



Edge Max Solar Kit Installation Guide

Version 1.2

Revision History

Version	Date	Description	Author
1.0	3/9/2023	Draft	M. Covington
1.1	3/20/2023	Added 4 battery config, plus feedback from the field.	M. Covington
1.2	9/22/2023	Added pole instructions and antenna plate mounting.	M. Covington

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1 Introduction

Rekor's solar solutions allows Rekor Edge systems to be utilized and powered in any location. This document provides information on the parts included in this solar kit, as well as installation instructions.

There are several steps to this installation:

- Calculate the Tilt and Azimuth according to the latitude and longitude (before installation).
- Install the solar panels.*
- Install the antenna on the enclosure.
- Install the enclosure:
 - Set the DIP switches and install the solar controller dongle on the control panel.
 - Install the Master Edge.
 - Mount the enclosure on the pole (using a spacing jig, if needed).
 - Install the batteries in the enclosure.
- Connect the wiring inside the enclosure and connect the solar panels wiring to the enclosure.
- Test the system.

*It is up to the installation team on whether to install the solar panels before the enclosure or after the enclosure.

WARNING:

Photovoltaic (PV) modules generate electricity when exposed to light. Modules pose a shock hazard and risk of serious injury or death if instructions and safety precautions are not followed carefully. Cover the glass faces of the modules with opaque material while working on the system to stop the production of electricity. Avoid touching the terminals and isolate wire ends until all connections are complete.

Batteries can explode or severely burn if the terminals are shorted to the opposite polarity. A single point system ground is required per NEC A.690. It is recommended to tie the battery negative (-) terminal to the equipment chassis at the time of installation. Always observe proper polarities when making electrical connections to the modules, batteries, and the controller.

2 Preparation

2.1 Calculate Installation Tilt and Azimuth

For optimum performance, your PV array should face true south in the Northern Hemisphere (and true north in the Southern Hemisphere). However, when determining direction using a magnetic compass, indicated bearings will vary from true bearings because of the difference between the location of the true and magnetic north poles. This angular difference varies with location on the globe and is called the “declination.”

1. Locate your installation site using the following website (This site calculates magnetic variation from an input of latitude and longitude, or Zip code Great accuracy is not critical): <http://www.ngdc.noaa.gov/geomag-web/#declination>
2. Using the magnetic declination from the web site calculate true South. For example, the declination for Washington, D.C., is approximately -11°; for Chicago, IL, -3°; and for Los Angeles, CA, +14°.
3. Determine magnetic south at your site using a magnetic compass.
NOTE!: If the local declination found in step 2 is negative, true south is that number of degrees added to magnetic south. For example, at Washington, D.C., true south is the same as $180^{\circ} + 11^{\circ} = 191^{\circ}$ indicated. If the local declination found in step 2 is positive, true south is that number of degrees subtracted from magnetic south. For example, at Los Angeles, true south is the same as $180^{\circ} - 14^{\circ} = 166^{\circ}$ indicated.
4. Orient your array in the direction of true south (or north, if applicable) as determined above.
5. For optimum performance, your PV array should set to a specific tilt angle. To determine the desired tilt angle of the array, use the latitude from step one above.
6. Take this value and add the factor based on the table below. This will provide the optimum worst-case performance with the minimum amount of annual adjustment, based on the winter months (Northern hemisphere).

LATITUDE SETTINGS

Latitude Range Actual Degrees:	Set To:
90 – 45°	60°
40 – 25°	+15°
25 – 15°	+5°
10 – 0°	15°

3 Pole Installation

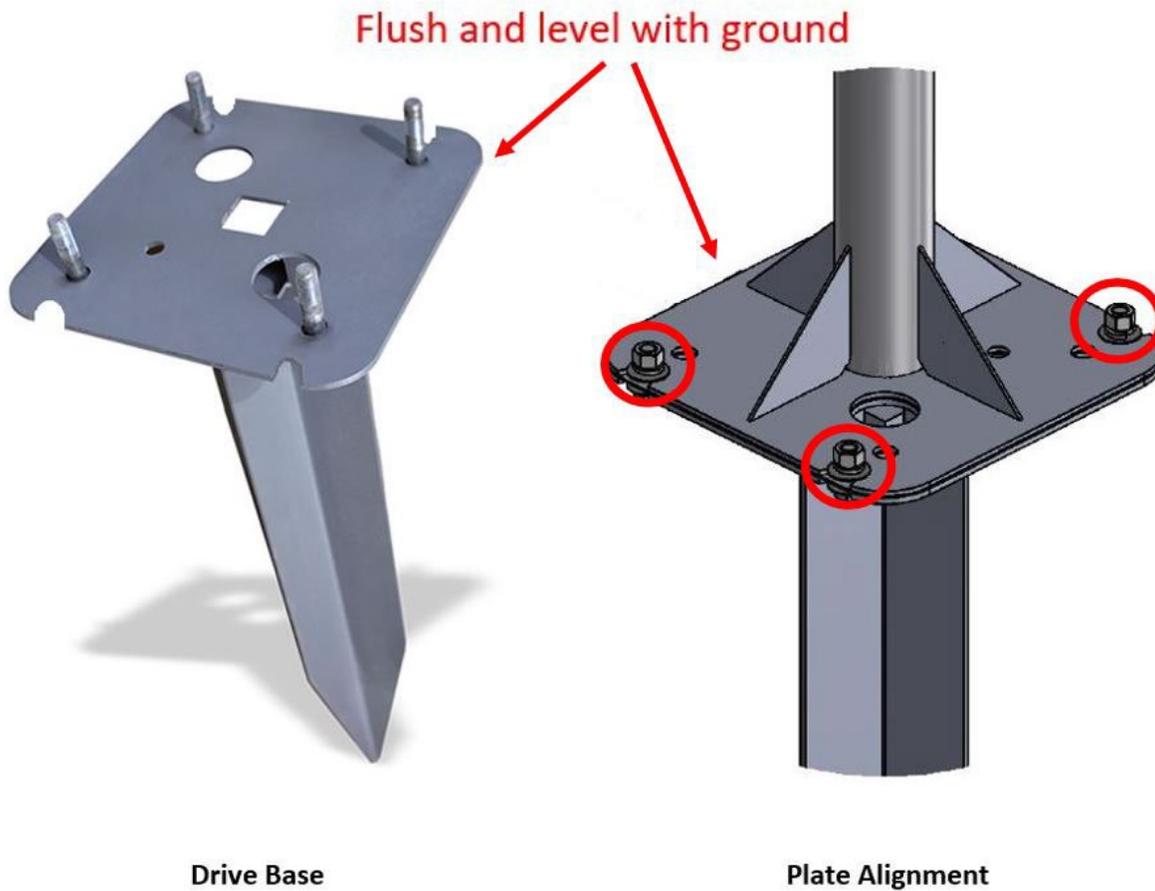
3.1 Parts

Parts included:

- Drive Base with welded breakaway plate
- Extendable pole with breakaway welded plate
- Single breakaway mounting plate
- 4 Bolts

Tools needed:

- Jackhammer
- Screwdriver
- Adjustable wrench



1. Locate where the Edge Max pole will be installed.
2. If the location is on grass, drive the Drive Base into the ground using a jack hammer, ensuring that the welded breakaway plate is flush with the ground and that the plate is level. The plate must be flush with the ground so that it reduces vibration.

NOTE!: If the location is a concrete area, a 16”H x 16”W x 50”D hole will need to be excavated in the concrete. Fill the hole with quick-set concrete then sink the Drive Base into the concrete, ensuring that the welded breakaway plate is flush with the top of the concrete and that the plate is level, once the concrete sets. Then proceed with Step 3.

3. Place the single mounting plate on top of the Drive Base welded plate, ensuring that all holes and notches are aligned.
4. Bolt the three plates together IN THE FOUR NOTCHES THAT LINE THE PLATE, as shown above. This allows the pole to be breakaway for safety
5. Extend the pole, making sure that each section’s spring button clicks into place. DO NOT OVEREXTEND THE POLES.

4 Solar Panel Hardware Mounting Instructions

4.1 Parts List

Included Parts:

