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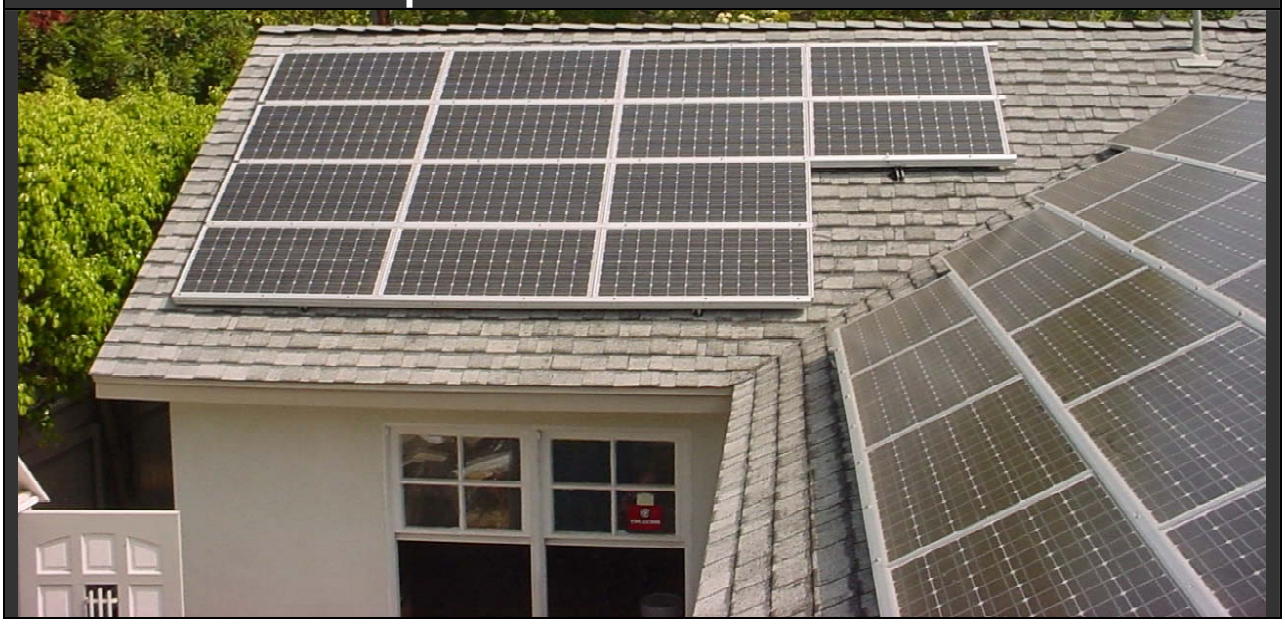
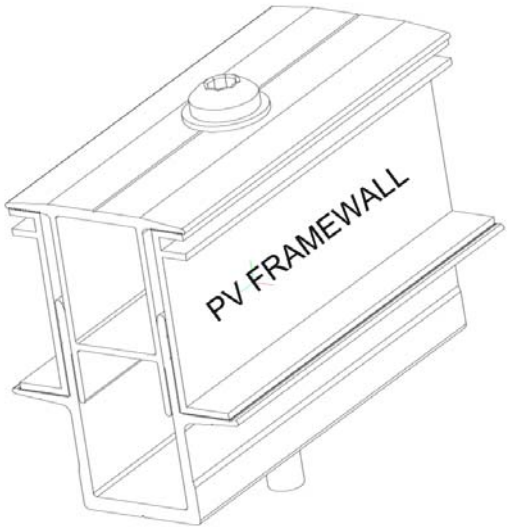
SunEarth CompRail™ Residential Installation Manual



