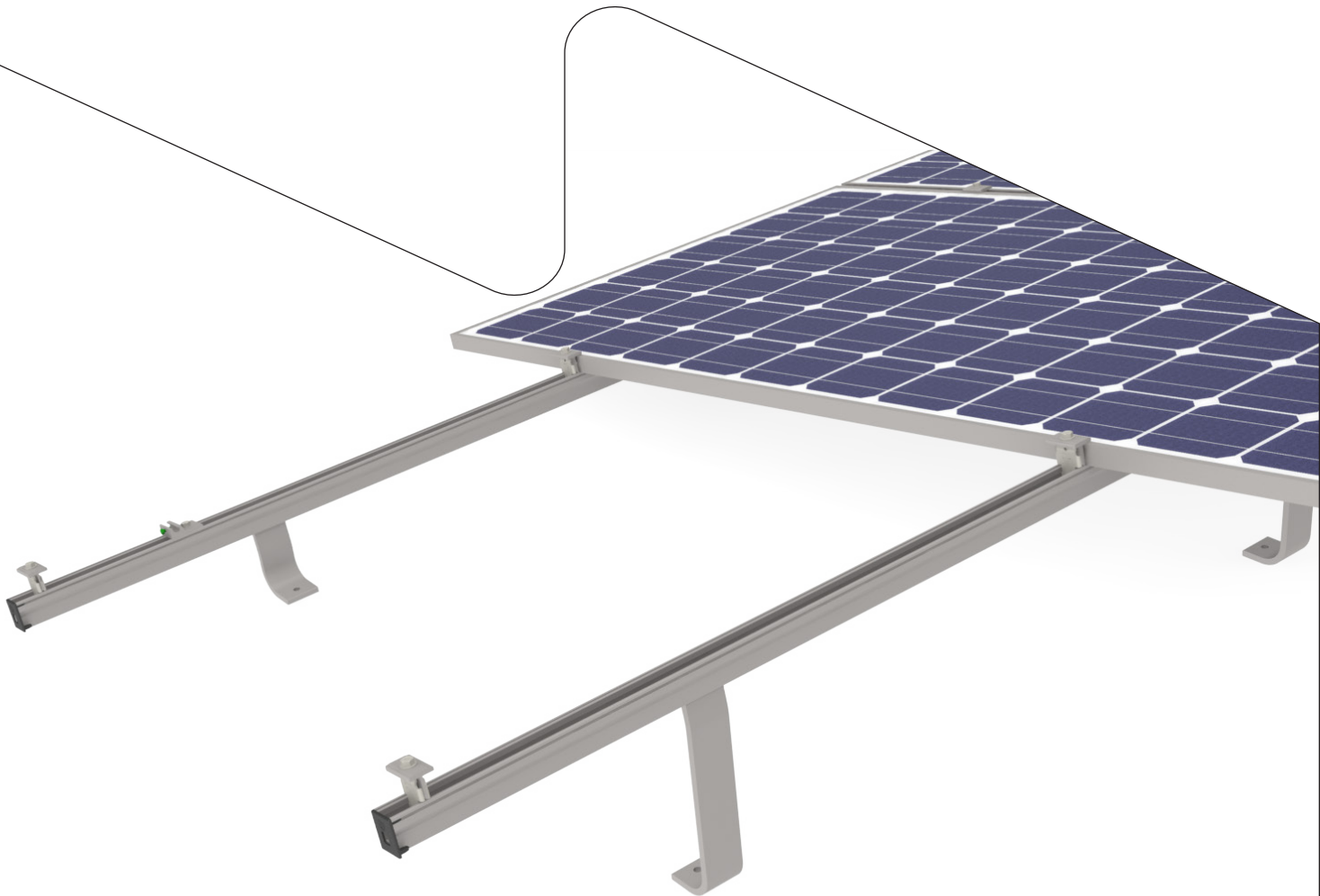




Connecting Strength

K2 Tilt 10°

ASSEMBLY INSTRUCTIONS



Engineering, Quality & Table of Contents



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, positioning 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.

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/>

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• Rails & MLPE/Optimizer Mount	
• Module Clamps	
• Bonding & Grounding Paths	
• Finishing Touches	

Structural Requirements

K2 systems mounting components' structural performance can be evaluated and automatically calculated using the K2 Quote or K2 Base planning software to verify conformance to site specific conditions and design criteria. The design and engineering perimeters provided in a project specific report must be followed.

Roof pitch: 0° – 7°

Roof mean height: 0 – 60 ft

Tilt angle of modules: 10°

Typically, rail overhangs shall not exceed 1/3 of the maximum allowable span. Refer to engineering letters on K2 Systems website for more details on maximum spans and overhangs.

To allow for system movement due to thermal expansion and contraction, a movement joint, or break should be utilized. Systems with connected rail lengths exceeding 65 feet (20 meters); shall have a maximum allowable space between thermal expansion joints of 80 feet, with a minimum gap of 1.25" between rails at such points.

This system has been successfully evaluated for Mechanical Loading according to the requirements of UL 2703, Section 21. System tested to a maximum module size of 33.47 ft² with minimum design load of 10 PSF down, 5 PSF up, and 5 PSF lateral.

To view a list of compatible modules see the link below. K2 systems products are continuously under development thus the list may change without notice at any time. Prior to installation consult the link for the most update to compatible modules. You may request an email copy from info-us@k2-systems.com.

Compatible module list:

<https://k2-systems.com/en-us/resource-center/download-library/>

NOTE: This system is only approved for use with Type 1 & Type 2 fire rated modules for compliance to UL 3741 PV Hazard Control Systems.

Roof Requirements

Prior to installation, an evaluation of the roof structure must be conducted to ensure the substructure can withstand the imposed loads added by the K2 systems mounting components and all the other associated systems. Failure to obtain verification from a license professional as required by the governing building codes may forfeit any available warranty offered by K2 Systems.

