SunPort 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).

TABLE OF CONTENTS

Installer Responsibility: .................................................................................................................. 3
Safety: ........................................................................................................................................... 3
Carport System Components .......................................................................................................... 4
Tools Required for Installation ......................................................................................................... 8
Torque Values for Carport System .................................................................................................. 9
Carport Configuration ...................................................................................................................... 10
SP4000 Base Plate to Concrete Block ............................................................................................ 11
SP4000 Vertical Tube Brace to NS Top Extrusion ......................................................................... 12
SP4000 Vertical Tube Brace to Base Plate ....................................................................................... 13
SB3500 Beam to NS Top Extrusion ................................................................................................. 14
SB3500 Beam to SB3500 Beam Splice .......................................................................................... 15
HR Rail to SB3500 Beam .................................................................................................................. 16
SP2000 Base Plate to Concrete Block ............................................................................................. 17
SP2000 Vertical Beam to NS Beam .................................................................................................. 18
EW SB3500 Beam to NS SB5000 Beam ....................................................................................... 19
HR Rail to SB3500 Beam .................................................................................................................. 20
Rail and Beam End Clamps ............................................................................................................. 21
Module to HR Rail using Bottom Clamps ....................................................................................... 22
Module to HR Rail using Top Clamps ............................................................................................. 23
Bottom Clamp Bonding Methods .................................................................................................. 24
GENERAL NOTES UNLESS OTHERWISE SPECIFIED ................................................................ 25

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

### End Clamp Kit
- K10224-1XX
- K10224-1XX-BK

### Self-Bonding Mid Clamp Kit
- K10180-001
- K10180-001-BK

### 3.5" Beam Clamp Kit
- K10220-002
  - Beam Clamp Kit

### 6" Beam Clamp Kit
- K10220-005
  - Beam Clamp Kit

### Base Plate Kit
- 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.
For single-use only K10179-XXX

Vertical Tube Brace
180X80X4.5mm L=XXXmm
Vertical Tube Brace A20330-XXX

Cross Beam Kit
with 5/8 Hardware K60010-XXX

SB3500 Triangular Beam A20243-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.

SB5000 BoxBeam A20143-XXX

Helio Rails: A20144-XXX (Clear)
Helio Rails: A20144-XXX-BK (Black)
Helio Rails: HR250 (Standard Rail)
Helio Rails: A20145-XXX (Clear)
Helio Rails: A20145-XXX-BK (Black)
Helio Rails: HR350 (Heavy Rail)
Helio Rails: A20146-XXX (Clear)
Helio Rails: A20146-XXX-BK (Black)
Helio Rails: 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)

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
# 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.

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Torque</th>
</tr>
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<tbody>
<tr>
<td>M6 AND 1/4&quot; NUTS AND BOLTS</td>
<td>8 N-M to 10 N-M</td>
</tr>
<tr>
<td></td>
<td>(6 FT-LBS to 7 FT-LBS)</td>
</tr>
<tr>
<td>M8 AND 5/16&quot; NUTS AND BOLTS</td>
<td>13 N-M to 15 N-M</td>
</tr>
<tr>
<td></td>
<td>(10 FT-LBS to 11 FT-LBS)</td>
</tr>
<tr>
<td>M10 AND 3/8&quot; NUTS AND BOLTS</td>
<td>28 N-M to 32</td>
</tr>
<tr>
<td></td>
<td>(22 FT-LBS to 24 FT-LBS)</td>
</tr>
<tr>
<td>M12 AND 1/2&quot; NUTS AND BOLTS</td>
<td>47 N-M to 53 N-M</td>
</tr>
<tr>
<td></td>
<td>(35 FT-LBS to 39 FT-LBS)</td>
</tr>
<tr>
<td>M16 AND 5/8&quot; NUTS AND BOLTS</td>
<td>115 N-M to 127 N-M</td>
</tr>
<tr>
<td></td>
<td>(85 FT-LBS to 93)</td>
</tr>
<tr>
<td>M20 AND 3/4&quot; NUTS AND BOLTS</td>
<td>232 N-M to 256 N-M</td>
</tr>
<tr>
<td></td>
<td>(171 FT-LBS to 189 FT-LBS)</td>
</tr>
</tbody>
</table>
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.
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.
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.
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
Use the SB3500 Beam Splice Kit to extend the SB3500 Beam as required

Repeat the SB3500 Beam attachment as required
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.
Ensure Base Plates are aligned on the concrete blocks

Secure the SB5000 BoxBeam to the Base Plates using the T-Bolts, Flange Nuts and Locking Nuts.

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
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.

1.5 inch minimum distance from end of Rail to End Clamp

Adjacent solar panel has been removed for clarity
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 ±5.0" | TOTAL LATERAL DEVIATION OF SUPPORTS WITHIN AN
      ARRAY IS ±5.0" | ARRAY TILT ANGULAR TOLERANCE ±1.0° | SUPPORT VERTICALITY TOLERANCE <2.0°
      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-HOLLLOWS AND HOLLLOWS 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.
See www.sunmodo.com for current warranty documents and information.

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