

EKONORACK®

by **KB RACKING**®



INSTALLATION MANUAL

EkonoRack 2.1

Press Fit Nuts

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BEFORE YOU BEGIN

Read all instructions carefully and completely.

IMPORTANT

Always observe all governing codes and ordinances.

For Reference Only – Images and diagrams used in this manual are for reference only. Your project will have specific documents and dimensions.

Secure & Dry Storage – Store parts in a secure, dry location during installation. Wet storage stains are prevented by sufficient ventilation and protection from moisture.

Roof Flooding – Ensure proper rooftop drainage. Constant submersion of PV supports in water may damage parts. Consult with a KB Racking® Project Manager if this is the case.

Check Parts – Ensure the correct type and quantities of parts have been delivered.

Mechanical Rating – Tested to UL2703 requirements. 10PSF downward, 5 PSF upwards, and 5 PSF downwards – slope load.

Fire Rating - Racking system is to be mounted over a fire resistant roof covering rated for the application. The EkonoRack 2.1 system is rated Class A for low slope application when used with type 1 or type 2 Listed Photovoltaic Modules and the L-Skirt is required

Grounding - Racking system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. This system was evaluated using a Canadian Solar Model: CS6X.

Modules – Racking system to be used with modules where compatibility from manufacturer has been approved



CAUTION/ATTENTION

KB Racking® components may have shifted during shipping. Take extra care when moving and unpacking components.

Les composants de KB Racking® peuvent ont déplacé au cours du transport. Prendre des précautions supplémentaires lorsque vous déplacez et déballage les composants.



DANGER

Only qualified professionals should install solar panels, DC cabling, and any anti-lightning safety devices.

Seulement les professionnels qualifié devrait installer les panneaux solaires, les fils CC, et les dispositifs de sécurité contre la foudre.

FOR YOUR SAFETY

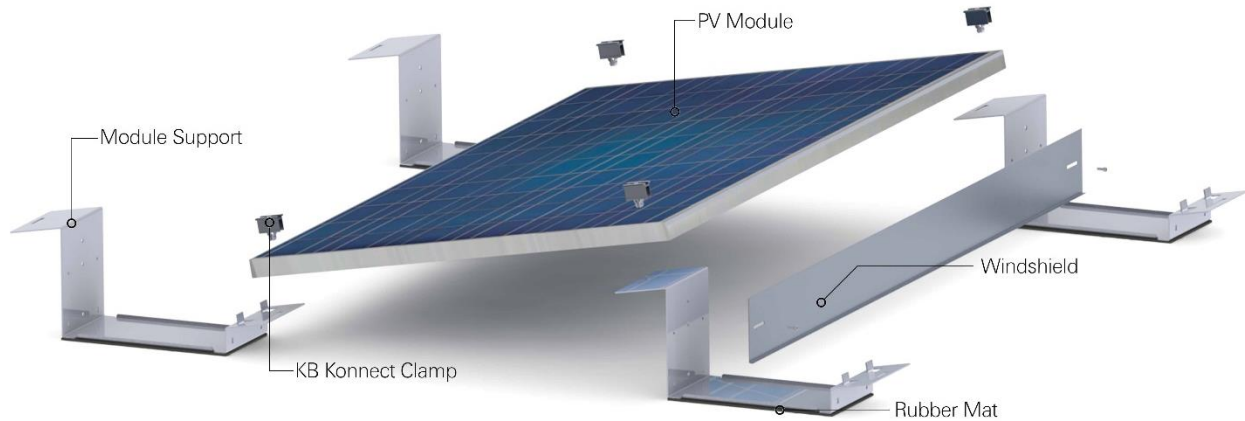
While installing the PV system, proper safety equipment should be worn.

KB RACKING® IS NOT RESPONSIBLE FOR ANY DAMAGES INCURRED
ONCE SHIPMENT HAS BEEN SIGNED FOR AND RECEIVED.

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System Overview



Parts Supplied by KB Racking®

<input type="checkbox"/>	Exx-01B-PF	Module Support (pre-attached press-fit nuts)
<input type="checkbox"/>	Exx-0xB-PF	Windshield
<input type="checkbox"/>	C02-xxE	KB Konnect Grounding Middle Clamp
<input type="checkbox"/>	C02-xxE	KB Konnect Grounding End Clamp
<input type="checkbox"/>	C00-01E-xx	KB Konnect Integrated Grounding End Clamp
<input type="checkbox"/>	C01-xxE	End Clamp Block
<input type="checkbox"/>	F04100 RC	Roof Protection Mat (pre-attached to module supports)
<input type="checkbox"/>	M6x15mm SS Hex	Windshield Bolt
<input type="checkbox"/>	M6 Safety Washer	Windshield Washer

Tools and Equipment Required for Installation

- 3/16" Allen Bit
- 10mm Socket
- Safety Gloves
- Safety Glasses
- Spacer Sticks*
- Power Drill
- Torque Wrench

*Use pre-cut wooden spacers to consistently space panel supports (not supplied).

KB Racking® Wire Management – Optional System

<input type="checkbox"/>	WM00-01R-30-v5	WM Rail	<input type="checkbox"/>	M6x25 SS Hex Head	M6 Bolts
<input type="checkbox"/>	WM00-09B-60-v3	WM Cover	<input type="checkbox"/>	M6 Serrated Flange Nut SS	M6 Nuts
<input type="checkbox"/>	WM00-03B-v3	WM Rail Grip	<input type="checkbox"/>	M6 Serrated Washers	M6 Washers
<input type="checkbox"/>	TRIM-LOK 75-B-3 0.063	Rail Trim	<input type="checkbox"/>	10mm socket, wrench	



PLEASE READ THE FOLLOWING



If roof/building edge has a fall distance of 10ft (3m) or greater,

Appropriate safety measures must be taken (i.e. harnesses) for installation of panels closer than 6.5ft (2m) to roof edges or skylights.

Distance from gas lines and electrical equipment

Solar panels should be a minimum of 3ft (0.9m) away, unless otherwise stated. Failure to comply could result in an inspection failure requiring the system to be dismantled.

Distance from rooftop hatches and/or doorways

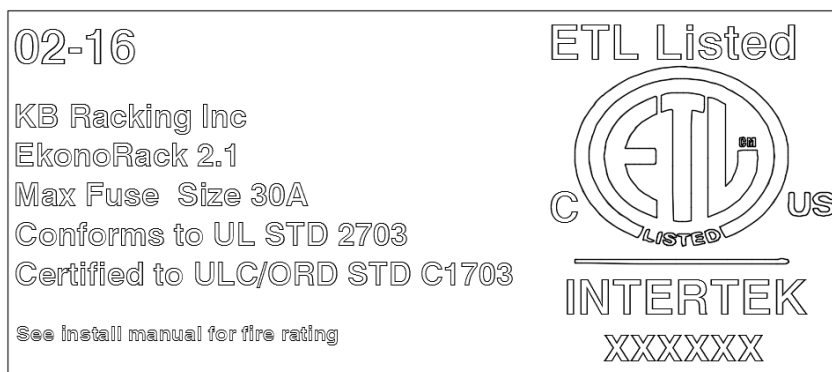
Solar panels should be a minimum of 5ft (1.5m) away, unless otherwise stated.

