

***SunModo Carport and Canopy  
PV Rack Mounting System***



**Please read carefully before installing**

SunModo PV Rack Mount System can be used to mount photovoltaic (PV) panels in a wide variety of locations. All installations shall be in accordance with NEC requirements in the USA. The self-bonding system is for use with PV modules that have a maximum series fuse rating of 30A. Mechanical design loads per UL 2703: Downward Pressure: 33.42 psf (1600.2 Pa), Upward Pressure: 22.28 psf (1066.8 Pa), Down-Slope: 5 psf (239.4 Pa).

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<p><b>SunModo Corporation:</b> Vancouver, Washington</p>	<p>Document Number D10141-V003 ©2020 – SunModo Corp.</p>	<p>www.SunModo.com Ph: 360-844-0048 info@sunmodo.com</p>
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### **Installer Responsibility:**

Before ordering and installing materials, all system layout dimensions should be confirmed by field measurements. SunModo reserves the right to alter, without notice, any details, proposals or plans. Any inquiries that you may have concerning installation of the PV system should be directed to your SunModo Sales representative. Consult SunModo Sales for any information not contained in this manual. This manual is intended to be used as a guide when installing SunModo's Carport System. It is the responsibility of the installer to ensure the safe installation of this product as outline herein.

- Installer shall guarantee that bolts and anchors have adequate pullout strength and shear capacities.
- Installer shall adhere to the torque values specified in this Instruction Manual.
- Installer shall use anti-seize compound, such as Permatex anti-seize, lubricant is recommended for all threaded parts.
- Installer shall adhere to all relevant local or national building codes. This takes account of those that supplant this document's requirements.
- Installer shall guarantee the safe placement of all electrical details of the PV array.
- Installer shall comply with all applicable local, state and national building codes, including periodic re-inspection of the installation for loose components, loose fasteners and any corrosion, such that if found, the affected components are to be immediately replaced.
- Installer to ensure the structural support members or footings for mounting the array can withstand all code loading conditions. Consult with licensed professional engineer for the appropriate loading conditions.
- Installer to follow all regional safety requirements during installation.
- This Carport System may be used to ground and/or mount a PV module complying with UL 1703 only when the specific module has been evaluated for grounding and/or mounting in compliance with the included instructions.
- Installer shall 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, re-tighten immediately. If corrosion is found, replace affected components immediately.

### **Safety:**

Review relevant OSHA and other safety standards before following these instructions. The installation of solar PV systems is a dangerous procedure and should be supervised by trained and experienced personnel.

It is not possible for SunModo to be aware of all the possible job site situations that could cause an unsafe condition to exist. The installer of the carport system is responsible for reading these instructions and determining the safest way to install the carport system. These instructions are provided only as a guide to show a knowledgeable, trained erector the correct part placement one to another. If following any of the installation steps would endanger a worker, the erector should stop work and decide upon a corrective action. Provide required safety railing, netting, or safety lines for crew members working on the carport.

### Carport System Components



Bottom Clamp Kit includes:  
Aluminum Clamp  
T-Bolt  
Flange Nut

K10242-001  
HR (1/4) Bottom Clamp Kit  
  
K10242-002  
SB (3/8) Bottom Clamp Kit



End Clamp Kit, fits panel height from 31 to 50 mm. For last 3 digits, see table on last page.

K10224-1XX  
K10224-1XX-BK



Self-Bonding Mid Clamp Kit fits panel height from 31 to 50 mm.  
**May be repositioned until torqued to final value.**

K10180-001  
K10180-001-BK  
**For single-use only**



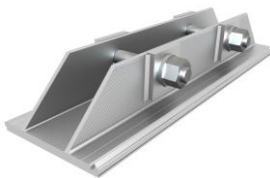
3.5" Beam Clamp Kit includes:  
Aluminum Clamp  
2X 3/8-16 Hex Head Bolt  
2X 3/8-16 Flange Nut

K10220-002  
Beam Clamp Kit



6" Beam Clamp Kit includes:  
Aluminum Clamp  
2X 3/8-16 Hex Head Bolt  
2X 3/8-16 Flange Nut

K10220-005  
Beam Clamp Kit



Base Plate Kit includes:  
2X 1" Hex Head Bolt  
2X 1" Flange Nut  
1X UHMW-PE Pad

K10339-001  
Post Base Plate Kit



Post Base Plate Kit includes:  
16X 3/8 T-Bolt  
16X 3/8 Flange Nut  
16X 3/8 Locking Nut

K50036-001



Beam Bracket Kit available in 0, 3  
and 5 degrees includes:  
16X 3/8 T-Bolt  
16X 3/8 Flange Nut  
16X 3/8 Locking Nut

K50036-XXX



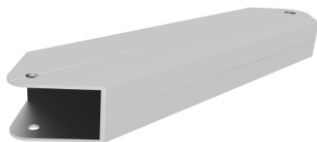
L-Foot Kit includes:  
2X 3/8-16 Hex Head Bolt  
2X 3/8-16 Flange Nut  
2X Rectangular Washers

K10066-007



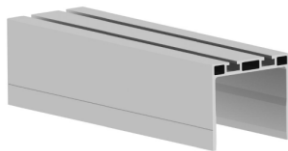
Grounding Lug Kit with Grounding  
Spacer and 1/4-20 T-Bolt.

K10179-XXX  
**For single-use only**



Vertical Tube Brace  
180X80X4.5mm L=XXXmm

A20330-XXX  
Vertical Tube Brace



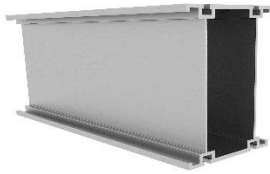
Cross Beam Kit  
with 5/8 Hardware

K60010-XXX



SB3500 Triangular Beam

A20243-XXX



SB5000 BoxBeam

A20143-XXX



Helio Rails: Features both 1/4" and 3/8" side slots, and 1/4" top slot for clamping PV panels. Available in 84", 124", 164" and 206" lengths. Last 3 digits denote rail length. 4 stock sizes in clear and black.

A20144-XXX (Clear)  
A20144-XXX-BK (Black)  
HR250 (Standard Rail)  
A20145-XXX (Clear)  
A20145-XXX-BK (Black)  
HR350 (Heavy Rail)  
A20146-XXX (Clear)  
A20146-XXX-BK (Black)  
HR500 (Super Rail)



SB3500 End Cap

A20261-001



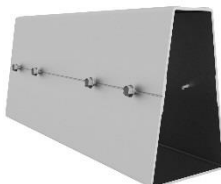
SB5000 End Cap

A20251-001



Metal Rail End Caps available for Helio Standard and Heavy rails (optional)

A20284-001  
A20284-BK1 (Black)  
HR250 (Helio Standard)  
A20285-001  
HR350 (Helio Heavy)  
A20263-001  
HR500 (Helio Super)



SB3500 Beam Splice Kit

K10238-001



Solar Panel Seam Gaskets available for 1/2" and 1" gaps between panels

C10040-XXX  
1/2" Seam Gasket

C10040-XXX  
1" Seam Gasket



DynoBond, by DynoRaxx, is an alternative method of bonding the PV modules together.

Contact DynoRaxx

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### Tools Required for Installation

Electric Drill or Impact Driver.

*Note that the use of an impact driver is strongly discouraged for all stainless nut and bolt hardware.*



3/8" Socket wrench



Sockets for 3/8" drive sockets, 7/16", 1/2", 9/16" and 1-1/16"



Torque Wrench 3/8" drive, 0 to 35 ft. lbs.



