

UNI-PGRM INSTALLATION MANUAL

For models:

UNI-PGRM/1P1

UNI-PGRM/2P1

UNI-PGRM/3P1

UNI-PGRM/4P1

UNI-PGRM/4P2

UNI-PGRM/5P2

UNI-PGRM/6P2

UNI-PGRM/1P1-47

UNI-PGRM/2P1-47

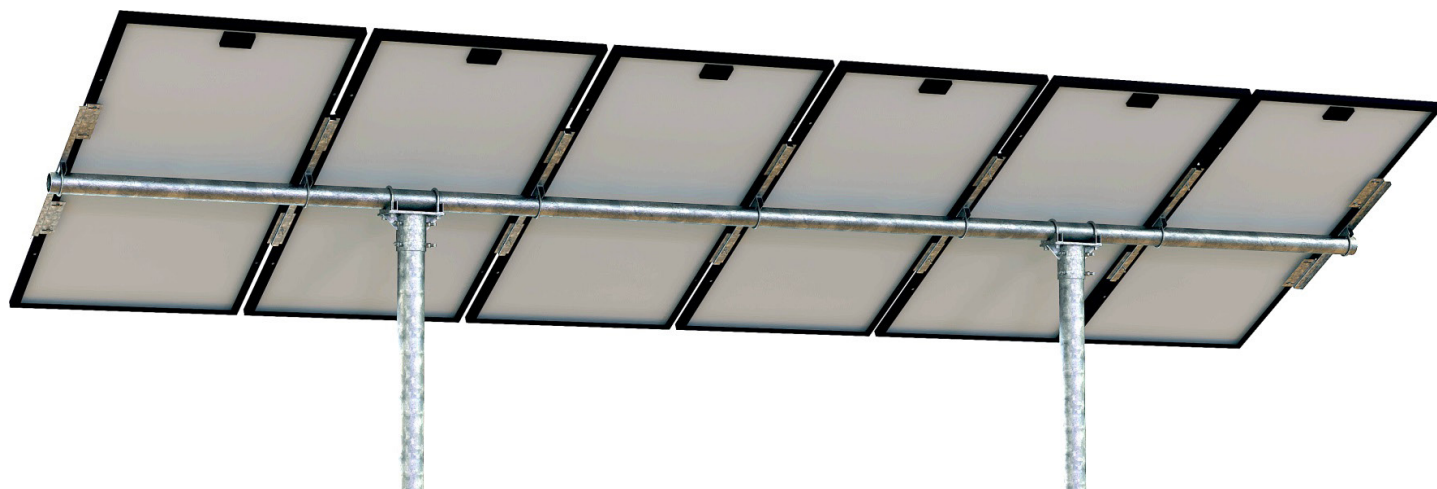
UNI-PGRM/3P1-47

UNI-PGRM/4P1-47

UNI-PGRM/4P2-47

UNI-PGRM/5P2-47

UNI-PGRM/6P2-47



Introduction

The PGRM series of pole mounts are a sturdy, economical universal pole mounting solution with user-adjustable angle settings, 10° to 60° per engineering (0° to 85° possible).

NOTE: 4-IN Schedule 40 steel vertical pole pipe (4.5-IN actual outside diameter) and 3-IN Schedule-40 steel horizontal beam pipe (3.5-IN actual outside diameter) are not supplied by Tamarack. Purchase locally.

Galvanized coated sheet steel used in the MID Clamps and END Clamps will show rust on cut edges. This is normal and will not affect the structure and function of the mount.

Customer Support

Tamarack Solar makes every effort to ensure your mounting kit is easy to install. If you need assistance at any point in your installation or have suggestions on how we can improve your experience, call customer support at 1-800-819-7236 Ext 556 or email us at support@tamaracksolar.com

Tools Required and Torque Specifications

Tools that support the Hex head sizes in the table below.

Use of an Inch-pound (in-lbs) torque wrench is recommended for all torques under 20 ft-lbs, as most ft-lbs wrenches are not accurate under 20 ft-lbs.

NOTE: ANTI-SEIZE COMPOUND SHOULD BE USED ON ALL STAINLESS STEEL HARDWARE IN ORDER TO PREVENT GALLING WHEN TIGHTENING.

The torque values listed here are “dry”, subtract 20% if using anti-seize lubricant.

