

Polar Bear® III 3 Degree, First Solar Installation Manual

Document Number 9910036 Rev D

June 2016



System Fire Class Rating: Class A for low slope roofs with First Solar Series 2, 3, and 4 Modules

Mechanical Load Rating: See [Appendix C: UL 2703 Electrical Grounding](#)

Revision History

Rev	ECO #	Date	Description of Changes	Approved By
A	C00430	28-JAN-16	3D INITIAL RELEASE	CN
B	C00429	13-JUN-16	FAST CLAMP HARDWARE CHANGED TO METRIC	CN
C	C00463	25-AUG-16	Changed grounding/bonding jumper wire to #12 or #10 AWG Cu, Add Appendix E	CN
D	C00471	05-DEC-16	Added ground lug picture and torque requirements. Clarification of UL section. Added system label location information	CN

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Introduction

Polar Bear® III 3 Degree flat roof system comprises of four major components that intuitively assemble into a flat roof PV mounting system array. The following features improve construction performance, optimize maintenance and increase power density:

- Just four major components (Support, Ballast Tray, Sub-Frame, and Clips), light-weight and easy to move
- Tight-row spacing for increased power density
- Compatible accessories to simplify wire management and microinverter attachment
- Built-in rubber roof pads to help prevent roof top damage

Document Objective

This installation manual has been put together to assist in the proper steps required to build a photovoltaic array using Polar Bear III 3 Degree flat roof system array.

“THIS INSTALLATION MANUAL DOES NOT COVER SELECTION OF OR INSTALLATION OF ANY MATERIALS USED TO SEAL A MECHANICAL ATTACHMENT TO THE ROOF. FOR THESE INSTRUCTIONS PLEASE SEE OEM PROVIDER INSTALLATION MANUALS AND RELATED LITERATURE. A LIST OF OEM PROVIDERS IS SHOWN BELOW.

THIS INSTALLATION MANUAL DOES NOT COVER SELECTION OF OR INSTALLATION OF FASTENERS REQUIRED TO FASTEN A MECHANICAL ATTACHMENT TO THE ROOF STRUCTURE ITSELF. FOR THESE INSTRUCTIONS, PLEASE SEE OEM PROVIDERS INSTALLATION MANUALS AND RELATED LITERATURE. A LIST OF OEM PROVIDERS IS SHOWN BELOW”

OEM MECHANICAL ATTACHMENT PROVIDERS:

- Anchor Products: www.anchorp.com
- OMG Roofing Products: www.omgroofing.com
- ECOFasten Solar: www.ecofastensolar.com

Safety Overview

Safety is an essential part of every photovoltaic (PV) installation and every construction site. It is imperative to plan ahead for any safety concerns and hazards to promote safe work practices during installation. This section does not claim to address or support all safety concerns that may arise during the installation of PanelClaw mounting systems or any other aspect of the work being performed. Before beginning work, installers should refer to all local and federal safety, health and regulatory requirements to assure compliance. Refer to OSHA Part 1926 and related Subparts for federal construction related regulations and standards.

The section in [Appendix A: Safety](#) outlines major hazards that could exist during the installation of PanelClaw products.



PRIOR TO INSTALLATION, READ THE SAFETY PROVISIONS ATTACHED IN [APPENDIX A: SAFETY](#) AND REVIEW THE INSTALLATION MANUAL IN ITS ENTIRETY.

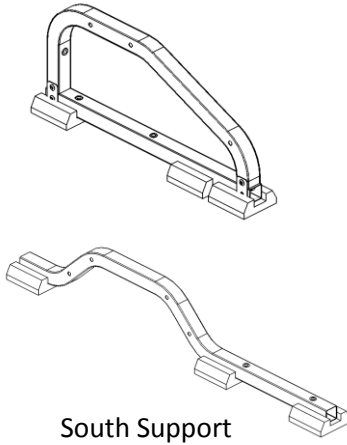


An annual corrosion inspection and potential corrective actions are required to maintain product warranty. Visible surface red rust on galvanized steel components must be locally coated with a commercially available galvanized paint or coating to maintain product warranty.

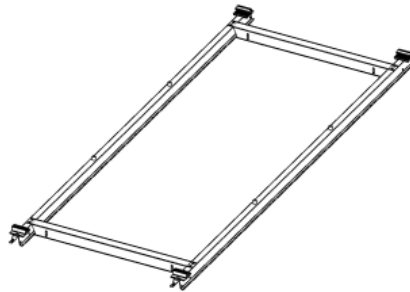
Parts and Hardware

Major Components

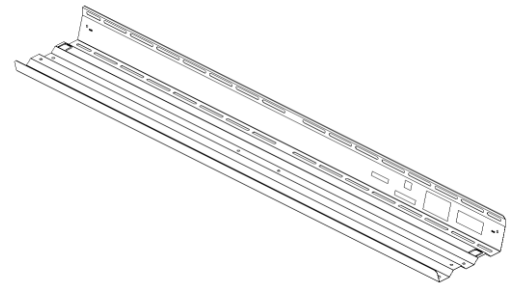
1 Support



2 Sub-Frame

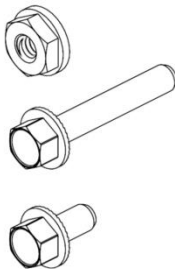


3 Ballast Tray



Hardware Kits

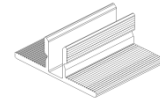
4 Claw Fastener Kit



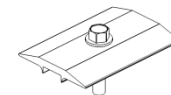
5 Ballast Tray fastener Kit



6 Fast Clamp Insulator



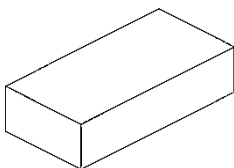
7 Fast Clamp



Ballast

8 Ballast Block

(Customer supplied
See [Appendix E: Ballast Blocks](#))



Mechanical Attachments

9 OMG Roofing Products

PowerGrip
PowerGrip Plus
EcoFasten® Solar

Anchor Products

U-Anchor 2000
U-Anchor 2400
U-Anchor 2600

System Accessories

10

Shim Pad
Microinverter Attachment Kit
Optimizer Attachment Kit

Ground Lug



Parts and Hardware

1	Support	Support unit with pre-installed integrated recycled rubber pads
2	Sub-Frame	Sub-Frame with integrated bonding. Used to attach modules to Supports.
3	Ballast Tray	Connects Supports and captures 4"x8"x16" or 2"x8"x16" ballast blocks.
4	Claw Fastener Kit	Serrated flange nuts Stainless Steel 18-8 Hex head cap screw Stainless Steel 18-8
5	Ballast Tray Fastener Kit	Hex head cap screw 1/4-20 x 0.5" Stainless Steel 18-8
6	Fast Clamp Insulator	Rubber insulator used in clamping module to Sub-Frame
7	Fast Clamp	Connects modules to Sub-Frame
8	Ballast Block	Solid cap concrete roof paver, conforms to ASTM C 1491-03 standard and manufactured for freeze thaw resistance where applicable. Block must be specified so that it maintains its weight over the life of the system
9	Mechanical Attachment (design dependent)	Designed with OMG Roofing Products (PowerGrip and PowerGrip Plus), EcoFasten® Solar and Anchor Products (U-Anchor family) attachment systems

Required Tools

- 3/8" drive torque wrench (settings available between 4 ft-lb to 8ft-lb)
- 3/8" deep socket (bolts)
- 7/16" deep socket (nuts)
- M10 deep socket (Fast Clamps)
- Spacer Stick (supplied), See [Figure 6](#) on page 10
- Battery powered tools may be used as long as they do not exceed torque requirements

Torque Settings

Torque Setting	Fastening Operation
8-10 ft-lb (100-120 in-lb)	All connections
2 ft-lb (25 in-lb)	Attaching ground lug to Ballast Tray
3.75 ft-lb (45 in-lb)	Attaching bonding jumper to ground lug

Installation

Step 1: Build Panel Assemblies (Sub-Frame with Modules installed)

1.1 Lay Sub-Frame on work surface.

1.2 Place Fast Clamp Insulators onto the four standoffs on the sub-frame. [Figure 1](#)

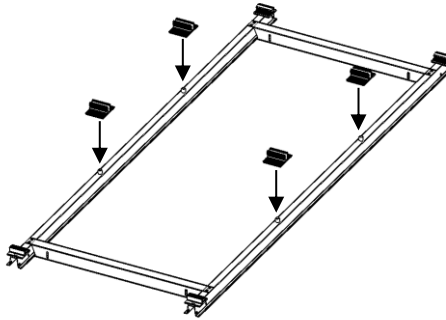


Figure 1 Place Fast Clamp Insulators onto Sub-Frame standoffs

READ THESE NOTES BEFORE PROCEEDING TO FOLLOWING STEPS:

- Keep each solar module as flat as possible to the sub-frame rail. Raise the top edge of the module only as much as is necessary to clear the stud and vertical leg of the rubber fast clamp insulator during installation
- The end and mid clips should never be tampered with and never pulled open as this could compromise secure solar module mounting, or damage the solar modules.
- Ensure solar module cables do not get caught between the solar module and the rail during installation.
- Soapy water may be used to lubricate the end clip rubber. Soapy water is three drops of liquid dish washing soap per 475ml (16oz) of water.
- When installing modules to the sub frame ensure that the junction box for each module is always located on the same side.

