



Adjustable Ground Mount 2.0

Installation Guide

KAGM-G September 2021 Revision

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Product Certifications

SBWK-312

WEEB-M-KR

CL501TN

The above products are tested to UL 467, CAN/CSA-C22.2 No.41 US/Can safety standards for safety grounding and bonding equipment.

Hat rails, Mid Clamps, and Kinetic Ground Lugs have been certified to meet the bonding requirements of UL 2703 and LTR AE-001-2012. Please contact us for more details

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Disclaimer

Kinetic Solar Racking and Mounting Inc. (Kinetic Solar) does not install any components of its Racking and Mounting systems. Kinetic Solar Racking and Mounting does not have any duty or responsibility for safe and proper installation and/or maintenance of its Racking and Mounting systems; including job site safety standards and procedures.

All installation work must comply with the applicable regional and local regulations or other national or international electrical standards and are the sole responsibility of the installer, contractor and/or developer.

Kinetic Solar Racking and Mounting shall not be held responsible for damages of any kind, including but not limited to: bodily harm, damage to property or injury. Kinetic Solar Inc. shall not be held responsible for the proper compliance or non-compliance with the instructions detailed in this manual including handling solar modules, solar racking or system installation.

Before attempting to install, operate or service a Kinetic Solar system, all instructions should be read and understood. Failure to follow these instructions/guidelines may result in death, injury or property damage.

Module manufacturer's guidelines should be followed at all times. Modules mounting guidelines should be followed at all times. Ensure recommended rail spacing is consistent with the provided structure. It is the sole responsibility of the customer to ensure that a compatible module is used.

Solar module width and/or length will determine the exact rail spacing. (Please refer to the module manufacturer's specifications)

Please retain this manual for future reference. Kinetic Solar reserves the right to make additions, deletions and modifications to the content of this document without prior notice.

This manual is only valid for the following Kinetic Solar Racking Systems: Adjustable Ground Mount 2.0 Models Starting with SKU KAGM

The instructions contained in this manual are exclusive to the products referenced. Use of any other products in conjunction with the listed products is done at one's own risk.

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General Notes

- **The hot dip galvanizing process may sometimes cause zinc accumulation inside holes or along edges. This is normal. Bolts / hardware can be lightly tapped through the holes to clear the buildup. Alternatively, they can be cleaned up with a drill so long as the Zinc is not completely stripped**
- **Paint blemishes may occur as a result of the underlying hot dip galvanized coating. This is a normal occurrence and will not affect product performance**
- Drawings in this installation manual are examples and are NOT specific to your order.
- When installing components do not fully tighten components until specified
- Prior to installation, ensure that you are in possess all of the required components for installation

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<i>Tools required</i>	<i>Main components</i>
Measuring Tape	A-Frames (3 pcs each)
Chalk /String Line	C-Channels
Impact Wrench	6,8,10 Module Hat Rails
3/8" Wrench	Cross Braces
3/8" Socket	Support Bars
1/2" Wrench	End Clamps / Toe Clamps
1/2" Socket	Mid Clamps
3/4" Wrench	Hardware
3/4" Socket	
1 1/8" Wrench	
1 1/8" Flare Nut Wrench Adapter	
Torque Wrench	
Hammer	