Anti-seize compound (Permatex 80071 or equivalent).



Tape measure



Saws for cutting aluminum posts and rails as necessary



Chalk line or laser



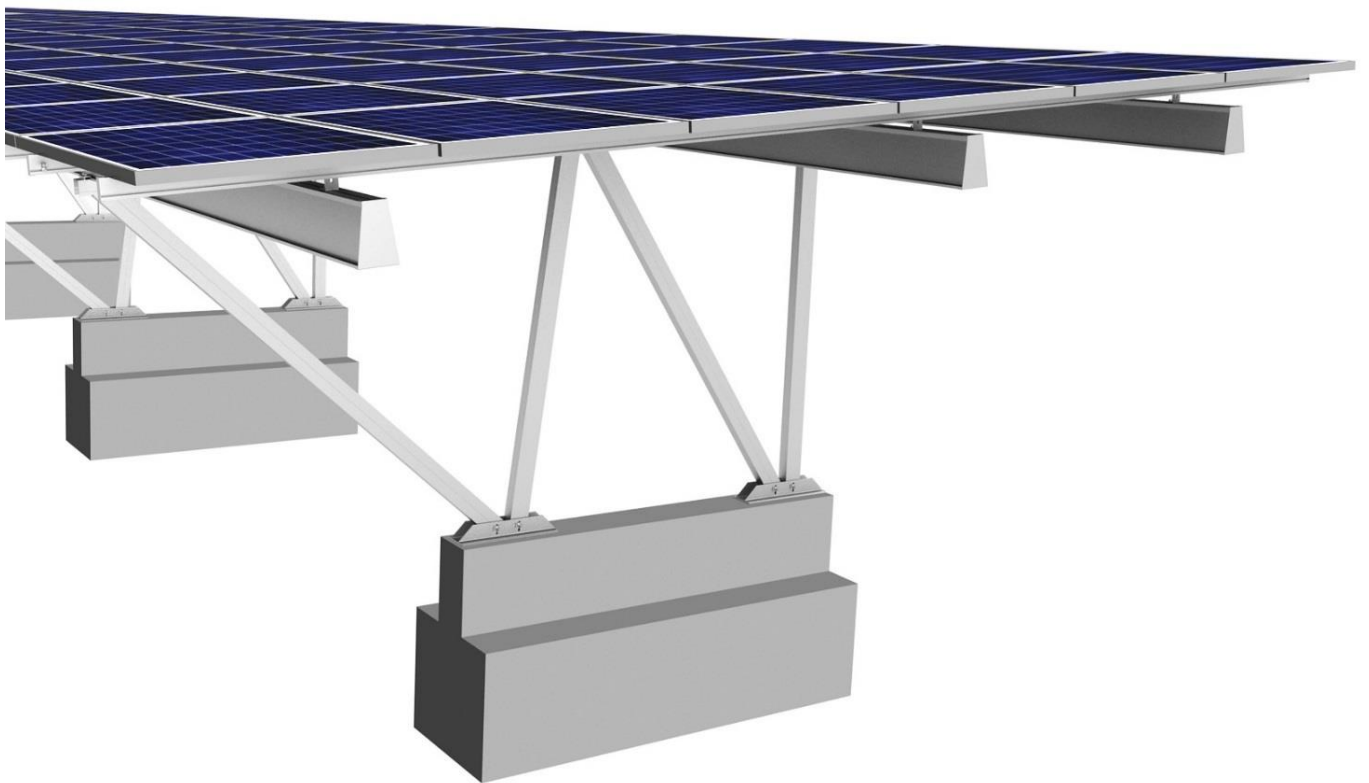
### Torque Values for Carport System

These values must be adhered to, both for mechanical strength and to insure the performance of the integral grounding and bonding features. It is required that a torque wrench be used to measure the bolt torque during final assembly, and it is recommended that anti-seize compound be applied to the bolt threads.

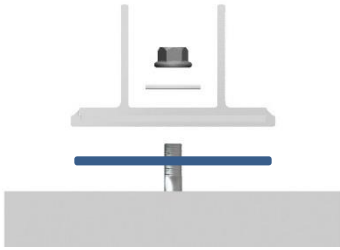
Hardware	Torque
M6 AND 1/4" NUTS AND BOLTS	8 N-M to 10 N-M (6 FT-LBS to 7 FT-LBS)
M8 AND 5/16" NUTS AND BOLTS	13 N-M to 15 N-M (10 FT-LBS to 11 FT-LBS)
M10 AND 3/8" NUTS AND BOLTS	28 N-M to 32 (22 FT-LBS to 24 FT-LBS)
M12 AND 1/2" NUTS AND BOLTS	47 N-M to 53 N-M (35 FT-LBS to 39 FT-LBS)
M16 AND 5/8" NUTS AND BOLTS	115 N-M to 127 N-M (85 FT-LBS to 93)
M20 AND 3/4" NUTS AND BOLTS	232 N-M to 256 N-M (171 FT-LBS to 189 FT-LBS)

## Carport Configuration

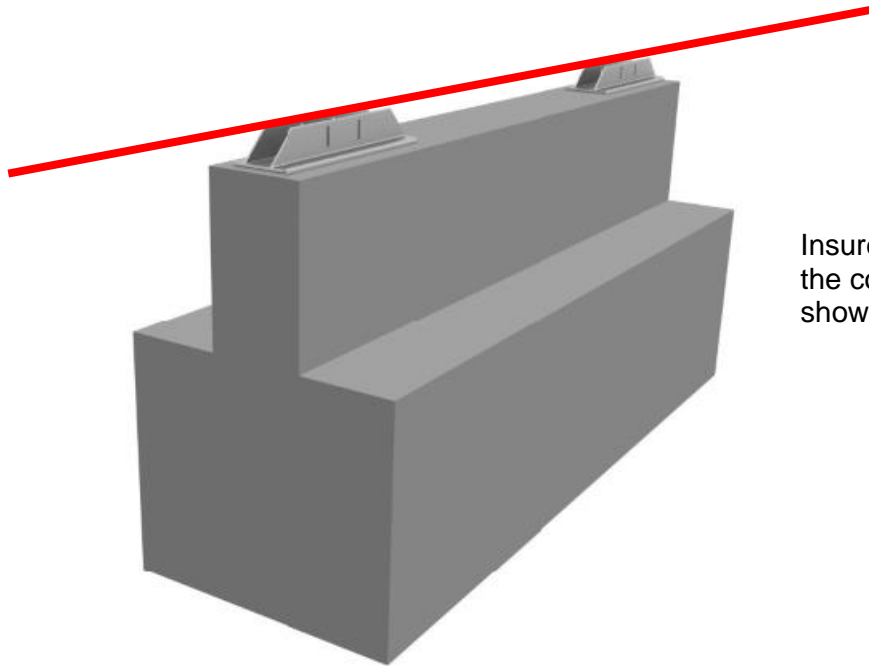
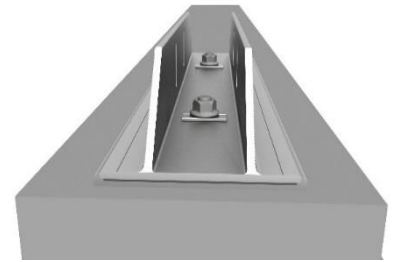
The SunPort Carport and Canopy System is a robust all aluminum elevated structure. It has been engineered to support a wide variety of carport and canopy configurations. With a full range of interchangeable components the SunPort Carport and Canopy System can be configured to fit any outdoor requirement. A typical landscape carport layout features three East-West (EW) beams mounted to North-South (NS) supports on the bottom and our Helio Rail on the top. Our beam rail stack can achieve spans of 27 feet or enough space to park three cars.