- 1.3 Install the first module. Insert the solar module into the end clip and lay the solar module flat onto the insulator. Be sure to center the module on the Sub-Frame. [Figure 2](#)

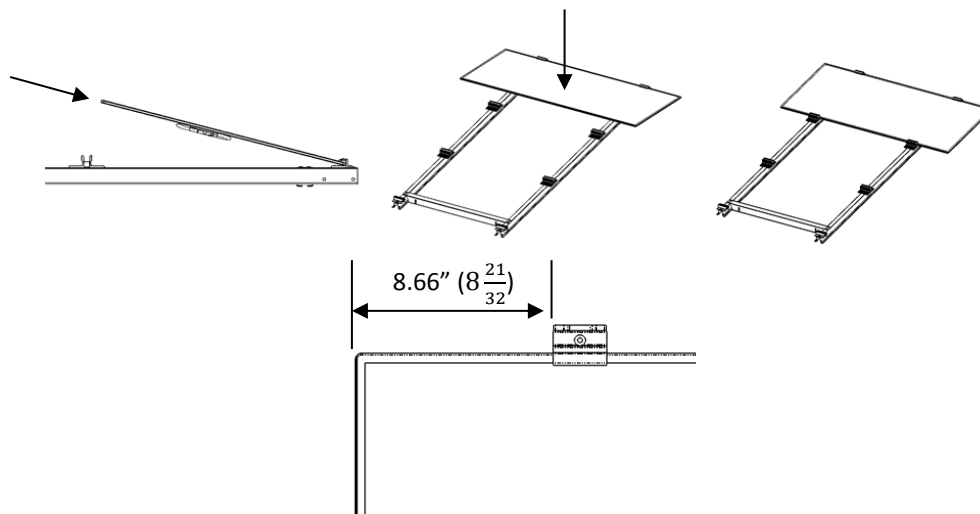


Figure 2 Install First module to Sub-Frame

- 1.4. Install the second module. Place the solar module flat onto the 4 insulators. Be sure to center the module on the Sub-Frame. [Figure 3](#)

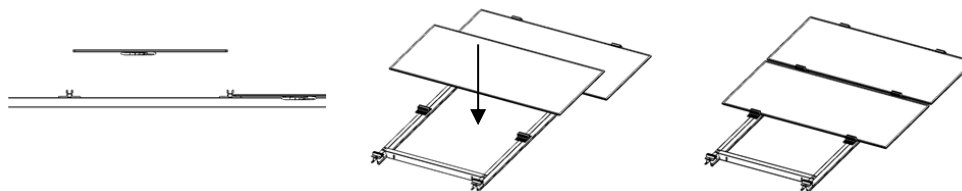


Figure 3 Install Second module onto Sub-Frame.

- 1.5 Install the third module. Insert the solar module into the end clip and lay the solar module flat onto the insulator. Be sure to center the module on the Sub-Frame. [Figure 4](#)

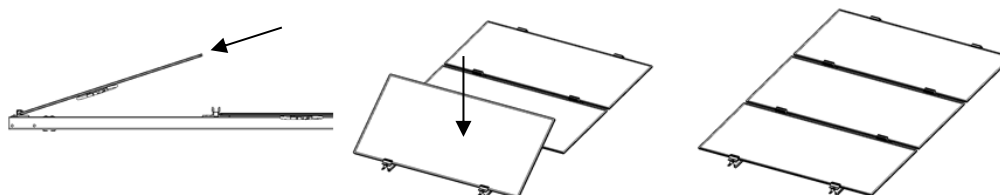


Figure 4 Install Third module onto Sub-Frame

- 1.6 Secure all modules. Affix the fast mount clamps over the fast clamp insulators while folding down the insulator ears over the solar module. Torque the fast clamps to 8-10 ft-lbs (100-120 in-lbs). [Figure 5](#)

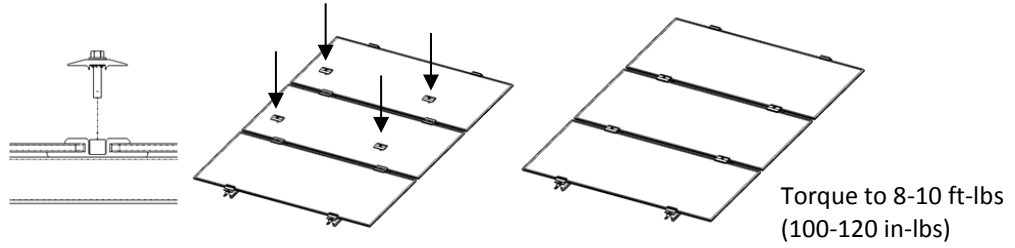


Figure 5 Secure all modules with Fast Clamps.

