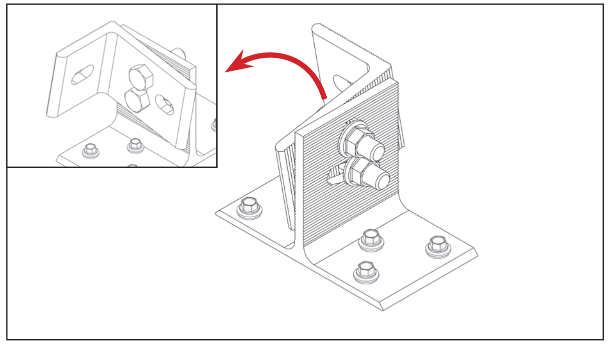


WARNING

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

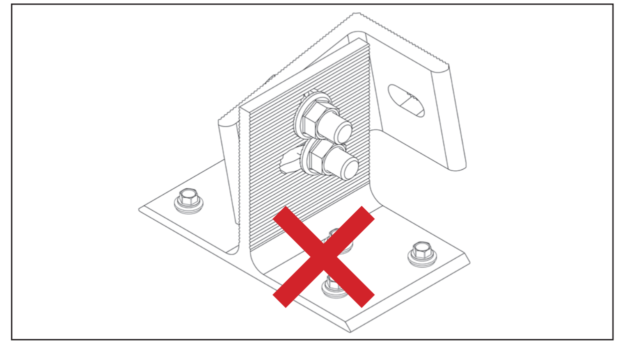


INSTALL TILT L-PLATE FOR FRONT TILT CONNECTION
Place the Tilt L-Plate against the roof attachment to mate with the serrations.



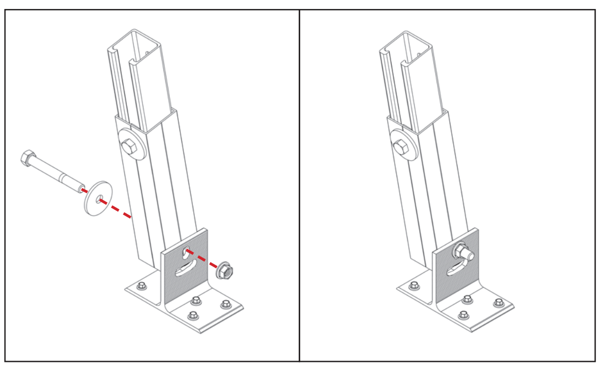
SECURE TILT L-PLATES
Insert two 3/8"-16 bolts provided with kit in each slot as shown above and align Tilt L-Plate to required tilt angle. Secure Tilt L-Plate to roof attachment using 3/8" flange nuts.

Torque Value: 30 ft-lbs.



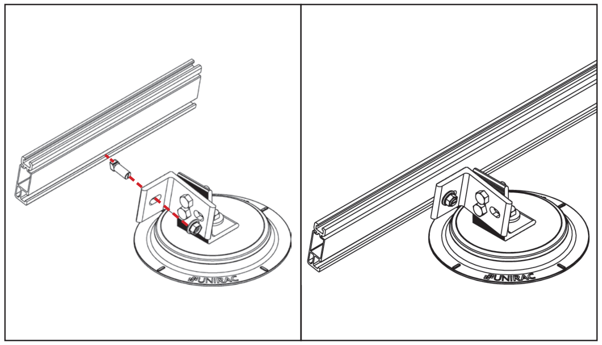
CAUTION

Do not install Tilt L-Plate as shown above.

