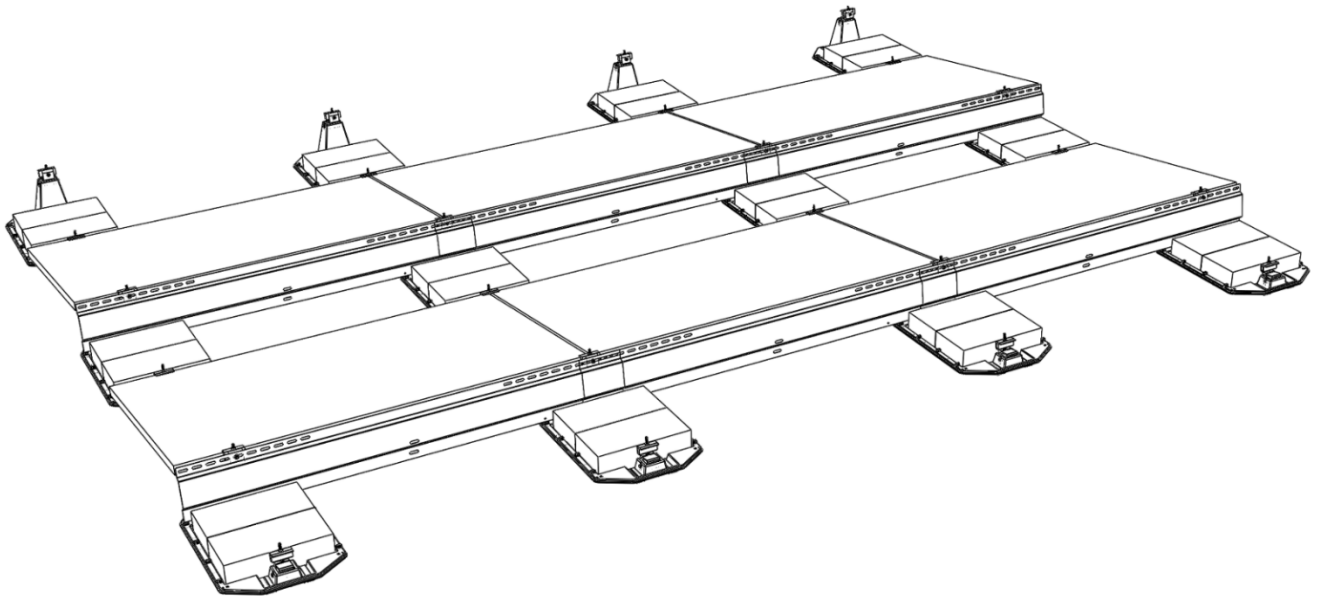


# EcoFoot2+<sup>®</sup>



## Installation Guide

### EcoFoot2+<sup>®</sup> 10-Degree Ballasted Racking System

Document No. ECO-002\_850

Rev 1.7, January 2020

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## Revision History

Revision	Description of Changes	Date
1.0	Initial EcoFoot2+ Release	2014-August-18
1.1	Updated for UL1703	2014-November-25
1.2	Module Removal Addendum	2015-January-08
1.3	Updated for UL2703	2017-January-10
1.4	Updated for Compatible Modules and Reformatting	2017-April-13
1.5	Updated for Grounding Method, Product Logo and Trademark Notice	2017-May-24
1.6	Updated UL2703 Fire Rating language Mid-Support Span Addendum B Added Ground Path Addendum C Added	2018-January-05
1.7	Update UL2703 Stamp	2020-January-27

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### Field Support Contact Information

Ecolibrium Solar proudly offers dedicated engineering expertise and superior customer support. For questions about the installation procedures or a specific application, please contact our Field Support Specialists at 866-488-6794 or [FieldSupport@EcolibriumSolar.com](mailto:FieldSupport@EcolibriumSolar.com).

### Installer Responsibility

The installer is solely responsible for:

- Utilizing all necessary safety equipment, as required by applicable rules and regulations.
- Complying with all applicable local and national building codes, including any that may supersede this manual.
- Ensuring that Ecolibrium Solar® EcoFoot2+® and other products are appropriate for the specific installation and are designed for the installation environment.
- Ensuring that the roof, its rafters, connections, and other structural support members can support the array under all conditions.
- Maintaining the waterproof integrity of the roof including selection of appropriate flashing if the system is being installed using attachments.
- Ensuring safe installation of all electrical aspects of the entire system

### Legal Notices

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## Disclaimer of Liability

ECOLIBRIUM SOLAR® does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with installation, operation, use, or maintenance by using this manual.

ECOLIBRIUM SOLAR assumes no responsibility for any infringement of patents or other rights of third parties, which may result from use of modules. No license is granted by implication or under any patent or patent rights. The information in this manual is believed to be reliable, but does not constitute an expressed and/or implied warranty.

ECOLIBRIUM SOLAR reserves the right to make changes to the product, specifications, data sheets and this manual without prior notice. This document is not prescriptive regarding safety and does not purport to address all the safety concerns that may arise with its use. Contractors should become familiar with all applicable safety, health, and regulatory requirements before beginning work.