Hex Head Size	FT-LBs/(IN-LBs) Dry Threads	FT-LBs/(IN-LBs) w/ Anti-seize
1/2-IN*	40 / (480)	< Reduce by 20%
3/8-IN	20 / (240)	< Reduce by 20%
5/16-IN	12 / (144)	< Reduce by 20%
1/4-IN	84 / (7)	< Reduce by 20%

* 8- or 12-point socket for square head set screws.

Components

UNI-PGRM COMPONENTS LIST

		Single-Post Mounts*							
Part Number	Part Description	UNI-PGRM/ 1P1	UNI-PGRM/ 1P1-47	UNI-PGRM/ 2P1	UNI-PGRM/ 2P1-47	UNI-PGRM/ 3P1	UNI-PGRM/ 3P1-47	UNI-PGRM/ 4P1	UNI-PGRM/ 4P1-47
70-0300-PGM-B	POLE CAP FOR 4" SCH-40 OR SCH-80 VERTICAL POST (4.5" O.D.)	1	1	1	1	1	1	1	1
UNI-PGRM-MID	MID CLAMP, 35-IN (for modules 38-IN - 72-IN long) - Use (1) between each module			1		2		3	
UNI-PGRM-END	END CLAMP, 35-IN (for modules 38-IN - 72-IN long) - Use (2) per mount	2		2		2		2	
UNI-PGRM-MID47	MID CLAMP, 47-IN (for modules 72-IN - 96-IN long) - Use (1) between each module				1		2		3
UNI-PGRM-END47	END CLAMP, 47-IN (for modules 72-IN - 96-IN long) - Use (2) per mount		2		2		2		2

		Two-Post Mounts*					
Part Number	Part Description	UNI-PGRM/ 4P2	UNI-PGRM/ 4P2-47	UNI-PGRM/ 5P2	UNI-PGRM/ 5P2-47	UNI-PGRM/ 6P2	UNI-PGRM/ 6P2-47
70-0300-PGM-B	POLE CAP FOR 4" SCH-40 OR SCH-80 VERTICAL POST (4.5" O.D.)	2	2	2	2	2	2
UNI-PGRM-MID	MID CLAMP, 35-IN (for modules 38-IN - 72-IN long) - Use (1) between each module	3		4		5	
UNI-PGRM-END	END CLAMP, 35-IN (for modules 38-IN - 72-IN long) - Use (2) per mount	2		2		2	
UNI-PGRM-MID47	MID CLAMP, 47-IN (for modules 72-IN - 96-IN long) - Use (1) between each module		3		4		5
UNI-PGRM-END47	END CLAMP, 47-IN (for modules 72-IN - 96-IN long) - Use (2) per mount		2		2		2

* Some wind speeds & snow loads require an additional vertical pole and/or Sched-80 horizontal/vertical pipe. Consult the engineering documents listed on the next page. If an additional vertical pole is required, order Pole Cap 70-0300-PGM-B.

Warranty Information

Warranty details can be found on our website: www.tamaracksolar.com/warranty/

Installer Responsibilities

- Comply with all applicable local or national building codes, including any that may supersede this manual.
- Ensure all products used are appropriate for the particular installation and the installation environment including the site's loading conditions. Parameters, such as snow loading, wind speed, exposure and topographic factor should be confirmed with the local building official or a licensed professional engineer.
- Use only Tamarack Solar parts or parts approved by Tamarack Solar; substituting parts may void any applicable warranty.
- Ensure safe installation of all electrical aspects of the PV array. Electrical installation should be conducted by a licensed and bonded electrician or solar contractor.
- If loose components or loose fasteners are found during periodic inspection, retighten immediately. If corrosion is found, replace affected components immediately.
- Review module manufacturer's documentation to ensure compatibility and compliance with warranty terms and conditions.
- Maximum Series Fuse Rating for the photovoltaic array is 30 Amps.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- Ensure information used for the system design is accurate. Any inaccurate information used for the system design will cause errors and are the installer's responsibility to correct.

A local geotechnical report may be required to assess soil conditions. We recommend consulting with a local engineer familiar with local regulations and build site requirements, including soil conditions, terrain, and load criteria (wind, snow, seismic). All of these parameters may impact foundation requirements.

The number of posts needed can vary from 1 to 3 and required post hole depth can vary from 4 to 11 feet. It is the installers responsibility to use the engineering documents from our website to determine the proper number of posts and the post hole depth.

