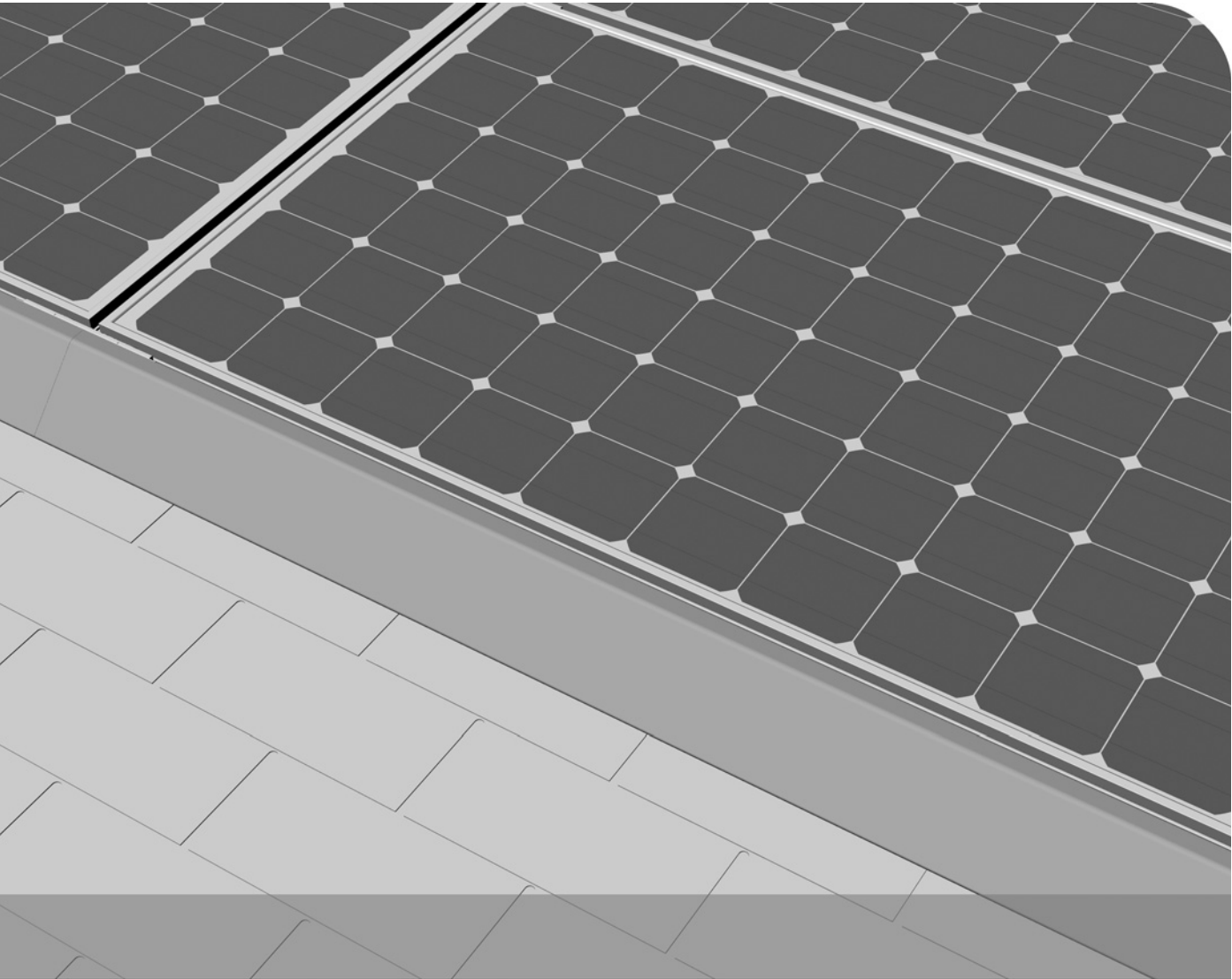




800-0351-001 REV. A



# ZS Comp

FOR COMPOSITION SHINGLE ROOFS  
Installation Manual (US)



**THIS MANUAL CONTAINS SAFETY, INSTALLATION, CONFIGURATION AND TROUBLESHOOTING INSTRUCTIONS FOR YOUR ZS COMP. ZEP SOLAR, INC. RECOMMENDS THAT YOU SAVE THIS MANUAL IN A READILY ACCESSIBLE LOCATION SHOULD ANY QUESTIONS ARISE ABOUT YOUR ZS COMP.**

**WARRANTY VOID IF NON-ZEP-CERTIFIED HARDWARE IS ATTACHED TO THE ZEP-GROOVE OF A ZEP-COMPATIBLE PV MODULE FRAME.**

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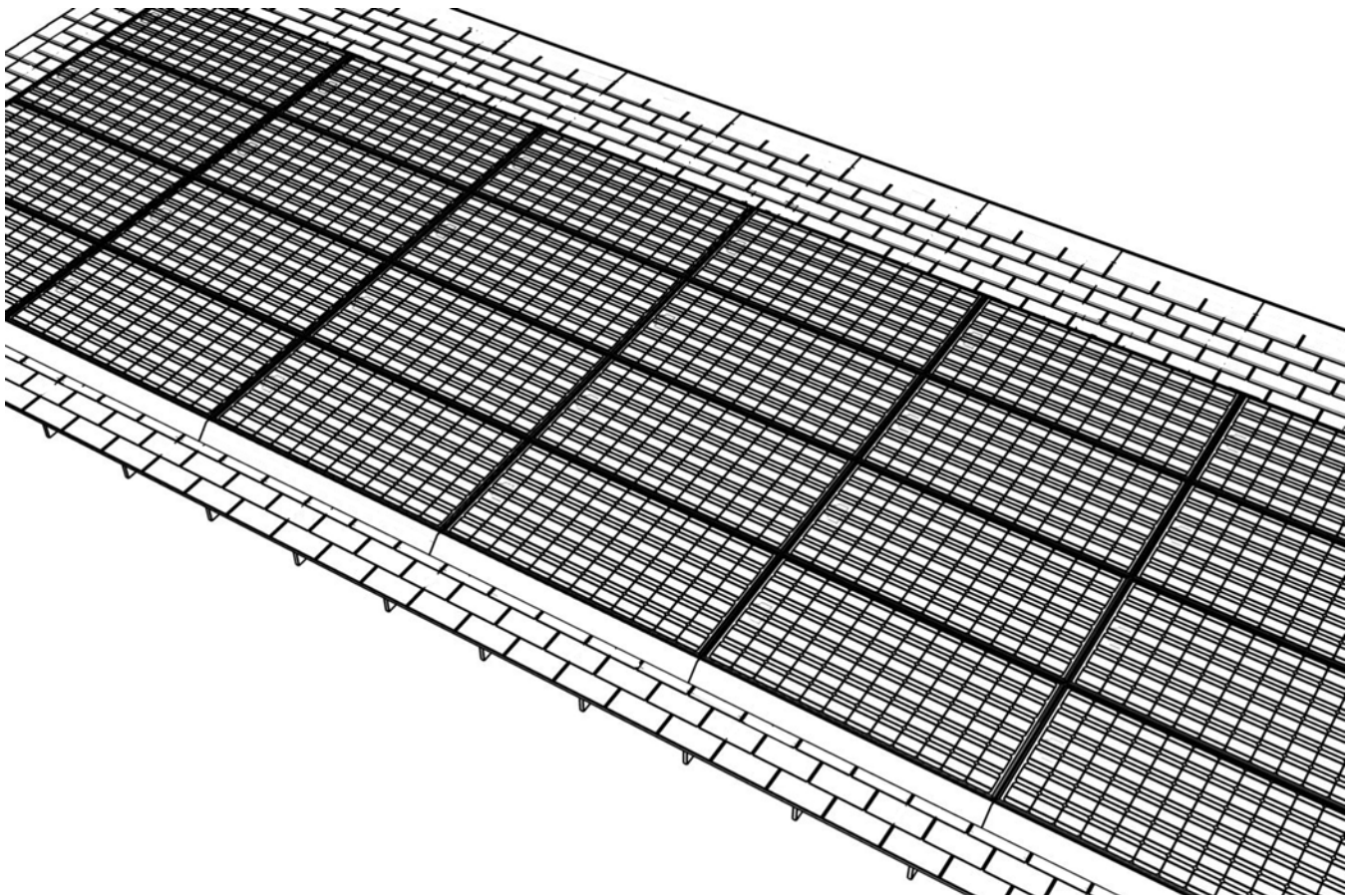
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## 1.0

# Getting Started

ZS Comp from Zep Solar, Inc. offers the fastest and least expensive way to mount rooftop PV arrays on composition shingle roofs using a series of drop-in and quarter-turn connections to greatly accelerate the process. Structural and grounding connections are accomplished using very few parts and no mounting rails. The simple installation delivers labor and logistics savings.





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## 1.1 - ZS Comp Overview

ZS Comp from Zep Solar, Inc. is designed for use on composition shingle roofs. It is compatible with a number of roof attachment systems such as the Comp Mount manufactured by Quick Mount PV exclusively for Zep Solar, Inc. The low number of parts and elimination of mounting rails makes installation much faster and easier than comparable systems; just lay out a few lines, and install the mounting system at selected locations. Leveling Feet mount to the roof attachment system to provide anchor points for the Leveling Feet. Each Leveling Foot can be leveled to provide a perfectly level array surface. PV modules drop and rotate into place on the Leveling Feet. Interlocks provide structural and grounding connections across rows and columns of modules, and Hybrid Interlocks can be used when PV modules meet above a Leveling Foot. ZS Comp supports both landscape (horizontal) and portrait (vertical) module installation. Most components provide visual and/or audible feedback to indicate proper installation.

## 1.2 - Features & Benefits

ZS Comp offers the following features and benefits:

- **Rapid installation:** Installation is fast and easy from planning to assembly. Only a few basic lines need to be laid out. Leveling Feet either lag directly to the roof or bolt to the roof attachment system and other components drop in and/or twist into place with quarter turns. Visual cues and audible clicks tell you when parts are properly installed.
- **Supports landscape and portrait mounting options:** ZS Comp allows you to mount modules in either landscape (horizontal) or portrait (vertical) orientation, which provides additional flexibility for both aesthetics and maximizing the number of modules in the array.
- **Ultra-low parts count:** Fewer than 10 core components are required to mount an array.
- **Drop-in and quarter-turn connections:** PV modules drop into the front Leveling Feet and rotate into place. Rear Leveling Feet rotate and lock into place. Interlocks between modules are pressed into place and then locked using quarter turns.
- **High-wind and snow load resistance:** ZS Comp is rated to wind speeds in excess of 130 miles per hour and snow loads in excess of 40 pounds per square foot.
- **Automatic Grounding:** ZS Comp is auto-grounding. Every module is redundantly bonded via the Interlocks, which have been tested to UL 1703. A single Ground Zep, tested to UL 467, carries the array grounding to Earth for up to 60 modules. This grounding system exceeds UL standards by 10x and is the most robust in the industry.





