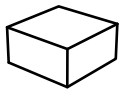


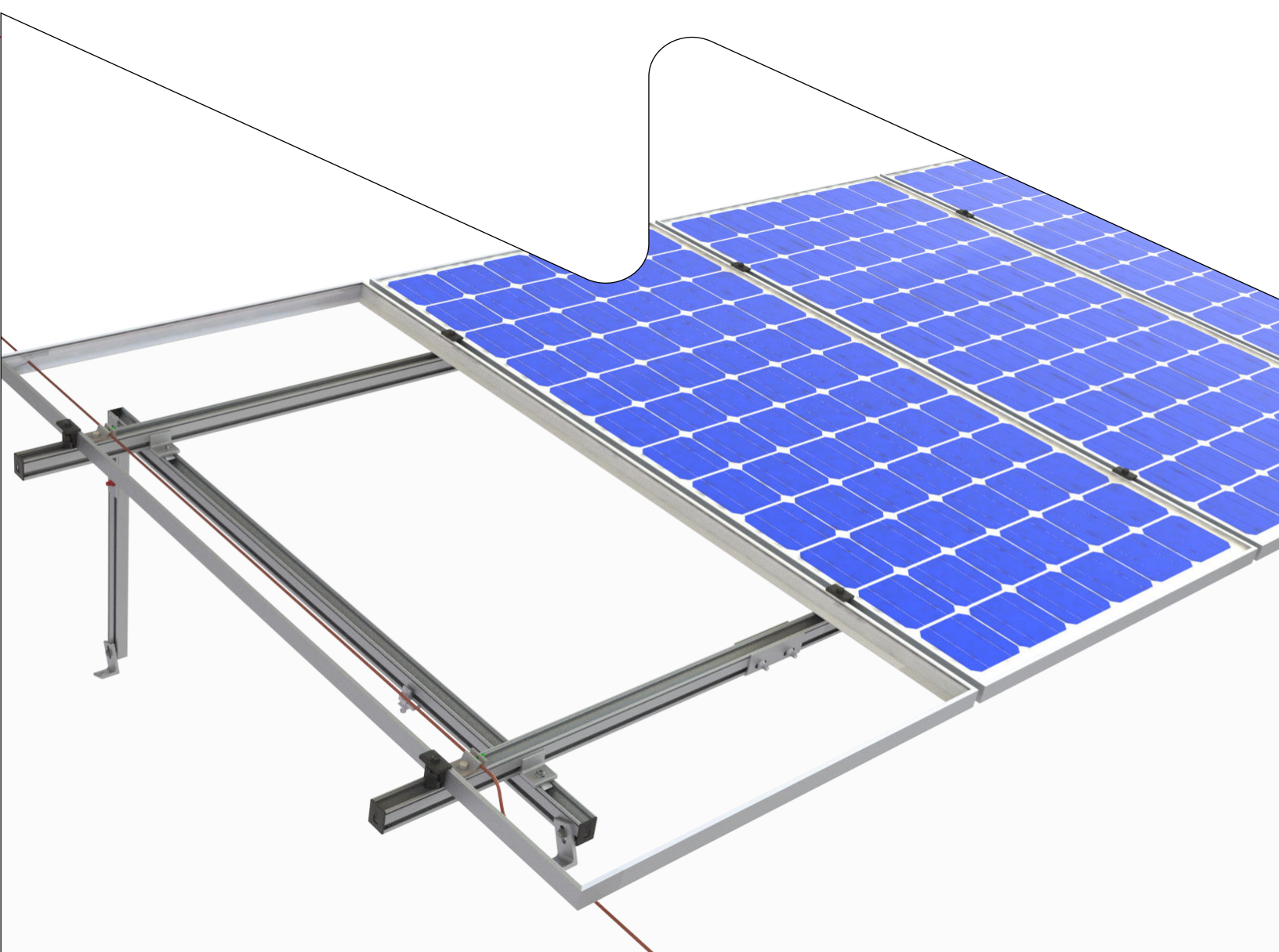


Connecting Strength

CrossRail Tilt Up System



ASSEMBLY INSTRUCTIONS





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Quality tested - several certifications

K2 Systems stands for secure connections, highest quality and precision. Our customers and business partners have known that for a long time. Independent institutes have tested, confirmed and certified our capabilities and components.

Please find our quality and product certificates under:

<https://k2-systems.com/en-us/company/quality-management/>

Engineering strength is at our core



With sophisticated product innovations and a deep customer focus, K2 Systems is the engineering leader for all your mounting system needs. We are a market leader with more than 27 GW installed worldwide.

We offer proven product solutions and innovative designs. Wind tunnel testing along with advanced structural and electrical validation to facilitate permitting, design and installation. Our designs result in cost competitive racking systems with dedicated support that will position you to win more projects.

We partner with our customers and suppliers for the long-term. High quality materials and cutting edge designs provide a durable, yet functional system. Our product line is comprised of a few, coordinated components that lower the cost of materials, and simplify installation, saving you time and money. All backed by German engineering, a long track record of quality and a company that is here to stay.

Thank you for choosing K2 Systems for your Solar PV Project.

General Safety Information



Please note that our general mounting instructions must be followed at all times and can be viewed online at <https://k2-systems.com/en-us/services/resource-center/>

- /The equipment may only be installed and operated by qualified and adequately trained installers.
- /Prior to installation, ensure that the product complies with on-site static loading requirements.
For roof-mounted systems, the roof load-bearing capacity must always be checked.
- /National and local building regulations and environmental requirements must be adhered to.
- /Compliance with health and safety regulations, accident prevention guidelines and applicable standards are required.
 - /Protective equipment such as safety helmet, boots and gloves must be worn.
 - /Roofing works must be in accordance with roofing regulations utilizing fall protection safeguards when working at heights of 6 feet or more above a lower level.
 - /At least two people must be present for the duration of the installation work in order to provide rapid assistance in the event of an emergency.
- /K2 mounting systems are continuously developed and improved and the installation process may thereby change at any time. Prior to installation consult our website at:
<https://k2-systems.com/en-us/resource-center-2/>.
We can send you the latest version on request.
- /The assembly instructions of the module manufacturer must be adhered to.
- /Equipotential bonding/grounding/earthing between individual parts is to be performed according to country specific standards, as well as national laws and regulations.
- /At least one copy of the assembly instructions should be available on site throughout the duration of the installation.
- /Failure to adhere to our general safety and assembly instructions and not using all system components, K2 is not liable for any resulting defects or damages. We do not accept liability for any damage resulting in the use of competitor's parts. Warranty is excluded in such cases.
- /If all safety instructions are adhered to and the system is correctly installed, there is a product warranty entitlement of 25 years! We strongly recommend reviewing our terms of guarantee, which can be viewed at <https://k2-systems.com/en-us/resource-center-2/>. We will also send this information on request.
- /Dismantling of the system is performed in reverse order to the assembly.
- /K2 stainless steel components are available in different corrosion resistance classes. Each structure or component must be carefully checked for possible corrosion exposure.

The following guidelines apply



The CrossRail Tilt Up System can be installed as standard under the following conditions. Even if the system is capable of meeting higher demands through the integration of safety standards, please get in touch with your contact at K2 Systems if the specified values are exceeded.



Roof requirements

/The sufficient holding force of the roof covering at the support or substructure must be ensured on site.

/Roof slope: 0 - 7°

/Roof mean height: 0-30 ft



Structural requirements

/Wind speed: 90-180 mph

/Snow load: 0-70 psf

/Clearance: 2" to 10" clear from the top of the roof to the top of PV panel

/Maximum end cantilever of horizontal support rail shall not exceed one-third [1/3] of allowable span in the roof wind pressure zone of the cantilever but no greater than 24".