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Mounting Procedure

Step 1A: Pre-

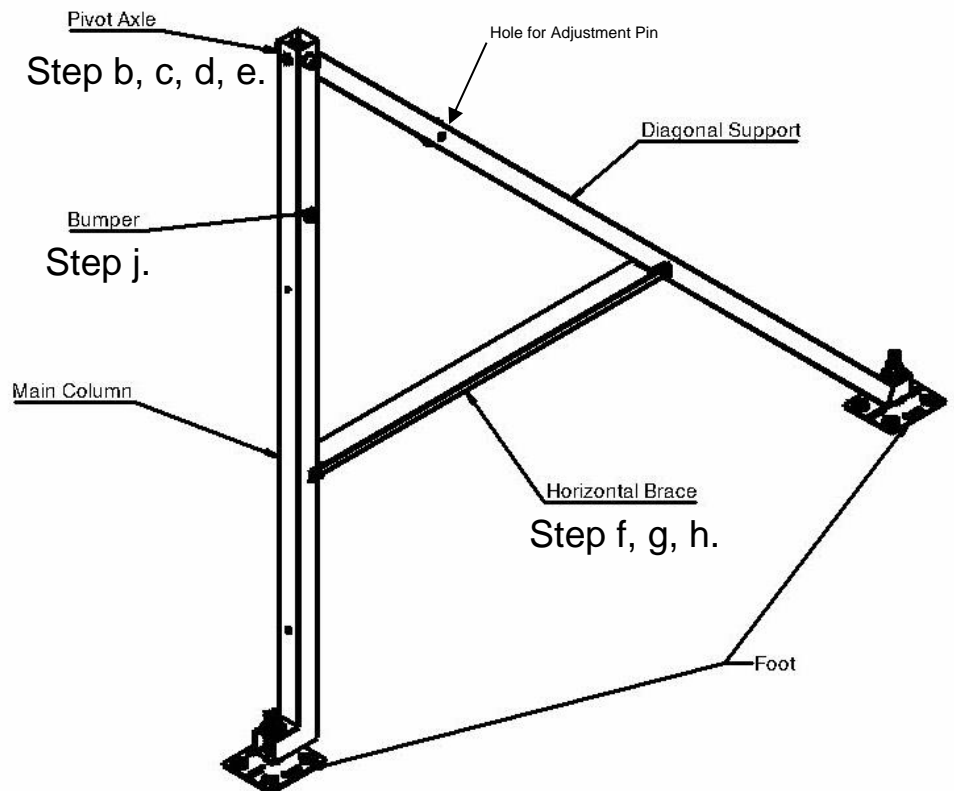
Assemble A-Frames

- a. Each A-Frame consists of a column, horizontal brace and diagonal support

- b. Insert the non-bent

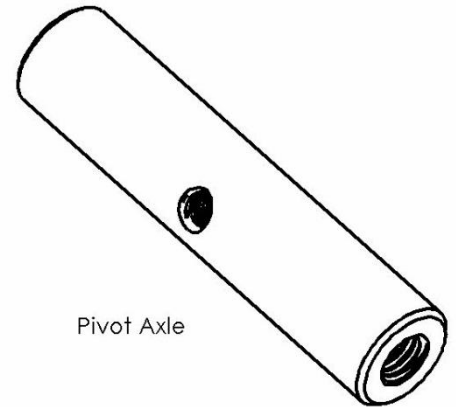
end of the diagonal member into the rectangular hole near the top of the unbent end of the column so that the bent ends are parallel, and the large holes are aligned

- c. Insert the pivot axle into the set of aligned holes so that it pins the two members together and the tapped middle portion is aligned with the corresponding hole in the column

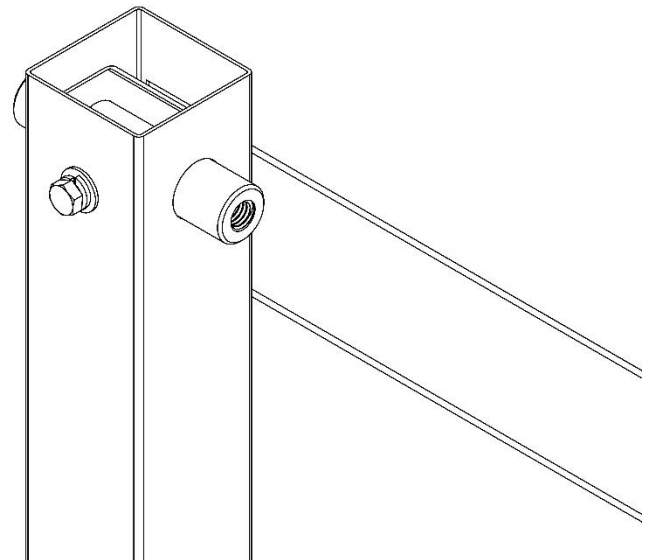


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- d. Insert the hex bolt (5/16" x 1.5") with a properly sized lock washer under the head and a flat washer below that through the hole in the column and into the thread in the pivot axle so that it fixes the position and rotation of the pivot axle



- e. Finger tighten the bolt to hold the pieces in place
- f. Install the horizontal brace to the underside of the A-Frame the end with the aligned notches goes towards the column and the offset notched end goes towards the rear (diagonal) end



- g. Install bolts (5/16" x 3.5") with flat washers (5/16") pre-installed through both ends to fix the horizontal brace in place
- h. Install flat washers (5/16"), then lock washers (5/16") and hex nuts (5/16") on both of the bolts and torque to 12 ft-lbs
- i. Tighten the bolt in the pivot axle until the lock washer collapses and then add another 1/4 turn

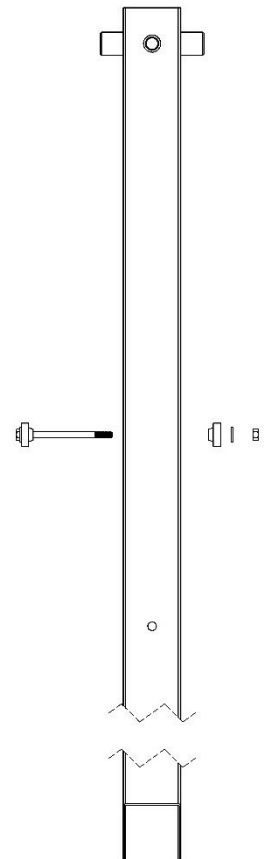
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j. Install the safety bumpers

- i. The safety bumpers are provided in order to slow or stop the c-channels in an extreme case.

