ZOMEWORKS
CORPORATION

FX4 and FX6 POLE TOP RACKS

Product Manual

Revised July 2018
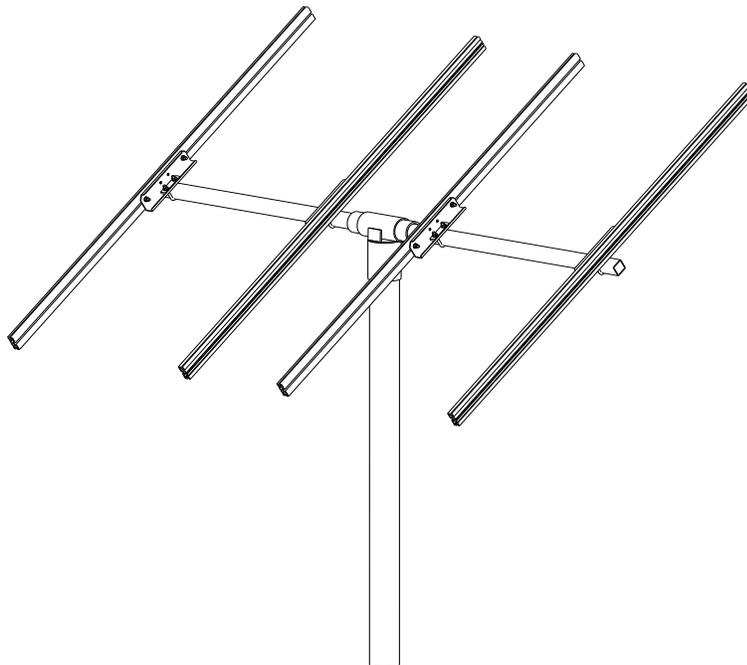
FX Series Selection & Array Sizing Guide

All Zomeworks fixed racks and trackers are sized according to the total module area.

Length[ft] X **Width[ft]** X **No. of Modules** = **Total Area [sq.ft]**

Or, for dimensions in inches:

Length[in] X **Width[in]** X **No. of Modules** ÷ **144** = **Total Area [sq.ft]**

Choose a gimbal size with the Maximum Module Area greater than or equal to the total area of the modules to be mounted. The names roughly correlate to maximum module area in square feet.

MODEL (Gimbal)	Maximum Module Area	Pole Dia. (Nominal)	Maximum Crossbar Width	Maximum Rail Length
FX2	20 square feet	2"	55" (4 ft 7")	117" (9 ft 9")
FX3	30 square feet	3"	55" (4 ft 7")	117" (9 ft 9")
FX4	45 square feet	4"	120" (10 ft)	117" (9 ft 9")
FX6	65 square feet	6"	120" (10 ft)	117" (9 ft 9")
FXL-090	90 square feet	6"	144" (12 ft)	180" (15 ft)
FXL-120	120 square feet	6"	144" (12 ft)	192" (16 ft)
FXL-168	168 square feet	8"	168" (14 ft)	192" (16 ft)

The area capacity of a rack is driven mainly by wind load considerations, and is based largely on the bending strength of the steel pole and gimbal. Within this area limit, various array shapes are possible, but the maximum area is a limit that must not be exceeded.