Bonding and Grounding



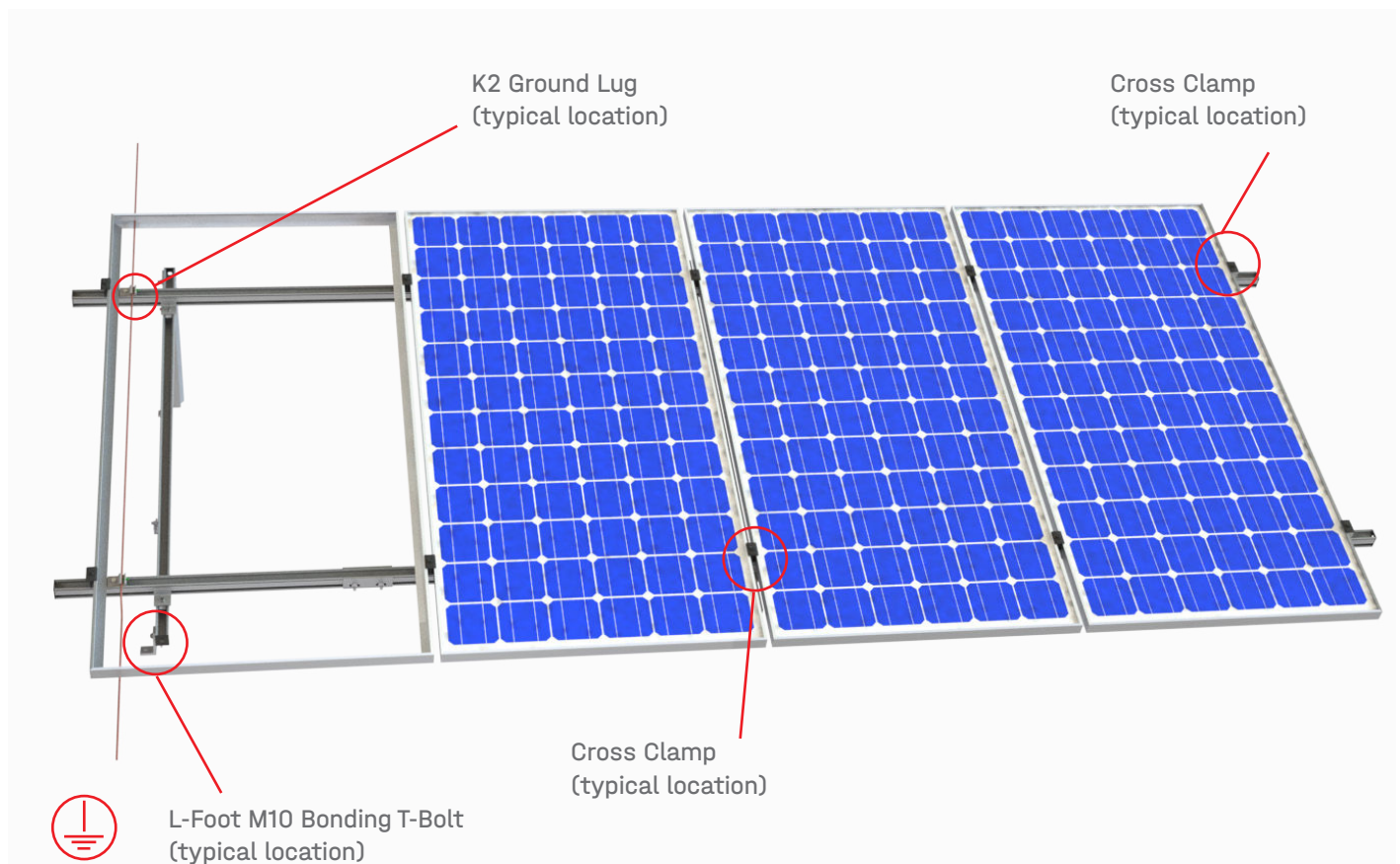
Appropriate means of bonding and grounding are required by regulation. The information provided in this manual shall always be verified with local and national building codes.

K2 Systems has obtained a UL 2703 system listing from Underwriter's Laboratories (UL).

A sample bonding path diagram is shown in Figure 1 below. Your specific installation may vary, based upon site conditions and your AHJ's requirements.

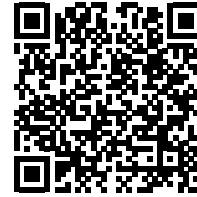
Each electrical connection has been evaluated to a maximum fuse rating of 30A. At least one ground lug per row of modules must be used to ground all equipment within each sub-array, although additional may be used for redundancy. When installed per these installation instructions, all connections meet the requirements of NEC 690.43.

This racking system may be used to ground and/or mount a PV module complying with UL 61730 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.



Approved Modules

To view our list of compatible modules, please click this link or scan the QR code: <https://k2-systems.com/wp-content/uploads/2023/06/Approved-Modules.pdf>



Torque Overview

/M10 T-Bolts: 25.8 ft-lbs (35Nm)

/K2 Ground Lug: M8 Hex Bolt: 10.3 ft-lbs [14Nm], Terminal Screw: 3-5 ft-lbs [4-6.8Nm]

/K2 Cross Clamp Hex Head M8×50mm: 12 ft-lbs (16.3Nm)

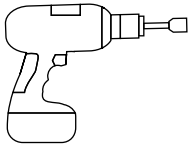
/MLPE, Module Frame Mount, Kit: 15 ft-lbs (20.3Nm)

/CR Micro inverter & OPT, 13mm Hex Kit: 10.3 ft-lbs [14 Nm]

/Yeti Clamp 2.0: 12 ft-lbs (16.3Nm)

Tools Overview

Refer to the specific roof attachment Quick Guides for additional tools needed



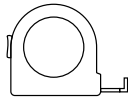
Cordless Drill



13mm deep socket
7/16" socket



4 - 35 Nm
(2.9 - 25.8 ft-lb)
Torque Wrench



Measuring Tape

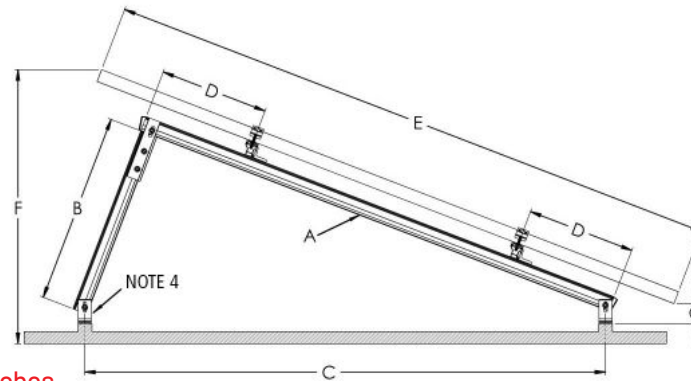


Chalk Line

Install Dimensions



The CrossRail Tilt Up System is a fully customizable solution. The image and table below provide recommended installation dimensions based upon a standard 60-cell and 72-cell PV module with 1/6 - point clamping locations. Always ensure that the dimensions are suitable for the project site.



Note: All dimensions are in inches

*Note: / degree tilted systems in landscape require specific configurations. See Step 7.