Unauthorized field modification of ECOLIBRIUM SOLAR components or assemblies may affect ECOLIBRIUM SOLAR warranty coverage. Provide written drawings for ECOLIBRIUM SOLAR's review, comment and approval prior to attempting any field modifications.

## Warnings & Safety

Both electrical and roofing knowledge are required to correctly and safely install a solar photovoltaic system. Only qualified and certified installation professionals should install EcoFoot2+. Failure to follow the methods and procedures outlined in this guide may result in injury and/or damage to property.

Carefully read this guide before starting any work. Store a copy of this guide on the job site at all times and contact Ecolibrium Solar with any installation questions related to EcoFoot2+.

### **Please note the following warnings when installing EcoFoot2+:**

- EcoFoot2+ components fit together tightly and could cause pinch injuries.
- EcoFoot2+ components may be hot to the touch if left in the sun.

### **Please follow the safety requirements below when installing EcoFoot2+:**

- Always keep children and unauthorized people away from work areas.
- Always wear required OSHA approved Personal Protective Equipment (PPE).
- Always use insulated tools when working with or near electrical systems.
- Always provide OSHA approved fall protection for all installation personnel.
- Never wear jewelry during mechanical and electrical installation work.
- Never work in rain, snow or extremely windy conditions.
- Never leave a module unsupported or unsecured on the roof.
- Never install broken photovoltaic modules.
- Never use photovoltaic modules as a work surface.

## EcoFoot2+ General Application Notes

**Site-Specific System Design:** Ecolibrium Solar provides drafting services on all EcoFoot2+ projects. This service produces a site-specific design package with an Engineered Stamped Layout including detailed ballast plan and bill of materials.

**Roof Type:** EcoFoot2+ is designed to mount photovoltaic modules to a range of roof surfaces, including: EPDM, TPO, PVC, Mineral Cap Sheet (a.k.a. Rolled Asphalt), Tar and Gravel.

**Roof Slope Range:** 0-7 degrees maximum, 3-degree limit for unattached seismic.

**Wind Zone:** EcoFoot2+ is designed to mount photovoltaic modules on flat roof surfaces with a maximum pitch of 7 degrees in areas with extreme wind conditions. Please contact Ecolibrium Solar for clarification or assistance.

**Installation Requirements:** EcoFoot2+ is ballasted photovoltaic racking designed as a system which requires all EcoFoot2+ components, the specific module, and ballast placement prescribed in the PE stamped design. The absence of any of these elements in any given sub-array could present a compromised condition on the roof. Arrays shall not be left unattended in such a state during an installation.

This install guide officially documents the components used and proper methods for an EcoFoot2+ installation. Bonding elements are incorporated into EcoFoot2+ components. As the system is built on the roof, components and modules are bonded together. Specific steps to ensure a bonded system are described through the installation guide. It is the installer's responsibility to ensure that the system is safely and properly installed, and that the system is bonded back to a final ground point.

When wiring the array, keep bare copper from contacting bare aluminum.

**Thermal and Seismic Design Requirements:** EcoFoot2+ is a flexible and expandable design that accommodates various array geometries.

Maximum widths for arrays are as follows:

- 60-cell modules, 26 modules in a row
- 72-cell modules, 22 modules in a row

Minimum spacing between sub-arrays is 6". Site specifics may further limit array sizes and spacing.

**Re-Inspection:** Ecolibrium recommends 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.

**Compatible Modules:** Ecolibrium Solar has evaluated many photovoltaic modules for installation compatibility with the EcoFoot 2+ 10-degree racking system. A list of compatible modules may be found in "EcoFoot2+ Install Guide Appendix - Compatible Modules.pdf" on our website: [www.ecolibriumsolar.com](http://www.ecolibriumsolar.com)

**UL2703 Qualification:** In cases where UL 2703 certification is required, the EcoFoot2+ system conforms to the UL2703 Standard for grounding and bonding and fire ratings. The EcoFoot2+ 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.

EcoFoot2+ Racking maintains a Class A fire rating when installed in landscape orientation according to the installation instructions, on a low slope roof Class A roof with Type 1 and Type 2 modules.

Further information about Ecolibrium Solar's UL2703 Listing, including module load ratings may be found in "EcoFoot2+ Install Guide Appendix - UL2703 Qualification.pdf" at [www.ecolibriumsolar.com](http://www.ecolibriumsolar.com).

**UL2703 System Label:** The label shown below is stamped into to the Wind Deflector (identified as component 5 in the installation guide).

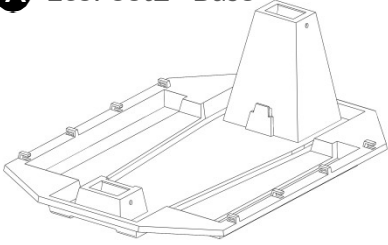


The Date Code **ABCYZZ** shown above will appear on production parts, letters defined as follows:

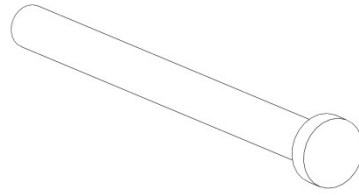
- ABC shall be an acronym for identifying the source factory
- Y shall be the Quarter of the year (i.e. 1, 2, 3, 4) of manufacture
- ZZ shall be the last 2 digits of the year of manufacture