Note: THE BUMPERS ARE PROVIDED IN ORDER TO MINIMIZE THE CHANCES OF AN ACCIDENT THEY DO NOT GUARANTEE STOPPAGE OF THE C-CHANNELS AND ARE NOT A REPLACEMENT FOR ADJUSTING THE ARRAY IN A SAFE MANNER WITH BY TWO ABLE BODIED PEOPLE

- ii. Place a flat washer (1/4") next to the head of the 1/4" x 4" bolt, followed by the rubber bumper in the orientation shown.
- iii. Insert the assembly into the hole immediately below the pivot axle as shown. Install the other bumper, flat washer (1/4") and hex nut (1/4") as shown. Tighten the hardware until it is hand tight and then add an additional quarter turn. This hardware assembly does not need to be torqued using a torque wrench



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Step 1B: Place A-Frames

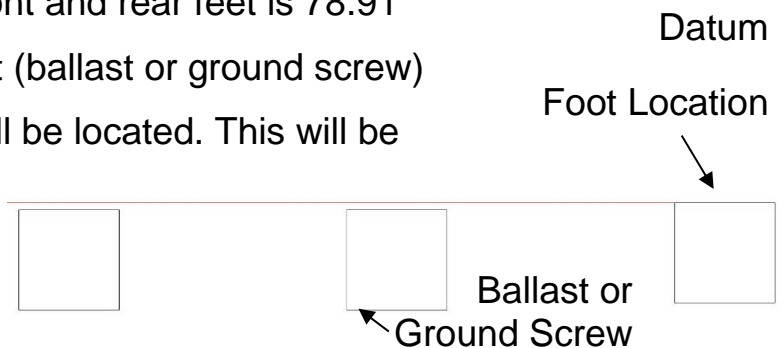
- a. If your A-Frames do not have spacers welded inside the bent ends, you will be supplied with spacer tubes pre-assembled on the feet. There are two different sizes, a long and a short. The longer spacer tube is to be used with the front leg and the shorter is to be used inside of the rear leg.



Foot with Spacer

- b. When installing the feet, insert the spacer inside the end of the tube to that the threaded portion of the foot will pass through it. If it is too tight of a fit, a hammer can be used to tap it into place.
- c. Attach feet to bottom of A-Frame starting with the rear leg for each A-Frame— See Appendix 2 Spacing Guidelines and Appendix 3 Foot Detail
- iv. Spacing between A-Frames is 124.50"
 - v. Spacing between front and rear feet is 78.91"

- d. Establish the highest point (ballast or ground screw) where an A-Frame foot will be located. This will be known as the datum foot. Place the first upright in this position so that the foot is seated at the minimum position on the screw adjustment.