Dimension	Description	Desired Tilt Angle									
		25 degrees		20 degrees		15 degrees		10 degrees		7 degrees	
		Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
		67.5" x 44.8"									
A	Front Leg	57	43 3/4	57	43 3/4	57	43 3/4	57	43 3/4	57	43 3/4
B	Rear Leg	26 1/8	19 7/8	20 1/4	16	15	11 3/4	9 7/8	7 5/7	6 7/8	5 3/8
C	L-Foot Spacing	60 1/8	45 5/8	58 1/8	44 1/8	56 5/8	42 7/8	55 1/2	42 1/8	55 3/8	42
D	Rail Offset	6	6	6	6	6	6	6	6	6	6
E	Module Length	67.5	44.8	67.5	44.8	67.5	44.8	67.5	44.8	67.5	44.8
F	Rear Module Height	32	24 7/8	27 1/4	21 1/2	22 1/4	17 5/8	17 1/8	14	14	11 7/8
G	Front Module Height	2 1/2	4 5/8	3 1/8	4 7/8	3 3/4	5	4 3/8	5 1/4	4 3/4	5 3/8

Dimension	Description	Desired Tilt Angle									
		25 degrees		20 degrees		15 degrees		10 degrees		7 degrees	
		Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
		80" x 43.2"									
A	Front Leg	63	42 1/4	63	42 1/4	63	42 1/4	63	42 1/4	63	42 1/4
B	Rear Leg	28 7/8	19 1/4	22 1/2	14 7/8	16 3/8	10 7/8	10 5/8	7	7 1/4	4 5/8
C	L-Foot Spacing	66 7/8	43 7/8	64 5/8	42 1/2	62 7/8	41 3/8	61 5/8	40 5/8	61 1/2	40 1/2
D	Rail Offset	6	6	6	6	6	6	6	6	6	6
E	Module Length	80	43.2	80	43.2	80	43.2	80	43.2	80	43.2
F	Rear Module Height	36 1/2	24 3/8	31	21	25	17 5/8	19	14	15 3/8	11 3/4
G	Front Module Height	1 1/2	4 5/8	2 1/4	4 7/8	3	5	4	5 1/4	4 1/2	5 3/8

Dimension	Description	Desired Tilt Angle									
		25 degrees		20 degrees		15 degrees		10 degrees		7 degrees	
		Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
		86" x 41.0"									
A	Front Leg	69	40	69	40	69	40	69	40	69	40
B	Rear Leg	31 3/4	18 1/8	24 3/4	14 1/4	18 1/2	10 3/4	12 1/8	7	8 1/2	5
C	L-Foot Spacing	73 1/2	41 1/2	70 7/8	40	68 7/8	38 7/8	67 1/2	38	67	37 3/4
D	Rail Offset	6	6	6	6	6	6	6	6	6	6
E	Module Length	86	41	86	41	86	41	86	41	86	41
F	Rear Module Height	39	23 3/8	33	20 1/2	27	17 1/2	20 1/2	14	16 5/8	12 1/8
G	Front Module Height	1 1/2	4 5/8	2 1/4	4 7/8	3	5	4	5 1/4	4 1/2	5 3/8



Dimension	Description	Desired Tilt Angle									
		25 degrees		20 degrees		15 degrees		10 degrees		7 degrees	
		Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape	Portrait	Landscape
		92.5" x 46"									
A	Front Leg	75 1/2	45	75 1/2	45	75 1/2	45	75 1/2	45	75 1/2	45
B	Rear Leg	34 3/4	20 1/2	27 1/8	16	20	11 3/4	13 1/8	7 3/4	9 1/8	5 1/2
C	L-Foot Spacing	80 5/8	47	78	45 1/2	75 7/8	44 1/4	74 3/8	43 1/2	73 7/8	43
D	Rail Offset	6	6	6	6	6	6	6	6	6	6
E	Module Length	92.5	46	92.5	46	92.5	46	92.5	46	92.5	46
F	Rear Module Height	41 3/4	25 1/2	35 1/4	22	28 1/2	18 1/2	21 1/2	14 7/8	17 1/4	12 1/2
G	Front Module Height	1 1/2	4 5/8	2 1/4	4 7/8	3	5	4	5 1/4	4 1/2	5 3/8

Important Notes

/Rail offset not to exceed 8"

/Rear module height not to exceed 30", note that dimension provided in Table 1 does not include roof attachment height

/Front module height dimension does not include roof attachment height

/Refer to CrossRail Tilt Up Engineering Letter[s] for reaction loads at L-Feet

/Always refer to chosen PV module manufacturer's installation instructions for approved clamping locations.

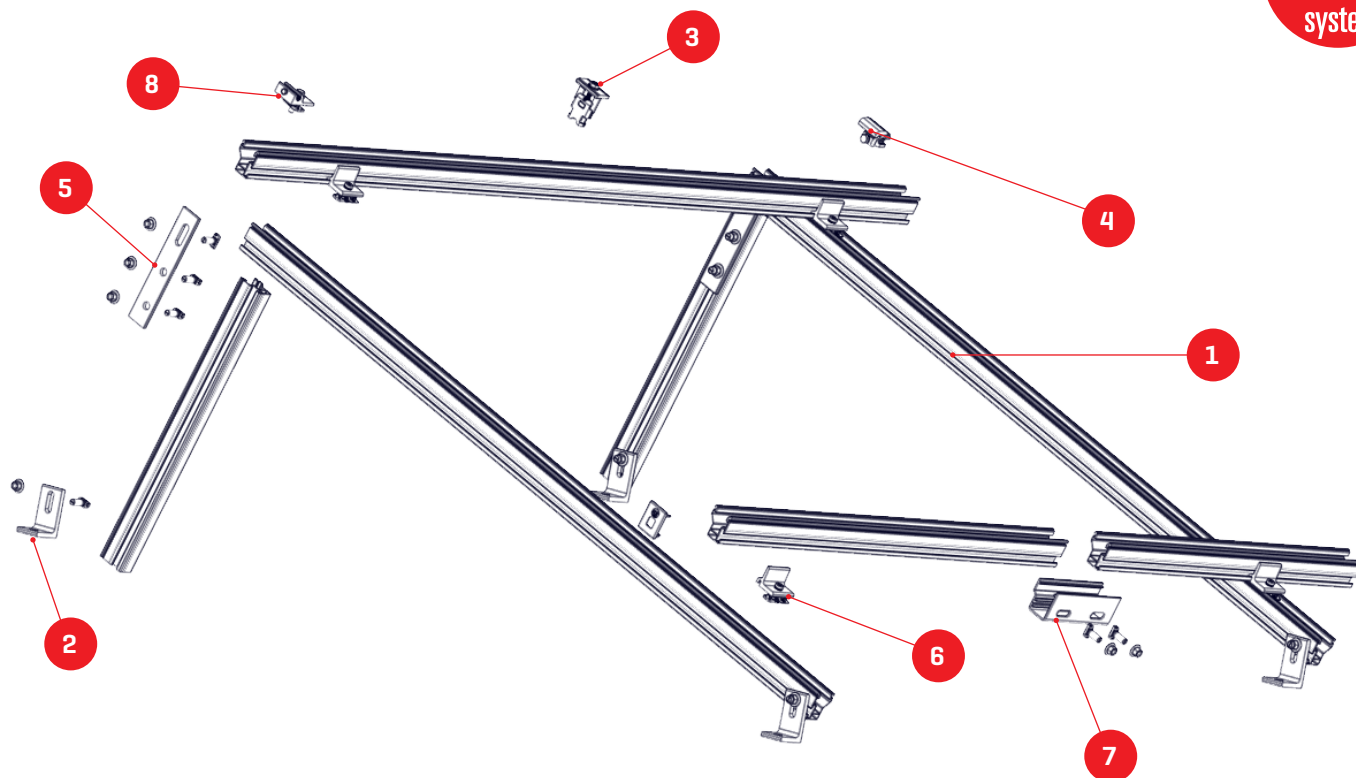
Dimensions in Table 1 assume a standard 60-cell or 72-cell module with clamping locations at the 1/6-points on the module's long edge.

/Installer is responsible for cutting rail to lengths specified "A" and "B" in Table 1

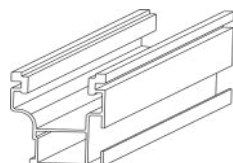
/Dimensions provided in Table 1 are suggested values. Installer shall verify dimensions are appropriate for the individual site conditions, selected PV module and roof surface.