Fire Rating

This 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:

- Installed over a Class A, or better fire rated roof covering
- Roof slope less than or equal to 7°
- Connection to roof substrate with any height stand-off
- System uses only UL 61730 Listed modules with a fire performance rating of Type 1, Type 2 or Type 29.
- 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.

General Information & Required Tools



General Information

General mounting instructions shall be followed at all times. K2 Systems mounting solutions are continuously under development thus the installation process may thereby change at any time. Prior to installation consult <https://k2-systems.com/en-us/resource-center/download-library/>. You may request an email copy of the latest installation procedures from info-us@k2-systems.com. It is best practices to have access to a digital copy or printed set of these instructions while on site during the installation process.

For dismantling of the system for service or decommissioning follow the installation procedures in reverse order from assembly.

Installation should be periodically reinspected for loose components or fasteners and any corrosion. Any components showing signs of damage that compromise safety shall be replaced immediately. In addition, any loose components or fasteners shall be re-tightened in accordance with these instructions.

The design, engineering and installation of K2 systems mounting solutions and associated products shall adhere to all governing building codes and environmental regulations including requirements set forth by the local Authority Having Jurisdiction (AHJ). This includes installing the system in accordance to the National Electrical Code, ANSI/NFPA 70.

All project specific conditions shall be reviewed and/or certified by a professional engineer. Equipment shall be installed and operated by qualified and adequately trained installers.

K2 Systems is not liable for any resulting defects or damages for failing to adhere to K2 Systems installation instructions, site specific engineering requirements and all governing building codes; K2 Systems is also not liable for any resulting defects or damages as result of using competitor's or 3rd party mounting components not specifically approved for use by K2 Systems prior to installation. Any available warranty is forfeited in such cases.

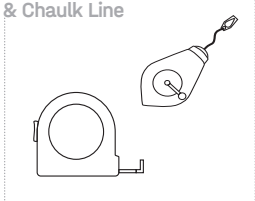
A 25 Year Limited Product Warranty is available for K2 Systems mounting solutions. The Terms and Conditions of the Warranty are available online, <https://k2-systems.com/en-us/resource-center/download-library/>. You may request an email copy from info-us@k2-systems.com.

K2 Systems stainless steel components are available in different corrosion resistance classes. Each structure or component must be carefully checked for possible corrosion exposure.

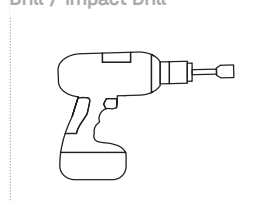
Tools for Installation

The following are the basic tools required for installation of the K2 Systems Mounting Solutions outlined within this document

Tape Measure
& Chalk Line



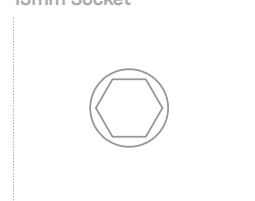
Drill / Impact Drill



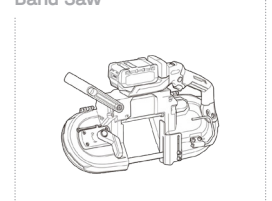
Torque Wrench



13mm Socket



Band Saw

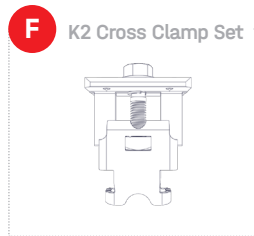
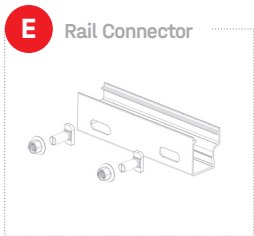
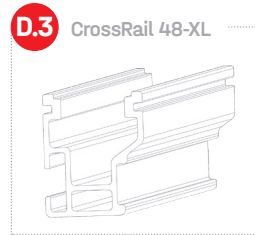
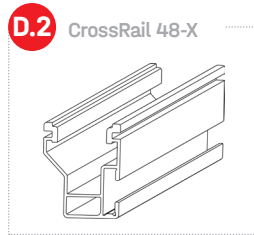
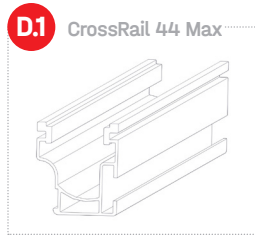
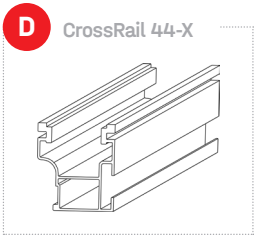
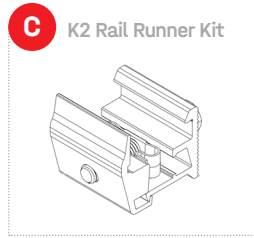
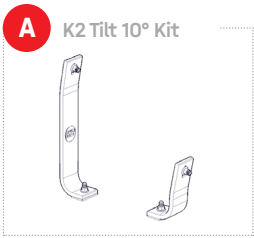
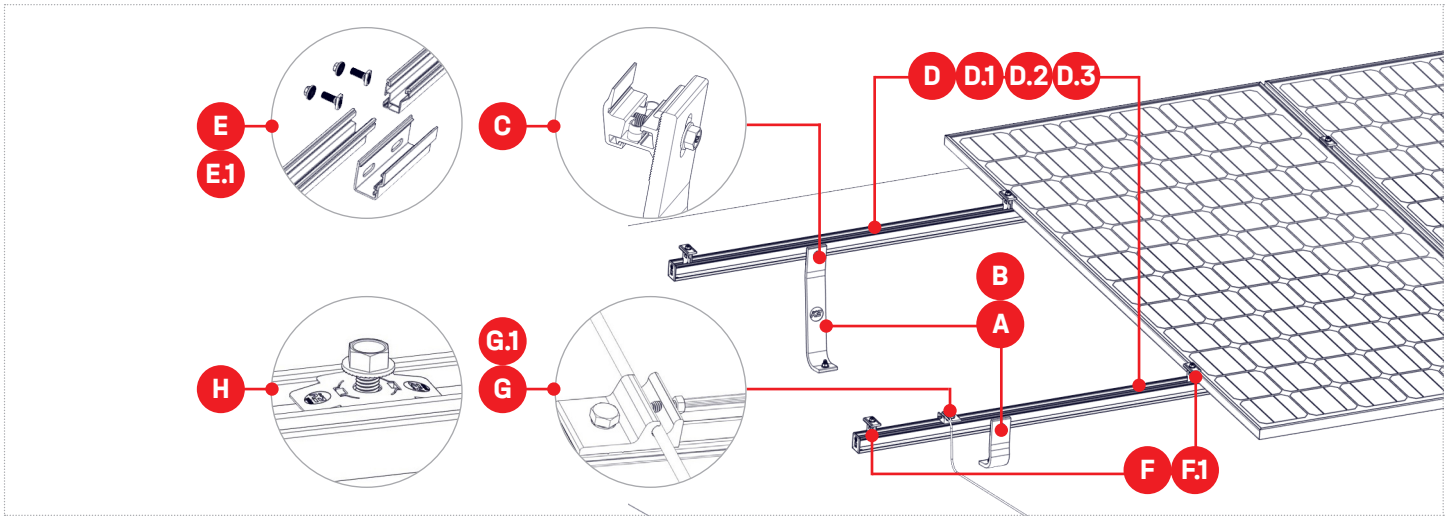