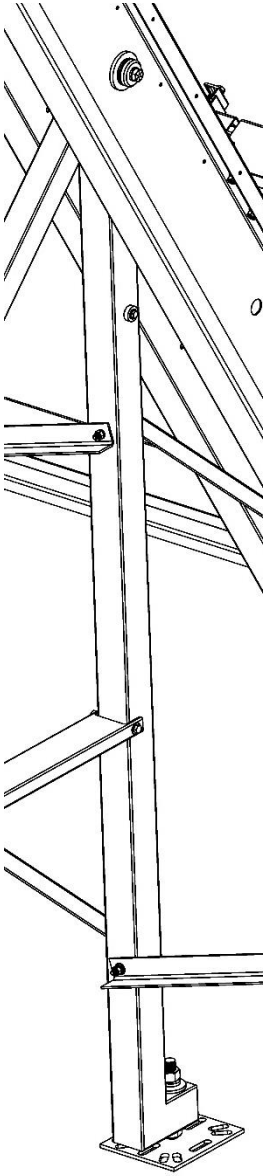


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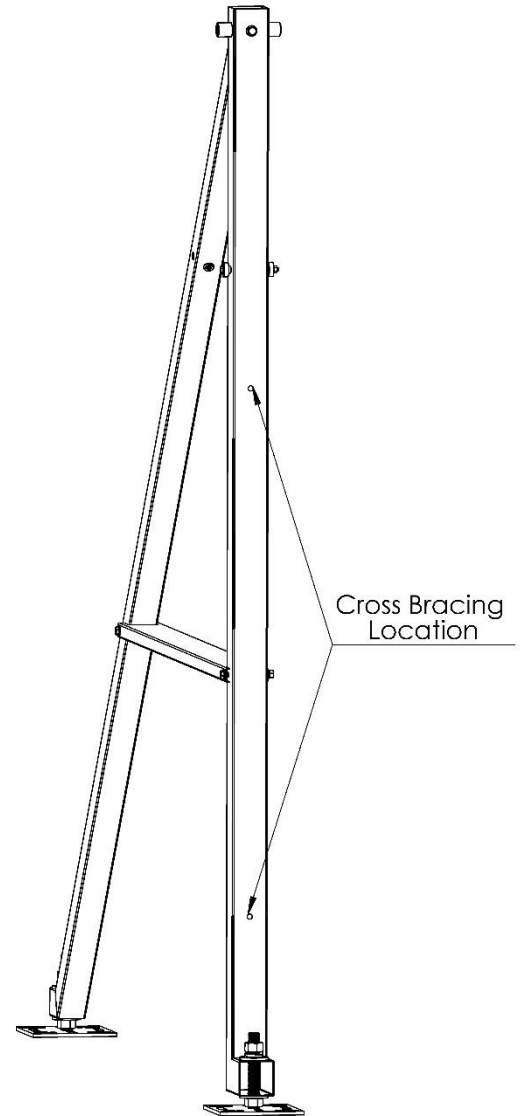
- e. Place the remainder of the uprights in position on foundation. Adjust the height using the screw adjustment as needed until they are at the same height as the initial A-Frame. If a beam were to be placed across the A-Frames at this point it should be level, plumb and square.
- f. Fully torque all of the nuts related to the height adjustment of the feet once the position and level has been confirmed
- g. Hand tighten the remaining components
- h. If using ground screws or screw piles, attach feet to ground screws / screw piles

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Step 2: Attach cross bracing



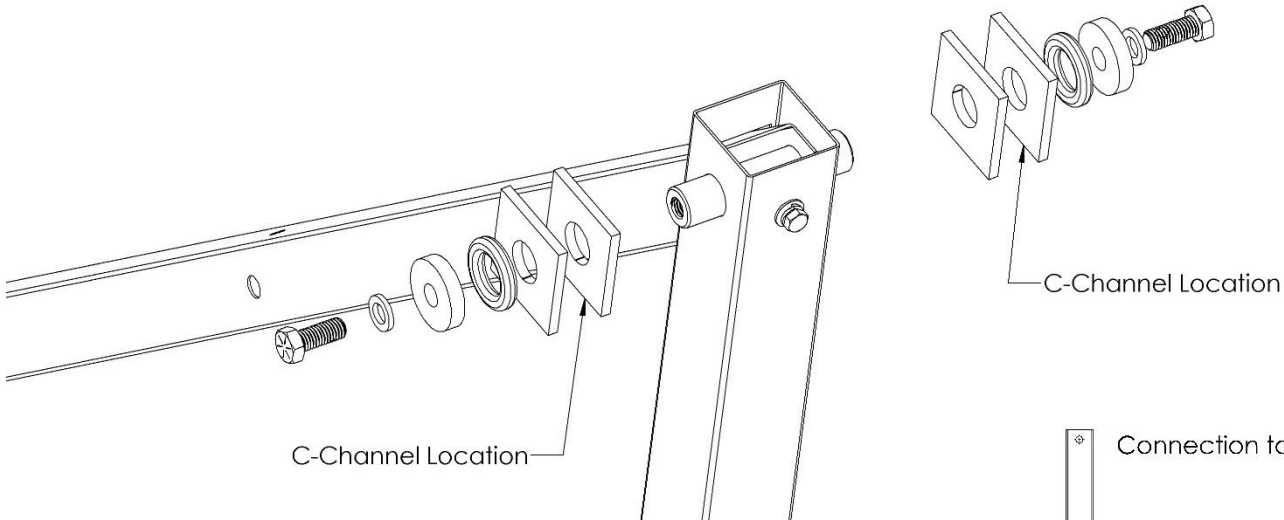
- a. Mount cross bracing to A-frames
 - vi. If the A-frame is in the middle of the array, the bolt (5/16" x 3 1/2") goes through both pieces of cross bracing
 - vii. Refer to diagram to ensure the correct holes are being used
 - viii. The cross bracing is designed to be installed on opposite sides of the A-Frame
- b. Hand tighten bolts to set spacing