## SP4000 Base Plate to Concrete Block

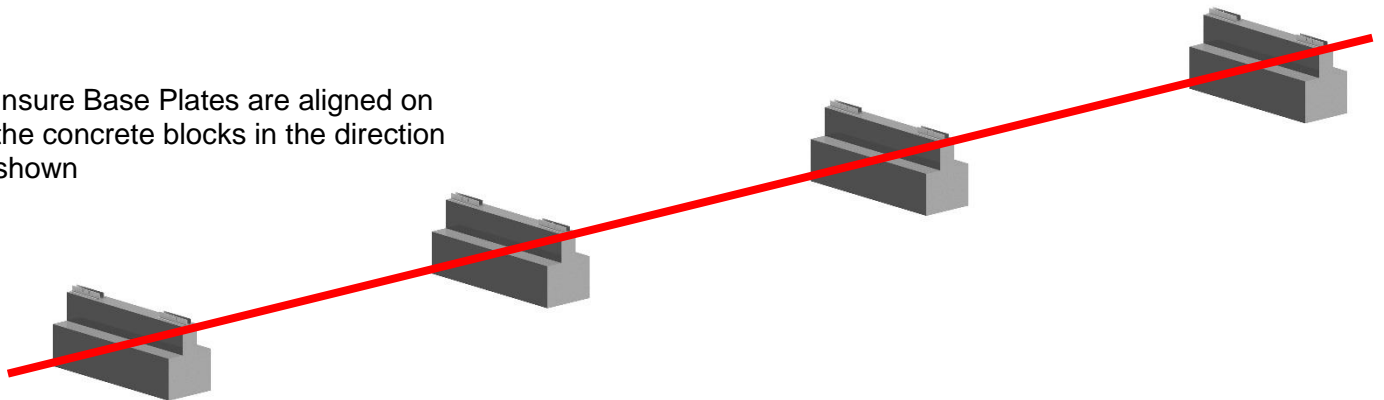


Attach the UHMW Pad Insulator and the Base Plate onto the concrete block using the threaded rod and the 1/2 Flat Washer and 1/2-24 Flange Nut



Insure Base Plates are aligned on the concrete block in the direction shown

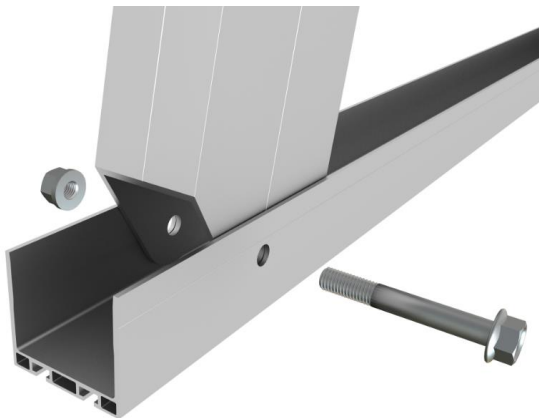
Insure Base Plates are aligned on the concrete blocks in the direction shown



## SP4000 Vertical Tube Brace to NS Top Extrusion



Attach the Vertical Tube Brace to the NS Top Extrusion using the M12 Hex Head Bolt and the M12 Flange Nut



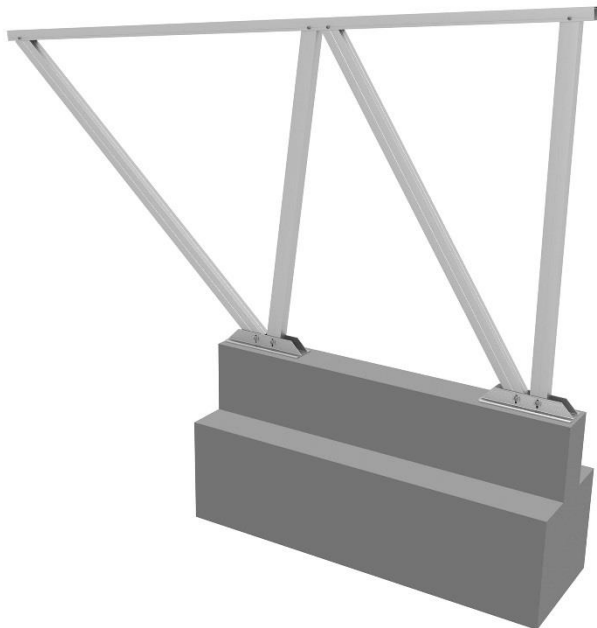
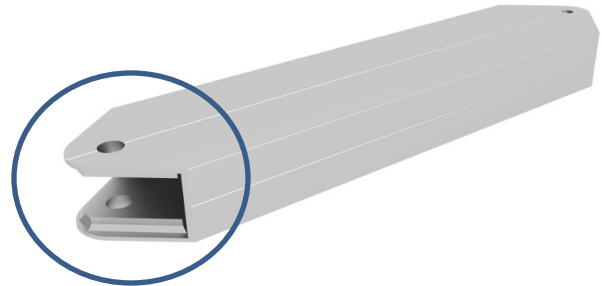
Attach four (4) Vertical Tube Brace to the NS Top Extrusion



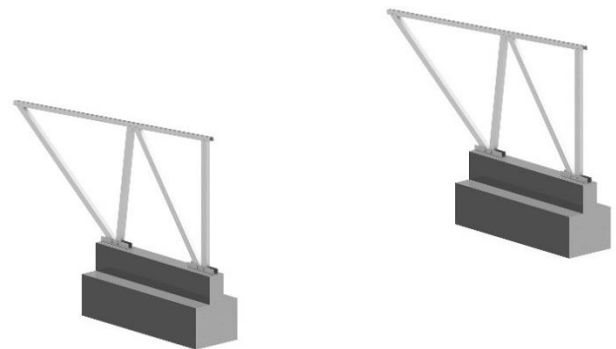
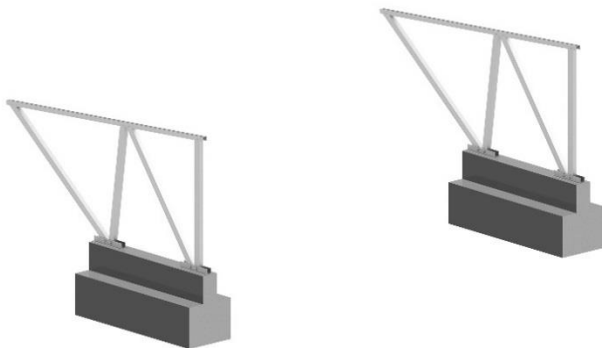
## SP4000 Vertical Tube Brace to Base Plate



Attach the welded reinforced end of the Vertical Tube Braces to the Bottom Plate using the 1" Hex Head Bolt and the 1" Flange Nut

