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 (provided separately).

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.

Damaged Parts – If you have received damaged parts, immediately notify your KB Racking® Project Manager.

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

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.

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

⚠ 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.

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®

- AXXX-04B-XX Module Top Support
- AXX-03B Module Bottom Support
- A00-01B-XX Rail \(\text{(multiple lengths possible)}\)
- A00-02B-TEK Rail Splice
- A00-13B-TEK Ballast Tray \(\text{(optional)}\)
- AX-0X Module Top Support
- AX-0XB Side Shield \(\text{(Left or Right, optional)}\)
- C02-XXE KB Konnect Grounding Middle Clamp
- C02-XXE KB Konnect Grounding End Clamp
- C00-01E-40 End Clamp Block
- F04100 RC 4"x5" Roof Protection Mat \(\text{(un-attached)}\)*
- FISTE0840035 TEK Screw 410SS 8X5/8 HWH
- M6x25mm SS Hex M6 Bolts

*Pre-attached Roof Protection Mats are included on the following components: Rail, Rail Splice, and Ballast Tray. Unattached mats are placed under exposed Rail edges, per “Installing the Rails” section of this manual.

Tools and Equipment Required for Installation

- 3/16" Allen Bit
- 10mm Hex Socket
- 1/4" Hex Socket
- Power Drill
- 10mm Hex Socket
- Torque Wrench
- Safety Glasses
- Safety Gloves
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.

If you have received damaged or missing parts, immediately notify your KB Racking® Project Manager.

**CAUTION**

Wear safety gloves when handling parts. Newly fabricated parts may have sharp edges.

**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.

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.
Installing the Rails

1. Before you begin, ensure you have the following documents provided separately: **Layout Diagram, Rail Table, and Spacing Diagram**.

   **Example of ODD NUMBER of PANELS**
   
   ![Diagram of ODD NUMBER of PANELS]

   **Example of EVEN NUMBER of PANELS**
   
   ![Diagram of EVEN NUMBER of PANELS]

   **Fig. 1 – Use your Rail Table to determine which size of Rail to use.**

2. Place your first Rail for an array. Refer to your **Rail Table** and **Layout Diagram** (Figure 8). The **Rail Table** provides the Rail size (short or long). The **Layout Diagram** provides the system location relative to the roof edge.

   **Tip:** Your first Rail for a column of panels may be SHORT or LONG, depending on the number of panels in a column. Use your **Rail Table** to determine which combination of Rails to use, per Figure 1.

   **SHORT Rails are only used:**

   1. At the end of a N/S column, AND
   2. Where there are an odd number of panels in a N/S column.

   **Note:** Your project may use one OR two sizes of rails. See your Rail Table.

3. Use your **Spacing Diagram** to obtain the E/W Rail Spacing (see example, Figure 9).

4. Complete the first row of rails of the array. Lay Rails adjacent to each other. Use chalk lines or spacer sticks to consistently align Rails and ensure Rails remain parallel to each other (Figure 2-3).
5继续安装所需各列的铁轨。使用您的“铁轨表”和“布局图”来确定所需的具体数量和组合。

6安装铁轨接头来连接铁轨。将两根铁轨等间隔地放置在接头内。使用接头上的预钻孔来对齐并安装4个TEK螺钉（图4-5）。**拧紧至7.5 Nm（5.5 ft-lbs）**

7完成铁轨安装，将屋顶保护垫在铁轨末端根据需要放置。剥去双面胶上的保护膜，并将其粘附到铁轨的下表面，覆盖铁轨边缘（图6-7）。
How to Use Your Layout Diagram

1. 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.

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

   - NORTH ARROW
   - DIMENSIONS
   - LEGEND
   - ARRAY NUMBERS
   - ROOF STRUCTURES

*Fig. 8 – 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)
   - **INTER-SUPPORT SPACING** (inter-row distance between Supports)
   - **E/W RAIL SPACING** (E/W distance between Rails)
   - **ROW SPACING** (N/S distance between similar points)

   Record these numbers and do not confuse them.