An Introduction to the CompRail™ Concept

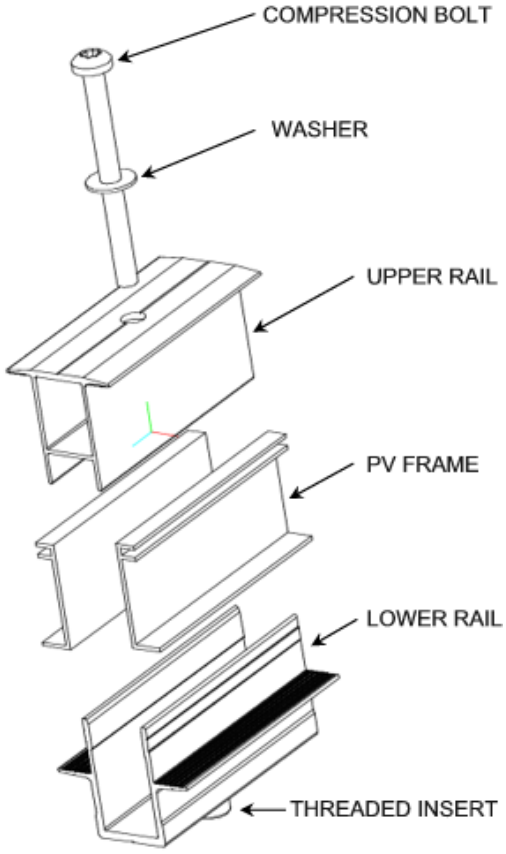


Most PV racking systems on the market today utilize dual strut style runners underneath rows of PV modules. Top-side clips are then used to attach the PV modules to the runners.

The CompRail™ Compressed Rail Mounting System (CRMS) is distinctly different. CompRail™ utilizes a common lower rail that bridges adjacent rows of modules. The PV modules rest on shelves that extend from each side of the lower rail. The modules are then held captive by an upper rail that bolts into the lower rail and compresses the PV modules between the rails.

Because both rails are monolithic and extend the entire length of the row, they form a structurally superior frame that utilizes the continuous PV framewall to increase the rigidity of the entire racking structure.

Anatomy of the CompRail™ System



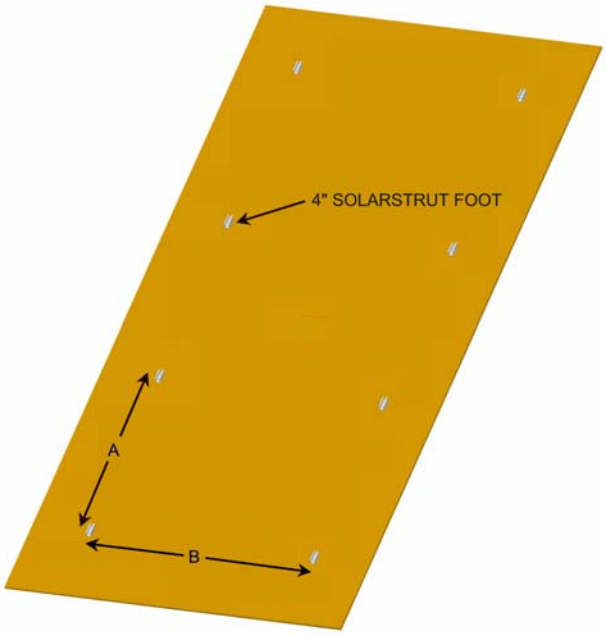
The CompRail™ system has two distinct components: an upper rail and a lower rail that are compressed by a 5/16”-18 stainless steel button head bolt. Both rails are fabricated from 6063-T6 aluminum alloy and are available in mill finish, clear or bronze anodized material.

The lower mill finish rail contains a captive threaded insert made from cold headed 5056 aluminum. The inserts for the anodized material are formed from 400 series Monel. The insert is cold formed onto the rail and does not require access when tightening the compression bolt.

A drill starter mark/groove has been placed on the back side of the lower rail to center the attachment point holes used to fasten the lower rails to the strut feet or runners.

The upper rail is a structural hollow that allows the compression force of the bolt to be spread over a large distance of the PV frame. The upper rail has 3/8” bolt holes placed at 20” O.C. to match the threaded inserts in the lower rail.