Distance between arrays

Unless otherwise stated, solar arrays should be spaced a minimum of 4ft (1.2m) from each other, E/W, with a minimum 1ft (0.3m) gap ever 15 to 16 modules to allow emergency crews easy access between arrays.

NOTE: Please note that KB Racking® Inc. requires all arrays to be no closer than 3ft (0.9m), unless otherwise stated, from a building's roof edge to validate wind load calculations and ensure the system is safely ballasted.

ETL Listed label conforming to UL2703 appears on KB Konnect Clamps



(Sample Label)

Preparing for Installation

- 1 Clean roof surface and remove all dirt and debris.

IMPORTANT

Inspect roof for damage prior to installation and record any existing damage with a digital camera.

- 2 Ensure proper drainage on the roof. Water accumulations may lower the load reserve of the rooftop and decrease lifespan.

- 3 Ensure the correct type and quantities of parts have been delivered.



PLEASE READ THE FOLLOWING



TO SPEED UP INSTALLATION PROCESS

Install the system on a per array basis, partially ballasting the EkonoRack supports. Leave enough space to secure the windshields. Once windshields are fully installed, add the remaining ballast to the supports.

This process will save you from re-arranging ballast blocks to create space while installing windshields.

NOTE

Never leave an array under-ballasted without windshields. If leaving an unfinished array overnight, or for an extended length of time, the system **MUST** be fully ballasted.

Installing the Module Supports

- 1 Place your first support for an array. Refer to your project specific *Layout Diagram* for dimensions (see example, Figure 3).

IMPORTANT

Wear safety gloves when handling parts.

- 2 Use your project specific *Spacing Diagram* to obtain the distance between two module supports in the N/S and E/W directions. Complete the first row of the array (see example, Figure 4).
- 3 Begin the next row of the array. Use chalk lines or pre-cut wooden spacer sticks to consistently align supports (Figure 1).
- 4 Place supports for the entire array before installing ballasts (Figure 2).

IMPORTANT

Ballast paver blocks used to prevent module supports from shifting **MUST** be replaced with the correct paver combinations before panels are installed.



Fig. 1 – Use of Spacer Sticks to Aid Placement



Fig. 2 - Supports Placed Prior to Ballasting

How to Use Your Layout Diagram

1

Note the following items on your project specific *Layout Diagram*:

NORTH ARROW

DIMENSIONS

LEGEND

ARRAY NUMBERS

ROOF STRUCTURES

2

From the layout, use the N/S and E/W dimensions at a corner of your roof as the **ORIGIN** (i.e. the beginning) of your installation.

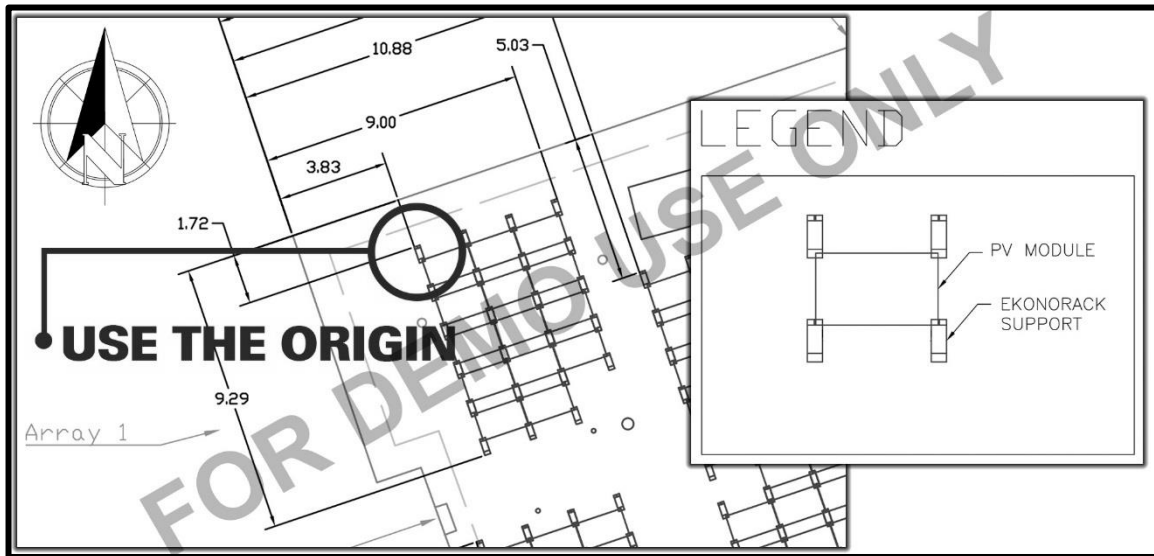


Fig. 3 - Sample Layout Diagram

How to Use Your Spacing Diagram

1

Your *Spacing Diagram* will indicate the following important dimensions:

N/S SUPPORT SPACING (N/S distance between supports)

E/W SUPPORT SPACING (E/W distance between supports)

ROW SPACING (N/S distance between support rows)

Record these numbers and do not confuse them.

2

OPTIONAL. Create spacer sticks for each *support spacing* dimension.