2. *Recommended*: Create spacer sticks for the first three dimensions above.

![Sample Spacing Diagram](image)
Installing Module Supports

1. Mark 15cm (6”) from the South edge of a Rail (Figure 10).

2. Click-in the first Bottom Support by aligning the front of the support at the 6” mark. Apply downward pressure by stepping on the support (Figure 11). All four (4) click-in features of the support must be engaged with the rail.

3. Use the Spacing Diagram to obtain the N/S Support Spacing.

4. Click-in the Module Top Support at the distance obtained in Step 3, with your spacing stick (see example, Figure 12-13).

   **Tip:** Hold the support at the top flange with both hands. Centre the support within the Rail channel and apply pressure by stepping on the bottom flange of the support. Applying pressure at the bottom flange first will click-in this flange alone. To completely click-in the Top Support, apply pressure with hands on the top flange.

5. Click-in all supports using the methods outlined above.

---

**IMPORTANT**

Complete the first row before installing additional rows to fix the distances between the module supports.

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Fig. 10 – Measure the first Bottom Support of the row  
Fig. 11 – Click in the Module Bottom Support
PLEASE READ THE FOLLOWING

Following the installation of the module supports, ensure that the surface of the roof is well protected at the N/S ends of each column of rails. Any rail excess that may pose a threat of damage to the roof structure should have some roof protections pads placed underneath. Alternatively, these excess sections could be cut off with a Circular Saw.

NOTE

The system requires at least 15cm (6in) of rail extending beyond supports at each end of a column of rails.

Fig. 12 – Use pre-cut wood spacers to evenly space supports

Fig. 13 – Click-in the Module Top Support
Installing Ballast Trays (optional)

1. Ballast Trays are optional, and only required wherever ballast trays are shown on the *Ballast Layout* (see example, Figures 18).

2. Install Ballast Trays under PV panels, top-down, onto rails (see example illustration, Figure 14). Refer to the *Shading Diagram*, provided separately, for configuration requirements.

3. Install 2x TEK Screws to secure Ballast Tray to Rail using the pre-drilled holes. **Torque to 7.5 Nm (5.5 ft-lbs)**

Installing Ballast

1. Place Ballast under panels according to your project specific *Ballast Layout* and *Shading Diagram* (see example, Figure 16-19).
How to Use Your Ballast Layout

1. Ensure you have the Ballast Layout and Shading Diagram documents, both provided separately.

   The Ballast Layout shows the combinations of stones required at each rail, to ballast the adjacent panels.

   The Shading Diagram shows sample arrangements of stones (Figure 14).

   **Fig. 18 – Sample Ballast/Paver Layout**

   **Fig. 19 – Sample Ballast/Paver Shading Diagram**
Installing PV Modules

1. Begin at an array edge. Place a PV module across two Bottom Supports.

2. Lay down the PV module onto the Top Supports.

3. Align the module. Each support features an etching. The edge of a PV module must be on this etching to ensure the panel is centered across all four supports (E/W).

**IMPORTANT**

Strong winds can lift panels. Once installed, PV Modules should not be left unsupervised without windshields installed.

4. Continue placing PV modules for an entire row.

5. Secure PV modules beginning at the start of a row. Clamps at module edges require End Blocks, OR Integrated End Clamps. Click clamps into slots on the support and use a 3/16 allen-key to secure the clamp (Figures 20-22).

**IMPORTANT**

End Blocks provided by KB Racking® are designed to match your PV Module thickness. This ensures the clamp sits flat. If end clamps do not sit flat, you have the incorrect block. Notify your builder immediately.

**IMPORTANT**

Each solar panel requires FOUR (4) clamps.
**IMPORTANT**
To prevent damage to solar panel and clamp, do not exceed recommended torque setting below.

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

6 Continue installing adjacent PV modules. To ensure proper clamping, pull panels firmly together while installing (see example, Figure 23-24).

7 **Torque KB Konnect to 8.3Nm (6.1 ft-lb).** Clamps must sit flush to each panel being clamped. This ensures the panel frames are pierced.