/Adjust based on your installation needs.

Components



1 Multiple PN's



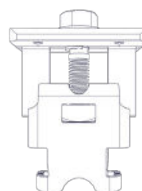
CrossRail 44-X,
48-X or 48-XL

2 4000630/4000631



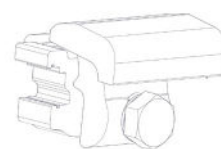
L-Foot Slotted Set

3 4000135/4000145



K2 Cross Clamp Set

4 4000050-B



Yeti Clamp 2.0, Set

5 4000505



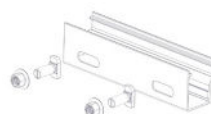
Tilt Connector Set

6 4006042-H/4006043-H



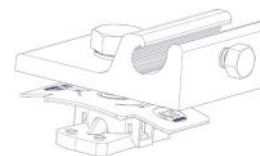
Climber Set
CR 44-X or 48-X/48-XL

7 4000051/4000052
4000385/4000386



Structural Rail Connector
CR 44-X or 48-X/48-XL

8 4000006-H

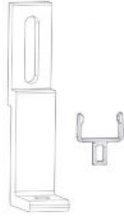


K2 Ground Lug

Roof Attachments



T-Foot X 6" Kit, Mill
4000080



**Big Foot 6" w/ 3"+ Chem
Link Clip**
4000218



**Standing Seam Power-
Clamp Mini, Set**
4000016



**Standing Seam Power-
Clamp Standard, Set**
4000017

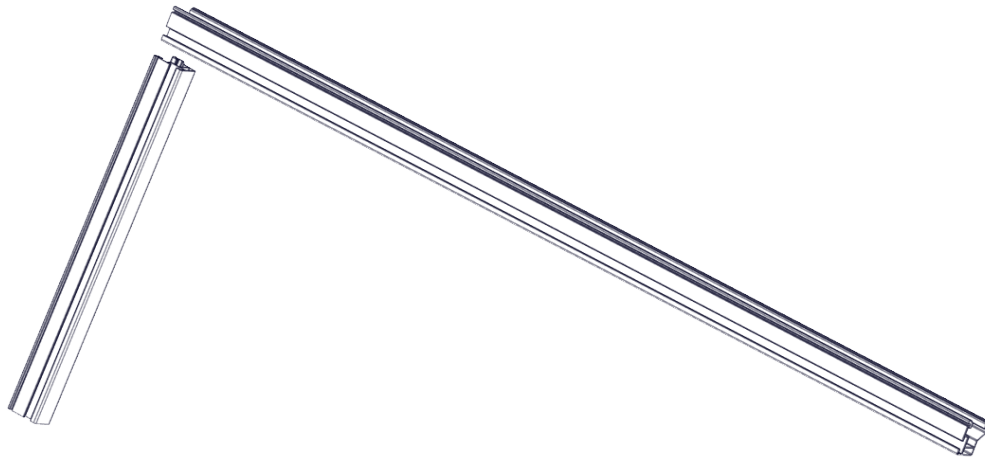
Assembly



Flat Roof

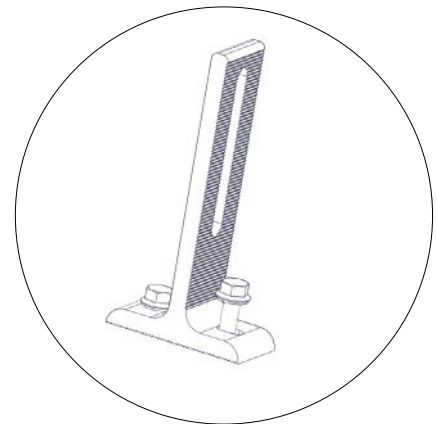
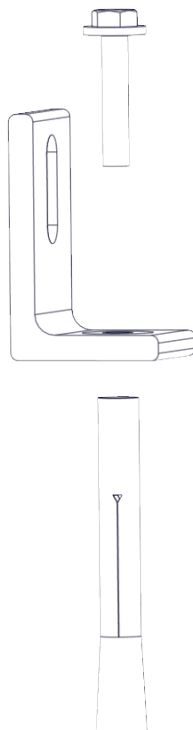
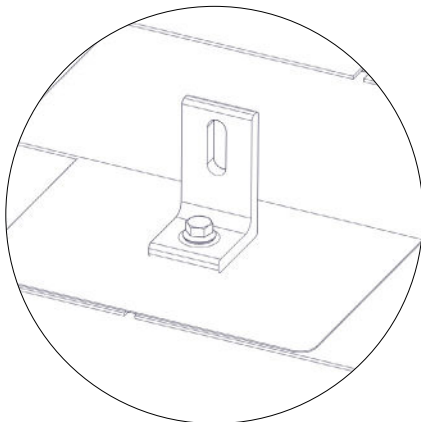
1
!

Using the table above as a guide, cut CrossRail to appropriate lengths according to desired tilt angle.



2
!

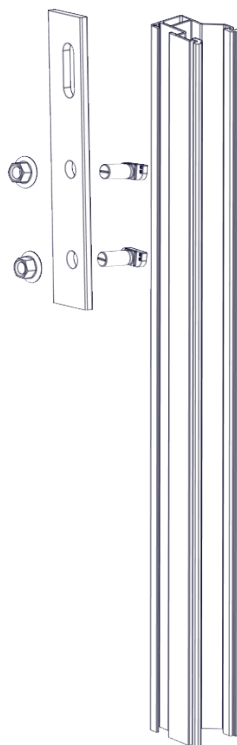
Select and install appropriate roof attachment according to manufacturer's instructions. Typically, a connection to the roof structure (i.e. rafters) is required. Attach L-Foot to roof attachment system as specified by the attachment manufacturer.



For instructions on how to install the EverFlash eComp or T-Foot X, please see their respective Quick Guides. If installing the E-Curb with the T-Foot X, please follow the manufacturer's guidelines for installation at <https://chemlink.com/?s=e+curb>.

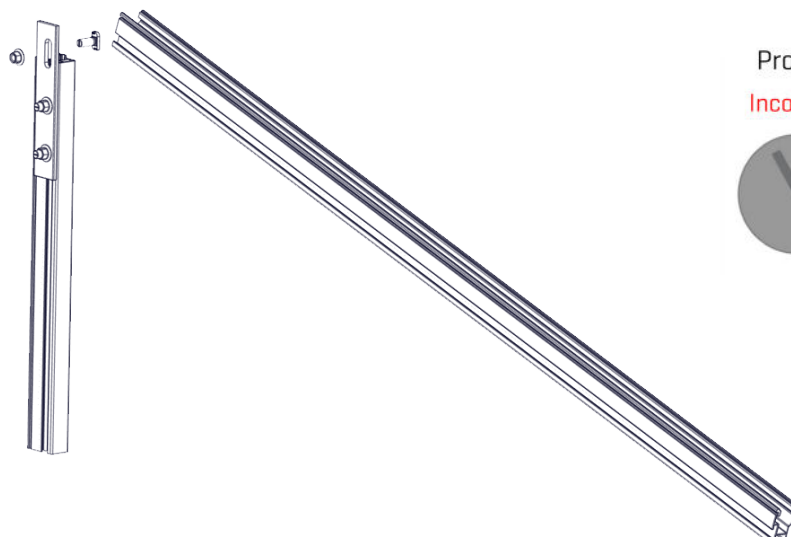
3

Attach rear tilt leg to Tilt Connector Set using two T-Bolts and serrated hex nuts. Make sure connector is flush along bottom of rail. Torque to 25.8 ft-lbs (35 Nm). If installing a 7° landscape configuration, do not tighten bottom hex nut on connector. Continue to the next step and then skip to step 6.