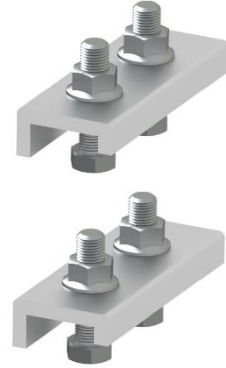
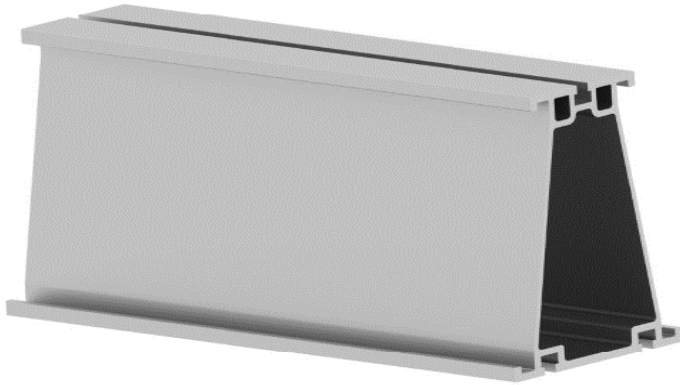


Attach four (4) Vertical Tube Brace to the two (2) Bottom Plates as shown



Repeat Vertical Tube Braces as required

## SB3500 Beam to NS Top Extrusion



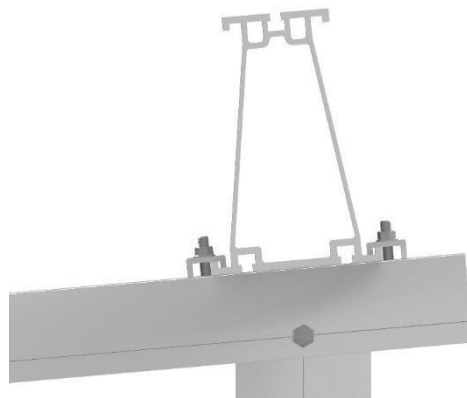
Use the Beam Clamp Kits to secure the SB3500 Triangular Beam to the NS Top Extrusion



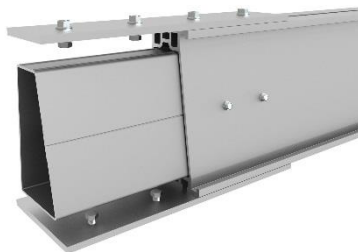
SB3500 Triangular Beam end clamping shown



SB3500 Triangular Beam mid span clamping shown

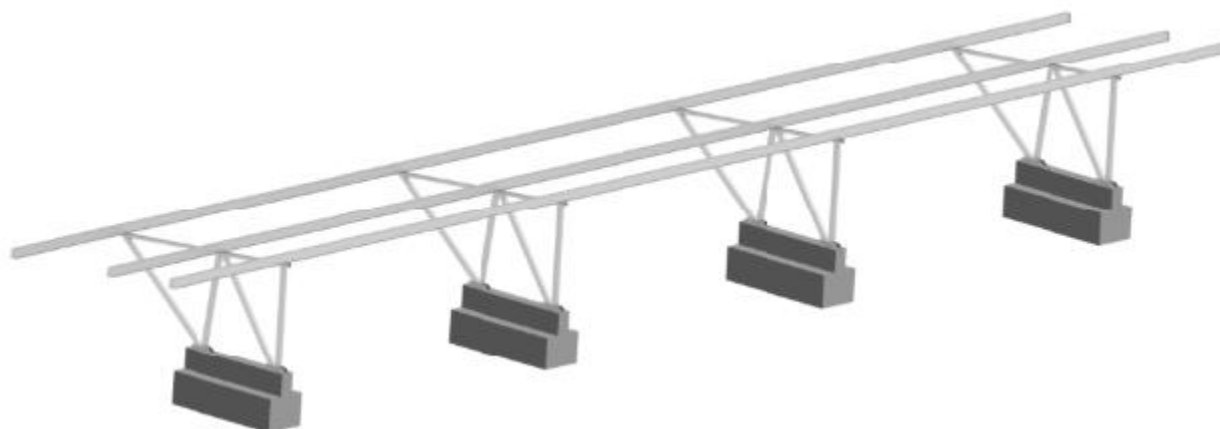


## SB3500 Beam to SB3500 Beam Splice

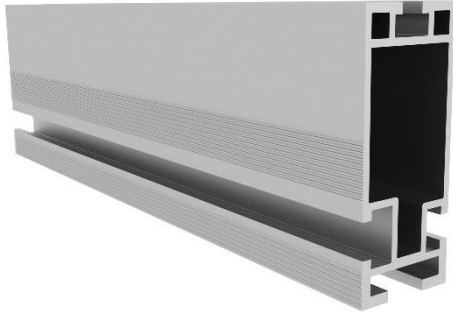


Use the SB3500 Beam Splice Kit to extend the SB3500 Beam as required

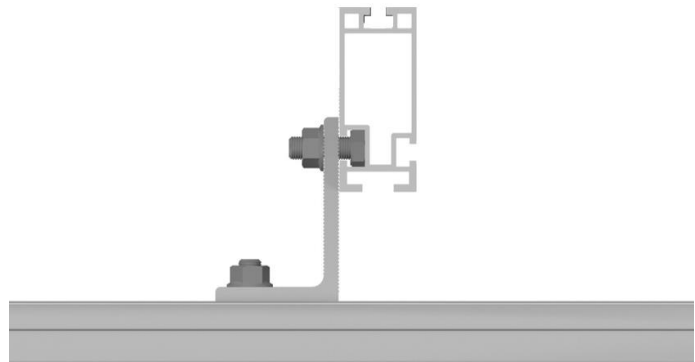
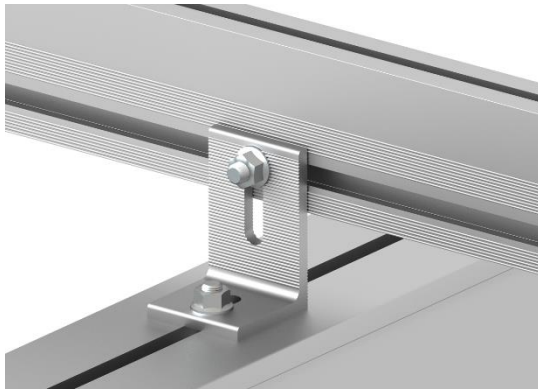
Repeat the SB3500 Beam attachment as required