A) 2x Module Rail



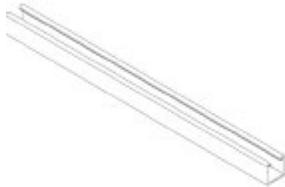
B) 2x Saddle Bracket



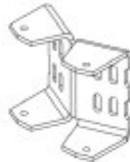
C) 2x Tilt Leg Tube



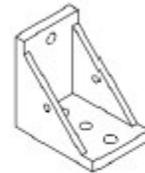
D) 2x Tilt Leg Strut



E) 2x Easy Mount Bracket



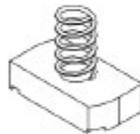
F) 4x Angle Bracket



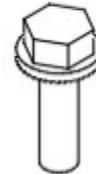
G) 4x Band Clamp



H) 3/8" Spring Nut



I) 3/8" Flange Bolt



J) 5/16" Flange Bolt



K) 1/4" Flange Bolt



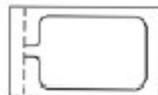
L) 5/16" Flange Nut



M) 1/4" Flange Nut



N) 1x Anti-Seize Packet



4.2 Side of Pole Mounts

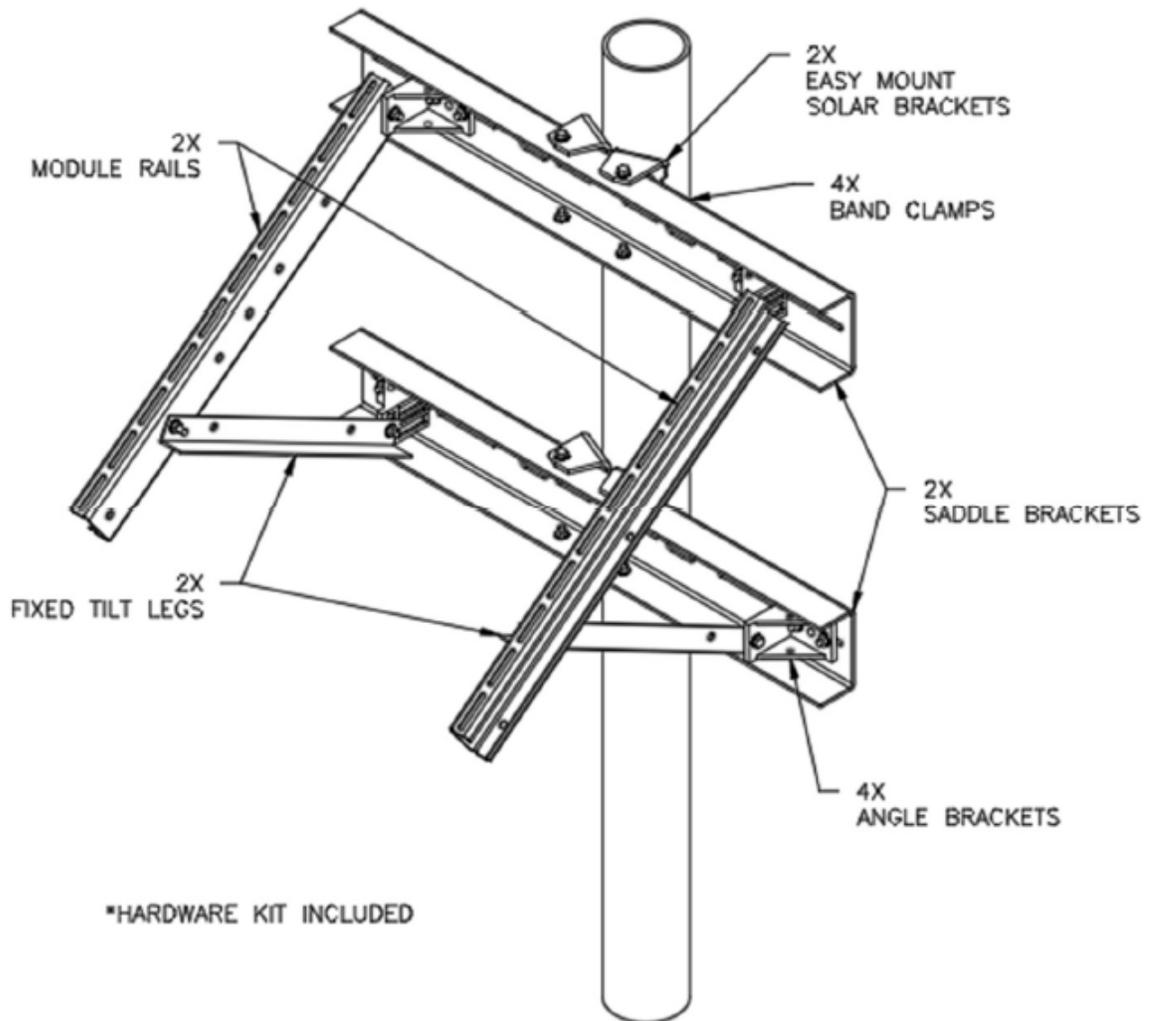
Each rack is optimized for specific pole diameter ranges, for standard round SCH40 steel poles.

Standard SOP mounts:

Rail Length (inches)	Pipe Size Dia (SCH 40)	Max Module Qty
Large Format		
60	4-6	1
96	4-6	2
60	8-10	1
96	8-10	2
Small Format		
27	2-6	1
60	2-6	2
96	2-6	3
27	8-10	1
60	8-10	2
96	8-10	3

Hardware Note:

- Apply anti-seize to all hardware to prevent galling
- 1 ft-lb = 12 in-lb = 1.36 Nm
- Use 5/16" hardware Mount assembly
- Use 1/4" hardware -> Mounting module to rails
- Use 3/8" bolts -> Tilt leg spring nuts (if applicable)

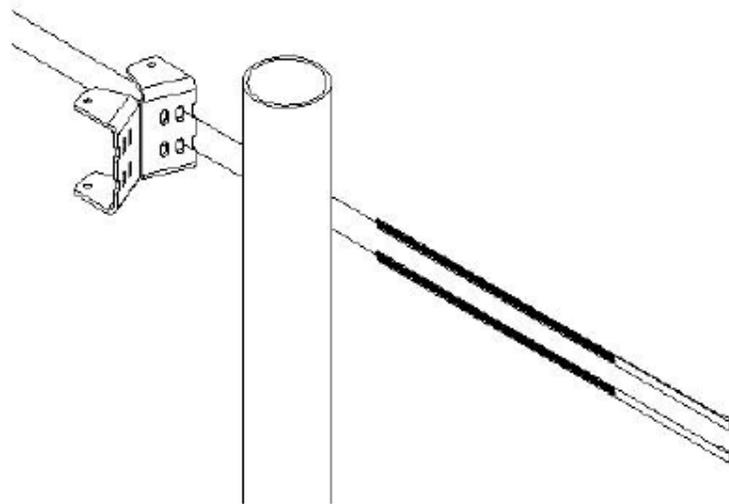


4.3 Pole Mount Site Variation

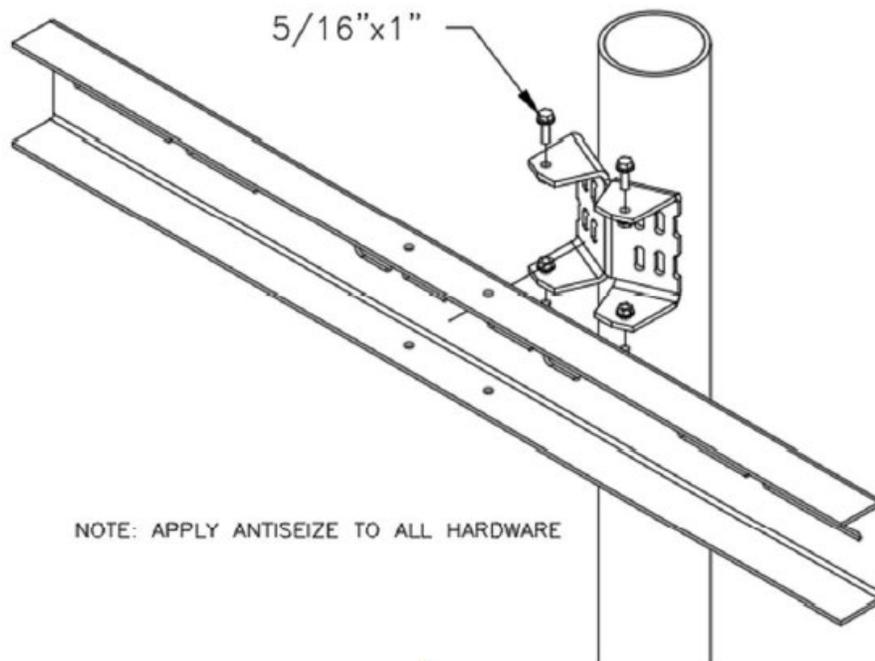
- The pole used to support the PV array must be designed per the local soil conditions to meet the following minimum requirements:
 - The array area is based on a tilted angle.
 - The typical sustained wind speed per the recommended local building code.
- The pole is to be seated against a firm crushed stone base, on firm compacted soil a minimum of 6" below the frost line encased in reinforced concrete per ASTM standards.
- The pole is to be level and plumb.
- The pole diameter and wall thickness are sized to withstand array forces without damage.

4.4 Mounting Hardware Installation

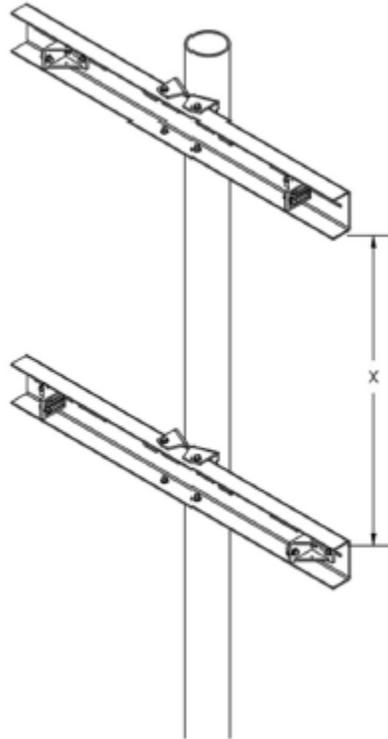
Fasten the upper easy mount solar bracket to the pole at the desired maximum height of the mount using two 1/2" stainless steel band clamps (provided). For high wind loads U-bolts (not provided) are required. **DO NOT** use the easy mount bracket when using U-bolts. The saddle or easy mount bracket can optionally be lag-bolted or through-bolted to the pole.



When using band clamps, tighten to 4-5 ft-lb torque. Wiggle saddle bracket to remove slack in band clamps and retighten. Repeat until clamps are snug.

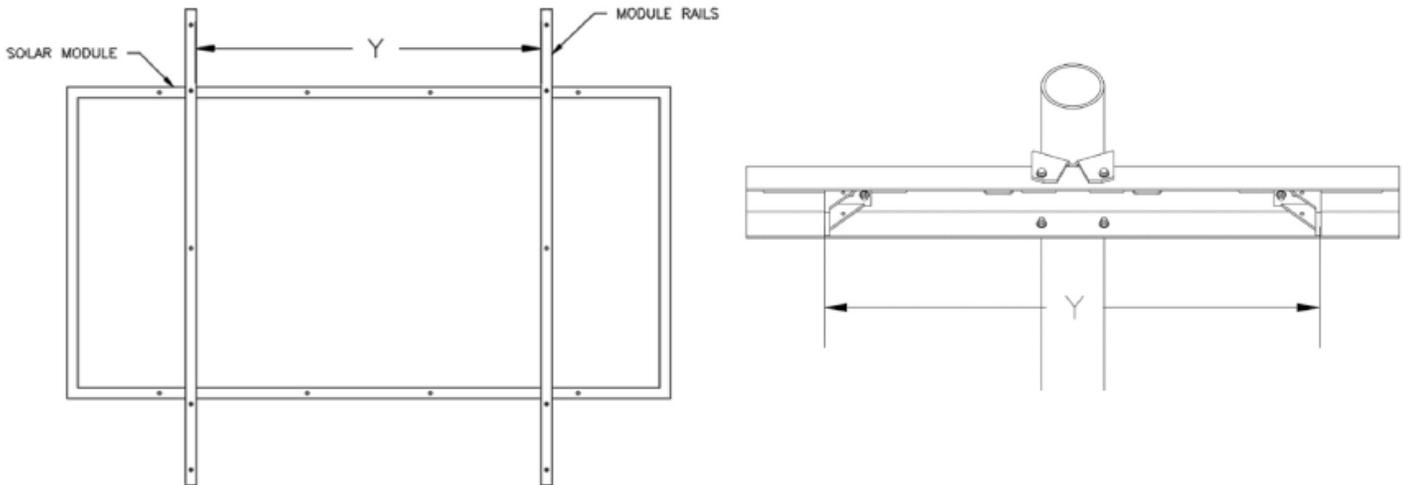


Fasten the saddle bracket to the easy mount bracket using the provided 5/16" hardware. For 5/16" hardware, tighten using a 1/2" wrench to 10-12 ft-lb torque. Apply anti-seize.

