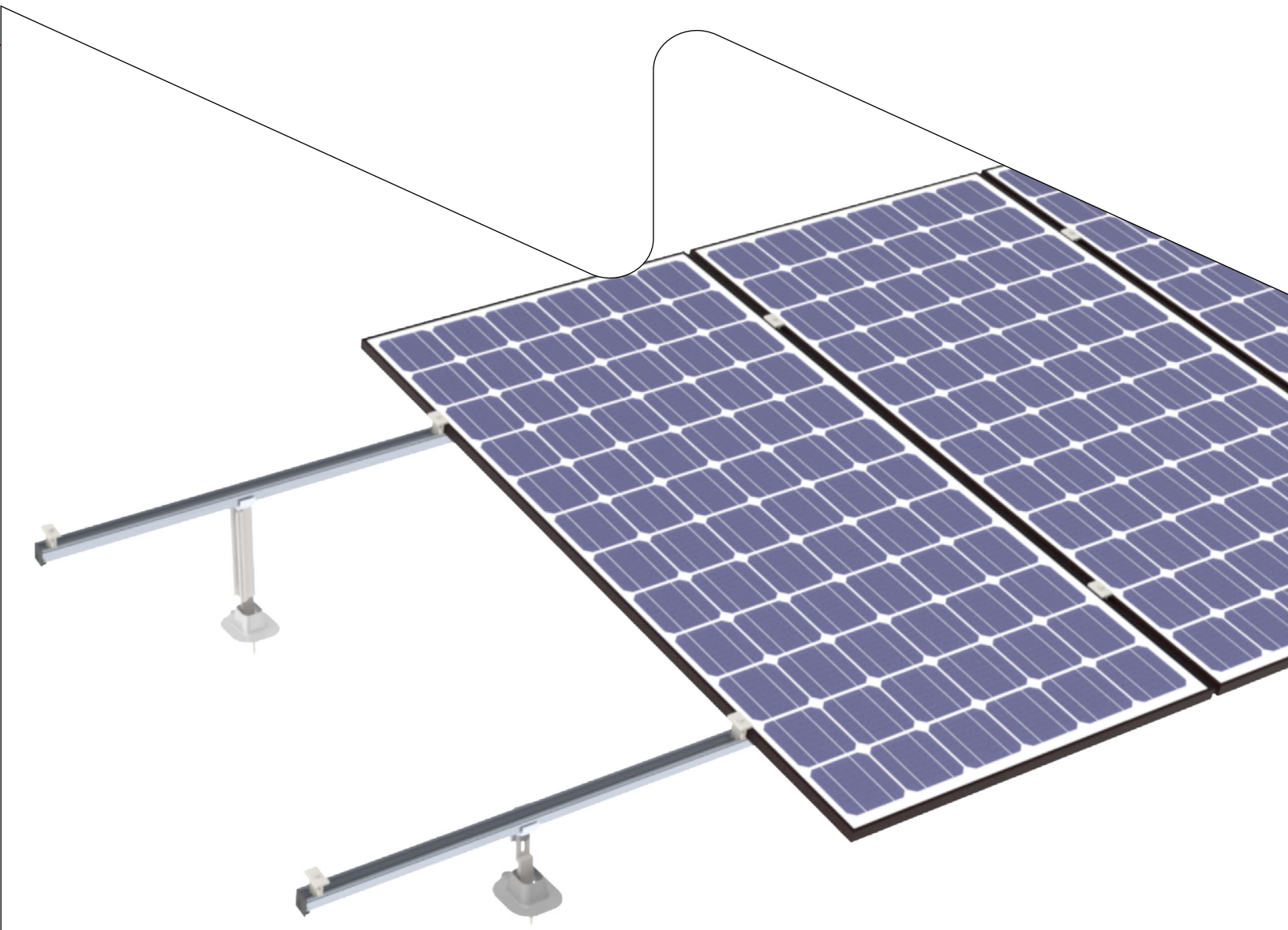
Connecting Strength

Simple Tilt System

ASSEMBLY INSTRUCTIONS



Content

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/resource-center/download-library/

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 32 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/resource-center/download-library/

TThe 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/download-library/
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/download-library/
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 Simple Tilt 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 pitch: 0° - 7°

/ Roof mean height: 0 - 50 ft

/ Tilt angle range of modules: 0° - 25°

Structural requirements

The static verification of the component is automatically calculated with the K2 Quote planning software for the respective location. The design provided in a project report must be followed.

Important mounting instructions

/ On-site general standards and regulations for lightning protection must be observed and consultation with a specialist to create a lightning protection concept is recommended (use lightning protection clamp if necessary). Country-specific regulations must be observed.

/ Due to thermal expansion and contraction we recommend placing a movement joint, or break, in connected rail lengths that exceed 65 feet (20 meters). Maximum allowable spacing between thermal expansion joints shall not exceed 80 feet with a minimum gap of 1.25" between rails at the joint

/ Typically, rail overhangs cannot exceed 1/3 of the maximum allowable span. See the engineering letters on the K2 website for more details on maximum spans and overhangs.

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.

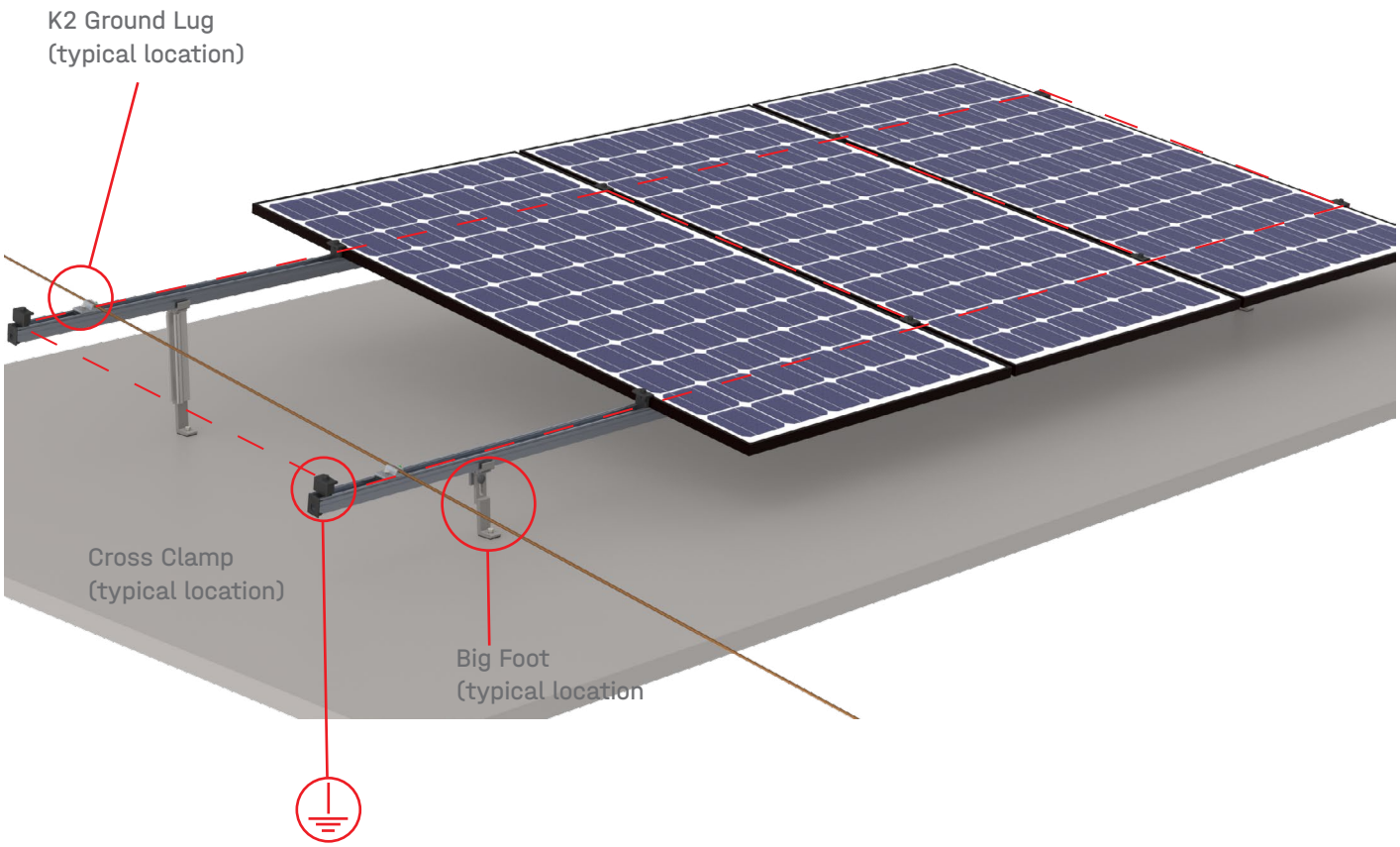


Figure 1: Bonding connections shown in red. For certain jurisdictions, bonding and grounding conncections are identified in typical locations.