Engineering Documents

UNI-PGRM/1P1 and UNI-PGRM/1P1-47
UNI-PGRM/2P1 and UNI-PGRM/2P1-47

<https://tamaracksolar.com/wp-content/uploads/Calculation-Packet-Top-of-Post-Ground-Mount-1-and-2-Modules.pdf>

UNI-PGRM/3P1 and UNI-PGRM/3P1-47
UNI-PGRM/4P1 and UNI-PGRM/4P1-47
UNI-PGRM/4P2 and UNI-PGRM/4P2-47

<https://tamaracksolar.com/wp-content/uploads/Calculation-Packet-Top-of-Post-Ground-Mount-3-and-4-Modules.pdf>

UNI-PGRM/5P2 and UNI-PGRM/5P2-47
UNI-PGRM/6P2 and UNI-PGRM/6P2-47

<https://tamaracksolar.com/wp-content/uploads/Calculation-Packet-Top-of-Post-Ground-Mount-5-and-6-Modules.pdf>

Vertical Pipe Installation Recommendations

Auger holes to the minimum depth shown in the engineering certification letters.

The pipe should be a minimum of 3-IN from the bottom of the hole and a maximum of 12-IN.

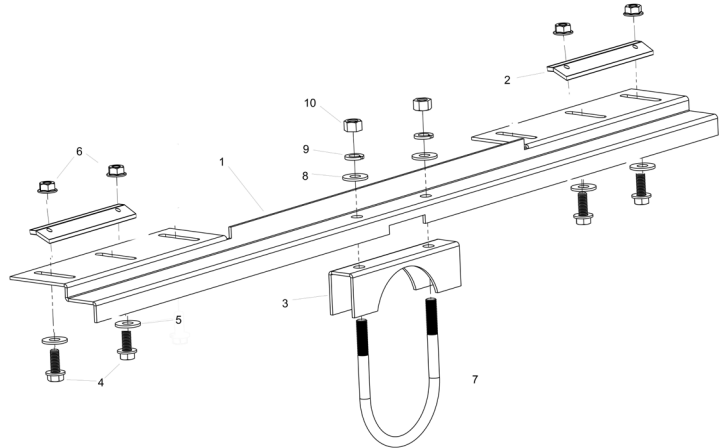
The pipe should be installed vertically and braced to remain in position until concrete has cured at least 24 hours.

Parts List

UNI-PGRM-END / -END47 - END CLAMP

No matter which version of the PGRM Kit you are using, there are two END Clamps per kit, one clamp for each end of the mount. END Clamps are designed to grab the flange on the underside of the solar module frame.

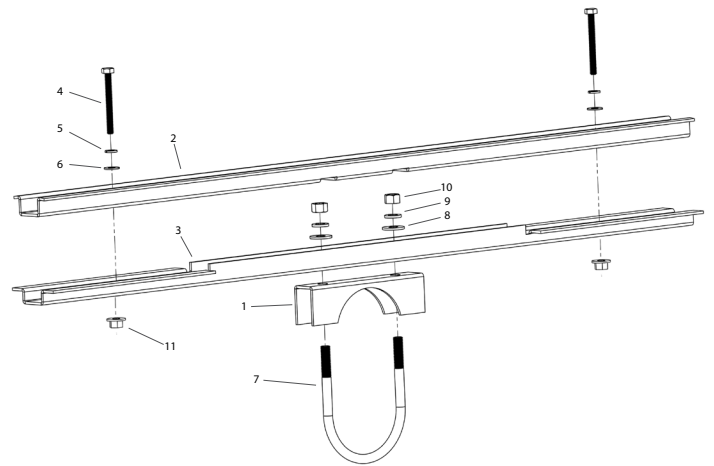
Item	Part Number	Description	Qty
1	51-0835-ECB	End Clamp Base 35-IN (UNI-PGRM-END)	1
	51-0847-ECB	" " " 47-IN (UNI-PGRM-END47)	1
2	51-0835-UPC	Panel Frame Clamp	2
3	51-0835-UBC	U-Bolt Clamp	1
4	23-3118-875	Bolt, 5/16-18 x .875-IN	4
5	25-3102-000	Washer, Flat 5/16-IN	4
6	25-2501-015	Nut, Flange 5/16-IN	4
7	23-0100-033	U-Bolt for 3-IN Pipe	1
8	25-3702-GLV	Washer, Flat 5/16-IN	2
9	25-3701-GLV	Washer, Lock 3/8-IN	2
10	24-3716-GLV	Nut, 3/8-16	2



UNI-PGRM-MID / -MID47 - MID CLAMP

UNI-PGRM/1P1 will not have a MID Clamp.