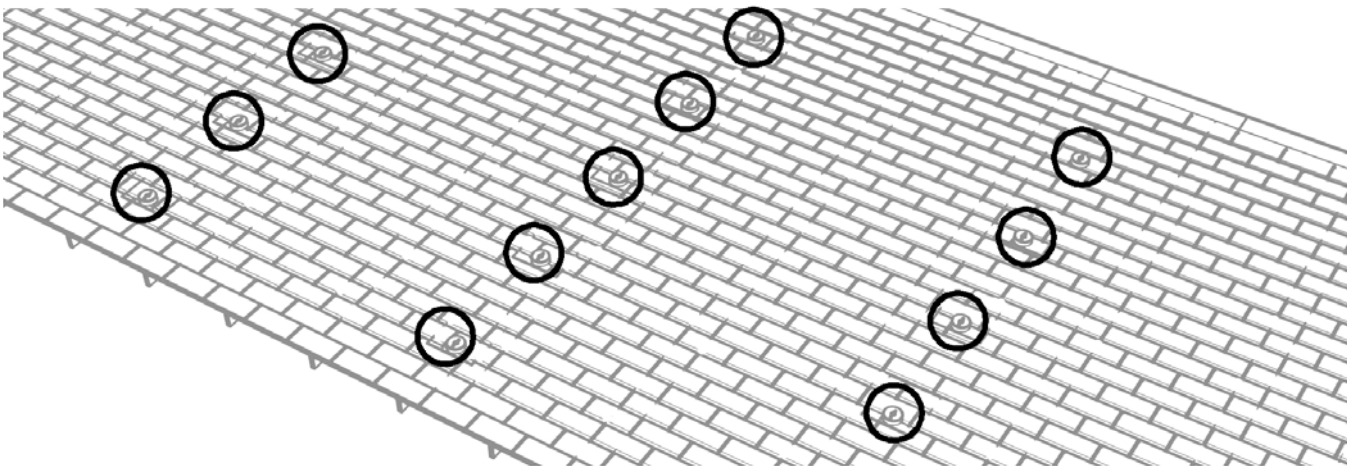
## 1.3 - How It Works

ZS Comp contains several innovative features not found in typical mounting systems that make design and installation simple, fast, and flexible. It is important to understand the unique characteristics of ZS Comp before installation in order to get the most from its unique capabilities. The key features that separate ZS Comp and typical mounting systems are:

- Reduced Roof Penetrations.
- Precise Component Mating.
- Automatic grounding.
- Adaptability

### Reduced Roof Penetrations

ZS Comp creates structural bonds between PV modules using mating Interlocks at the corners of each module frame. This allows a module frame to act like a rail, thus leveraging the existing structural characteristics of the frame and allowing the array to distribute load to fewer attachment points. Modules attach to Leveling Feet that in turn bolt to the roof attachment system that transfers the load to the building roof structure. This system-level load distribution minimizes roof penetrations through optimization.

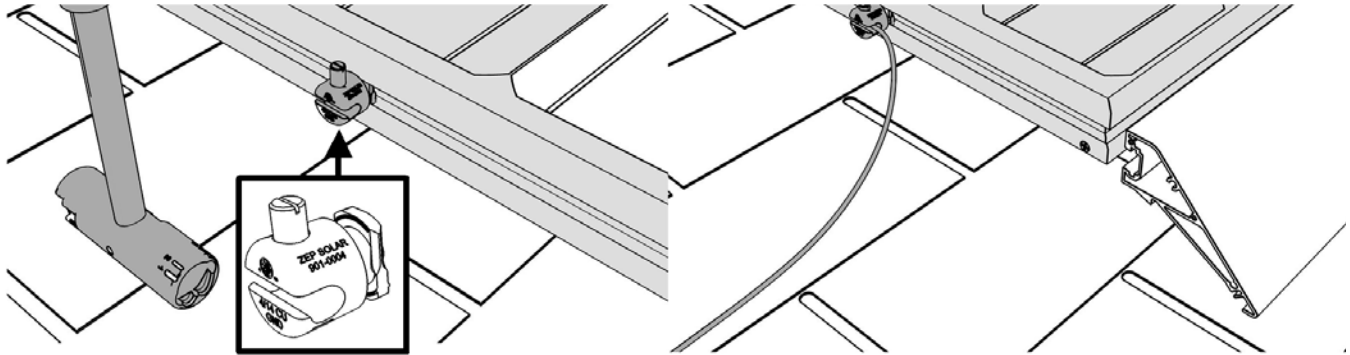


### Automatic Grounding

The structural connections created by Interlocks simultaneously establish a ground bond path between modules. Both the Key and Tongue sides of Interlocks cut through the anodized coating of the module frame to create a solid conductive bond. Bonds can be reversed and reset up to 50 times with no significant degradation of the ground bond connection. Every Interlock creates a redundant ultra-low resistance ground path.

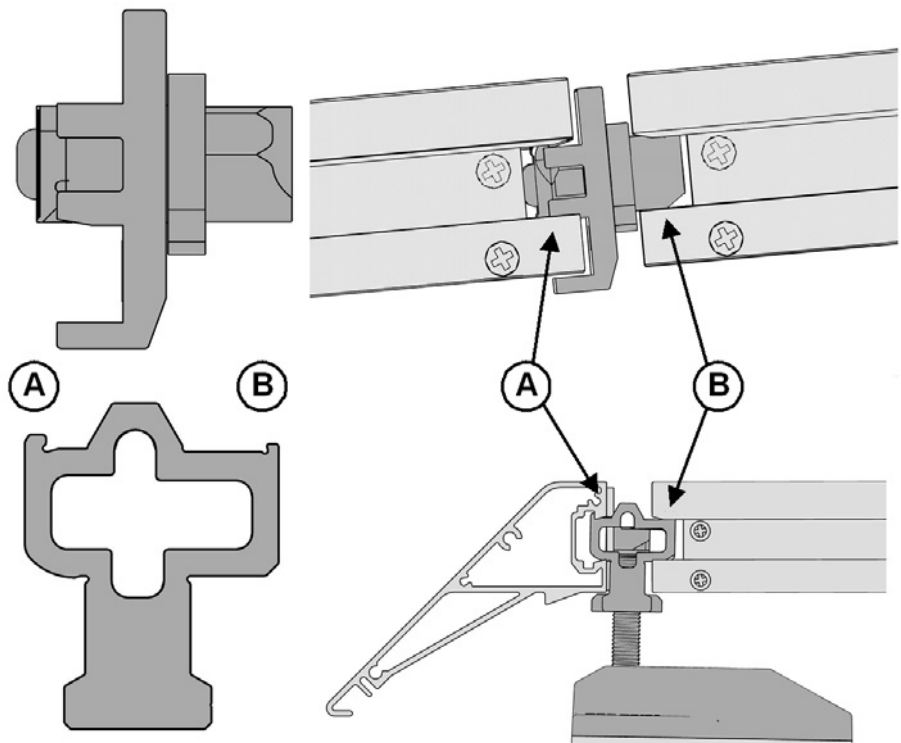


The Ground Zep rotates into the module groove with a quarter turn and provides a ground bond connection from the array to the equipment grounding conductor(s). Only one Ground Zep is required per sub-array and can be installed anywhere on the perimeter of the array.



### Precise Component Mating

ZS Comp uses the grooves in Zep-compatible PV modules to easily and precisely mate with Zep components. The Key side of Interlocks, Hybrid Interlocks, and Leveling Feet (A) lock into the grooves of Zep-compatible PV modules. The Tongue side of these components (B) receive adjustable drop-in connections. As a rule, the Tongue side always faces the direction of the next module to be dropped in; it “receives” the next module.



### Adaptability

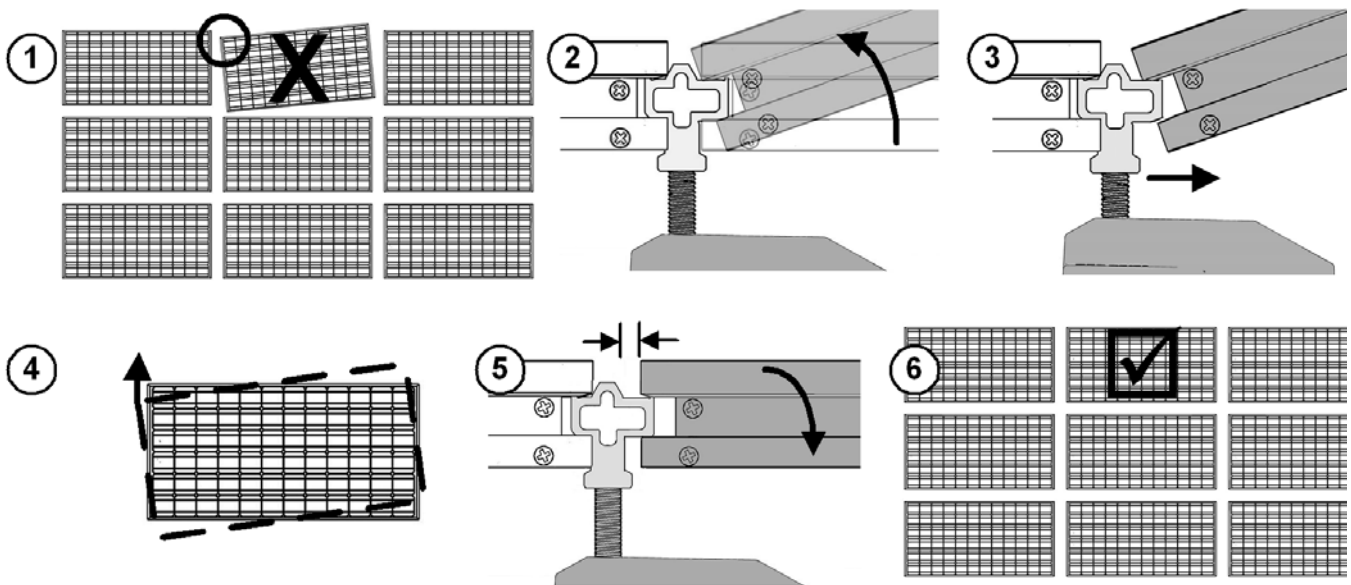
Installers often need to mount a perfect-looking array on an imperfect structure using imperfect PV modules. Roofs are often neither square nor perfect planes, making it difficult to establish reference points for orienting each module. Also, each PV module may have slightly different dimensions because of manufacturing tolerances. Conventional systems compound slight module misalignments or dimensional deviations throughout the array. The larger the array, the more difficult it is to counter this problem.



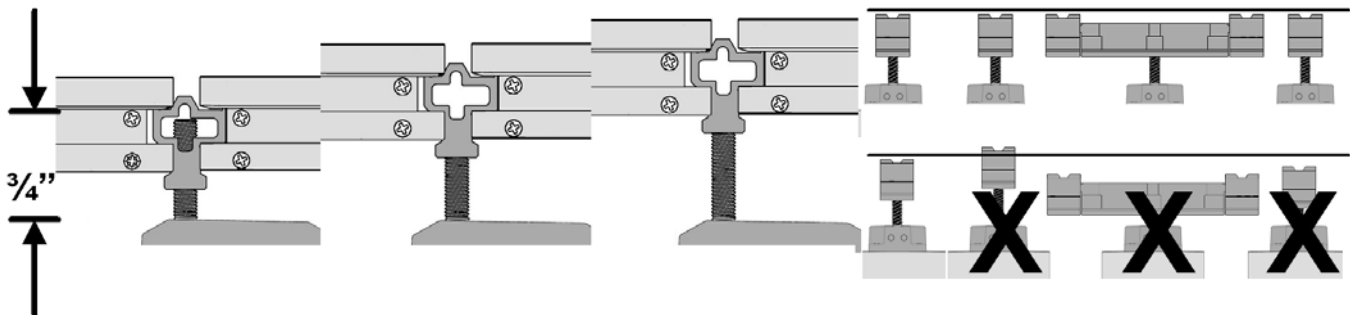


ZS Comp is flexible in the X, Y, & Z axes, making square and level installations easy. The position and orientation of each module can be adjusted during installation, allowing the installer to keep the array aligned with system-level reference points such as a lower-edge chalk line and by sighting along seams and edges to make the array look good with little effort.

- **Module Truing (X-Y):** This consists of adjusting each module in the X-Y (horizontal) axes to keep the overall array square. The module groove can seat at different positions on the Tongue side of Interlocks, Hybrid Interlocks, and Leveling Feet, meaning that the tongue can be fully or partially inserted into the groove and still accomplish a solid structural and ground bond connection. Thus, each module can be trued independently. Truing a module is as simple as rotating it up a few degrees and adjusting the module on the Tongues as needed.



- **Module Leveling (Z):** This consists of adjusting each module in the Z (vertical) axis to maintain a planar array over imperfections in the roof surface. Each Leveling Foot can be raised or lowered over a range of 3/4" by rotating the threaded stud using a #30 Torx bit to achieve a perfectly planar array.