# EcoFoot2+® Core Components

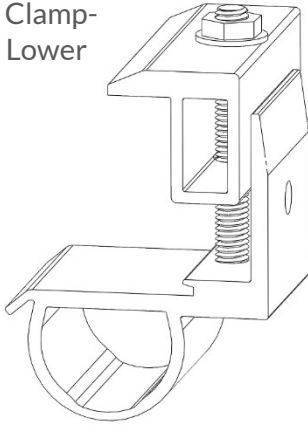
**A** EcoFoot2+ Base



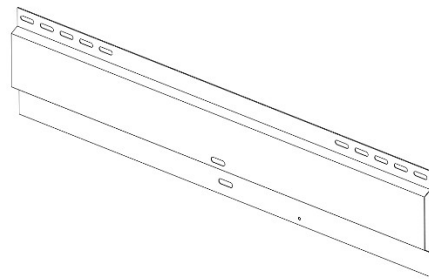
**D** Clevis Pin



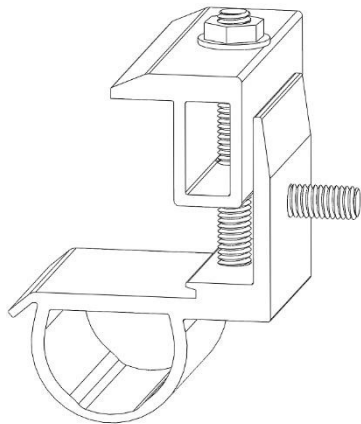
**B** Clamp-Lower



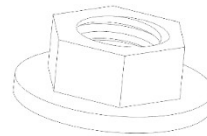
**E** Deflector



**C** Clamp-Upper



**F** Nut



# EcoFoot2+™ Installation Instructions

- 1 Chalk lines on roof denoting two outside edges of the EcoFoot2+® according to project drawing. Place EcoFoot2+® Bases (A) in position.

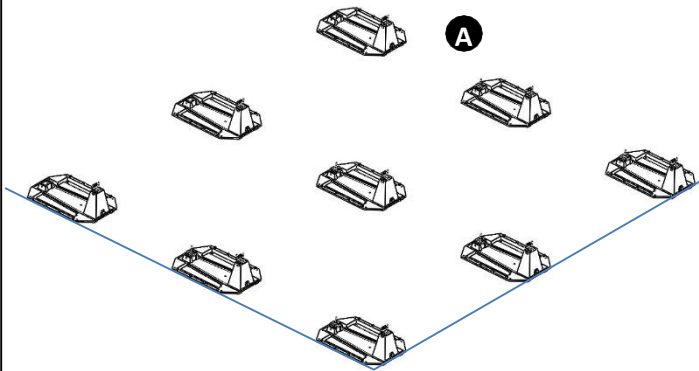
*Tip: Ensure lines are square using 3-4-5 principle.*

*Tip: As you build the array, panels will space Bases. Roughly place a few rows of Bases at a time so that they are within reach of final location.*

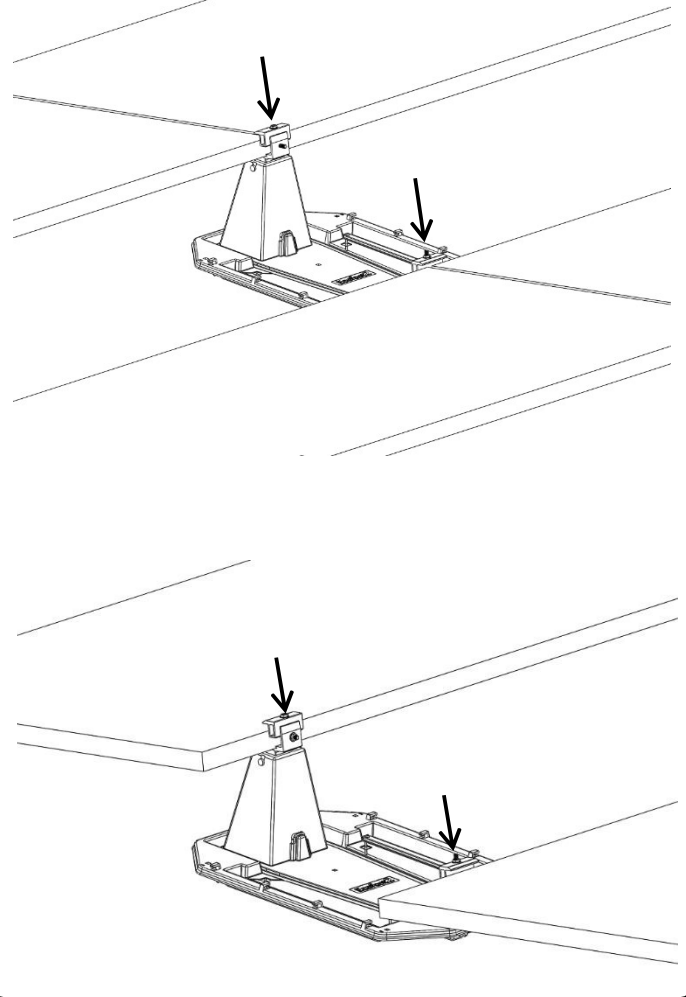
*Tip: If installation requires 2 blocks or fewer on the north row, north row Bases can be turned around 180 degrees and tucked under the panel.*

