

## FRONIUS RAPID SHUTDOWN BOX MOUNTING OPTIONS

For Rail and Rail-less systems on L-feet, stand-offs, and other attachment types

### Summary

The Fronius Rapid Shutdown Boxes (RSBs), Multi- and Single string versions, are designed for wall and roof-top mounting with 600V maximum rated PV systems. Any mounting design must consider PV source circuit wire runs and PV output circuit conduit runs. Both RSBs include water-tight glands/connectors for PV source circuit inputs (PV Wire, USE-2, etc.) and a pre-drilled hole for the PV output circuit using home-run wiring (THHN, THWN-2, etc.) inside appropriate conduit. To maintain the box's NEMA 4X rating, only water-tight fittings should be used and unused gland fittings should be plugged with included black plugs.

The wall mounting is achieved with wood, metal, or masonry fasteners through fabricated holes in the base of the RSB. Roof-top mounting can vary depending on the mounting system and roofing material. In general, the included bracket is attached to the rail of a rail-based system but a different attachment method might be required if using a rail-less system. For ideal aesthetics, the RSB may be installed under the array unless there is insufficient vertical clearance; it should fit between the roof surface and the rear of the module while providing an air gap for each, as determined by the local AHJ. Please review Appendix A for the NEC code regarding installation of an electrical box under a PV module, and access to the provided DC disconnect.



Figure 1: Fronius Rapid Shutdown Box installation

### Wall Mounting

If a portion of the array is within 10 feet of a vertical surface (wall, side of dormer, parapet, etc.), it can be mounted onto that surface. In this case, mount the RSB without the included bracket, being mindful of providing room for the conduit run back to the inverter. Four anchors are needed (as illustrated)

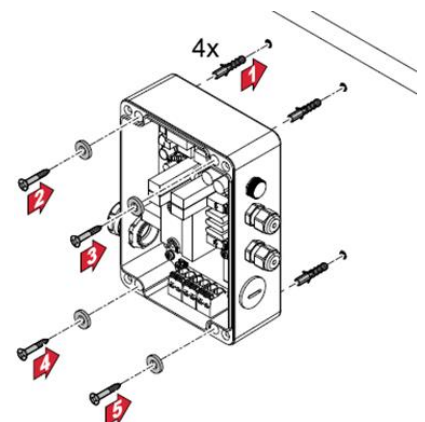


Figure 2: Wall mounting of RSB

### Roof Mounting

Since the RSBs are NEMA 4x rated, they can be placed horizontally, vertically, or tilted on a roof. When mounted to racking via the bracket, the un-affixed end is providing additional stability by the conduit attachment.

### Rail-based System

The larger mounting bracket is designed for bolting to the top or side of a rail. Most rail systems provide top and side channels for mounting the bracket with bolts also supplied with the mounting system. The most common bolt is a T-bolt and this often is the same bolt for top and side channels.

The top-mounting channel design of the multi-string mounting bracket mimics commonly used microinverter or optimizer (aka, MLPE device) brackets. Thus this bracket will also fasten to most rail top channels just like MLPEs with similar bracketing. However, the RSB is generally taller than MLPEs which may preclude attachment under a module.



Figure 3: A generic rail system demonstrates typical top and side channels for mounting bolts

Even proprietary rail systems should work if their bolting method also works for MLPE devices, as seen at right in this SnapN'Rack rail system.

### Height Matters

The ability to fasten to the top or side of a rail is inconsequential if the RSB doesn't fit under the module or along the side of the array. Most rail-based systems are height-adjustable but that's no guarantee of a fit under the array. Some L-feet are not that tall or adjustable, leaving insufficient room height-wise. This results in the top bracket sitting above the top rail or at least the RSB touching the roof. To avoid this, make sure the dimension from roof face to top of the rail is equal to or greater than the following:

#### RSB Model & Rail Height

Single-string: 4.0" (10.2 cm)

Multi-string: 4.5" (11.4 cm)

If the height adjustment means provided by the racking system is insufficient, consider third party products: (1) substituting with a third-party L-foot with greater height (e.g., EcoFasten Solar® Compression Brackets) (2) or mounting the footing atop a third-party stanchion (e.g., ProSolar FastJack®, Quick Mount PV QBase®) will provide greater clearance.