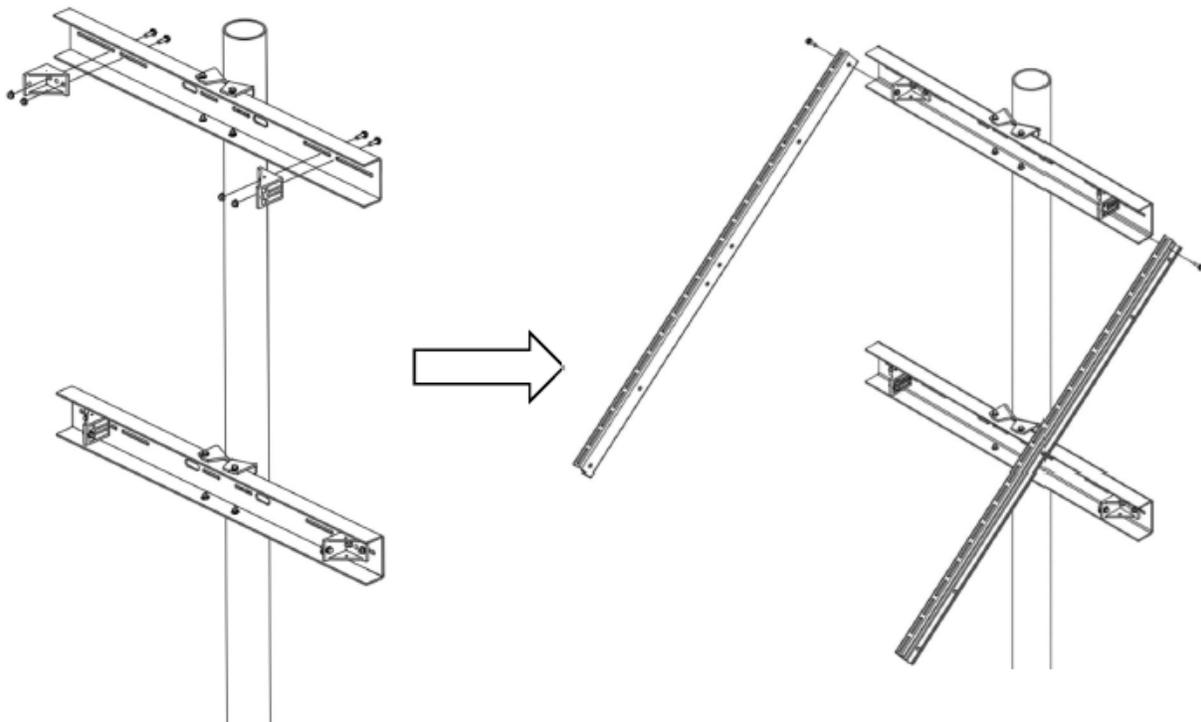


Loosely fasten the lower easy mount bracket to the pole. Use the below chart for rough spacing between the two saddles.

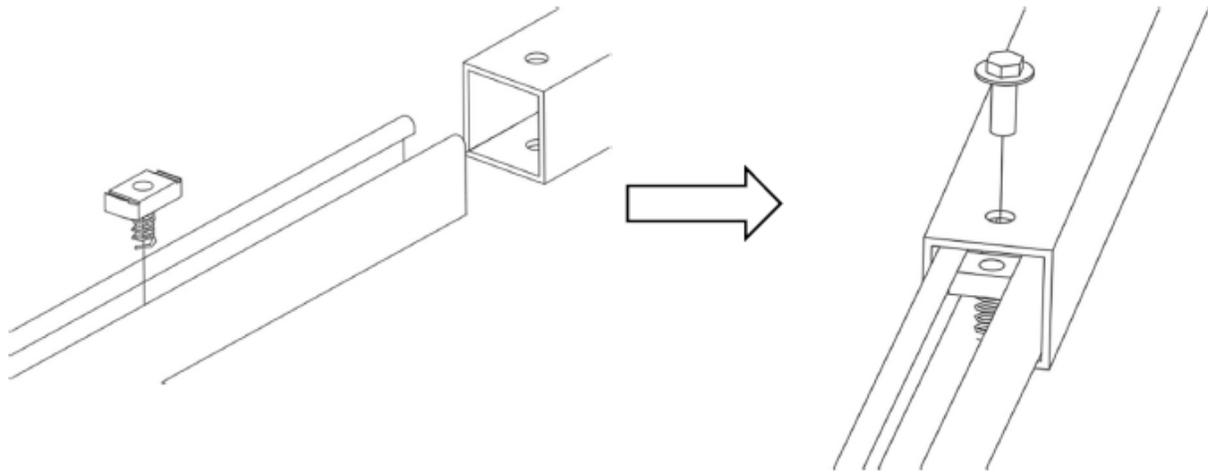
Approximate Saddle Spacing (X)	
Rail Length (in)	Spacing (in)
27	X = 24
60	X = 48
96	X = 72-84



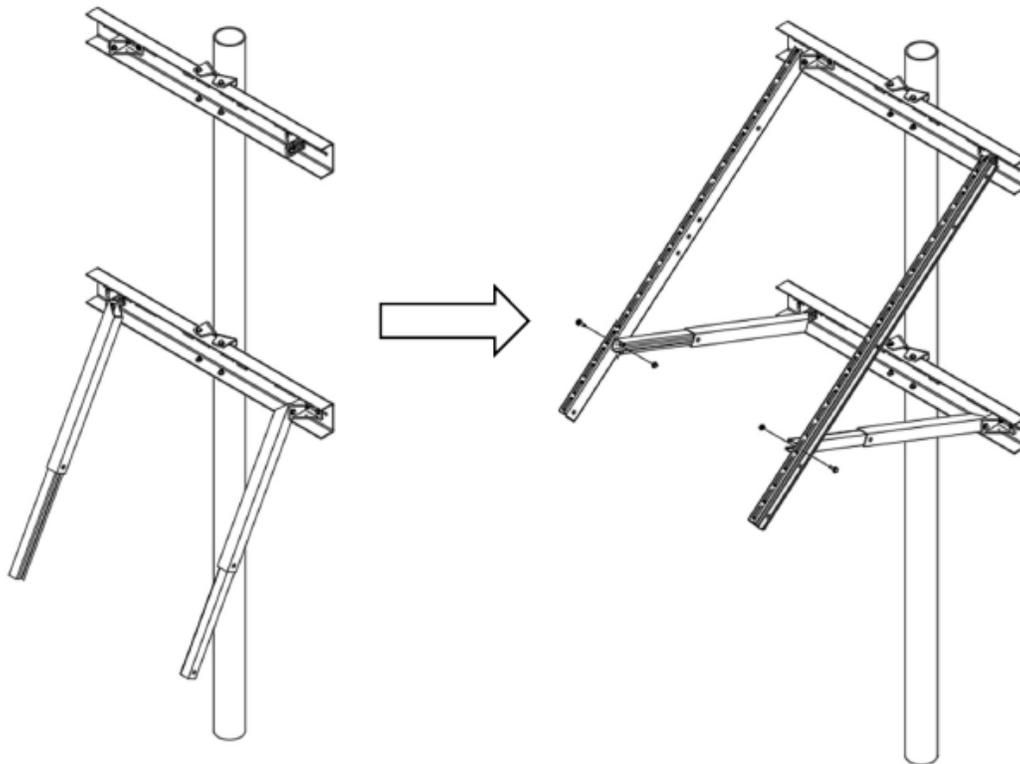
Lay rails on module holes (but do NOT attach) to determine angle bracket spacing (see image below). Measure between the inside of the module rails. Mount angle brackets to saddles using the 5/16" hardware provided. Tighten using 1/2" wrench to 10-12 ft-lb torque. Apply anti-seize.



Attach panel rails to upper saddle L-brackets using 5/16" hardware provided. Apply anti-seize.

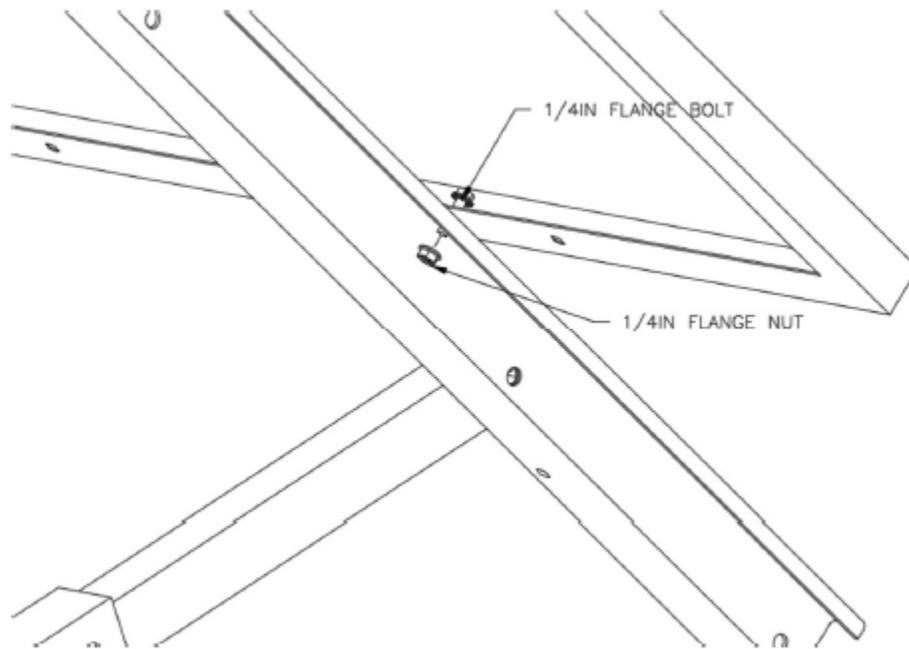


OPTIONAL: Drop spring nut into tilt leg strut and rotate to lock into place. Slide strut and spring nut into tilt leg tube and adjust to desired length. Longer legs, decrease tilt: shorter legs, increase tilt. Tighten 3/8" hardware using 9/16" wrench to 18-20 ft-lb torque.



Attach tilt legs to lower saddle L-brackets. Adjust the tilt angle by adjusting the tilt arms and lower saddle to the desired angle of tilt then tighten the U-bolt/band clamp on the lower saddle. For 5/16" hardware tighten using 1/2" wrench to 10-12 ft-lb torque.