Placing the Strut Feet/Runners

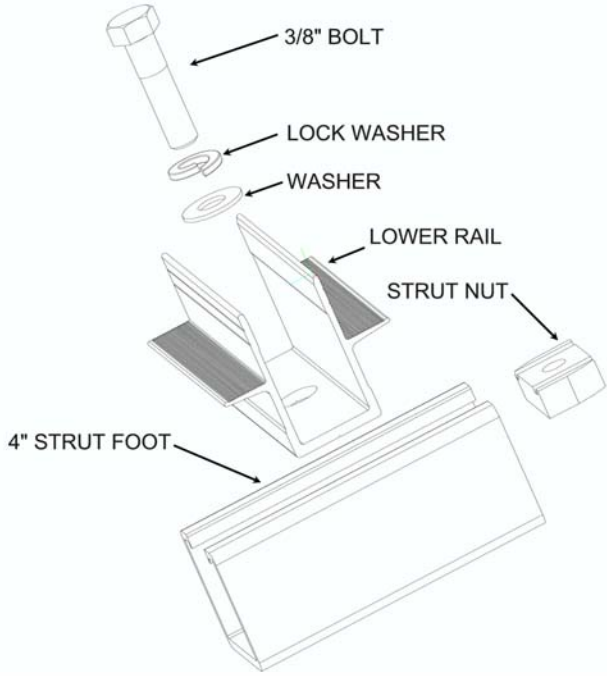


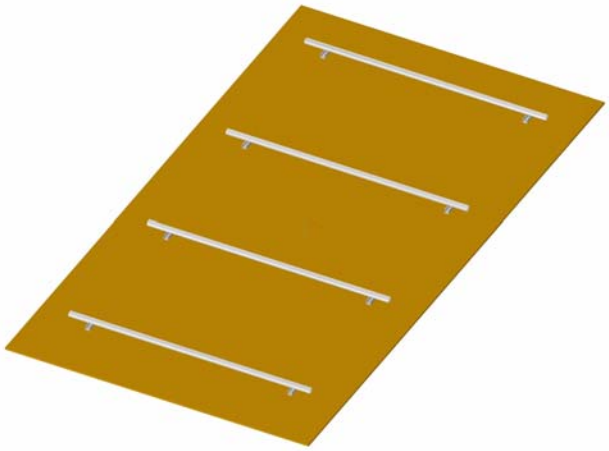
SolarStrut™ feet or runners must be attached to the roof to hold the lower CompRail™ in place. The figure at the left shows SunEarth 4” SolarStrut™ feet lagged to the structural members of the roof in a pattern that accommodates 3 vertical banks of modules.

The vertical distance ‘A’ between rows of feet should be equal to the racked length of the module plus 1-1/8” to account for the width of the CompRail™ itself. For example, a 63.9” Shell Solar SP-130-PC module will require the center-center distance ‘A’ to be 65” between the strut feet.

The distance between foot supports along the rail ‘B’ should not exceed 8’ with a typical recommended spacing of 4-6’. Actual spans will be dictated by the lag pullout resistance for the SolarStrut™ feet. The CompRail™ overhang on the last foot support for the rails must not exceed 2’.

Attaching the Lower Rail to Feet/Runners





The lower rail is designed to be attached to SolarStrut™ feet or runners with a sliding strut nut assembly. The sliding strut nut assembly allows for fine adjustment on the spacing between adjacent lower rails.

To install the lower rail onto the SolarStrut™ feet, turn the lower rail over so that the open channel faces the roof and rest it on the strut feet it will be attached to. Using a Unibit™ or similar drill, place a ½" hole centered on the drill starter mark/groove in the lower rail. The hole should be centered left-right so that it lines up with the center of the strut foot.

For ease of installation, always install the lowest rail in the array first, i.e. the rail closest to the eves.

