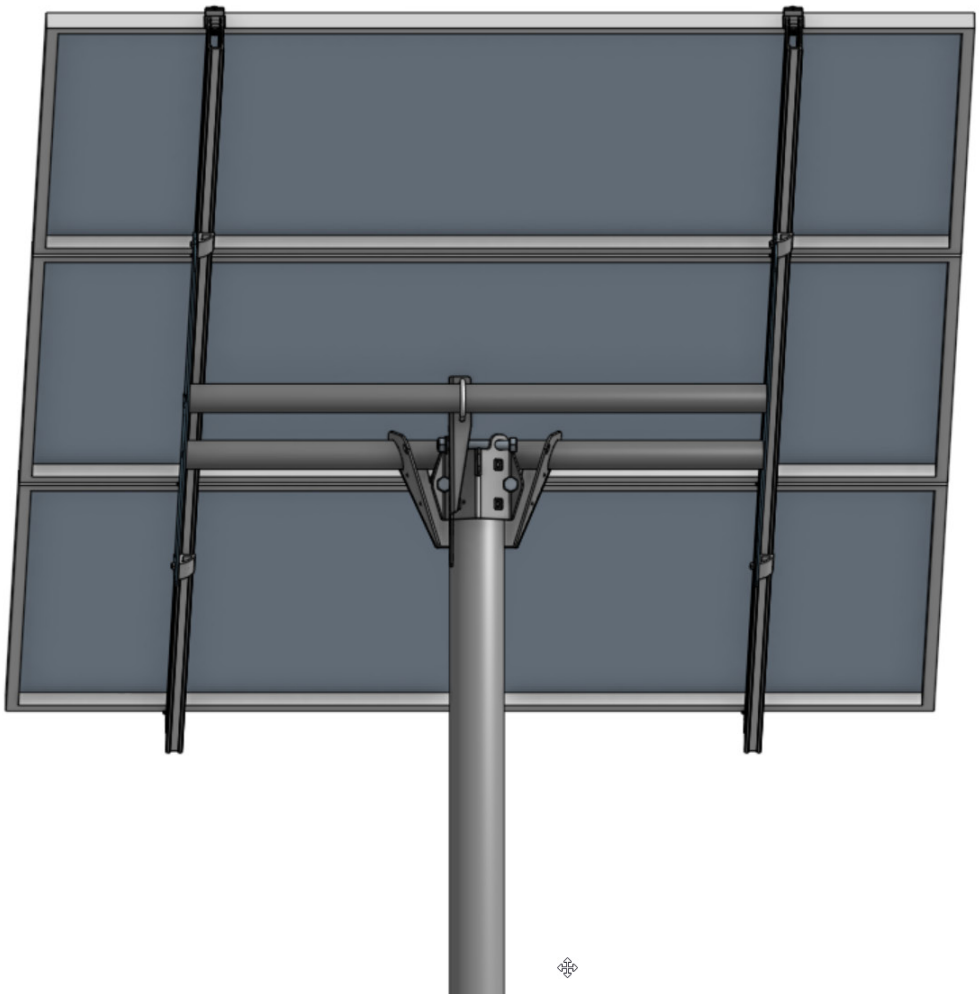
Tamarack Solar Products

Installation Manual

For Models TTP-2, TTP-3

TTP-23-MAN 2022 Edition v2



90286 TTP-2 2 Module Top of Pole Mount
90293 TTP-3 3 Module Top of Pole Mount

Disclaimer

This manual describes proper installation procedures and provides necessary standards required for product reliability. Warranty details are available on our website. www.tamaracksolar.com
All installers must thoroughly read this manual and have a clear understanding of the installation procedures prior to installation.
Failure to follow the proper installation procedures may result in equipment failure, potentially causing property damage or injury to persons or animals.
Structural parts of this mount are made with painted steel which will show signs of rust in areas that get scratched during assembly. It is good practice to repaint scratched parts after assembly.

Installer Responsibilities

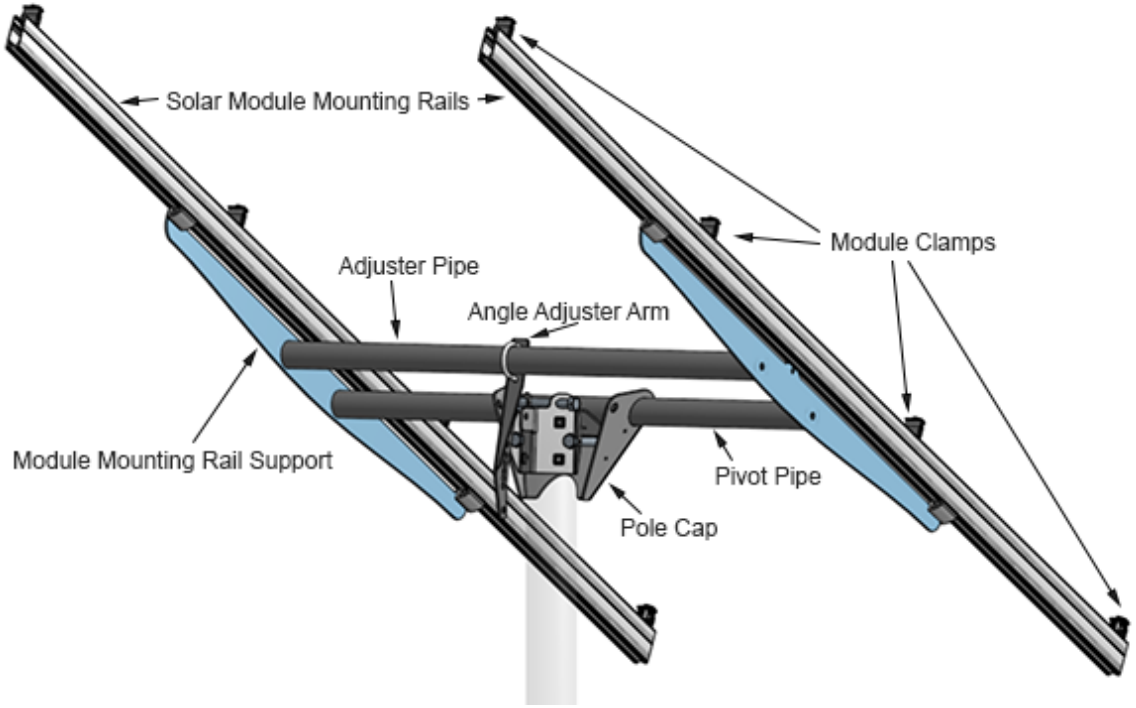
- Follow all applicable local or national building and fire codes, including any that may supersede this manual.
- Electrical installation should be conducted by a licensed and bonded electrician or solar contractor.
- Module maintenance or removal must not break the bonding path of the system.
- Ensure all products used are appropriate for the installation and array under the site's loading conditions.
- Use only Tamarack parts or parts approved by Tamarack; substituting parts may void any applicable warranty.
- Comply with all applicable fire codes including, but not limited to, keeping walkways clear.
- Ensure bare copper grounding wire does not contact aluminum and zinc-plated steel components, to prevent risk of galvanic corrosion.
- If loose components or loose fasteners are found during periodic inspection, retighten immediately. If corrosion is found, replace affected components immediately.
- Provide an appropriate method of direct-to-earth grounding according to the latest edition of the National Electrical Code, including NEC 250: Grounding and Bonding, NEC 690: Solar Photovoltaic Systems, and CSA C22.1, Safety Standard for Electrical Installations, Canadian Electrical Code, Part 1
- Disconnect AC power before servicing or removing microinverters and power optimizers.
- Review module manufacturer's documentation to ensure compatibility and compliance with warranty terms and conditions.
- Maximum Series Fuse Rating is 20 Amps.