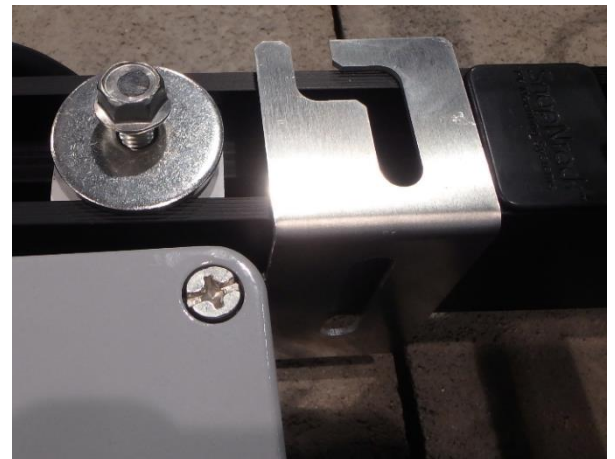


Figure 4: SnapN'Rack's snap in bolting device works in both its top and side rails.



Figure 5: the bracket is in contact with the rail top, but the RSB is touching the roof. Therefore, the RSB needs to be raised by either adjustable attachment to the side rail or by raising the rail itself.

## Rail-less System

While rail-based systems are commonly used, rail-less systems are gaining in popularity. The stanchions used to support and connect adjoining modules often provide a top channel. However, an additional stanchion would likely be required to provide complete support. This necessitates an additional roof penetration. Some manufacturers include hardware for attaching boxes (e.g. stanchion bracket from Equilibrium Solar) but they will likely not fit the RSB footprint or attachment points. So you may need to devise a solid method or just use an attachment method that is independent of the racking system.

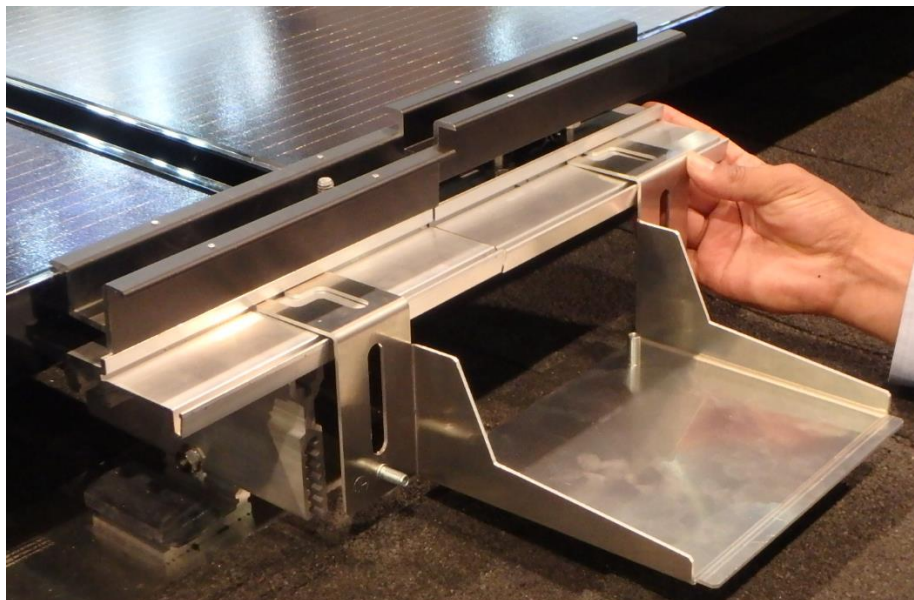


Figure 6: for rail-less systems without hardware for attaching junction or combiner boxes, consider adding another stanchion; if this is not acceptable, consider mounting the RSB directly to the roof (see below).

## Racking Independent Mounting

An installer can bypass the hardware limits of their array mounting system if they attach the RSB with a method independent of the array racking. The RSB may be mounted atop certain stanchions (standoffs) or directly to the roof deck with deck screws and approved sealant (or roof flashing). Examples are provided below but other manufacturers may offer similar solutions.

### Stanchion / Base Mounting – e.g. Roof Tech

The mounting bracket can be affixed to some stanchions/stand offs/bases. For example, Roof Tech, a rail-less racking manufacturer, provides a mounting base for which they have offered a fast and simple RSB attachment to asphalt shingle or metal roofing (see figure 7). Analogous solutions can be devised using other stanchions or stand-offs or bases (see figures 8 & 9).