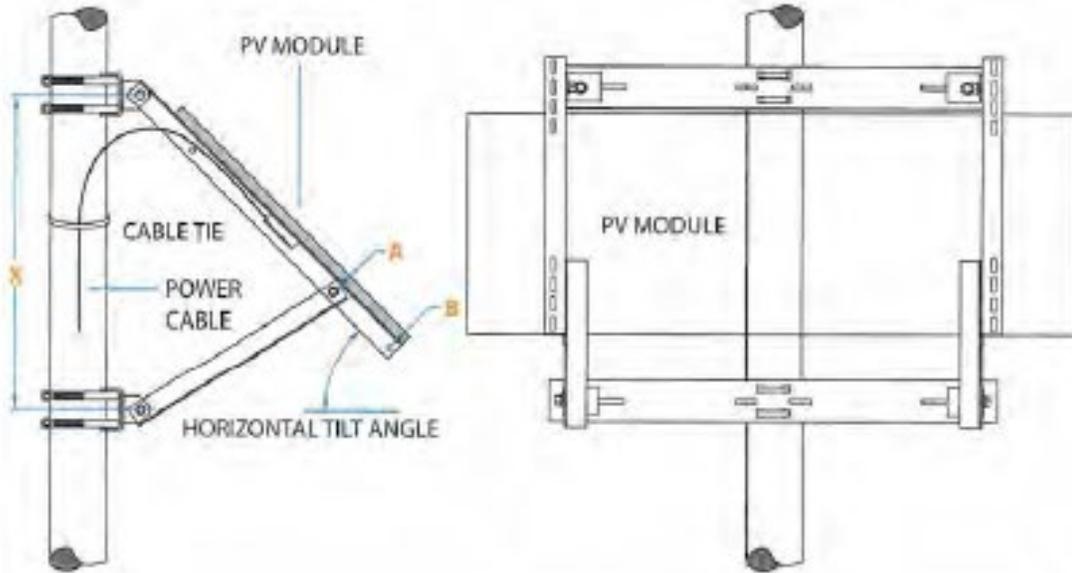
Check alignment of all assembled parts and ensure all bolted connections are tight.



Mount the solar modules to the rails using the 1/4" hardware provided.

5 Solar (PV) Array Mounting

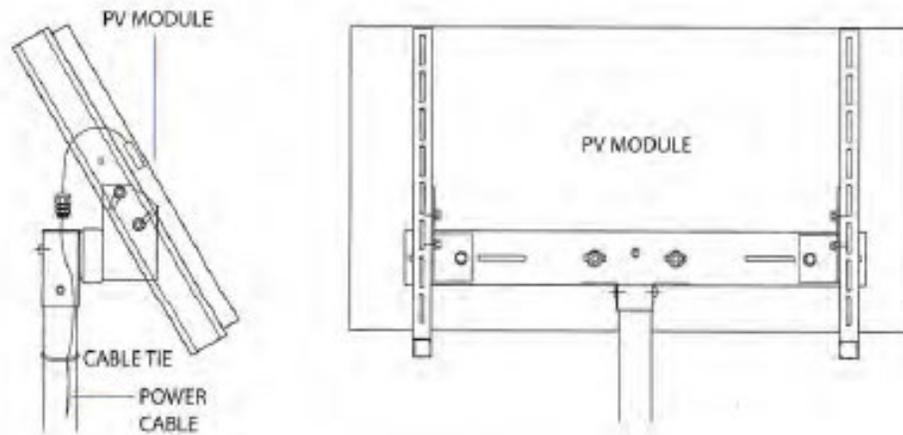
5.1 Side of Pole Array Mount



1. Attach the top of the array structure to the pole at the desired maximum height using the supplied band clamps or U-bolts.
2. Mount the bottom tilt bracket on the PV array to the pole. Turn the array to face South and adjust to the proper tilt angle for your location (refer to Section 2. Preparation).
3. Adjust the placement of the bottom band clamp or U-bolt, referring to the table below.

Horizontal Tilt	25°	30°	35°	40°	45°	50°	55°	60°
26.5" and 35" Rail								
Mounting Hole	A	A	A	A	B	B	B	B
X inches/mm	8.75/222.25	14.5/368.3	18.5/469.9	22/558.8	18/457.2	26.5/673.1	31/787.4	34/876.3
53" Rail								
Mounting Hole	A	A	A	B	B	B	B	B
X inches/mm	23.5/596.9	29.25/742.9	34.5/876.3	34.5/876.3	42/1066.8	48.25/1225.5	53.25/1352.5	57.5/1460.5

5.2 Top of Pole Array Mount



1. Attach the array with the gimbal to the top of the pole.
2. Turn the array to face South and fasten the gimbal screws.
3. Set the tilt angle (refer to Section 2. Preparation) and tighten the screws on the L bracket.

6 Antenna Mounting

6.1 Antenna Part

We are using Abracon AEACBK110053-MLWG (5-in-1) antenna. Product image below:

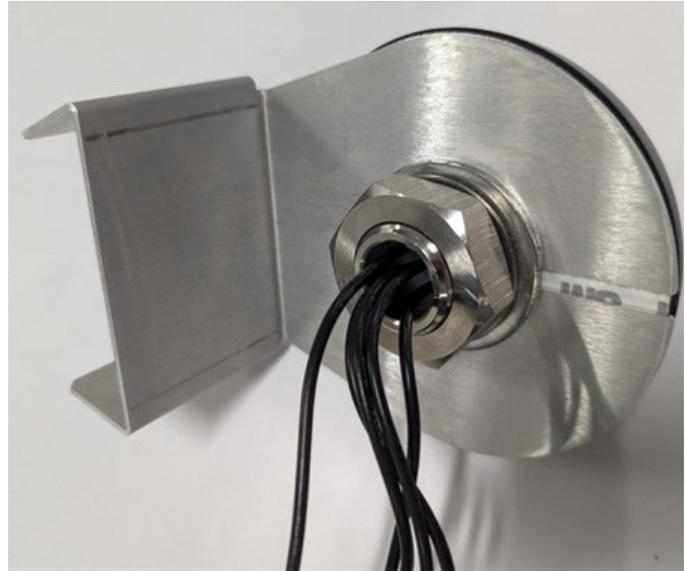


6.2 Mounting the Antenna

The antenna will be mounted to the second section of the pole above the solar array using a mounting plate with a built-in bracket.



Antenna – Side View



Antenna – Bottom View

NOTE: Make sure to peel off the 3M adhesive tape before mounting.

Thread the cables and bolt of the antenna through the hole, then secure the bolt with a washer and nut.



Once the antenna is mounted to the plate, mount the plate to the pole above the solar panel.
Control Panel Installation

7 Control Panel Setup

The control panel is mounted on a mounting plate with a load panel mounted on a din rail.



7.1 DIP Switch Settings

Lift the cover of the Control Panel. Set the DIP switch settings on the solar controller to support a 24V load.

Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
OFF	ON	OFF	OFF	ON	OFF	OFF	ON



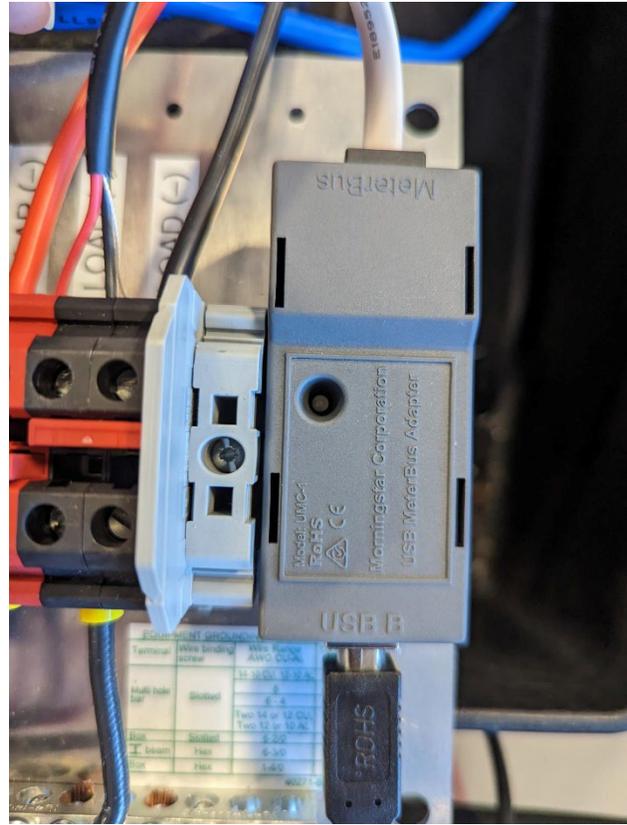
7.2 Mount the MeterBus Dongle

The Dongle can be mounted on the Din rail next to the circuit breaker.

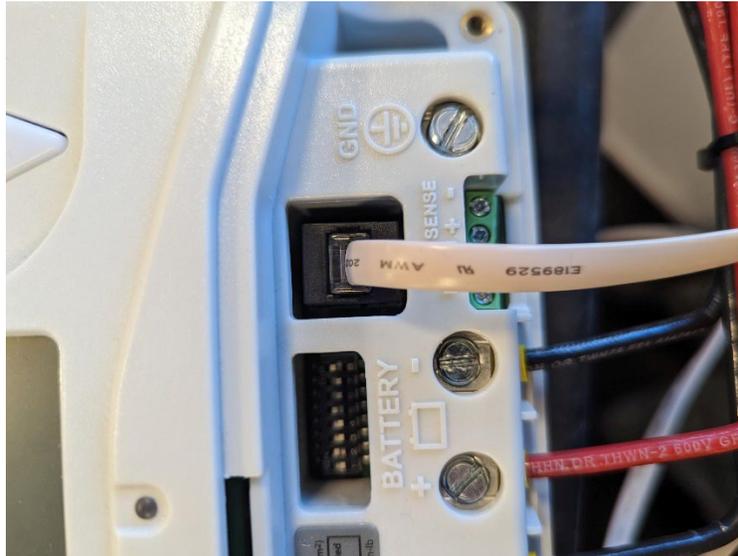
Before:



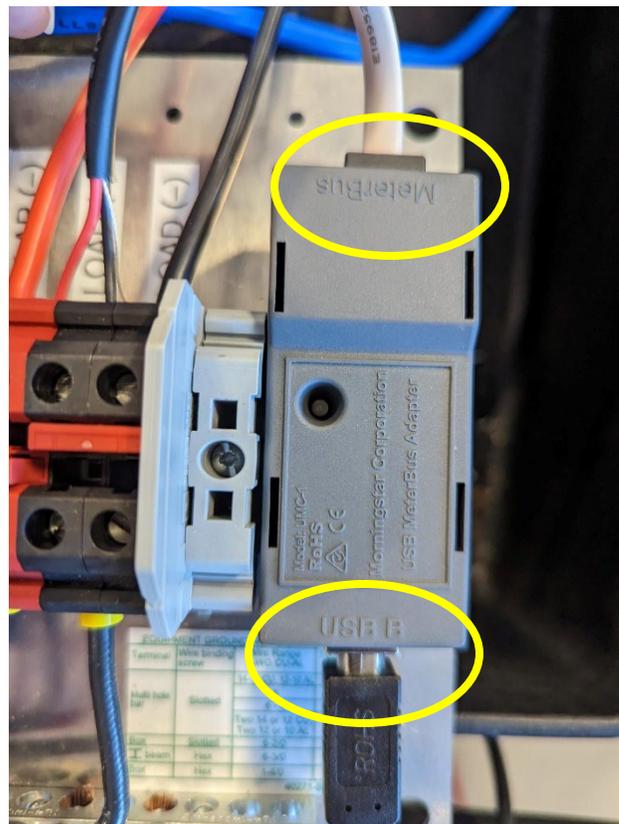
After:



Connect one end of the MeterBus cable into the dongle and the other end into the RJ17 port to the solar controller, next to the DIP switches then replace the panel:



Connect the USB cable into the other side of the dongle:

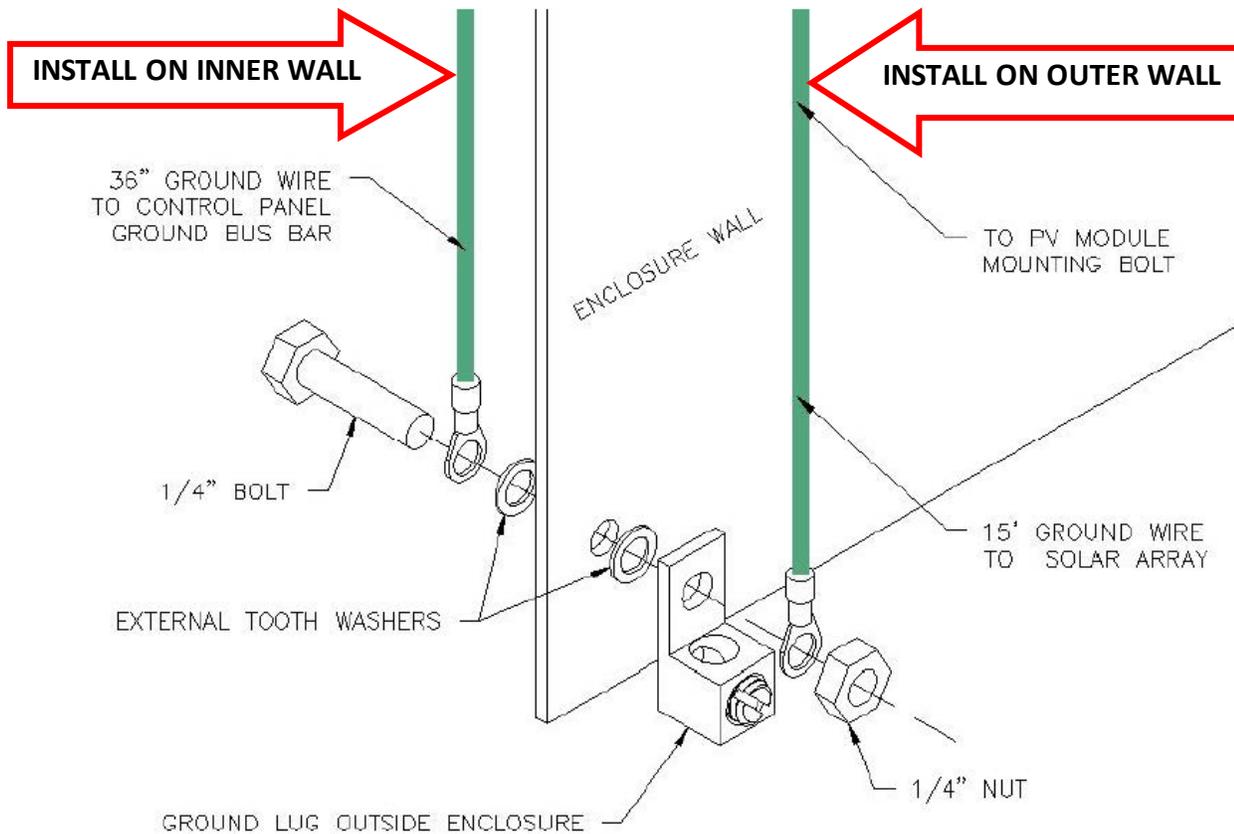


7.3 Control Panel Mounting



1. Remove the second set of supplied nuts from the mounting studs located on the back wall of the enclosure.
2. Adjust the first set of nuts on each stud to the same distance from enclosure wall leaving enough stud exposed for control panel and second nuts.
3. Install the control panel and second set of nuts as shown above.
4. Verify all breakers are in the OFF (open) position.
5. Ground the control panel to the enclosure (see grounding below).

7.4 Grounding



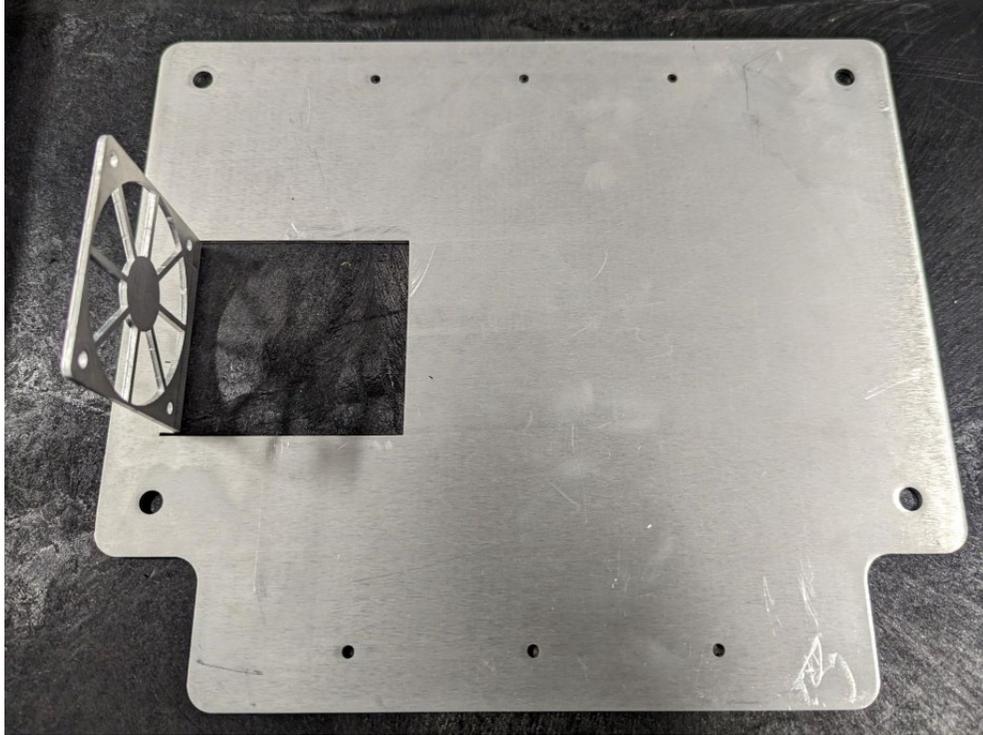
1. Set all circuit breakers in enclosure to OFF (open).
2. Install ground kit (provided) per figure below. Use wire rated for outdoor use per local codes and size per NEC A.690 for system earth grounding. Verify system neutral bonding is per local code.

8 Master Edge Mounting

The Master Edge will be mounted onto a mounting plate with an external fan that is powered by the Master Edge. The plate is then secured to the right interior wall of the enclosure.