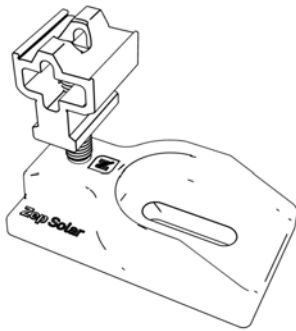




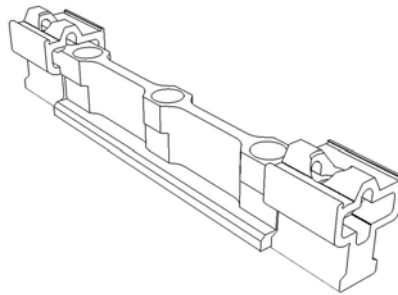
## 1.4 - Components

ZS Comp consists of the following components (PV modules not shown):

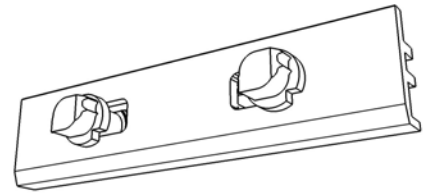
Leveling Foot



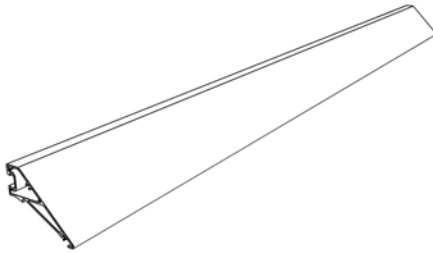
Hybrid Interlock



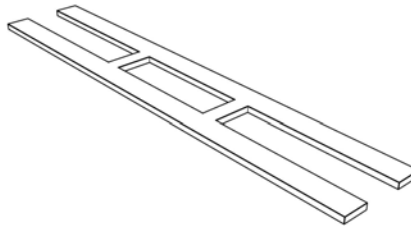
Interlock



Array Skirt



Array Skirt Spacer



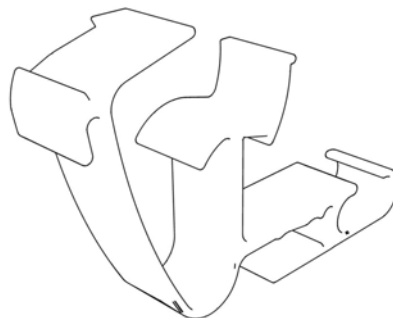
Jam



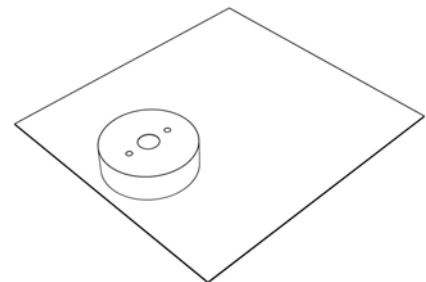
Ground Zep



Wire Clip



Roof Mount (**not included**)





## 1.5 - Additional Items

You will also need the following additional items:

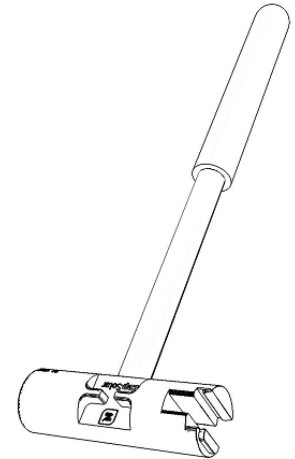
- **Zep Tool:** The Zep Tool is used to install the Interlocks and Ground Zep and to level the Leveling Feet using a #30 Torx bit. It can also help with installing Leveling Feet and Hybrid Interlocks that are snug in the module groove.
- **Flat Tool:** This tool is a low-cost alternative to the Zep Tool. It is also customized for module removal.

See Chapter 6 for instructions on using the Zep Tool and the Flat Tool.

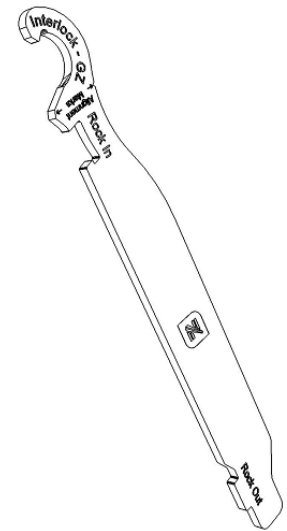
## 1.6 - For Further Information

Additional information about ZS Comp is available online at [www.zep-solar.com](http://www.zep-solar.com). The available resources include:

- **Datasheet:** The ZS Comp datasheet contains technical details and specifications.
- **Videos:** Watch animated installation tutorials to further familiarize yourself with the installation process.
- **Distributors:** Locate a Zep Solar distribution partner who can supply you with Zep Solar parts and accessories for all of your solar needs. The Zep Solar, Inc. web site also includes links to manufacturers of Zep-compatible PV modules.
- **Supplemental documentation:** Additional documentation varies by product and may include engineering certifications, supplemental installation instructions, updates, and more. You may also download CAD models of Zep Solar parts to help you design your array.
- **Training:** Zep Solar, Inc. offers training sessions that provide hands-on opportunities to use the products and ask questions.
- **Contact:** Contact Zep Solar, Inc. for any additional support that you are not able to obtain using the available online resources.



Zep Tool



Flat Tool



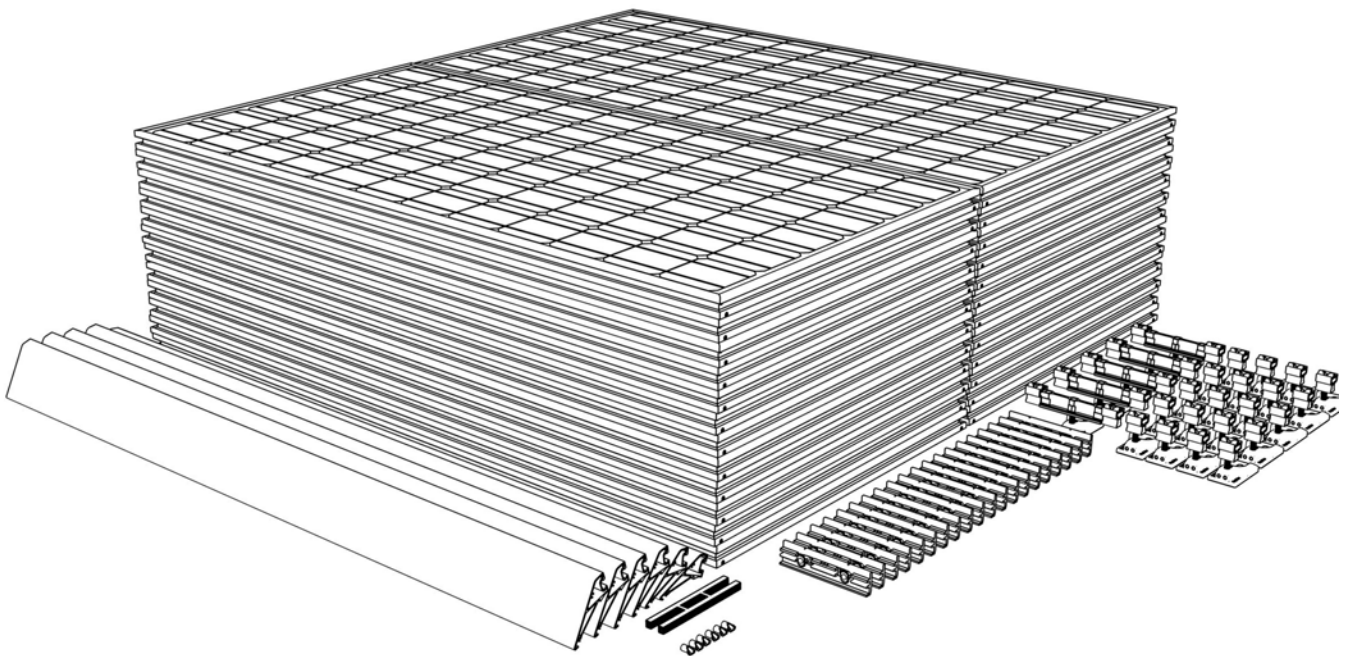
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## 2.0

# Safety Precautions

All instructions in this Installation Manual and all instructions in the installation manual provided by the PV module manufacturer must be read and understood before attempting to install ZS Comp. The installer assumes all risk of personal injury or property damage that might occur during the installation and handling of the components.







---

## 2.1 - General Safety

- All installations must be performed in compliance with all applicable regional and local codes, such as the latest National Electric Code (USA), Canadian Electric Code (Canada) or other national or international electrical standards.
- Follow all safety precautions contained in both this Installation Manual and the module installation manual.
- Always comply with all applicable OSHA or equivalent safety standards including but not limited to the proper use of regulation fall-protection equipment.
- Do not perform any installations in wet or windy conditions.

## 2.2 - Installation Safety

- All installation and servicing must be performed by qualified personnel. The installer is responsible for ensuring that all personnel are properly trained and licensed.
- The installer is responsible for knowing and following all applicable codes and regulations and for obtaining all required permits and inspections.
- Check applicable building codes or consult with a structural engineer to ensure that the structure upon which ZS Comp is being installed can properly support the array under live load conditions.
- ZS Comp must be installed over an appropriately rated fire resistant roof covering.
- The Leveling Feet and Interlocks must be fully engaged with the PV modules. You will feel a snap when Leveling Feet are properly installed.
- Always use appropriate personal protective equipment (PPE) such as safety glasses, gloves, hard hat, etc. as needed and as required by OSHA or other equivalent safety standards.
- Never expose the PV modules to excessive loads or deformation such as twisting or bending.
- Some components may be heavy and/or bulky. Always use proper lifting and carrying techniques when handling components and materials at the job site.
- The installation process involves working around high-voltage electrical equipment. Follow applicable safety regulations and best practices to avoid creating an electrocution hazard.
- The installation process requires working on roofs. Follow applicable safety regulations and best practices to avoid a fall. Use caution to prevent objects from falling or dropping off the roof area. Cordon off ground areas directly below roof-related work when possible.



## 3.0

# System Design Process

ZS Comp is designed for use on composition shingle roofs. This chapter provides a high-level overview of the process of assessing and planning a prospective ZS Comp installation. Each installation is unique and has unique requirements that go beyond the high-level overview included in this manual. Please contact Zep Solar, Inc. for more details.





## 3.1 - The Site Planning Process

In order to determine if ZS Comp is appropriate for a specific project, please follow the design process detailed below:

1. Contact Zep Solar, Inc. and ask to speak to a member of our Sales team. You will be asked some basic questions about your project to assess whether ZS Comp is appropriate for your site and building conditions. Please be prepared to discuss project location, system size, module type, roof height, slope, membrane type, etc. to help determine initial feasibility.
2. If the project meets the initial qualifications, you will receive a Site Assessment Form to complete and return to Zep Solar, Inc. along with photos of the site and roof and your proposed array layout.
3. Once Zep Solar, Inc. receives your completed Site Assessment package, a member of our Applications Engineering department will review your documents and create a Project Assessment Package including a Bill of Materials once the project has been approved.