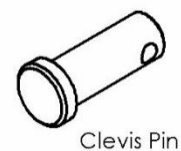
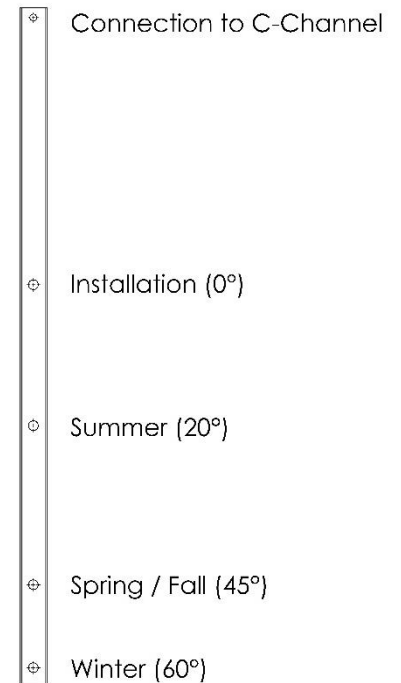
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Step 3: Attach C-Channels / Supports

- a. Add components onto the axle in the following order

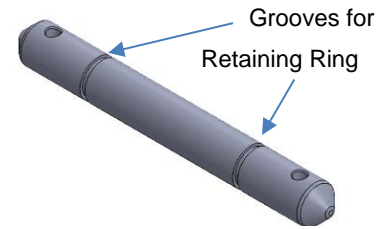


- b. Repeat for the other end of axle, even if it is the end of the array and no C-Channel is to be installed there
- c. Attach support bar to C-Channel using the clevis pin (with 2 x 3/8" flat washers on outside of both sides)
- Clevis pin must go through small hole in support bar
 - Insert cotter pin to finish installation



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- d. Insert the adjustment pin into the upper hole of the support diagonal (see picture in page 7).
- e. Attach the two retaining rings on the grooves of the adjustment pin.



Adjustment Pin



Retaining Ring

Adjustment Pin

- f. Slide uppermost hole of support bar over the adjustment pin (this will be the flat position)
 - i. The C-Channel should be sitting level at this point
- g. Fix in place with a cotter pin

Once all steps have been followed each A-Frame should look like this. If it is an end, it will only have one C-Channel instead of the two shown here.

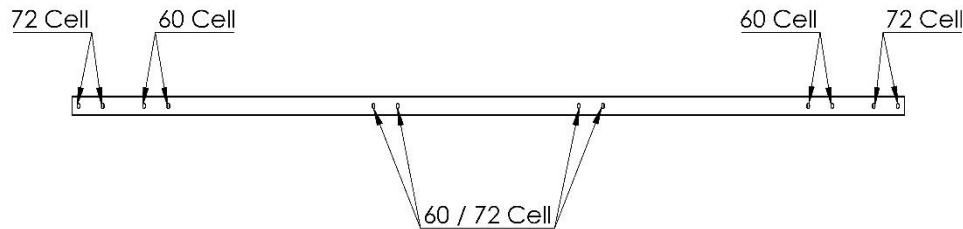


Step 5: Mount Hat Rails

- a. Mount the hat rails in place according to the size of module you are using
 - i. For 72 cell modules, use the outermost set of holes in the C-Channel to mount the top and bottom rails

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- ii. For 60 cell modules, use the set of holes that is second from the end of the rail



- b. The C-Channel has slots to accommodate the hat rail in order to provide some tolerance for error. It is best to install the bolt in the middle of the slot wherever possible.
- c. The hardware must be assembled in the following order from the top down:
 - i. 5/16" x 3/4" bolt
 - ii. Lock washer
 - iii. Flat washer
 - iv. Hat rail
 - v. Flat washer
 - vi. Hex nut
- d. Once all of the Hat Rails have been mounted, proceed to torque all of the bolts connecting them to 12 ft-lbs

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Step 6: Mount Feet

- a. Bolt the datum foot in place (height adjustment is set to zero)
- b. Test movement on each section to ensure that there is no interference between the ends of the hat rails in all positions. If interference is found, first check the position of the feet to make sure that they are in the correct location. If they are, check the installed position of the hat rail in the C-Channel slot.
- c. Once everything is correctly positioned and leveled, bolt the rest of the feet to your chosen foundation. **(Hardware not included)**

Step 7: Final Tighten and Torque

- a. Torque cross bracing to 12 ft-lbs
- b. Systematically tighten / torque all of the bolts in the structure to the following values unless otherwise specified values are used