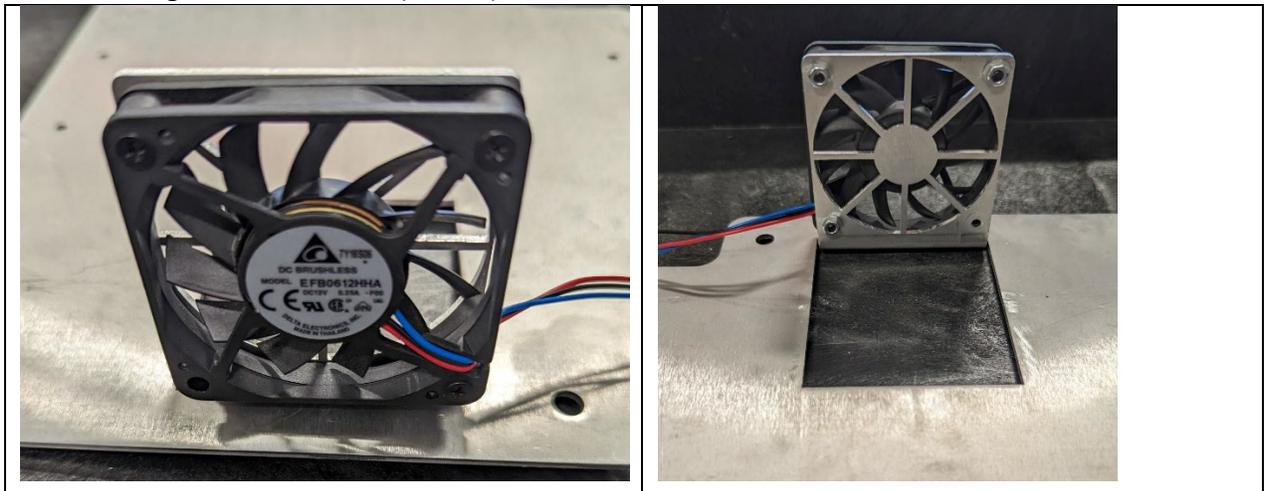
8.1 Master Edge Mounting

1. Mounting plate:



2. Installing fan:

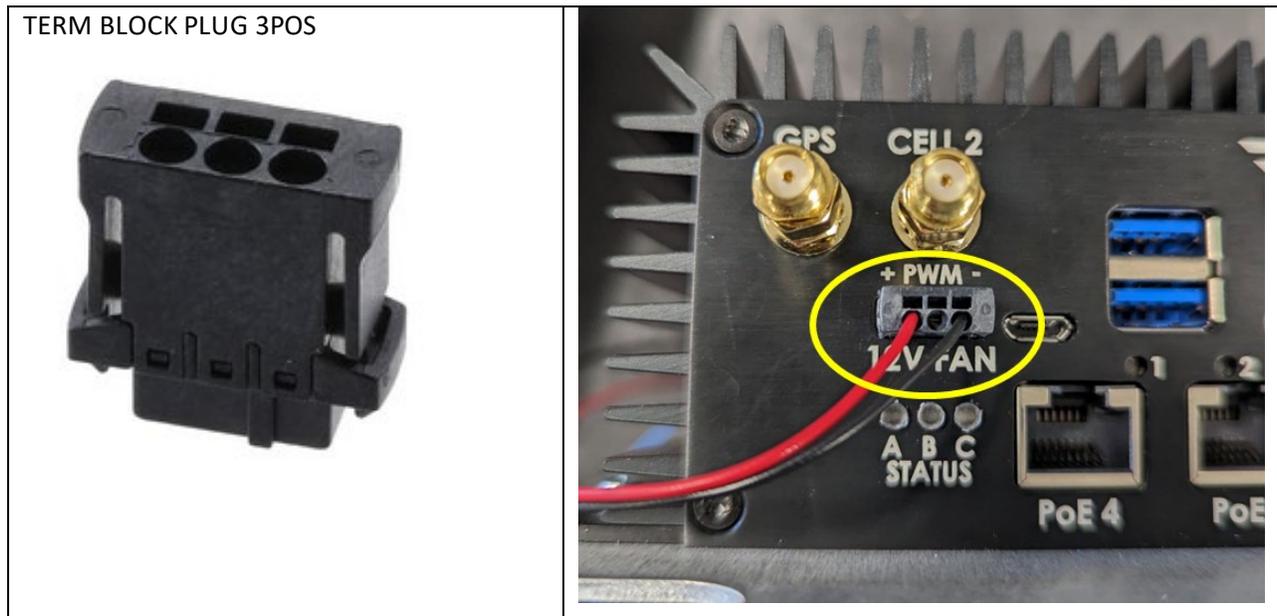
Fan will be mounted on the vertical slot on the mounting plate behind the Master Edge using four M3 screws (16mm) and washers.



Note the orientation of the label on the fan. The fan will pull the air away from the Master Edge.

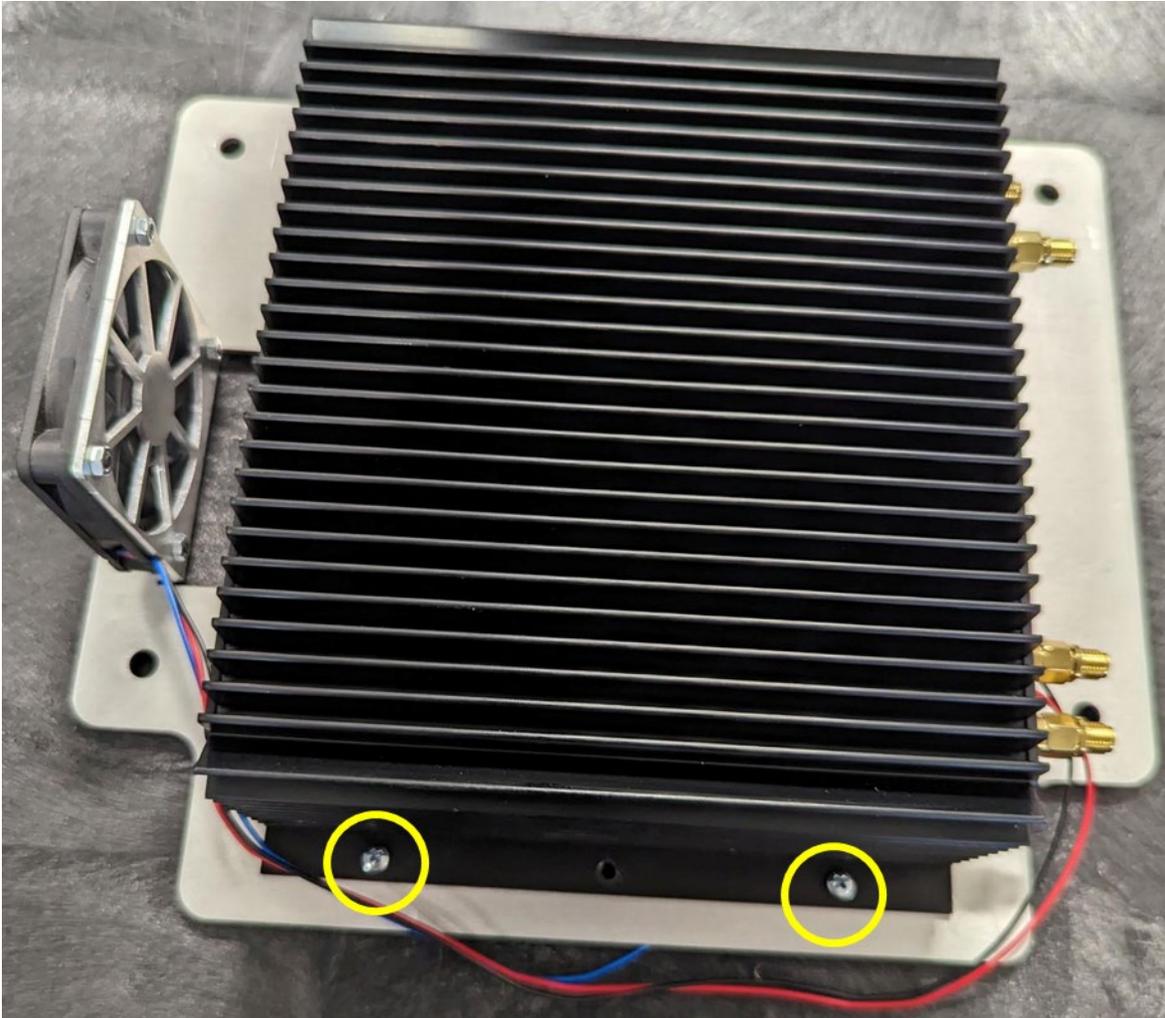


The fan is connected to the Master Edge using a 3 position terminal block plug, shown below:



3. Mounting Master Edge on the mounting plate:

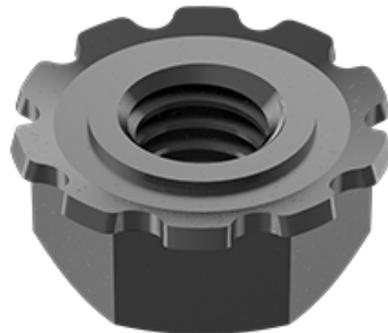
Master Edge will be mounted on the plate using M3 pan head screws (8mm long) along with the M3 locknut with lock washer.



M3 Pan Head Philips Screw

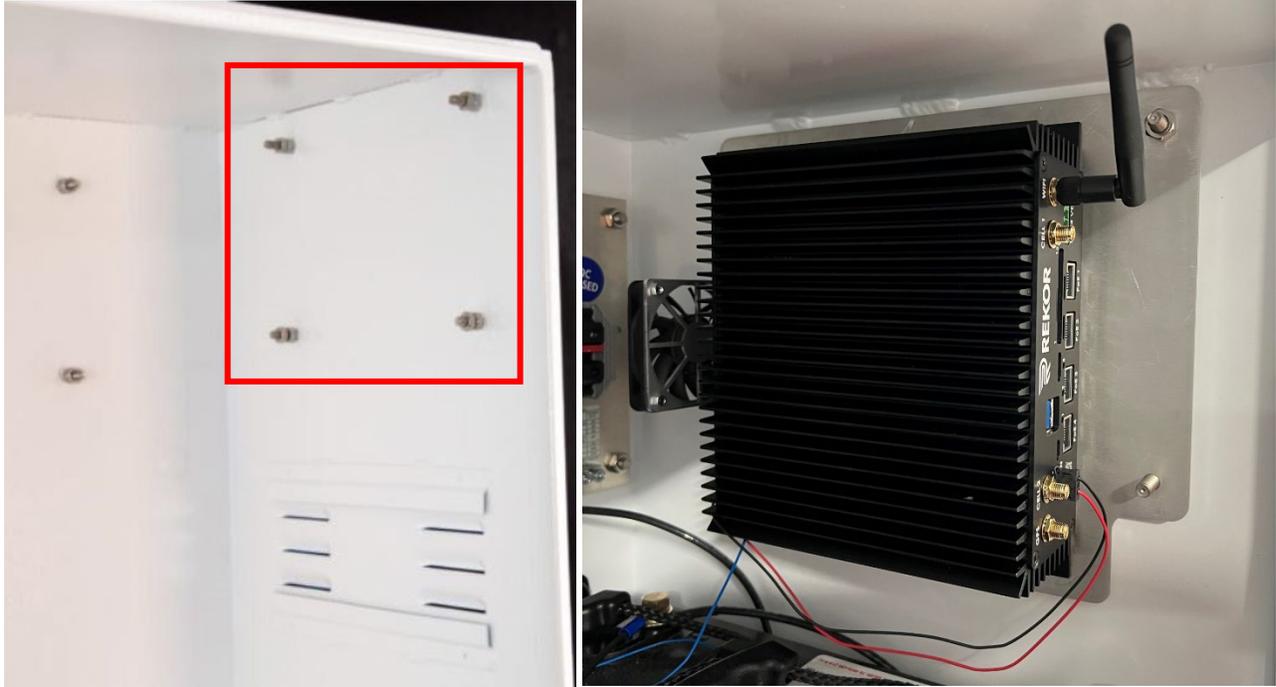


M3 Locknut with Lock Washer

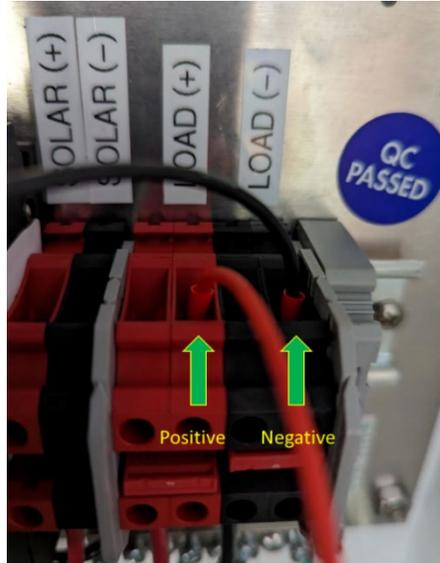


8.2 Mount the Master Edge Assembly into the Enclosure

Please make sure to install the Control Panel BEFORE installing the Master Edge.



Connect the Master Edge load power wire to the breaker circuit marked Load +/-.