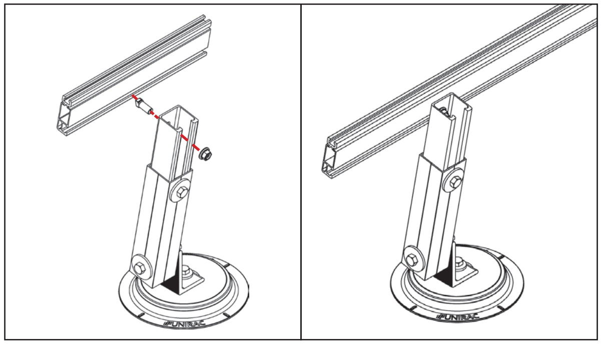


ATTACH TILT LEG TO BUTYL ATTACHMENT:
Insert 3" hex bolt with a fender washer in the bottom hole of the square tube and secure it to the roof attachment at the required tilt angle.

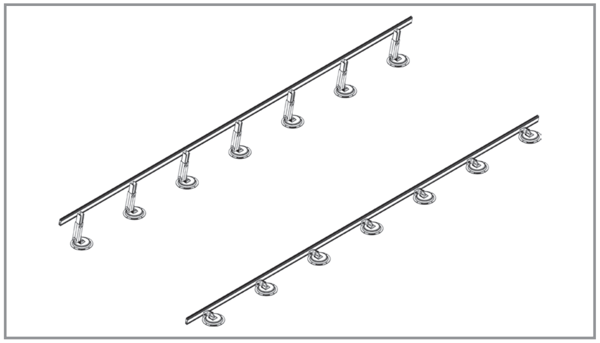
TORQUE VALUE EXCEPTION:
3/8" nut to 15 ft-lbs
(Lower torque required to avoid crushing tube)



STEP-1: SECURE SM RAIL TO FRONT TILT L-PLATE
Secure SM Rail to Tilt L-Plate as shown above using 3/8" T-bolt and flange nut.
Torque Value: 30 ft-lbs.

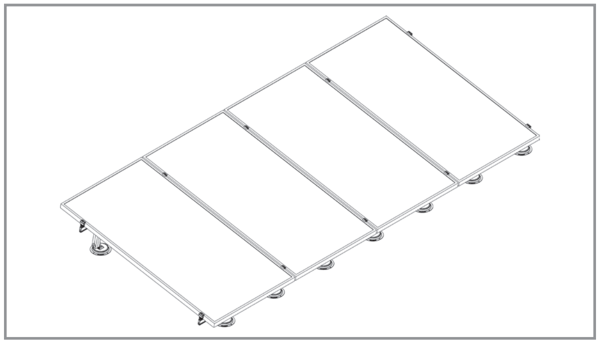


STEP-2: SECURE SM RAIL TO REAR TILT LEG
Secure SM Rail to the strut as shown above using 3/8" T-bolt and flange nut.
Torque Value: 30 ft-lbs.