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Images Illustrative in Nature & May Differ From The Physical Product

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System Overview | Components



K2 Tilt 10° • Information Subject to Change Without Notice

Images Illustrative in Nature & May Differ From The Physical Product

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System Overview | Additional Components



I K2 Rail EndCap



J K2 Cross Cap



K Wire Mgt. Clip
Omega, Black



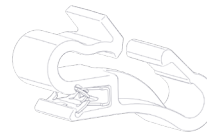
L HEYClip SunRunner
Cable Clip, SS



M Wire Mgt. Clip, TC



N K2 4 Wire
Dragon Clip



Part Numbers



System Components – Part Number References

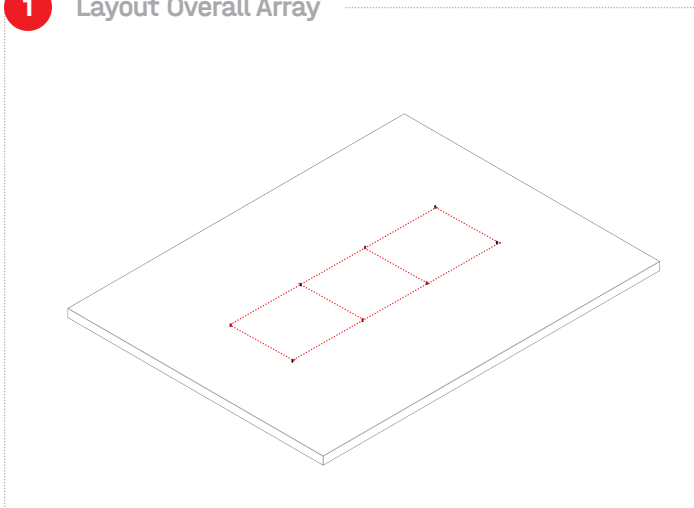
The following are the reference part numbers for the components outlined within this document

Ref.	Component	Part Numbers (P/N)
A	K2 Tilt 10° Kit, w/Butyl Pad	4000488
B	13×25mm T-Bolt Kit	4000048
C	K2 Rail Runner Kit	4000769/4000770
D	CrossRail 44-X, 44 MAX, 48-X, 48-XL & 80	Multiple P/Ns
E	Rail Connector	4000385, 4000386, 4001196, 4000329
E.1	Tool-less Rail Connector	4000051-T, 4000052-T
F	K2 Cross Clamp Set	4000135, 4000145, 4000050-B, 4000050-B-US
F.1	Yeti Clamp 2.0, Set	Multiple P/Ns
G	K2 Ground Lug	4000006-H
G.1	Lighting Ground Lug	4000396
G.2	ILSCO Ground Lug	4000960
H	CR Micro-inverter & Optimizer Kit	4000629-H, 4000629-H-US
I	CrossRail EndCap	4000176/4000431
J	K2 Cross Cap	4000312
K	Wire Mgt. Clip Omega, Black	40005394
L	HEYClip SunRunner Cable Clip, SS	4000382
M	Wire Mgt. Clip, TC	4000069
N	K2 4 Wire Dragon Clip	4000400

