CrossRail Shared Rail System

ASSEMBLY INSTRUCTIONS
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:
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 20 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/downloads/documentation

- 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 eaves height exceeds 3 m.
  - 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/downloads/documentation for up-to-date instructions. 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/downloads/documentation 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 Shared Rail 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 structural integrity of the roof must be reviewed on site and approved by a licensed structural engineer.
- Roof mean height: 0-60 ft
- For allowable roof pitch, refer to the CrossRail engineering letters on our website: https://k2-systems.com/en-US/downloads/documentation

Structural requirements

- Wind speed: 95-200 mph
- Ground snow load: 0-100 psf
- Clearance: 2” to 10” clear from the top of the roof to the top of the PV panel
- Maximum cantilever: L/3 where “L” is the span noted in the engineering span tables, provided there is at least 1 module length between maximum cantilevers
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.

Everest Solar 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 sub array must be used to ground all strings, 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 1703 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 connections are identified at typical locations.
Fire Rating

The CrossRail Shared Rail 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/48-X/48-XL under the following conditions:

- Roof slope of 2/12” rise per linear foot or greater

- Used in combination with a UL 1703 Listed module with a fire performance rating of Type 1, Type 2, or Type 3. 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 1703 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.
Compatible Modules

K2’s CrossRail Shared Rail System was tested with the following:

- **UL/NRTL Listed Aptos Solar Modules:**
  - DNA-120-MF26-XXXW
  - DNA-144-MF26-XXXW
  - DNA-120-BF23-XXXW
  - DNA-144-BF23-XXXW
  - DNA-144-MF23-XXXW

- **UL/NRTL Listed Axitec Modules:**
  - AC-xxxP/156-60S
  - AC-xxxM/156-60S
  - AC-xxxP/60V
  - AC-xxxP/60xV
  - AC-xxxP/60S
  - AC-xxxP/60x
  - AC-xxxMH/120S
  - AC-xxxM/60V
  - AC-xxxM/60xV
  - AC-xxxMH/120V
  - AC-xxxM/60S
  - AC-xxxM/60x
  - AC-xxxP/156-72S
  - AC-XXXP/72V
  - AC-XXXP/72VX
  - AC-XXXP/72S
  - AC-XXXP/72X
  - AC-XXXM/144S
  - AC-XXXM/72V
  - AC-XXXM/72VX
  - AC-XXXM/144W
  - AC-XXXM/72S
  - AC-XXXM/72X

- **UL/NRTL Listed Boviet Modules:**
  - BVM6612M 72-Cell Mono

- **UL/NRTL Listed Canadian Solar Inc. Modules:**
  - CS6K-xxxM
  - CS6K-P-FG DYMOND
  - CS1Y-xxxMS
  - CS3N-xxxMS

- **UL/NRTL Listed CertainTeed Modules:**
  - CTXXHC11-04
  - CTXXHC00-04
  - CTxxxHC11-06