**CAUTION - The installation must conform to the details on the Project Assessment Package and Design Guidelines provided by Zep Solar, Inc. Failure to do so may void your warranty and may lead to premature system failure, resulting in property damage and/or personal injury.**

## 3.2 - Assessment Information

Each site assessment form (Step 2, above) must include the following information:

- Site location
- Project Information (installation date, size in kW, PV module make/model/quantity)
- Site details (wind speed, snow, distance from shore, exposure, occupancy, seismic)
- Building and roof details (dimensions, slope, age, roof type, etc.)
- Any additional pertinent information

## 3.3 - Getting Started

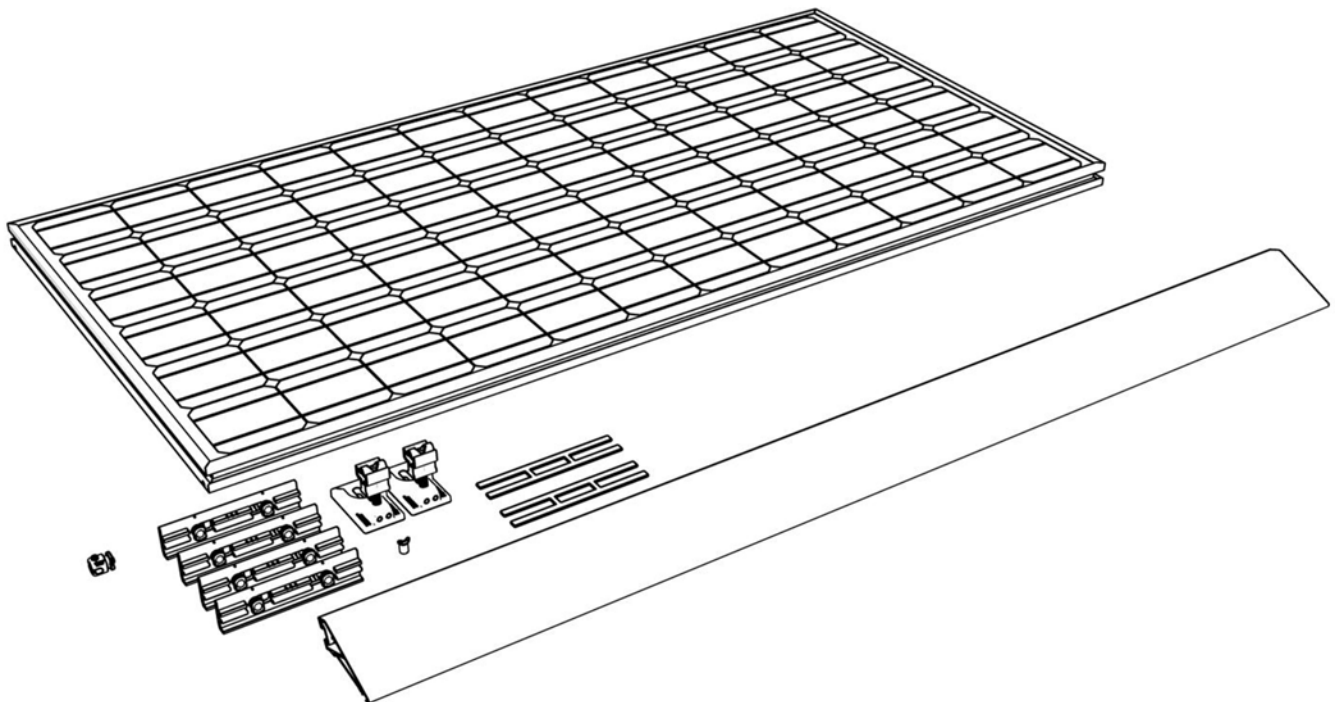
Please contact Zep Solar, Inc. to begin planning your ZS Comp installation if you have not done so already. Contact information can be found online at [www.zepsolar.com](http://www.zepsolar.com).



## 4.0

# Installation

This chapter guides you through the ZS Comp installation process. Please read this chapter in its entirety to familiarize yourself with the process before beginning the installation. You may also visit the Resources section at [www.zepsolar.com](http://www.zepsolar.com) to view videos and other training materials. Also, be sure that the site has been completely prepped before beginning the installation.



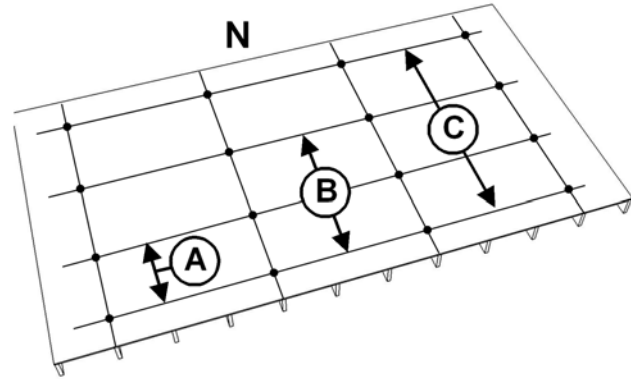


## 4.1 - STEP 1: Formulas & Layout Lines

### To lay out a **LANDSCAPE** installation:

Chalk selected rafters per Zep Span Table. Chalk horizontal lines as follows:

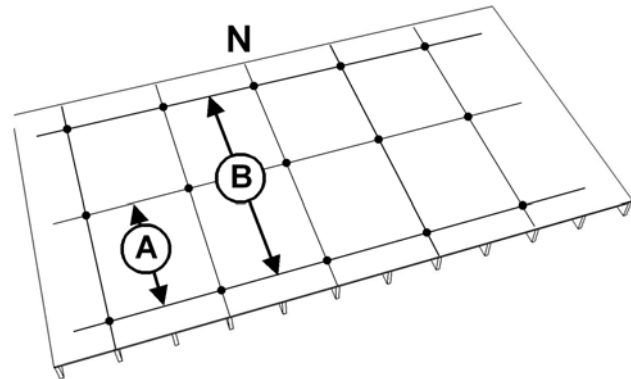
- **A:** Row 1-2: Module width + 1/2"
- **B:** Row 1-3: 2x(Module width + 1/2")
- **C:** Row 1-4: 3x(Module width + 1/2")
- etc.



### To lay out a **PORTRAIT** installation:

Chalk selected rafters per Zep Span Table. Chalk horizontal lines as follows:

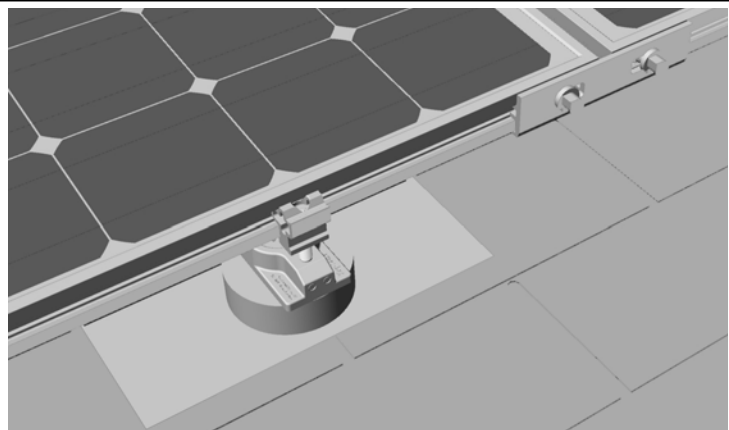
- **A:** Row 1-2: Module length + 1/2"
- **B:** Row 1-3: 2x(Module length + 1/2")
- etc.



### Select roof attachment system for use with the installation.

ZS Comp is compatible with a selection of roof attachment systems such as the Comp Mount made exclusively for Zep Solar, Inc. by Quick Mount PV.

**The roof attachment system is not included with ZS Comp.**





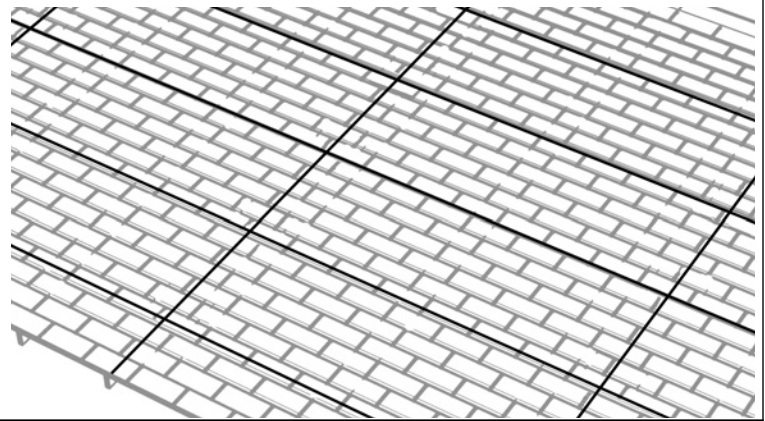


## 4.2- STEP 2: Installing Roof Attachments

### 2-A: Lay out the locations of the roof attachments.

*NOTE: This manual details a landscape installation.*

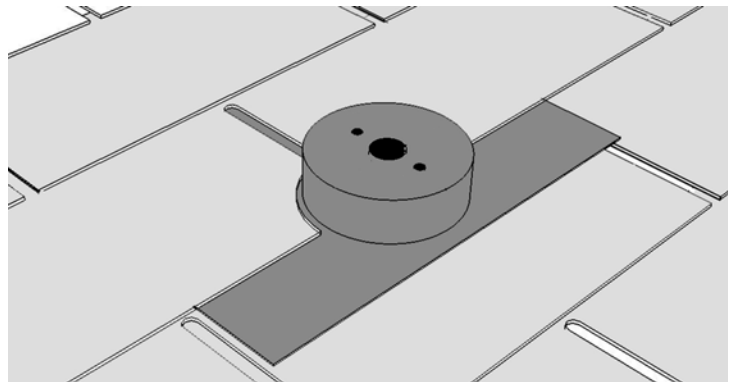
Make sure that all roof attachment points are centered above rafters.



### 2-B: Install the roof attachments.

Please refer to the instructions included with your roof attachment system for installation instructions.

*NOTE: This manual shown an installation using Comp Mounts; the installation procedure is identical for all compatible roof attachments.*

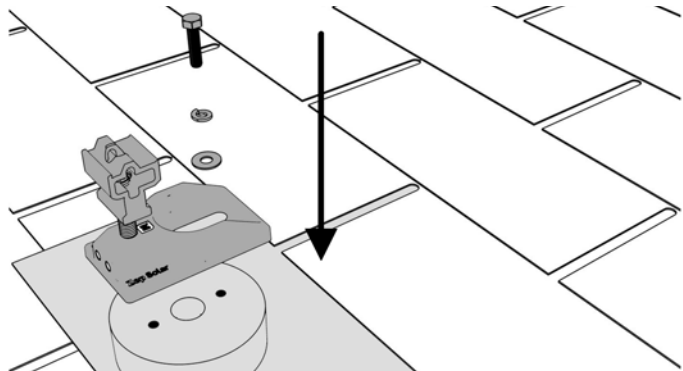


## 4.3 - STEP 3: Installing Front-Row Leveling Feet

### 3-A: Attach the Leveling Feet to the roof attachment system.

Place the Leveling Foot on the roof attachment and bolt into place using a washer and lock washer.

Torque to 14 foot-pounds.

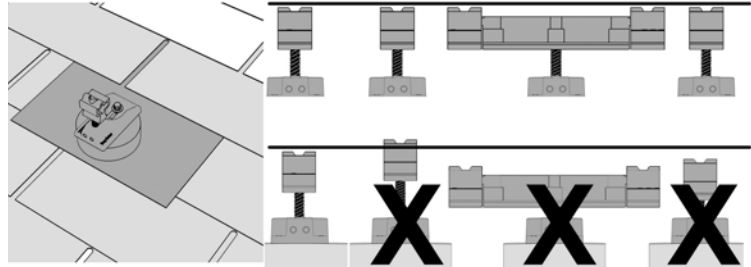




**3-B: Attach the remaining front-row Leveling Feet.**

Use a string line to make sure that all front row Leveling Feet are coplanar and level.

Spin the top portion of the Leveling Foot (the Rockit) to adjust Z-axis leveling.

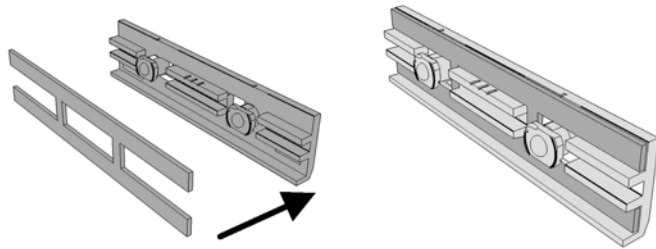


**4.4 - STEP 4: Installing the Array Skirt**

**4-A: Place an Array Skirt Spacer over an Interlock**

This is necessary for the Interlock to properly engage the Array Skirt.