Technical Support: 707-234-8107 or 800-819-7236 ext.556

Tools Required:

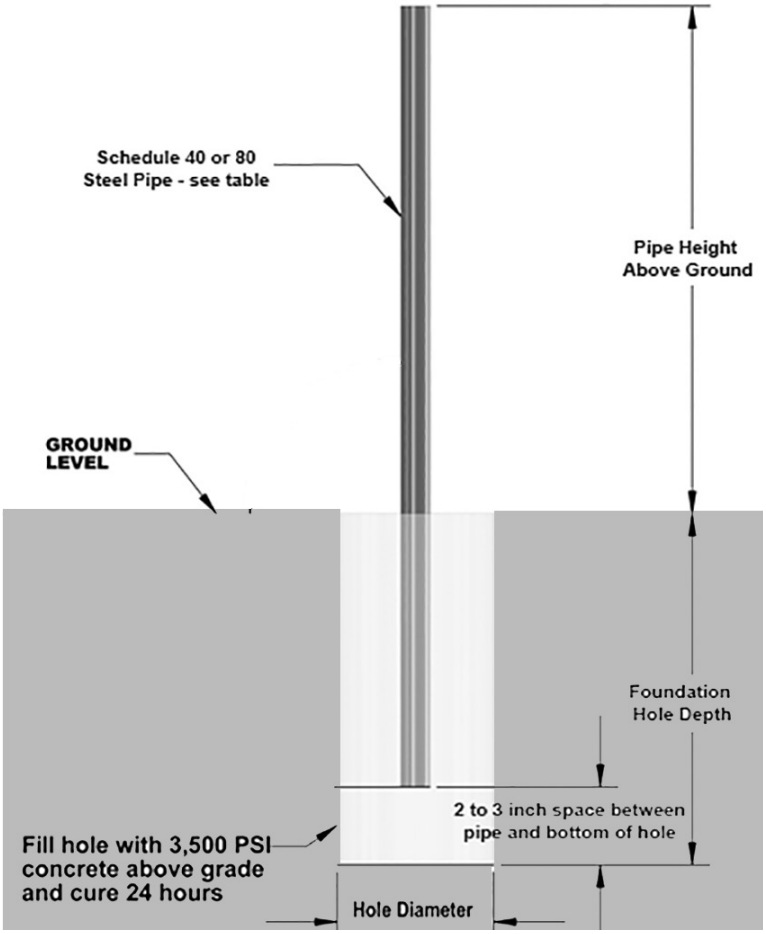
- 1- 1/8-inch Socket
- 1-1/8-inch Wrench
- 3/4-inch Socket
- 9/16-inch Socket
- 1/2-inch Socket
- Ratchet to fit Sockets
- Crescent Wrench
- Torque Wrenches (settings range from 6 to 100 foot-pounds. This may require multiple wrenches)
- Tape Measure
- Angle Finder
- Compass
- Ladder

TTP-2 and TTP-3 Pole Mount Components



	Part #	Part Description	TTP-2	TTP-3
Box 1 Cap Assembly and Hardware	53-1001	Pole Cap, Pivot 4-inch pipe, 2-inch holes	1	1
	53-1002	Pole Cap Backplate	1	1
	53-1013	Tilt Adjuster Arm	1	1
	53-1024	Pole Top Cover, 4-inch	1	1
	TTP-23-MAN	Manual, TTP2 and TTP3	1	1
	26-2107	Pole Cap Bolts 3/4 -10 x 7-inch	2	2
	26-2106	Pole Cap Top Support Bolt 3/4-10 x 6-inch	1	1
	26-2113	Pole Cap FlangeNut 3/4-10	3	3
	26-2141	Set Bolts 1/2-13 x 1-1/2-inch	6	6
	26-2122	Hex Bolt ½-13 x 1 ½" for Adjuster	1	1
	26-2125	Flange Nut ½ - 13 for Adjuster	1	1
	26-2129	Adjuster U-Bolt 3/8-inch x 3-1/8-inch	1	1
	26-2121	Hex Bolt ½-13 x 1-1/4-inch	4	4
	26-2133	Split Washer 1/2-inch	4	4
	26-2136	Flat Washer 1/2-inch	4	4
	89938	Module Rail Splice with Bolts and Nuts	0	2
	88832	Module Mounting Clamp	6	8
	88795	Rail Mounts	4	4
	88788	Module Rail End Caps	4	4
	88931	Ground Lug	1	1
	88971	Module Lead Clips	6	9
Box 2	53-4048	Support Pipe 2-inch Sch 40 x 48-inch	2	2
Box 3 Module Mounting Rails	89488	3.1 Rail 85-inch	2	0
	90488	3.1 Rail 65-inch	0	4
	53-1107	Rail Support Blade 5-foot	2	2

Foundation Hole and Pole Guidelines



- The suggestions below are recommendations only. It is the installer's responsibility to validate foundation parameters prior to installation, 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.
- If you are planning to make seasonal adjustments to the solar array angle, use the steepest angle that you plan to use for foundation and pipe sizing to insure that the pole and foundation are strong enough to support the array, and that the desired minimum ground clearance is maintained, at all projected angles.
- Highlighted lines in the tables on the next 2 pages require schedule 80 pipe for the main support pole.
- Dig hole according to recommended depth and diameter. Remove or properly compact any loose material at the bottom of the hole.
- The pipe lengths listed in the following tables are based on having the pole pipe installed 2-3 inches from the bottom of the dug holes. Use a brick, concrete block, tiles, or other non-organic solid material at the bottom of the hole to support the pole on, allowing it to be raised above the bottom of the hole and allowing the concrete to fully encapsulate the pipe pole. If using a thicker material, be sure to allow for the added thickness when calculating the above-ground and total pipe lengths.
- Set pipe in hole and use a level to insure that it is straight and plumb in all directions.
- Brace pipe to prevent movement while pouring concrete. Pouring so that concrete is in direct contact with the soil is recommended. If forming or using sonotube, properly compact backfill. Allow concrete to cure for recommended length of time.