- **UL/NRTL Listed ET Solar Modules:**
  - ET-M660xxxBB

- **UL/NRTL Listed Hanwa Q Cells Modules:**
  - Q.PEAK DUO L-G6 xxx
  - Q.PEAK DUO L-G6.2 xxx
  - Q.PEAK DUO L-G6.3 xxx
  - Q.PLUS DUO L-G5 xxx
  - Q.PLUS DUO L-G5.1 xxx
  - Q.PLUS DUO L-G5.2 xxx
  - Q.PLUS DUO L-G5.3 xxx
  - Q.PEAK DUO L-G4.2 xxx
  - Q.PEAK L-G4.1 xxx
  - Q.PLUS L-G4.2 xxx
  - Q.PLUS L-G4.1 xxx
  - Q.PLUS L-G4 xxx
  - Q.PEAK DUO BLK G6+/SC xxx
  - Q.PEAK DUO G5/SC xxx
  - Q.PEAK DUO BLK G5/SC xxx
  - Q.Plus BFR-G4.1xxx
  - Q.Pro BFR-G4.1xxx
  - Q.Pro BFR G4.3 xxx
  - Q.PEAK-G4.1/xxx
  - Q.PEAK DUO BLK G6+TS XXX
  - Q.PEAK DUO 05/TS-XXX
  - Q.PEAK DUO BLK G6/TS XXX
  - Q.PEAK DUO G6/TS-XXX
  - Q.PEAK DUO G6+/TS-XXX
  - Q.PEAK DUO ML-G9 XXX
  - Q.PEAK DUO ML-G9.2 XXX
  - Q.PEAK DUO ML BLK-G9 XXX
  - Q.PEAK DUO ML BLK-G9.2 XXX
  - Q.PEAK DUO XL-G9 XXX
  - Q.PEAK DUO XL-G9.2 XXX
  - Q.PEAK DUO XL BLK-G9 XXX
  - Q.PEAK DUO XL BLK-G9.2 XXX
  - Q.PEAK DUO XL BLK-G9.3 XXX
  - Q.PEAK DUO XL-BFR-G9.3 XXX
  - Q.PEAK DUO ML -G9.3 XXX
  - Q.PEAK DUO ML BLK -G9.3 XXX
  - Q.PEAK DUO BLK DUO BLK-G6+TS XXX
  - Q.PEAK DUO BLK ML-G9.3 XXX
  - Q.PEAK DUO BLK ML-G9.3 XXX
  - Q.PEAK DUO BLK ML -G9.3 XXX
  - Q.PEAK DUO BLK DUO BLK-G6+/TS XXX
  - Q.PEAK DUO XL BLK-G9.3 XXX
  - Q.PEAK DUO XL BLK-G9.3 XXX
  - Q.PEAK DUO BLK ML -G9.3 XXX
  - Q.PEAK DUO BLK ML -G9.3 XXX
  - Q.PEAK DUO BLK ML-BFR-G9.3 XXX
  - Q.PEAK DUO BLK DUO BLK-G6+/TS XXX
  - Q.PEAK DUO BLK DUO BLK-G6+/TS XXX
  - Q.PLUS DUO BLK ML-G10/ SC xxx
  - Q.PEAK DUO BLK ML-G10+ SC xxx
  - Q.PEAK DUO BLK ML-G10+ / AC xxx
  - Q.PLUS DUO BLK ML-G10/AC
  - Q.PEAK DUO BLK ML-G10/AC
  - Q.PEAK DUO XL-G10.d
UL/NRTL Listed Hyundai Modules:
- HiS-MxxxMG
- HiS-MxxxMI

UL/NRTL Listed Itek Modules
- IT-xxx-SE
- Hipro TP672M-xxx

UL/NRTL Listed JA Solar Modules:
- JAP6[DG]
- JAM6[K]-60-xxx/4BB

UL/NRTL Listed Jinko Solar Modules:
- JKMxxxPP-72-DV
- JKMxxxPP-60-DV
- JKMxxxM-60HBL
- JKMxxxM-72HL-V
- JKMxxxM-72HL-TV
- JKMxxxP-60
- JKMxxxM-72HL4-TV
- JKMxxxM-6RL3-B

UL/NRTL Listed Kyocera Modules:
- KUxxxMCA

UL/NRTL Listed LG Electronics Inc. Modules:
- LGxxxxS1C-G4
- LGxxxxN1C-G4
- LGxxxxS2W64
- LGxxxxN1K-G4
- LGxxxxN2W-G4
- LGxxxxN1K-A5
- LGxxxxQ1C-V5
- LGxxxxQ1K-V5
- LGxxxxN2W-A5
- LGxxxxS2W-A5

UL/NRTL Listed Lumos Modules:
- LSxxxx-60M-B/C

UL/NRTL Listed Luxor Solar Modules:
- Lx-xxxP
- Lx-xxxM
Compatible Modules continued

K2’s CrossRail Shared Rail System was tested with the following:

- **UL/NRTL Listed Mission Solar Modules:**
  - MSExxSB1J
  - MSExxSO5T
  - MSExxSO4J
  - MSExxSQ5S
  - MSExxSO6J
  - MSExxSQ4S
  - MSExxSQ5T
  - MSExxSQ8T
  - MSExxSQ8K
  - MSExxSQ9S
  - MSExxSR8T
  - MSExxSR8K
  - MSExxSR9S

- **UL/NRTL Listed Panasonic Modules:**
  - VBHNxxxSA16
  - VBHNxxxKA01
  - VBHNxxxKA03
  - VBHNxxxKA04
  - VBHNxxxSA17
  - VBHNxxxSA18
  - VBHNxxxSA17E
  - EVPVxxx
  - EVPVxxxK