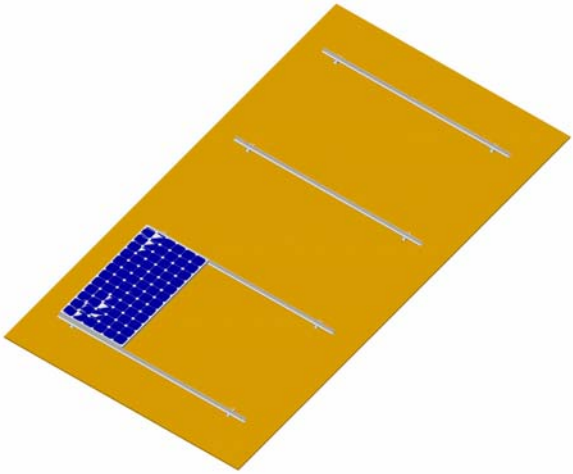
Loosely assemble the sliding strut nut assembly and attach it to the lower rail. Turn the lower rail over and lay it onto the strut feet. Slide the strut nut assemblies into the strut feet/runners.

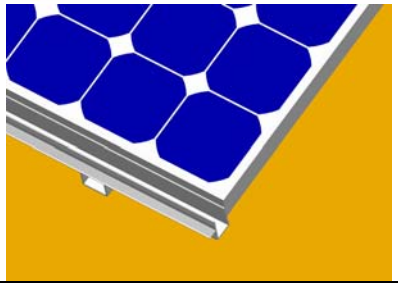
If this is the 1st/lowest rail, slide the rail until it is flush with the front edge of the strut feet/runners and tighten it in place. This will hide the strut feet/runners and provide the cleanest appearance.

If you are attaching any rail other than the 1st rail, space the rail away from the 1st rail so that the module being racked fits between the two rails with approximately 1/16" to 1/8" clearance. The module itself may be used to establish this distance or a pre-cut spacer may be used instead.

When the rail is properly set, tighten the 3/8" strut bolts to 150 in-lb of torque.

Laying PV Modules in the Lower Rail



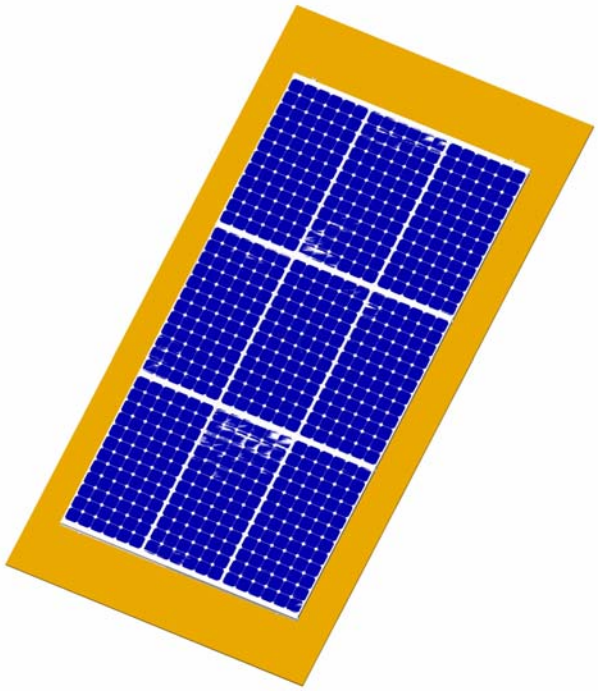


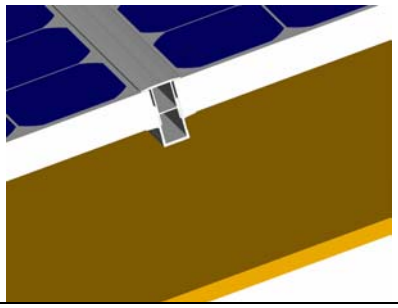
Once the lower rails have been set in place, lay the modules down between the rails with the module framewall resting on the integral shelves.