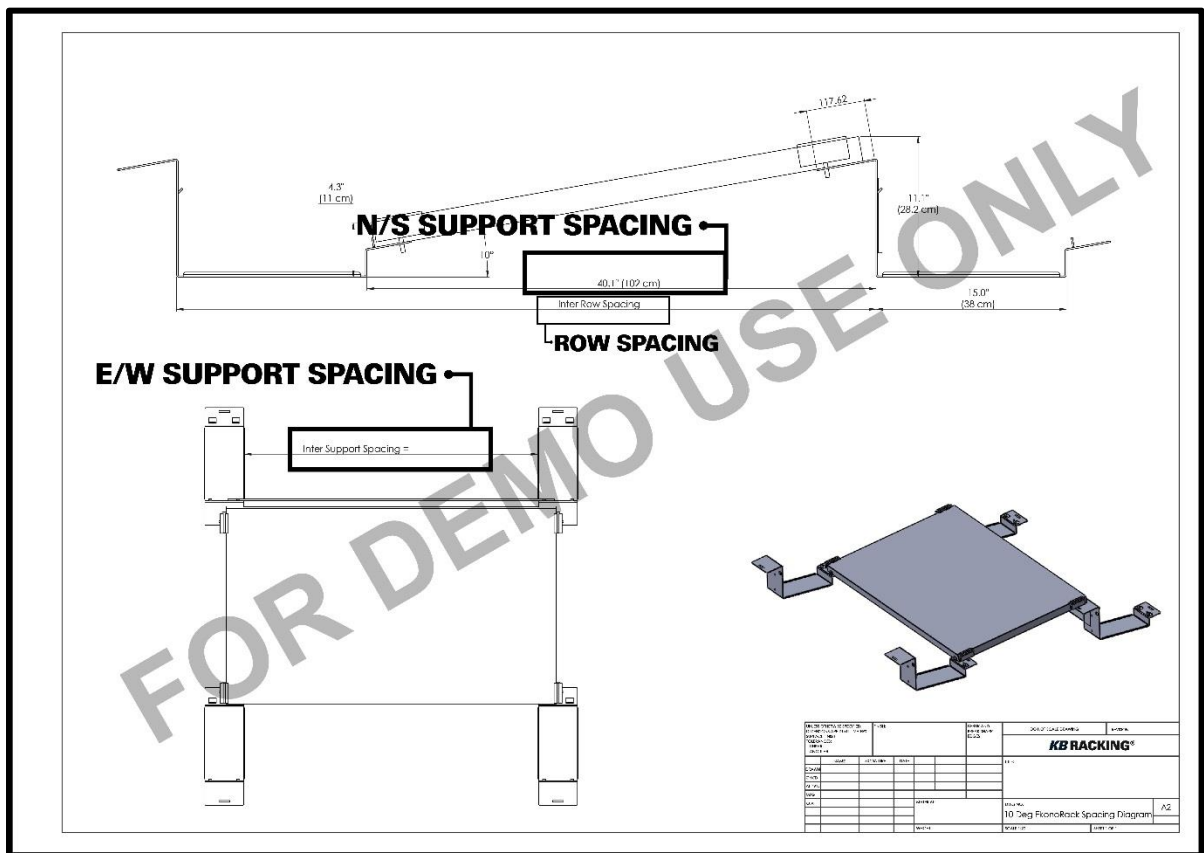


Fig. 4 - Sample Spacing Diagram

Installing Fire Mitigation Bars

- 1 Use your project specific *Fire Mitigation Bar Plan* to lay out fire mitigation bars and L-brackets at required locations (see example, Figure 6).

IMPORTANT

N/S bars require two (2) L-brackets and 4x M6 nuts and bolts.

E/W bars only require 2x M6 nuts and bolts.

- 2 Install L-brackets loosely, by hand, to the module supports – only for N/S bar locations.
- 3 For N/S bars, align mounting holes with L-bracket slots. Fasten the N/S bars to each L-bracket using M6 nuts and bolts

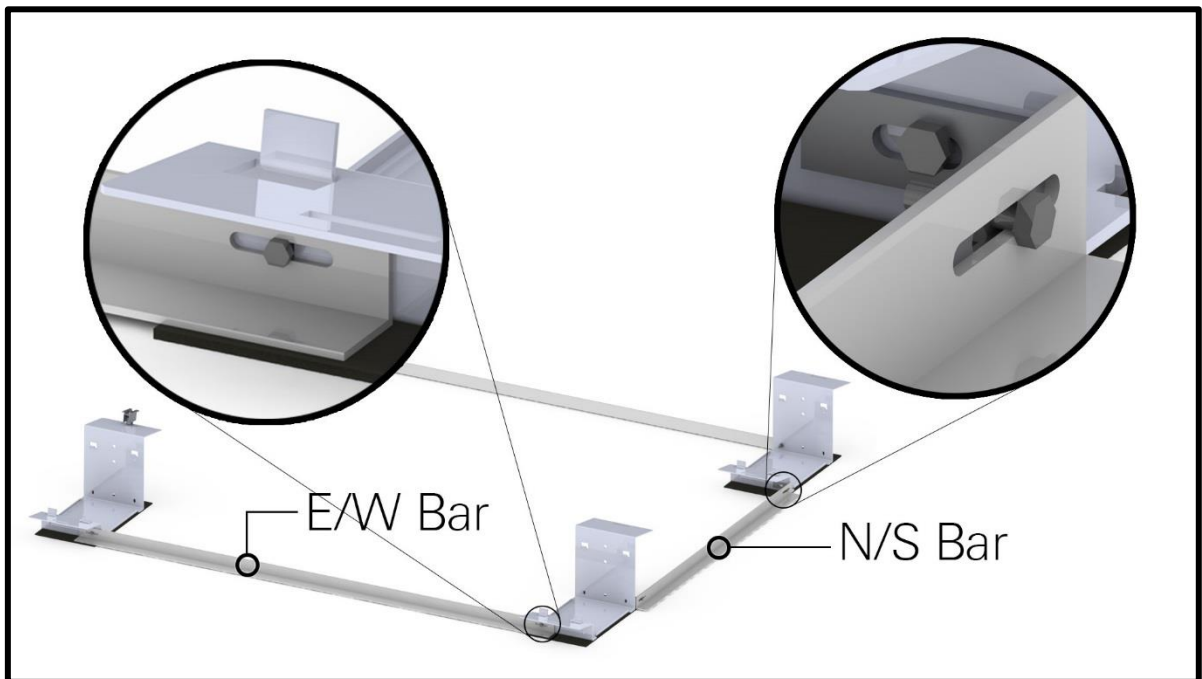


Fig. 5 - Close up showing bar and bracket placement

- 4 For E/W bars, align mounting holes with module support holes. Fasten the E/W bars to each support using M6 nuts and bolts.

- 5 Torque all M6 nuts and bolts to **11.8 Nm (104.4 in-lb)**
- 6 Repeat the steps above to completely install all fire mitigation bars.

How to Use Your Fire Mitigation Bar Plan

- 1 Your project specific *Fire Mitigation Bar Plan* will tell you where to place fire mitigation bars for each array of your project.

Note the following:

ARRAY NUMBER

N/S BARS

E/W BARS (two types!)