Step 2: Set up Spacer Stick

2.1. Reference [Figure 6](#) and set spacer stick brackets to the Q dimension and the L dimension.

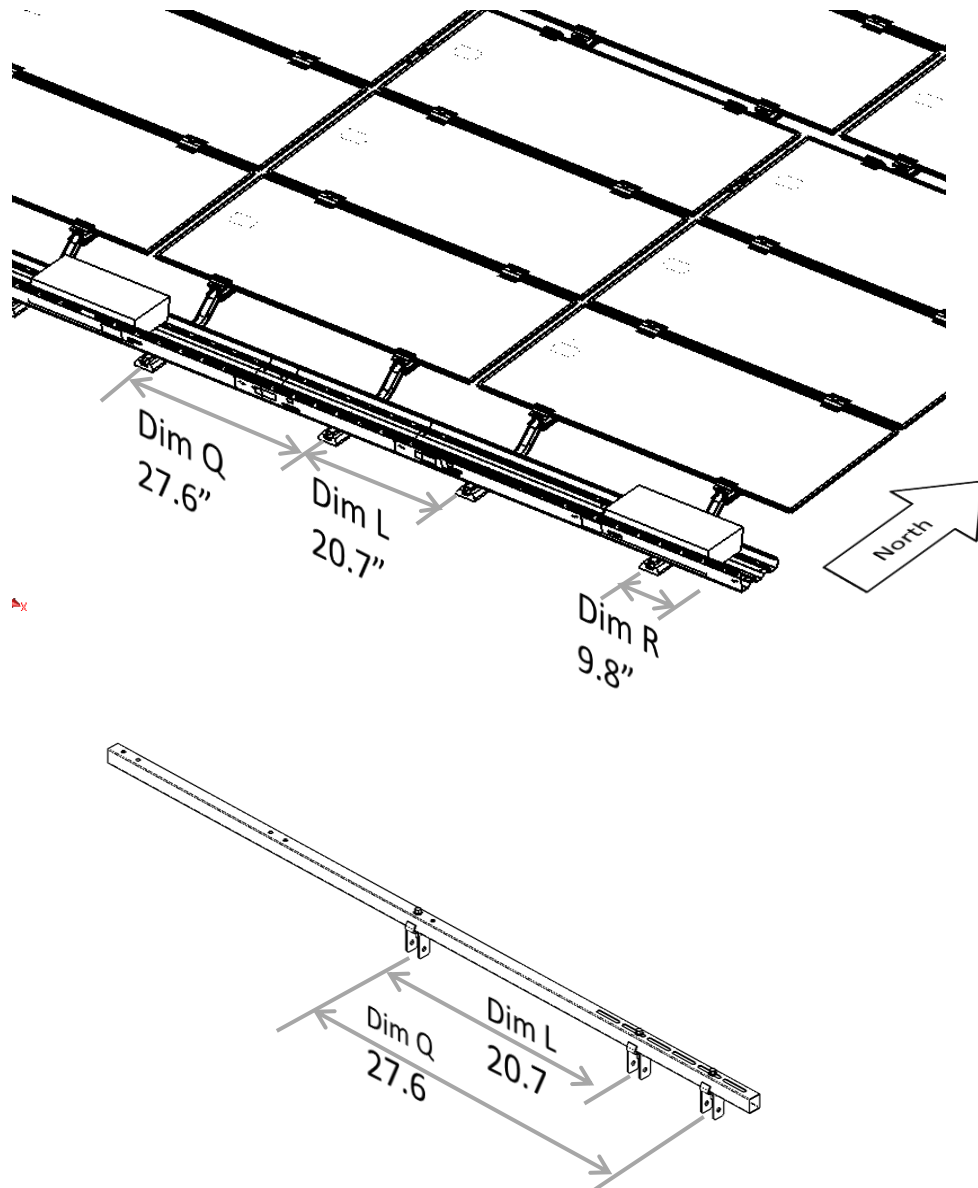


Figure 6 Spacer Stick and system reference dimensions

Step 3: Build Northern Row of Modules

- 3.1. Snap north-south and east-west layout lines (chalk or dry line recommended) for the edge of the array. Consult the Racking Construction Set for the Support spacing from module edge (Dim R, 9.8"). (Note that the chalked lines will indicate the Support perimeter and not the module perimeter.)
- 3.2. Begin the array at the northeast or northwest corner. Building arrays starting with the south row is strongly discouraged.
- 3.3. Place the first three or four Supports in their approximate locations east-west and then use the Spacer Stick to set the Supports in the correct locations.
- 3.4. In the example below the western most Support roof pads must be lined up with north-south snap line. North edge Support roof pads must align with east-west snap line. Leave the Spacer Stick in place (Figure 7).

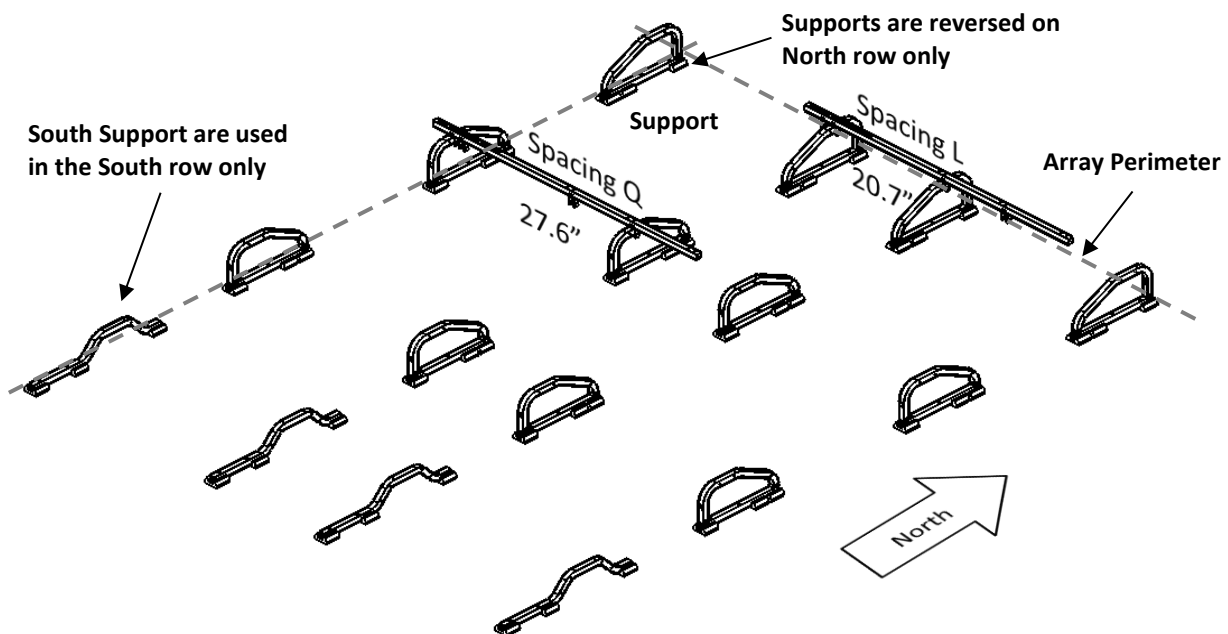


Figure 7 Starting the array

- 3.5. Place a long Ballast Tray inside the hoops of the second and third Supports. Roughly center the Ballast Tray between the Supports. Locate the Ballast Tray slots closest to the pre-installed Support rivet nuts and shift the Ballast Tray east or west as needed to align the rivet nuts with the slots. This Ballast Tray connects the first two columns of modules.

A TRAY SHOULD ALWAYS BE INSTALLED BETWEEN TWO MODULES SO THAT THE COLUMNS OF MODULES ARE CONNECTED TOGETHER. (Figure 8)

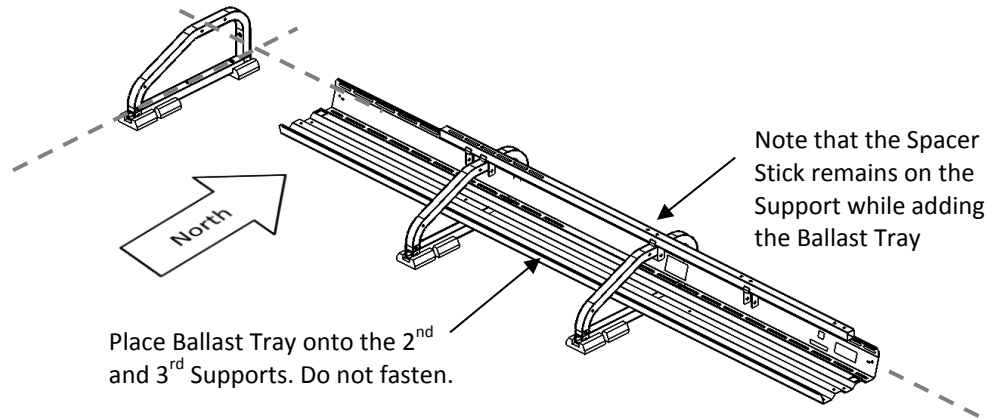
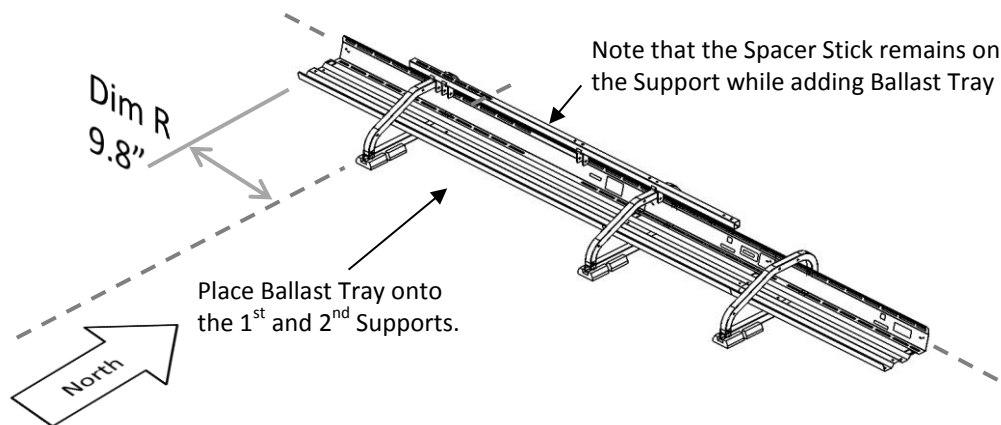


Figure 8 Placing the Ballast Tray onto Supports between modules.

- 3.6. Place a long Ballast Tray inside the hoops of the first and second Supports. The module overhang from the center of the Support will be 9.8" (Dim R). Align the Ballast Tray to the first Support so that the Ballast Tray overhangs the Support nearly as much as the module (only on north array edges where the Ballast Tray acts as a wind deflector).
- 3.7. Install the Ballast Trays to the pre-installed rivet nuts on the Supports using the nearest slots. The Ballast Trays may be shifted east or west to align with the slots. Ballast Trays must **overlap** on the second Support. (Figure 9)



Note: North row is shown. All other rows have Supports and ballast trays turned 180°

Figure 9 Placing a Ballast Tray on the 1st and 2nd Supports in the northern most row

- 3.8. Install a ¼-20 serrated bolt on each pre-installed rivet nut. Torque all ¼-20 serrated bolts to 8-10 ft-lb (96-120 in-lb). Use the Spacer Stick to keep the Ballast Tray perpendicular to the Supports while maintaining spacing between Supports. (Note there are three bolts required to connect a tray to each individual support, one fastener per slot).
- 3.9. Repeat Steps 3.5 and 3.8 for the length of the array and torque all bolts. Pairs of supports (4 and 5, 6 and 7, 8 and 9, etcetera) should be connected with long Ballast Trays. At the opposite end

of the row repeat Steps 3.6 through 3.8 replacing the first two supports in the row with the last two. Overlap two Ballast Trays on the second Support in from the end to ensure every Support has a Ballast Tray attached. Ensure the spacing between Supports alternates by the Q and L dimensions. All Ballast Trays on north rows should be continuous with gaps kept to a minimum.