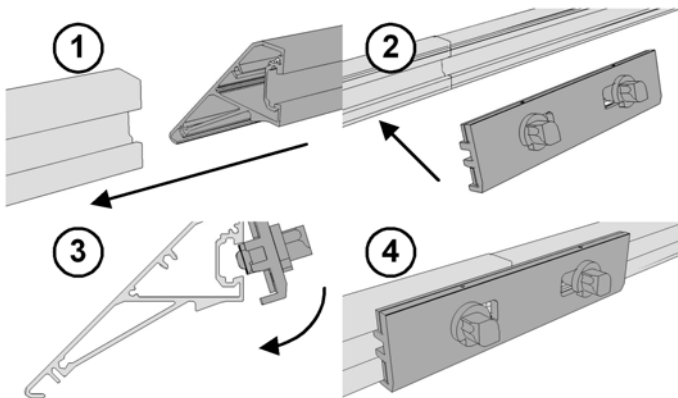
*NOTE: Array Skirt Spacers are only needed for Interlocks that connect to the Array Skirt.*



**4-B: Connect the first two Array Skirt segments together.**

Place two Array Skirt segments together end to end.

Rotate and press the Interlock firmly into place.





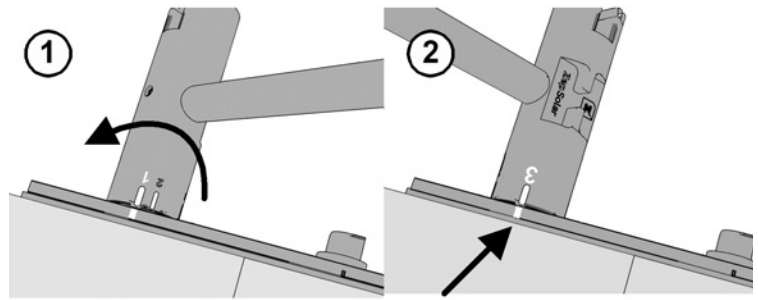
#### 4-C: Secure the Interlock using a Zep Tool.

Place the Zep Tool over the fastener with the 1 aligned with the reference mark on the Interlock.

Rotate the Zep Tool CW to Position 3.

**CAUTION: Do not over- or under-tighten. Turn to Position #3 exactly.**

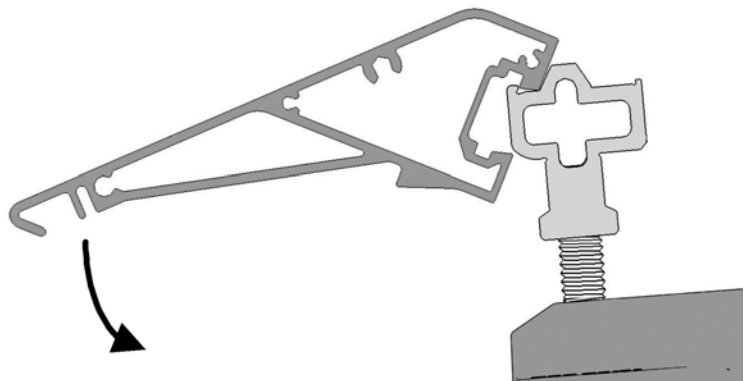
Repeat for the second fastener.



#### 4-D: Place the Array Skirt onto the Leveling Feet.

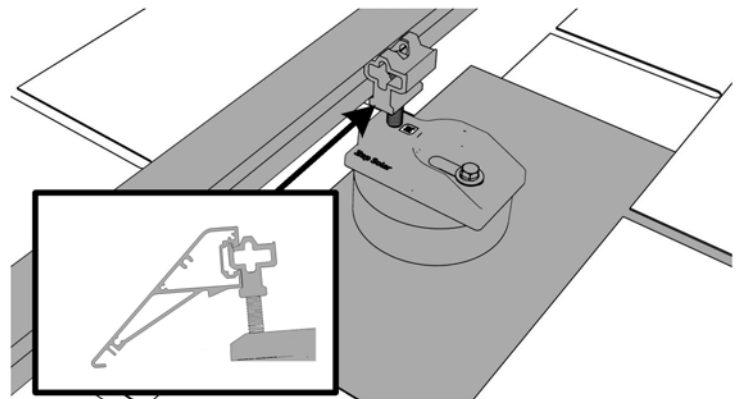
The Key side of the Leveling Feet must engage with the groove in the Array Skirt.

If using a Hybrid Interlock, align the Array Skirt with the center mark. (See Section 5.1)



#### 4-E: Rotate the Array Skirt into place.

You will feel a snap when the Array Skirt is properly installed.

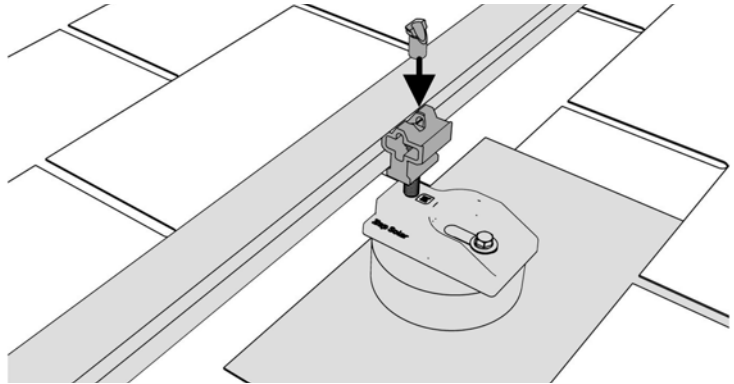




**4-F: Insert Jams into the Leveling Feet.**

Place one Jam in each front row Leveling Foot.

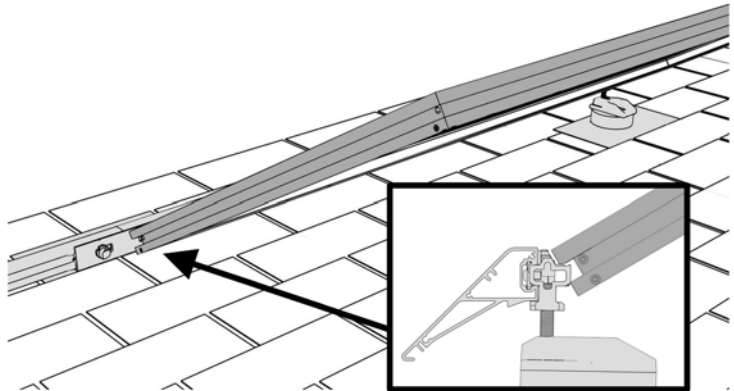
**CAUTION: This is an important safety measure to prevent the Array Skirt from rotating off the Leveling Foot.**



**4.5 - STEP 5: Installing the First Module**

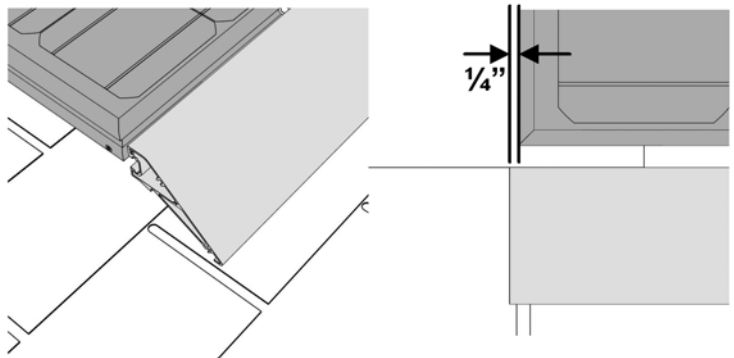
**5-A: Lower module onto Leveling Feet.**

The module groove rests on the Tongue side of Leveling Feet and Interlocks.



**5-B: Verify module alignment.**

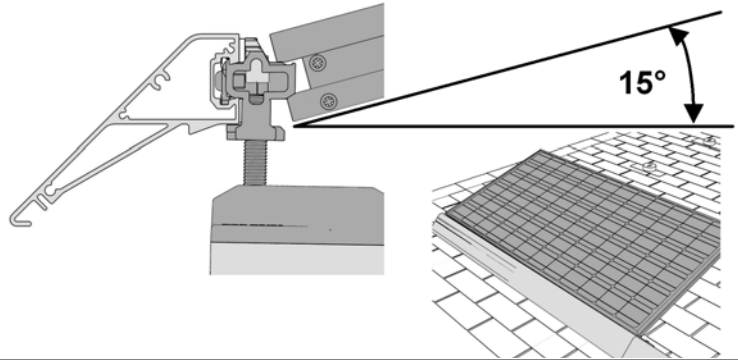
The Array Skirt should extend approximately 1/4" beyond the edge of the module.





**5-C: Rotate module to 15 degrees.**

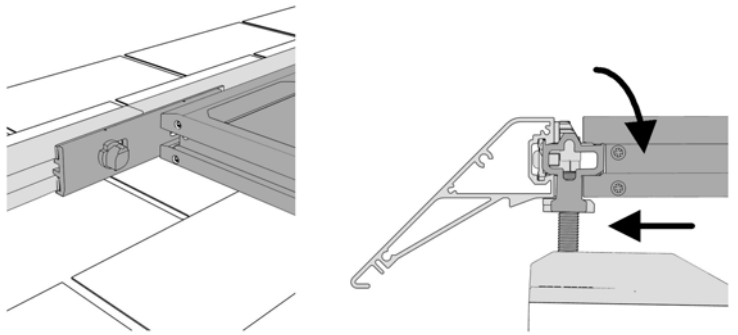
Rotate module until it is 15 degrees above the roof plane.



**5-D: "Drop in" module onto front Leveling Feet and Interlocks.**

Press the module forward while lowering it to the plane of the roof (0 degrees) to fully engage the Leveling Foot and Interlocks.

If the module does not fully seat, raise it slightly (4-5 degrees) and press forward again while lowering.

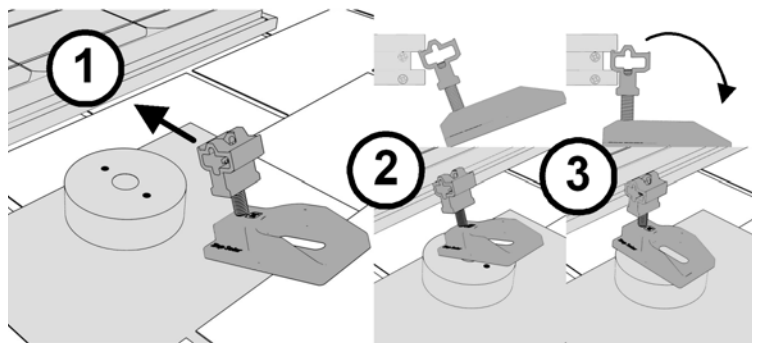


**5-E: Add rear Leveling Feet.**

Engage the Key side of the Leveling Foot with groove in module then rotate into position. (See Step 3-E.)

The Leveling Foot will snap into place when properly installed.

Bolt the Leveling Foot to the roof attachment system as described in Step 3-A.

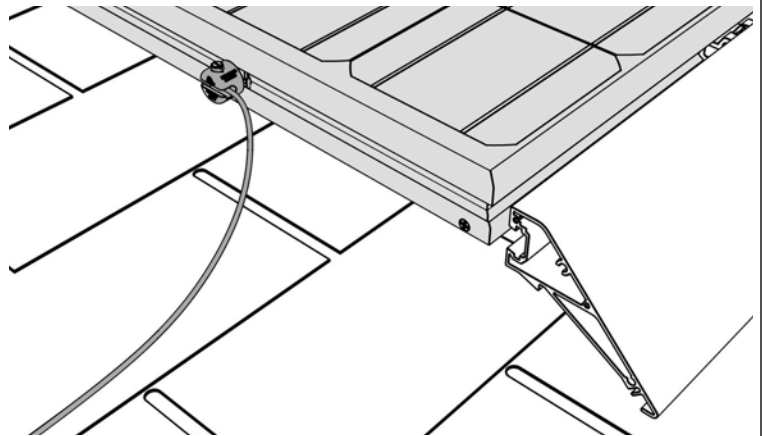






**5-F: Ground the Array.**

Add a Ground Zep to the outside module edge and connect to building ground. (See Step 9).



