POWER SYSTEM RACK (PSR) INSTALLATION MANUAL

OutBack Power Systems, Inc.

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IMPORTANT SAFETY INSTRUCTIONS

Save These Instructions!

A. This manual contains important safety instructions as prescribed by UL standards for the model PSR that shall be followed during installation and maintenance of the Battery system and Enclosure.

B. The OutBack Battery Rack is listed by ETL as an indoor enclosure to UL standard UL1741-2000.

C. This Battery enclosure is intended for battery circuits configured for 12 to 48 volts nominal. The battery types to be used with this enclosure include sealed or vented lead acid, Gel Cell, Absorbed Glass Mat, and Nickel Cadmium. The types of batteries that have been evaluated in the PSR rack are: Group 27 and 31, T105 golf cart batteries, L16, 4D and 8D batteries. Other sizes can be used as well.

D. Grounding Instructions – The frame of this enclosure should be connected to a grounded, permanent wiring system. For most installations, the negative battery conductor should be bonded to the grounding system at one (and only one) point in the DC system. All installations should comply with all national and local codes and ordinances.

E. Overcurrent protection for the battery circuit is not provided with this enclosure. Overcurrent protection must be provided as part of the installation. This can be added to the PSR during the installation.

F. Never charge a frozen battery

G. To reduce the risk of electric shock or dangerous arcing, use only insulated tools to connect up batteries, do not wear jewelry, and do not leave ends of battery cables exposed such that they could result in shorting out the battery circuit. Make the connection to the negative terminal of the battery last to reduce the risk of shorting the positive circuit to the enclosure during battery installation and wiring.

H. **WARNING** – Working in the vicinity of a non-sealed lead acid battery is dangerous. Batteries generate explosive gasses during normal operation, Provide ventilation to outdoors from the battery compartment. Vent the enclosure from the highest point. Sealed batteries do not require venting.

I. Connections to battery terminals are specific to the type of battery installed. Refer to the battery manufacturer's recommendation for terminal connections and torque requirements.

J. Tools required for assembly of this enclosure: No 3 Phillips screwdriver, slip joint pliers, 10mm wrench

K. The battery enclosure constitutes a hazard during earthquakes and other non-intended movement events. An optional seismic kit is available for bolting the PSR down to the floor. The seismic kit also contains 12 battery tie down straps. Additional mounting to an adjacent vertical wall may be required.

INTRODUCTION

The OutBack Power Systems PSR provides a safe and attractive way to install batteries in renewable energy systems. It can be used to also enclose a power inverter, charge controller and overcurrent protection – a complete renewable energy power system can be installed in a single cabinet (with sealed batteries only).

The PSR is built with corrosion resistant steel and is shipped knocked down for easy transportation and storage. The cabinet can be assembled with additional shelves for more batteries or other components.

A front mounted bracket is provided to allow the installation of a inverter/battery disconnect breaker, two PV array disconnects and a two pole PV ground fault protection system. An optional hinged breaker cover can be field installed to allow locking of the breakers or to prevent tampering. The PSR should include the circuit breakers only when used with sealed batteries.

An optional battery spill containment tray can be used on each shelf to prevent damage from battery spill or mist during charging. It can also be used as a vent hood when mounted upside down in the top of the enclosure with vent piping to prevent accumulation of hydrogen gas inside of the enclosure.

An optional seismic zone 4 kit is also available to allow the installation to comply with local and national building code standards. The kit includes two mounting feet and twelve battery restraint straps.

An optional PSR mounting plate is also available to allow the installation of various power electronic components inside of the enclosure with sealed batteries.

An optional heavy duty top is also available to allow the mounting of inverters directly on top of the PSR for indoor installations.

Also available is a outdoor rainproof version (PSR-3R) and a frame only version (PSR-FO) without the side and top panels for use as a battery rack inside restricted access equipment rooms.