Figure 7: The Roof Tech [E] Mount AIR Base: RSB bracket attached to the top of AIR base plus [E] mount Shims. The standard Roof Tech [E] mount is used as an EMT conduit support.



Figure 8: Example of a stand-off with rail section.

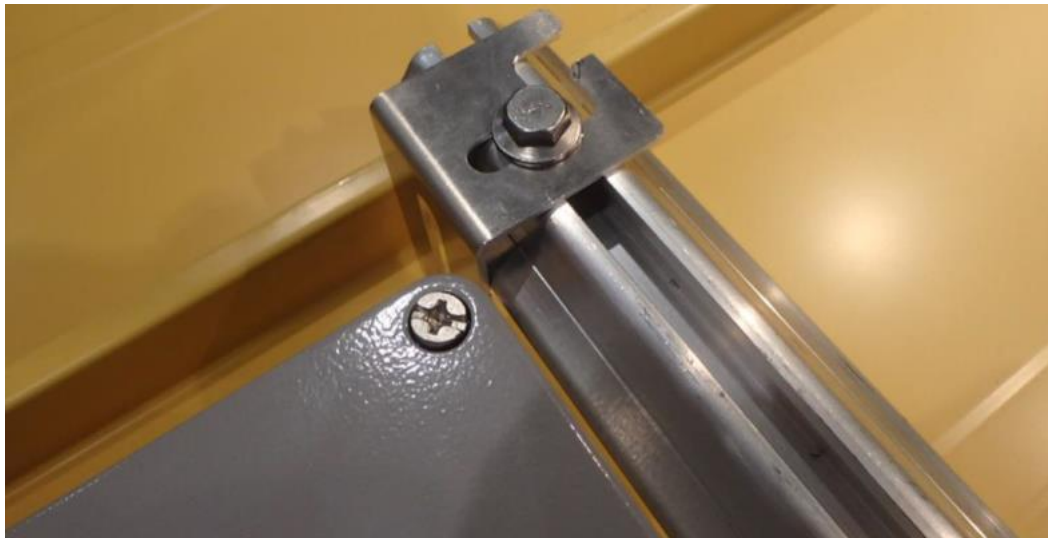


Figure 9: S-5! has a variety of raised metal seam attachment solutions with a generic rail



SHIFTING THE LIMITS

### **Direct Roof Mounting**

If none of the prior solutions are available, the local AHJ may approve direct mounting of the RSB box to the roof surface. Consider using stainless deck screws and approved sealant (e.g. butyl tape or flashing sealant) following roofing codes and best practices. Use the same mounting holes as shown in Figure 2.

If you have any questions about this or if you want to learn more about our solar solutions, do not hesitate and contact us at **(219)734-5500** or [PV-Support-USA@Fronius.com](mailto:PV-Support-USA@Fronius.com) . We are happy to help you!

## Appendix A – NEC 2017 References

The Fronius Rapid Shutdown Box (RSB) may be mounted under the array as direct access to the RSB or integrated DC disconnect is not needed as the NEC code states:

**Section 690.15 Disconnection of Photovoltaic Equipment.** Isolating devices shall be provided to isolate PV modules, ac PV modules, fuses, dc-to-dc converters inverters, and charge controllers from all conductors that are not solidly grounded. An equipment disconnecting means or a PV system disconnecting means shall be permitted in place of an isolating device. Where the maximum circuit current is **greater than 30 amperes** for the output circuit of a dc combiner or the input circuit of a charge controller or inverter, an equipment disconnecting means shall be provided for isolation. Where a charge controller or inverter has multiple input circuits, a single equipment disconnecting means shall be permitted to isolate the equipment from the input circuits.

Informational Note: The purpose of these isolating devices are for the safe and convenient replacement or service of specific PV system equipment without exposure to energized conductors. (A) Location. Isolating devices or equipment disconnecting means shall be installed in circuits connected to equipment at a location within the equipment, or within sight and within 3 m (10 ft.) of the equipment. An equipment disconnecting means shall be permitted to be remote from the equipment where the equipment disconnecting means can be remotely operated from within 3 m (10 ft.) of the equipment.

**Section 690.34 – Access to Boxes:** Junction, pull, and outlet boxes located behind modules or panels shall be so installed that the wiring contained in them can be rendered accessible directly or by displacement of a module(s) or panel(s) secured by removable fasteners and connected by a flexible wiring system.