Product Installation | Array Layout & Bldg Connections

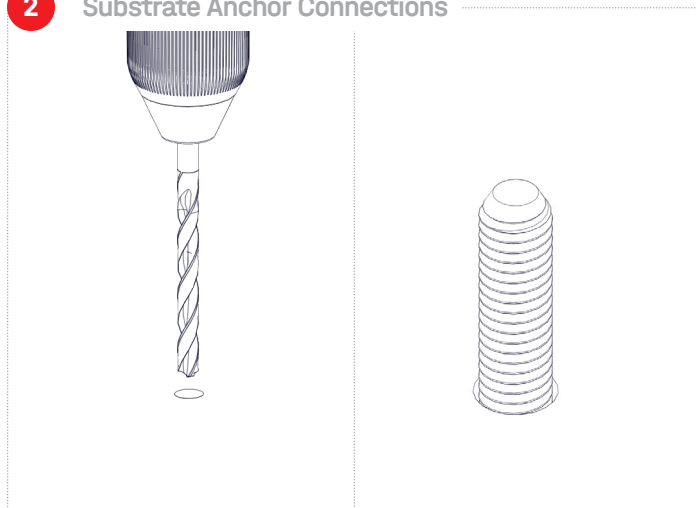


1 Layout Overall Array



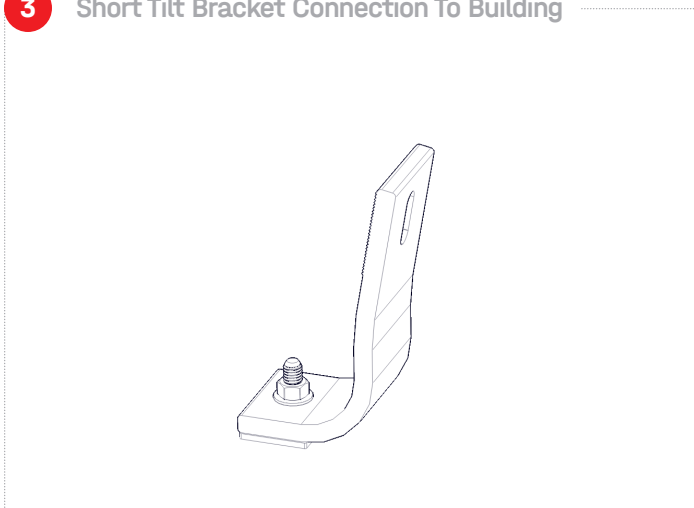
Identify and mark the corners of the photovoltaic array on the roof surface. Use chalk lines to define the position of the mounting rails and accurately locate the anchor points. The spacing between supports in the east-west direction must follow the design and structural engineering specifications, while the spacing in the north-south direction will depend on the dimensions of the photovoltaic module used.

2 Substrate Anchor Connections



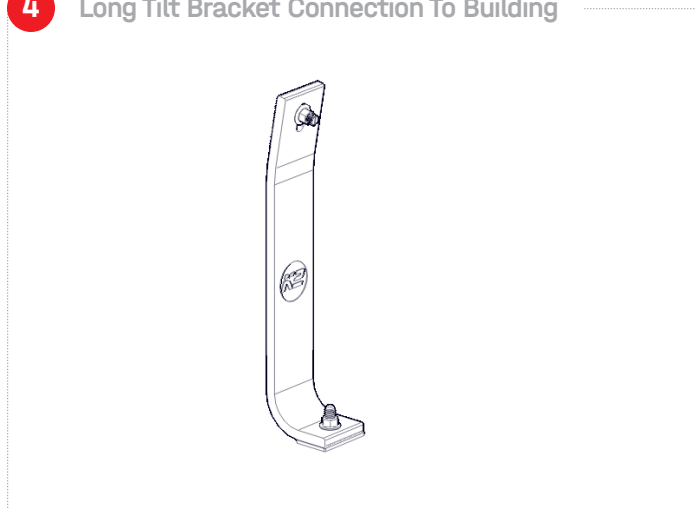
Drill holes according to the anchor system manufacturer specifications (mechanical or chemical), respect the required diameter and depth. It is essential to completely remove dust & debris from inside the holes before proceeding with the installation of the anchor. Tighten per manufacturer's instructions and ensure that the thread protrudes sufficiently to accommodate the thickness of the tilt bracket and the serrated nut.

3 Short Tilt Bracket Connection To Building



Mounting the K2 Tilt 10 Short Bracket: Align the hole in the K2 Tilt 10 Short Bracket with the exposed thread of the anchor. Secure the component using a serrated nut and apply the torque specified by the anchor manufacturer.

4 Long Tilt Bracket Connection To Building

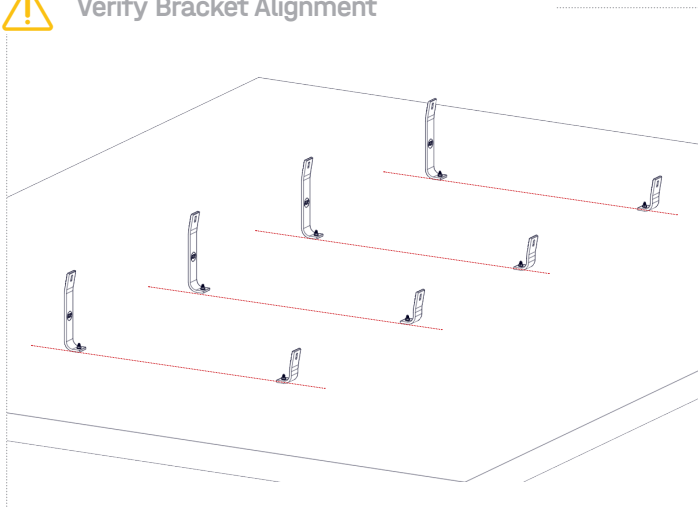


Mounting the long K2 Tilt 10 bracket: Repeat the previous procedure, aligning the hole in the long K2 Tilt 10 bracket with the exposed thread. Secure with a serrated nut and apply the recommended torque.

Product Installation | Tilt Brackets to Rail Connections



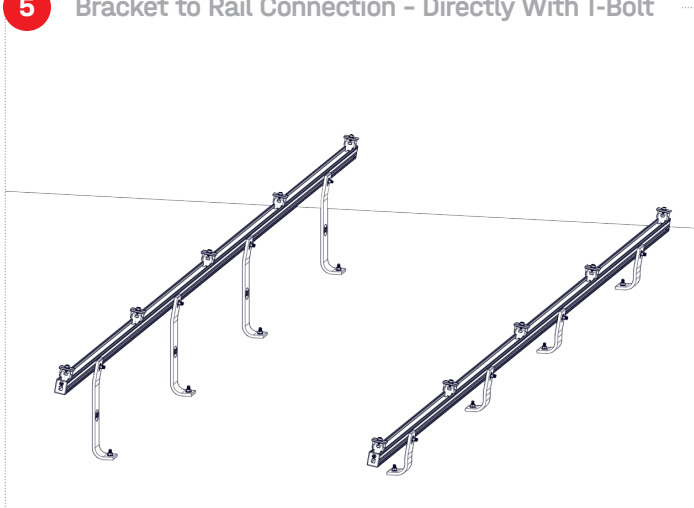
Verify Bracket Alignment



Aligning the tilt system: Ensure that the K2 Tilt 10 brackets are correctly aligned and show no visible rotation or deformation, as shown in the example in the image above.