- **UL/NRTL Listed Peimar Modules:**
  - SGxxxP-[BF]
  - SgxxxP
  - SGxxxM-[BF]
  - SGxxxM

- **UL/NRTL Listed Phono Solar Modules:**
  - PSxxxMG-20/U
  - PSxxxPB-20/U
  - PSxxxM-20/U
  - PSxxxMH-20/U

- **UL/NRTL Listed Prism Solar Modules:**
  - B48 xxx Bifacial
  - B60 xxx Bifacial

- **UL/NRTL Listed Sharp Modules:**
  - NU-SCxxx
  - NU-SAxxx

- **UL/NRTL Listed Sanyo Electric Co Ltd of Panasonic Group Modules:**
  - VBHNxxxSA16
  - VBHNxxxSA17
  - VBHNxxxSA18
  - VBHNxxxSA16
  - VBHNxxxSA17
  - VBHNxxxSA18
  - VBHNxxxKA01
  - VBHNxxxKA03
  - VBHNxxxKA04
  - UL/NRTL Listed Seraphim Modules:
  - SEG-XXX-6MA-HV
  - SEG-XXX-BMA-HV

- **UL/NRTL Listed Silfab Modules:**
  - SLAxxxM
  - SLG-M-xxx
  - SLA-xxx-xxx
  - SLG-xxx-xxx
  - SIL-xxx BL
  - SIL-xxx HL
  - SIL-xxx NL
  - SIL-xxx ML
  - SIL-xxx NT
  - SIL-xxx BK
  - SIL-xxx NU
  - SIL-xxx NX
  - SIL-xxxHC

- **UL/NRTL Listed Solaria Modules:**
  - PowerxT® -xxxR-PD
  - PowerxT® -xxxR-BD

- **UL/NRTL Listed Solarworld Modules “Sunmodule”:**
  - Plus SW XXX Mono
  - Plus SW XXX Poly

- **UL/NRTL Listed Soluxtec Modules:**
  - FR xxx Wp
  - Power Slate 54 Mono Dark Series
  - Power Slate 54 Mono Series

- **UL/NRTL Listed SunPower Modules:**
  - SPR-E19-xxx
  - SPR-E20-xxx

- **UL/NRTL Listed Sunpreme Modules:**
  - 6x8-xxx
  - 6x8-xxxxSM
  - 6x8-xxxxSL

- **UL/NRTL Listed Sunspark Modules:**
  - SST-275-300M
  - SMX-250-265P
  - SST-xxxM 60 cell
  - SST-xxxM 72 cell
  - SST-xxxMB-60/72
  - SST-XXXM3B-60/72
  - SST-XXXM3B-60/72

- **UL/NRTL Listed S-Energy Modules:**
  - SN15-60PAE/PCE-xxxV
  - SN10-60PAE/PBE/PCE-xxxV
  - SN15-60MAE/MCE-xxxV
  - SN10-60MAE/MCE-xxxV
  - SN20-60MAE/MBE/MCE-xxxV
  - SN25-60MAE/MCE-xxxV
  - SN20-72MAE/MBE/MCE-xxxV
  - SN25-72MAE/MCE-xxxV
  - SC20-72MAE/MBE/MCE-xxxV
  - SC25-72MAE/MCE-xxxV
  - SD25-60BDE-xxxV
Compatible Modules continued

K2’s CrossRail Shared Rail System was tested with the following:

- **UL/NRTL Listed Talesun Modules**
  - Hipro TP660M-xxx
  - Hipro TP672M-xxx

- **UL/NRTL Listed Trina Solar Modules**:
  - TSM-xxxDE14A
  - TSM-xxxDD05A.08
  - DUOMAX SPECS 1. PEG14
  - DUOMAX SPECS 2. PEG5
  - DUOMAX SPECS 3. PEG5.07
  - DUOMAX SPECS 4. PDG5
  - TSM-DE15H(II)
  - TSM-DE15M(II)
  - TSM-DD06M.05(II)
  - TSM-DD06H.05(II)
  - TSM-DD06H.15(II)
  - TSM-DD06H.T5(II)
  - TSM-P615H
  - TSM-DE015HC.20(II)
  - TSM-DE015MC.20(II)
  - TSM-DE06HC.20(II)
  - TSM-DE06MC.20(II)
  - TSM-xxxDE15V(II)
  - TSM-xxxDE19
  - TSM-xxxDEG15VC.20(II)
  - TSM-xxxDEG19C.20