Soil Classifications

- If in doubt about the soil type and holding strength, consult a local engineer.
- Class 3 - Sandy Gravel and/or Gravel - Lateral Bearing Pressure - 200 lbs/sq ft below natural grade
- Class 4 - Sand; silty sand, clayey sand, silty gravel, and clayey gravel - Lateral Bearing Pressure - 150 lbs/sq ft below natural grade
- Class 5 - Clay, sandy clay, silty clay, silt and sandy silt - Lateral Bearing Pressure - 100 lbs/sq ft below natural grade

TTP-2 For Array Ground Clearance of 3 Feet

Foundation Hole Depth, Height of Pole Above Ground and Total Pole Length for **Ground Clearance of 3 Feet** at Lowest Part of the Array & Exposure Catgory B For Various Soil Class and Foundation Hole Diameter. Vertical Pipe is 4-inch Schedule 40. Highlighted sections in the table below require 4-inch Schedule 80 Pipe.

Soil Type →			Class 3				Class 4				Class 5			
Foundation Diameter →			24"		36"		24"		36"		24"		36"	
Array Tilt Angle ↓	Wind Speed (mph) ↓	Pipe Above Ground (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)
20°	100	4.1	2.5	6.4	2.1	6.0	2.8	6.7	2.4	6.3	3.3	7.2	2.8	6.7
	120		2.9	6.8	2.4	6.3	3.2	7.1	2.7	6.6	3.8	7.7	3.2	7.1
	140		3.2	7.1	2.8	6.7	3.6	7.5	3.1	7.0	4.3	8.2	3.6	7.5
30°	100	4.7	2.9	7.3	2.5	6.9	3.3	7.7	2.8	7.2	3.8	8.2	3.3	7.7
	120		3.4	7.8	2.9	7.3	3.8	8.2	3.2	7.6	4.4	8.8	3.8	8.2
	140		3.8	8.2	3.2	7.6	4.3	8.7	3.6	8.0	5.0	9.4	4.3	8.7
40°	100	5.1	3.3	8.2	2.8	7.7	3.7	8.6	3.2	8.1	4.3	9.2	3.7	8.6
	120		3.8	8.7	3.2	8.1	4.3	9.2	3.6	8.5	5.0	9.9	4.3	9.2
	140		4.3	9.2	3.7	8.6	4.8	9.7	4.1	9.0	5.7	10.6	4.8	9.7
50°	100	5.6	3.6	8.9	3.1	8.4	4.0	9.3	3.4	8.7	4.7	10.0	4.0	9.3
	120		4.1	9.4	3.5	8.8	4.6	9.9	4.0	9.3	5.5	10.8	4.6	9.9
	140		4.7	10.0	4.0	9.3	5.2	10.5	4.5	9.8	6.2	11.5	5.2	10.5
60°	100	5.9	3.8	9.4	3.3	8.9	4.3	9.9	3.7	9.3	5.0	10.6	4.3	9.9
	120		4.4	10.0	3.8	9.4	4.9	10.5	4.2	9.8	5.8	11.4	4.9	10.5
	140		5.0	10.6	4.2	9.8	5.6	11.2	4.7	10.3	6.6	12.2	5.6	11.2

TTP-2 For Array Ground Clearance of 6 Feet

Foundation Hole Depth, Height of Pole Above Ground and Total Pole Length for **Ground Clearance of 6 Feet** at Lowest Part of the Array & Exposure Catgory B For Various Soil Class and Foundation Hole Diameter. Vertical Pipe is 4-inch Schedule 40. Highlighted sections in the table below require 4-inch Schedule 80 Pipe.

Soil Type →			Class 3				Class 4				Class 5			
Foundation Diameter →			24"		36"		24"		36"		24"		36"	
Array Tilt Angle ↓	Wind Speed (mph) ↓	Pipe Above Ground (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)
20°	100	7.1	2.9	9.8	2.5	9.4	3.3	10.2	2.8	9.7	3.8	10.7	3.3	10.2
	120		3.3	10.2	2.9	9.8	3.7	10.6	3.2	10.1	4.4	11.3	3.7	10.6
	140		3.8	10.7	3.2	10.1	4.2	11.1	3.6	10.5	4.9	11.8	4.2	11.1
30°	100	7.7	3.4	10.8	2.9	10.3	3.8	11.2	3.2	10.6	4.4	11.8	3.8	11.2
	120		3.9	11.3	3.3	10.7	4.3	11.7	3.7	11.1	5.1	12.5	4.3	11.7
	140		4.4	11.8	3.8	11.2	4.9	12.3	4.2	11.6	5.7	13.1	4.9	12.3
40°	100	8.1	3.8	11.7	3.3	11.2	4.2	12.1	3.6	11.5	4.9	12.8	4.2	12.1
	120		4.4	12.3	3.7	11.6	4.9	12.8	4.2	12.1	5.7	13.6	4.9	12.8
	140		4.9	12.8	4.2	12.1	5.5	13.4	4.7	12.5	6.4	14.3	5.5	13.4
50°	100	8.6	4.1	12.3	3.5	11.8	4.6	12.9	3.9	12.2	5.3	13.6	4.6	12.9
	120		4.7	13.0	4.0	12.3	5.3	13.6	4.5	12.8	6.1	14.4	5.3	13.6
	140		5.3	13.6	4.5	12.8	5.9	14.2	5.1	13.4	6.9	15.2	5.9	14.2
60°	100	8.9	4.3	12.9	3.7	12.3	4.8	13.4	4.1	12.7	5.6	14.2	4.8	13.4
	120		5.0	13.6	4.3	12.9	5.6	14.2	4.8	13.4	6.5	15.1	5.6	14.2
	140		5.6	14.2	4.8	13.4	6.3	14.9	5.4	14.0	7.3	15.9	6.3	14.9

TTP-3 For Array Ground Clearance of 3 Feet

Foundation Hole Depth, Height of Pole Above Ground and Total Pole Length for **Ground Clearance of 3 Feet** at Lowest Part of the Array & Exposure Catgory B For Various Soil Class and Foundation Hole Diameter. Vertical Pipe is 4-inch Schedule 40. Highlighted sections in the table below require 4-inch Schedule 80 Pipe.