It is important to note that while racks have a max crossbar width and max rail length, both maximums cannot be used at the same time. Doing so may exceed the module area limit. We can make an array tall and narrow, or we can make it short and wide. But, we *cannot* make it both tall and wide at the same time, even if both crossbar width and rail length are within their individual limits. The area limit takes precedence over the length limits. If using full width & length together will cause module area to exceed the area limit, then choose the next larger model.
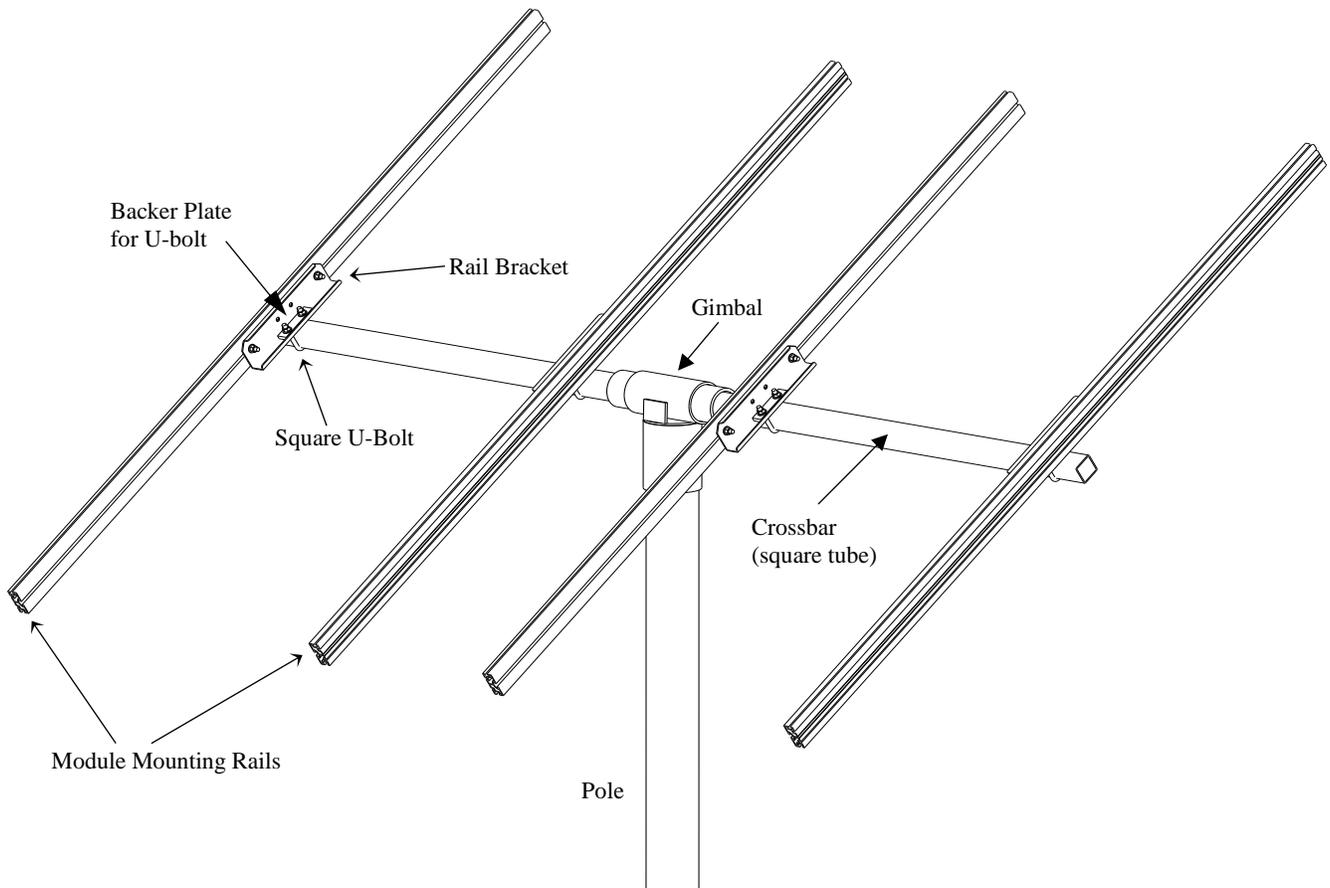
Crossbar Size is determined by the spacing of the module mounting holes. There are two different ways of specifying mounting hole location: **distance apart**, or **distance from ends** (from the end of the module). The cross bar does not need to extend to the end of the modules, it only needs to reach far enough to set the rails under the outermost mounting holes.

For the FX2 and FX3, there will only be one column of modules, usually in Landscape, with rails running vertically. Choose a crossbar that fits the **distance apart** of the mounting holes.

For the FX4 and FX6 (arrays with more than one column of modules), choose crossbar width by the total width all modules, minus 2 X the mounting hole **distance from ends**, plus 2" to accommodate mounting brackets.

Rail Length is simply the total length of modules, accounting for Landscape or Portrait orientation, plus ¼" space between modules, plus ¼" at each end. Round up to next whole inch. (The presence or absence of spacing between modules has negligible effect on wind loading, and may be ignored for purposes of module area calculations.)

Note: Nominal sizes of poles are not exact to their names, due to wall thickness and industry naming conventions for "nominal" sizes. For convenience, we refer to a gimbal that fits on a Nominal 6-inch pole as a "6-inch gimbal" (even though neither the pole nor the gimbal is exactly 6 inches).