NOTE: Do NOT fasten Long Ballast Trays together where and if they overlap in midair about the center of the module

3.10. Install ballast blocks into northern Ballast Trays and bend the tabs up at the ends of the row.

3.11. Place a second row of Supports south of the row previously built. Supports should be spaced by roughly the width of the module in the north-south direction. Mid supports are turned 180 degrees from the North Supports, [Figure 7](#).

3.12. Carry the Panel Assembly to the north-east (or west) corner and align the Sub-Frame holes ([Figure 10](#)) with the Support hole found on top of the north Supports.

3.13. Follow [Figure 10](#) to align Panel Assembly over the north Support mounting holes. Insert bolts through Sub-Frame and Support mounting hole. Finger-tighten nuts onto bolts.

NOTE: Be cautious of where junction boxes should be placed in order to facilitate wiring.

3.14. Position Panel Assembly onto the lower mounting holes of the next row of Supports. Move the Support as needed to align the holes. Insert bolts through Sub-Frame and lower mounting holes of the Supports.

3.15. Tighten all four mounting bolts to 8-10 ft-lb (96-120 in-lb) of torque.

3.16. Repeat steps 3.10 through 3.15 for the entire row. A support turned upside down and placed between modules may be used to ensure that a 1" spacing is maintained between columns (if Ballast Trays are not secured to Supports prior to module installation).

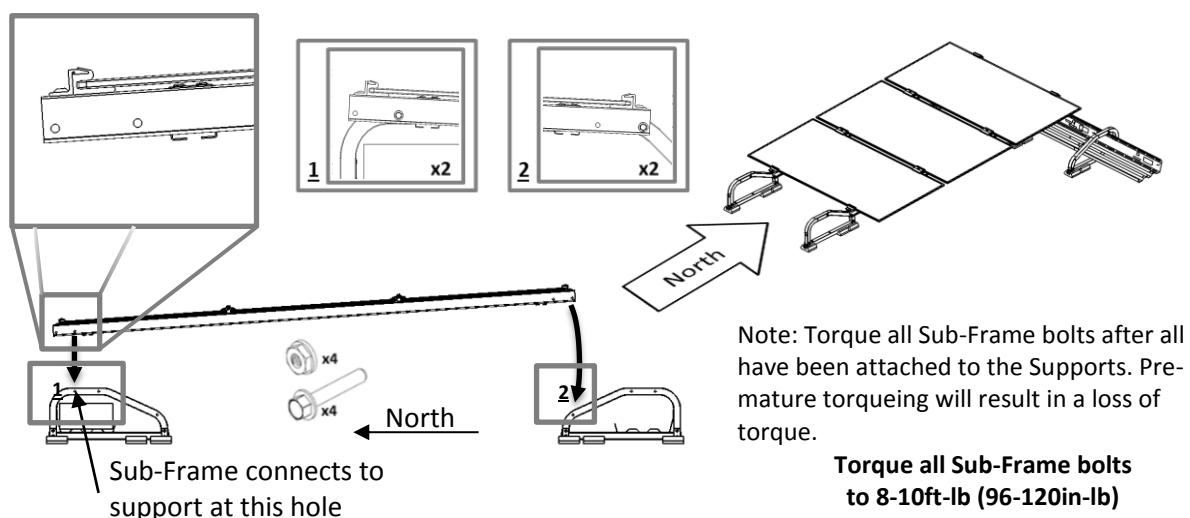
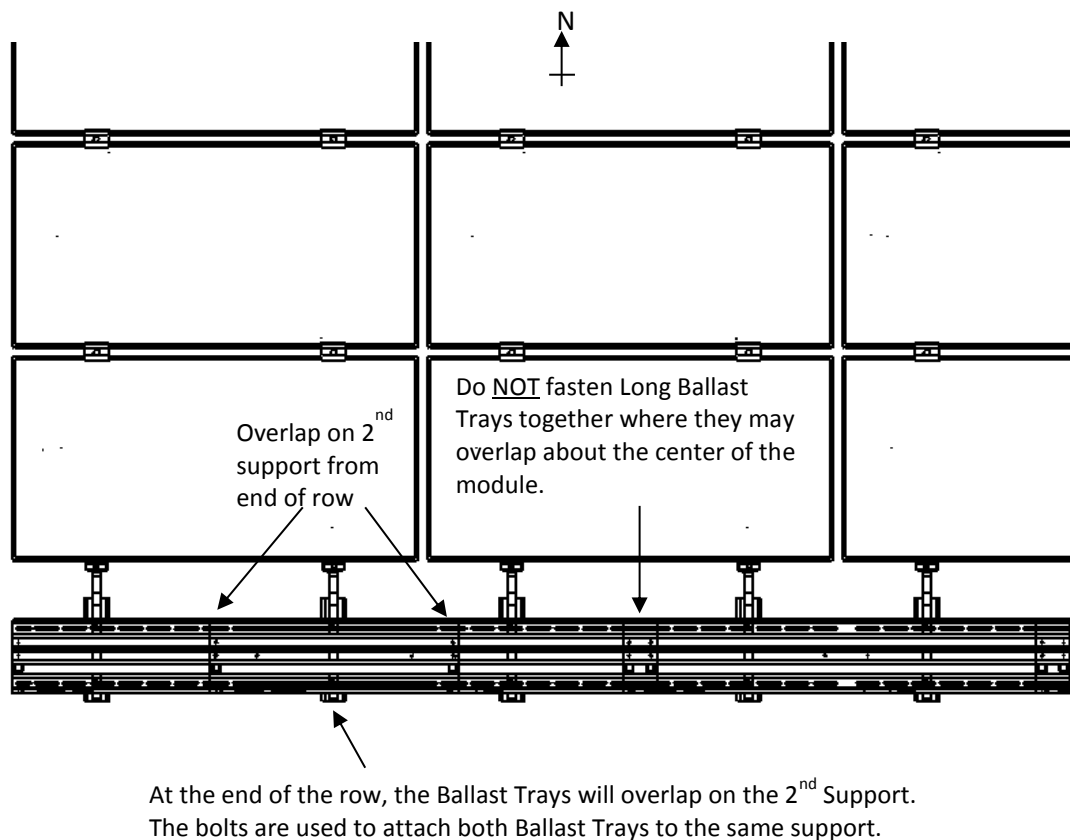


Figure 10 Attach module to Supports

3.17. Install Ballast Trays to the pre-installed rivet nuts on the second row of Supports by centering each Ballast Tray between two modules. For end of row Ballast Trays install the tray centered on the module. The Ballast Tray may be shifted east or west to align with the closest slots. All ballast trays must be secured to two supports. Use the Spacer Stick to ensure the high side of the Supports is properly spaced. Thread a Bolt into each of the pre-installed Rivet Nuts and torque to 8-10 ft-lb (96-120 in-lb). (Figure 11)

NOTE: All end of row Ballast Trays must be bolted to both the first and second support in from the array edge. End trays do not need to be flush with the edge of the module for all non north array edges. Where a long Ballast Tray is specified at the end of the row it should appear flush with the module. When a short Ballast Tray is specified at the end of the row it should appear centered on the module.

NOTE: Do **not** fasten Long Ballast Trays together where they overlap in midair. Secure Ballast Trays together only when two Ballast Trays overlap on the same Support (all end of rows).