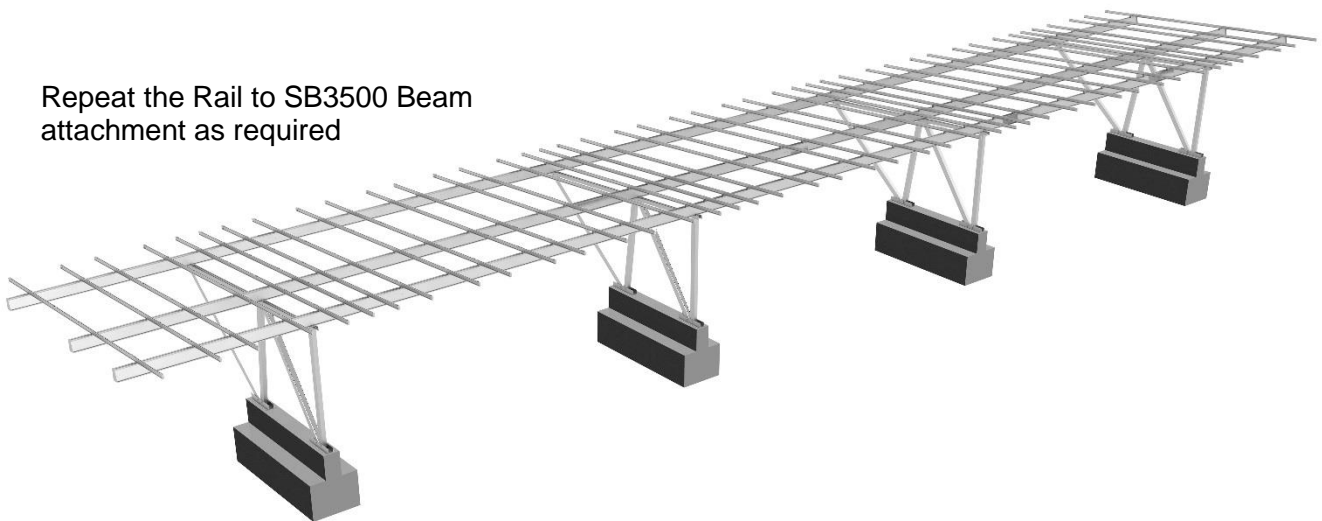
## HR Rail to SB3500 Beam



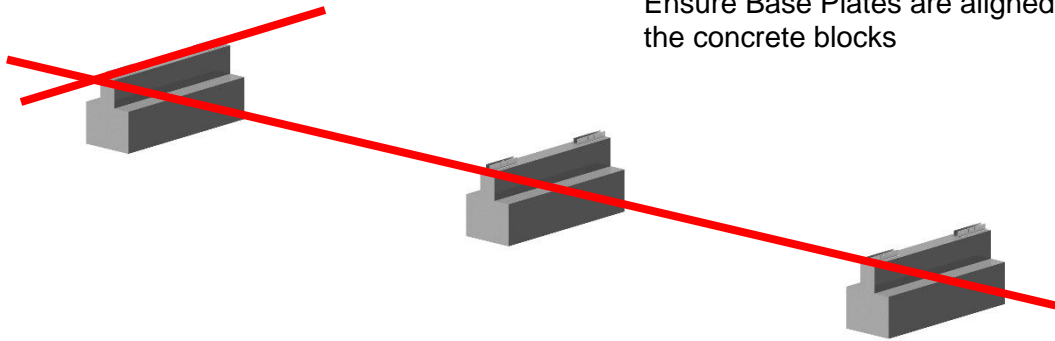
Attach the Rail to the SB3500 Beam using the 3/8 Bolts and Nuts provided with the L-Foot Kit



Repeat the Rail to SB3500 Beam attachment as required



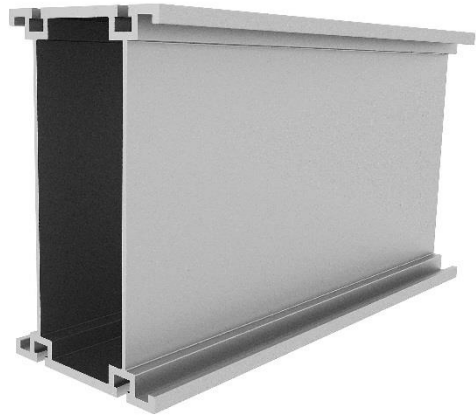
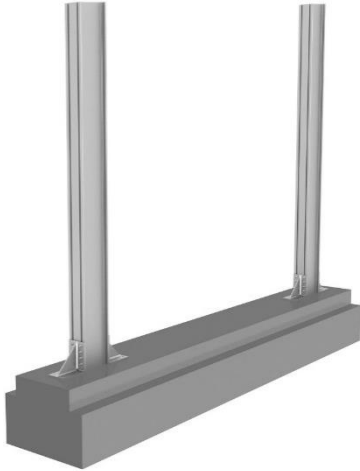
## SP2000 Base Plate to Concrete Block



Attach the UHMW Pad Insulator and the Base Plates onto the concrete block using the threaded rod and the Flange Nuts and Locking Nuts.



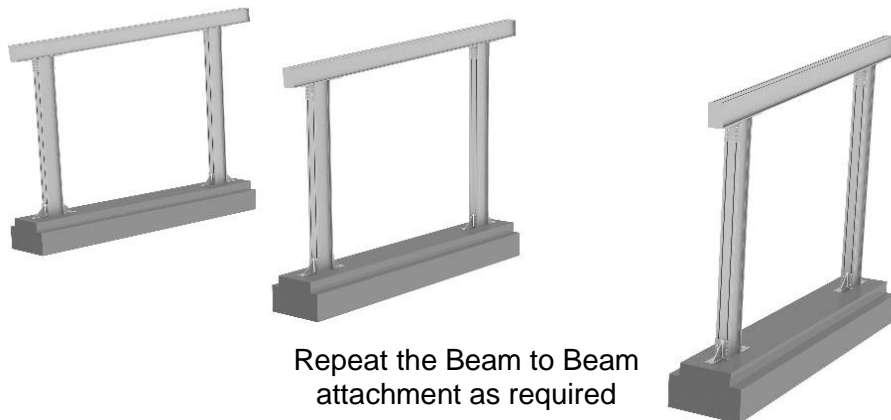
**SP2000 Vertical Beam to NS Beam**



SB5000 BoxBeam  
as North/South

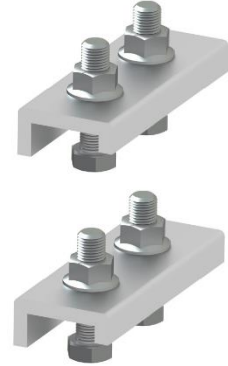
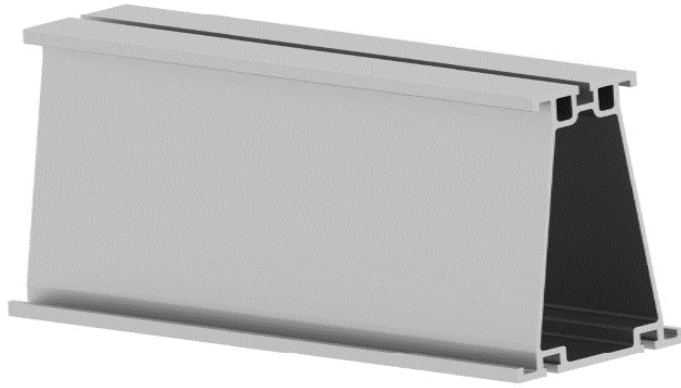