After the Master Edge is securely mounted to the enclosure, connect the load wire to the Master Edge power input.



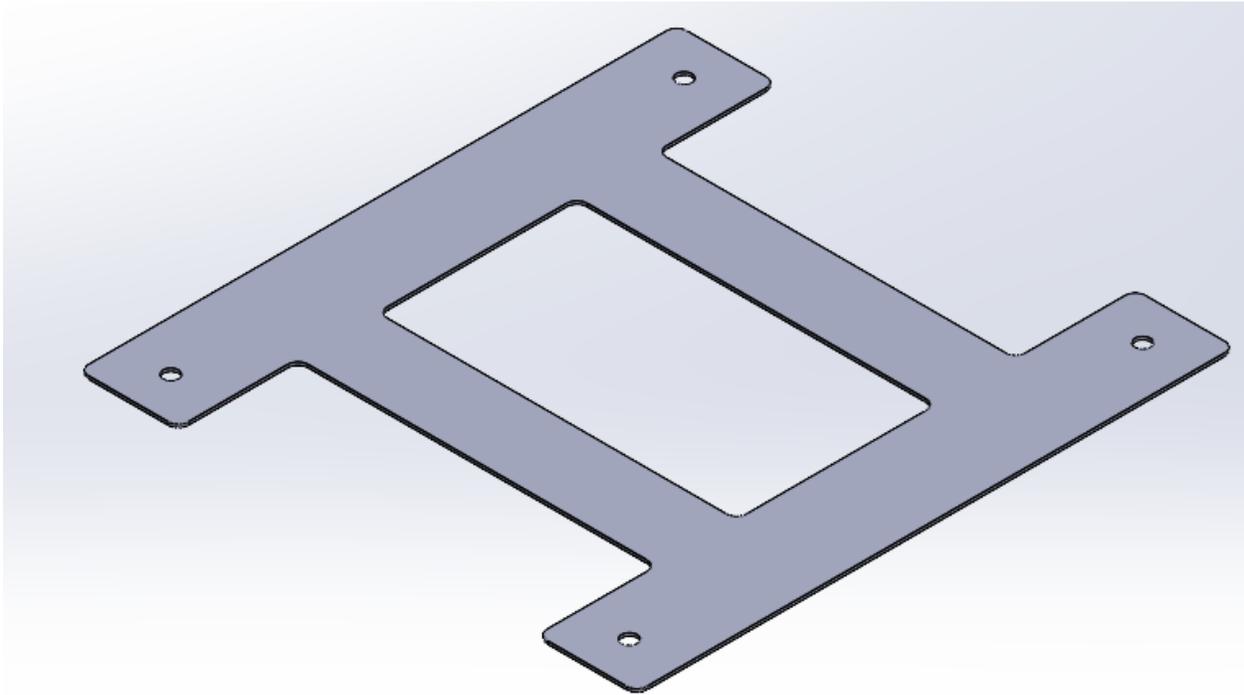
9 Connecting Solar Controller to Master Edge

Ensure the Solar Controller is connected (see Section 7.2), then connect the other end of the USB cable plugs into the Master Edge USB port:



10 Enclosure Installation

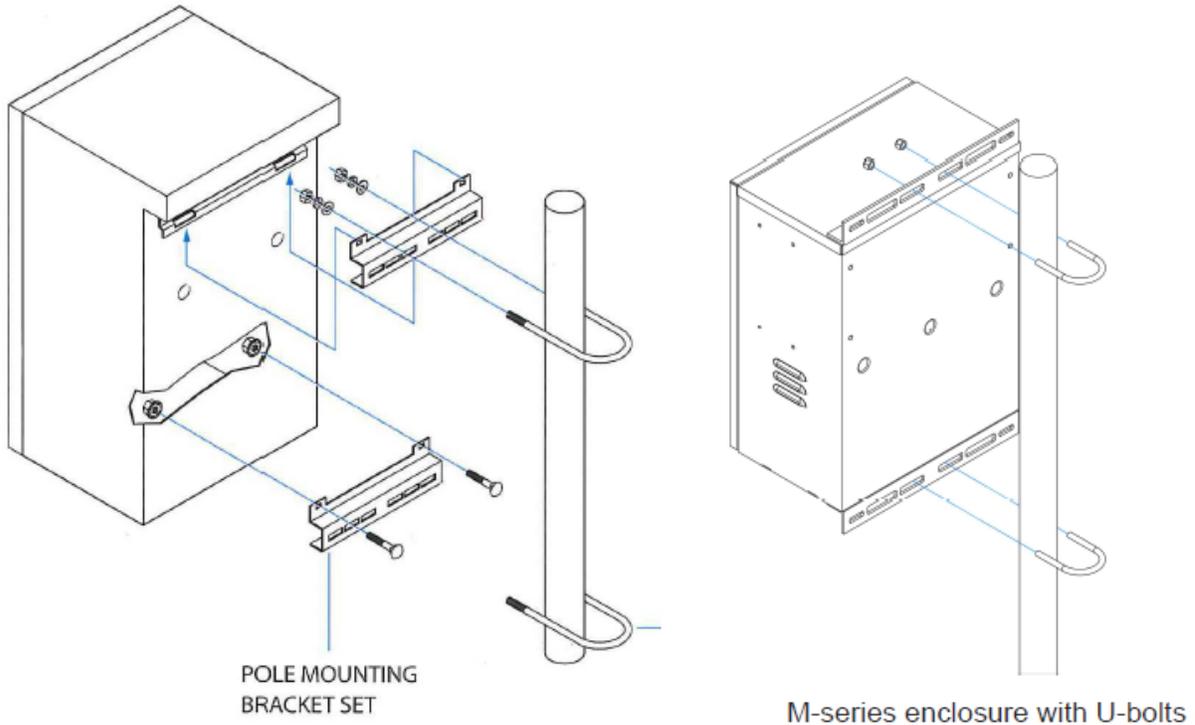
Use the spacing jig to assist in mounting the enclosure, if using the U bolts for mounting. If using bands, skip to Section 10.1.



1. Mount Sunwize pole mounts to Rekor spacing jig.
2. Secure Sunwize pole mounts to pole (U-Bolts).
3. Remove Rekor spacing jig.
4. Mount Sunwize enclosure on Sunwize Pole mounts with included hardware from Sunwize.

10.1 Side of Pole Mount Enclosure

NOTE: Remove the door to the enclosure before installing the enclosure onto the pole.



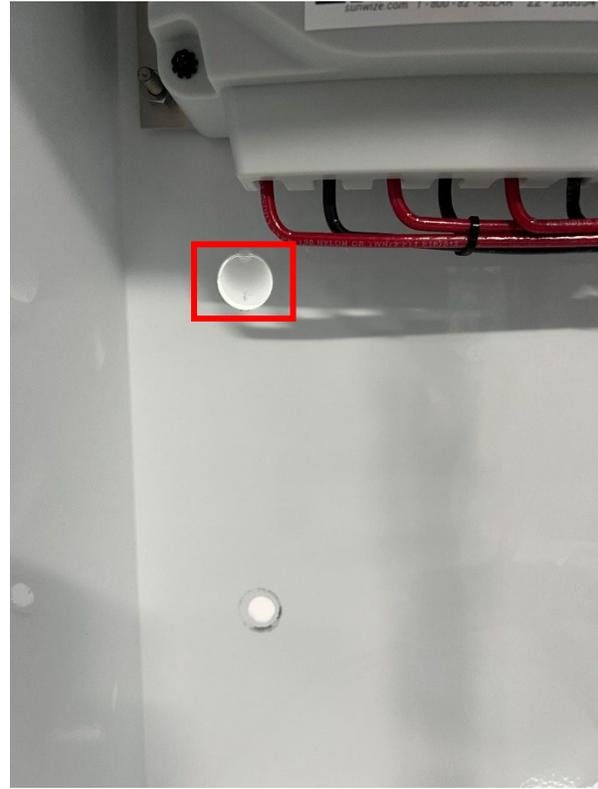
1. Mount the upper mounting bracket at the desired height of the enclosure on the pole using U-bolts.

Install the lower mounting bracket, Spacing should be measured from the upper bracket as follows:	
Model	Xinches/mm
WF2 or WF4 battery enclosure	23/584.2
F1 or F2 battery enclosure	12.7/327
F4 battery enclosure	24.1/612
F4 (tall) battery enclosure	39.1/993.14

2. Hang the top of enclosure on the top bracket - slip the tabs on either end of the mounting bracket under the tabs on the top of the back of the enclosure.
3. Attached the lower bracket to the enclosure using the round carriage bolts.

11 Enclosure Knockouts

Before installing the batteries, the knockouts in the back wall of the enclosure must be removed. This allows the solar panel cables to be run inside the enclosure and connect to the solar controller.



To remove the knockout plugs, use a screwdriver and mallet to strike the **BOTTOM** of the plugs. Avoid striking the knockout plugs at the top, as they are attached to the enclosure at the top.

12 Antenna Connection

12.1 Connect Antenna to Master Edge:

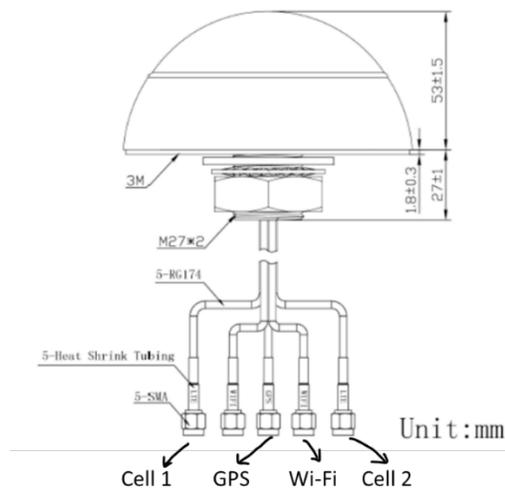
Run the cables down the pole and insert them through the cutouts on the back solar enclosure. For the cable connections, see Section 9.1.

For Rev 5.1, use the SMA Female to RP-SMA Male coax adapters, as shown.



These adapters are screwed in on the GPS, Cell 1 and Cell 2 SMA terminals on the Master Edge, leaving only the WiFi connector without any adapter:

Connect the antenna terminals to the Master Edge:



These adapters are screwed in on the GPS, Cell 1 and Cell 2 SMA terminals on the Master Edge, leaving only the WiFi connector without any adapter.