Fire Rating

The CrossRail Simple Tilt System has undergone fire performance testing in accordance with UL 2703, Fire Performance. A System Class A fire rating is achieved when using CrossRail 44-X Max/44-X/48-X/48-XL under the following conditions:

/Roof slope less than or equal to 7°

/Used in combination with a UL 61730 Listed module with a fire performance rating of Type 1, Type 2, or Type 29. Consult the module manufacturer for specific fire performance rating information.

/CrossRail may be mounted using any stand-off height to maintain the Class A fire rating. Always consult the module manufacturer's installation instructions to ensure your installation is in compliance with their UL 61730 Listing.

/The results of the racking system do not improve a roof covering Class rating.

All documentation can be found on UL's Online Database as well as K2 Systems' website.

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/2023/04/Approved-Modules-EN-US.pdf

Torque

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

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

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

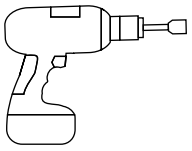
/MLPE, Module Frame Mount, Kit: 15 ft-lbs (20.3 Nm)

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

/All other components: M8 Hex Bolts: 10.3 ft-lbs (14 Nm)

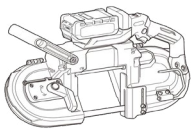
Tools

See the Roof Attachment Quick Guide for additional required tools.

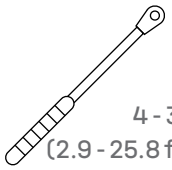


Drill

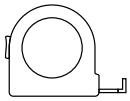
13mm
7/16"



Band Saw



4 - 35 Nm
(2.9 - 25.8 ft-lbs)



Tape Measure

Chalk Line

Simple Tilt Dimensions for Installation

The Simple Tilt System is a completely custom solution. Figure 1 and Table 1 and 2 below provide recommended installation dimensions based on examples of standard PV modules with fastening locations at approximately 1/6 of the module length dimension. Always make sure the dimensions are suitbale for the project site.

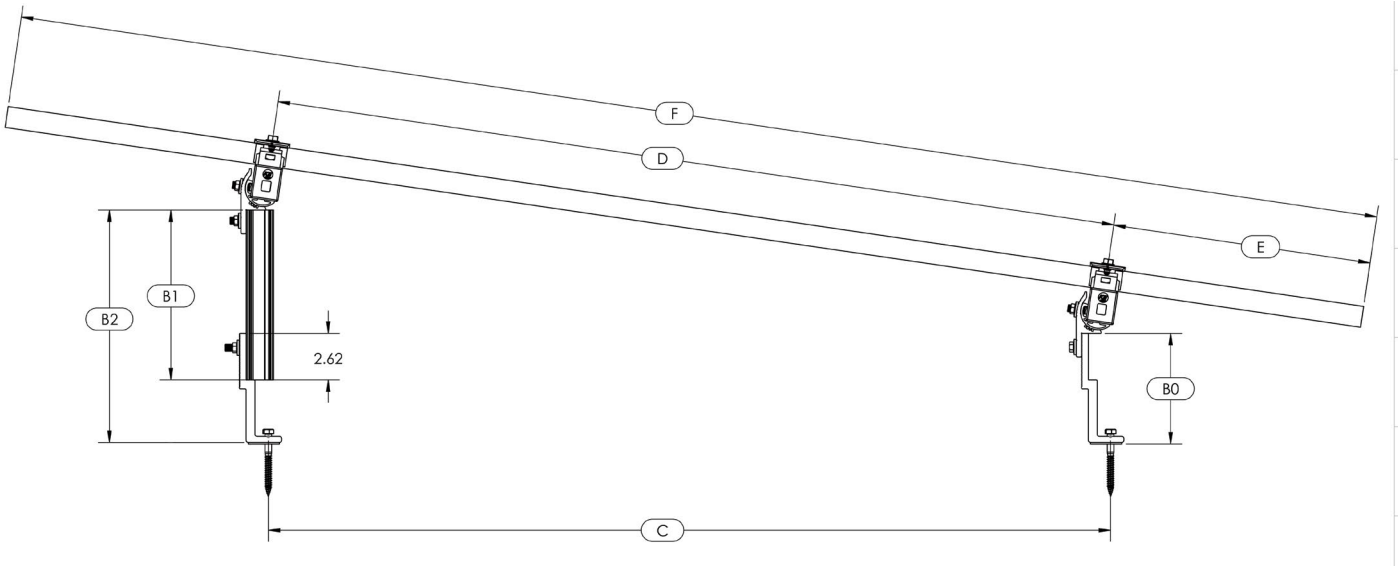


Figure 1: Assembly dimensions for the Simple Tilt System
Note: Maximum roof inclination of 7 °
Note: When the desired tilt angle is 0° the rail B1 isn't necessary.
Note: You can find B1 by using the equation B1 = C x tan(θ) + 2.6
Note: For roofs with 1-2" of foam that require foam coring minus 1/2" off the back rail lengths listed below.

Dimensions	Description	Desired Tilt Angle			
		0 Degrees	10 Degrees	15 Degrees	25 Degrees
		Portrait			
		70" - 85" panels			
B0	Front Post Maximum	6.3	6.3	6.3	6.3
B1	Back Rail	0	11.06	15.46	24.98
B2	Back Post	6.3	14.76	19.16	28.68
C	Span Front to Back	48	48	48	48
D	Clamp to Clamp	48	48.74	49.69	52.96
E	Clamp to Module Edge	15.37	15	14.52	12.89
F	Module Length	78.74	78.74	78.74	78.74

Table 1: Installation dimensions for one row of the Simple Tilt with 70" - 85" panels. All dimensions are in inches.

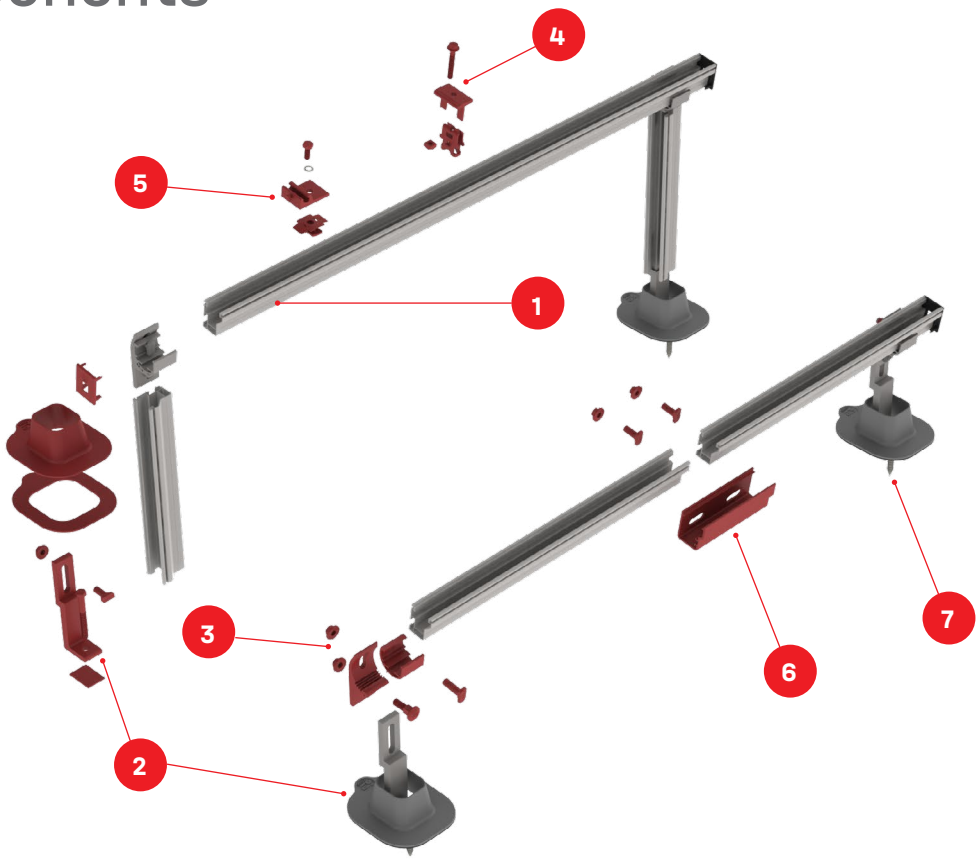
Dimensions	Description	Desired Tilt Angle			
		0 Degrees	10 Degrees	15 Degrees	25 Degrees
		Portrait			
		Up to 70" panels			
B0	Front Post Maximum	6.3	6.3	6.3	6.3
B1	Back Rail	0	10.01	13.85	22.18
B2	Back Post	6.3	13.71	17.55	25.88
C	Span Front to Back	42	42	42	42
D	Clamp to Clamp	42	42.65	43.48	46.34
E	Clamp to Module Edge	12.47	12.14	11.72	10.29
F	Module Length	66.93	66.93	66.93	66.93

Table 2: Installation dimensions for one row of the Simple Tilt for up to 70" panels. All dimensions are in inches.