*Tip: If installation requires butyl, then butyl will be preinstalled on the bottom of the Base with protective tape. Ensure these butyl components are placed where specified in project drawing.*

*Remove protective tape after step 6.*

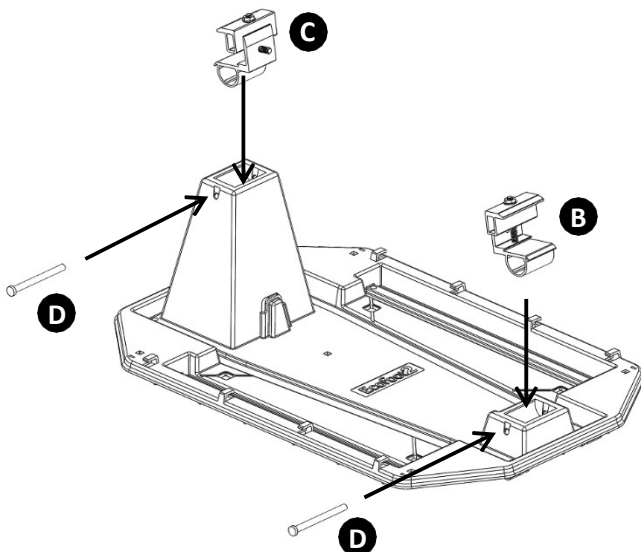


- 3 Place module onto EcoFoot2+® Base (A). Using a 1/2" deep socket, torque Nuts (F) to 14 ft-lbs. Space modules 1/2" apart using the alignment marks on the Clamps.



- 2 Place Lower Clamp (B) and Upper Clamp (C) into EcoFoot2+ Base (A) as shown. Push Clevis Pin (D) completely into EcoFoot2+® Base(A) to secure Rocker.

*Tip: Only install Clamps where modules will rest. Refer to diagram below for correct placement and orientation of Clamps.*

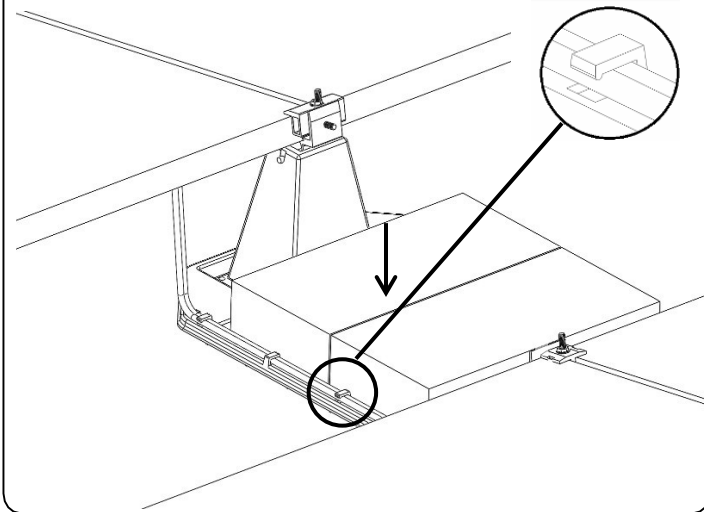


- 4** Place Ballast (not included) as required per PE Certified Ballast Plan provided.

*Tip: See note below for ballast block placement. In freeze/thaw environments, use concrete block with minimum compressive strength of 3,000psi (ref ASTM C1491-03 Standard Specifications for Concrete Roof Pavers).*

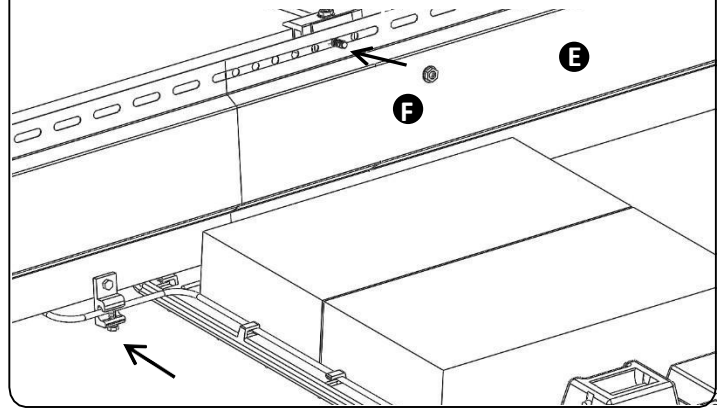
- 5** Route, connect and secure conductors.

*Tip: Wire clips attached to the module flange (not included) can be used to dress conductors in a row of modules. Integrated snap features in the Base can be used to dress conductors bridging rows.*



- 6** Place Deflectors (E) into slot on EcoFoot2+® Base and attach to Rocker using Nut (F) provided. Using a 1/2" deep socket, torque Nut (F) to 14 ft-lbs. Application of anti-seize on threaded post is recommended.