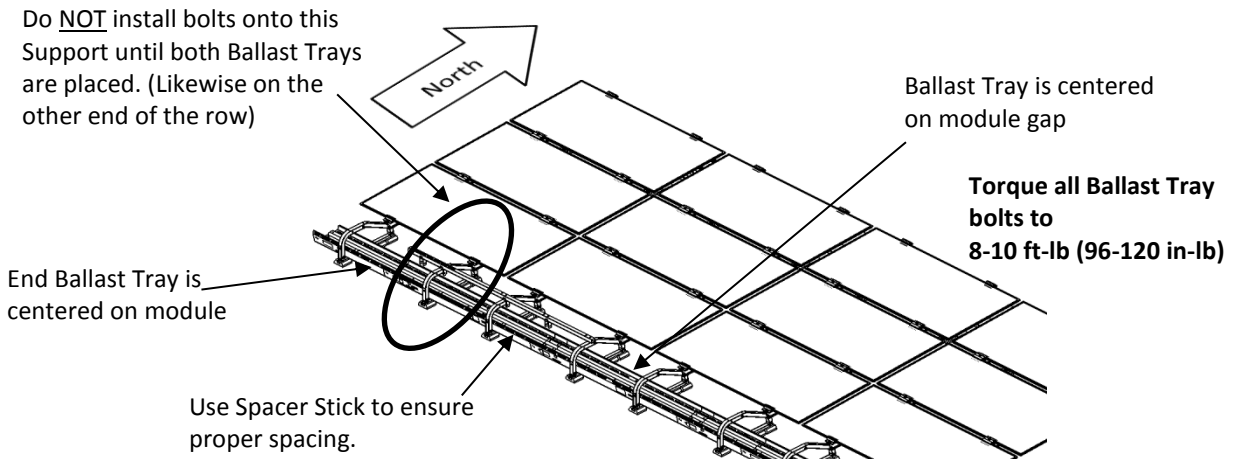


Figure 11 Attach Ballast Trays to Supports

3.18. Install required ballast into the second row of Ballast Trays and bend up the end tabs located at the end of each Ballast Tray (Figure 12). Reference the Racking Construction Set to determine ballast quantity and proper placement per Ballast Tray.

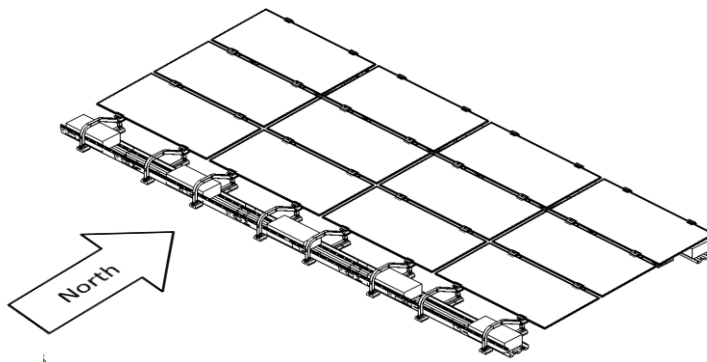


Figure 12 Install required ballast

Step 4: Install Array Row-By-Row

- 4.1. Place two Supports for each module at their approximate final resting location. Supports and Ballast Trays may be pre-assembled similar to the most northern row procedure. Ballast is to be installed prior to module installation once Support and Ballast Tray assemblies are distributed on the roof at their final resting location. A tape measure may be used to approximately place each Support and Ballast Tray assembly without modules. If Supports and Ballast Trays are pre-assembled ensure that the spacing is correct using either the L or Q dimension as appropriate. Also ensure that all Ballast Tray to Support connections are torqued to 8-10 ft-lb (96-120 in-lb).
- 4.2. Install Panel Assemblies by aligning the Sub-Frame to the correct hole on the upper mounting holes of the Supports in the previous row. Reference the Racking Construction Set to determine which of the upper mounting holes is used based on the location of the module within the array. Finger-tighten nuts and bolts.

- 4.3. Adjust the placement of the next row of Supports as needed to connect Panel Assembly to the low side of the Support. Finger-tighten nuts and bolts. Be sure to align the Support pads with the north-south snap line on the end of array modules.
- 4.4. Tighten all Sub-Frame to Support mounting hardware to 8-10 ft-lb (96-120 in-lb) of torque.
- 4.5. Repeat Steps 4.1 through 4.4 for remainder of the row.
- 4.6. Install the Ballast Tray and ballast blocks as done in the previous row. See Step 3.17. (Build Northern Row of Modules)

NOTE: End of row Ballast Trays must be bolted to both the first and second support in from the array edge. End trays do not need to be flush with the edge of the module for all none north array edges. Where a long Ballast Tray is specified at the end of the row it should appear flush with the module. When a short Ballast Tray is specified at the end of the row it should appear centered on the module.

- 4.7. Complete the array by constructing row-by-row until the south array edge. Install the South Supports as shown in [Figure 13](#).

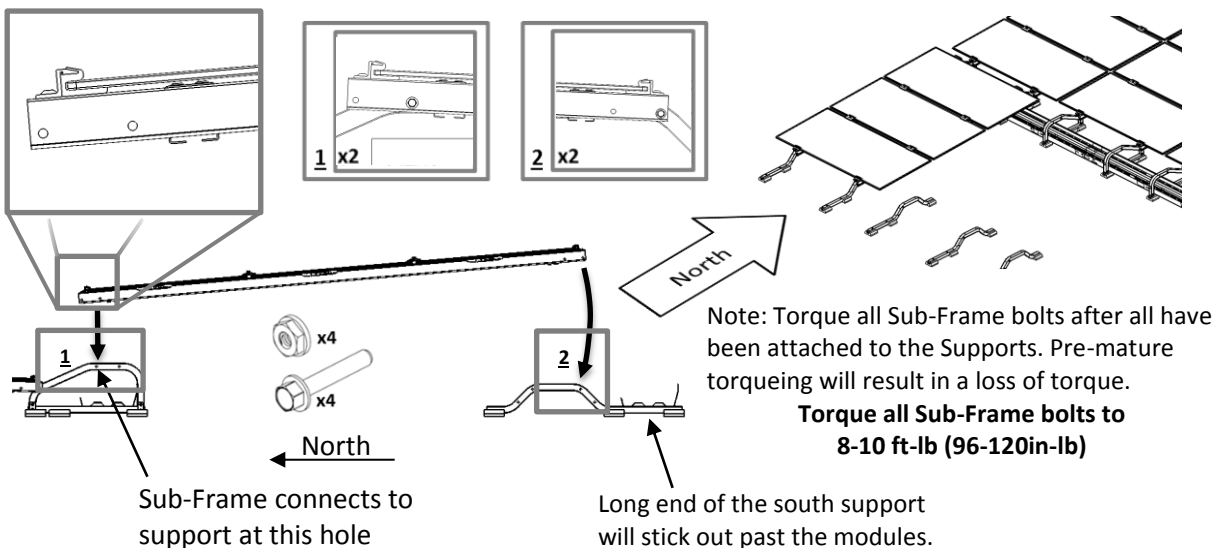


Figure 13 Installation of South Support

- 4.8. Install Ballast Trays to the pre-installed rivet nuts on the longer side of the South Supports by centering each Ballast Tray between two modules ([Figure 14 Installation of the South Tray](#)). The Ballast Tray may be shifted east or west to align with the closest slots. At the end of rows of modules the tray will span a single module. Thread a bolt onto each of the pre-installed Rivet Nuts and torque to 8-10 ft-lb (96-120 in-lb).

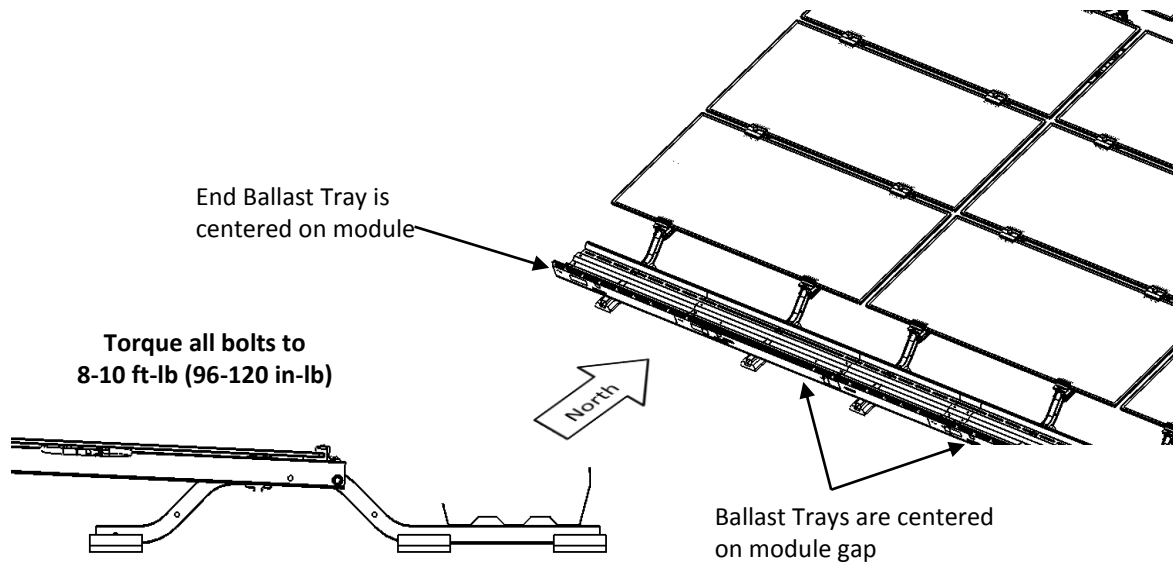


Figure 14 Installation of the South Tray

Step 5: Electrical Grounding

Please consult with national and local building code(s) for complete grounding requirements for your installation. The Polar Bear grounding method conforms to UL 2703 and is certified by UL for use with approved photovoltaic modules listed under UL 1703. Installers can quickly and easily establish UL-certified electric bonds between all connected array components, including modules and mounting system components, without the use of additional grounding devices, e.g. ground lugs and copper wire. At least one ground lug must be used to ground all strings within a physical sub-array provided the fuse rating for each string does not exceed 30 amps. Installers may opt to use multiple lugs per sub-array for redundancy. When grounding devices are installed according with the approved methodology and capacity below, the connections described above meet all the requirements outlined in NEC 690.43.