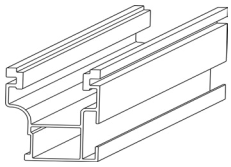
Considerations:

1. Always refer to the PV module manufacturer's installation instructions for approved fastening locations. The dimensions in Table 1 is an example that assumes a standard 70"-85" module length with fastening locations approximately 1/6 of the total length and a centered module.
2. The dimension of the front leg (B0) must measure at most 6.3" total length and a centered module.
3. Dimensions C and D are critical dimensions that must be followed, dimensions B1 and E are given in Table 1 as suggested values. The installer must verify that the dimensions are appropriate for individual site conditions, modules selected, and roof surface. With the following formula you can have an estimate of the length of the back leg:
B1 = C x tan(θ) + 2.6
B1=Back leg (in)
θ=Permitted tilt angle: 0°, 10°, 15° or 25°
E=Long side of module (in)
D=Module clamping area. Typically between 1/4 and 1/6 of the long side of the module. Consult the technical information of the module manufacturer to know the exact clamping zones.
4. The installer is responsible for cutting the track to the "B1" lengths.
5. Refer to Simple Tilt System Engingeering Letter(s) for reaction loads at each anchor point. These calculations only consider wind loads. Seismic loads and snow loads were not taken into account.
6. The Simple Knee performs best when fully seated on top of the rail.
7. For more information please request the K2 Tool with our engineering team at infous@k2-systems.com

Components



1 Multiple PNs

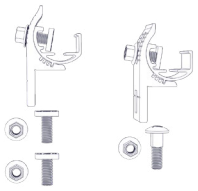


CrossRail 44-X Max, 44-X, 48-X or 48-XL

2 4000559

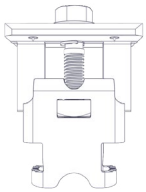
K2 Armor w/ Big Foot, Set

3 4000416



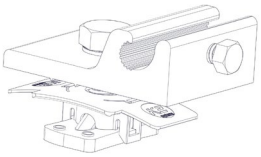
Simple Knee Kit

4 4000135/4000145
4000135-US/4000145-US



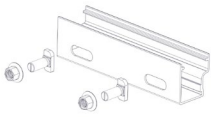
K2 Cross Clamp

5 4000006-H



K2 Ground Lug

6 Multiple PNs

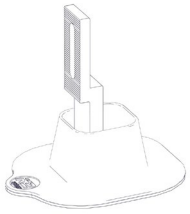


Rail Connector
CR 44-X Max/44-X or 48-X/48-XL

7 4000358

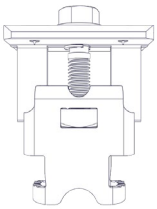
Lag Screw w/ EPDM Washer
4" length

Roof Attachments

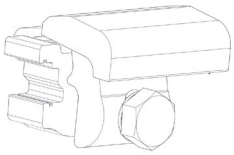


K2 Armor w/ Big Foot, Set
4000559

Clamps



K2 Cross Clamp
4000135/4000145
4000135-US/4000145-US

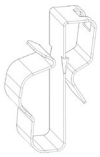


Yeti Clamp
4000050-B

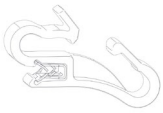
Accessories

Wire Management Clip, Omega, Black
4005394

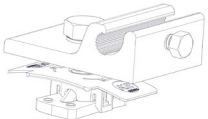
Wire Management Clip, TC
4000069



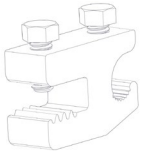
HEYClip SunRunner Cable Clip SS, S6404
4000382



K2 4 Wire Dragon Clip
4000400

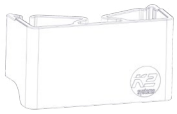


K2 Ground Lug
4000006-H



ILSCO Lug
4000960

CrossRail EndCap
4000176/4000431

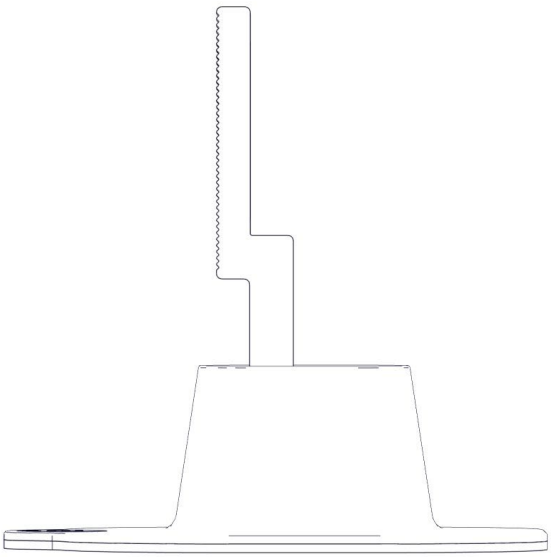


K2 Cross Cap
4000312

Assembly

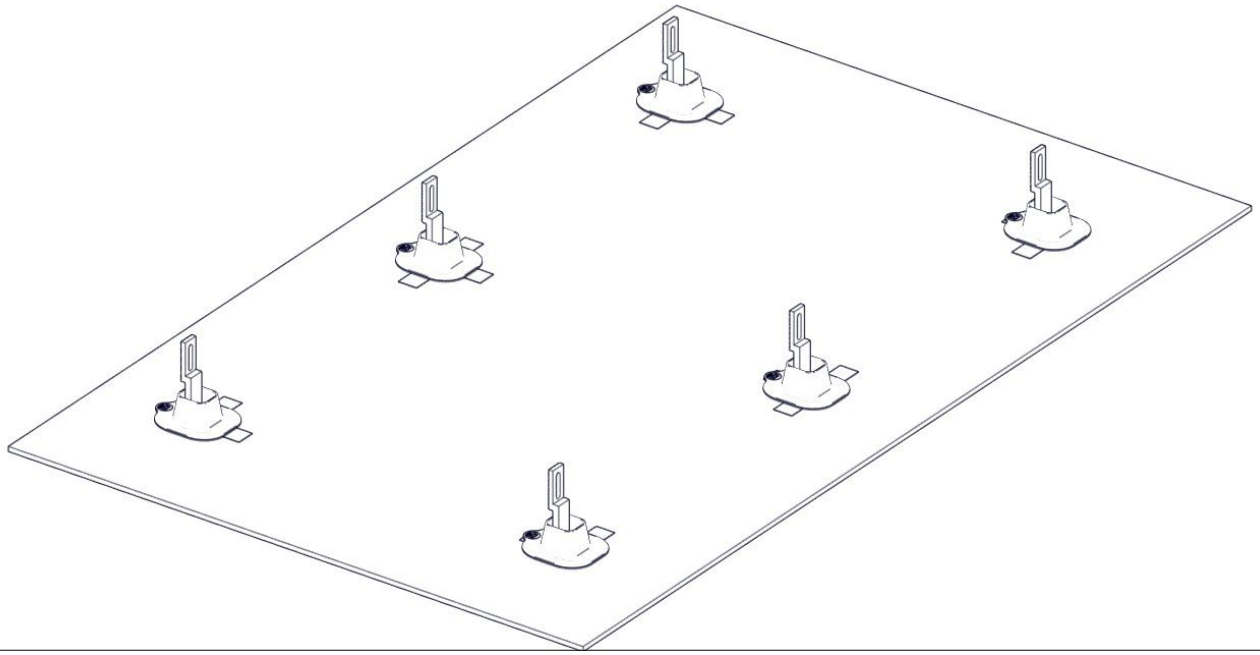
1 !

For proper installation of the K2 Armor w/ Big Foot Kit, please reference the quick guide here: https://catalog.k2-systems.com/media/b4/46/cb/K2-Armor-QG-EN.pdf



2 !