Attach the SB5000 BoxBeam to the vertical  
Beams using the Beam Bracket Kit

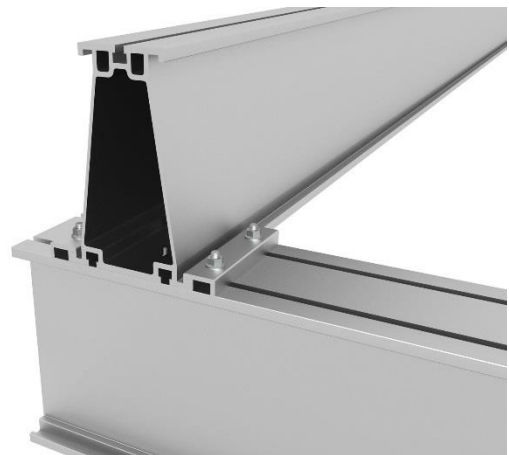


Repeat the Beam to Beam  
attachment as required

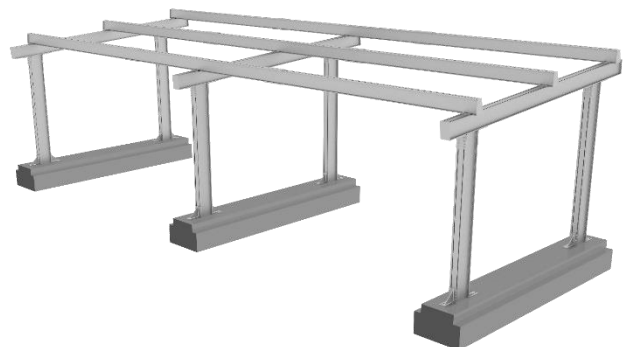
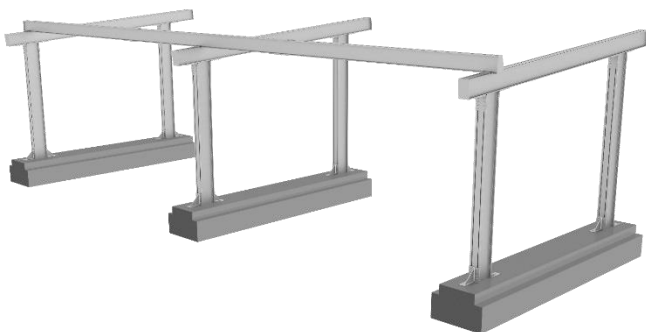
## EW SB3500 Beam to NS SB5000 Beam



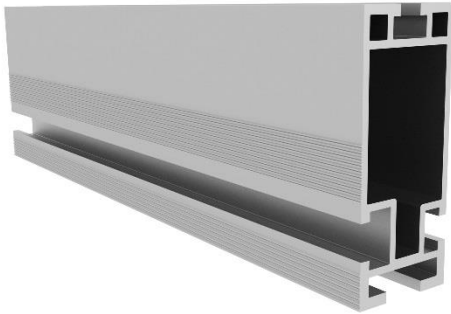
Use the Beam Clamp Kits to secure the SB3500 Triangular Beam to the SB5000 BoxBeam



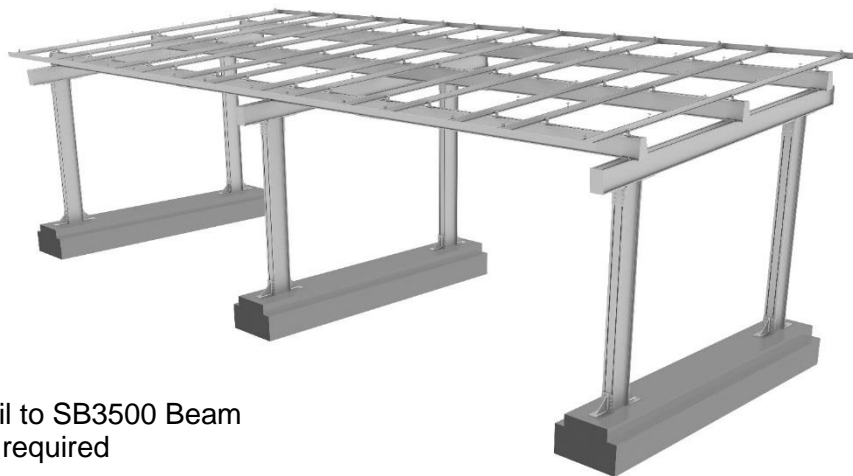
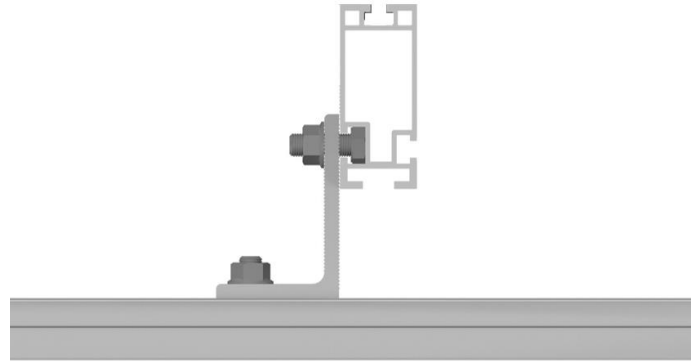
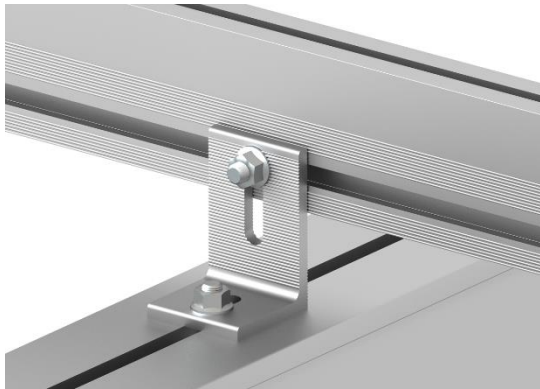
Repeat Beam to Beam attachment as required



## HR Rail to SB3500 Beam



Attach the Rail to the SB3500 Beam using the 3/8 Bolts and Nuts provided with the L-Foot Kit



Repeat the Rail to SB3500 Beam attachment as required

## Rail and Beam End Clamps



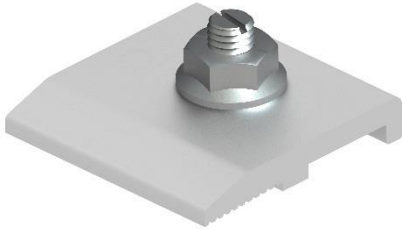
Use the Rail and Beam End Caps to complete the Carport. Custom lengths are available.



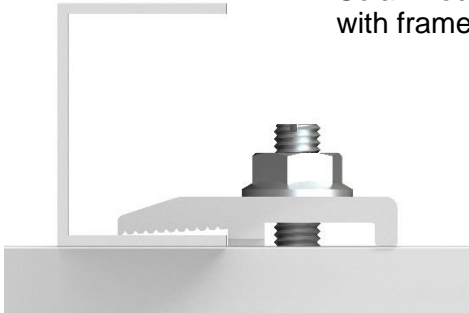
Install the Panel Seam Gaskets in the gaps between the solar panels.