Backer Plate
for U-bolt

Rail Bracket

Gimbal

Square U-Bolt

Crossbar
(square tube)

Module Mounting Rails

Pole

About the FX4 and FX6

The Zomeworks FX4 and FX6 racks are very similar and share some of the same components, the main difference being the FX4 gimbal fits on a 4" pole, while the FX6 gimbal fits on a 6" pole. Crossbars, rail brackets & rails are the same for both.

Model Numbers are coded to describe the size of pole & gimbal, the length of the cross bar, and the length of the rails. Standard configuration is four rails, to mount two columns of modules in landscape orientation. The model number system includes suffixes to modify the standard configuration for either a two-rail or six-rail rack.

1st number: FX4 or FX6 means the nominal size in inches of the gimbal, and the pole it fits on.
2nd number: Length of the crossbar in feet.

Zomeworks will help specify the parts for any rack, given the number and type of modules to be mounted. The following information is for customers who want to size the system on their own.
Choosing Crossbar Size: The crossbar for the FX4 and FX6 is a one-piece square tube with a round sleeve in the middle, which adds strength and allows rotation for seasonal adjustment. The crossbars are available in 1-foot increments from 4 feet up to 10 feet. Most crossbars have a 12" wide sleeve, but the 9-ft or 10-ft have a longer sleeve, 18 inches, for extra strength. Width of sleeve must be considered when placing rails.
     When mounting in **Landscape**, the crossbar only needs to be wide enough to reach the outermost mounting holes, it does not need to be as wide as the total array width. Keep in mind that the rail-mounting brackets have square bolts that only fit around the square tube, they do not fit around the sleeve. If the module's mounting

holes are not far enough from the end of the module to span the sleeve, then a small gap may be required in the middle of the array. Include this gap when choosing the length of the cross bar.

This is particularly the case when modules are mounted in **Portrait**, since the rails will be co-linear with the edges of the module (they have no overhang to cover the center). In this case, include a space in the middle the full width of the sleeve, and remember that the crossbar needs to reach to the full width of modules, since the outer rail will be directly under the edge of the frame.

Choosing Rail Length: Modules are normally intended to be mounted in Landscape orientation, but may be in Portrait if needed. Choose a length of rail long enough to span the vertical dimension of the modules, including spacing between each module, (1/4" recommended) plus ¼" at both ends. Round up to the next whole inch.

FX4 and FX6 Size Selection & Ordering

Specify a choice for each of the following:

- **Gimbal & Crossbar Base Kit:** Chosen according to total module area.
- **Rails:** Priced by the foot, and cut to your specification. Order 2 rails for each Gimbal kit. Enter Quantity as total feet of all rails, and write-in the number of rails and length of each. Always round up to the next whole inch.
- **Rail Mounting Brackets:** Each rail needs a rail mounting bracket. Order the same number of brackets as number of rails.

EXAMPLE: Assume an installer wants to mount four GenPro modules. Its dimensions are 62.2" wide by 31.8" tall, in landscape orientation. The mounting holes are 31.5" apart, or 15.35" from the ends.

Array Area: Multiply the module's length by width, and divide by 144 to convert to feet. The module's area is 13.7 square feet, times six modules is 54.8 square feet. By the Sizing Chart on page 2, this is too large for an FX4, so we choose the **FX6**, which can hold up to 65 square feet.

Crossbar: The array will be 2 x 62.2" wide, plus a ¼" gap, equals 124.65" wide. Remembering that the crossbar need not be the full width of the modules, we subtract the distance of the mounting holes from the ends. The mounting holes in landscape are 15.35" from the ends, so subtracting 2 x 15.35", means the crossbar needs to be 93.95 inches long. Converting to feet (÷ 12) is 7.83 ft long. Rounding up to next available size, you need the 8ft crossbar, so the model number to order is the **FX6-8**.

Rails: The two modules stacked will be 31.8" x 2 = 63.6" high, plus 0.25 for spacing, plus 2 x 0.25 for the ends, is 64.35". Rounding up to the next inch, you need 65" rails. (This is well within the FX6's rail length limit of 117".) Rails are priced by the foot, so the total feet of rail is 65" /12 = 5.42 ft each, times four rails is 21.67 ft. On your order, call out the total Qty of rail, and write-in the number of individual rails and the length of each.