Tightening Chart

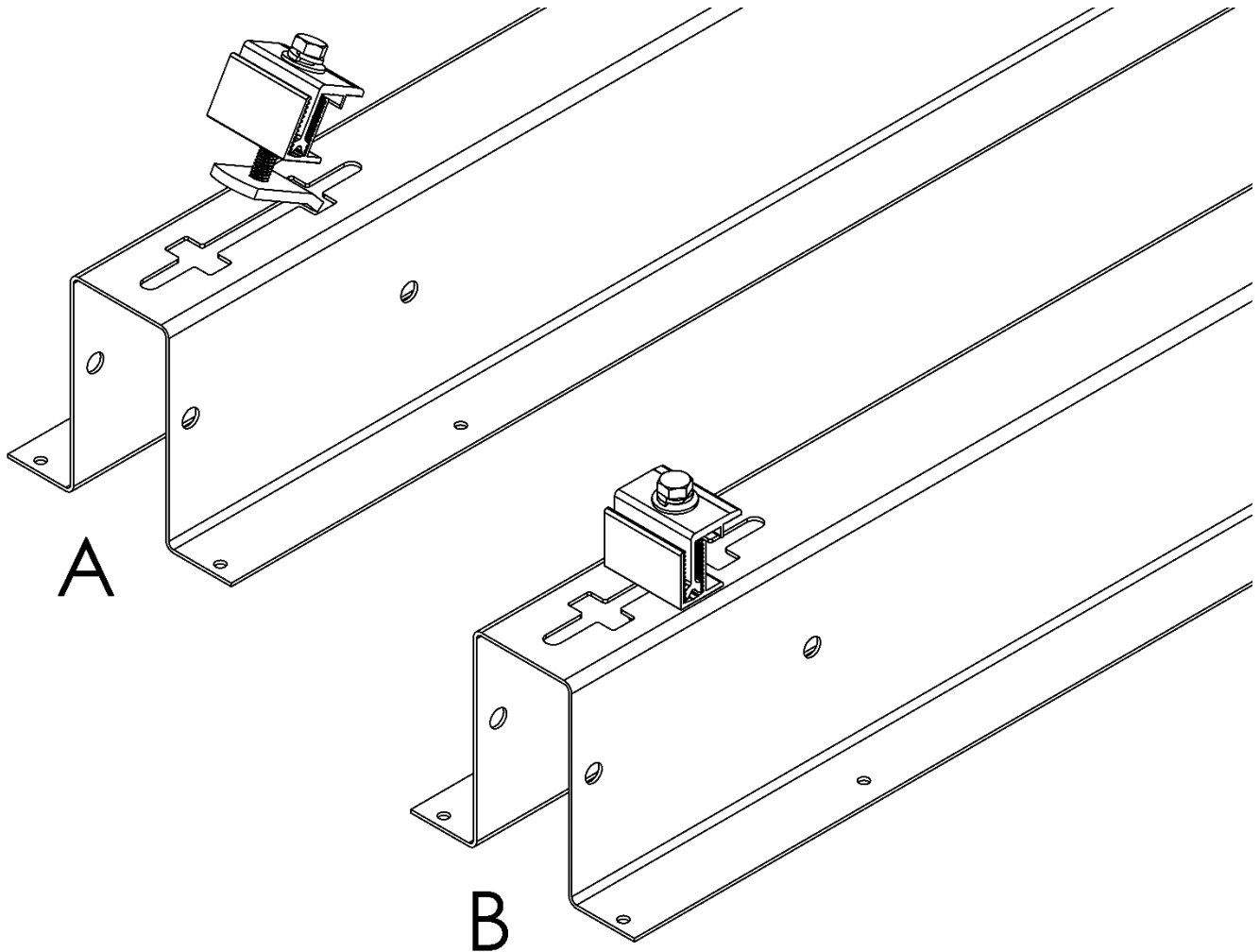
All values are default and to be used unless specified otherwise

5/16"	Collapse Lock Washer + ¼ Turn
1/2"	50 ft-lbs
3/4"	60 ft-lbs

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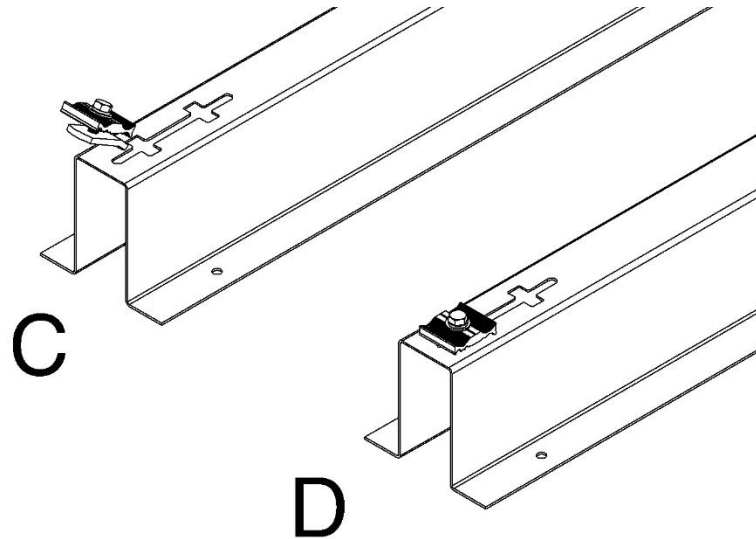
Step 8: Mount Modules