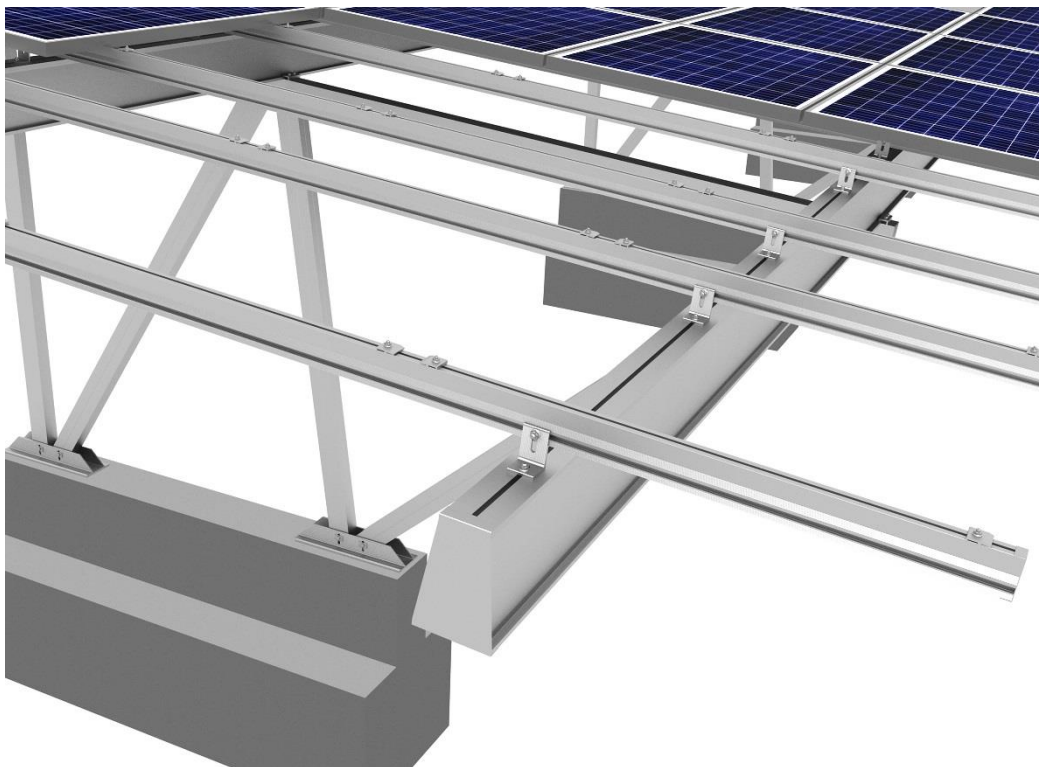
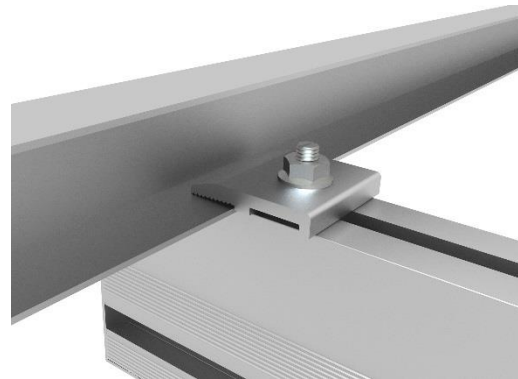
## Module to HR Rail using Bottom Clamps



Use the Bottom Panel Clamp Kit to secure the Solar Module to the Rail.



Solar Module shown with frame only

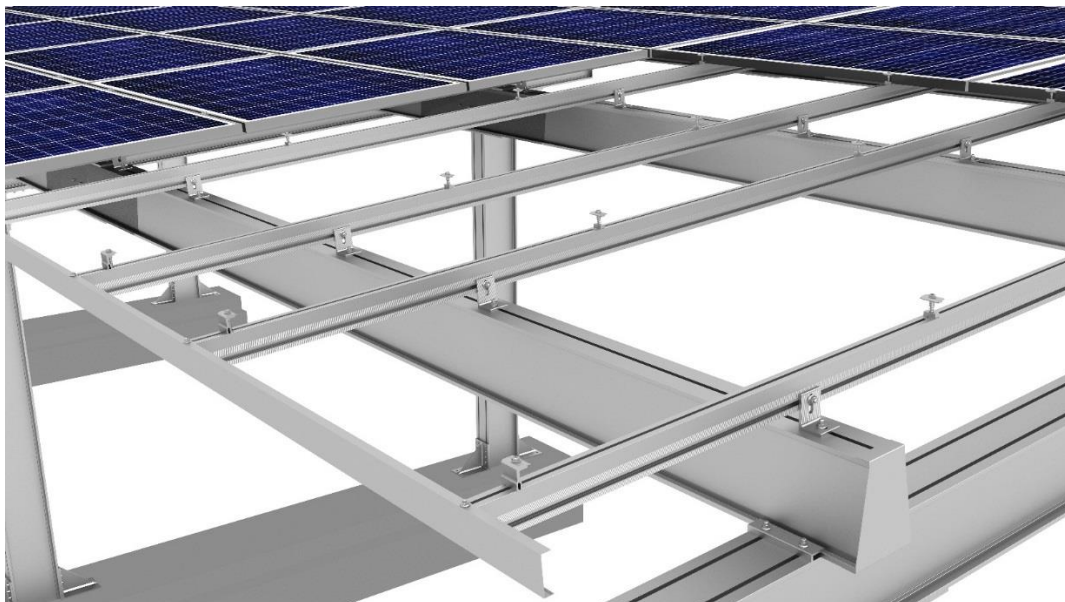
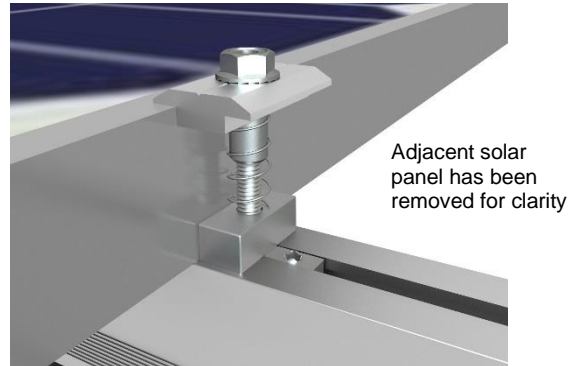
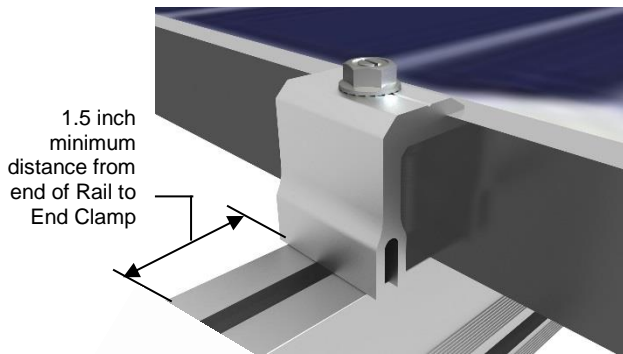
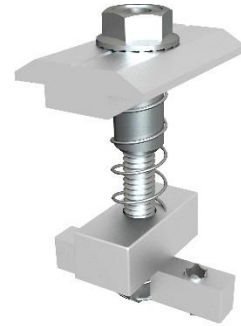


### Module to HR Rail using Top Clamps



Use the End Clamps and Mid Clamps to secure the Module to the Rail.

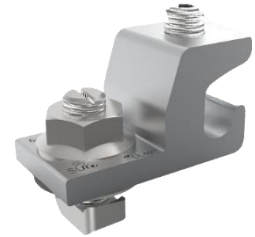
Mid Clamps are Self-Bonding in compliance with UL2703.



## Bottom Clamp Bonding Methods

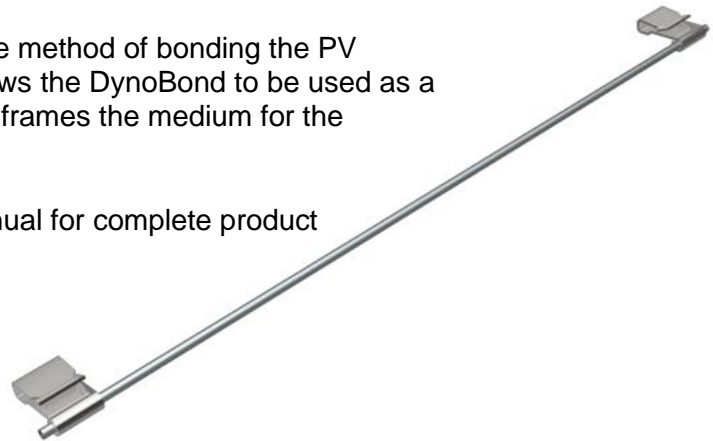
The SunModo Grounding Lug can be used to bond anodized aluminum to a copper wire electrode. The Grounding Lug along with a length of copper wire can be used as a jumper between modules, making the module frames the medium for the equipment ground path.