4

Attach Tilt Connector slot on front tilt leg. Attach connector using one T-Bolt and one serrated hex nut. Torque to 25.8 ft-lbs (35 Nm). Ensure the line at the bottom of the T-Bolt is perpendicular to the rail, indicating proper engagement.



Proper T-Bolt Alignment

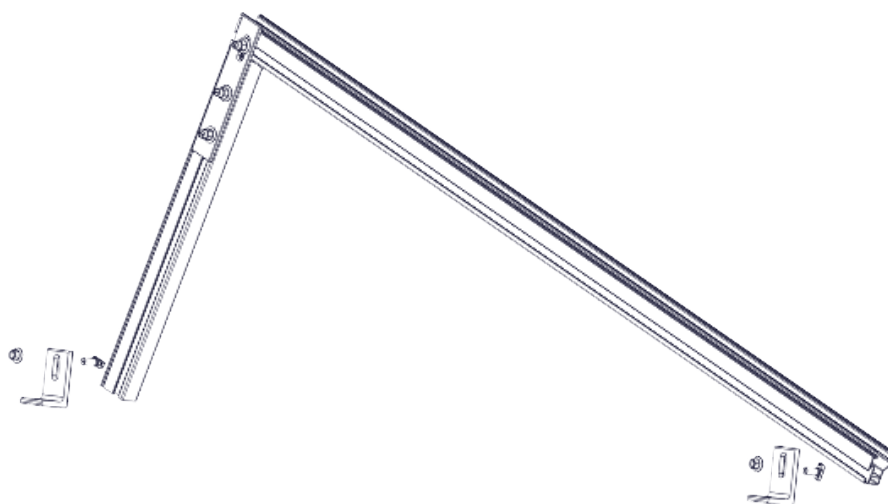
Incorrect

Correct



5

Position leg set assembled in steps 4 and 5 above so that its flush against vertical wall of L-Foot or T-Foot X. Hand tighten leg set to the L-Feet or T-Feet with T-Bolts and serrated hex nuts. Using appropriate leveling techniques, ensure appropriate tilt angle and roof clearances are obtained. Torque to 25.8 ft-lbs (35 Nm).

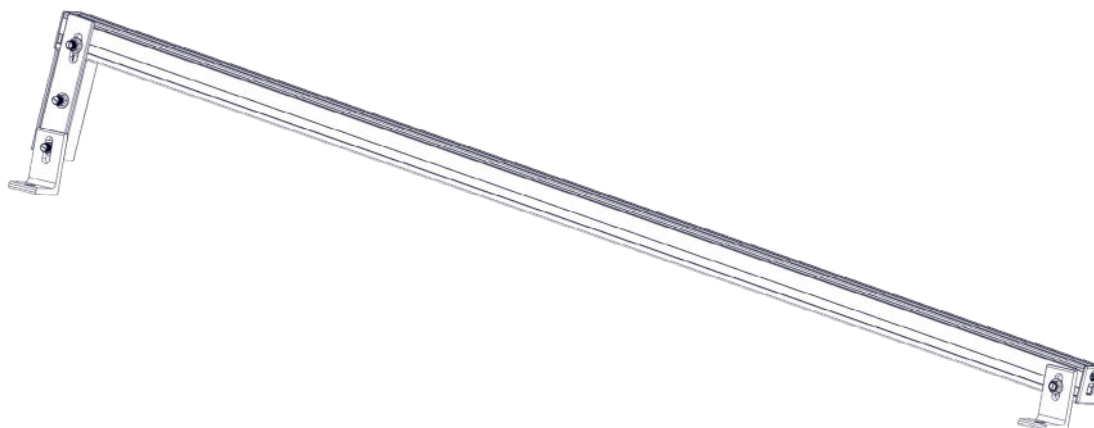


6

Optional 7° Tilt in Landscape Only

!

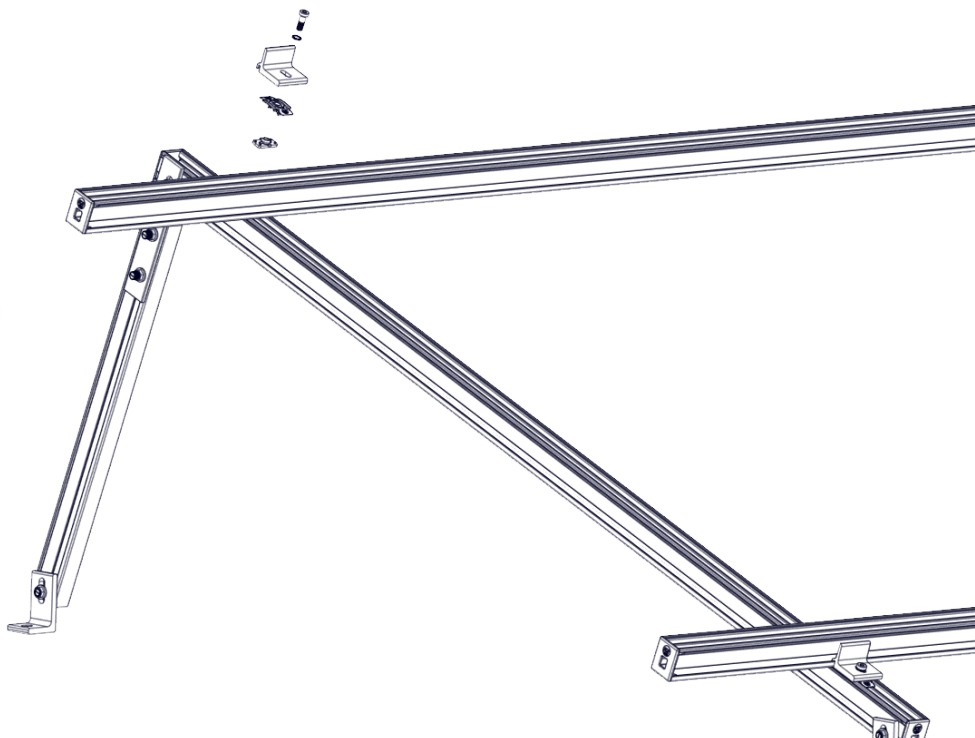
Position leg set assembled in steps 4 and 5 above so that its flush against vertical wall of L-Foot or T-Foot X. Hand tighten leg set to the L-Feet or T-Feet with T-Bolts and serrated hex nuts. Using appropriate leveling techniques, ensure appropriate tilt angle and roof clearances are obtained. Torque to 25.8 ft-lbs (35 Nm). Note you will now have a spare T-Bolt and serrated hex nut from the roof attachment kit.



7



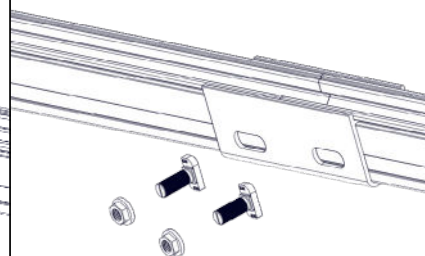
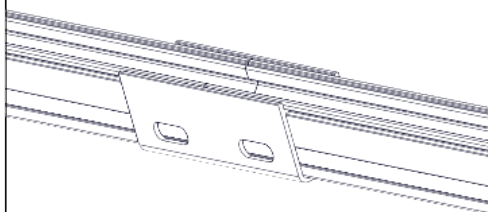
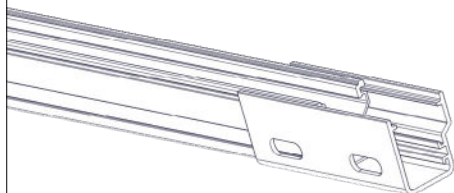
Attach horizontal sections of CrossRail to tilt leg sets using Climber Set. The max distance from the horizontal rails to support points is 8". Torque Climber Set to 11.8 ft-lbs (16 Nm). Due to thermal expansion we recommend placing a gap of 1.25-2" (3-5 cm) ever 65 ft (20 m) between rails. Max allowable spacing between thermal expansion gaps shall not exceed 80 ft (24.4 m).