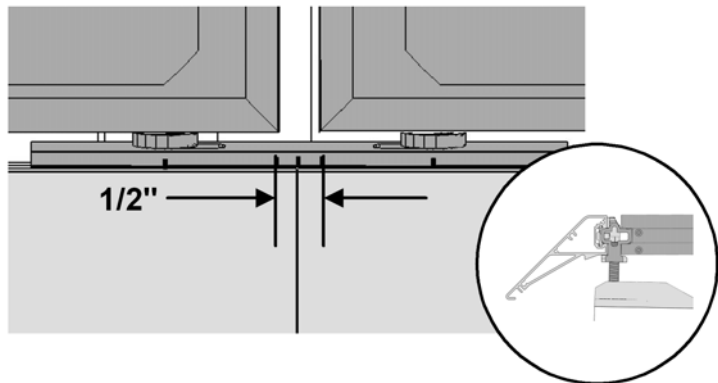
**4.6 - STEP 6: Installing the Remaining First-Row Modules**

**6-A: Place module on front row Leveling Feet.**

Repeat Steps 5-A through 5-D for the next module.

This module should be approx. 1/2" from the first module.

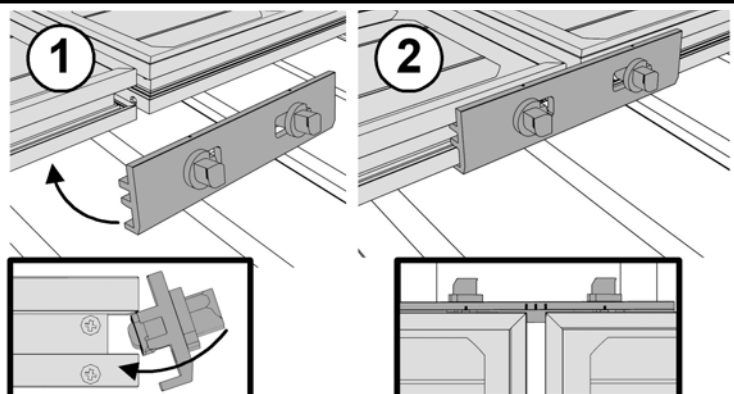
Use the hash marks on top of the Interlock as a guide for module spacing.



**6-B: Insert an Interlock between the modules to bond the modules.**

Rotate and press the Interlock firmly into place as described in Step 4-B.

Modules should be spaced approximately 1/2" apart. (The acceptable range is 1/4" - 3/4".)





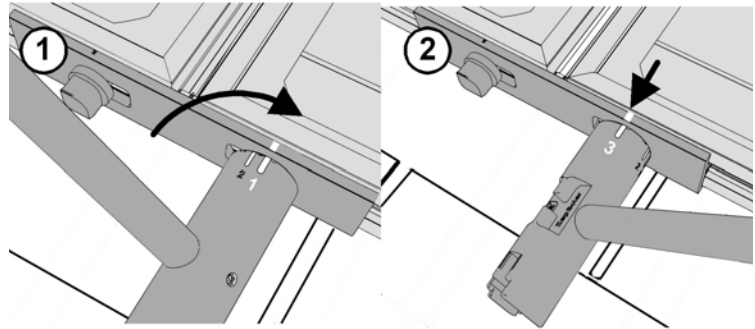
**6-C: Secure the Interlock to the modules.**

Place the Zep Tool over the fastener with the 1 aligned with the reference mark on the Interlock.

Rotate the Zep Tool CW to Position 3.

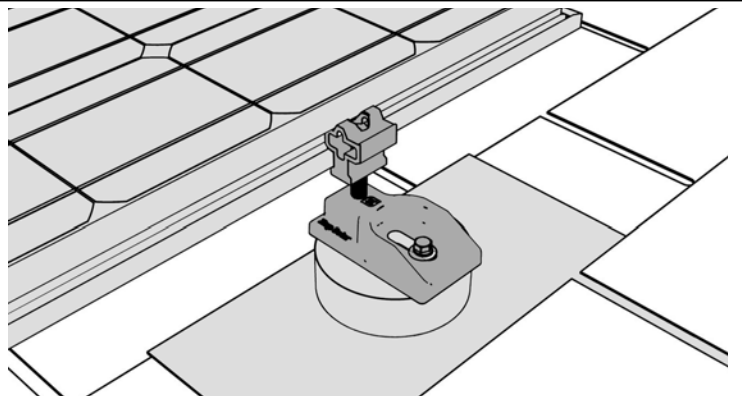
**CAUTION: Do not over- or under-tighten. Turn to Position #3 exactly.**

Repeat for the second fastener.



**6-D: Add rear Leveling Foot.**

Attach and secure as described in Step 5-E.

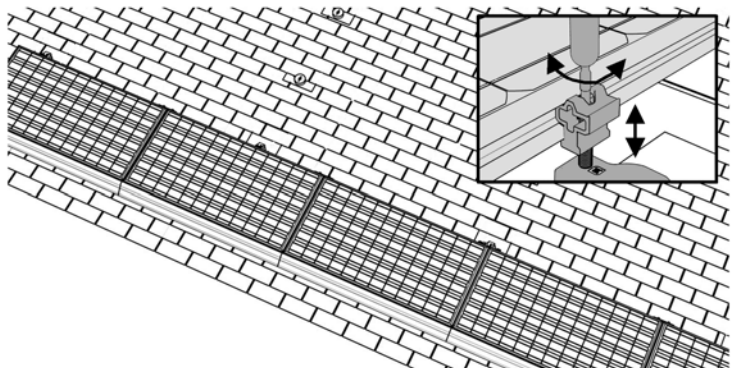


**4.7 - STEP 7: Finishing the First Row**

**7-A: Add the remaining modules to the first row.**

Repeat Steps 6-A through 6-D for each remaining module in the row.

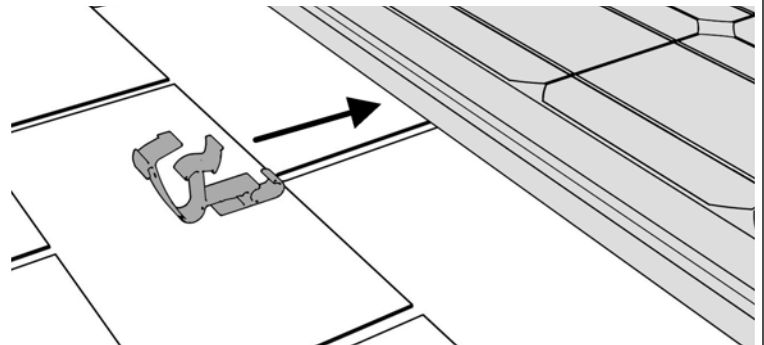
Ensure that the modules are level by using a #30 Torx bit to adjust each Leveling Foot as needed (Z axis).





**7-B: Wire the PV modules.**

Use Wire Clips as described in Step 10.



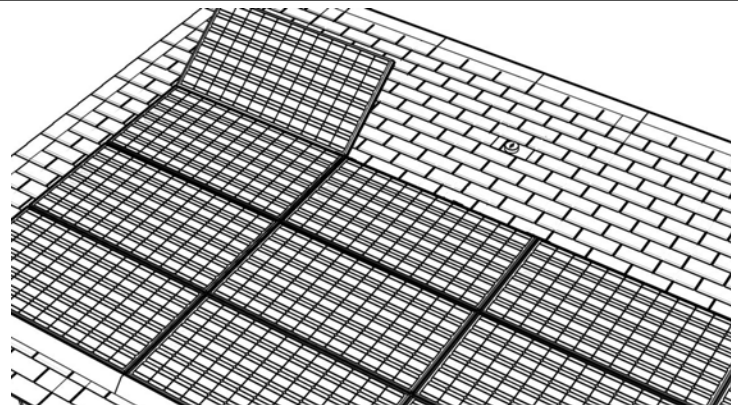
## 4.8 - STEP 8: Installing the Next Rows

**8-A: Add the remaining rows of modules.**

Repeat Steps 5 through 7 for the remaining rows of modules.

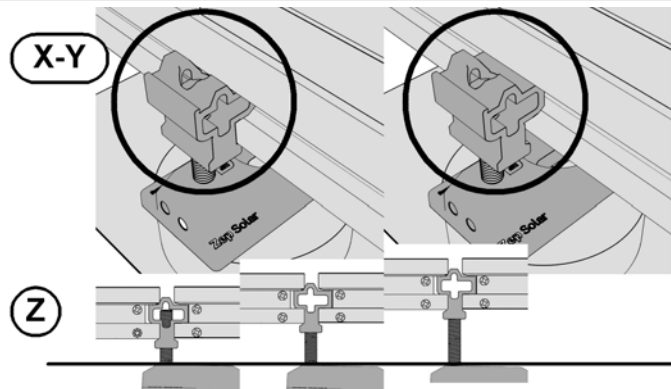
Adjust module truing (X-Y axes) and leveling (Z axis) as you go as described in Step 8-B for a square, level array.

Proceed to Step 8-C when you reach the final row of modules.



**8-B: Adjust module truing and leveling as you go.**

Please refer to Section 1.3.



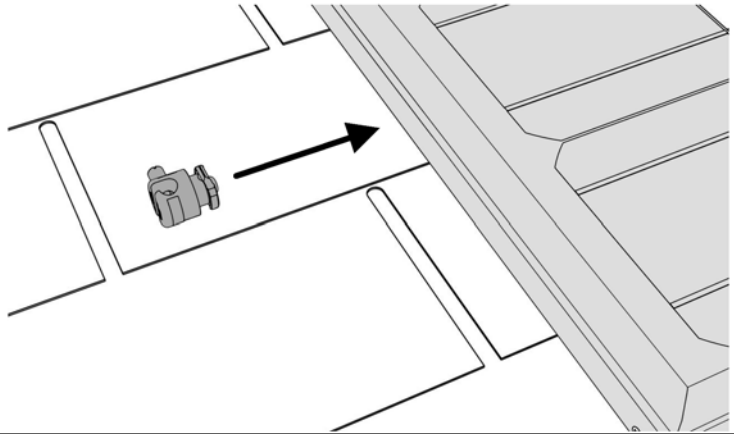


## 4.9 - STEP 9: Grounding

### 9-A: Insert a Ground Zep into the module.

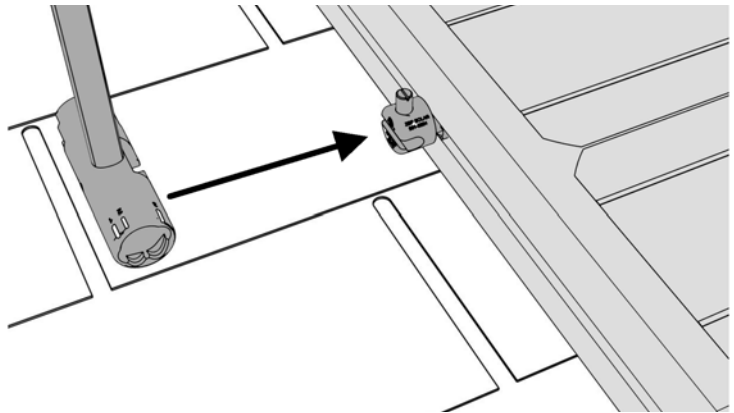
Grounding as soon as the first module is installed ensures that the array is grounded during installation for technician safety.

Insert the Ground Zep into the module groove with the set screw at the 9 o'clock position.



### 9-B: Lock the Ground Zep into place.

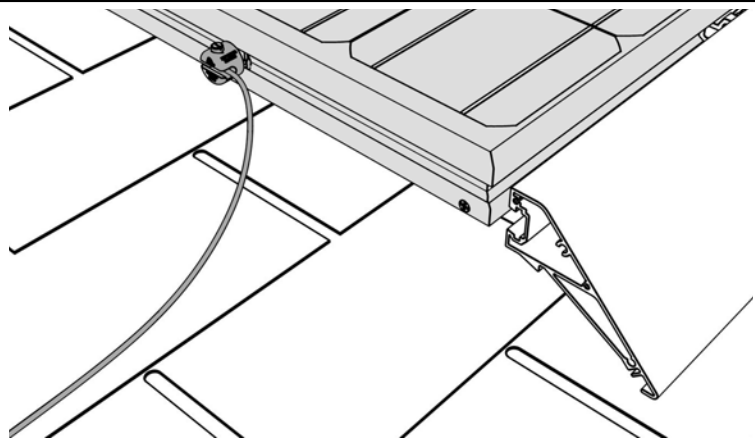
Rotate the Ground Zep 1/4 turn clockwise using the Zep Tool.