The Grounding Lug is for use with PV modules that have a maximum series fuse rating of 30A. Grounding Lug and detailed installation document D10003 are available from SunModo separately.

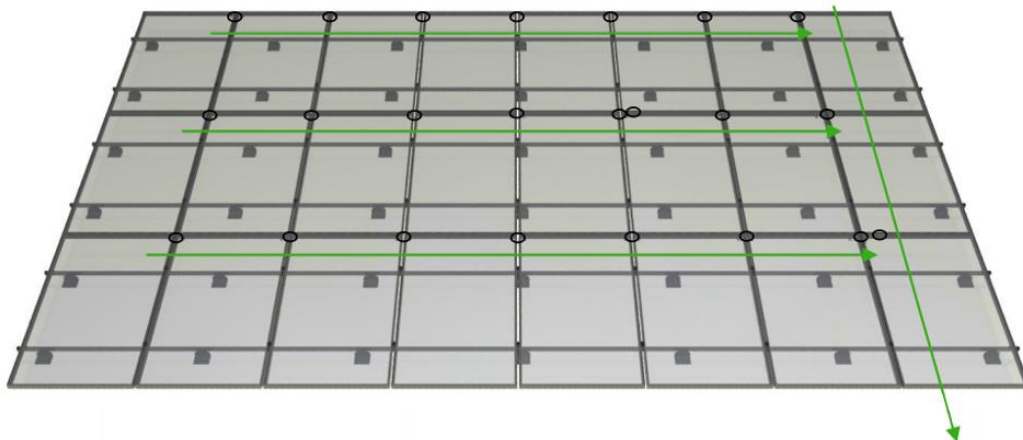


The DynoBond, by DynoRaxx, is an alternative method of bonding the PV modules together. This proprietary design allows the DynoBond to be used as a jumper between modules, making the module frames the medium for the equipment ground path.

See the DynoRaxx DynoBond installation manual for complete product installation instructions.



Begin by charting your installation. In this example, the system consists of 3 rows of 8 modules per row totaling 24 modules shown in portrait. The bonding jumpers are installed in the same manner for Carport Systems mounted in portrait or landscape. The homerun wires are shown exiting the system at the southeast corner of the array. The bonding jumpers will be installed to connect the modules west to east across each individual row. The bonding jumpers will also be connected on a row to row basis from North to South to bridge each row together. The bonding jumper is used as a jumper between modules. The highlighted circles are the location of bonding jumpers for this specific installation. The bonding jumpers can be installed while installing the modules or if space permits after the module installation is completed.



## GENERAL NOTES UNLESS OTHERWISE SPECIFIED

1. DESIGN CRITERIA:
  - a. 2006 EDITION OF THE INTERNATIONAL BUILDING CODE, WITH LOCAL AMENDMENTS.
2. INSTALLATION TOLERANCES:
  - a. LATERAL SUPPORTS PLACEMENT IS  $\pm 5.0"$  | TOTAL LATERAL DEVIATION OF SUPPORTS WITHIN AN ARRAY IS  $\pm 5.0"$  | ARRAY TILT ANGULAR TOLERANCE  $\pm 1.0^\circ$  | SUPPORT VERTICALITY TOLERANCE  $< 2.0^\circ$  EAST TO WEST.
3. GENERAL:
  - a. THE INSTALLATION INSTRUCTIONS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OR SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. SUNMODO SHALL NOT BE RESPONSIBLE FOR THE CONTRACTOR'S MEANS, METHODS, TECHNIQUES, AND SEQUENCES FOR PROCEDURE OF CONSTRUCTION, OR THE SAFETY PRECAUTIONS AND THE PROGRAMS INCIDENT THERE TO (NOR SHALL OBSERVATION VISITS TO THE SITE INCLUDE INSPECTION OF THESE ITEMS). THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN AND IMPLEMENTATION OF ALL SCAFFOLDING, BRACING AND SHORING.
  - b. WHERE REFERENCE IS MADE TO VARIOUS TEST STANDARDS FOR MATERIALS, SUCH STANDARDS SHALL BE THE LATEST EDITION AND/OR ADDENDA.
4. FOUNDATIONS:
  - a. SUNMODO IS NOT RESPONSIBLE FOR ANY GEOTECHNICAL ASPECTS OF THIS PROJECT. IT IS RECOMMENDED THAT THE OWNER RETAIN A REGISTERED GEOTECHNICAL ENGINEER TO CONDUCT A GEOTECHNICAL INVESTIGATION AND PREPARE A REPORT WITH RECOMMENDATIONS FOR FOUNDATION AND EARTHWORK PROCEDURES.
5. ALUMINUM:
  - a. ALL ALUMINUM SHALL CONFORM TO THE LATEST ALUMINUM DESIGN HANDBOOK.
  - b. ALL ALUMINUM SECTIONS SHALL BE:
    - i. SEMI-HOLLOWS AND HOLLOWES SHALL BE 6105-T5, 6005A-T6, OR 6005-T5.
    - ii. SOLIDS SHALL BE 6063-T6.
6. STEEL:
  - a. ALL BOLTS, NUTS AND WASHERS SHALL BE 304 STAINLESS STEEL CLASS 2 (A2-70).
7. TORQUE:
  - a. SEE TABLE ON PAGE 10: TORQUE VALUES FOR CARPORT SYSTEM.
  - b. RECOMMENDED SPEED FOR INSTALLATION OF SELF-DRILLING 1/4" DIAMETER SCREWS IS 1200-1800 RPMS.
8. MODULE SIZE:
  - a. RACKING SYSTEM DESIGNED FOR MODULE SIZE: SEE SHOP DRAWING.
  - b. VERTICAL MODULE GAP: 12 mm
  - c. HORIZONTAL MODULE GAP: 12 mm
9. CONCRETE:
  - a. ALL CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF ACI 301 AND ACI 318. CEMENT PER ASTM C150, TYPE II. AGGREGATE PER ASTM C33. CONCRETE SHALL BE READY MIXED IN ACCORDANCE WITH ASTM C94 AND SHALL BE DESIGNED FOR A MINIMUM 28 DAY COMPRESSIVE STRENGTH AS FOLLOWS: FOUNDATIONS 3,000 PSI (DESIGNED FOR 2,500 PSI).
  - b. 6% AIR ENTRAINMENT.
10. REINFORCING:
  - a. REINFORCING STEEL SHALL CONFORM TO ASTM A615 (Fy = 60ksi) DEFORMED BARS. NO TACK WELDING OF REINFORCING BARS ALLOWED WITHOUT PRIOR REVIEW OF PROCEDURE WITH THE STRUCTURAL ENGINEER. LATEST ACI CODE AND DETAILING MANUAL APPLY.
  - b. ACCURATELY PLACE OR SUPPORT ALL REINFORCING TO HAVE A CLEAR CONCRETE COVERAGE OF 3".
11. SPECIAL INSPECTION:
  - a. PER IBC CHAPTER 17, SPECIAL INSPECTION IS REQUIRED FOR THE FOLLOWING ITEMS:
    - i. BOLTS IN CONCRETE:
      1. DURING THE PLACEMENT OF CONCRETE AROUND BOLTS.



*SunPort Carport*  
*And Canopy*

See [www.sunmodo.com](http://www.sunmodo.com) for current warranty documents and information.

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