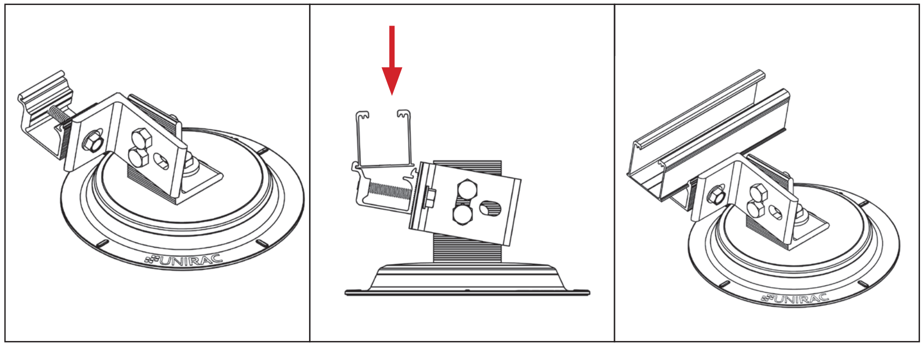
COMPLETE RAIL INSTALLATION

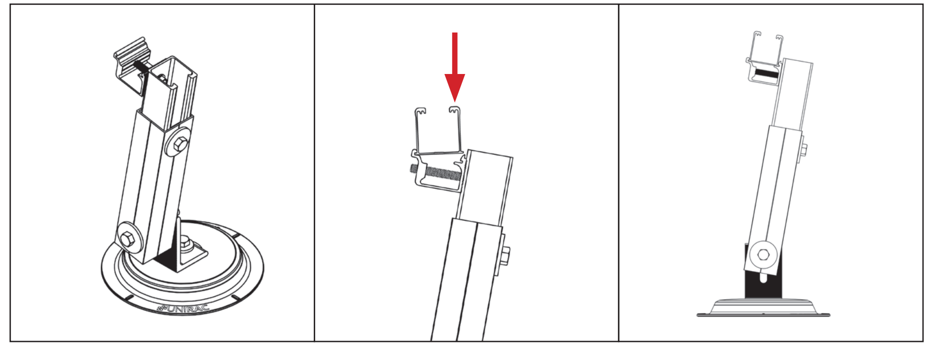
- Complete the whole system rails installation by repeating STEP-1 and STEP-2.
- In the case of using splices to attach rails, refer to the Splice Installation section of SOLAR MOUNT installation manual.



FINISH INSTALLATION
Follow instructions mentioned in SOLAR MOUNT installation manual to finish system installation.

NOTE
Refer to the SOLAR MOUNT installation manual available on website *https://unirac.com/tech-support-pitched-roof/* for compatible module list, system grounding and fire classification data.





STEP-1: SECURE NXT RAIL TO FRONT TILT L-PLATE

A Loosely attach rail clamp to Tilt L-Plate with the hex bolt provided in kit

B Position NXT rail in rail clamp

- Insert the rail flange on one side of the clamp groove.
- Then click-in the other side of the rail into the clamp groove.

C Tighten hex bolt to secure NXT Rail and Rail clamp to Tilt L-Plate.

Torque Value: 20 ft-lbs.

STEP-2: SECURE NXT RAIL TO REAR TILT LEG

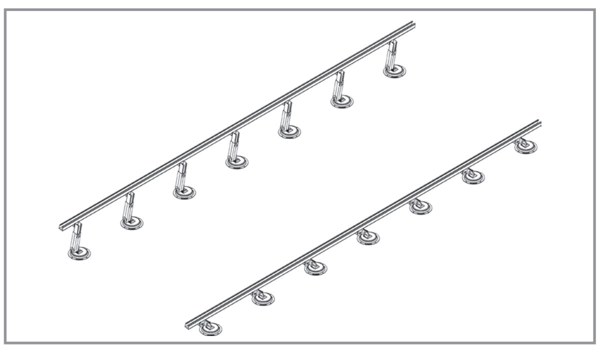
A Attach rail clamp to Tilt Leg with the hex bolt provided in kit

B Position NXT rail in rail clamp

- Insert the rail flange on one side of the clamp groove.
- Then click-in the other side of the rail into the clamp groove.

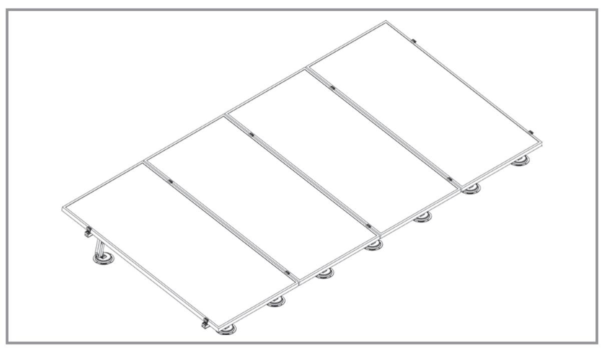
C Tighten hex bolt to secure NXT Rail and Rail clamp to Tilt Leg.

Torque Value: 20 ft-lbs.



COMPLETE RAIL INSTALLATION

- Complete the whole system rails installation by repeating STEP-1 and STEP-2.
- In the case of using splices to attach rails, refer to the Splice Installation section of NXT UMOUNT installation manual.