NORTH ARROW

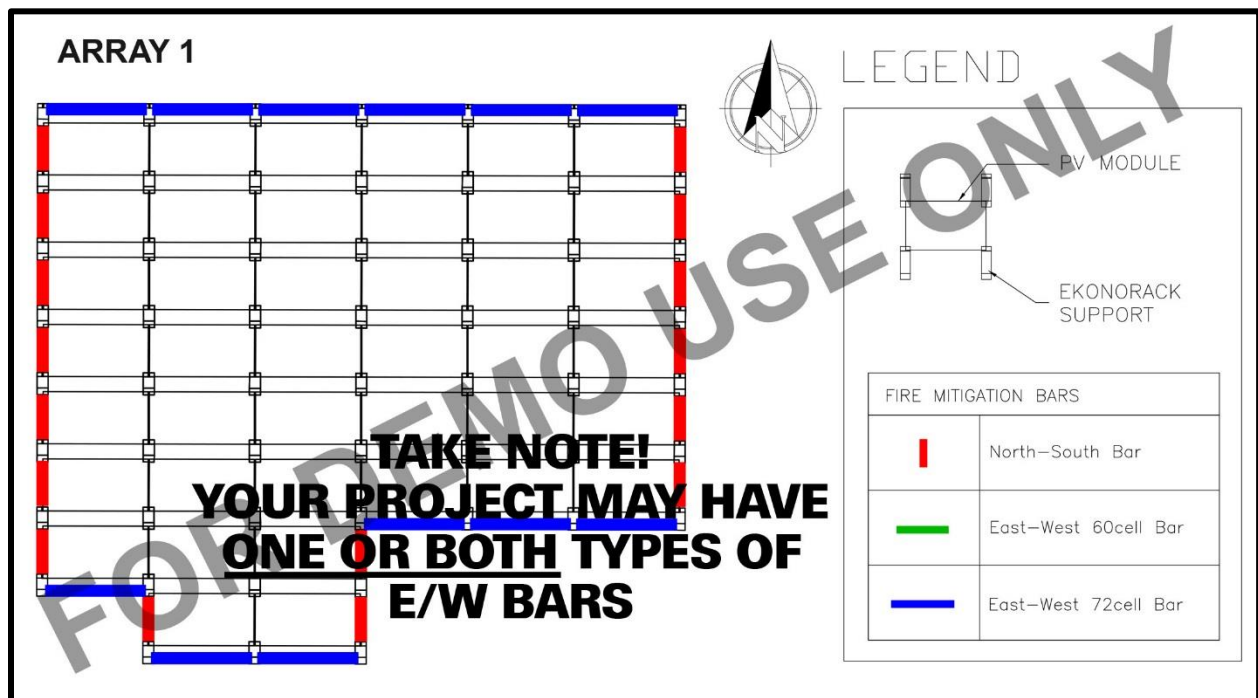


Fig. 6 - Sample Fire Mitigation Bar Diagram

Installing Ballasts

IMPORTANT

Place ballast blocks on module supports before installing panels to prevent panels from lifting.

1

Use your project specific *Paver Layout* to place paver block combinations onto all module supports (see example, Figure 6).

IMPORTANT

Where possible, position pavers atop flanges of the module support base-plates.

2

Use your project specific *Paver Shading Diagram* to ensure paver combinations do not exceed the shadow line for your project location (see example, Figure 7).

IMPORTANT

Paver blocks MUST have their center of gravity resting on the module support base, as shown below.

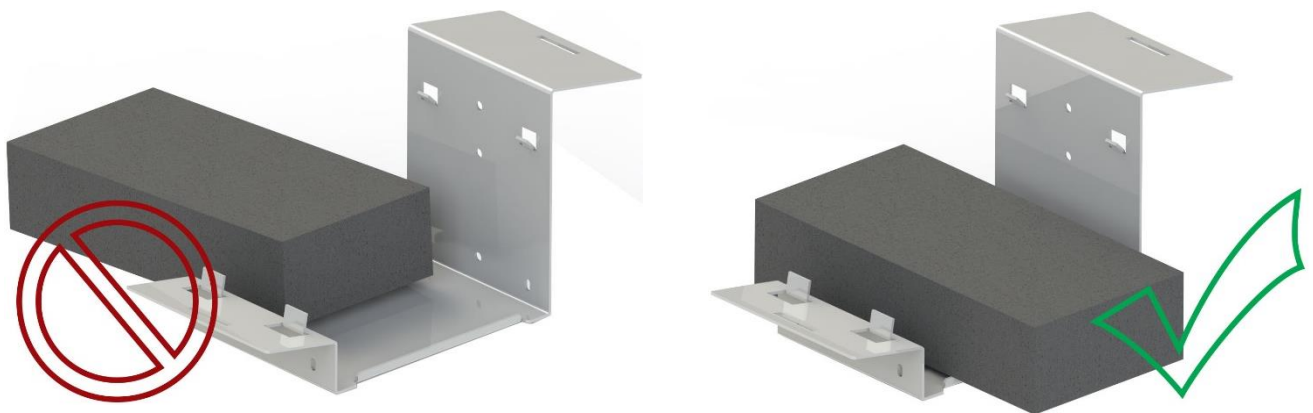


Fig. 7 - Place ballasts with majority of their weight on the support

How to Use Your Paver Documents

1

Ensure you have the *Paver Layout* and *Paver Shading Diagram* documents.

The *Paver Layout* shows the combinations of blocks required for each support to ballast each panel.

The *Paver Shading Diagram* shows sample arrangements of pavers to prevent shadows being cast onto the panels.