5

Bracket to Rail Connection - Directly With T-Bolt



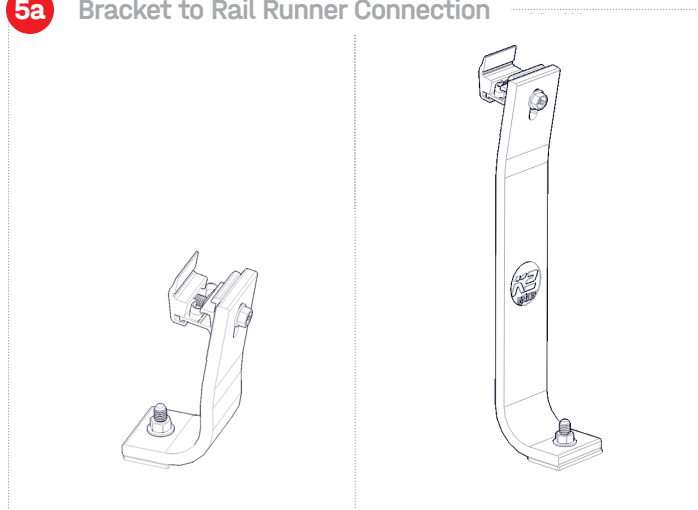
CR48-X rail installation: Place the rail on the Tilt 10 brackets using M10 T-bolts. Secure the connection by applying the required torque.

Check the rail orientation matches the direction shown above.

M10 T-Bolt, Tilt Bracket to CrossRail Torque: 25.8 ft-lbs

5a

Bracket to Rail Runner Connection

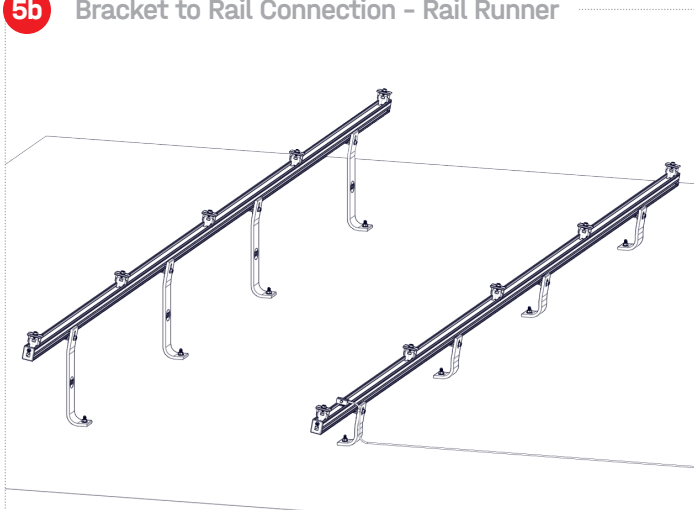


Place the rail on the K2 Tilt 10 brackets using the K2 Rail Runner, applying the required torque.

Rail Runner to Tilt Bracket Torque: 12.0 ft-lbs

5b

Bracket to Rail Connection - Rail Runner



Place the rail on the K2 Tilt 10 brackets using the K2 Rail Runner, applying the required torque.

Check the rail orientation matches the direction shown above.

Rail Runner to CrossRail Torque: 12.0 ft-lbs

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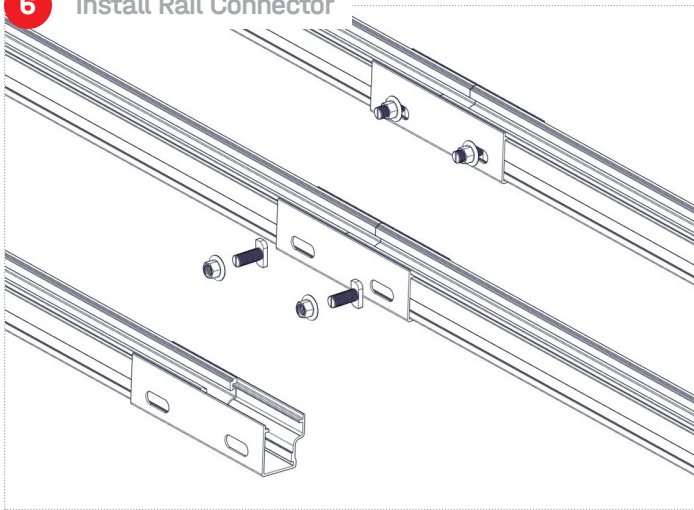
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Product Installation | Rails & MLPE/Optimizer Mount



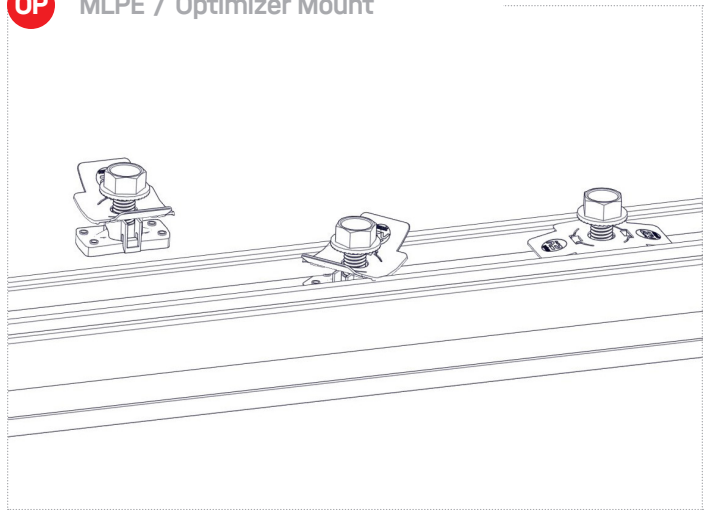
6 Install Rail Connector



Slide Rail Connector onto first rail by matching up the mating features. Then, slide second rail into the connector and center the rail ends. Attach rail connector using one T-Bolt and Serrated Hex nut per side (2 total). Using a 13mm socket to tighten. Leave 1/16"-3/16" gap between rail ends. Tool-less option does not require T-bolts.