8



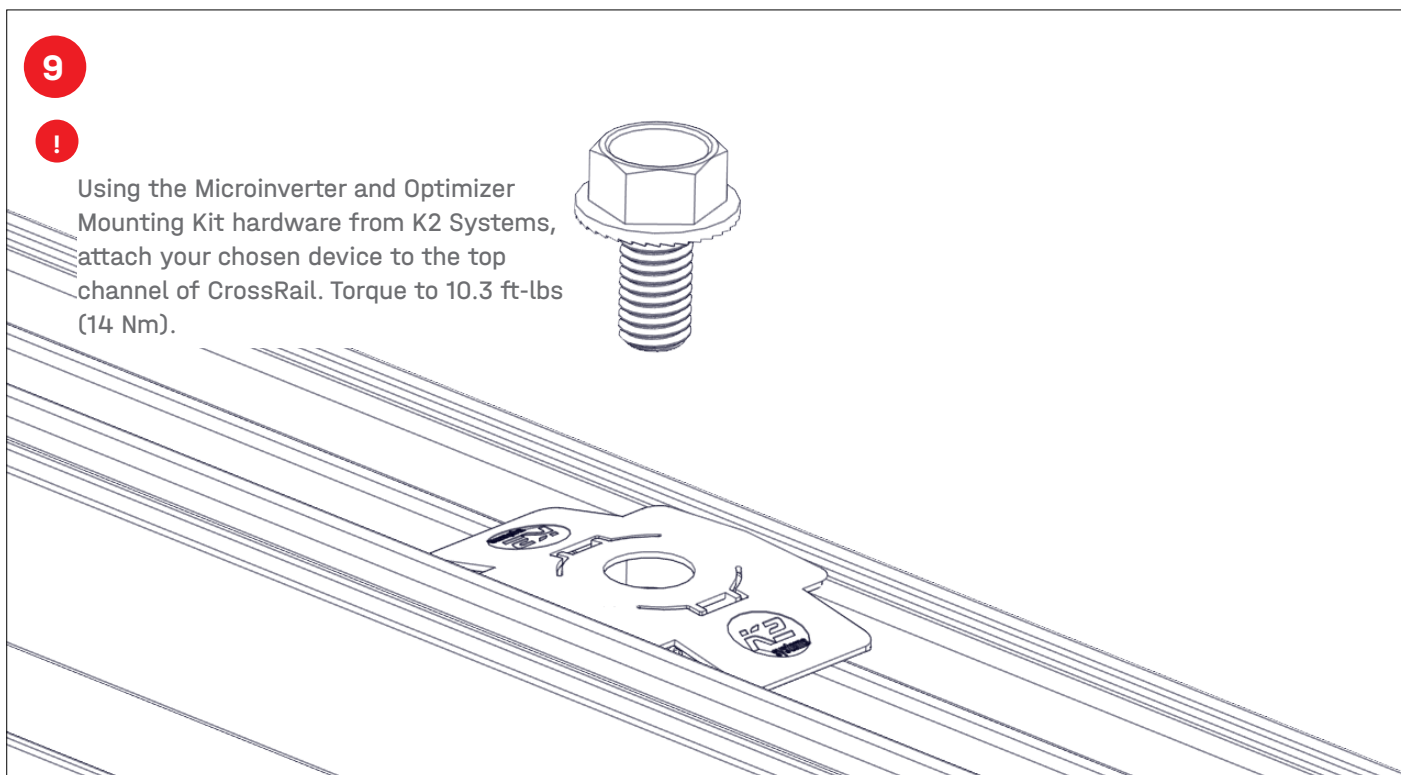
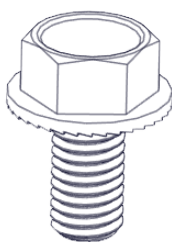
Align two rail ends next to each other. Slide rail connector from below rails, centering connector between the two rail ends. Ensure rail connector does not interfere with a roof attachment. Attach rail connector using two T-Bolts and serrated hex nuts per side (if applicable). Ensure slot on bottom of T-Bolt is perpendicular to rail, indicating proper alignment. Torque to 25.8 ft-lbs (35 Nm).



9



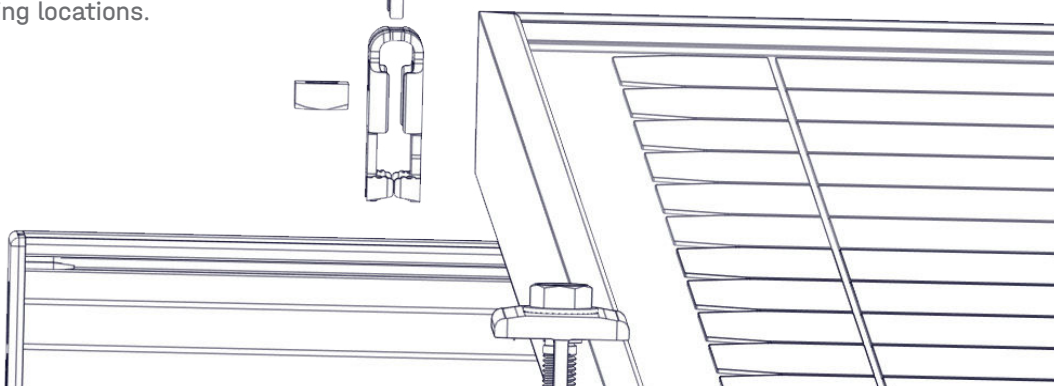
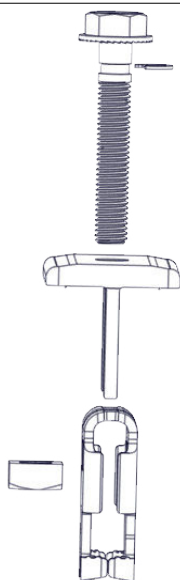
Using the Microinverter and Optimizer Mounting Kit hardware from K2 Systems, attach your chosen device to the top channel of CrossRail. Torque to 10.3 ft-lbs (14 Nm).