Item	Part Number	Description	Qty
1	51-0835-UBC	U-Bolt Clamp	1
2	51-0835-MCT	Mid Clamp Top (UNI-PGRM-MID)	1
	51-0847-MCT	" " " (UNI-PGRM-MID47)	1
3	51-0835-MCB	Mid Clamp Bottom (UNI-PGRM-MID)	1
	51-0847-MCB	" " " (UNI-PGRM-MID47)	1
4	23-2520-250	Bolt, 1/4-20 x 2.5-IN all thread	2
5	25-2502-000	Washer, Flat 1/4-IN	2
6	25-2501-000	Washer, Lock 1/4-IN	2
7	23-0100-033	U-Bolt for 3-IN Pipe	1
8	25-3702-GLV	Washer, Flat 5/16-IN	2
9	25-3701-GLV	Washer, Lock 3/8-IN	2
10	24-3716-GLV	Nut, 3/8-16	2
11	25-2501-014	Nut, Flange 1/4-20	2

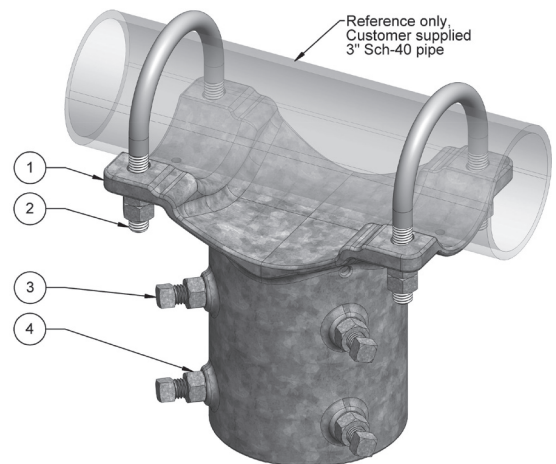


70-0300-PGM-B POLE CAP

In most cases, use one post and Pole Cap for 1-3 modules and two posts and Pole Caps for 4-6 modules. Additional Caps (and posts) may be required in some instances. Refer to the engineering certification letters (see page 3) to determine the number of posts and Pole Caps required for your particular installation.

Hardware package contains twelve 1/2-IN nuts. Use 4 as lock nuts on the set screws and 8 on the U-bolts.

Item	Part Number	Description	Qty
1	70-0400-000	Cap, 4-IN Pipe REV E	1
2	23-0350-GLV	U-Bolt, 1/2-13 for 3-IN Pipe with (4) Nuts	2
3	23-5013-150	Set Screw, 1/2-13 x 1.5-IN	4
4	24-513J-GLV	Nut, Jam 1/2-13	12



Horizontal Beam Length and Post Placement Calculations

Use 3-IN Schedule-40 (3.5-IN OD) steel pipe for Horizontal Beam.

Compute Horizontal Beam Length with formula below.

W = Module Width (inches) / **Q** = Quantity of Modules

END Clamps = 1.41-IN wide (x2 per mount)

MID Clamps = 1.28-IN wide (x (# of modules minus 1))

Beam Length Formula: Length (inches) = 4.82 + (Q x W) + ((Q – 1) x 1.28)

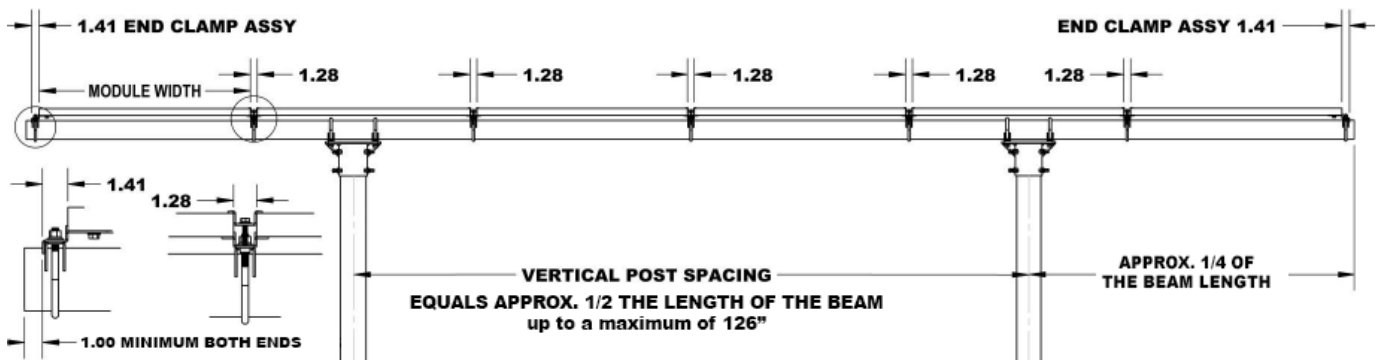
This is the *minimum* length required. There is no problem if the Horizontal Beam is longer.