Rail Connector to CrossRail Bolt Torque: 25.8 ft-lbs

OP MLPE / Optimizer Mount



Using the K2 Systems CrossRail Microinverter & Optimizer Mounting Kit you can attach the device of your choice to the top channel of the CrossRail.

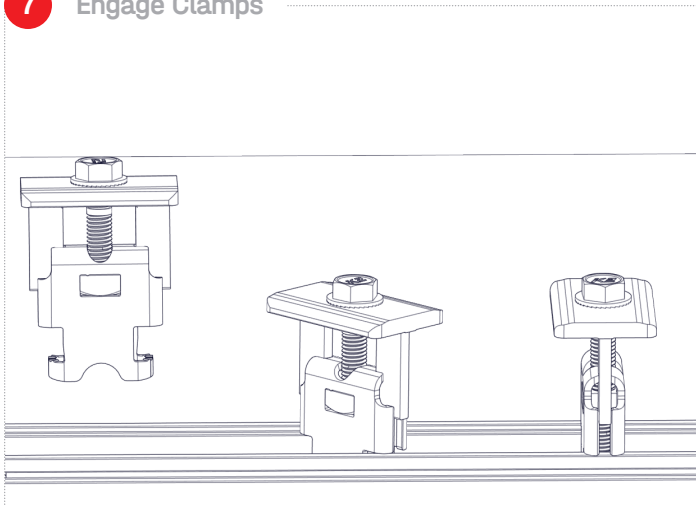
NOTE: MK3 Single Use Only

MPLE/Optimizer Mount to CrossRail Bolt Torque: 10.3 ft-lbs

Product Installation | Module Clamps



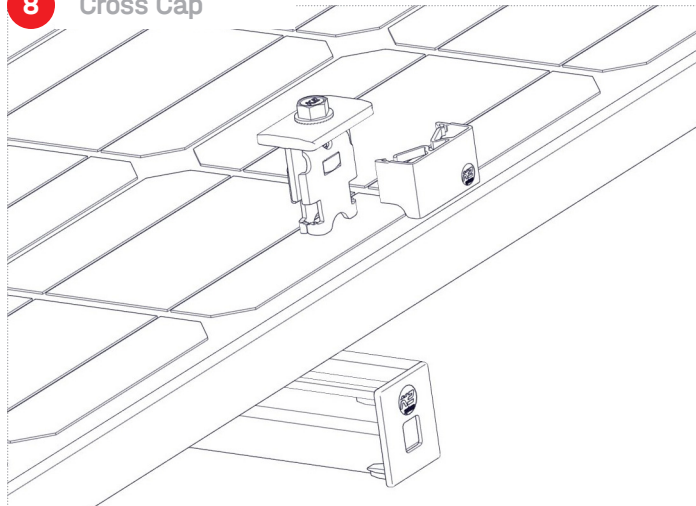
7 Engage Clamps



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

NOTE: K2 Cross Clamps are intended for single use.

8 Cross Cap

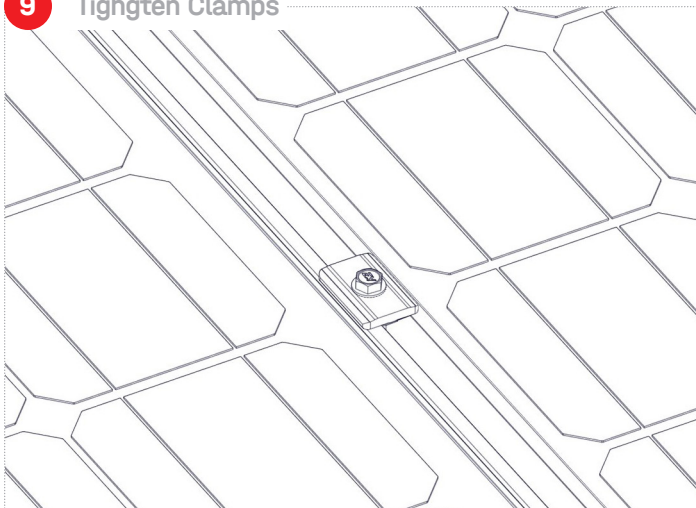


Insert the Cross Clamp into the top channel of the CrossRail. Rotate 90 degrees clockwise to engage into the railchannel. Torque M8 bolt.

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

Cross Clamp to CrossRail Bolt Torque: 12.0 ft-lbs

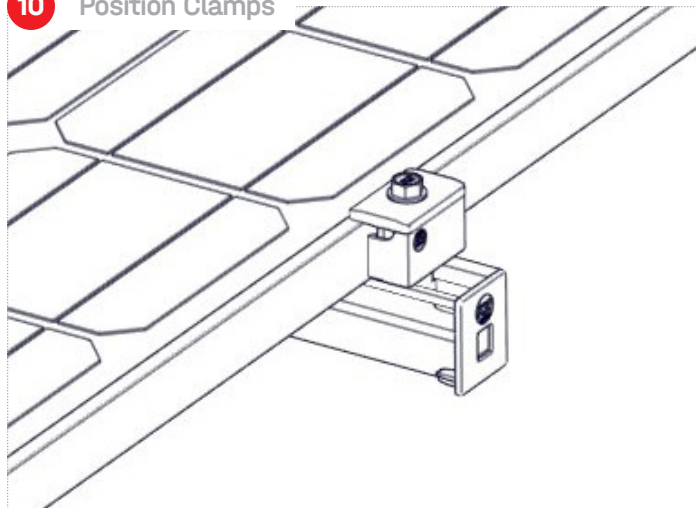
9 Tighten Clamps



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.