Grounding Instructions

For modules that have been evaluated for use with Polar Bear III HD 10 Degree, please follow the instructions below in [Appendix C: UL 2703 Electrical Grounding](#). Additional information regarding UL 2703 and the specific list of evaluated modules included in PanelClaw’s UL listing can be found in the “PB3 HD UL Overview and Module Listing” document (available at www.panelclaw.com).

Note: During grounding and bonding ensure that there is separation between bare copper and aluminum or galvanized steel components.

Appendix A: Safety

The subsections below outline some of the obvious / major hazards that could exist during the installation of PanelClaw products, and are divided to bring a level of clarity to such hazards. Some sections do not apply to all PanelClaw product lines and such exclusions are noted within each section.

Electrical Hazards: PanelClaw products are purely mechanical and do not contain any electrically live parts. When a photovoltaic module is exposed to sunlight it is electrically live and cannot be turned off. As soon as modules are installed using a PanelClaw system, an electrical shock hazard is present. All personnel on site should coordinate to ensure that such electrical hazards are clearly communicated. It is advised, at a minimum, that all personnel utilize caution and proper Personal Protective Equipment as outlined in that section. Only electrically qualified personnel should perform PV module installation. Refer to OSHA Part 1926 Subpart K – Electrical and NFPA 70E for additional information.

Fall Hazards: This section only applies to Polar Bear® products installed on locations six feet or higher above grade. Proper fall protection should be in place at all work sites. There are many fall protection solutions readily available to help reduce exposure to fall hazards. These may include personal fall arrest systems, safety nets, guardrails, and flagged setbacks from all roof edges as outlined in OSHA Part 1926 Subpart M – Fall Protection.

Trip Hazards: All PanelClaw arrays have elevated components that are installed above grade or above a roof surface. Such hazards should be identified and caution should be taken to avoid tripping over such components. Refer to the Fall Hazards section specifically if working with the Polar Bear product line. Make sure to pick up and not drag your feet when working on site, and always pay attention to your path of movement to note any obstructions that could create a trip hazard.

Lifting Hazards: The PanelClaw installation process involves lifting of heavy items that could lead to personal injury and damage to property. All personnel should be trained in the proper procedures for manually lifting. Evaluate an object’s size and weight prior to lifting, and follow these general guidelines for lifting:

1. Assess the lift and know the object weight.
2. Bend at the knees and get a good grip.
3. Keep back straight and lift straight up with legs without twisting. It is important to lift with the legs and not the back.
4. If an object is too large or heavy, ask for help and do not attempt to lift by yourself. In the case that mechanical assistance (e.g. crane, forklift, etc.) is required to complete the lifting operations, all machine operators of such devices should be licensed and trained.

Material Handling: All PanelClaw parts and components are made of aluminum and steel alloys and utilize stainless steel assembly hardware. These materials are considered non-toxic and require no special handling procedures. Metal components may have sharp edges, so be sure to handle with care and utilize proper personal protection equipment, especially gloves, during handling. Refer to OSHA Part 1926 Subpart H – Materials Handling, Storage, Use, and Disposal for additional information.

Personal Protective Equipment (PPE): All personnel should utilize and implement proper PPE per OSHA requirements. Refer to OSHA requirements for proper use and implementation of PPE. The following

items are suggested as a minimum to avoid injury based on the installation procedure outlined in this manual:

1. Appropriate work clothing
2. Electrically insulated hard hat
3. Protective eyewear
4. EH rated safety boots
5. Gloves
6. High-visibility safety vest
7. Hearing protection

If any PPE appears to be defective, stop the use of such equipment immediately, and ensure it is replaced before work continues. Refer to OSHA Part 1926 Subpart E – Personal Protective and Life Saving Equipment for additional information.

Hand and Power Tools: Access to all hand and power tools should be regulated and controlled at all times on site to prevent improper use and related injuries. When not in use, all equipment should be stored in a secured location. Only personnel who have been properly trained in the safe operation of any potentially dangerous tool should be allowed access. All required tools to perform the installation of PanelClaw racking are outlined in the installation procedure. All tools should be inspected daily and before use by the operator. If any tool appears to be defective, stop the use of such equipment immediately, and ensure it is replaced before work continues. Electrical power tools should follow proper lock-out tag-out procedures per OSHA requirements. Refer to OSHA Part 1926 Subpart I – Tools – Hand and Power for additional information.

Appendix B: Special Configurations

Many roofs will have various installation configurations or situations that require certain Support/Ballast Tray installation configurations. This section covers some of these situations, such as inside corners with northern exposure and roof cricketing or roof waviness.

Inside Corners with Northern Exposure to Wind

1. The northern exposed part of the array is assembled in the same manner as the north row, with the Supports flipped 180° and tucked under the module.

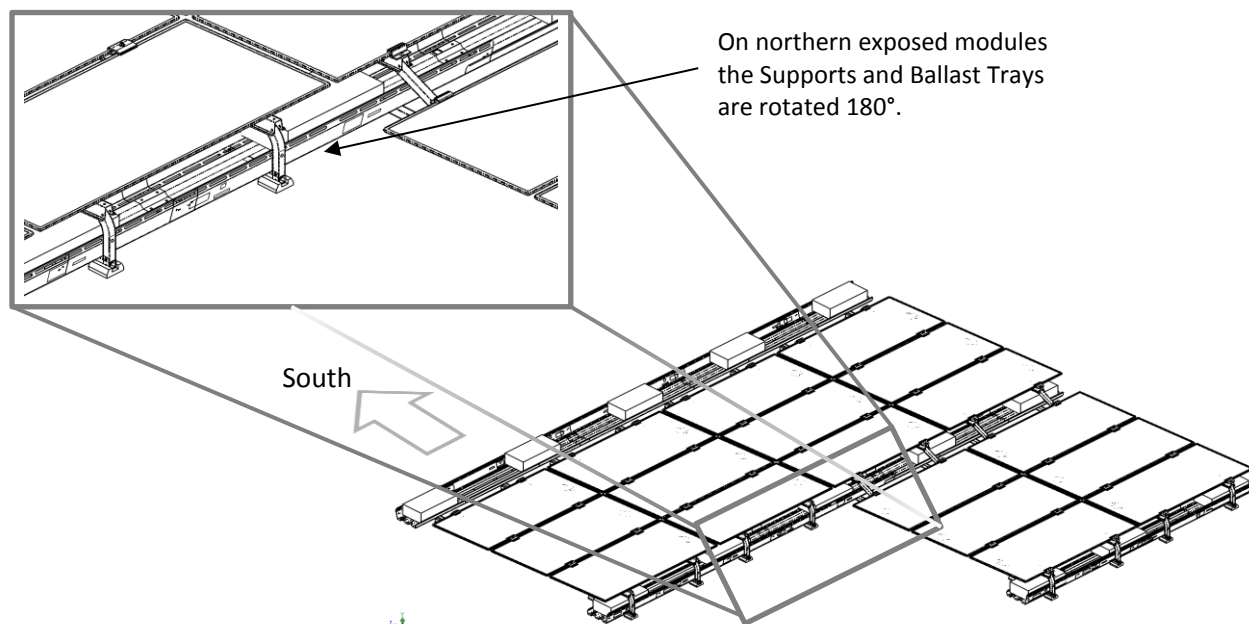


Figure 15 Inside corners with Northern exposure to wind

Roof Cricketing or Roof Waviness

1. Shim Pads must be placed where the end of the Ballast Tray comes in contact with the roof. A Shim Pad must be installed in one of the two holes in the end of the Ballast Tray. These two holes allow for different heights of shimming.