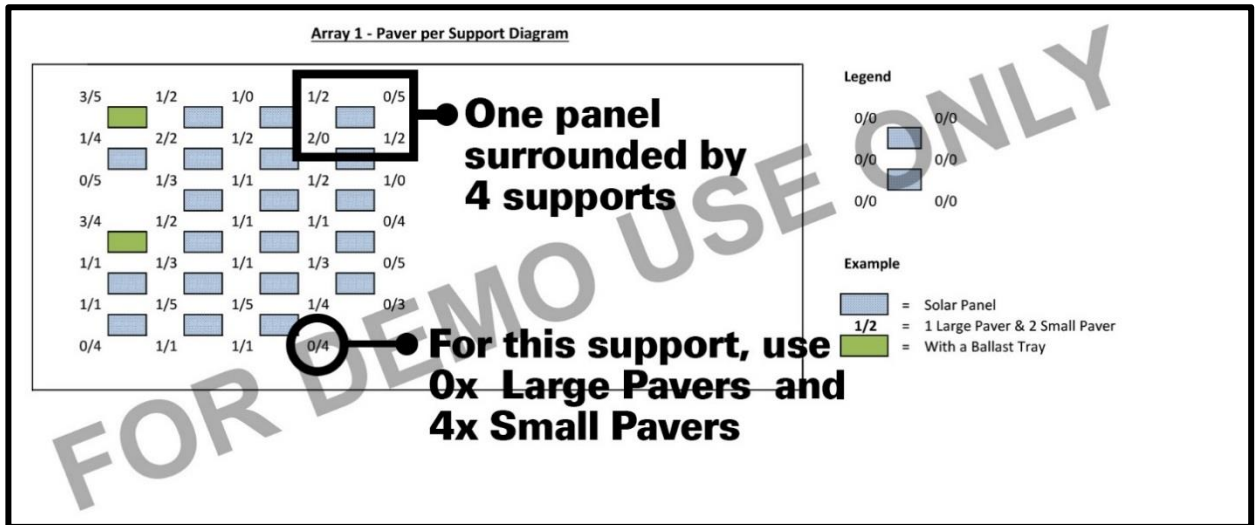


Fig. 8 - Sample Paver Layout

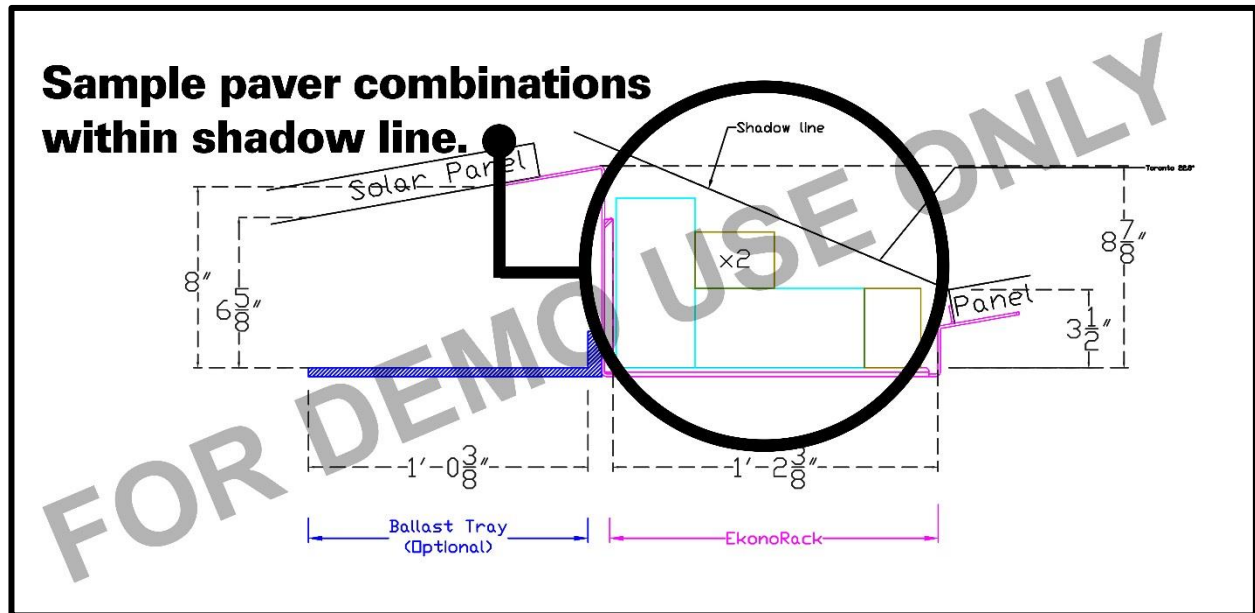


Fig. 9 - Sample Paver Shading Diagram

NOTE

If your project requires Ballast Trays, please refer to Appendix A for Installation Instructions.

Installing Solar Panels - with/without Integrated End Clamp

- 1 Begin at an array edge. Place a solar panel onto the module support (Exx-01B-PF).

IMPORTANT

KB Racking® will provide either regular end clamps (C02-xxE) with end clamp blocks (C01-xxE) or Integrated end clamps (C00-01E-xx) without blocks.

Integrated end clamps are designed for specific panel thickness only.

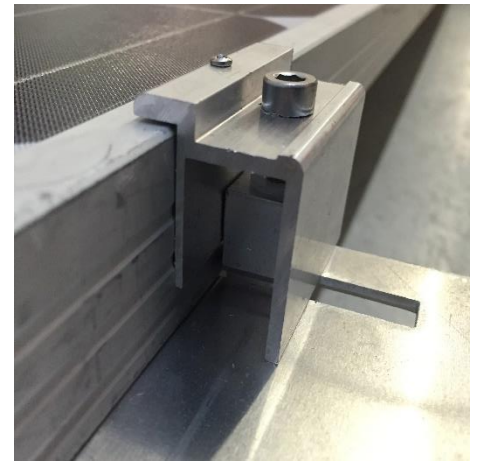


Fig. 10- Integrated End Clamp

- 2 Along the array edge, click end clamps into top and bottom mounting slots of module supports:
 - a) For regular end clamps (C02-xxE), insert end clamp blocks (C01-xxE) to balance clamp in place.
 - b) For Integrated end clamps (C00-01E-xx), click clamp in place aligned with panel.

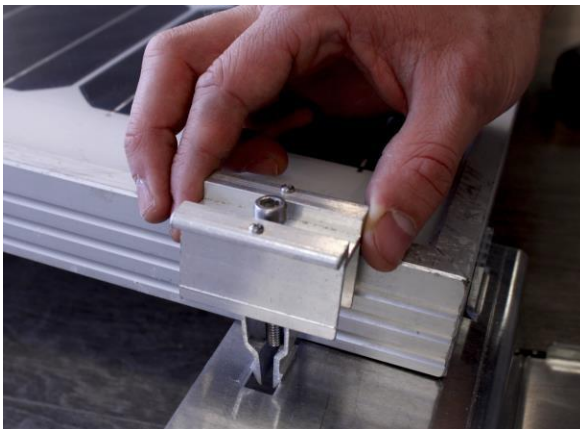


Fig. 11- Click-in KB Konnect Clamp

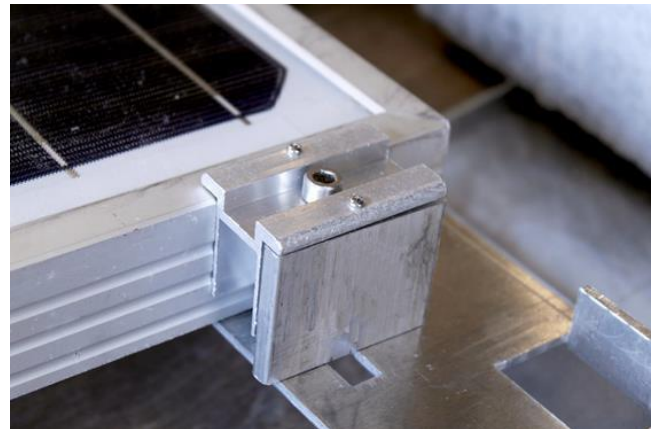


Fig. 12 - Insert End Block for End Clamps

IMPORTANT

Each solar panel requires FOUR (4) clamp.

3

Place the next solar panel in the row. Click middle clamps (C02-xxE) into mounting slots on the modules supports.

IMPORTANT

End clamp blocks and integrated end clamps provided by KB Racking® are designed to match your solar module thickness. This ensures the clamp sits flat. If end clamps do not sit flat, please notify your builder immediately.

4

Secure the first panel in the row. Tighten the end clamps and middle clamps with a standard drill or torque wrench.

Torque to 8.3Nm (73.2 in-lb).



Fig. 13 - Use Standard Drill



Fig. 14 - Use Torque Wrench

IMPORTANT

To prevent damage to solar panel and clamp, do not exceed recommended torque setting above.