### 9-C: Connect the Ground Zep to the building ground.

Connect the Ground Zep to the building ground. Torque set screw as follows:

- 14-10AWG: 40 inch-lbs.
- 8AWG: 45 inch-lbs.
- 6-4AWG: 50 inch-lbs.



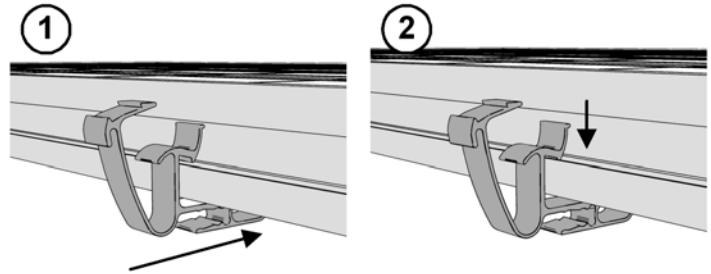


## 4.10 - STEP 10: Wire Clips

### 10-A: Place the Wire Clip in the module groove.

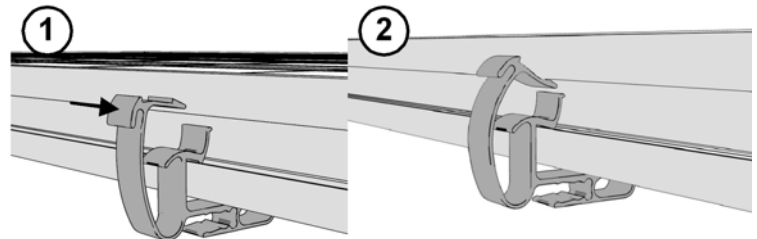
Set the Wire Clip in the module groove.

Ensure that the Wire Clip is sitting flush with the bottom of the module groove.



### 10-B: Press the Wire Clip into place.

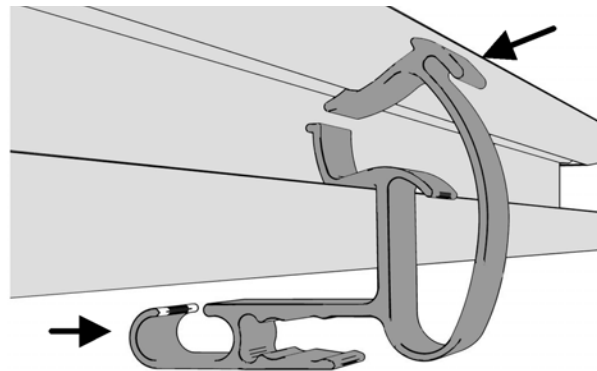
Push the thumb tab inward until it clips into the module groove.



### 10-C: Connect wires and adjust tension.

Lay wires in the wire basket portion of the Wire Clip or press into wire retention feature.

To adjust wire tension, squeeze the Wire Clip and slide it along the module groove.



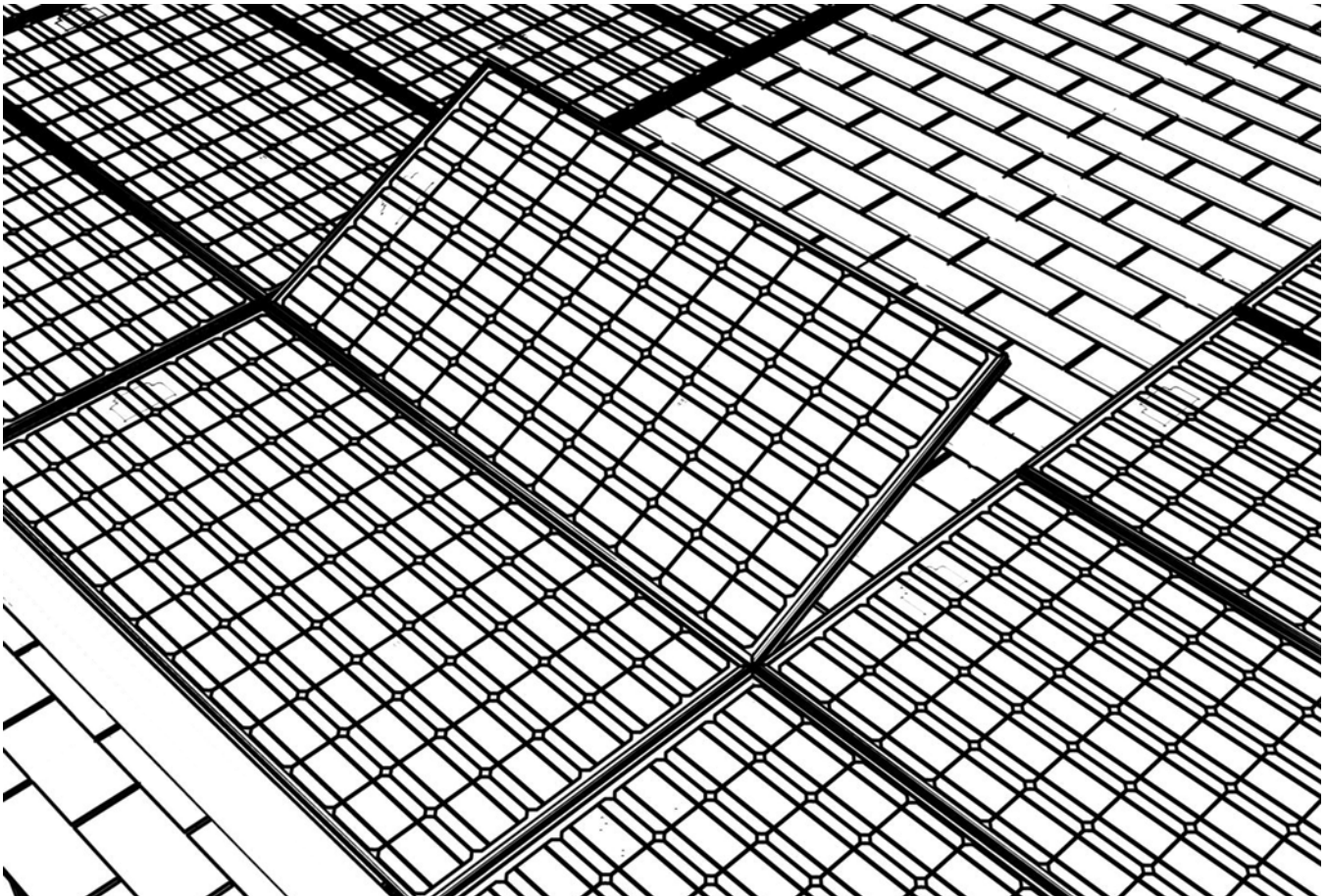




## 5.0

# Options & Servicing

This chapter describes the standard and Hybrid Interlocks used for ZS Comp. Most modules will connect to Spanner Bars using standard Leveling Feet; however, Hybrid Interlocks may be used in certain cases. This chapter also describes the process of removing a module for servicing or replacement. ZS Comp makes repairs fast and easy.





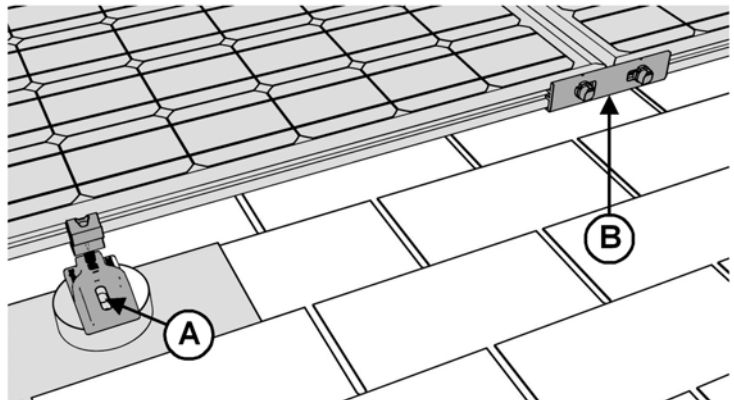
## 5.1 - Interlock vs. Hybrid Interlock

ZS Comp uses two types of Interlock: standard and hybrid.

### Option A: Standard Leveling Foot and Interlock.

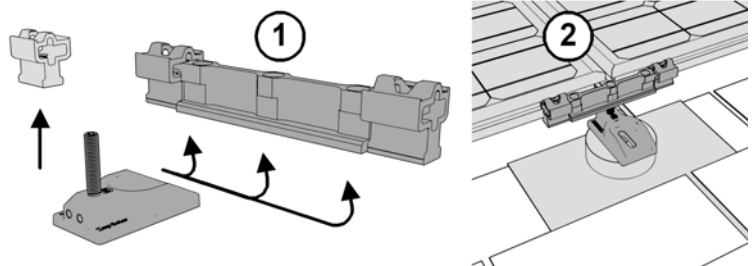
The standard Leveling Foot (A) secures a module to the Spanner Bar anywhere along the module frame.

Interlocks (B) secure modules to each other.



### Option B: Leveling Foot and Hybrid Interlock

The Hybrid Interlock allows for the installation of a Leveling Foot in the same location as an Interlock.



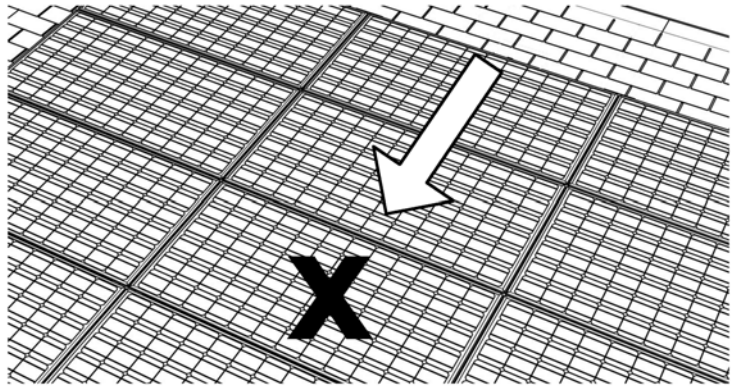


## 5.2 - Servicing the Array

Remove modules by column to access a faulty module. See Chapter 6 for tool use instructions.

### SVC-A: Start at the top of the column with the faulty module.

Work from the top down, removing one module at a time.

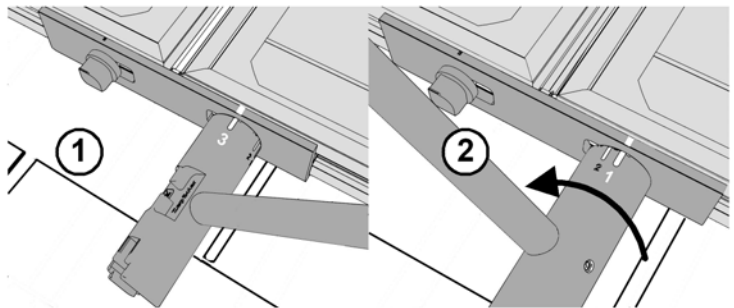


### SVC-B: Remove the top row Interlock(s).

Place the Zep Tool over the fastener with the 3 aligned with the reference mark on the Interlock.

Rotate the Zep Tool CCW to Position 1. Repeat for the second fastener.

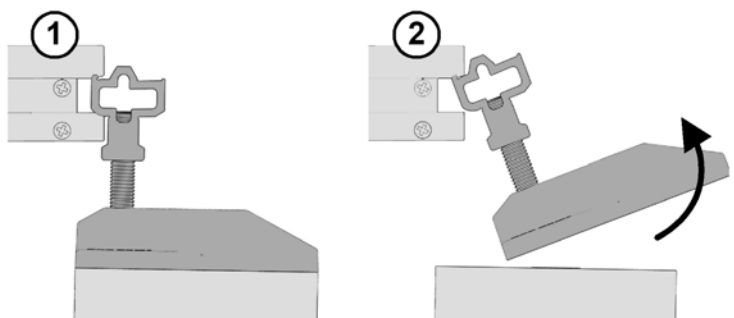
**NOTE: Turn to Position #1 exactly for ease of removal.**



### SVC-C: Remove Leveling Feet.

Remove the bolt securing the Leveling Foot to the roof attachment system.