Mounting Brackets: You'll need a mounting bracket for each rail, so order the same number of brackets as rails. Each bracket kit contains the square U-bolt, nuts, washers and back plate.

Bolts and Flange Nuts are included in the price of the gimbal kit, but we need to know how many to include. Please call out the number of modules you be using, so we can include the right number of mounting bolts.

The itemized list on your sales order should look like this:

QTY	Part#	Description
1	FX6-8	FX6 Gimbal with 8ft wide crossbar
21.67 ft	Alex Rail	Alex Rails (4 rails, cut 65" each)
4	RailBr	Rail Bracket kit for FX6
		(For four GenPro modules)

FX4 & FX6 Parts & Hardware Packing List

FX4 ships in one box, 10" x 7" x (rail length), weight approx 50 lbs (depends on rail length)
FX6 ships in two boxes, one for 6" gimbal, one 10" x 7" x (rail length), weight approx 50 lbs (depends on rail length)

Zomeworks Part #	Description	Qty	Packaged Location	✓
	Gimbal Assembly, one of the following:	1	Gimbal Box	
AS-Gimbal-FX4	**4" Gimbal**			
RM-BLT-Z15309-FR	5/8"-13 x 1¼" Yellow-Zinc-Plated Bolt (crossbar and pole set-bolts.)	3	threaded into gimbal	
AS-Gimbal-FX6	**6" Gimbal**			
RM-BLT-Z15309-FR	¾"-10 x 2" Yellow-Zinc-Plated Bolt (pole set-bolt)	2	threaded into gimbal	
RM-BLT-Z15309-FR	5/8"-13 x 1¼" Yellow-Zinc-Plated Bolt (crossbar set bolts)	2	threaded into gimbal	
	Crossbar Assembly, one of the following:	1		
AS-Crossbar-4	4-Foot Cross Bar			
AS-Crossbar-5	5-Foot Cross Bar			
AS-Crossbar-6	6-Foot Cross Bar			
AS-Crossbar-7	7-Foot Cross Bar			
AS-Crossbar-8	8-Foot Cross Bar			
AS-Crossbar-9	9-Foot Cross Bar			
AS-Crossbar-10	10-Foot Cross Bar			
AS-RailBr-Alex-FX46	**Rail Bracket Assembly, w/ hardware.**	1 per Rail		
	Each Rail Bracket Assembly contains:	*(multiply times # of rails)*		
	Rail Bracket	1		
RM-CCS-4609-FR	Backing Plate for U-Bolt	1	attached to rail bracket by tape	
RM-BLT-U42040-2-FR	3/8" x 2 x 3-1/4 Square U-Bolt	1		
RM-BLT-Z21537-FR	3/8-16 x 1" Zinc-Plated Short-Neck Carriage Bolt	2		
RM-WHS-Z33082-FR	3/8" Zinc-Plated Flat Washer	2		
RM-NUT-Z37024-FR	3/8" Zinc-Plated Nylock Nut	2		
	Aluminum Module-Mounting Rails (length as per model#)	2 or 4 or 6		
	Module Mounting Hardware (by number of modules)			
AS-MODHRDW-FX	1/4" Module Hardware Set *contains 1 bolt & 1 nut. Rack includes 4 sets per specified module, plus 1 extra*			
RM-BLT-S70002-FR	1/4" x 5/8" Stainless Steel Hex Bolt	4/mod	Module Hardware Bag	
RM-NUT-S01929150-FR	1/4" Stainless Steel Serrated-Flange Hex Nut	4/mod	Module Hardware Bag	

Before assembling your rack, use the above list to check that you have all your parts.

In the event of missing parts, contact: **ZOMEWORKS at 1-800-242-5354**. When calling, please have available your sales order number, date of purchase, and the dealer's name you purchased from.

POLE INSTALLATION

IMPORTANT NOTE: Zomeworks Corporation assumes no liability for the structural integrity of the pole and its installation. Soil and wind conditions vary. If there is any doubt, consult with a local structural engineer.