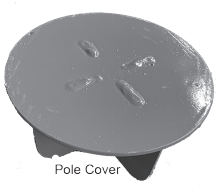
Soil Type →			Class 3				Class 4				Class 5			
Foundation Diameter →			24"		36"		24"		36"		24"		36"	
Array Tilt Angle ↓	Wind Speed (mph) ↓	Pipe Above Ground (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)
20°	100	4.7	3.0	7.5	2.5	7.0	3.3	7.8	2.8	7.3	3.9	8.4	3.3	7.8
	120		3.5	7.9	2.9	7.4	3.8	8.3	3.3	7.8	4.5	9.0	3.8	8.3
	140		4.0	8.4	3.3	7.8	4.3	8.8	3.7	8.2	5.1	9.6	4.3	8.8
30°	100	5.5	3.6	8.9	3.1	8.4	4.0	9.3	3.4	8.7	4.7	10.0	4.0	9.3
	120		4.2	9.5	3.6	8.9	4.6	9.9	3.9	9.2	5.4	10.7	4.6	9.9
	140		4.7	10.0	4.0	9.3	5.2	10.5	4.4	9.7	6.1	11.4	5.2	10.5
40°	100	6.2	4.1	10.1	3.5	9.5	4.5	10.5	3.9	9.9	5.3	11.3	4.5	10.5
	120		4.7	10.7	4.0	10.0	5.3	11.2	4.5	10.5	6.2	12.2	5.2	11.2
	140		5.3	11.3	4.5	10.5	5.9	11.9	5.0	11.0	7.0	13.0	5.9	11.9
50°	100	6.8	4.4	11.0	3.8	10.4	4.9	11.5	4.2	10.8	5.8	12.4	4.9	11.5
	120		5.1	11.7	4.4	11.0	5.7	12.3	4.8	11.4	6.6	13.3	5.6	12.1
	140		5.7	12.3	4.9	11.5	6.4	13.0	5.4	12.0	7.5	14.1	6.2	13.0
60°	100	7.3	4.7	11.8	4.0	11.1	5.2	12.3	4.5	11.6	6.1	13.2	5.2	12.3
	120		5.4	12.4	4.6	11.7	6.0	13.1	5.2	12.3	7.1	14.3	6.0	13.1
	140		6.1	13.0	5.2	12.3	6.8	13.9	5.8	12.9	8.0	15.1	6.8	13.9

TTP-3 For Array Ground Clearance of 6 Feet

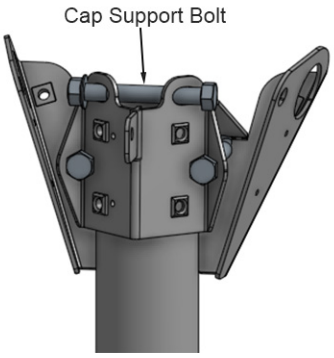
Foundation Hole Depth, Height of Pole Above Ground and Total Pole Length for **Ground Clearance of 4 Feet** at Lowest Part of the Array & Exposure Catgory B For Various Soil Class and Foundation Hole Diameter. Vertical Pipe is 4-inch Schedule 40. Highlighted sections in the table below require 4-inch Schedule 80 Pipe.

Soil Type →			Class 3				Class 4				Class 5			
Foundation Diameter →			24"		36"		24"		36"		24"		36"	
Array Tilt Angle ↓	Wind Speed (mph) ↓	Pipe Above Ground (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)	Hole Depth (ft)	Total Pipe Length (ft)
20°	100	7.7	3.4	10.9	3.0	10.5	3.8	11.3	3.3	10.8	4.5	12.0	3.8	11.3
	120		3.9	11.4	3.4	10.9	4.4	11.9	3.8	11.3	5.2	12.7	4.4	11.9
	140		4.4	11.9	3.8	11.3	5.0	12.5	4.3	11.8	5.8	13.3	5.0	12.5
30°	100	8.5	4.1	12.4	3.5	11.8	4.5	12.8	3.9	12.2	5.3	13.6	4.5	12.8
	120		4.7	13.0	4.0	12.3	5.2	13.5	4.5	12.8	6.1	14.4	5.2	13.5
	140		5.3	13.6	4.5	12.8	5.9	14.2	5.0	13.3	6.9	15.2	5.9	14.2
40°	100	9.2	4.5	13.5	3.8	12.8	5.0	14.0	4.3	13.3	5.8	14.8	5.0	14.0
	120		5.2	14.2	4.4	13.4	5.8	14.8	4.9	13.9	6.7	15.7	5.8	14.8
	140		5.8	14.8	5.0	14.0	6.5	15.5	5.5	14.5	7.6	16.6	6.5	15.5
50°	100	9.8	4.9	14.5	4.2	13.8	5.5	15.1	4.7	14.3	6.4	16.0	5.5	15.1
	120		5.7	15.3	4.8	14.4	6.3	15.9	5.4	15.0	7.4	17.0	6.3	15.9
	140		6.4	16.0	5.4	15.0	7.1	16.7	6.1	15.7	8.3	17.9	7.1	16.7
60°	100	10.3	5.2	15.3	4.5	14.6	5.8	15.9	5.0	15.1	6.8	16.9	5.8	15.9
	120		6.0	16.1	5.2	15.3	6.7	16.8	5.7	15.8	7.8	17.9	6.7	16.8
	140		6.7	16.8	5.8	15.9	7.5	17.6	6.4	16.5	8.8	18.9	7.5	17.6

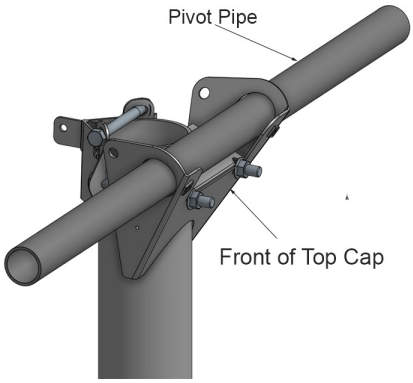
Step One - Pole Cap Assembly

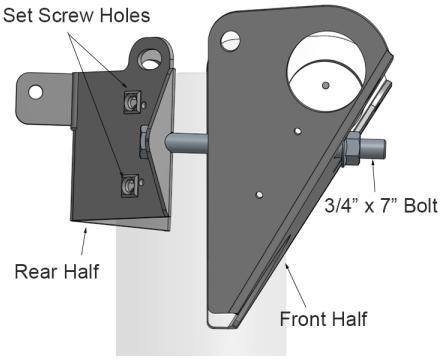


- Place the Pole Cover on top of the mounting pole.
- Install the 3/4 x 6-inch Cap Support Bolt through the two top holes in the rear half of the cap and install nut and tighten firmly. This bolt keeps the cap at the top of the pole.