EXAMPLE: Modules are 39.5-IN wide. Quantity of modules is 6

$4.82 + (6 \times 39.5) + ((6-1) \times 1.28) = 248.22$ inches (or 20' 8-1/4")

Schedule 40 and 80 steel pipe is usually supplied in 21-FT lengths (252-IN long), so in the example above, 6 PV modules that are 39.5-IN wide, will fit nicely. However, if the PV modules are wider than 40.1-IN, only 5 of them will fit on a 21-FT length of 3-IN pipe.

Note: Tamarack Solar's 3-IN Pipe Coupler (# 91252) can be used to join two 3-IN pipes, sold separately.



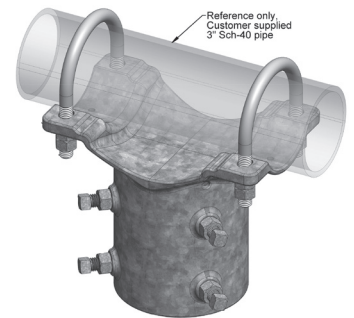
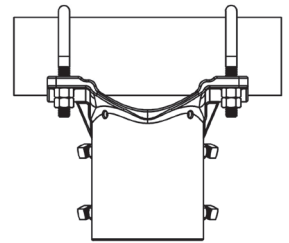
When using a **single vertical post** (4-IN Sched-40 or -80 pipe), center beam over vertical post. If mounting an odd number of modules (1 or 3) there will be a module centered directly over the center of the Pole Cap. If mounting an even number of modules (2 or 4), there will be a MID Clamp directly over the center of the Pole Cap.

When using **2 vertical posts**, determine the post center-to-center spacing by measuring the total length of the horizontal beam, and dividing by 2. That measurement will place half of the beam between the two posts, and a quarter of the beam at each end. However, make certain that the Pole Caps will not be located where they will interfere with placement of any PV module clamps. This is best done by marking out the solar module layout on the 3-IN horizontal beam (with 1.28-IN between them for the MID Clamps). The posts should be roughly centered in the middle of the PV modules placed where the posts are located, as per the diagram above.

If using **3 vertical posts** (sometimes required with 5 or 6 modules), it's important to mark out the proper layout on the 3-IN horizontal beam beforehand. Begin by placing the middle post in the center of the beam. To ensure the two outer posts are in a place that will not interfere with the PV module clamps, mark out the locations of the PV modules on the 3-IN pipe beam, and place the two outer posts and Pole Caps roughly in the center of the two end PV modules of the array. **NOTE:** If three posts are required, it is very difficult to line up three posts set in concrete perfectly. We recommend that the two outer 4-IN posts be set into place first, and for the concrete to cure for at least 24 hours before installing the middle post. After the concrete has sufficiently cured, place the Pole Caps on the outer two posts and install the 3-IN horizontal beam on them. Then the center 4-In post can be hung from the 3-IN beam and into the middle foundation hole, lining it up with the other two posts. The concrete can then be poured into the middle hole. Be sure that the 3-IN horizontal beam is not sagging while doing this. Brace the beam, if necessary, to keep it straight and level.