Location & Site Considerations

For installations in sandy or muddy areas, for tall mounting poles, or for any mounting different from the situations described in these instructions, you will need to consult a local structural engineer. Large racks can receive significant wind loads, so a strong mounting pole and foundation is very important. The rack should be sited to receive maximum possible sunlight from sunrise to sunset, winter and summer. Avoid shade from buildings and trees, including shade that may occur in other seasons. The height of the pole should result in adequate ground clearance for the mounted modules.

Caution - Be careful when working around the rack after installation on the pole. Some of the structural members may be at head level.

- **Pole Size** must be a minimum schedule 40 steel pipe, either black or galvanized.
      Note: Heavier steel pipe, schedule 80, or schedule 160, may also be used.
- **Pole Height** above finished grade should be 6 feet or more. The largest rack will be at least 12 feet above grade when the rack is tilted to the maximum winter angle.
- **Hole Depth** should be 1/3 of the pole length or greater (1/3 of the pole in ground, 2/3 above ground). Example: 3' below grade, 6' above grade, total of a 9' pole.
- **Hole Diameter** should be three times the pole diameter, or greater.

- Center the pipe in the hole, and hold it vertical with a temporary frame.
- Fill the hole with concrete (3000-psi minimum strength). Check the pole for plumb with a level.
- For added strength, the pole may be filled with concrete up to a few feet above ground level.
- Allow the concrete with pole to set for a minimum of 36 hours before installing the rack.

Description	Model			
	FX3	**FX4**	**FX6**	
Minimum Schedule 40 Steel Pipe	3" (3-$\frac{1}{2}$" OD)	4" (4-$\frac{1}{2}$" OD)	6" (6-$\frac{5}{8}$" OD)	
Min. Pole Height (Grade Level)	6 Feet	6 Feet	6 Feet	
Min. Pole Depth (Below Grade)	3 Feet	3 Feet	3 Feet	
Minimum Recomended hole diameter	12" diameter Set pipe in concrete	14" diameter Set pipe in concrete	20" diameter Set pipe in concrete	**POLE INSTALLATION DETAIL**
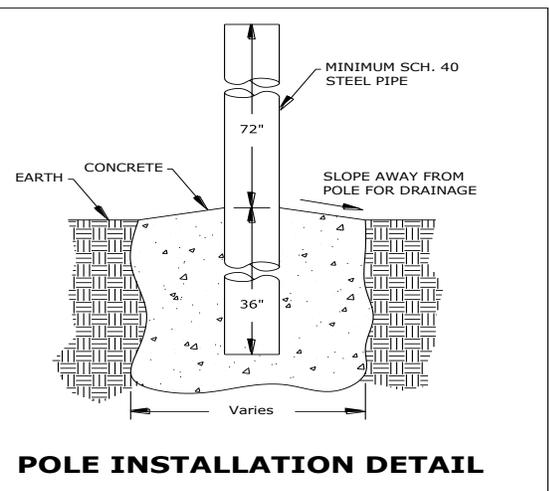
FX4 and FX6 ASSEMBLY