Rotate the Leveling Foot out of the groove in the module.

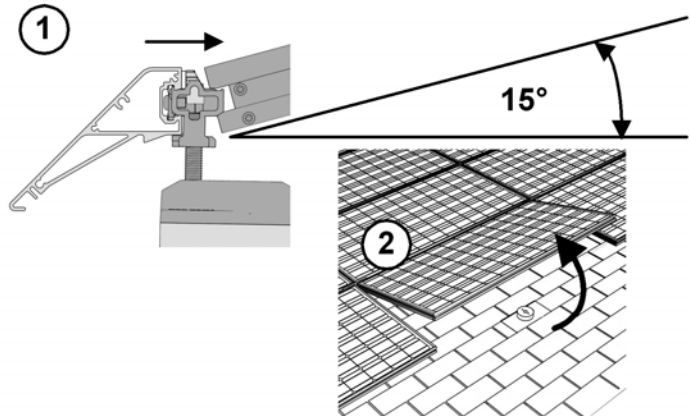






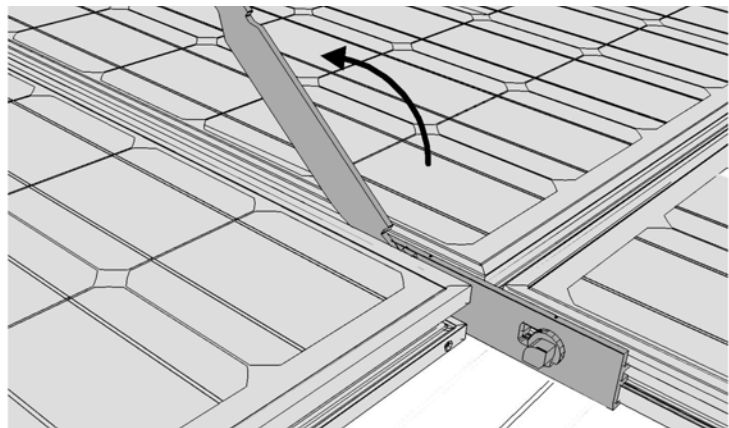
**SVC-D: Remove the first module.**

Pull module back and rotate up 15 degrees, then rotate module up and out of the array.



**SVC-E: Remove Interlock(s) from the next row of modules.**

Rotate both fasteners to Position #1 using Flat Tool as shown.

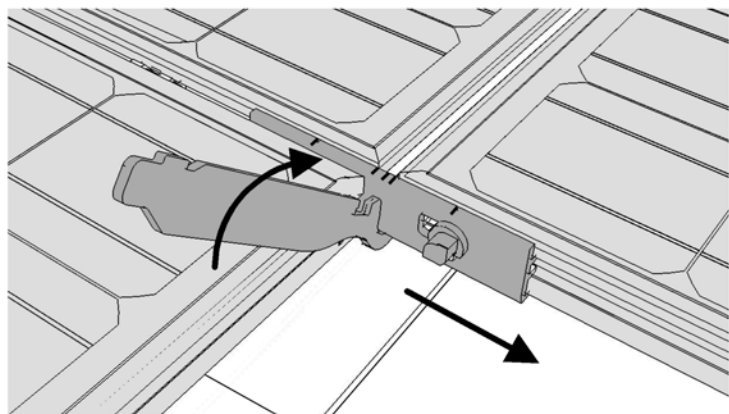


**SVC-F: Disengage the Interlocks using the Flat Tool.**

Use the Flat Tool to lever the Interlock lug out of the module groove.

Slide the Interlock clear of the modules.

You may need to tap the Interlock using the Flat Tool and a rubber mallet to free it from the module.

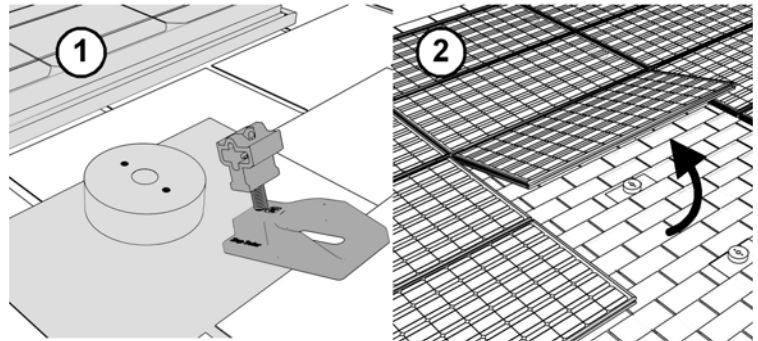




**SVC-G: Remove the next module.**

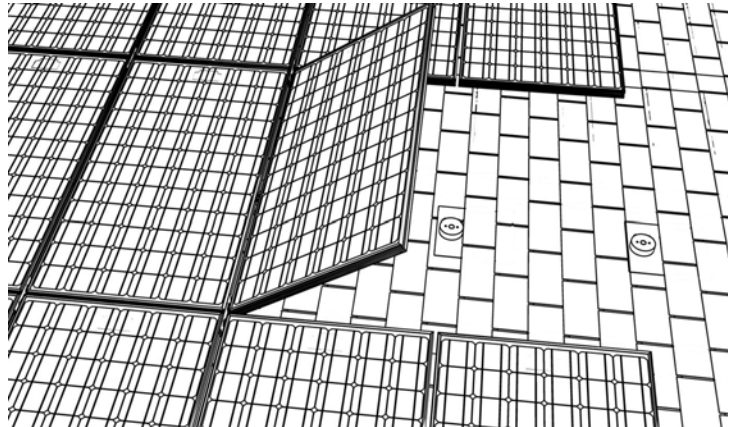
Remove the Leveling Foot.

Rotate the module up and out of the array.



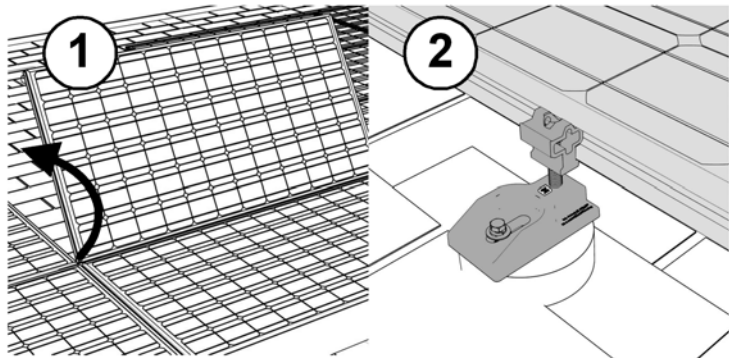
**SVC-H: Remove the remaining modules.**

Repeat Steps SVC-E through SVC-G to remove the remaining modules until you reach the module you are going to replace.



**SVC-I: Replace the faulty module.**

Follow Steps 5-A through 5-E in Chapter 4 to install the new module.



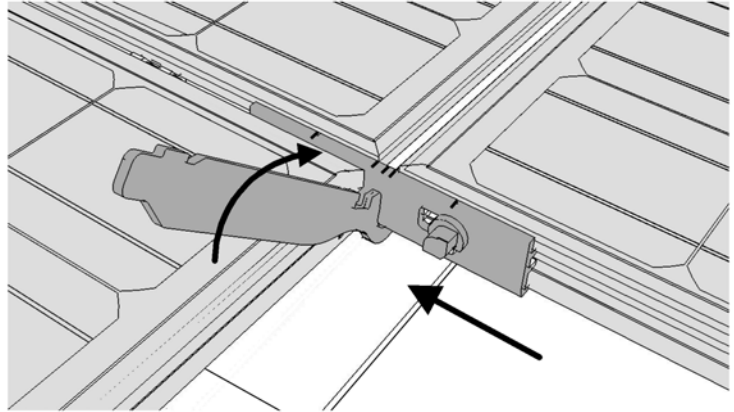


**SVC-J: Replace the Interlock(s).**

Slide the Interlock into position.

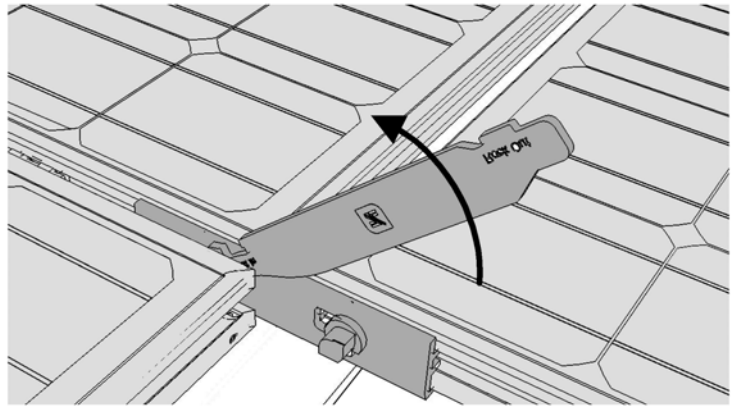
Use the Flat Tool to keep the lug of the Interlock rotated out of the module groove

Slide the IL back into place, tapping with the Flat Tool and a rubber mallet if necessary.



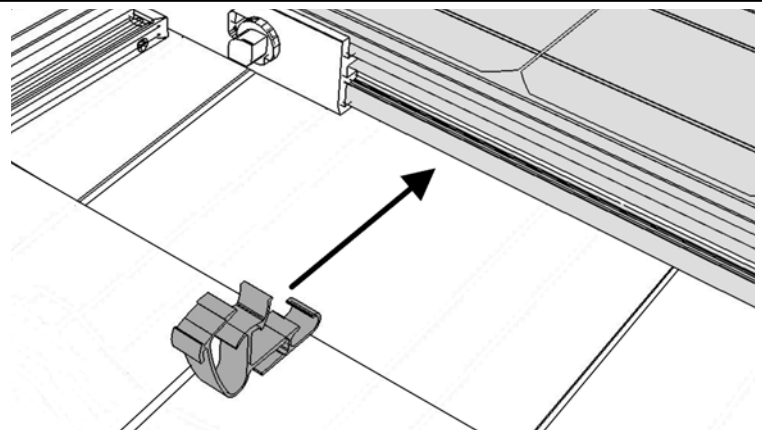
**SVC-K: Secure the Interlock(s)**

Twist the fasteners to Position #3 using the Flat Tool.



**SVC-L: Wire the module.**

Use Zep wire clips to rewire the module. (See Section 4.10.)

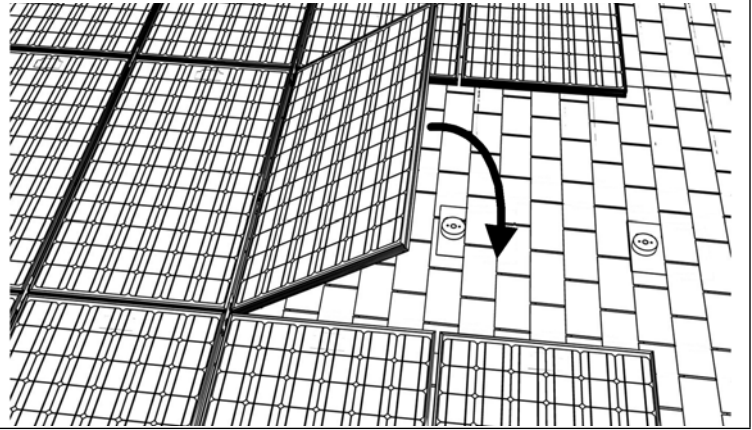






**SVC-M: Install the remaining modules.**

Follow Steps SVC-H through SVC-L to install the remaining modules in the column.





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**ZS Comp  
for Composition Shingle Roofs  
Installation Manual (US)**

**800-0351-001 Rev. A**

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