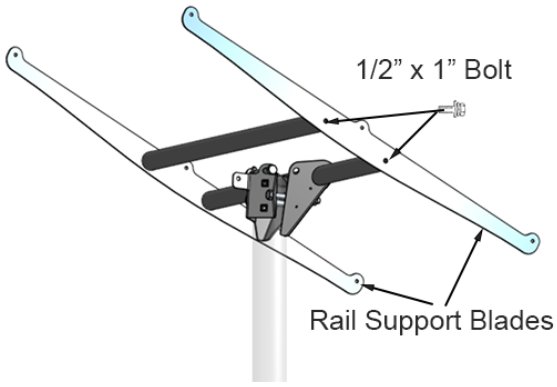
- Put the two 3/4 x 7-inch bolts into the back half of the mount, then through the front half and put the nut losely on the bolts.
- Slide the assembled Cap over the 4-inch vertical pole.
- Rotate the cap on the pole so that the front (larger) half of the cap is on the side of the pole the the array will be facing.
- Loosely install the four 1/2-inch set screws in the threaded holes on the rear half of the cap. Do not tighten at this time.
- Securely tighten the two 3/4-inch bolts in the cap assembly, but do not fully torque to spec until final assembly is complete.





Step Two - Assemble Frame

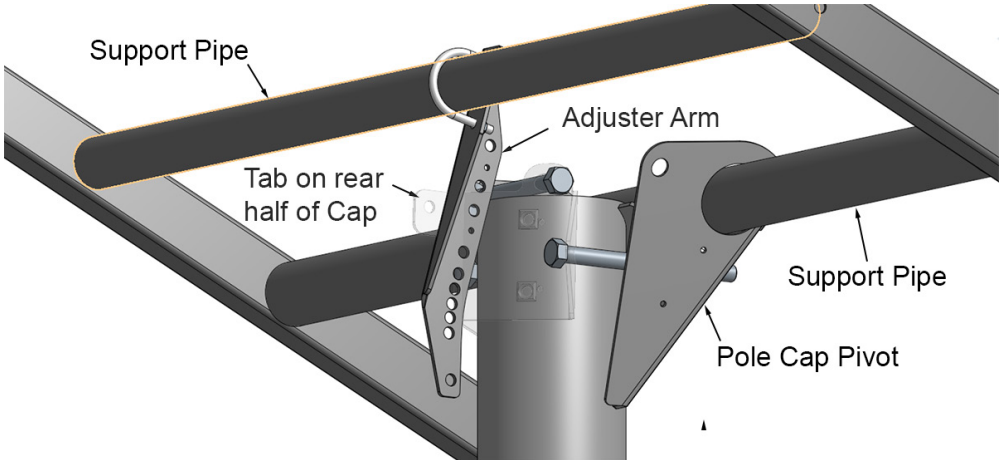
- Slide one of the 2" Support Pipes (2-3/8-inch O.D.) through the holes on the side of the front half of the Pole Cap. Center the pipe in the Pole Cap.
- Install a Rail Support Blade to each side of this Support Pipe with a 1/2-13 x 1-1/4-inch bolt, flat washer and split lock washer. Leave these bolts hand-tight until you install the second support pipe.



- Attach the other 2-inch Support Pipe (2-3/8-inch O.D.) between the two Rail Support Blades with a 1/2-13 x 1-1/4-inch bolt, flat washer and split lock washer on each side. This support must be above the back section of the cap when it is attached between the blades. Tighten the 4 bolts to 45 ft-lbs.

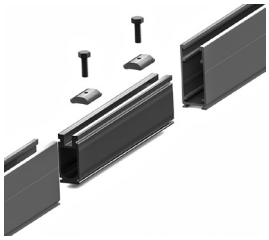
Step Three - Assemble Adjuster Arm

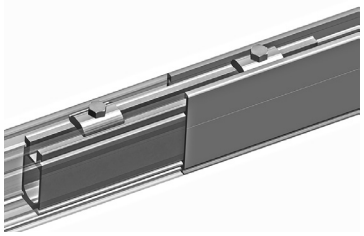
- Install the Adjuster Arm as shown in the image below. Attach it to the Support Pipe that does not go through the holes in the Pole Cap with a 2-3/8-inch U-bolt and two flange nuts. Tighten hand tight to allow it to be alligned with the tab on the Pole Cap Backplate.
- Attach the Adjuster Arm to the tab provided on the Pole Cap Backplate with a 1/2-13 x 1-1/2-inch bolt and nut.
- Use the hole that makes the Rail Support Blades approximately horizontal for assembly purposes. This will be readjusted in final assembly.



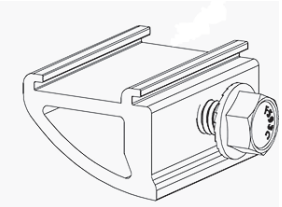
Step Four - Module Mounting Rail Assembly (for TTP-3 only)

- Assemble a 127.5-inch Module Mounting Rail by splicing an 85-inch rail and a 42.5-inch rail section using a rail splice and two 5/16" x 1.125-inch bolts and channel nuts. Slip the splice 5-inches into the end of one rail section, place a channel nut and bolt approximately 2.5-inches from the end and tighten. Slide the second rail section over the splice, butting the rail section ends together, and repeat this process
- Tighten Splice Bolts to 12 ft-lb. If a Module Clamp needs to be placed between the two Splice Bolts, they will need to be loosened to allow it to be inserted.
- Repeat this process for the second Module Mounting Rail.

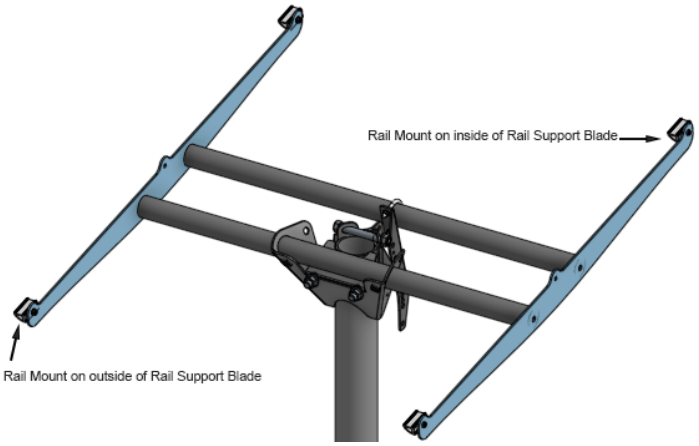




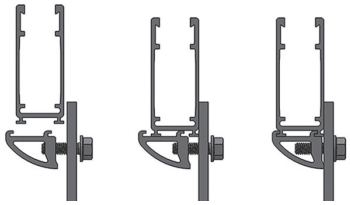
Step Five - Rail Mount Attachment



- Attach a Rail Mount to each of the 4 end holes on the Rail Support Blades. If the length of the solar module being used is less than 70-inches, place the Rail Mounts on the inside of the Rail Support Blades. If the solar module length is 70-inches or more, place the Rail Mounts on the outside of the Rail Support Blades. Leave the bolts on the Rail Mounts loose until the Rails are installed.