The lower rails now form a captive tray that the modules rest in. Unlike other racking systems, the module will not move if you release it. This flexibility allows you to lift up the modules to make electrical connections as you move along the array without immediately re-fastening it to the rail. The modules in the array may be lifted out of the lower rails at any time during this step of the assembly.

Once all the modules have been laid into the lower rails, they may be adjusted side to side so that the row is centered or otherwise aligned.

Attaching the Upper Rails to the Shared Lower Rails





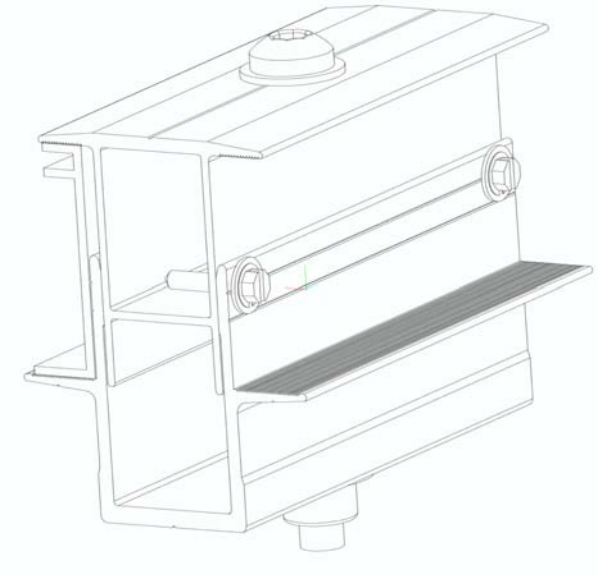
With the PV modules in place, the upper rails may be placed into the shared lower rails and bolted together.

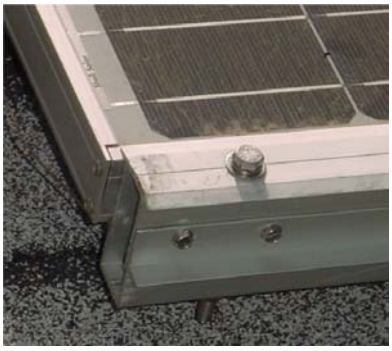
A shared lower rail refers to rails that have PV modules resting on both sides. With reference to the sample array at left, the shared rails are the 2nd and 3rd from the bottom. The 1st and 4th rails are the 'free edge' rails, which will be discussed in the next step.

With the upper rails placed into the lower shared rails, the ends should be aligned. This may be done by lightly tapping them with a rubber mallet or wood block. When the ends are plumb, the bolt holes in the upper rail should be aligned with the threaded inserts in the lower rail. *Verify this by inserting the button head compression bolts and starting the threads by hand.* If one of the bolts will not go in, make a slight adjustment to the rail.

Tighten the compression bolts in the range of 80-100 in-lbs of torque.

Attaching the Upper Rails to the Free Edge Lower Rails





If the free edge rails (those with PV modules on only one side) were simply compressed, the upper rail would tend to bend over onto the free edge instead of clamping directly on the module. To prevent this, the free edge must be fixed with tek screws (self tapping sheet metal screws) or rivets.

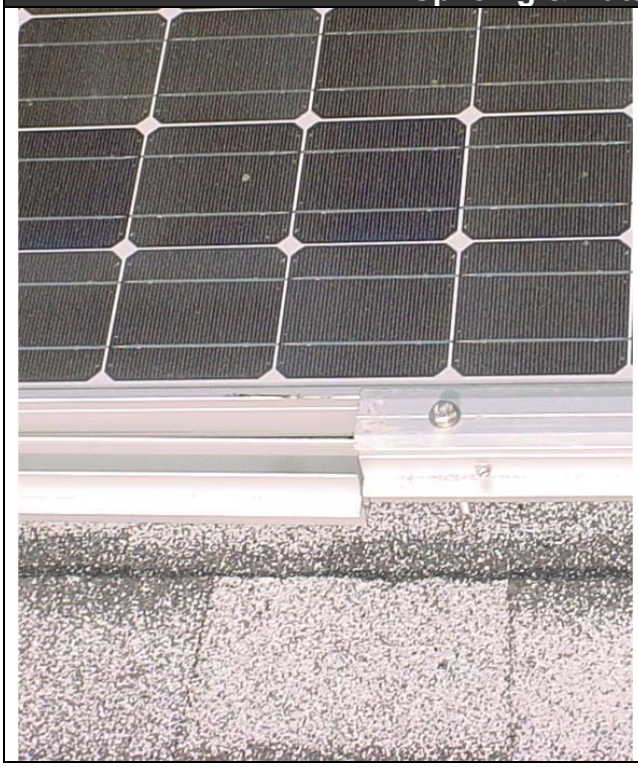
The method of fixing the free edge is to place the upper rail into the lower rail and align it just as though it were a shared rail and hand thread the compression bolts several turns.