- a. Insert the end clamps at the end of each rail by inserting the bent end of the nut into the large cutout portion of the slot and pivoting so that the nut is in the channel of the hat rail and the end clamp is sitting on top



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- i. Make sure that the end clamp is set to the correct size for the module you are using.
- ii. The end clamp should touch both the rail and the module without tightening
- iii. If it is not the correct height, disassemble the clamp, slide the teeth into the correct spot and reassemble



- iv. If Toe clamps were included with your ground mount, install them as shown.
- b. Position modules on top of rails in desired position
- c. Insert mid clamps by sliding or lifting edge of module and inserting in a similar fashion to the end clamps
- d. Slide modules into desired position (ensure squareness) and torque end and mid clamps to fix in place to 12 ft-lbs

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Step 9: Set / Adjust Tilt Angle

Warning

Improper use may result in bodily harm or in some cases death

Make sure you have at least two strong people to tilt the assembly, the weight should be well balanced, however wind may cause large forces on the array. Only change the tilt of the array when there is little to no wind. Hardhats are strongly recommended.

- a. Remove the cotter pins and washers from the section that is to be tilted
- b. Pivot the support bar off of the adjustment pin
- c. Tilt to desired angle (20° / 45° / 60°)
- d. Pivot the support bar back onto the adjustment pin in the correct hole
- e. Replace washer and insert the cotter pin back into the adjustment pin

Required Maintenance

At 6 months and 12 months after installation and at least once yearly afterwards, check to ensure that all bolts remain at the proper torque setting.

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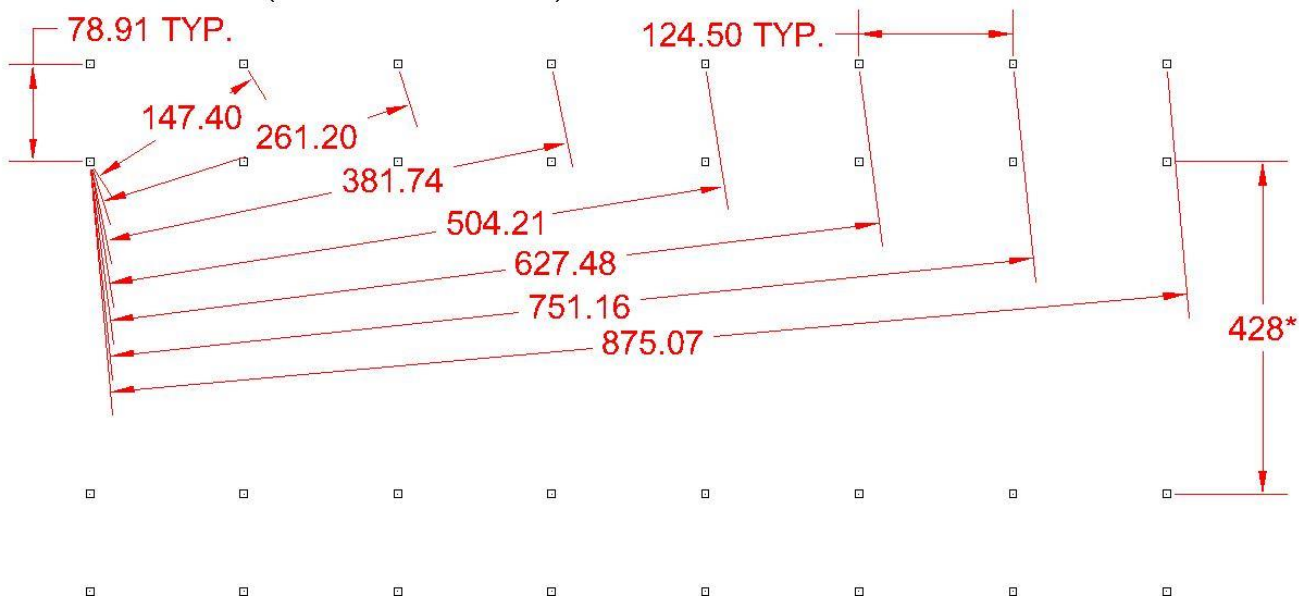
Appendix 1 – Grounding Guidelines

One grounding lug is required per array. Grounding can be achieved using a Kinetic Grounding Lug attached to either the C-Channel or the A-Frame.