Appendix C: UL 2703 Electrical Grounding

The Polar Bear III 3 Degree, First Solar flat roof system may be used to ground and/or mount a PV module complying with UL1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions. For a list of modules which have been evaluated see PanelClaw’s “PB3 HD UL Overview and Module Listing” (available at www.panelclaw.com).

A periodic re-inspection of the system shall be performed for loose components, loose fasteners, and any corrosion. If found, they should be immediately replaced or remedied in accordance with the system installation instructions.

System Ground Path

The system ground path follows through the Tyco lug, Ballast Tray, Support, and into the Sub-Frame (see Figure 16). The bonding continues through the Sub-Frame to the adjacent Support as shown below.

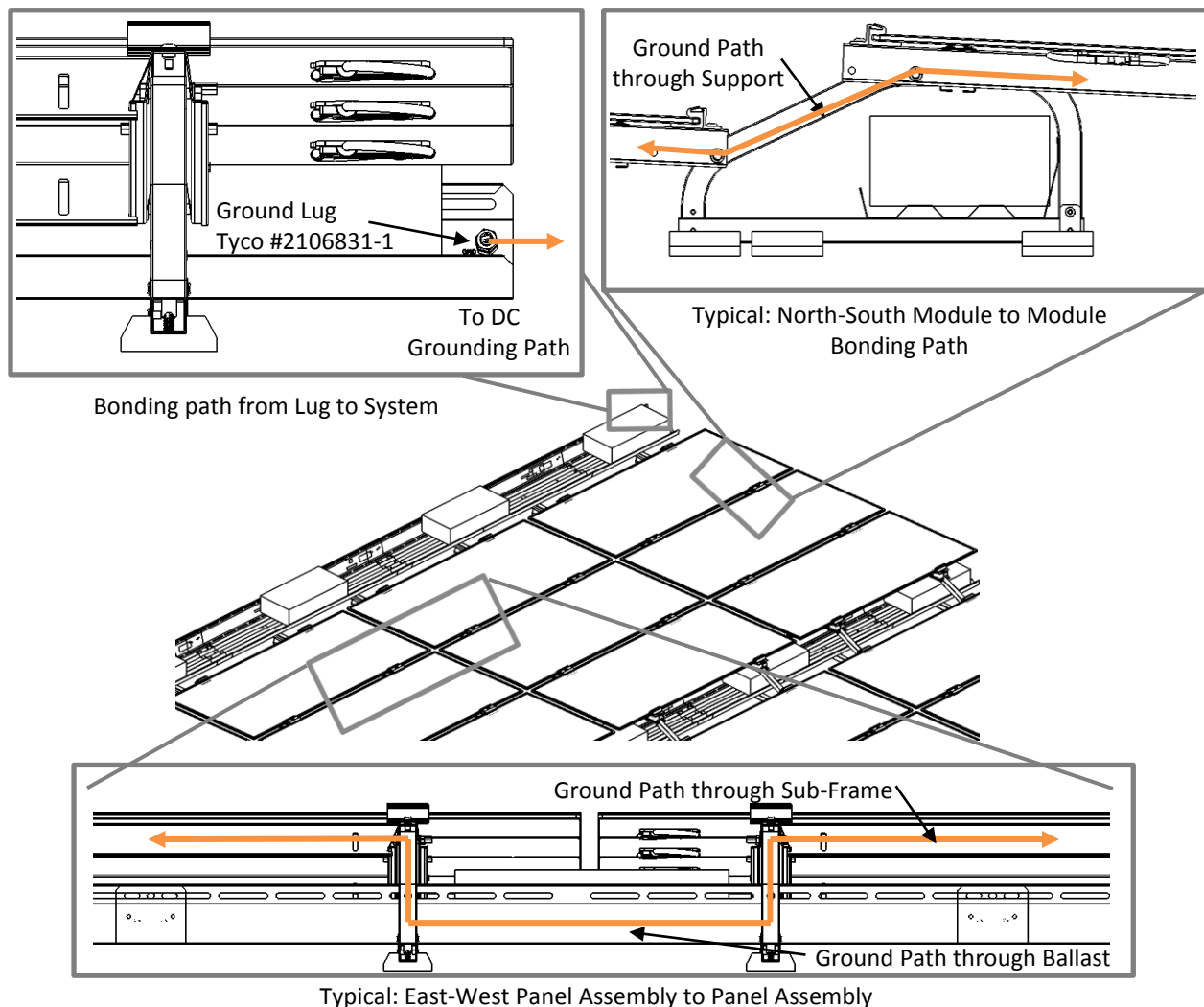


Figure 16 System Ground Path with UL Listed Module

Grounding Instructions:

PanelClaw components within the array are required to be electrically bonded to other DC grounding paths via the use of either a #12 or #10 AWG Cu bonding jumpers and a UL 467 listed Tyco solid wire grounding assembly, part number 2106831-1, manufactured by Tyco Electronics Corporation. The conductor size should be selected in accordance with NEC 690.45 and NEC 250.122.

To ground the array, first determine the groupings of strings whose power output wiring is grounded together at an equipotential grounding conductor location. This could be all the strings within a physical sub-array, or all the strings grouped by a single combiner box. Once the groupings of strings at equipotential have been determined, a Tyco solid wire grounding assembly must be attached to one Ballast Tray within each group of strings. PanelClaw’s Polar Bear Ballast Trays have a hole to which this grounding device/lug can be attached (see Figure 17). In an array that requires multiple bonding jumpers to satisfy the equipotential requirements, each bonding jumper should be located and installed on a Support within the group of strings which will be grounded by that jumper.

Note: Every independent array section must include at least one grounding device/lug.

To attach the Tyco grounding device/lug to the Ballast Tray, the mounting hex washer and threaded post end should be installed to the specified hole in the Ballast Tray and torqued to 2.08 ft-lb (25in-lb). Once the grounding device/lug has been attached to the Ballast Tray, a copper bonding jumper from an acceptable DC grounded location outside of the array must be installed to the wire slot end and torqued to 3.75ft-lb (45in-lb). For additional instruction regarding the installation of the Tyco solid wire grounding assembly, please refer to the Tyco Electronics instructions sheet (document number 408-10262) via their website www.te.com.

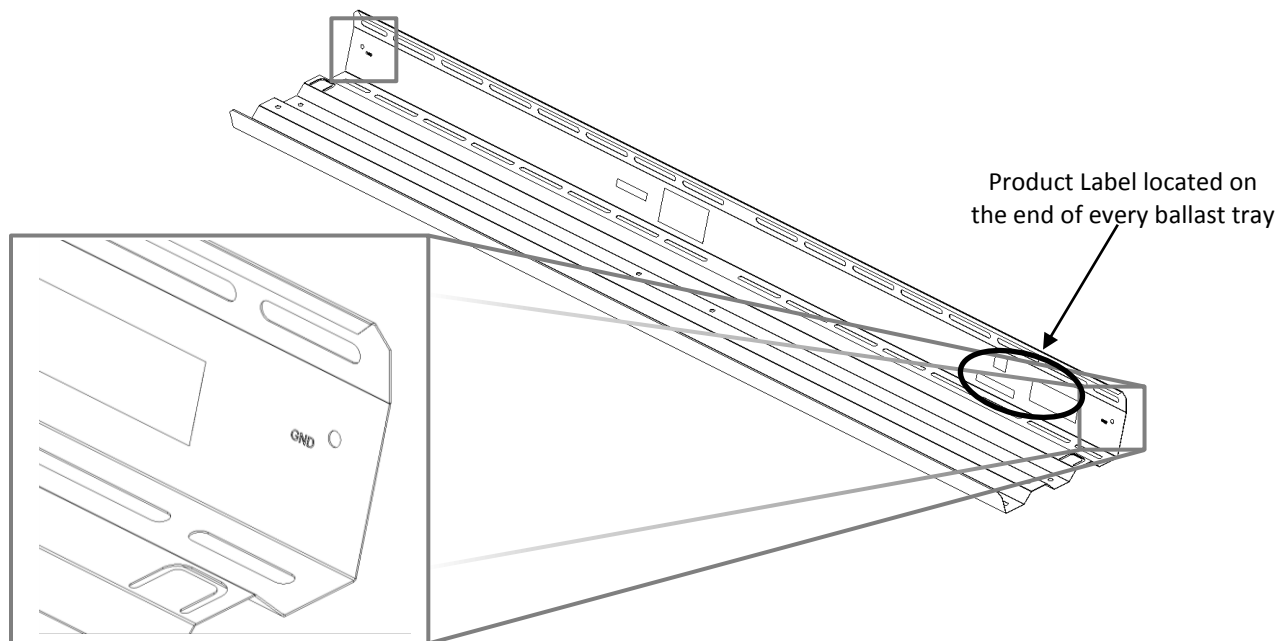


Figure 17 Ground Lug Attachment Location

Appendix D: ANSI/UL 2703 Fire Classification, Side Shield (Optional)