Layout the array by marking the corners of the module array. Mark the roof attachments with chalk lines to keep the layout square, refer to the C value in the tables for the spacing from front to back mounts. Reference the plans and K2 Quote report to mark the roof attachments along the chalk lines and centered over structural members.

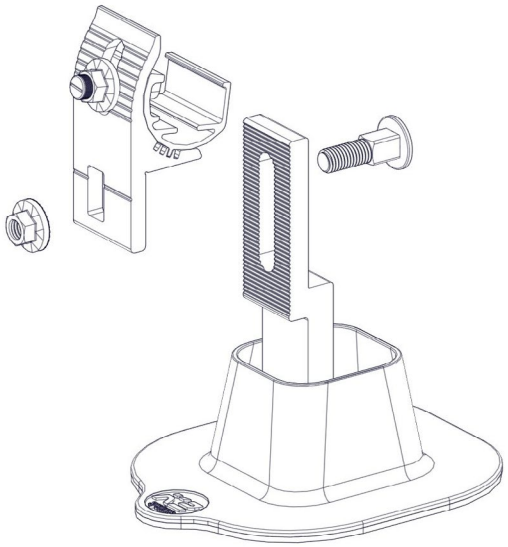


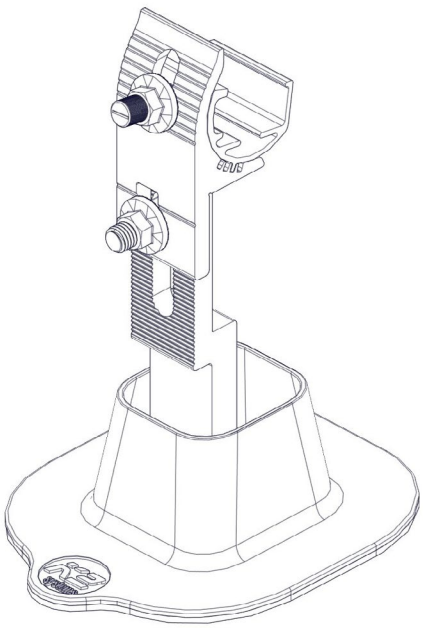
3

Cut the back leg CrossRail to the appropraite lengths according to the desired tilt angle. Refer to dimension B1 in the table(s) on Page(s) 9-10 for proper rail cuts.

4

Install the Simple Knee Kit directly to the front row of mounts using K2 Carriage Bolt and torque to 25.8 ft-lbs.





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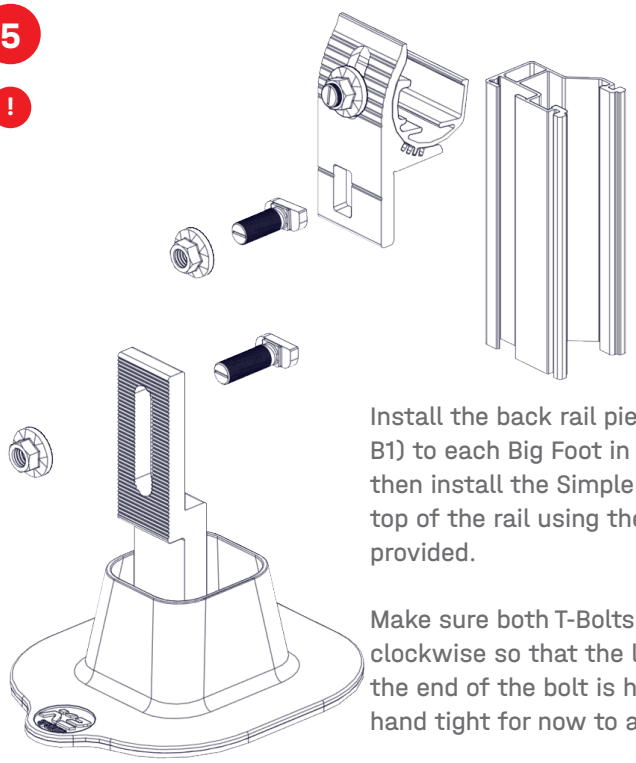
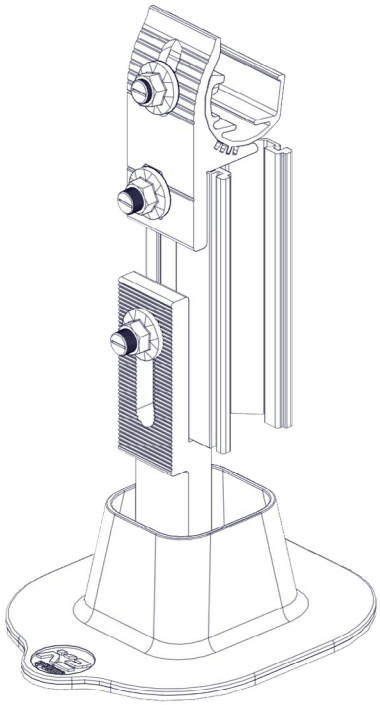


Install the back rail pieces (dimension B1) to each Big Foot in the back row, then install the Simple Knee Set to the top of the rail using the two M10 T-Bolts provided.

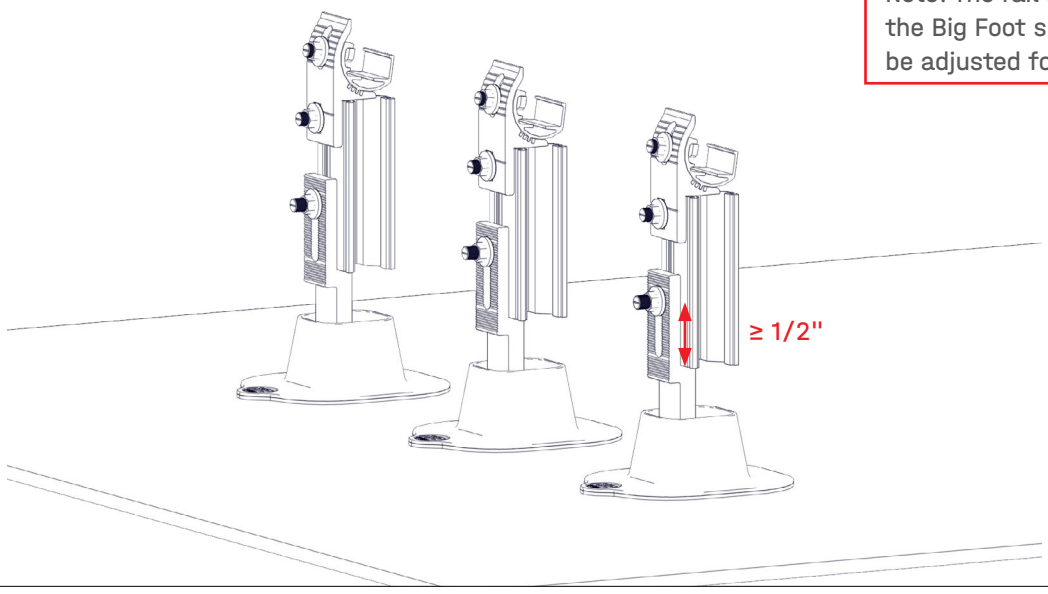
Make sure both T-Bolts are rotated clockwise so that the line marked at the end of the bolt is horizontal. Leave hand tight for now to adjust the level.



6

Adjust the rail leg up or down within the Big Foot slot so that there is at least 1/2" of rail past the center of the bolt. Torque both T-bolts connected to the back rail leg to 25.8 ft-lbs.

Note: The rail should rest on the Big Foot shelf but can be adjusted for leveling.