10



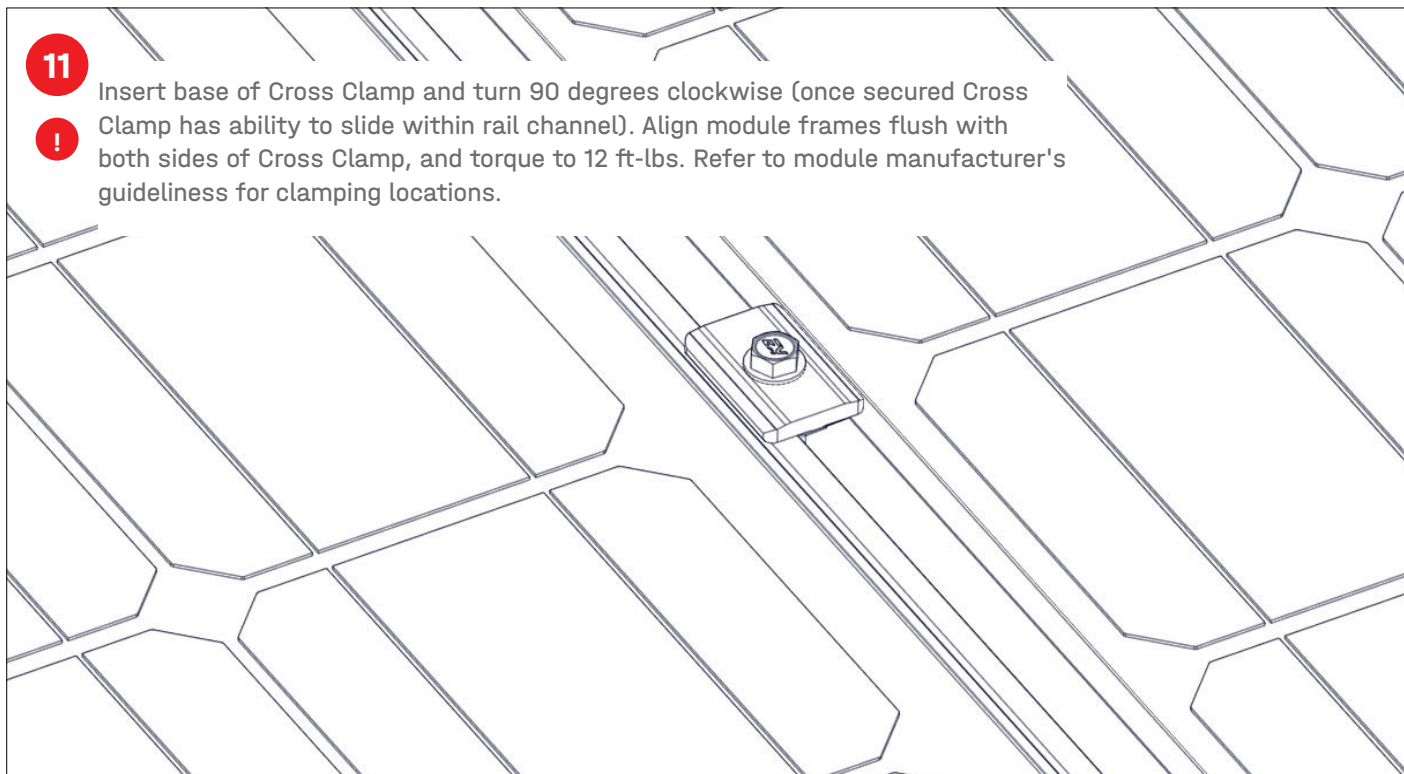
To secure Cross Clamp into rail channel insert base of Cross Clamp and turn 90 degrees clockwise. Slide Clamp within rail channel to ensure clamp sits flush against frame of module, and torque to 12 ft-lbs. Ensure minimum of 1" (20 mm) exists from end of clamp to end of rail. Refer to module manufacturer's guidelines for clamping locations.



11

Insert base of Cross Clamp and turn 90 degrees clockwise (once secured Cross Clamp has ability to slide within rail channel). Align module frames flush with both sides of Cross Clamp, and torque to 12 ft-lbs. Refer to module manufacturer's guidelines for clamping locations.

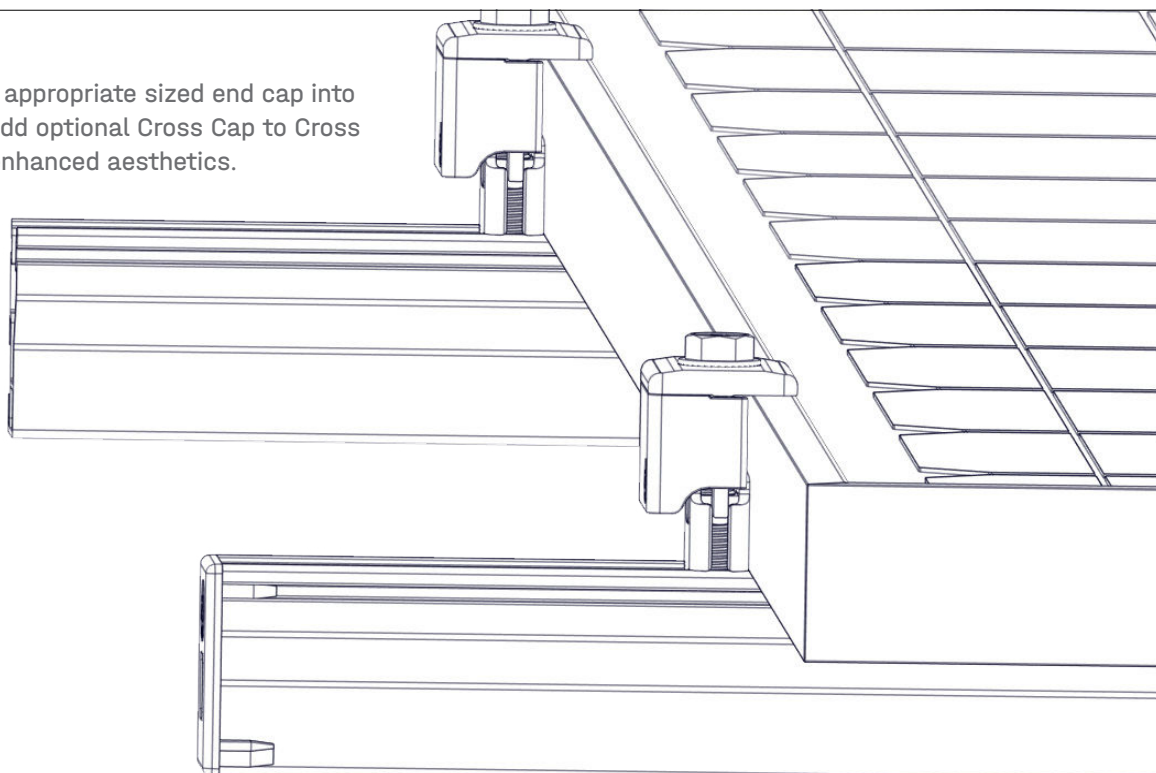
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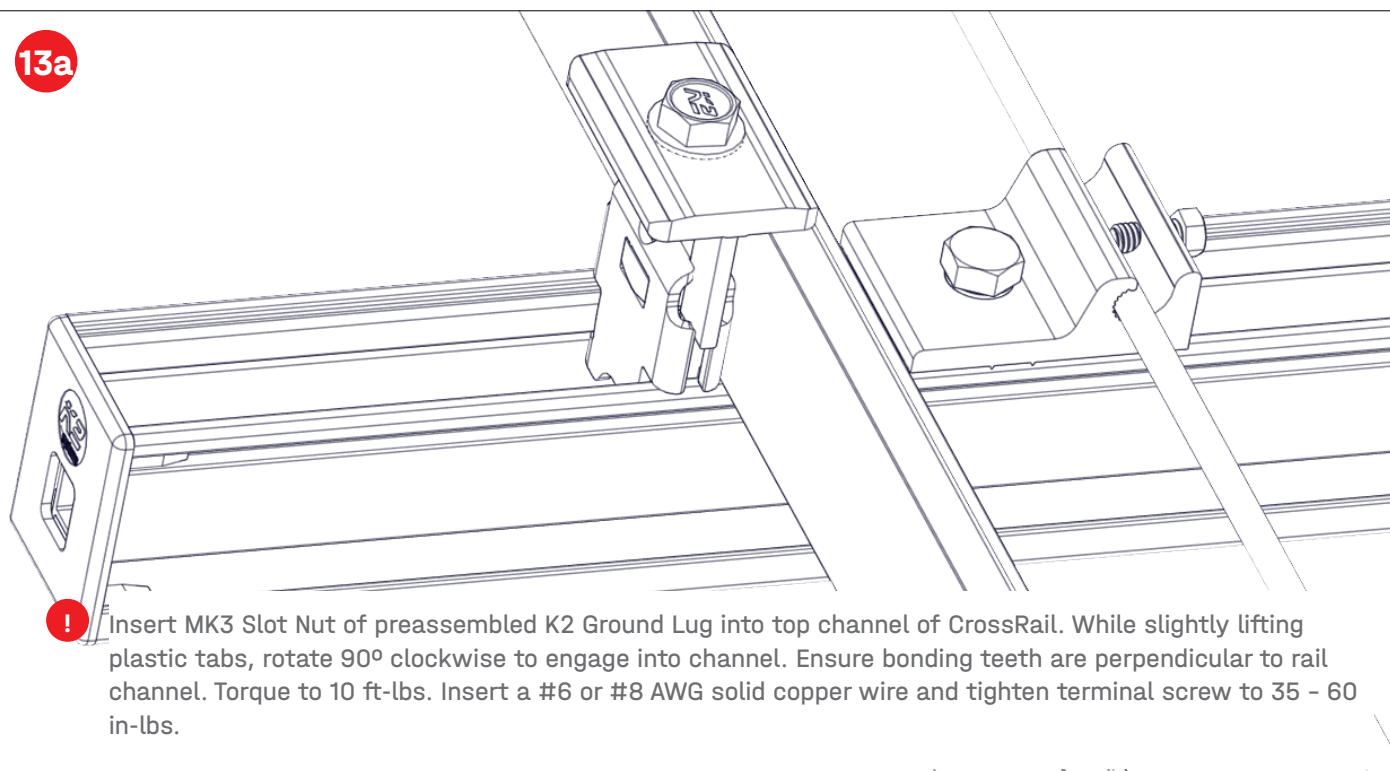
12