Rail Connector to CrossRail Bolt Torque: 12.0 ft-lbs

10 Position Clamps

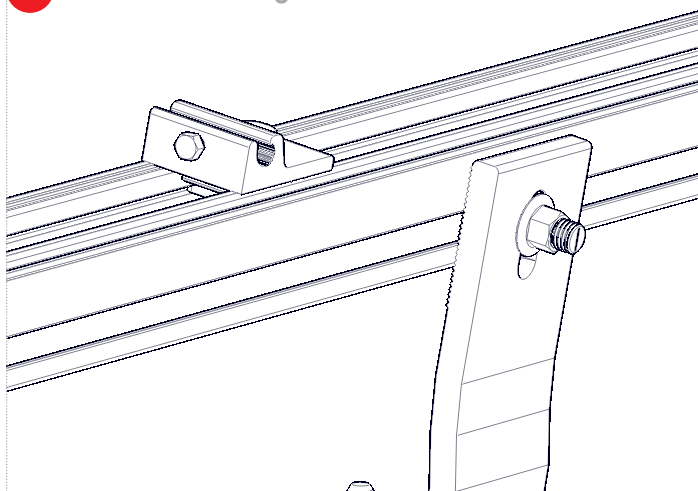


To avoid accidents with sharp corners and, in addition, add better aesthetics, End Caps can be used at the ends of any CrossRail, their design allows water flow avoiding stagnation. The minimum length required for CrossRails past module edge is 1.5".

Product Installation | Bonding & Grounding Paths



11 Place Ground Lug Into CrossRail

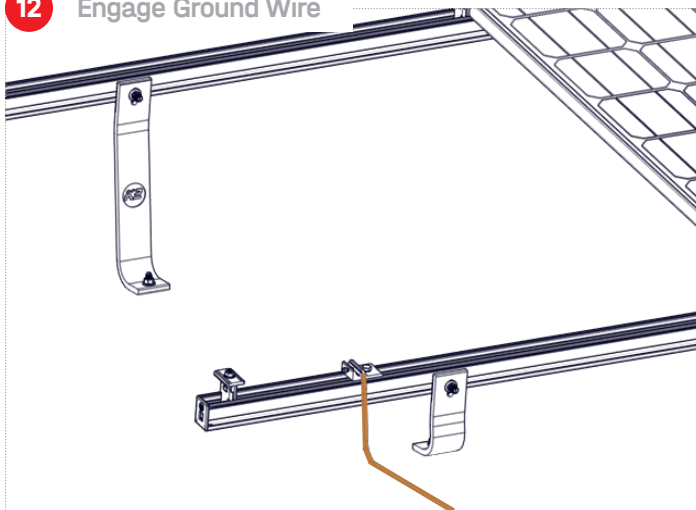


Insert MK3 Slot Nut of preassembled K2 Ground Lug into top channel of CrossRail. While slightly pinching plastic tabs, rotate 90° clockwise to engage into rail channel. Ensure bonding teeth are perpendicular torail channel.

Ground Lug to CrossRail Torque: 12.0 ft-lbs (16.3 Nm)

Lightning Lug to CrossRail Torque: 8-10 ft-lbs (10.8-13.6 Nm)

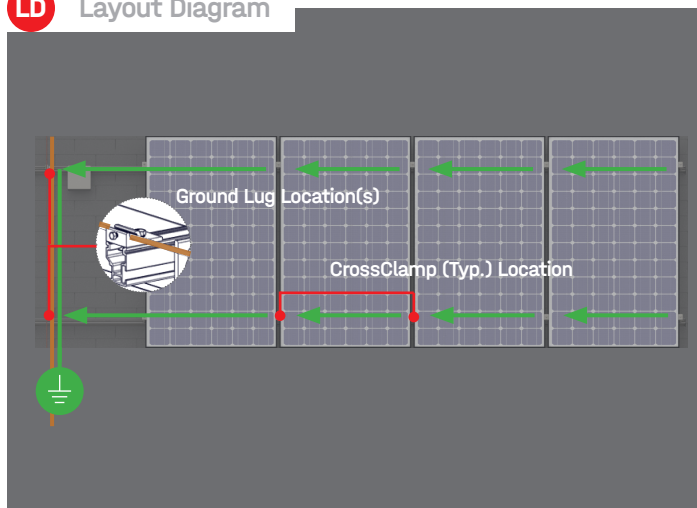
12 Engage Ground Wire



Continue installing one ground lug per row of modules. Install equipment grounding conductor wire of bare copper or stripped section of insulated copper into the terminal screw channel of the lug. Use #6, #8 AWG solid or stranded copper wire. Using a 7/16" socket tighten terminal screw required specifications.

Grounding Lug Conductor Torque: 3-5 lb-ft (4-6.8 Nm)

LD Layout Diagram



Bonding & Grounding

The bonding and grounding of K2 systems mounting solutions and associated products shall adhere to all governing building codes.

Appropriate means of bonding and grounding are required. A sample bonding path diagram is shown within this document. Your specific installation may vary, based upon site specific conditions and your AHJ's requirements.

K2 Systems has obtained a UL 2703 system listing in compliance with Intertek (ETL).