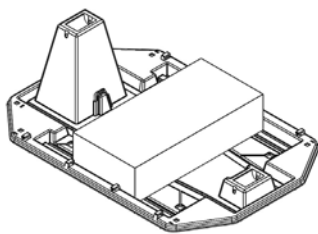
- 7** EcoFoot2+ is listed to carry module-to-module ground bond through the wind deflector. Each row of modules/wind deflectors must be grounded per the NEC and ANSI/NFPA 70 as described in Addendum C of this Install Guide. See Addendum C for requirements and Ground and Bond Path.



## EcoFoot2+® Ballast Block Placement

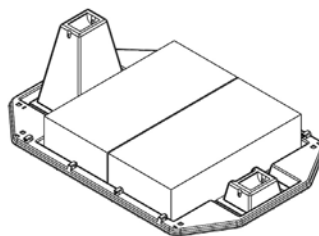
### One Block

When using a single ballast block, lay the block flat in the center of EcoFoot2+ Base tray.



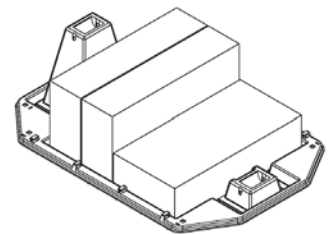
### Two Blocks

When using two ballast blocks, lay the blocks flat in the EcoFoot2+ Base tray.



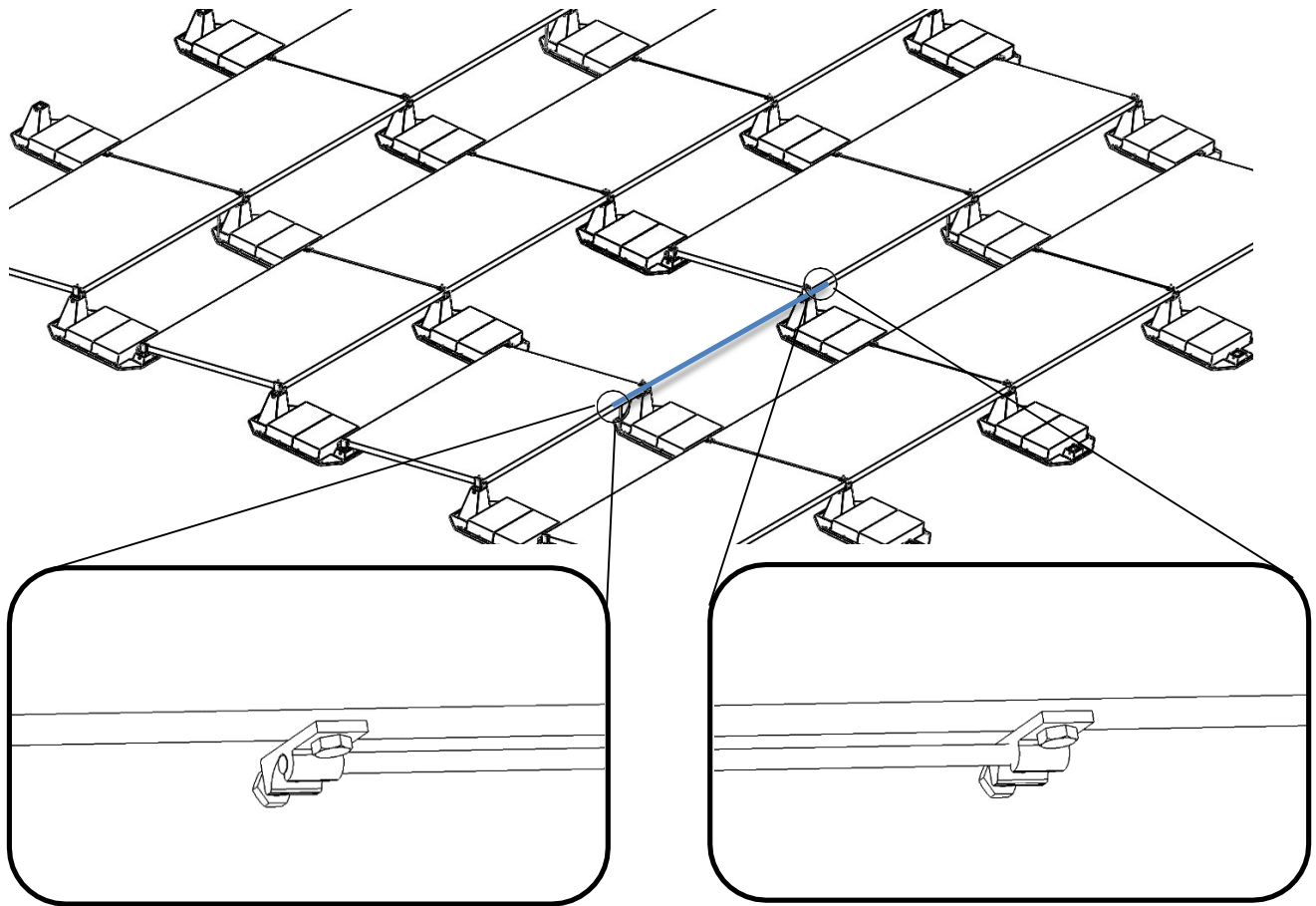
### Three Blocks

When placing three ballast blocks in the EcoFoot2+ Base tray, lay one block flat and two on the long edge. This configuration helps to prevent blocks from becoming dislodged accidentally.