7

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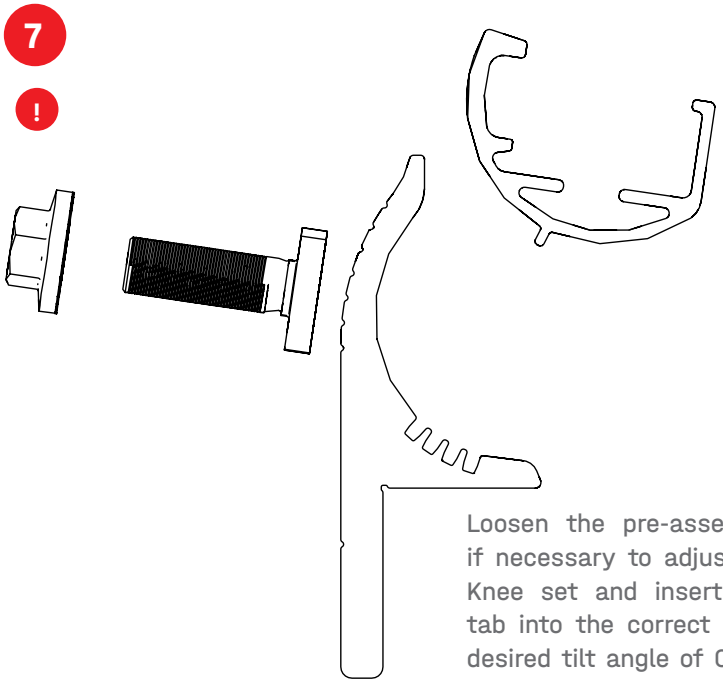
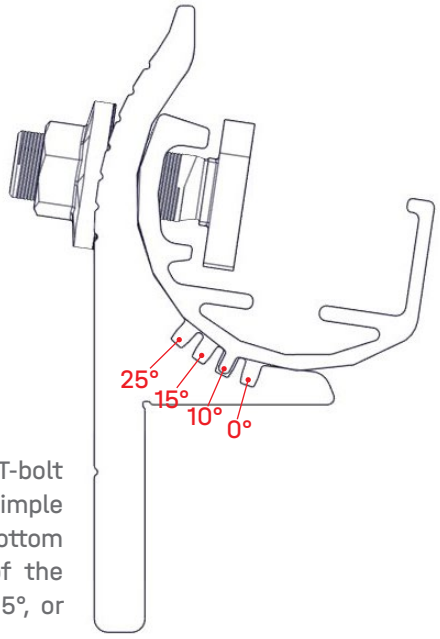


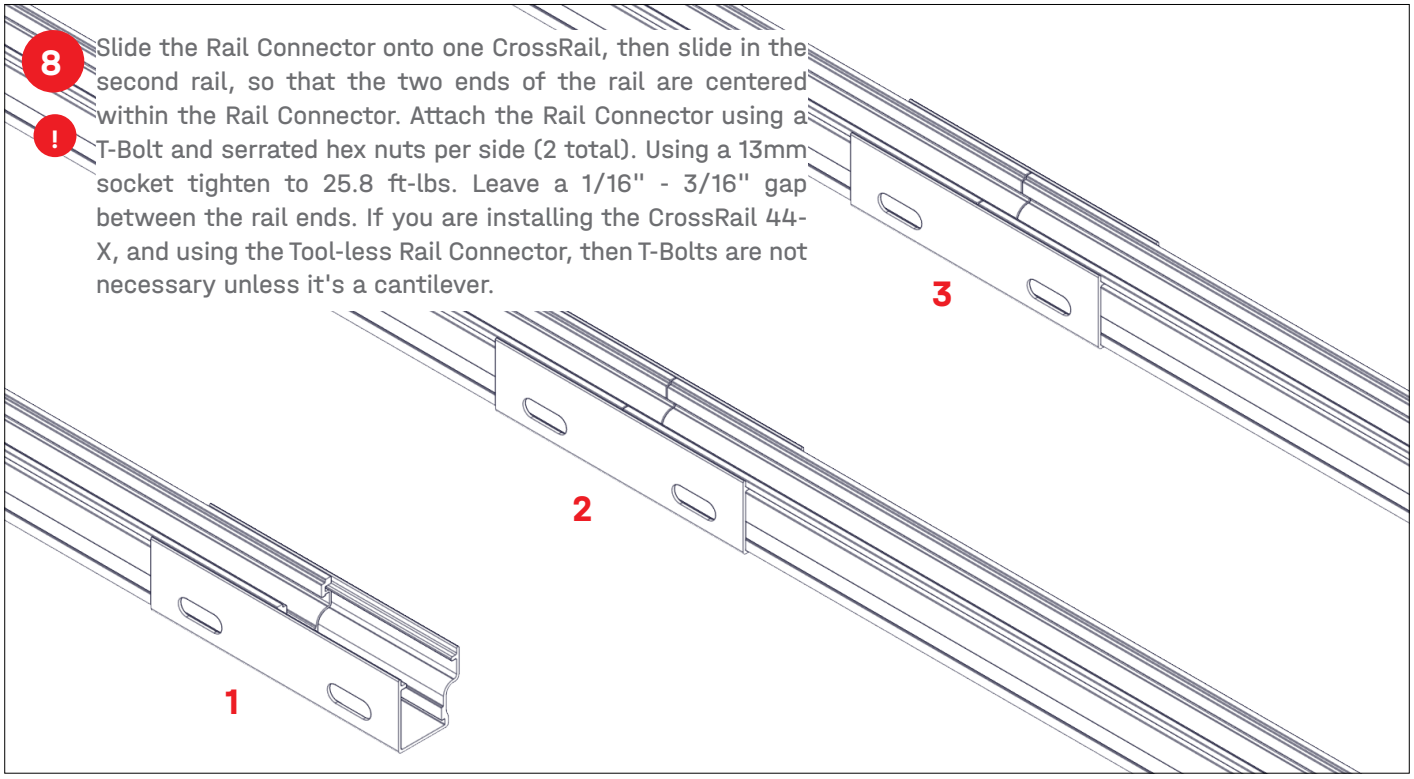
Loosen the pre-assembled T-bolt if necessary to adjust the Simple Knee set and insert the bottom tab into the correct notch of the desired tilt angle of 0°, 10°, 15°, or 25°.



8

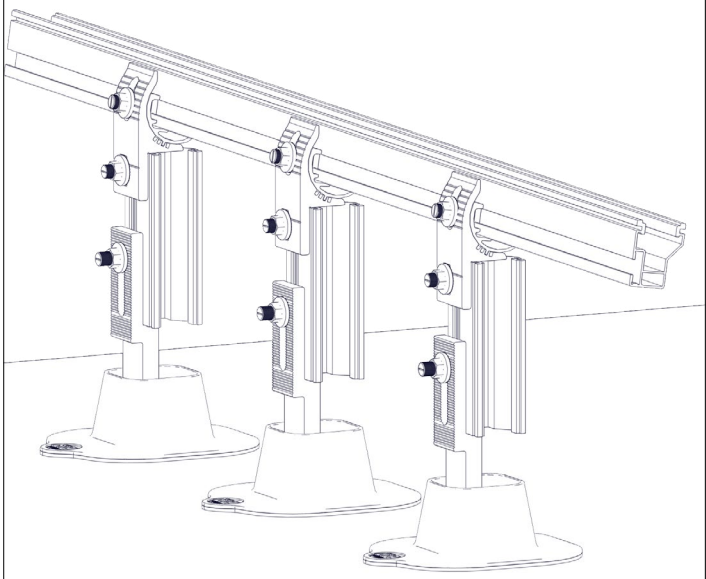
!

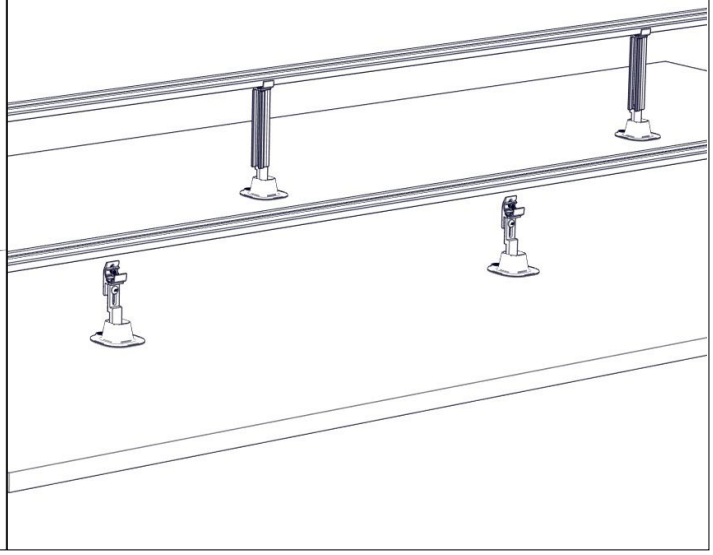
Slide the Rail Connector onto one CrossRail, then slide in the second rail, so that the two ends of the rail are centered within the Rail Connector. Attach the Rail Connector using a T-Bolt and serrated hex nuts per side (2 total). Using a 13mm socket tighten to 25.8 ft-lbs. Leave a 1/16" - 3/16" gap between the rail ends. If you are installing the CrossRail 44-X, and using the Tool-less Rail Connector, then T-Bolts are not necessary unless it's a cantilever.



9 !

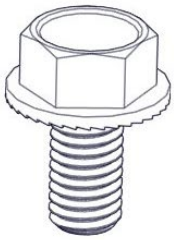
Install horizontal CrossRails using the preassembled 30mm T-Bolt in the Simple Knee Set. Turn the T-Bolt clockwise making sure the indicator mark is vertical and perpendicular to the Crossrail channel. Torque M10 T-Bolt: 25.8 ft-lbs (35 Nm).