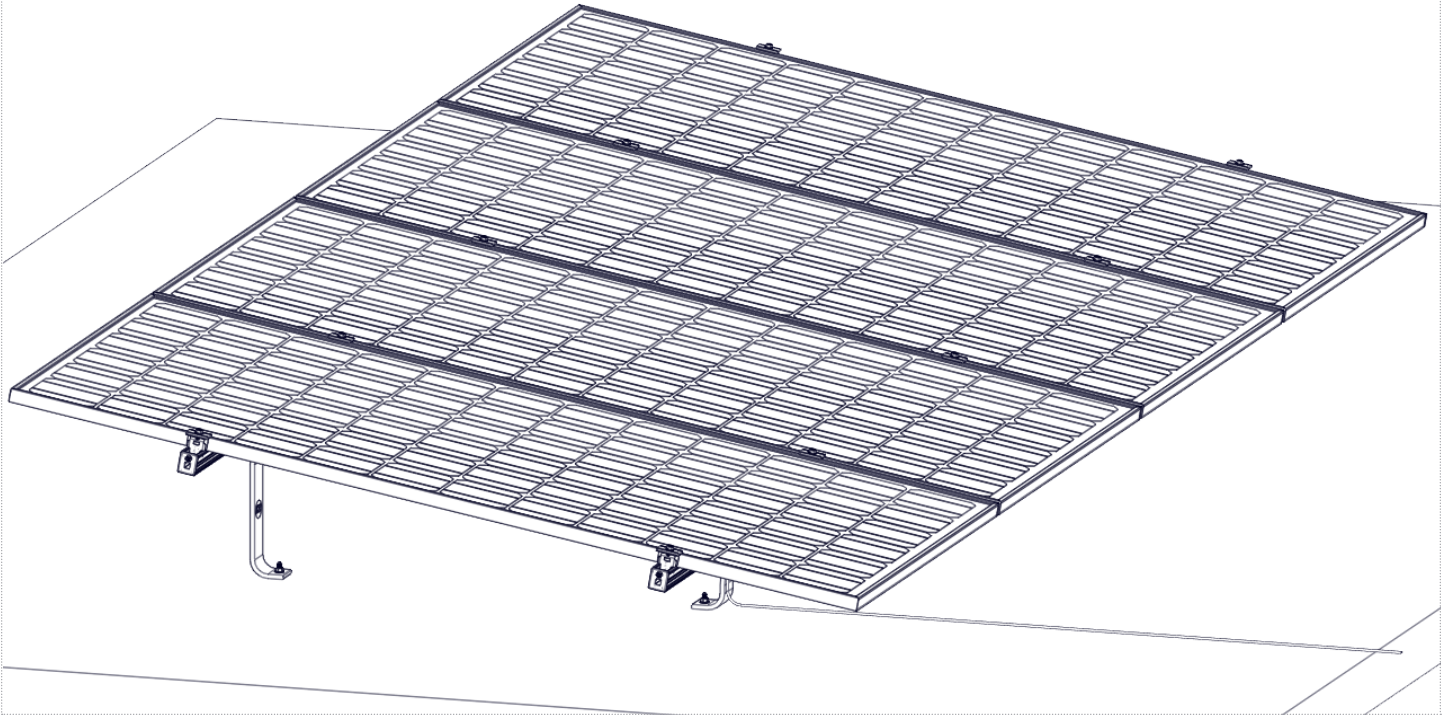
Each electrical connection has been evaluated to a maximum fuse rating of 30A. At least one ground lug per row of modules must be used to ground all equipment within each sub-array, although additional may be used for redundancy. When installed per these installation instructions, all connections meet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

Product Installation | Finishing Touches



FA Finished Array



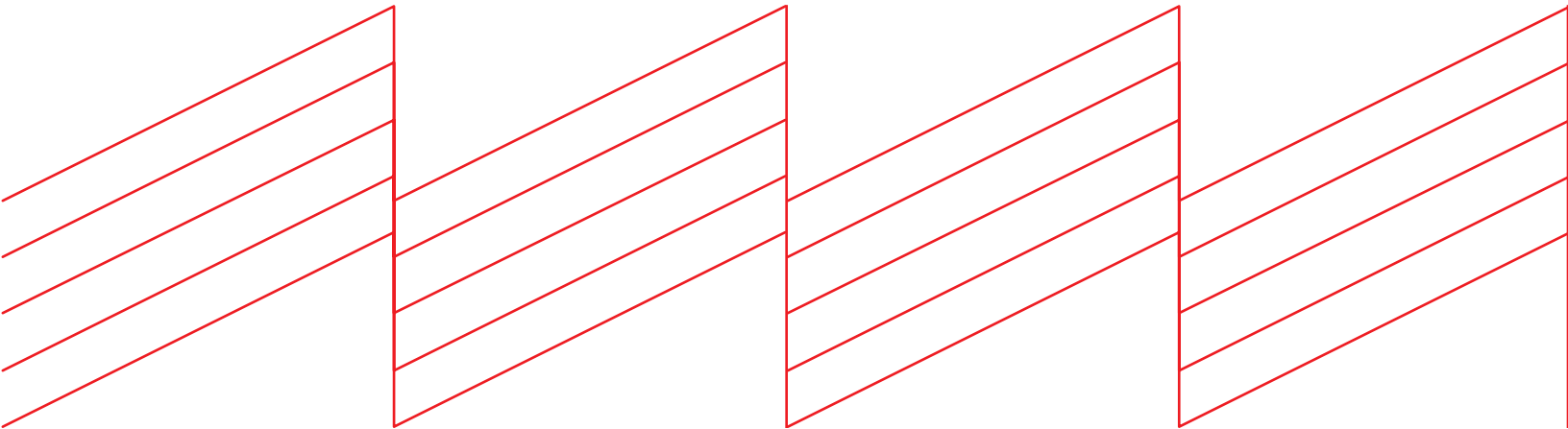
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Connecting Strength



K2 Tilt 10°



Testing & Certification
UL 2703 Compliance
UL 467 Compliance
UL 3741 Compliance

Certified As "K2 Tilt 10°"

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www.k2-systems.com/en-us

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