Appendix 2 – Spacing Guidelines

KAGM-G Foot Spacing Guide

All Dimensions (Centre to Centre) are in inches

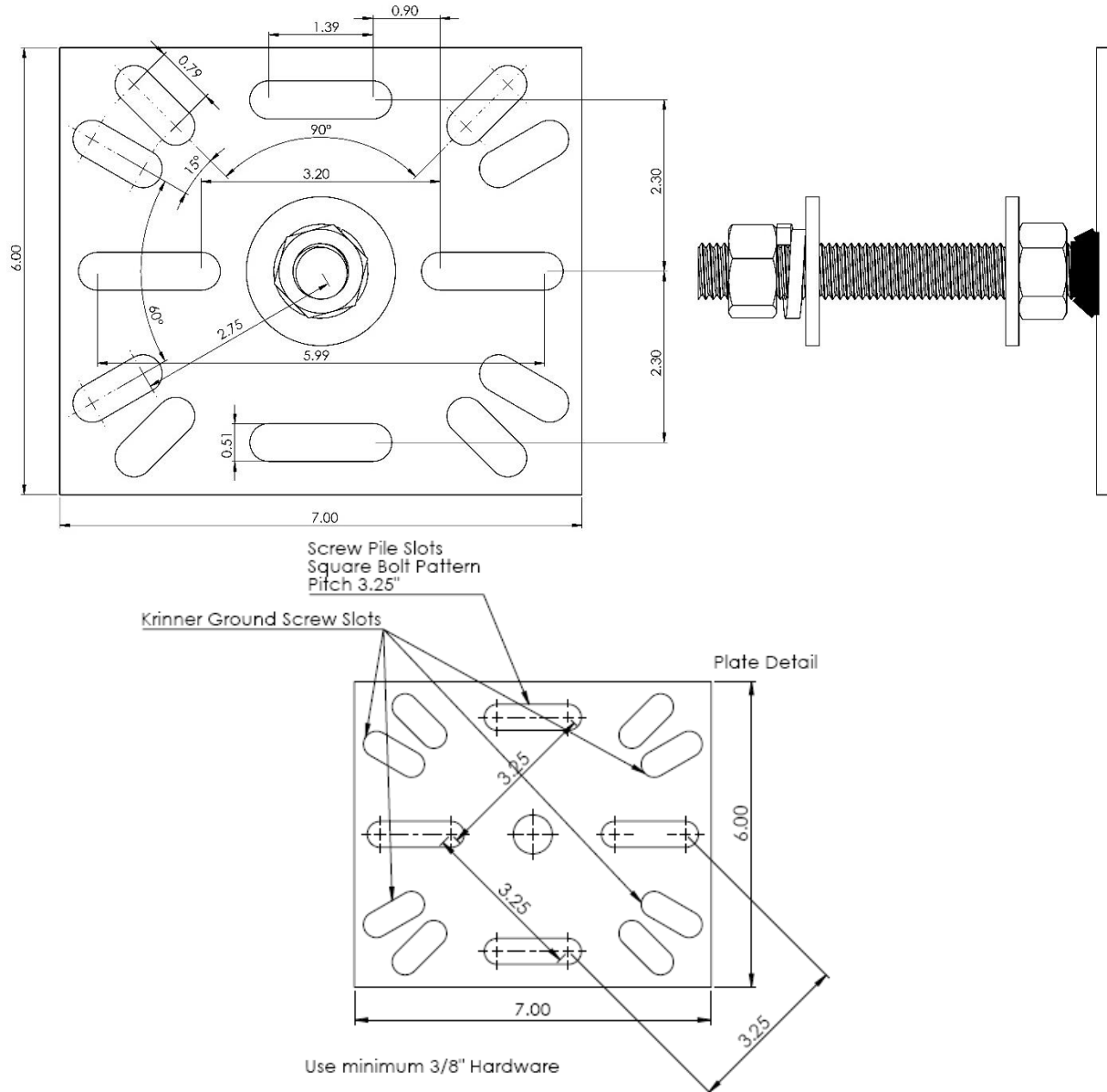


*Reccomended spacing, optimal spacing will vary from site to site (based on an 18° back angle)



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Appendix 3 – Foot Detail



Foot Positioning Tolerance	Screw Piles / Ballast Blocks / Sonotubes	Krinner Ground Screws
Z Tolerance	± 0.5"	± 0.5"
X Tolerance	± 1.07*** or ± 0.375****	± 0.375"
Y Tolerance	± 0.25*** or ± 0.945****	± 0.25"

*Tolerance is the maximum cumulative tolerance allowable

** Slot Oriented in the X direction

*** Slot Oriented in the Y direction