Push pins of appropriate sized end cap into end of rail. Add optional Cross Cap to Cross Clamps for enhanced aesthetics.

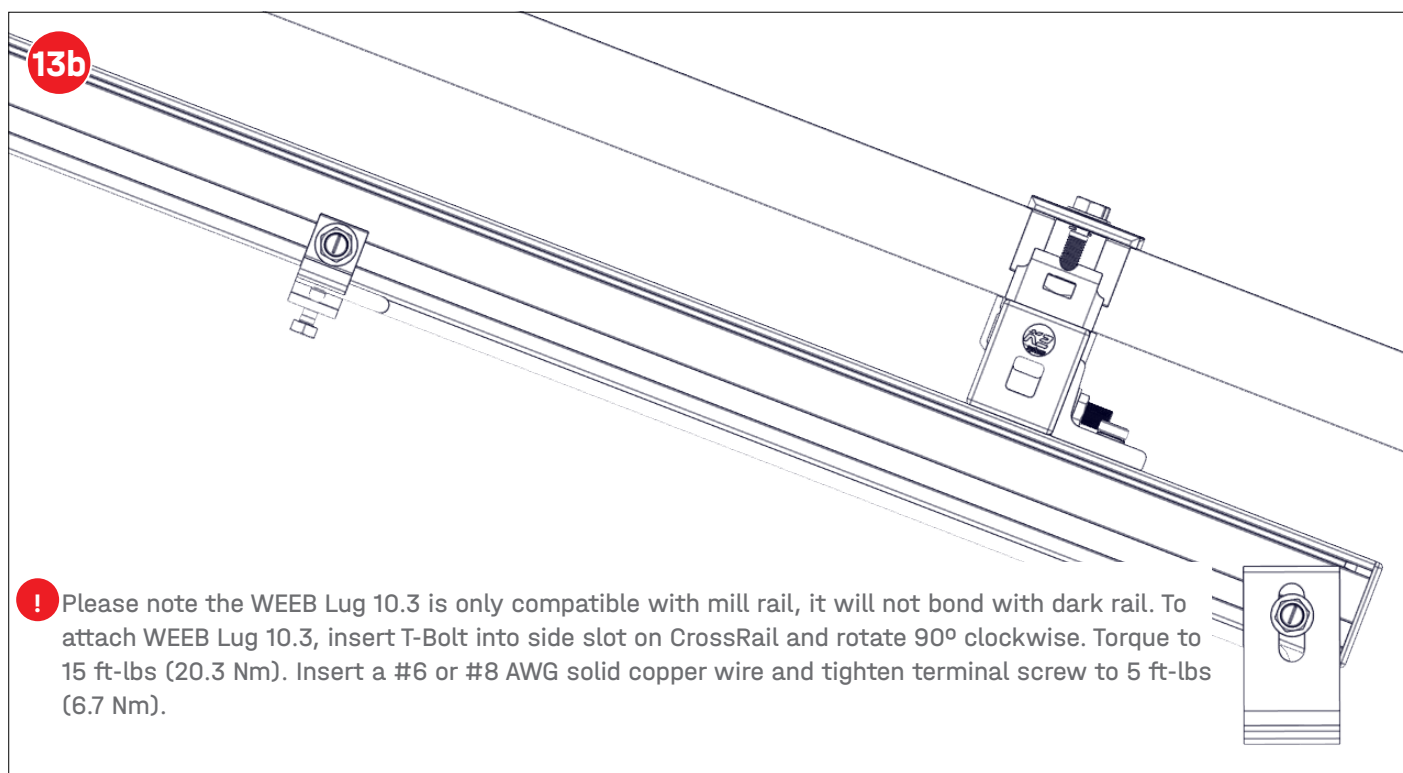
!



13a



13b



Notes

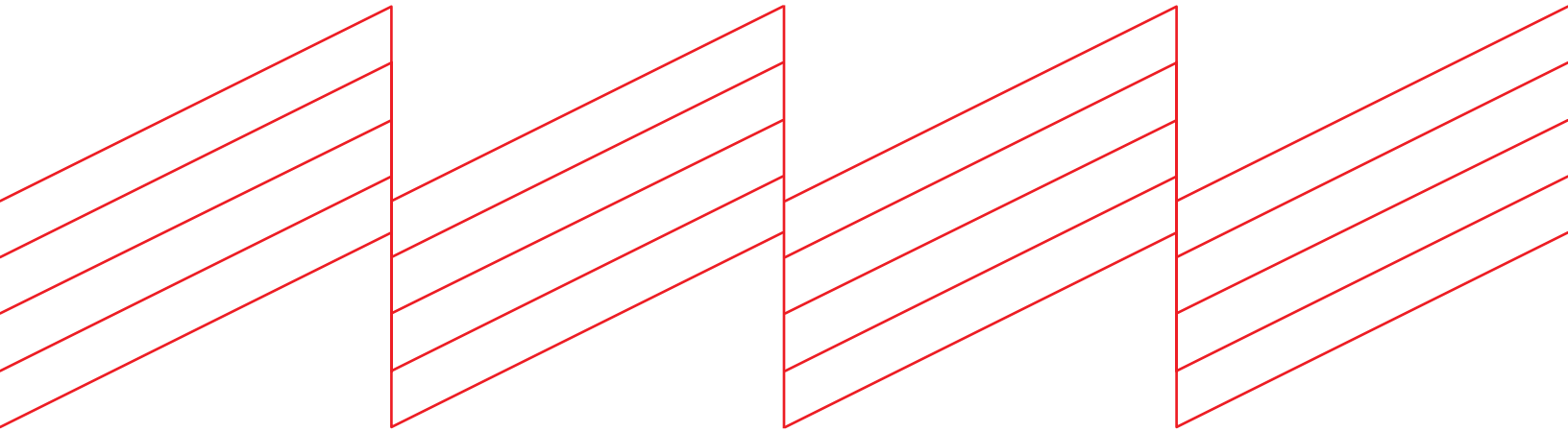


Notes





Connecting Strength



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USA +1.760.301.5300 • infous@k2-systems.com
www.k2-systems.com

CrossRail Tilt Up System Assembly V06 | 1123 • Subject to change
Product illustrations are exemplary and may differ from the original.