- **UL/NRTL Listed V Energy Modules**:
  - Series 200 PV

- **UL/NRTL Listed Yingli Solar Modules**:
  - YL-xxxP-29b
  - YL-xxx-35b
Tools Overview

![Drill with 13mm wrench](image)

**13mm**

![Wrench with 6mm socket](image)

**6mm**

![Measuring tape](image)

**≥ 3.0 m**

![Measuring tape](image)

**≥ 6.0 m**

Optional

![Optional tools](image)

Torque Overview

- M10 T-Bolts: 25.8 ft-lb (35 Nm)
- WEEB Lug 10.3: 15 ft-lb (20.3 Nm)
- End Clamp UL2703+: M8 Allen Bolts 10.3 ft-lb (14 Nm)
- All other components: M8 Hex Bolts: 10.3 ft-lb (14 Nm)

Tools and materials for the installation of third party items such as roof attachment products, roof covering and sealing products or items used for bonding and grounding are not listed here. Please refer to the instructions of those third party products.
Components

1. CrossRail 44-X, 48-X or 48-XL
   - 4000019/4000020/4000021/4000022
   - 4000062/40000675
   - 40000695/40000705

2. Mid Clamp, 13mm Hex
   - 4000601-H/4000602-H
   - 4000688-H/4000689-H

3. L-Foot Slotted Set
   - 4000630/4000631
   - 4000429/4000430
   - 4000050-H

4. End Clamp or Yeti Clamp
   - 30 - 50 mm module frame height
Structural Rail Connector
CR 44-X or 48-X/48-XL

Everest Ground Lug, 13mm Hex

Standing Seam PowerClamp
Available in Mini and Standard sizes

End Cap
CR 44-X or 48-X/48-XL

Add-On
Available in 5mm or 10mm

Other Roof Attachments & Accessories

EverFlash eComp + SR Kit
Available in Mill or Dark
4000015/4000027/4000029

CR Microinverter & Optimizer Mounting Kit, 13mm Hex
4000629-H

CrossRail 3" Black Sleeve
Compatible with CR 48-X/48-XL
4000583

TC Wire Management Clip
4000069

Omega Cable Clip
4005394

HEYCO Sunrunner Cable Clip
4000382
Important note for Yeti Clamp installs

The Yeti Clamp must be installed in an array. It cannot be installed on a single module that is not connected to the array by a mid clamp.

Frame Compatibility:
Flange Thickness = 1.2 - 2.5 mm
Flange Width = 15 - 40 mm
**Assembly**

**Standing seam**

1. Place the PowerClamp on the standing seam making sure it hugs the rib. Tighten set screw[s] so the clamp is secure, but leave it slightly lose to allow for later adjustment.

2. Insert the hex screw through the slot of the L-Foot and into the PowerClamp. Tighten to 12 ft-lbs [16.3 Nm].
Create a jig by securing two L-Feet on a piece of CrossRail. Face the L-Feet apart so the flat section of the L-Foot will rest against the CrossRail. Measure the module width or length depending on module orientation to the nearest 1/8”. Subtract 3/4” from that measurement to determine the jig length. Run the jig along CrossRail to ensure all rails are aligned and spaced at proper distance. At each mount location, double check proper rail spacing then tighten the L-Foot T-Bolt to 25.8 ft-lbs (35 Nm).

Due to thermal expansion, we recommend placing a gap of 1.25”-2” (3-5cm) every 65 ft (20m) between rails. Maximum allowable spacing between thermal expansion gaps shall not exceed 80 ft (24.4m). In areas that experience snow loads, install the rail on the roof-ridge side of the L-Foot.

Insert T-Bolt through the L-Foot slot and into side channel of rail. Turn T-Bolt 90° clockwise so that the mark at the end of the T-Bolt is perpendicular, indicating proper alignment. Torque to 25.8 ft-lbs (35 Nm).