Assemble Pole Cap(s) and Horizontal Beam

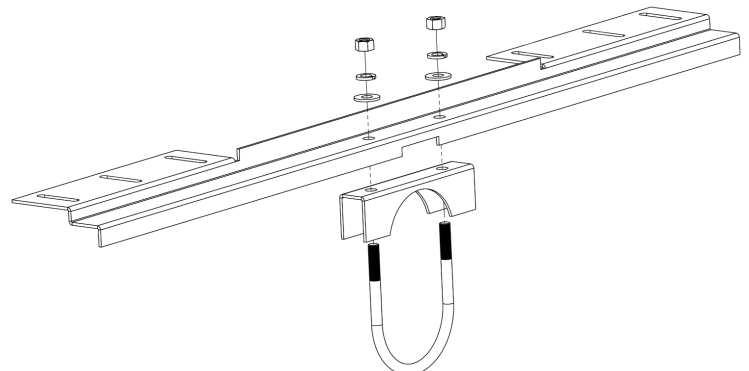
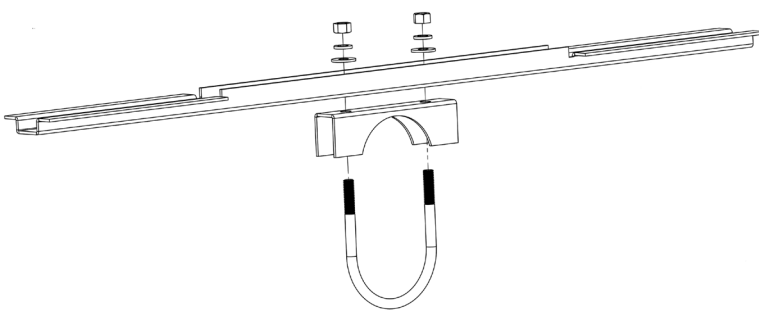
- Place Pole Cap(s) on 4-IN vertical post(s). Do not tighten set-screws at this time.
- Place Horizontal Beam pipe onto Pole Cap casting.
- Place 1/2-IN U-bolts over the Horizontal beam and through the holes in the Cap.
- Loosely attach U-bolts with (4) 1/2-IN nuts.
- Align Horizontal Beam approximately east to west and torque the Pole Cap set-screws to 40 FT/LBs.
- Tighten the jam nuts to prevent the screws from backing off over time.
- Tighten the nuts on the U-bolts just enough to keep the Horizontal Beam from rotating as you install the modules. **Do not** fully torque down these nuts until after you set the final array angle later in the installation.
- Save the additional 4 nuts to lock the U-bolts after torquing later in the installation.



Install Module Clamps

NOTE – if mounting only a single solar module, only two END Clamps are used, no MID Clamps.

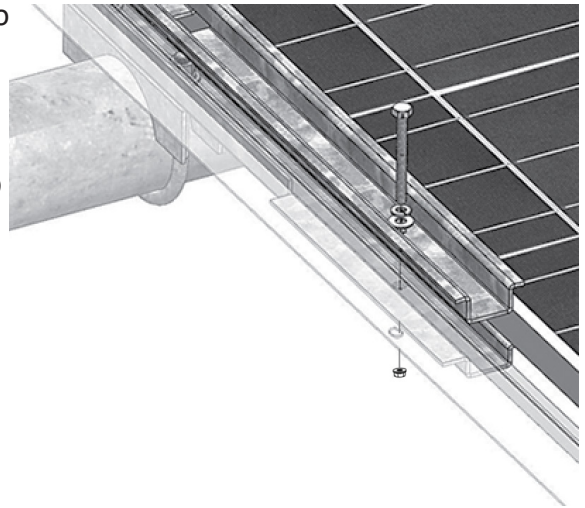
- Position and place the MID Clamps and END Clamps onto the Main Beam at the marked locations. See the spacing info in Horizontal Beam Length and Post Placement section on page 5. Leave an extra 1/4-IN of space when placing END Clamps to allow for easy insertion of the module.
- Use a level to put each MID and END Clamps in a horizontal position before tightening the U-bolts. Tighten the U-bolt nuts just enough to hold the horizontal position as you place solar modules onto them in the next steps. You will need to slide the clamps on the pipe slightly after each solar module is placed to ensure all module frames and clamps are making contact with each other.



Module Clamp Installation (cont'd)

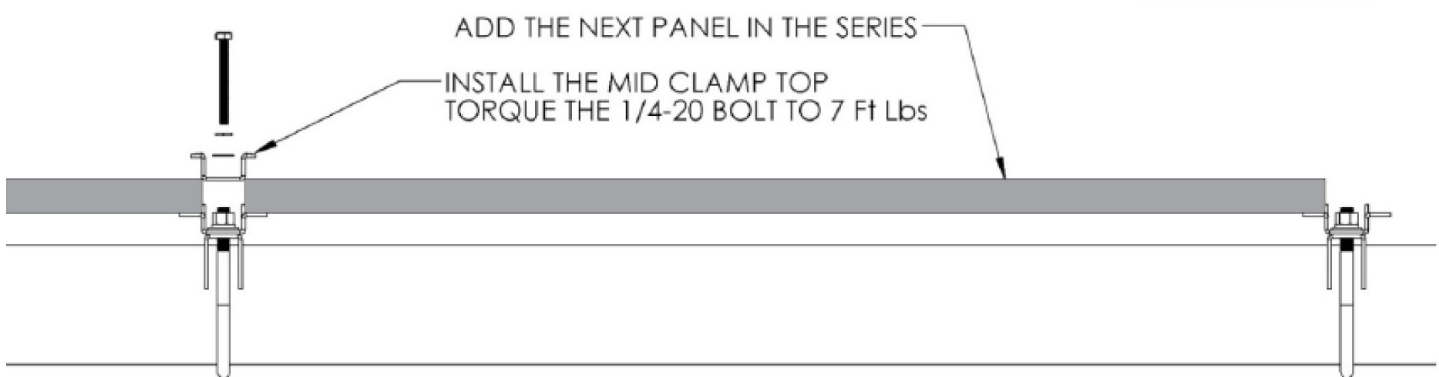
MID Clamp Installation (skip this step if installing a single module PGRM/1P1)