## ADDENDUM A Module Removal



**Note:** If a module is to be removed from an array, the following steps must be taken.

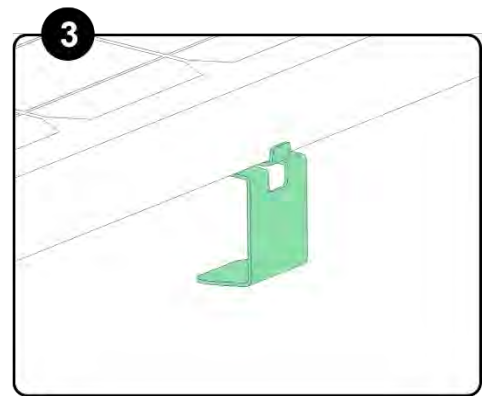
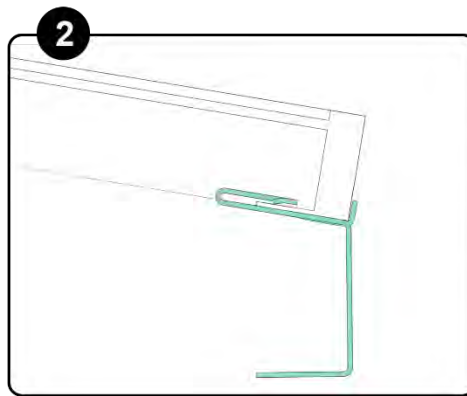
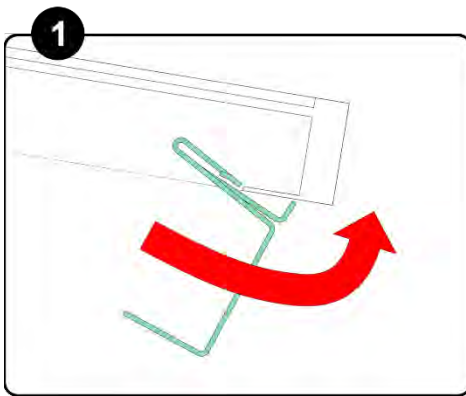
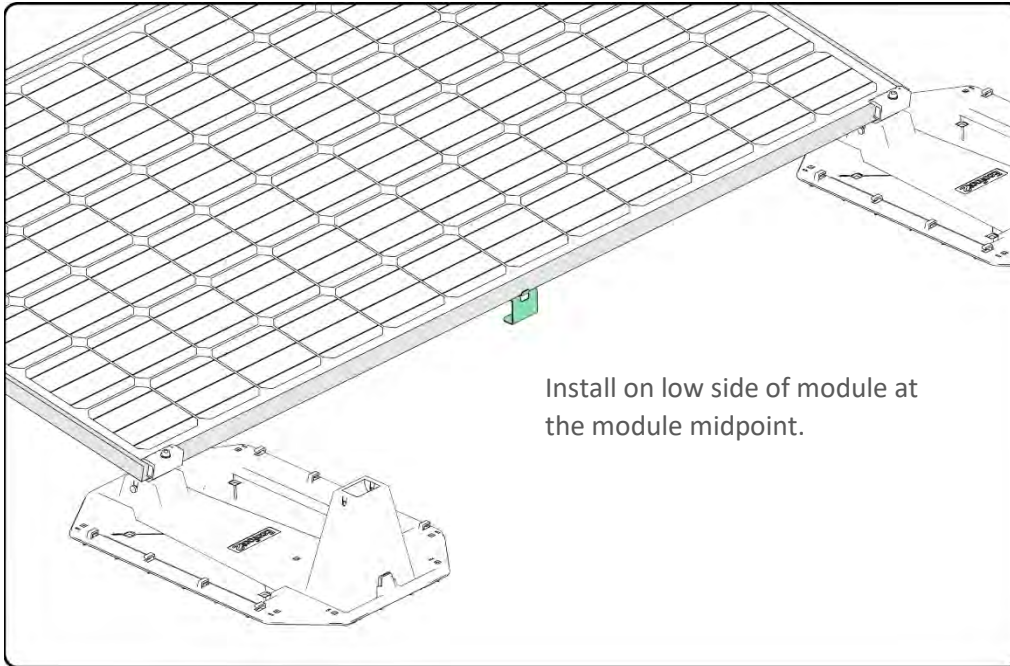
- a) **Determine module to be removed**  
Identify and mark the module to be removed.
- b) **Install ground lug on adjacent modules**  
Install a WEEB Lug 6.7 on both modules adjacent to the module to be removed. Utilize the grounding hole on the frame of the module.
- c) **Connect Bonding Jumper**  
Lay a bare #6 CU conductor into the two lay in lugs connected to the adjacent modules. Tighten lay-in lug terminal screw onto the conductor and torque to 7 ft- lbs.

When wiring the array, keep bare copper from contacting bare aluminum.