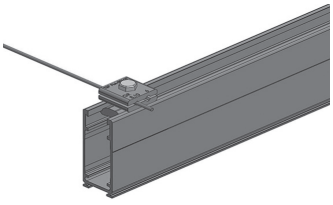


Step Six - Module Mounting Rail Attachment



- Place one of the Module Mounting Rails on the two Rail Mounts installed on the Rail Support Blades, and center it in the north/south direction so it extends past both Rail Mounts the same distance. Make sure that the Rail Mount slips into both of the mounting features on the bottom of the rails (see drawing at right).
- Tighten the the 3/8-inch bolts with a 9/16-inch socket to 18 ft-lbs.
- Repeat above step for the other Module Mounting Rail.

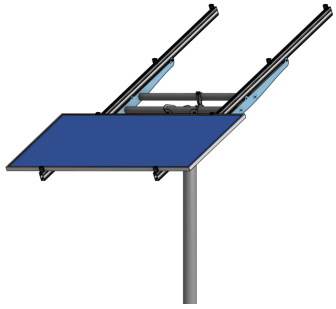
System Grounding



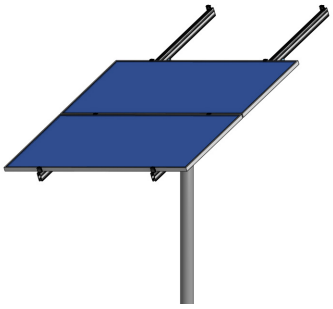
- Tamarack Module Mounting Rails and the PV module frames are electrically bonded together by the Tamarack Module Clamps. This creates a single electrically bonded unit for grounding purposes per UL 2703 requirements. Only one Ground Lug is required to provide equipment grounding for the entire column of PV modules.
- The Ground Lug can be attached at any location desired on either one of the two Module Support Rails.
- Connect the ground lug to the ground wire in the system according to local code.

Mount Solar Modules on Rails

- To center the modules on the rails, calculate the amount of excess Module Mounting Rail length:
  1) Add the width of the modules plus 1/2-inch space between modules.
  2) For TTP-2: subtract the above calculated number from 85-inches.
  For TTP-3 subtract the above calculated number from 127.5-inches.
  3) This will give you the total excess length of the Module Mounting Rails.
- Start module installation at the bottom. To center the column of modules on the rails, place the first two Module Clamps on the rails 1/2 of the total excess rail length from the bottom of the rails. Be sure to put the side of the top clamp with the two bonding pins inward toward the module frame.



- Center the first module east to west over the rails and hold in place. Make sure that the module is straight and level on the rails and tighten the two end clamp bolts to 108 inch-pounds (9 foot-pounds).
- Install one Module Clamp in each rail on the other side of the first module and slide it down so that the inside of the clamp contacts the frame of the first module. The springs will hold the clamps in place prior to tightening. Place the second module on the rails, align it with the first module, and slide down and fully into the two mid-clamps. Tighten the mid-clamp bolts to 144 inch-pounds (12 foot-pounds) to fully secure the module. Install the third module on TTP-3 in the same manor.



- On the top edge of the last module of the first column, install the Module Clamps so that the sides with the two stainless-steel pins are facing in toward the module frame, and the clamp is tight up against the module frame. Tighten the two end clamp bolts to 108 inch-pounds (9 foot-pounds).

Final Assembly

- Set the array tilt to the desired angle and tighten the Tilt Adjuster bolt to 40 ft-lbs.
- Tighten the U-bolt on the Tilt Adjuster to 20 ft-lbs.
- Rotate the array to point in the desired direction. Tighten the 3/4-inch nuts on the Pole Cap to 100 ft-lbs.
- Tighten all of the 1/2-inch set screws on the Pole Cap to 40 ft-lbs with a 3/4-inch socket.