13 Connecting Solar Controller to Master Edge

Ensure the Solar Controller is connected (see Section 7.2), then connect the other end of the USB cable plugs into the Master Edge USB port:



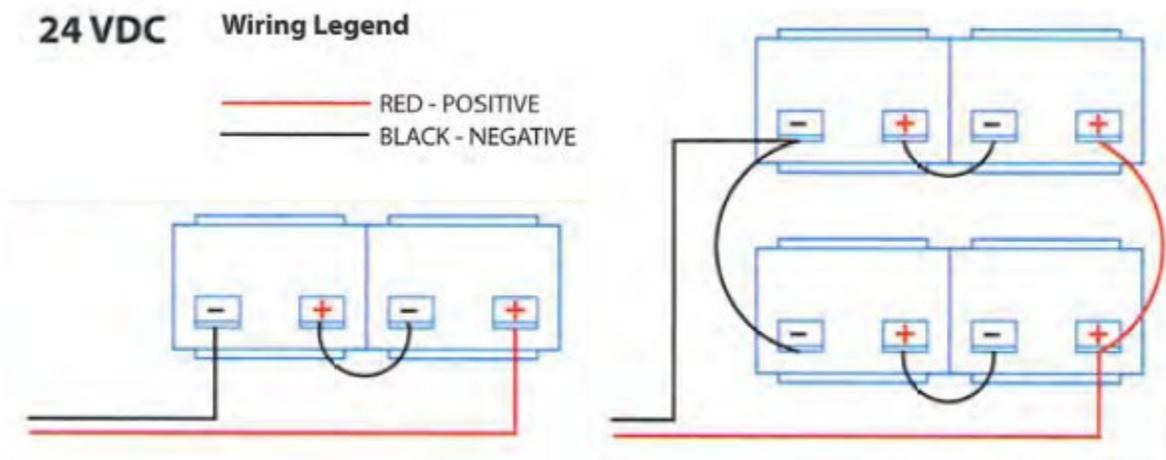
14 Battery Installation

14.1 24V System Battery Wiring

NOTE!: NOTE!: Each pair of 12V batteries are in series and form one string.

Battery Jumper Cable: [1] 16AWG 16" Red Wire

- 16AWG Ring Terminal (red heat shrink)
- 16AWG Ring Terminal (black heat shrink)



1. Connect the Battery Jumper Cable from BAT 1 NEGATIVE (-) terminal to the BAT 2 POSITIVE (+) terminal.
2. Repeat this pattern for each series string.
3. Each series string must be connected in parallel to complete the bank wiring.
4. Connect the RED jumper from BAT 1 POSITIVE (+) terminal to the BAT 3 POSITIVE (+) terminal, and the BLK jumper from BAT 2 NEGATIVE (-) terminal to the BAT 4 NEGATIVE (-) terminal.
5. Repeat this pattern for each parallel pair.
6. For the final connection: inside the control/battery enclosure, connect the controller RED BAT (+) wire to the battery bank POSITIVE (+) terminal. Connect the controller BLK BAT (-) wire to the battery bank NEGATIVE (-) terminal.

15 Solar (PV) Array Wiring

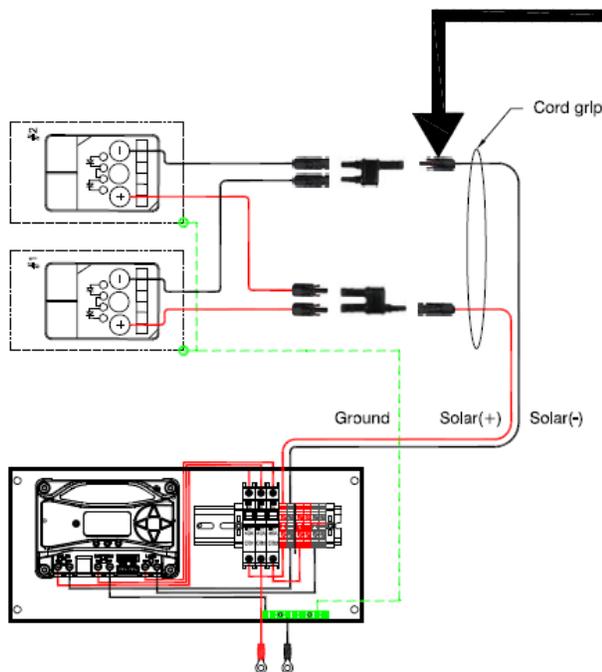
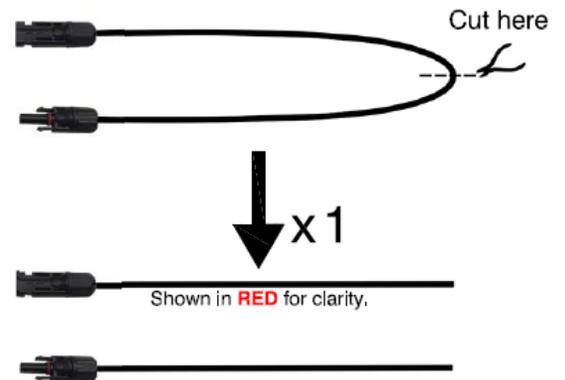
WARNING! Set the circuit breakers to OFF (open) and remove the fuses in enclosure (if provided) before starting the wiring installation.

24V System (2) Modules With 2-to-1 Connectors

Document #: 310023

LEAVE ALL BREAKERS OFF UNTIL BATTERIES ARE INSTALLED

1. Cut Quick Connector Cable in half as shown.
2. Run the cable and ground wire through the cord grip.
3. Connect the cable cut ends to the control panel.
4. Connect the ground wire to the ground bar.
5. Make sure all breakers are in the **OFF** position.
6. Connect the ground wire to one of the module frames.
7. Connect the module and cable Quick Connectors to the 2-to-1.



**VERIFY VOLTAGE AND POLARITY
BEFORE TURNING ON THE SYSTEM.**

**CONTROLLER DAMAGE WILL
OCCUR WITH OVER-VOLTAGE.**

Make sure all breakers are in the **OFF** position.

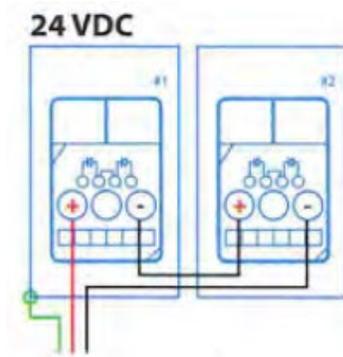
Measure from the bottom of Solar(+) terminal to Solar(-) terminal on the control panel and verify voltage (approx 45V)

Verify polarity is positive. If negative, reverse Solar wiring and check again.

Tray Cable



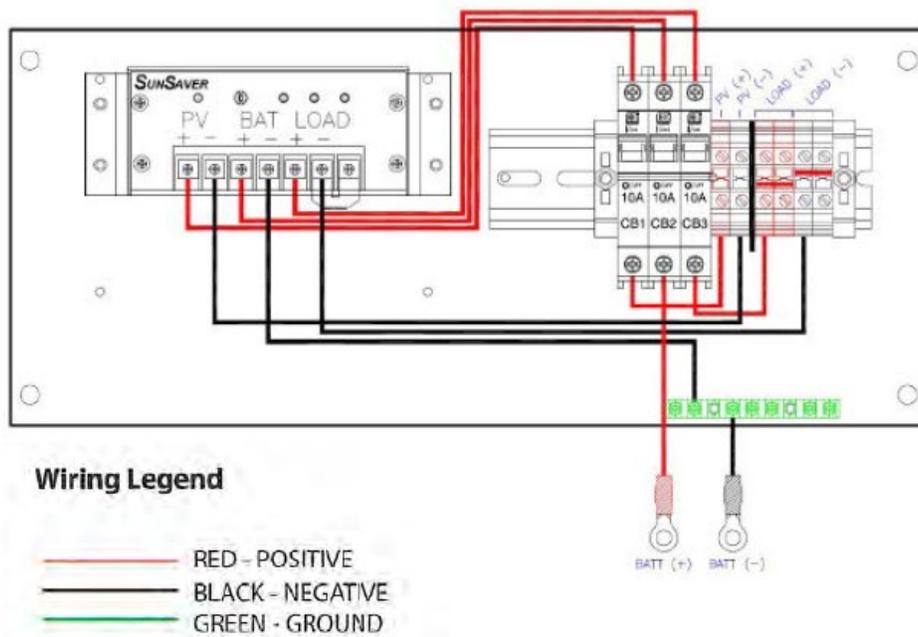
1. Route the output conductors from the solar (PV) panel to the enclosure. Secure the conductors to the panel frame or the mounting surface using wire ties or other restraining hardware (not provided). Install the cord grip fitting to the rear of the enclosure using the ½ inch knock out provided.
2. Inside the enclosure, mate the PV array PV(+) conductor to the controller PV(+) terminal block. Mate the BLACK PV(-) conductor to the controller PV(-) terminal block. Mate the PV array GREEN GND conductor per instructions in grounding section.



3. For all connections use correct interconnect cables and tray cable.

16 System Testing

1. Confirm all connections, fittings, and fasteners are secure and the PV array surface is clean and facing South.
2. Measure Voltages (Confirm all breakers are off before measuring)
3. Verify both the PV and battery polarity is positive. If negative, reverse wiring to the system and check again.
4. Measure PV array voltage from the PV(+) terminal to the PV(-) terminal in the enclosure:
 12V systems: 21VDC (open circuit voltage)
 24V systems: 42VDC (open circuit voltage)
5. Measure battery voltage from either the BAT(+) terminal block to the BAT(-) terminal block or the BANK(+) to the BANK(-) to verify that they are approximately:
 12V systems: 12-13V
 24V systems: 24-26V
6. Set breakers to the ON (closed) position.



On the charge control panel:

1. Set the BAT(+) CB2 input breaker.
2. Set PV(+) CB1 input breaker.
3. Set the LOAD (+) CB3 output breaker.
4. Confirm that the controller status LEDs function properly.
5. On the charge control panel, measure the voltage from the LOAD(+) terminals to the LOAD(-) terminals which should be the same as the battery voltage.

17 Connect the Equipment

1. Turn the Power Ready System OFF.
 - a. Turn the PV breaker (CB1) OFF.
 - b. Turn the Battery breaker (CB2) OFF.
 - c. Turn the Load breaker (CB3) OFF.
 - d. Connect your equipment to the terminal blocks on the control panel.
2. Turn the Power Ready System ON.
 - a. Turn the Battery breaker (CB2) ON.
 - b. Turn the PV breaker (CB1) ON.
 - c. Turn Load breaker (CB3) ON.
 - d. Confirm the Power Ready System is providing power to the load.

Re-install the door back onto the enclosure, close the door and lock it.