## ADDENDUM B Universal Support Brackets Installation

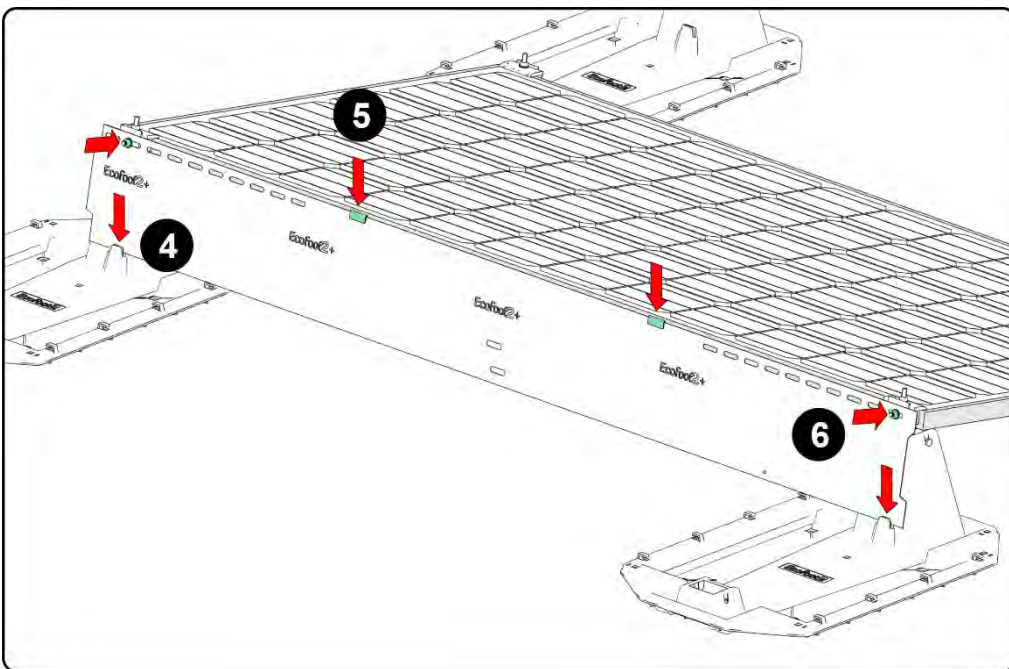
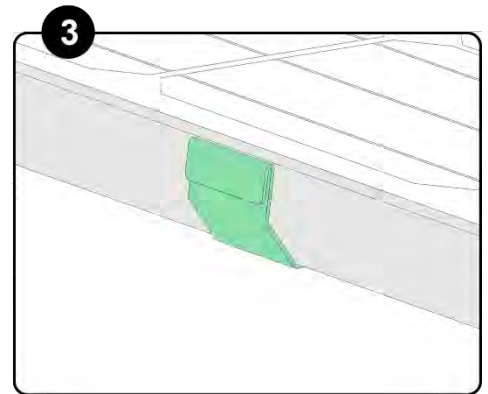
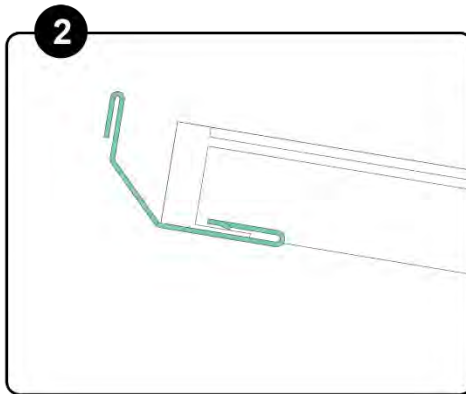
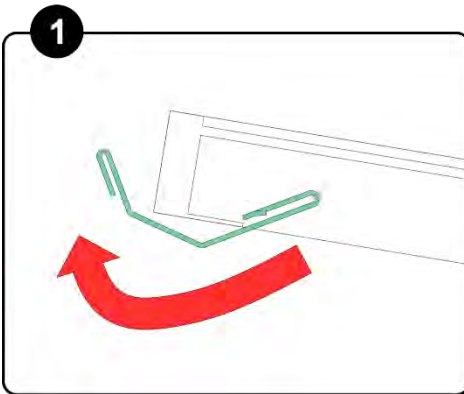
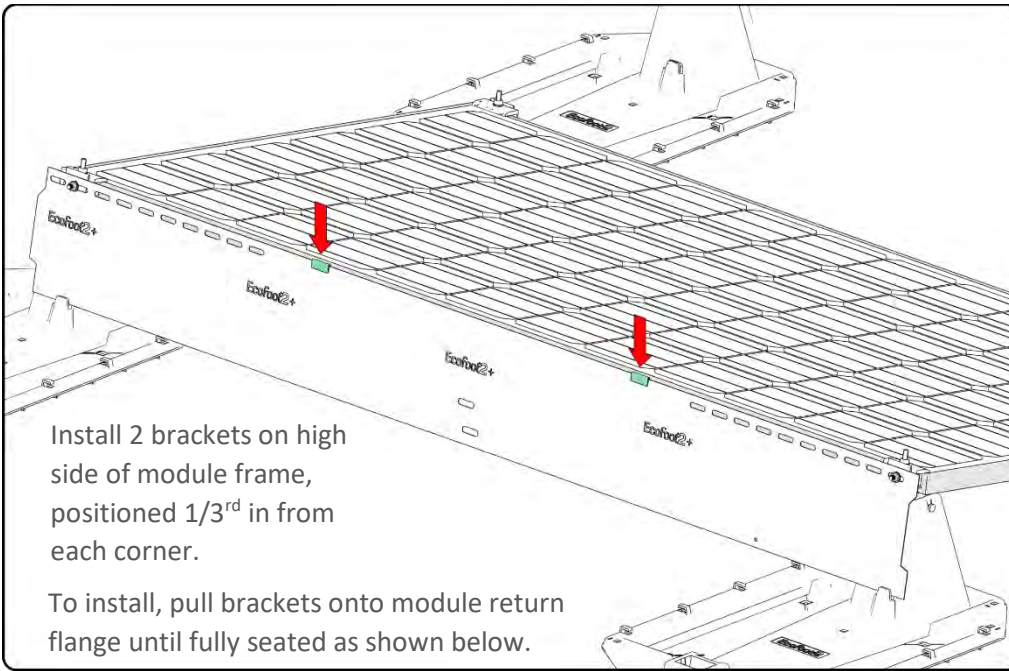
Universal Mid Support Brackets are a non-standard item and only used in heavy load conditions with light-duty panels. The design team at Ecolibrium Solar will indicate use when required.