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

**IMPORTANT**
KB Konnect clips are designed for single use only.
If clips are removed for maintenance purposes, new KB Konnect clips must be re-installed. Clamp body and bolt are multi-use.

![Fig. 20 – Fasten KB Konnect End Clamp, with End Block](image1)

![Fig. 21 – Torque KB Konnect End Clamp, with End Block](image2)
Fig. 22 – Integrated End Clamp

Fig. 23 – Two adjacent modules pulled together prior to securing clamp.

Fig. 24 – Two adjacent modules pulled together while securing clamp.
Installing Cable Systems

After all modules are in place, string cables can be put into the middle notch of the Module Top Supports and Bottom Supports.

**Tip:** Rails can be used as cabling channels either under or to the side of the supports, within the rail channel.

**IMPORTANT**

In case there are any anti-lightning safety devices on the roof, a qualified professional should integrate them into the solar installation.

*Fig. 25 – Rail cabling through supports*
Installing Windshields

LANDSCAPE

1. Start at the end of a row. Place the windshield flat against the Top Support. *Flanges face away from supports.*

2. Align slots on the shield to the press-fit nuts on the Top Supports. *Slide the shield as far to the outside edge of the array as permitted by the slots.*

3. Use two M6 bolts to secure the shield to two supports. **Torque to: 11.8 Nm (8.7 ft-lbs)**

4. Install remaining shields. Continue sliding shields to fit.

**IMPORTANT**

Windshields are designed to accommodate various lengths of panels. For smaller 60 Cell panels, it may be necessary to overlap and/or flip windshields.

Windshields must be mounted through the provided slot, and may slide along this slot to fit the system.

60 CELL WINDSHIELDS CAN OVERLAP/FLIP
Installing Side Shields (optional)

1. Install Side Shields at the end of rows (Figure 29). Left and/or Right-hand shields can be installed depending on your project requirements.

2. Place Side Shield by aligning the rear slot with the outer press-fit nut on a Top Support. Use an M6 bolt to hand-tighten the rear of the shield.

3. Using the pre-punched hole at the front of the side shield to locate and install a TEK Screw (Figure 30). **Torque to 7.5 Nm (5.5 ft-lb).**

4. Torque the M6 bolt at the rear of the shield to **11.8 Nm (8.7 ft-lb).**
Installing ETL Certified Grounding Lugs

Tyco Grounding Lug

1. Screw threaded post of grounding lugs (not provided) into any one Rail per array. Tighten the hex washer nut. 
   **Torque to: 2.82Nm (2.1ft-lb).**

2. Insert grounding lug wires. Insert #6 AWG – RW75 uninsulated copper ground wire into wire slot. Tighten hex nut. 
   **Torque to: 5.08Nm (3.75ft-lb).**

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**IMPORTANT**

For the purpose of electrical bonding, only one grounding lug is required per array per 20x25 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation. If array area exceeds 20x25 panels, then additional grounding lugs are required, per each additional area.

*Maximum Series Fuse Rating: 30 Amps*
Ilsco Grounding Lug

1 Fasten grounding lugs (not provided) onto any one Rail per Array. Tighten bolt. Torque to: 5Nm (3.69ft-lb).

2 Insert #6 AWG – RW75 uninsulated copper ground wire into wire slot. Tighten bolt. Torque to: 5.08Nm (3.75ft-lb).

IMPORTANT

For the purpose of electrical bonding, only one grounding lug is required per array per 20x25 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation. If array area exceeds 20x25 panels, then additional grounding lugs are required, per each additional area.

Maximum Series Fuse Rating: 30 Amps
The module clamps contain protruding screws that pierce the panel frame to provide an electrical bonding connection between the panel and racking. The grounding continues through the racking to the base Rail where the system is connected to a grounding wire through grounding lugs.

For the purpose of electrical bonding, only one grounding lug is required per array per 20x25 panels in the E/WxN/S directions, respectively. Panels may be installed in landscape or portrait orientation. If array area exceeds 20x25 panels, then additional grounding lugs are required, per each additional area.
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 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 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).
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.

- 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.