Certified Module List for UL2703 Listing Program

Manufacturer	Model
Aleo	P18/P19/S18/S19/S59/S79.
AU Optronics	PM Series
Astronergy	modules with 30, 35, 40, and 45 mm frames aaSMbbyyC/zz-xxx Where “aa” can be CH or A; "bb" can be 60, 66, or 72; “yy” can be blank, 10 or 12; "C" can M, P, M(BL), M-HC, M(BL)-HC, P-HC, M(DG), or M(DGT); and “zz” can be blank, HV, F-B, or F-BH
Auxin	modules with 40 mm frames AXN6y6zAxxx Where "y" can be M or P; "z" can be 08, 09, 10, 11, or 12; and "A" can be F or T
Axitec	Modules with 35 and 40 mm frames AC-xxxY/aaZZb Where "Y" can be M, P or MH; "aa" can be blank, 125- or 156-; "ZZ" can be 54, 60, 72, 120, or 144; "b" can be S
Boviet	Boviet modules with 35 and 40mm frames - BVMZZaaYY-xxxBcc Where "ZZ" can be 66 or 76; "aa" can be 9, 10 or 12; "YY" is M or P; and "B" can be blank, L or S; and "cc" can be blank, H, H-BF, H-BF-DG, H-HC, H-HC-BF, H-HC-BF-DG, HC-BF or HC-BF-DG]
BYD	BYD modules with 35 mm frames BYDxxxAY-ZZ Where "A" can be M6, P6, MH or PH; "Y" can be C or K; and "ZZ" can be 30 or 36
Canadian Solar	Canadian Solar modules with 30, 32, 35, and 40 mm frames - CSbY-xxxZ Where "b" can be 1, 3 or 6; "Y" can be H, K, L, N, P, U, V, W, X or Y; and "Z" can be M, P, MS, PX, M-SD, P-AG, P-SD, MB-AG, PB-AG, MS-AG, or MS-SD
CentrsoSolar	C and E series.
Certainteed	CertainTeed modules with 35 and 40 frames CTxxxYZZ-AA Where "Y" can be M, P, or HC; "ZZ" can be 00,01, 10, or 11; and "AA" can be 01, 02, 03, or 04
CSUN	Csun modules with 35 and 40 mm frames - YYxxx-zzAbb Where "YY" is CSUN or SST; "zz" is blank, 60, or 72; and "A" is blank, P, M or MM; "bb" is blank, BB, 5BB, BW, or ROOF
Dehui	Dehui modules with 30, 35 and 40mm frames - DH-MYYYZ-xxx Where "YYY" can be 760, 772, 860, 872; and "Z" can be B, F or W
Eco Solargy	ORION 1000 ECOXXXH156P-60, APOLLO 1000 ECOXXXT156M-60, and APOLLO 1000 ECOXXXA156M-60.
ET Solar	30, 35, 40, and 50 mm frames ET-Y6ZZxxxAA Where “Y” can be P, L, or M; “ZZ” can be 60, 72 or 72BH; and “AA” can be GL, WB, WW, BB, WBG, WWG, WBAC, WBCO, WWCO, WWBCO or BBAC
GCL	40mm frame: GCL-P6/72, 35mm frame: GCL-P6/72, GCL-P6/72H, GCL-M6/72, GCL-M6/72H, 35mm frame (Black frame): GCL-P6/60, GCL-M6/60
GigaWatt Solar:	Gigawatt modules with 40 mm frames - GWxxxYY Where “YY” can be either PB or MB
Hanwha Q-Cells	Modules with 32, 35, 40, and 42mm frames aaYY-ZZ-xxx where "aa" can be Q. or B.; "YY" can be PLUS, PRO, PEAK, LINE PRO, LINE PLUS, PLUS DUO or PEAK DUO; and "ZZ" can be G3, G3.1, G4, G4.1, L-G2, L-G2.3, L-G3, L-G3.1, L-G3y, L-G4, L-G4.2, L-G4y, LG4.2/TAA, BFR-G3, BLK-G3, BFR-G3.1, BLK-G3.1, BFR-G4, BFR-G4.1, BFR G4.3, BLK-G4.1, G4/SC, G4.1/SC, G4.1/TAA, G4.1/MAX, BFR G4.1/TAA, BFR G4.1/MAX, BLK G4.1/TAA, BLK G4.1/SC, EC-G4.4, G5, G5/SC, G5/TS, BLK-G5, BLK-G5/SC, BLK-G5/TS, L-G5, L-G5.1, L-G5.2, L-G5.2/H, L-G5.3, G6, G6/SC, G6/TS, G6+/TS, G6+, BLK-G6, L-G6, L-G6.1, L-G6.2, L-G6.3, G7, BLK-G6+, BLK-G6+/AC, BLK-G6+/HL, BLK-G6+/SC, BLK-G6/TS, BLK-G6+/TS, BLK-G7, G7.2, G8, BLK-G8, G8+, BLK-G8+ L-G7, L-G7.1, L-G7.2, L-G7.3, L-G8, L-G8.1, L-G8.2, L-G8.3, L-G8.3/BFF, L-G8.3/BFG, L-G8.3/BGT, ML-G9, BLK ML-G9, ML-G9+, BLK ML-G9+, ML-G10, BLK ML-G10, ML-G10+, BLK ML-G10+, ML-G10.a, BLK ML-G10.a, ML-G10.a+, BLK ML-G10.a+, XL-G9, XL-G9.2, XL-G9.3, XL-G9.3/BFG, XL-G10.2, XL-G10.3, XL-G10.c, XL-G10.d, XL-G10.d/BFG or XL-G10.3/BFG
Hansol	Hansol modules with 35 and 40 frames HSxxxYY-zz Where "YY" can be PB, PD, PE, TB, TD, UB, UD, or UE; and "zz" can be AH2, AN1, AN3, AN4, HH2, HV1, or JH2]
Heliene	Heliene modules with 40 mm frames - YYZZxxxA Where "YY" can be 36, 60, 72, 96, 120 or 144; "ZZ" can be HC, M, P, or MBLK; and "A" can be blank, HomePV, or Bifacial]
HT Solar	HT60-156(M) (NDV) (-F), HT 72-156(M/P)
Hyundai	Hyundai modules with 33, 35, 40 and 50 mm frames - HiY-SxxxZZ Where "Y" can be A, D or S; "S" can be M or S; and "ZZ" can be GI, HG, HI, KI, MI, MF, MG, PI, RI, RG, RG(BF), RG(BK), SG, TI or TG
ITEK	40 and 50 mm frames IT-xxx-YY Where “YY” can be blank, HE, or SE, or SE72
JA Solar	30, 35, 40 and 45 mm frames JAyyzz-bbww-xxx/aa Where “yy” can be M, P, M6 or P6; “zz” can be blank, (K), (L), (R), (V), (BK), (FA), (TG), (FA)(R), (L)(BK), (L) (TG), (R)(BK), (R)(TG), (V)(BK), (BK)(TG), or (L)(BK)(TG); “bb” can be 48, 60, or 72; “ww” can be D09, S01, S02, S03, S06, S09, S10, or S12; and “aa” can be BP, MR, SI, SC, PR, 3BB, 4BB, 4BB/RE, 5BB
Japan Solar	JPS-xxxP-60 (35mm), JPS-xxxM-60 (35mm), JPS-xxx-P-72 (40mm), JPS-xxxM-60-BB (35mm), JPS-xxx-P-72-BB (40mm)
Jinko	35 and 40 mm frames JKMYxxxZZ-aa Where “Y” can either be blank or S; “ZZ” can be M, P, or PP; and “aa” can be blank, 60, 60B, 60H, 60L, 60BL, 60HL, 60HB, 60HBL, 6HBL-EP, 60-J4, 60B-J4, 60B-EP, 60(Plus), 60-V, 60-MX, 7RL3-V, 7RL3-TV, 72, 72B, 72-J4, 72B-J4, 72(Plus), 72-V, 72H-V, 72L-V, 72HL-V, 72-MX, 72H-BDVP, 72HL-TV, or 72HL-V-MX3
Kyocera	KU26x-6MCA where x is 0 or 5.
LG	[LG modules with 35, 40, and 46 mm frames - LGxxxYaZ-bb Where "Y" can be A, E, M, N, Q, S; "a" can be A, 1, 2 or 3 "Z" can be C, K, T, or W; and "bb" can be A3, A5, A6, B3, B6, E6, G3, G4, J5, K4, L5, N5, V5 or V6]
LONGi	[Longi modules with 30, 35 and 40 mm frames - LRa-YYZZ-xxxM Where "a" can be 4, 5 or 6; "YY" can be blank, 60 or 72; and "ZZ" can be blank, BK, BP, HV, PB, PE, PH, HBD, HIB, HIH, HPB, HPH, or HIBD]
Mission Solar	33 and 40 mm frames MSEbbxxxZZaa Where “bb” can be blank or 60A; “ZZ” can be blank, MM, SE, SO, SQ , SR, or TS; and “aa” can be blank, 1J, 4J, 4S, 5K, 5T, 60, 6J, 6S, 6W, 8K, 8T, or 9S
Mitsubishi	Mitsubishi modules with 46 mm frames - PV-MYYxxxZZ Where "YY" can be LE or JE; and "ZZ" can be either HD, HD2, or FB