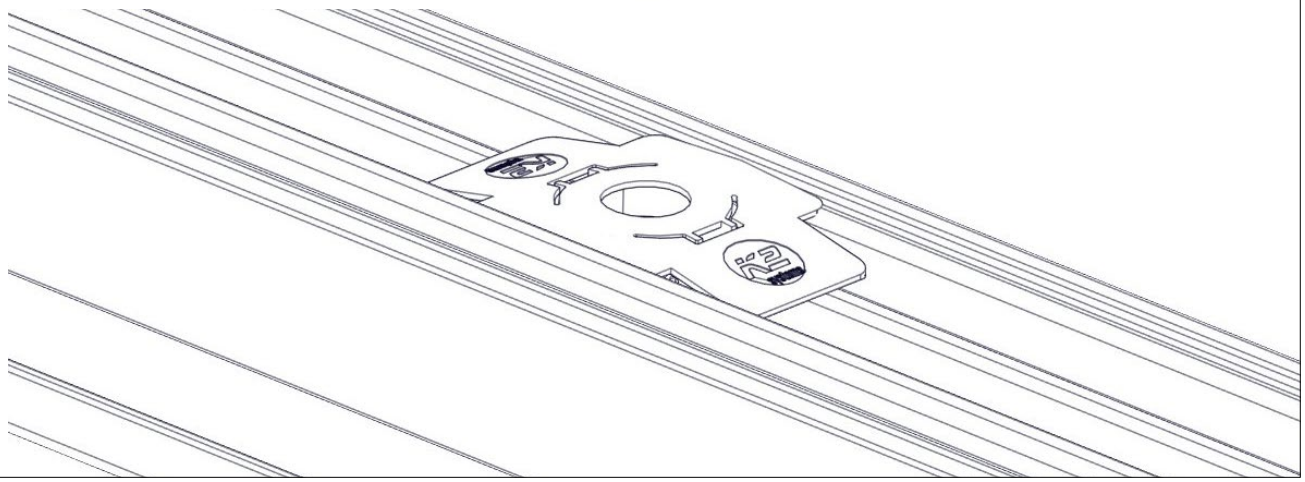




10 Optional

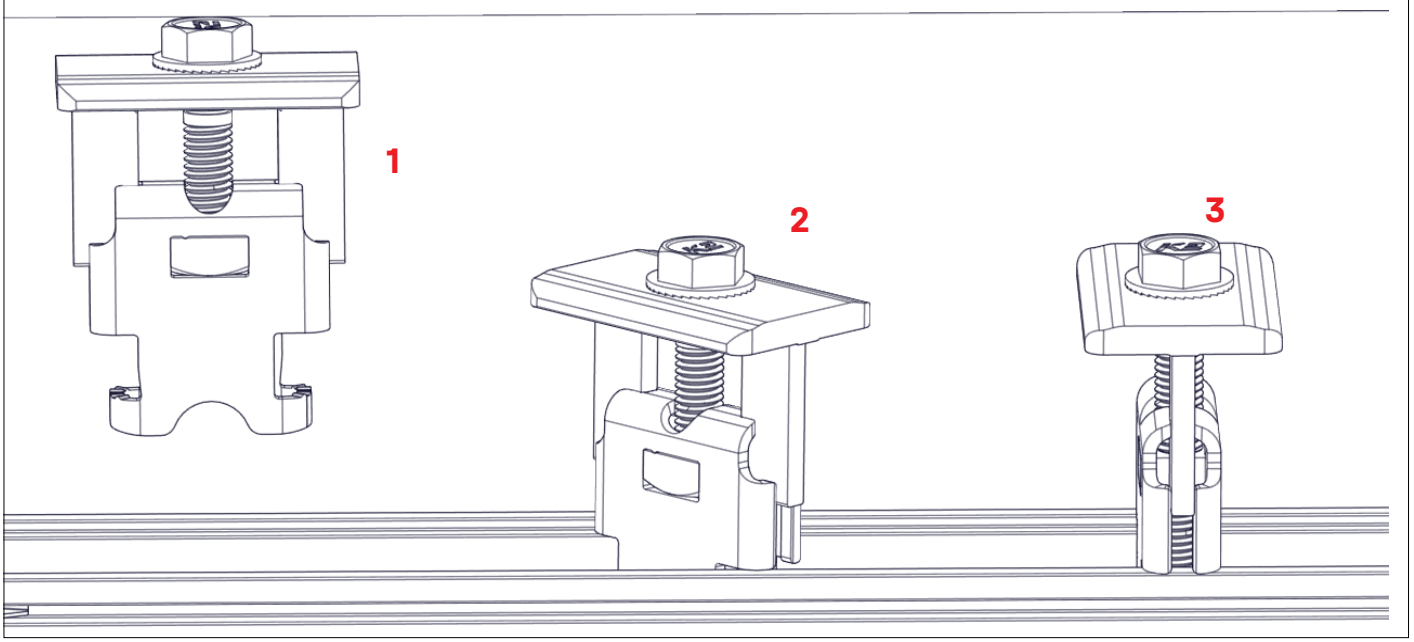
! Using the K2 Systems CrossRail Microinverter & Optimizer Mounting Kit you can attach the device of your choice to the top channel of the CrossRail. Torque: 10.3 ft-lbs (14 Nm).





11

! Install Cross Clamp, simply place into the rail and turn clockwise.

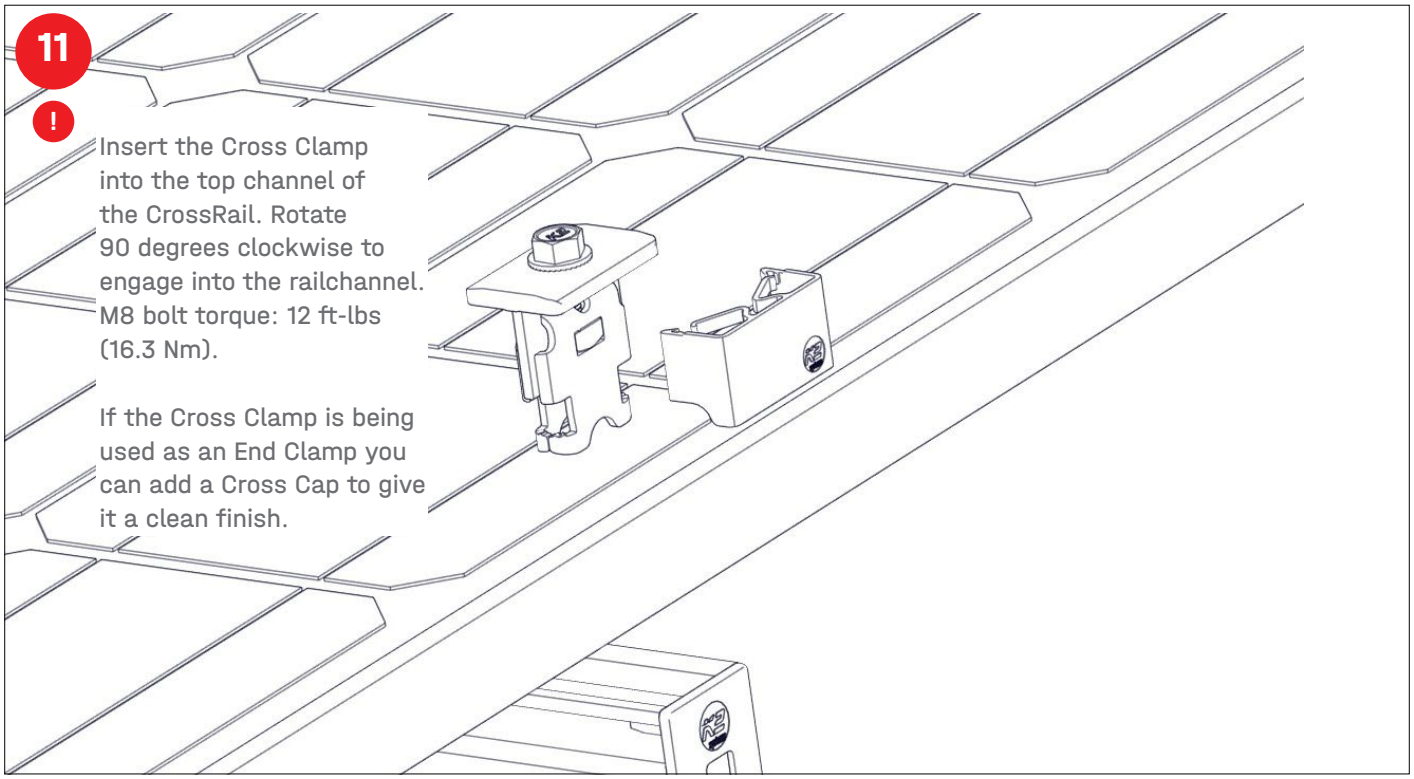


11

!