### Installing Lower Universal Mid-Support



To install, pull bracket onto the midpoint of module return flange until upright locking tab pops up on the frame's edge. This indicates the bracket is fully engaged.

## Installing Upper Universal Mid-Support



## Installing the Wind Deflector

- 4 Drop bottom of Wind Deflector into slot located on EcoFoot2+ Base..
- 5 Clip top of Wind Deflector into 2 Upper Universal Mid-Support Brackets.
- 6 Attach Wind Deflector to EcoFoot2+ Rocker using Nut provided.

## ADDENDUM C Grounding & Bonding

The EcoFoot2+ system has been tested by TÜV Rheinland and conforms to UL 2703 for Grounding and Bonding when installed per the published installation instructions.

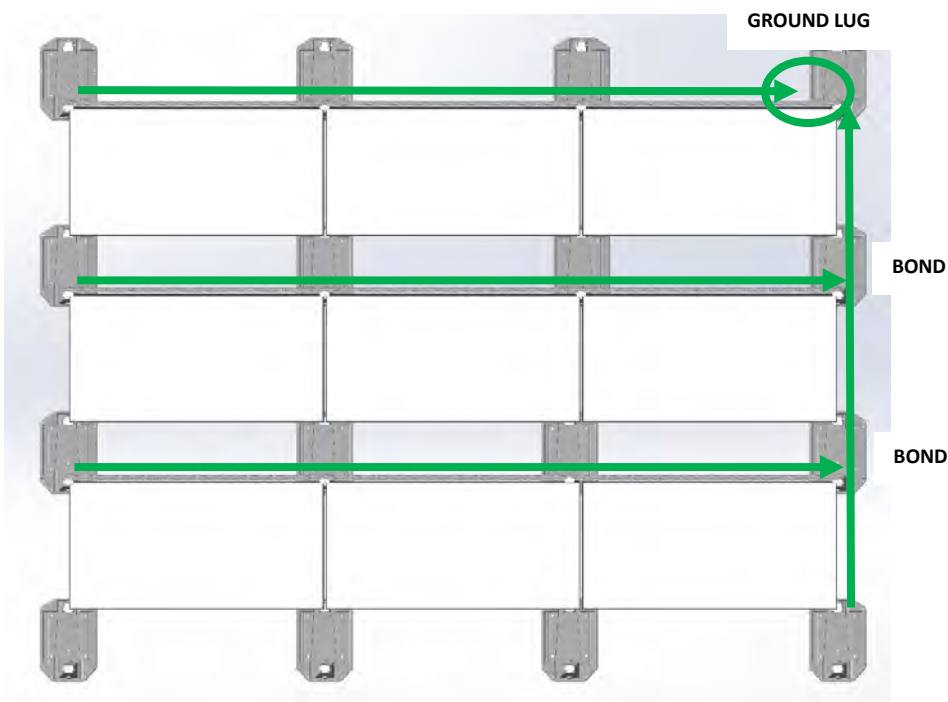
EcoFoot2+ carries module-to-module ground bond through the Wind Deflector, Item E listed in the “EcoFoot2+ Core Components” table in this document.

Each row of modules/wind deflectors in an array of up to 400 modules must be grounded per the NEC and ANSI/NFPA 70 either through the designated ground hole in the Wind Deflector, or by drilling a ¼” ground hole into the Wind Deflector a minimum of ½” from any edge. One Ground Lug is required for every 400 modules connected within an array.

Ecolibrium Solar recommends using #6 copper ground wire in conjunction with WEEB grounding devices such as the WEEB-LUG-6.7 or WEEB DSK516. Lugs are a single use component.

Other grounding methods must be reviewed and approved by a licensed master electrician or electrical engineer and Authority Having Jurisdiction (AHJ).

Ground hole with Lug Installed



Green lines represent ground bond path. Wind Deflectors carry module-to-module east/west ground bond. Bonding jumpers carry row-to-row north/south ground bond.