- Start in the center of the Main Beam. Lay the first module onto the flat portion on 1/2 of the clamp base.
- Center the module in the north/south direction to overhang equally past the clamp.
- Loosen the next MID Clamp U-bolt (for PGRM/2P1 skip to END Clamp installation) and move it against the other side of the module. Ensure module is firmly against both clamps to hold module in position. Re-tighten U-bolt to hold position.
- Add modules one at a time. Repeat this procedure in both directions.
- Install MID Clamp tops with the 1/4 x 2.5-IN hex bolts, flat & lock washers, from the top, *after* the MID Clamps have been moved tight against the module frames. Thread flange nut onto the bolt from the bottom.



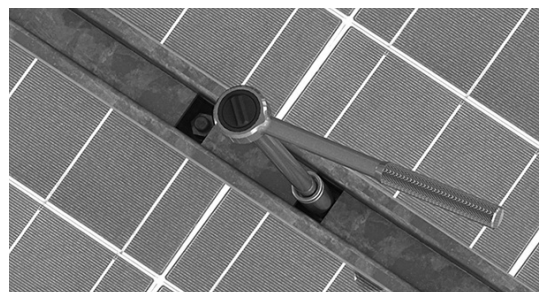
IMPORTANT TIPS

- » Be sure that the bolt holes in the top part of each clamp line up with the holes in the bottom part of the clamp.
- » We recommend using anti-sieze compound on these bolts.
- » Torque to 84 in-lbs or 7 ft-lbs (reduce by 20%, if using anti-sieze compound). **TO AVOID DAMAGE TO THE BOLT AND FASTENER, DO NOT OVERTIGHTEN. DO NOT USE AN IMPACT DRIVER.**
- » The flanges on the top part of the clamp will pull downward on the top of the module frames when the bolts are tightened.



Tighten MID Clamp U-Bolts

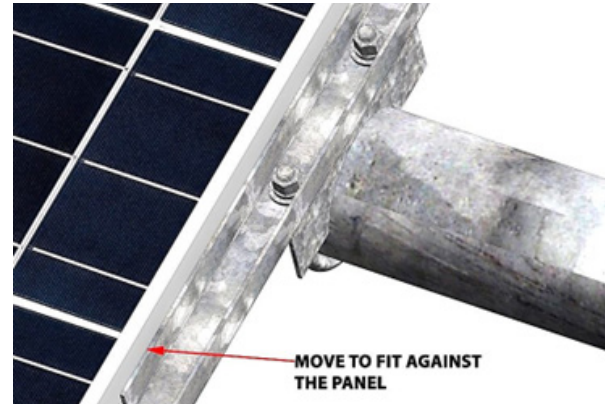
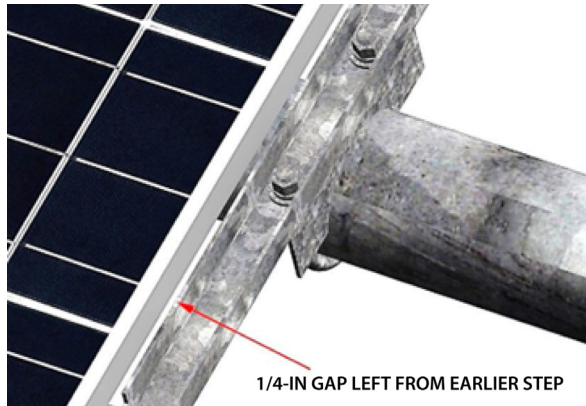
As each module clamp is positioned tight against module frames, tighten the U-Bolt nuts through the square access holes on the top of the top clamps. Torque the U-Bolt nuts to 240 in-lbs or 20 ft-lbs (reduce by 20% if using anti-sieze compound).