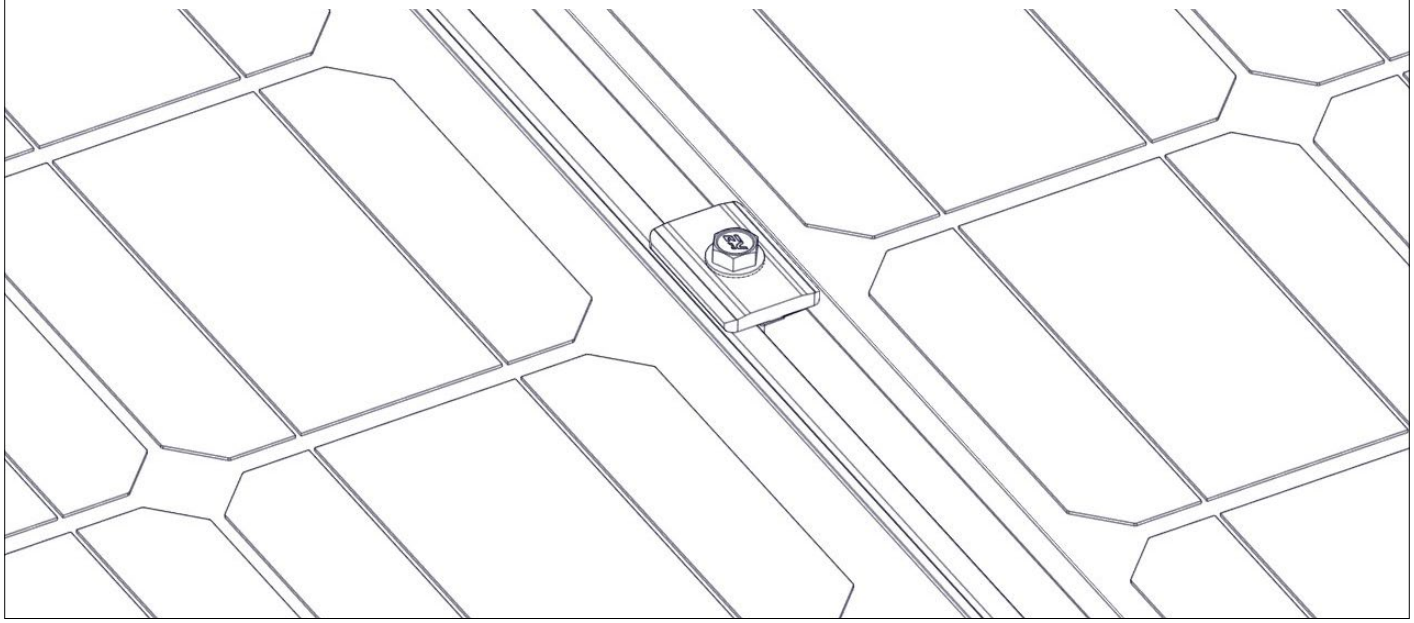
Insert the Cross Clamp into the top channel of the CrossRail. Rotate 90 degrees clockwise to engage into the railchannel. M8 bolt torque: 12 ft-lbs (16.3 Nm).

If the Cross Clamp is being used as an End Clamp you can add a Cross Cap to give it a clean finish.



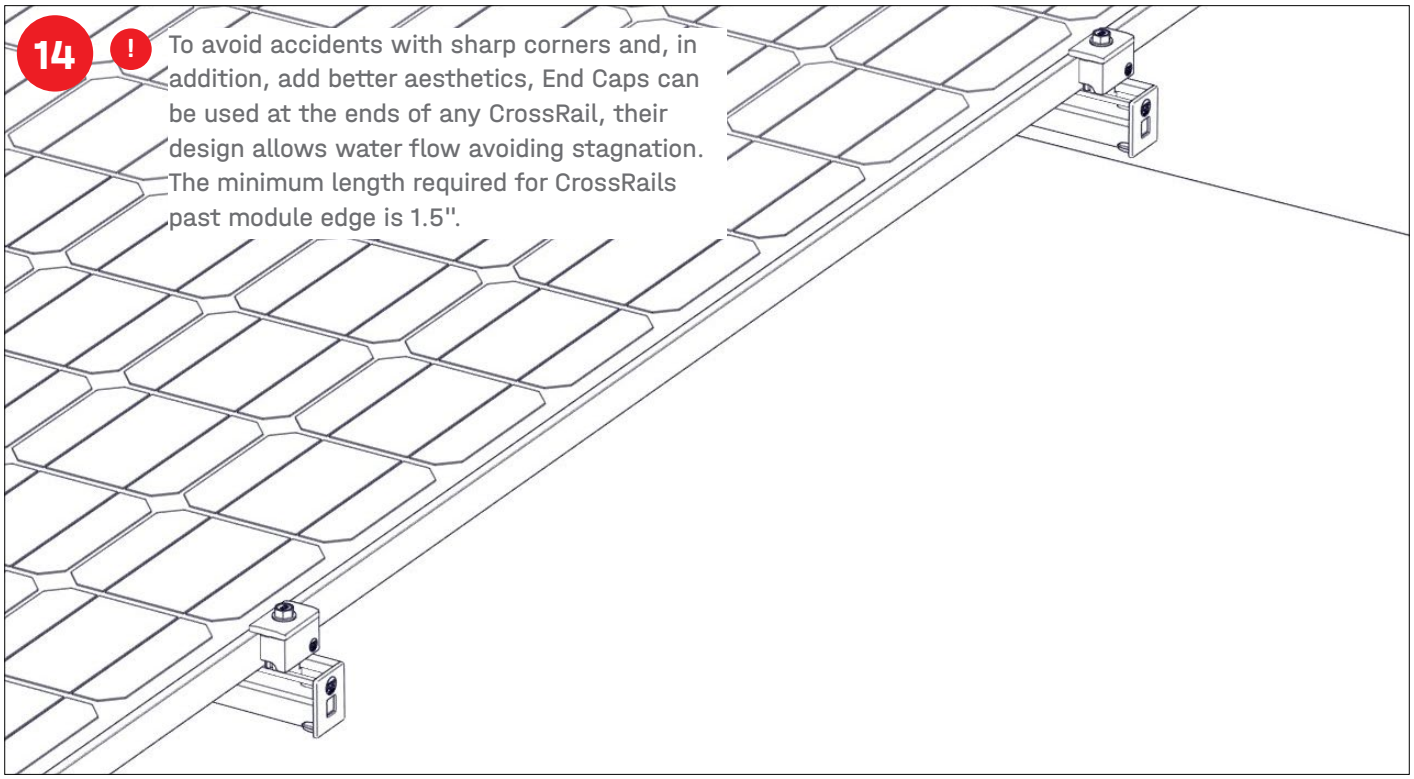
13

Insert the Cross Clamp into the top channel of the CrossRail. Rotate 90 degrees clockwise to engage into the rail channel. Connect the Mid Clamps to the PV module in the specified locations according to the PV module manufacturer's installation instructions. Torque: M8 Bolt: 12 ft-lbs.