Do not use hammer drills, impact drivers, or long allen keys.

IMPORTANT

When securing clamps, ensure EkonoRack support is firmly secured (by ballast or human weight).

Failure to do so may result in damage to the support and/or clamp.

5 Continue placing panels for your first row. Tighten the middle clamps as panels are installed.

6 At the end of the row, secure the panel with the associated end clamp (Integrated or Regular), similar to Step 2.

7 Begin the next row. Repeat steps 1-7 until all panels are installed.

IMPORTANT

Strong winds can lift panels. Once installed, solar panels should not be left unsupervised without windshields (Exx-0xB-PF) installed.

IMPORTANT

KB Konnect clips are designed for single use only. Please see page 22.

If clips are removed for maintenance purposes, please re-install using new KB Konnect clip. Rest of clamp (Body and Bolt) are multiple use.

Installing Cable Systems

1 Secure all panels in place before cabling.

2 Place string cables between circular notches of the top end of module support (Exx-01B-PF). Secure with cable (not supplied).

Cable trays are required for wire management of the system (additional component, not provided).

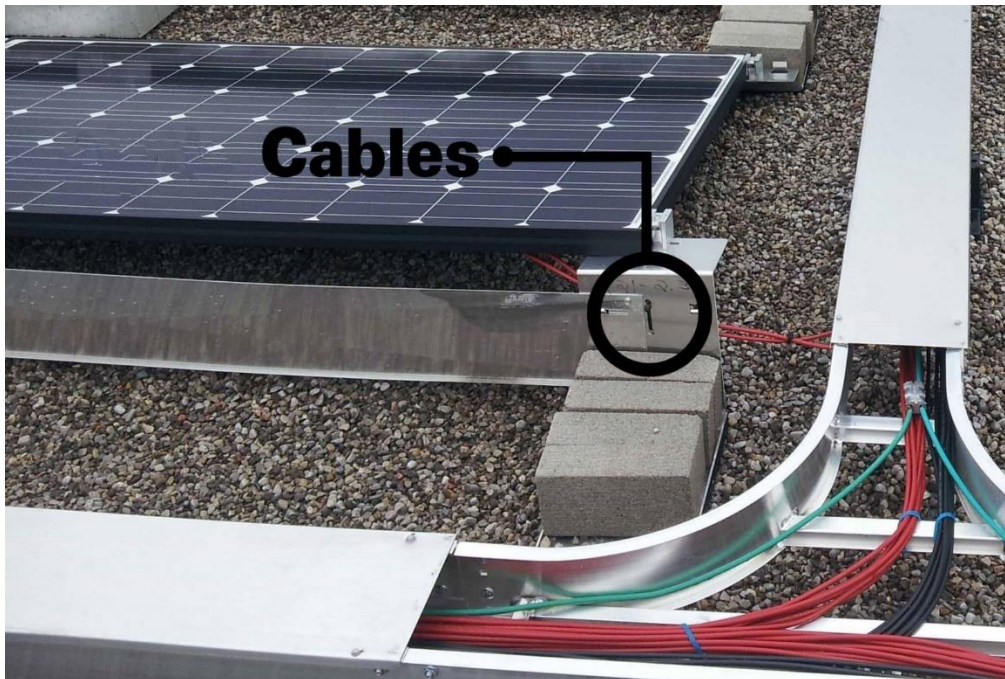
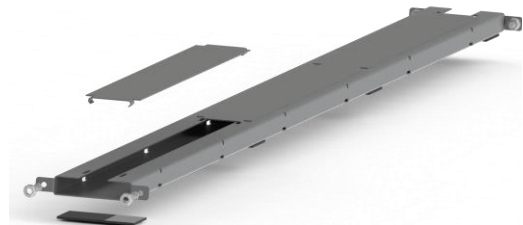


Fig. 15 – Wire management attached to the support.

Wire Management

KB Racking® offers an optional wire management solution designed specifically for easy installation with our EkonoRack 2.1 system. **See Appendix B for installation instructions.**



Installing Windshields

- 1 Align windshield (Exx-0xB-PF) onto back of module support. Windshield slots must align with inner press-fit nuts.
- 2 Secure windshields with one M6 bolt and one M6 safety washer on each end, as shown below.
Torque to: 11.8 Nm (104.4 in-lb)

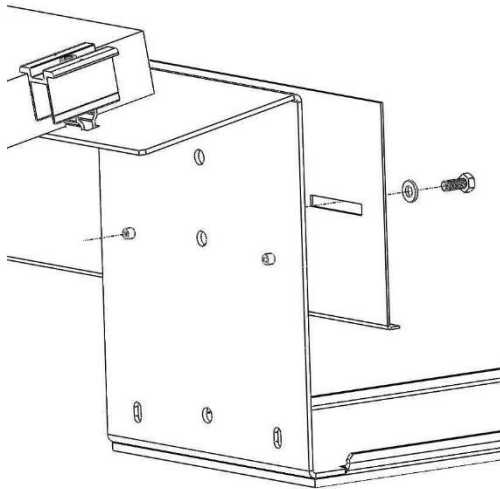


Fig. 16 – Align and Torque Bolt

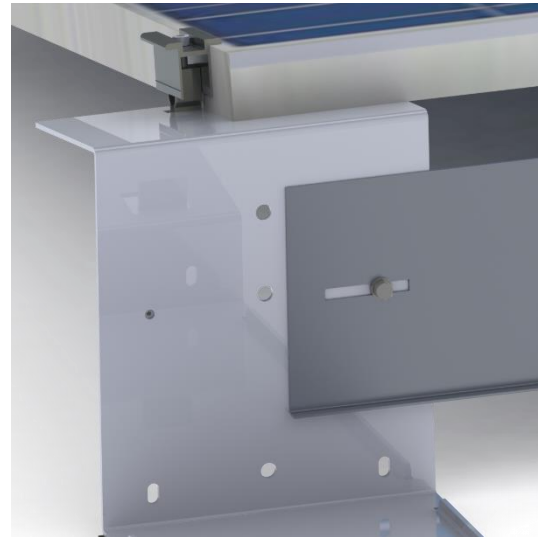


Fig. 17 – Assembled Windshield Bolt

IMPORTANT

Windshields must sit flush against EkonoRack supports. Ensure windshield flap is facing away from support when installing.

Note

Windshields may be optional depending on project specifications. Always install if supplied.

Installing ETL Certified Grounding Lugs

IMPORTANT

The only lugs allowed are those that have a UL2703 listing or were tested as part of the EkonoRack listing.

Tyco Grounding Lug

1

Screw threaded post of grounding lugs (not provided) into any module support. Tighten the hex washer nut. Diameter of penetration in the support for threaded lug shall not exceed 9.5 mm (0.37 in).