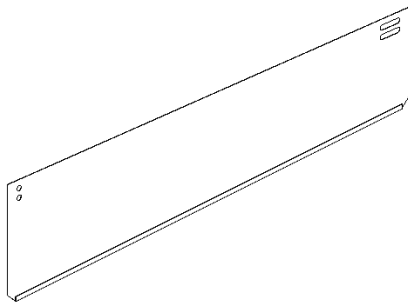
The system has a Fire Class A rating for low slope roofs with modules listed when the following requirements are met:

- System is installed over a fire resistant roof covering rated for the application (UL2703, 26.3B)
- Roof slope is less than 2"/ft
- 1 Ballast Block in every northern row Ballast Tray
- Side Shield on the perimeter of the array

Side Shields

The Side Shields must be installed around the East and West perimeter of the system in order to retain the System Fire Class A rating for low slope roofs with First Solar Series 2, 3, and 4 modules. Some modules may be located where they will require two side shields since they fall on both an East and West edge of an array, acting like a peninsula.

Component



Hardware to Secure Side Shield Ballast Tray Nut & Bolt



Parts and Hardware

1	Side Shield	26"L Side Shield and attachment hardware
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Installation

Attach Side Shield to Sub-Frame

1. Attach the side shield to the Sub-Frame using the included $\frac{1}{4}$ -20 fasteners. The side shield positioning is such that the lower lip of the shield is $\frac{1}{2}$ " off the roof height. Torque bolts to 8-10 ft-lbs (96-120 in-lbs). [Figure 18](#)

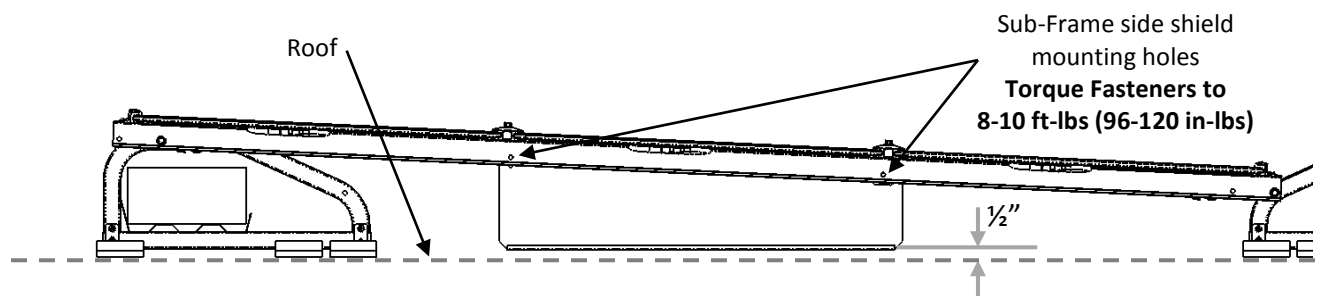


Figure 18 Install Side Shield

Ballast Blocks on North Row

One ballast block must be placed in each Ballast Tray on the northern row of the system in order to retain the System Fire Class A rating for low slope roofs with First Solar Series 2, 3, and 4 modules. See [Figure 19](#) for correct ballast block placement on Ballast Tray.

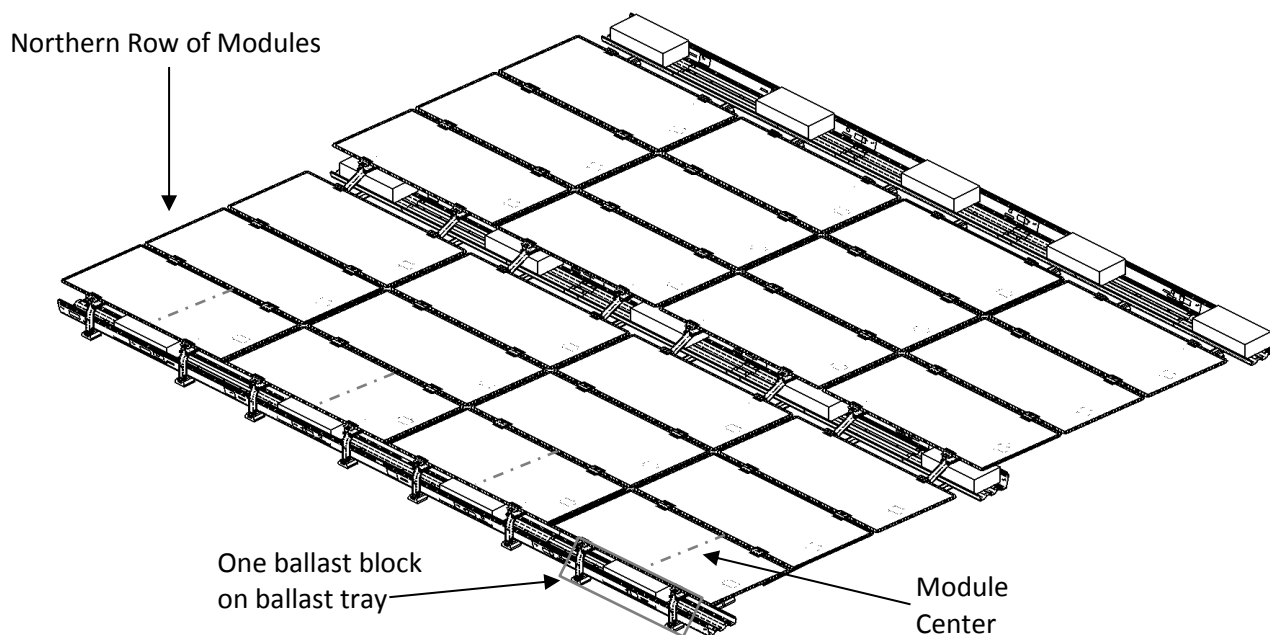


Figure 19 Ballast block placement in ballast trays on Northern row

Appendix E: Ballast Blocks

PanelClaw does not provide the ballast blocks required to construct the system in accordance with PanelClaw’s Racking Construction Set drawings. We do, however; maintain a list of potential block suppliers across the country.

IT IS ABSOLUTELY CRITICAL THAT WHEN PROCURING BALLAST BLOCKS FOR **ANY** BALLASTED ROOFTOP SYSTEM THAT IT BE MANUFACTURED TO RESIST FREEZE-THAW AS REQUIRED BY LOCAL CONDITIONS **AND** FOR IT TO BE ABLE TO MAINTAIN ITS WEIGHT OVER THE LIFE OF THE SYSTEM. IT IS STRONGLY RECOMMENDED THAT INSTALLERS WEIGH SEVERAL BLOCKS ON-SITE TO ENSURE THAT BLOCK WEIGHTS MATCH THE WEIGHT OF THE BLOCKS SPECIFIED IN PANELCLAW’S RACKING CONSTRUCTION SET DRAWINGS. BLOCK WEIGHT VARIANCES OF LISTED IN THE CHART BELOW ARE ACCEPTABLE.

Ballast Block Description	Nominal Weight kg [lb]	Allowable Weight Variance Kg [lb]
BLOCK, CONCRETE, 2"X 8"X 16"	6.6 [14.6]	0.45 [1.00]
BLOCK, CONCRETE, 3"X 8"X 16"	10.7 [23.6]	0.57 [1.25]
BLOCK, CONCRETE, 4"X 8"X 16"	14.8 [32.6]	0.68 [1.50]
BLOCK, CONCRETE, 8"X 8"X 16"	32.7 [72.0]	0.91 [2.00]

BLOCKS WITH A WEIGHT VARIANCE GREATER THAN WHAT IS SHOWN IN THE CHART ABOVE MUST NOT BE USED.

FAILURE TO FOLLOW THESE PRACTICES MAY RESULT IN SYSTEM PERFORMANCE BELOW DESIGN CRITERIA AND/OR MAY CAUSE STRUCTURAL DAMAGE TO THE BUILDING AND/OR ARRAY.