RECOMMENDED TOOLS:
- Two 9/16" and 7/16" open end, box or ratchet and socket wrenches
- 15/16" and 3/4" wrenches
- Tape Measure
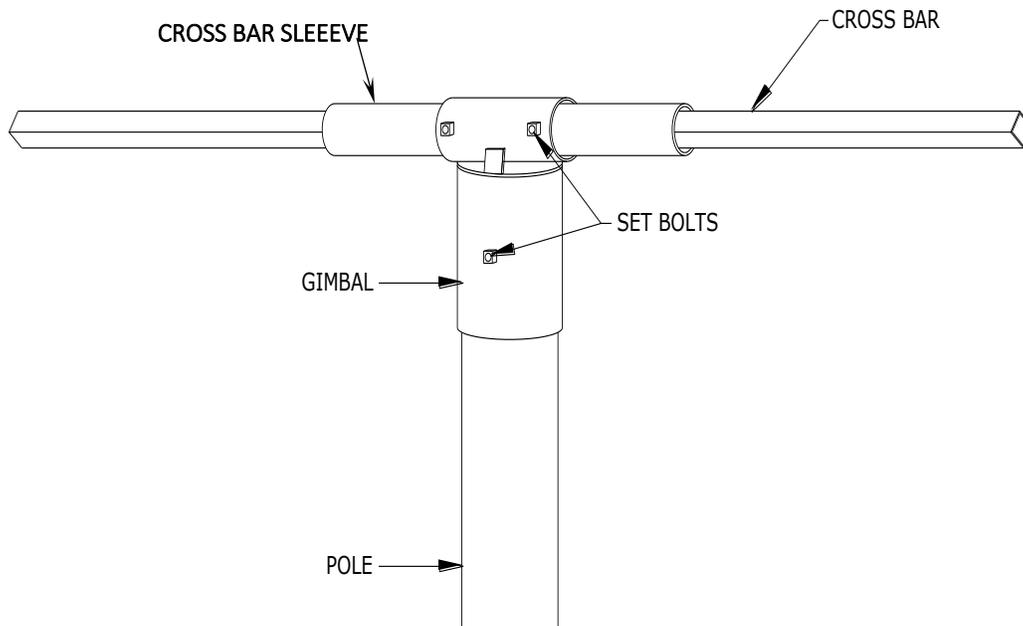
Mount gimbal to top of pole with set bolts facing due north. Secure the gimbal set bolt. Slide the cross bar through the top of the gimbal. Center the crossbar and tighten the set bolts, (but only lightly, they will be moved again when the rack is adjusted.)
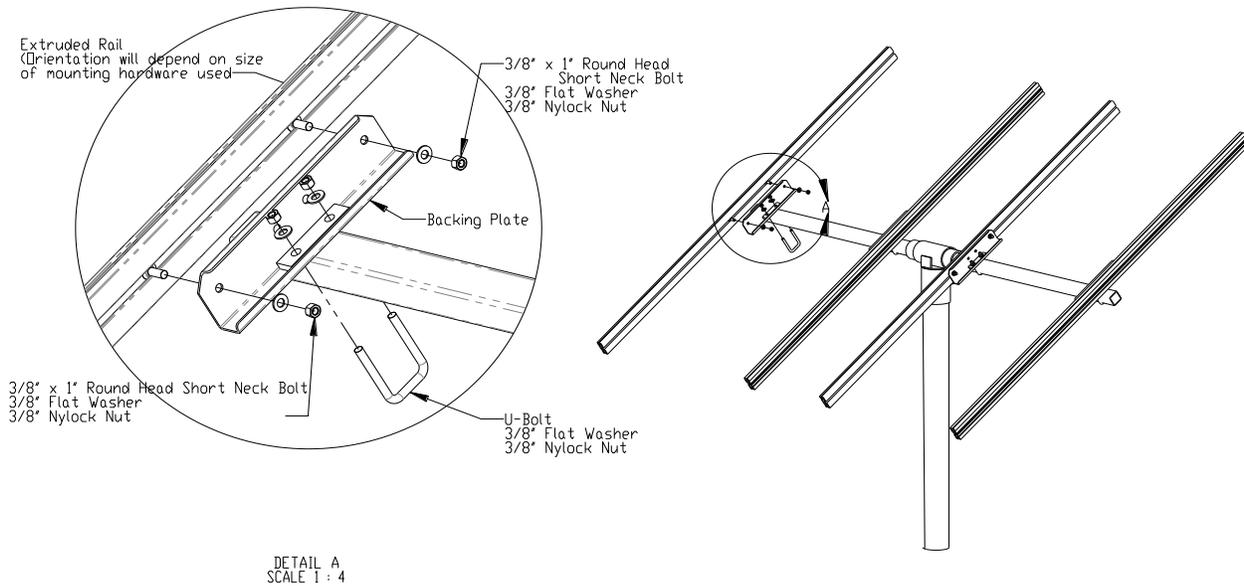
Optional Stiffening Rod:

The FX6 comes with two holes pre-drilled in the gimbal, for the purpose of running a rod through the pole to provide extra resistance against uplift and rotation. Although not required in every situation, it may be required by the local permitting authority. To install the rod, two 7/16" holes must be drilled in the pole. Install a 3/8" all-thread rod using a hex nut, flat washer and lock washer at each end.

To drill the holes in proper alignment, make certain that the gimbal is properly aligned with North before drilling, with its set bolts secure. Drill one hole from each side, using the gimbal holes as guides.

Caution - Be careful when working around the rack during installation on the pole. Some of the structural members may be at head level.