Torque to: 2.82Nm (25.2 in-lb).

2

Insert #6 AWG – RW75 uninsulated copped ground wire into wire slot.

Tighten hex nut. **Torque to: 5.08Nm (45 in-lb).**

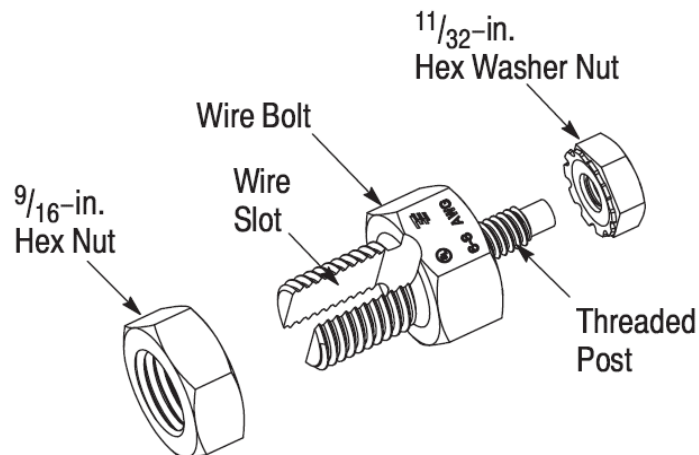


Fig. 18 - Grounding Lug Schematic (Tyco model, 2058729-1, shown as an example)

IMPORTANT

For the purpose of electrical bonding, only one grounding lug is required per array. DO NOT exceed 20x25 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation with a maximum rating of 320W.

Maximum Series Fuse Rating: 30 Amps

IlSCO Grounding Lug

- 1 Fasten grounding lugs (not provided) onto any module support or solar panel. Tighten the bolt.
Torque to: 5Nm (44.28 in-lb).
- 2 Insert #6 AWG – RW75 uninsulated copped ground wire into wire slot. Tighten the bolt. **Torque to: 5.08Nm (45 in-lb).**



Grounding Lug Schematic (IlSCO model, SGB-4, shown as an example)

IMPORTANT

For the purpose of electrical bonding, only one grounding lug is required per array. DO NOT exceed 20x25 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation with a maximum rating of 320W.

Maximum Series Fuse Rating: 30 Amps



PLEASE READ THE FOLLOWING



Installer is responsible for and shall provide an appropriate method of direct-to-earth grounding in accordance with the latest edition of the Canadian Electrical Code Part 1, CSA 22.1 Safety Standard for Electrical Installations or the National Building Code, including NEC 250: Grounding and Bonding, and NEC 690: Solar Photovoltaic Systems.

Please refer to your local Building and Electrical Codes.



PLEASE READ THE FOLLOWING



Keep Copper away from Aluminum and Galvanized Steel components in a fashion that maintains a minimum of ¼" separation.



PLEASE READ THE FOLLOWING



The bonding path for grounding is a result of the interconnection of all components in the array.

During scheduled maintenance, the removal of modules, windshields or other components must be carefully and methodically considered. By removing an entire row of modules, you may disrupt the bonding path in the North-South direction. Similarly, by removing a column of modules and windshields, you may be disrupting the bonding path in the East-West direction.

At all times, the array must be interconnected to the grounding lug (as well as during maintenance).

Note:

The module clamps contain protruding screws that pierce the panel frame to provide an electrical bonding connection between the panel and support. The grounding continues through the adjacent racking to where the system is connected to a grounding wire through grounding lugs.

The grounding path consists of:
Clamp → Module Frame → Support → Grounding Lug.

Therefore, only one EkonoRack support needs to be grounded per Array.

NOTE: When relaxing an already installed and torqued clamp, re-installing the clamp must occur with at least a 5mm offset from the original clamp location on the panel frame.

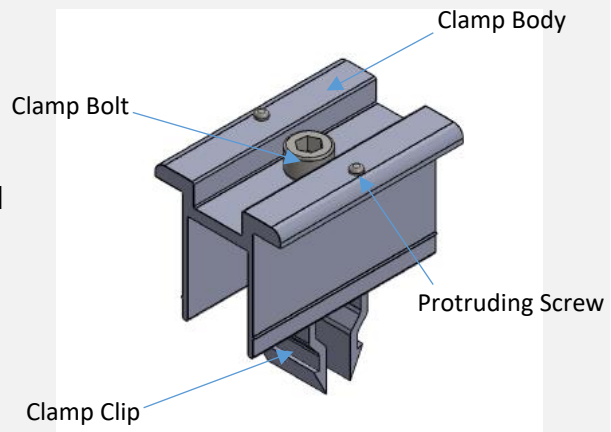
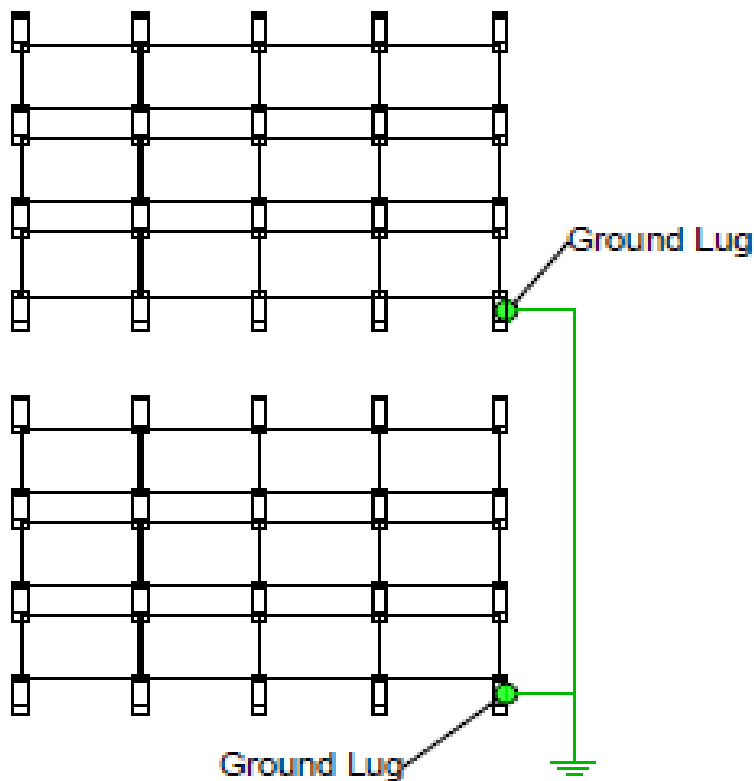


Figure 19 – Module Clamp

Basic Wiring Diagram



Basic Wiring Diagram, Use as Example Only

Completing the Installation

1

For each array, ensure the following items are correctly installed and torqued:

- i.* Module clamps
- ii.* Grounding lugs
- iii.* Windshields



Product Maintenance Information

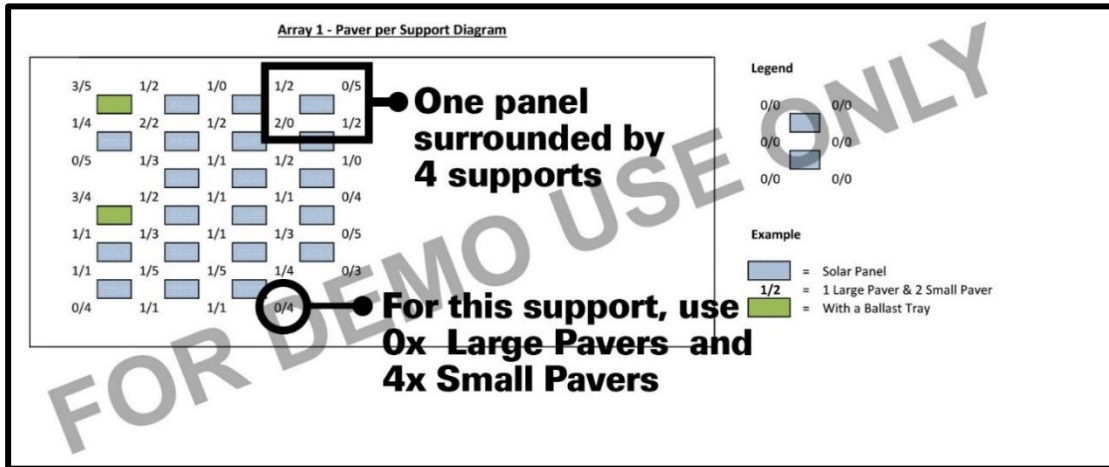
To maximize life span and ensure peak performance, KB Racking® recommends routine maintenance checks. The following checks should be completed every 6 months to maintain the system's integrity.

- Check system for loose components, loose fasteners, and any corrosion. If discovered, immediately replace the component.
- Remove debris from rooftop that can damage panels or stop solar absorption.
- Clean solar panels and remove bird waste.
- Check clamps and hardware to ensure intended connections are secured.
- Check components for damage (warping, bent).
- Check that windshields are in place and secured.

A P P E N D I X A

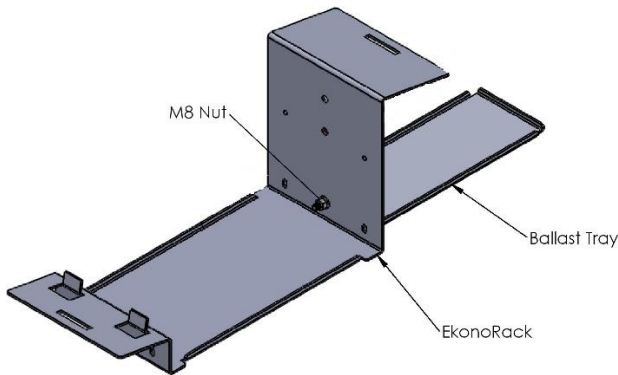
APPENDIX A | Installing KB Racking® Ballast Tray

- 1 Use your project specific *Paver Layout* to identify which supports require Ballast Trays to be installed.

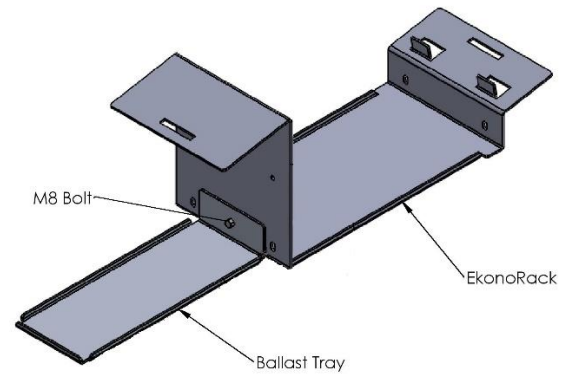


Sample Paver Layout

- 2 Align mounting hole on Ballast Tray with the center hole on the backside of the EkonoRack support, as shown below.



Front View, Ballast Tray Installation



Back View, Ballast Tray Installation

- 3 Secure Ballast Tray to EkonoRack support with supplied M8 x 25mm hex bolt and M8 serrated flange nut. **Torque to: 22.5 Nm (199.2 in-lb)**

A P P E N D I X B

APPENDIX B | Installing KB Racking® Wire Management

- 1 Align WM Rails per your electrical layout (electrical layout not provided by KB Racking®).

IMPORTANT

Rails should be placed under windshields, within array field. If placed outside the array, the outside edge of rails must be within 1m of an array edge.

IMPORTANT

KB Racking Wire Management system conforms to the CSA C22.2#126.1 and the NEMA VE 1 for electrical bonding/grounding.

For the purpose of electrical bonding, only one grounding lug is required per column of Wire Management rail.

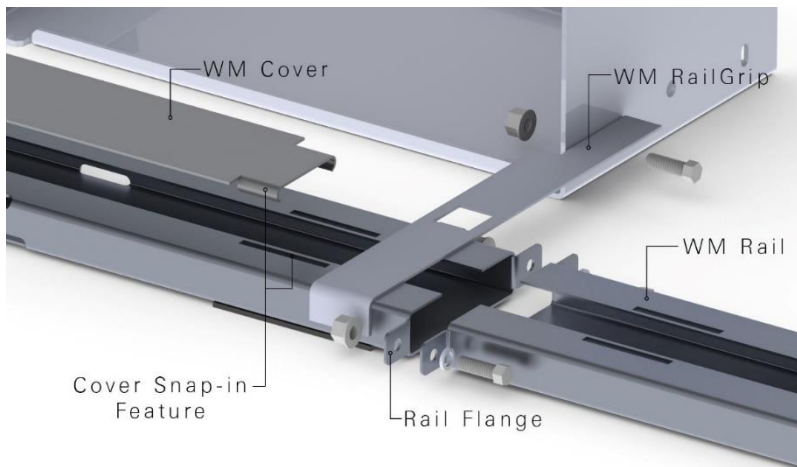


Fig. A1 – KB Racking® WM Assembly

- 2 Rails connect at flanges with M6 bolts. Assemble bolt with washer through flanges, then M6 nut. Snug-tighten with 10mm socket and wrench.
Torque to: 11.8 Nm (104.4 in-lb)
- 3 Place cables within tray. At exit/entry points for cables, cut Trim-Lok strip to length and adhere to WM Rail edges. This will protect cables from damage.
- 4 Rail covers can be snapped in to WM rail snap-in features. A full length of WM rail will require five covers.
- 5 Optional RailGrip attachments can be installed to secure rail to EkonoRack supports. Place RailGrip over rail as shown. Align other end with EkonoRack support hole. Secure with snug-tight M6 bolt/nut combination.