Example Measured Module Length [used for portrait installation] Jig Dimensions for Portrait Insallation Measured Module Width [used for landscape installation] Jig Dimension for Landscape Installation [rail spacing]

<table>
<thead>
<tr>
<th>Example</th>
<th>Measured Module Length</th>
<th>Jig Dimensions</th>
<th>Measured Module Width</th>
<th>Jig Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>English Units</td>
<td>64 1/2”</td>
<td>64 1/2 - 3/4”</td>
<td>39 3/8”</td>
<td>39 3/8 - 3/4”</td>
</tr>
<tr>
<td>Metric Units</td>
<td>1639mm</td>
<td>1639 - 19 = 1620mm</td>
<td>1000mm</td>
<td>1000 - 19 = 981mm</td>
</tr>
</tbody>
</table>
Align the two rail ends next to each other. Slide rail connector from below rails, centering the connector between the two rail ends. Ensure rail connector does not interfere with an L-Foot or roof attachment. Attach rail connector using two T-Bolts and serrated hex nuts per side (4 total). Ensure that the slot on the bottom of the T-Bolt is perpendicular to the rail, indicating proper alignment. Torque to 25.8 Ft-lbs (35 Nm).

Using the CrossRail Microinverter and Optimizer Mounting Kit hardware from K2 Systems, attach your chosen device to the top channel of Cross-Rail. Torque to 10.3 ftOlbs (14 Nm).
Using the standard End Clamps, attach the Array Skirt to the top channel of CrossRail. Torque clamps to 10.3 ft-lbs [14 Nm]. Place Array Skirt into channel ensuring tabs lock into channel. Place clamp into rail channel. Place Add-On over clamp and into rail channel.

Insert clamps (mid and end) into rail at approximate module mounting locations. To place clamps, insert the MK3 Slot Nut of the preassembled End Clamps into the top channel on CrossRail. While slightly lifting the plastic tabs, rotate 90° clockwise to engage into rail channel. Place Add-On over clamps and into rail channel after clamps are installed.
8b

Push zip tie up into leash channel located on bottom of Yeti Clamp. Slide clamp into rail channel with bolt facing outward. Leave enough room for the module to be placed. Place the module flush to end of rail. Pull leash toward you so the clamp slides over module frame. Torque to 12 ft-lbs. Use your hand to ensure the Yeti Clamp is fully engaged with the frame of the module as shown in the image. Note: The Yeti Clamp must be installed in an array. It cannot be installed on a single module that is not connected to the array by a mid clamp.

9

Lay modules down in a row one at a time. Safely connect and properly manage wires before module installation. We recommend starting at the bottom module row and working up.
10. Tighten end clamps to module at specified locations per PV module manufacturer’s guidelines. Torque to 10.3 ft-lbs. Ensure clamp sits flush against module frame.

11. Tighten mid clamps to module at specified locations per PV module manufacturer’s guidelines. Torque to 12 ft-lbs. Ensure modules are flush against the clamp.
12

! Push pins of appropriate end cap into end of rail.

13a

! Insert the MK3 Slot Nut of the preassembled Everest Ground Lug into top channel of CrossRail. While slightly lifting the plastic tabs, rotate 90° clockwise to engage into rail channel. Ensure bonding teeth are perpendicular to the rail channel. Torque to 10 ft-lbs. Insert a #6 or #8 AWG solid copper wire and tighten terminal screw to 35-60 in-lbs. Please note if the Everest Ground Lug is used on a rail that is shared, it must be outside of the modules on the end of the rail. It can be used on one of the non-shared rails underneath the module or on the outside.
To attach WEEB Lug 10.3, insert T-Bolt into side channel of CrossRail and rotate clockwise 90°. Tighten serrated hex nut to 15 ft-lbs [20.3 Nm]. Insert a #6 or #8 AWG solid copper wire and tighten terminal screw to 5 ft-lbs [6.7 Nm].

Front and rear rails can be offset to facilitate rail alignment and/or hide rail. Clamps may be used with or without the Add-On in this type of configuration. All intermediary rail between front and last rows must be aligned carefully using the steps outlined above.
Thank you for choosing a K2 mounting system.

Systems from K2 Systems are quick and easy to install. We hope these instructions have helped. Please contact us with any questions or suggestions for improvement.

Our contact info:

- k2-systems.com/en-US/contact
- Telephone: +1.760.301.5300