14

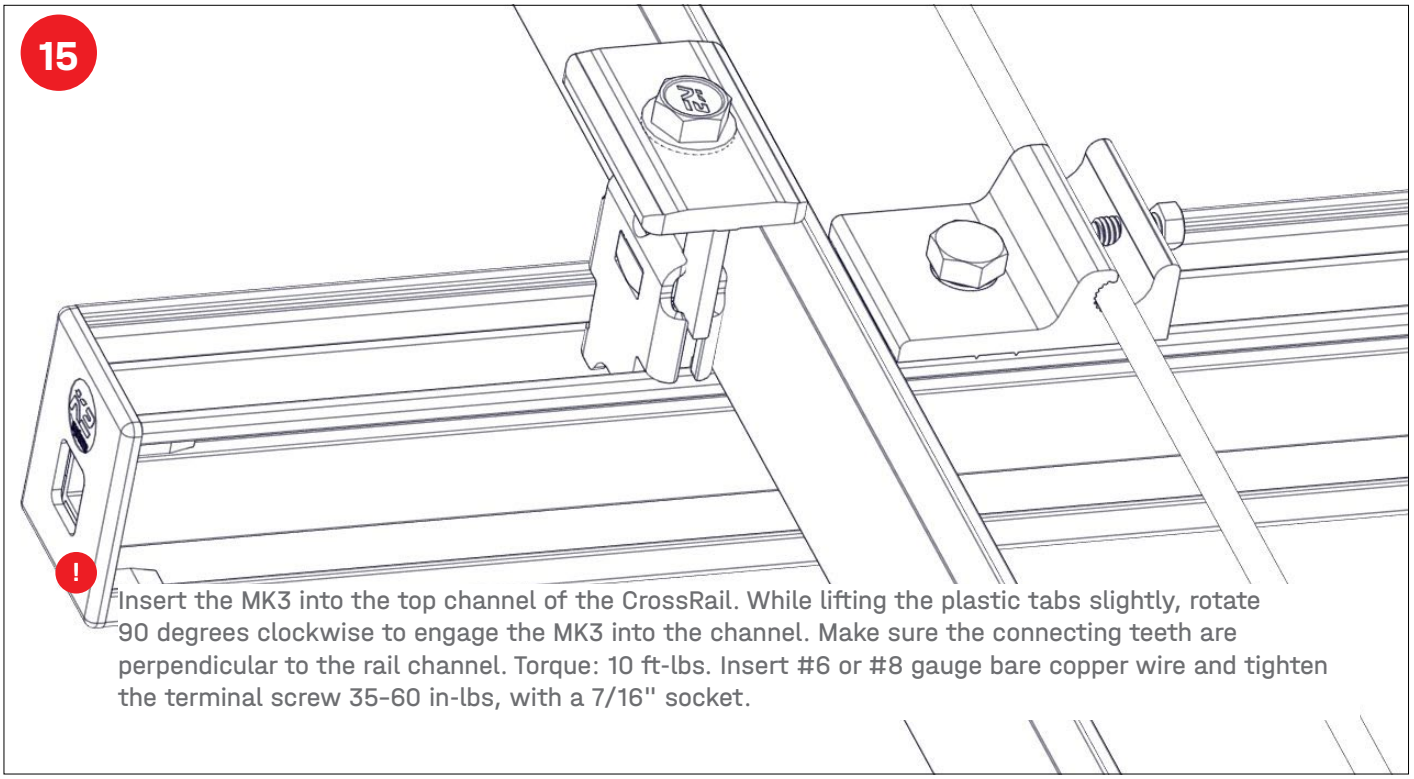
To avoid accidents with sharp corners and, in addition, add better aesthetics, End Caps can be used at the ends of any CrossRail, their design allows water flow avoiding stagnation. The minimum length required for CrossRails past module edge is 1.5".



Important Note:

Standards for photovoltaic systems require CrossRail components to be electrically bonded and grounded by mounting the K2 Ground Lug and using 6 or 8 gauge bare copper wire.

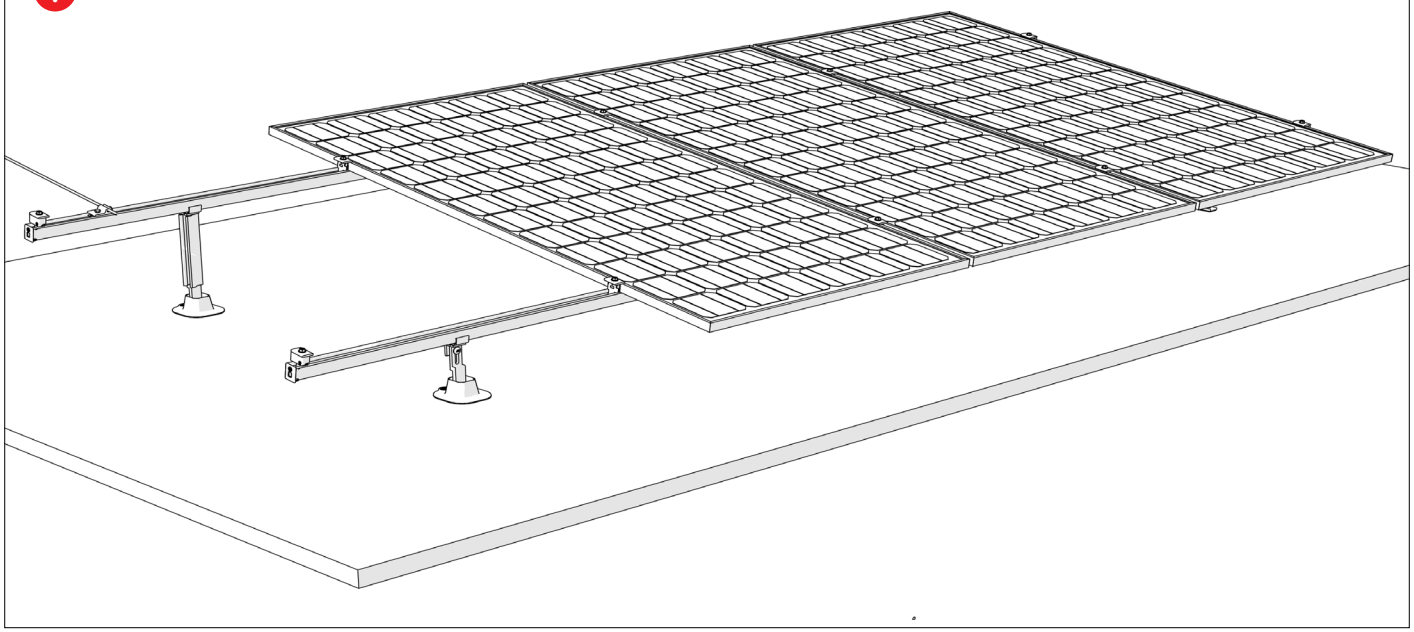
15



! Insert the MK3 into the top channel of the CrossRail. While lifting the plastic tabs slightly, rotate 90 degrees clockwise to engage the MK3 into the channel. Make sure the connecting teeth are perpendicular to the rail channel. Torque: 10 ft-lbs. Insert #6 or #8 gauge bare copper wire and tighten the terminal screw 35-60 in-lbs, with a 7/16" socket.

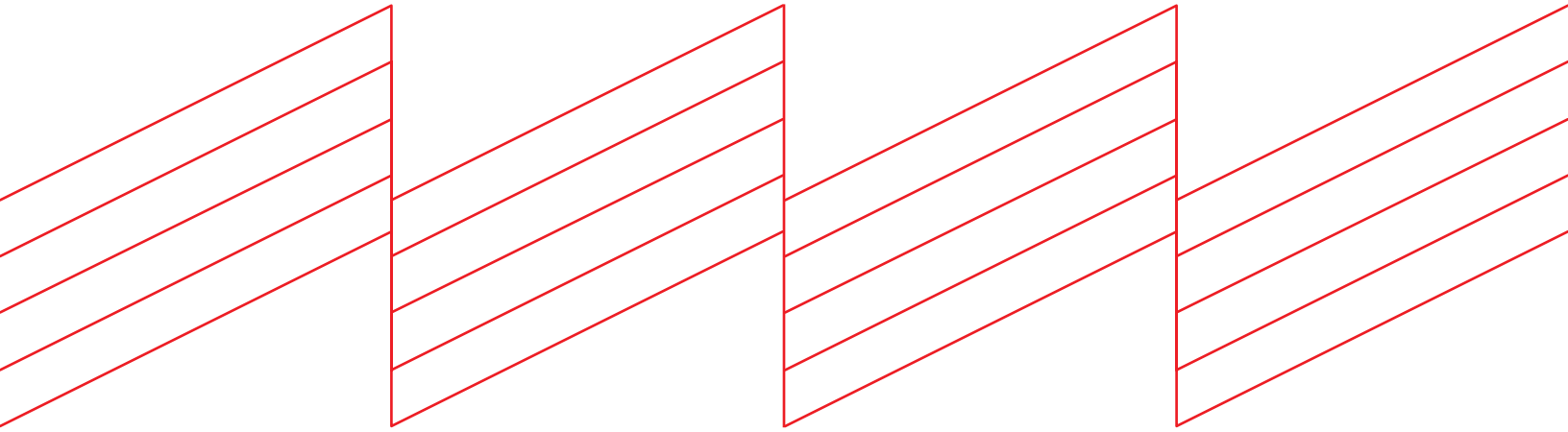
16

! FINISHED ARRAY!



Notes

Connecting Strength



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CrossRail Simple Tilt Assembly ENV4 | 1024 • Subject to change
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CrossRail Simple Tilt Assembly ENV4 | 1024 • Subjeta a cambios
Las ilustraciones del producto son ejemplares y pueden diferir del original.