Mounting the Module Rails

Extruded Rail
(Orientation will depend on size
of mounting hardware used)

3/8" x 1" Round Head
Short Neck Bolt
3/8" Flat Washer
3/8" Nylock Nut

Backing Plate

3/8" x 1" Round Head Short Neck Bolt
3/8" Flat Washer
3/8" Nylock Nut

U-Bolt
3/8" Flat Washer
3/8" Nylock Nut

DETAIL A
SCALE 1 : 4

Starting at the end of the cross bar, attach the rail bracket to crossbar using Square U-bolts, flat washers and nylock nuts.

Attach the module mounting rails to rail brackets by sliding the carriage bolts into the side slot of the rail, then align bolts with the holes in the rail bracket. Slide the rail to center it over the crossbar, and secure with flat washers and nylock nuts. Note that one of the slots for the module mounting hardware is sized for ¼" hardware and that the other slot is sized for 5/16" hardware. The slot that matches the hardware you are planning to use should be on top (1/4" module mounting hardware is shipped with all of our racks).

Adjust the width of the module rails to fit your modules by loosening the u-bolts, slide the brackets, the tighten U-bolts securely.

Mounting the Modules

Mount each module using four ¼" stainless steel bolts and four ¼" serrated-flange hex nuts through the mounting holes. Adjust the modules for desired spacing and tighten the bolts.

Option: It may be easier to pre-assemble a row of modules on rails beforehand, and then mount the whole assembly to the crossbar.

Adjusting the Rack

If the array is to remain fixed in place without seasonal adjustments, the best overall performance is obtained when the azimuth is set to due south, and tilt is set to the latitude of the site.

However**,** better performance by season may be obtained if the user is willing to adjust the rack twice a year to the best tilt for that season. For winter, adjust the tilt to **latitude plus 15°,** and for summer adjust tilt to **latitude minus 15°.** Change the tilt on the spring and fall equinoxes.

Setting the Azimuth: Loosen the pole set bolts, face the rack due south by rotating the gimbal on the pole. Tighten the pole set bolts with enough torque to permanently hold the azimuth.

Setting the Tilt: Loosen the cross bar set bolts, adjust for the desired tilt, and re-tighten the set bolts.

ZOMEWORKS FX-SERIES

LIMITED WARRANTY

Zomeworks Corporation guarantees, to the original owner, its fixed racks against defects in materials and workmanship for ten years from date of purchase. This warranty is limited to the repair or replacement of the fixed racks in compliance with the instructions provided by Zomeworks.

Some problems can be solved with a simple on-site adjustment. Please contact Zomeworks at the address and phone number below before returning your product. You must have an RMA number to return the product for warranty repair. If possible, return only the parts that are defective or damaged. Reuse your original packing material, if it's available, or call the factory for further instructions.

It is the owner's responsibility to check for damaged or missing parts immediately upon receipt of the fixed rack. Freight claims are time sensitive and require immediate notice. If the packaging is damaged, write this on the receipt (freight bill) and have the driver initial it. Use this information to contact your freight carrier when damage is noticed.

Upon receipt of defective parts, freight pre-paid, Zomeworks Corporation will determine whether the defect was caused in manufacturing. If so, the parts will be repaired or replaced at no charge to the customer, and will be returned freight pre-paid. If the damage is not a manufacturing defect, the factory will contact the customer before any repairs are made. Original owners should contact their dealer if an immediate replacement parts are needed. Individuals contacting Zomeworks desiring immediate replacement part will be required to provide Zomeworks with a valid credit card number to be charged for the replacement parts. Zomeworks will credit the valid credit card upon receipt of the warranted returned parts from the individual.

This warranty does not cover rusting of the steel due to a corrosive environment (such as salt air). Standard fixed racks are made of aluminum and painted mild steel, and will require maintenance. It is the owner's responsibility to maintain the paint on the fixed rack in order to protect the steel against corrosion. For corrosive environments, Zomeworks Corporation can manufacture the fixed racks with an epoxy primer.

Limitations On Warranty

The above ten-year warranty is the only warranty and remedy provided by Zomeworks Corporation to the user. Zomeworks disclaims all implied warranties of merchantability and fitness. In no event shall Zomeworks be liable for consequential or incidental losses or damages under any theory of liability, except to the extent that this limitation is found to be unenforceable under applicable state law. Some states do not allow the exclusion or limitation of incidental or consequential damages, so this exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

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