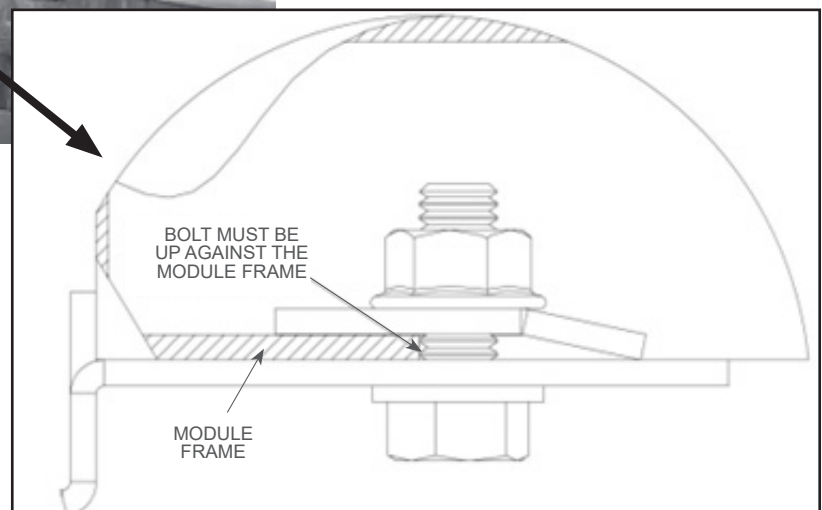
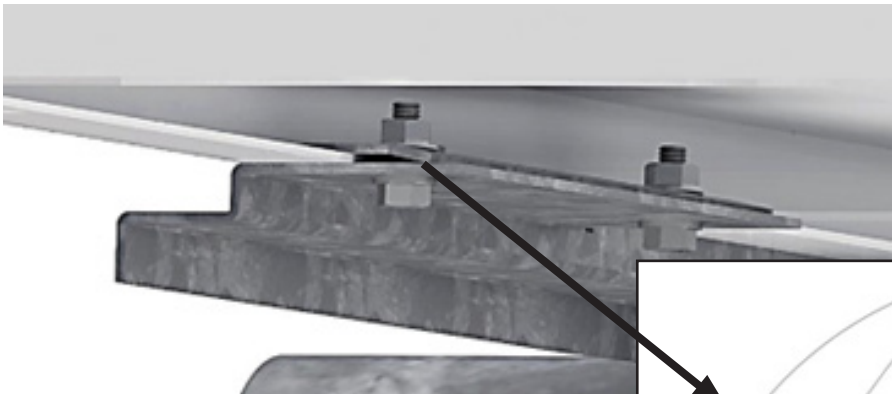
Module Clamp Installation (cont'd)

END Clamp Installation

- If installing more than one module, starting at one end of the array, place solar module against the last MID Clamp, and rest the other side on the bottom, flat portion of the END Clamp to hold it up.



- Loosen the END Clamp U-Bolt, if necessary, and slide until END Clamp sits firmly against the solar module frame. Re-tighten to hold position.
- Choose frame clamp slots - There are slots in the END Clamp base to use for the module clamp. Choose two of the slots that place the frame clamp closest to the mounting hole in the solar module frame.
- Attach Panel Frame Clamps to the END Clamp base with the 5/16-18 x 7/8-IN bolt flange nut and washer as shown in image below. Torque to 144 in-lbs or 12 ft-lbs (reduce by 20% if using anti-sieze compound).
NOTE: The Panel Frame Clamp must be resting on the inside of the solar module frame with bolts against the solar module frame.
- Tighten the U-Bolt nuts on the END Clamps to 240 in-lbs or 20 ft-lbs (reduce by 20% if using anti-sieze).



Set Final Angle

All modules should be horizontal at this point.

- Check to make sure all of the module clamp bolts and MID and END clamp U-bolts are tightened to the proper torque specifications before proceeding. See page 2.
- Slightly loosen all U-Bolt nuts on the PGRM Pole Cap(s).
- Mounts with more than 2 modules will require 2 people for this step. While supporting the modules on both ends of the array, rotate the entire array as one unit, to the desired angle and re-tighten the U-bolt nuts on the PGRM Pole Cap(s). Torque pole cap bolts to 40 ft-lbs (reduce by 20% if using anti-sieze compound) to lock the angle.
- After all nuts on the Pole Cap U-bolts are fully torqued, add a second nut to each U-bolt below the first and tighten firmly to lock the first nut in place. You will have a total of (4) nuts on each U-bolt.