Certified Module List for UL2703 Listing Program

Manufacturer	Model
NSP	D6M and D6P
Panasonic	30 mm frames EVPVxxxA, Where “A” can be blank or KPanasonic modules with 35 and 40 mm frames VBHNxxxYYzzA Where “YY” can be either KA, RA, SA or ZA; “zz” can be either 01, 02, 03, 04, 06, 06B, 11, 11B, 15, 15B, 16, 16B, 17, or 18; and “A” can be blank, E, G, or N
Peimar	40 mm frames SbxxxYzz Where “b” can be G, M or P; “Y” can be M or P; and “zz” can be blank, (BF) or (FB)
Phono Solar	Phono Solar modules with 35, 40, and 45 mm frames - PSxxxY-ZZ/A Where "Y" can be M, M1, MH, M1H, M4, M4H or P; "ZZ" can be 20 or 24; and "A" can be F, T, U, UH, or TH]
Risen	RSM72-6 (MDG) (M), RSM60-6
REC Solar	REC modules with 30, 38 and 45 mm frames - RECxxxYYZZ Where “YY” can be AA, M, NP, NP2, PE, PE72, TP, TP2, TP2M, TP2SM, TP2S, TP3M or TP4; and “ZZ” can be blank, Black, BLK, BLK2, SLV, 72, or Pure
Renesola	Virtus II with module ratings of 250-260 in increments of 5. 156 series with module ratings of 270-275.
S-Energy	S-Energy modules with 35 and 40mm frames - SABB-CCYYY-xxxZ Where "A" can be C, D, L or N; "BB" can be blank, 20, 25, 40 or 45; "CC" can be blank, 60 or 72; "YYY" can be blank, BDE, MAE, MAI, MBE, MBI, MCE or MCI; and "Z" can be V, M-10, P-10 or P-15
Seraphim Energy Group	Seraphim modules with 30, 35, and 40 mm frames - SEG-aYY-xxxZZ Where "a" can be blank, 6 or B; "YY" can be blank, MA, MB, PA, or PB; and "ZZ" can be blank, BB, BG, BW, HV, WB, WW, BMB, BMA-HV, BMA-BG, BMB-HV
Seraphim USA	Seraphim modules with 30, 35, 40 and 50 mm frames - SRP-xxx-YYY-ZZ Where "xxx" is the module power rating; and "YYY" can be BMA, BMD, 6MA, 6MB, 6PA, 6PB, 6QA-XX-XX, and 6QB-XX-XX; ZZ is blank, BB, BG or HV
Sharp	60 and 72 NUSA-xxx/NUSC-xxx
Silfab	Silfab Modules with 35 and 38 mm frames - SYY-Z-xxxAb Where "YY" can be IL, SA, LA, SG or LG; "Z" can be blank, M, P, or X; "A" can be blank, B, H, M, N; and "b" can be A, C, L, G, K, T, U or X
SolarWorld	Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 31, 33 or 46 mm frames SW-xxx, SolarWorld Sunmodule Plus, Protect, Bisun, XL, Bisun XL, may be followed by mono, poly, duo, black, bk, or clear; modules with 33 mm frames SWA-xxx
Solaria	40 mm frames PowerXT xxxY-ZZ Where “Y” can be R or C; and “ZZ” can be AC, BD, BX, BY, PD, PM, PM-AC, PX, PZ, WX or WZ
Sonali	SS 230 - 265
SunEdison	SunEdison Modules with 35, 40 & 50 mm frames - SE-YxxxZABCDE Where "Y" can be B, F, H, P, R, or Z; "Z" can be 0 or 4; "A" can be B,C,D,E,H,I,J,K,L,M, or N ; "B" can be B or W; "C" can be A or C; "D" can be 3, 7, 8, or 9; and "E" can be 0, 1 or 2
Suniva	Suniva modules with 35, 38, 40, 46, and 50 mm frames - OPTxxx-AA-B-YYY-Z and MVXxxx-AA-B-YYY-Z Where "AA" is either 60 or 72; "B" is either 4 or 5; "YYY" is either 100,101,700,1B0, or 1B1; and "Z" is blank or B
Sunpower	Sunpower standard (G3 or G4) or InvisiMount (G5) 40 and 46 mm frames - SPR-Zb-xxx-YY Where "Z" is either A, E, P or X; “b” can be blank, 17, 18, 19, 20, 21, or 22; and “YY” can be blank, BLK, COM, C-AC, D-AC, E-AC, BLK-E-AC, G-AC, BLK-C-AC, or BLK-D-AC
SunSpark	40 mm frames SYY-xxxZ-A Where “YY” can be MX or ST; and “Z” can be M, MB, M3, M3B, P or W; and "A" can be 60 or 72
Suntech	35, 40 and 50mm frames STPxxxy-zz/aa Where "y" is blank or S; and "zz" can be 20, 24, A60 or A72U; and "aa" can be Vd, Vem, Vfw, Vfh, Wdb, Wde, Wd, or Wfhb
Talesun	Talesun modules with 30, 35 and 40mm frames - TA6yZZaaxxx-b Where "A" can be D or P, "y" can be blank, F, G, H, I, or L; "ZZ" can be 60 or 72; "aa" can be M, M(H), or P; and "b" can be blank, B, T, or (H)
Tesla	Tesla modules with 40 mm frames - TxxxY Where "Y" can be H or S
Trina Solar	Trina Modules with 30, 35, 40 and 46mm frames - TSM-xxxYYZZ Where "YY" can be DD05, DD06, DD14, DE14, DE15, DE15V, DEG15, DEG15VC, DE19, DEG19C.20, DE06X, PA05, PC05, PD05, PD06, PA14, PC14, PD14, PE14, or PE15 ; and "ZZ" can be blank, .05, .05(II), .08, .10, .18, .08D, .18D, 0.82, .002, .00S, 05S, 08S, .20(II), A, A.05, A.08, A.10, A.18, (II), A(II), A.05(II), A.08(II), A.082(II), A.10(II), A.18(II), H, H(II), H.05(II), H.08(II), HC.20(II), HC.20(II), M, M(II), M.05(II), MC.20(II)
Upsolar	UP-MxxxP, UP-MxxxP-B, UP-MxxxM, UP-MxxxM-B
Vikram	40 mm frames VSyy.ZZ.AAA.bb Where "yy" can be M, P, MBB, MH, MS, MHBB, or PBB; "ZZ" can be 60 or 72; "AAA" is the module power rating; and "bb" can be 03.04 or 05
Yingli	YL xxx P-29b, YLM 60, YLM 72, YGE, YGE-VG, YLM, YL xxx P-35b, YL xxx D-30b, YL xxx D-36b
Waaree	AC, Adiya 60/72 Mono/Poly Black, Adiya 60/72 Multi
Winaico	35 and 40 mm frames Wsy-xxxZa Where "y" can be either P or T; "Z" can be either M, P, or MX; and "a" can be blank or 6

Certified Power Optimizer List for UL2703 Listing Program

Manufacturer	Model
Enphase	M250-72, 250-60, M215-60, C250-72, S230, S280, IQ 6, IQ 6+, IQ 7, IQ 7+, IQ 7X, Q Aggregator
Solar Edge	P300, P320, P340, P370, P400, P405, P505, P600, P700, P730, P800p, P800s, P850, P860