FINISH INSTALLATION

Follow instructions mentioned in NXT UMOUNT installation manual to install modules and finish system installation

NOTE

Refer to the NXT UMOUNT installation manual available on website *https://unirac.com/tech-support-pitched-roof/* for compatible module list, system grounding and fire classification data.

A thermal break prevents buckling of rails, system connection failure, and module damage due to thermal expansion and contraction. Determine where thermal breaks are necessary prior to the installation of roof attachments and rails.

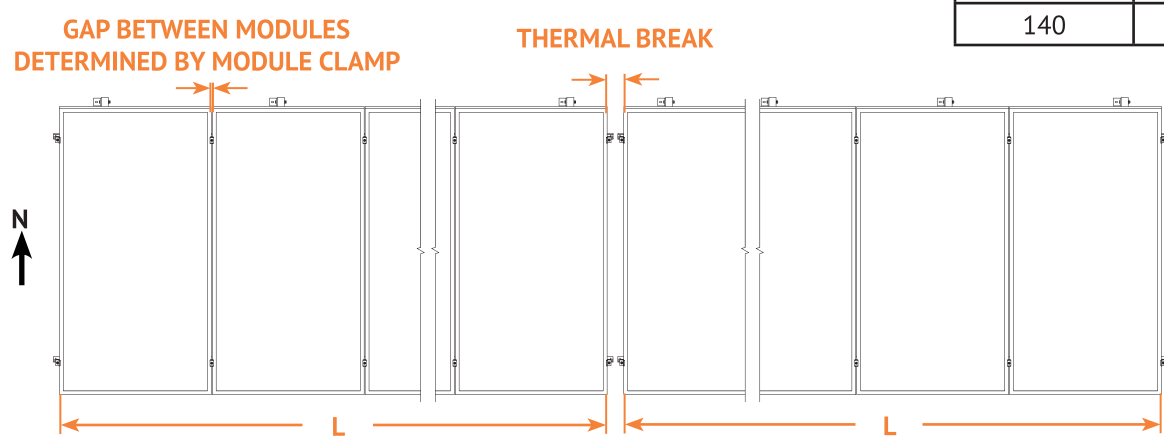
Thermal break is required when a continuous length of spliced rails exceeds the length, in feet, shown in the table to the right. To create the thermal breaks, provide a sufficient gap between rails for proper installation of end clamps and tooling (see image below).

The values displayed in the table are the maximum allowed rail length, in feet, without a thermal break.

The installer is responsible for determining the maximum temperature difference (ΔT) used to establish the maximum rail length, without expansion joint, at the install location.

ΔT refers to the maximum difference in the temperature of the rail between installation and the extreme high or low temperature. The Extreme Annual Design Conditions table at ***http://ashrae-meteo.info/*** can be used as a reference when determining ΔT.

	Maximum Continuous Length (ft.) of Spliced Rails (L)			
	SM		NXT	
ΔT (°F)	**48"**	**72"**	**48"**	**72"**
40	44	42	68	78
50	36	42	60	66
60	36	42	52	66
70	28	30	44	54
80	28	30	44	54
90	28	30	44	42
100	28	30	36	42
120	20	30	36	42
140	20	18	28	30



TOP VIEW

MECHANICAL LOAD TESTING
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 SM & NXT TILT LEGS system rating. Please consult the PV module manufacturer's installation guide for more information.

SYSTEM	MODULE	AREA (sq ft)	Design Load Ratings
SM TILT LEG	Hyundai: HiS-SxxxTI	21.05	Down: 50.53 psf, Up: 44.33 psf, Downslope: 10.93 psf
NXT TILT LEG			Down: 51 psf, Up: 32.23 psf, Downslope: 10.93 psf
NXT TILT LEG	JA Solar: JAM72D30-xxx/MB	27.81	Down: 30.35 psf, Up: 24.10 psf, Downslope: 8.13 psf

NOTE: Design loads are equal to tested loads with 1.5 safety factor applied.