With the upper rail properly aligned left-right, gently compress the upper rail against the lower rail by hand until the shelf on the upper rail just contacts the top of the PV module across the entire row. Do not compress the rails to the point that the upper rail begins bending over onto the free edge.

At this point, drive a #10 tek screw or rivet into each side of the compression bolts on the rail approximately ½" away from the bolt. You will need to pilot the holes with a #29 drill for the tek screws or the recommended drill size for the rivets. If possible, use the upper drill starter mark for these holes. If the web in the upper rail blocks this location, use the lower mark. Tighten the screws with a nut driver to approximately 15 in-lb of torque.

After the free edges have been set, tighten the compression bolts in the range of 80-100 in-lb of torque.

Splicing & Cutting CompRail™



In instances where the row length exceeds the standard 264” length of the CompRail™, adjacent rails may be spliced together. With Comprail™ a separate splice connector kit is not required. Instead, the PV module frame is used to splice two rails together. The PV frame aligns and provides the support to hold the rails together until they are secured to the next strut foot/runner on the roof. A partially assembled splice is shown in the photo on the left.

The location of the splice on the module is not critical, but should be 1” or more from the edge of the frame. If possible, a 1/8” gap should be left between adjacent splices to allow for expansion and contraction.

CompRail™ may be cut using a standard chop or miter saw equipped with a carbide blade. To cut the rails, simply insert the upper rail into the lower rail in a fully compressed position and make the cut.

Questions & Answers

Q: Do the modules need to be racked in a landscape or portrait mode, is there a preference?

A: Modules may be racked in either portrait or landscape modes with the CompRail system. Ideally, the modules should be racked in portrait with their short edge in line with the axis of the CompRail™. This configuration minimizes the amount of rail needed to rack the modules and limits the number of feet and roof penetrations required.

The array at the left shows a standard portrait style installation with CompRail™.

Q: Does CompRail™ need to be installed horizontally as shown in the examples or can it run vertically?

A: CompRail™ may be installed either vertically or horizontally. The only limitation is that the rails must run perpendicular to the strut feet or runners they are attached to. In the case of the examples shown, the feet/runners have been lagged to the rafters that run vertically, meaning the CompRail™ must run horizontally. Another possible configuration in these examples would be to use hangar bolts to send a set of strut runners horizontally across the roof. CompRail™ could then be attached vertically to these runners.

Q: How flexible is the CompRail™ system? What range of module heights can Comprail™ handle?

A: The CompRail™ system can accommodate modules from 0.95" to 2.25" in height by the interleaved slip fit of the upper and lower rails. There is no need for separate clip heights for different modules. At the time of this writing, Comprail™ is compatible with all modules currently available in North America.

Q: Can you install CompRail™ on a tile or cedar shake roof?

A: Of course. Use an aluminum strut runner and hanger bolts to create a platform above the tile. The aluminum runners may run horizontally (across the roof) or vertically (down the roof). In either case, the maximum span between runners should not exceed 8' with a maximum 2' module overhang over the last runner. Our preferred method of suspending the runners is to use hangar bolts lagged into the rafters and flashed into the tile with SunEarth copper flashing products.