Available Versions

PSR	**Power System Rack –** standard indoor version with removable panels and top – includes two shelves
PSR-3R	**Power System Rack – Type 3R / Outdoor Version –** Same as the PSR indoor version except the top and side panels are insulated / gasketed and includes a rainshield type top cover and a breaker cover kit
PSR-FO	**Power System Rack – Frame Only Version –** same as the PSR except without the side and top panels and the breaker/conduit brackets – includes three shelves standard

Available Options

PSR-HDT	**Heavy Duty Top** – allows mounting of an SW series inverter/charger with a conduit box on top of a PSR
PSR-SK	**Shelf Kit** – adds another shelf to the PSR for more batteries or an inverter/charger with sealed batteries
PSR-SZ4	**Seismic Zone 4 Kit** – includes two mounting feet and battery restraint straps for up to 12 batteries
PSR-BCK	**Breaker Cover Kit** – transparent flip-up cover with mounting screws and padlock hasp
PSR-SCT	**Spill Containment Tray** – Holds four Group 31, T105, or L16 batteries – Fits on one PSR shelf
PSR-MP	**Mounting Plate** - attaches to the back of a PSR to allow mounting of electrical components

EXPLODED VIEW OF MAJOR COMPONENTS

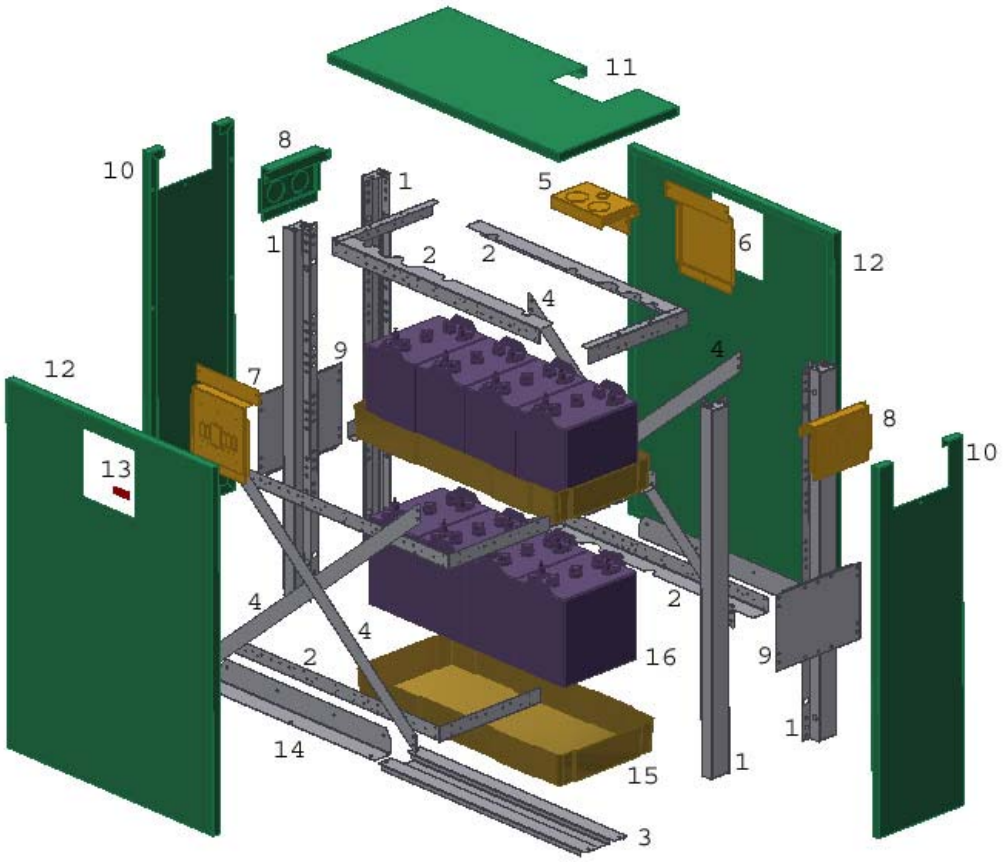

Figure 2

List of parts Shown for OutBack PSR, including some important options

Item	Qty	Part number	Description
1	4	300-0002-06C	Corner Vertical Leg
2	6	300-0001-01H	Battery Shelf Frame
3	2	300-00034-01A	Center Support
4	4	300-0044-02A	Ribbed Diagonal Support
5	1	300-0003-04	Top Conduit Bracket
6	1	300-0019-02	Filler Bracket
7	1	300-0018-02B	Breaker Bracket
8	2	300-0004-04	Side Conduit Bracket
9	2	300-0017-02	Web
10	2	300-0023-01	Side Panel
11	1	300-0008-01D	Top Panel
12	1	346-0022-01D	Front & Back Panel
13	1	336-0001-02	OutBack Logo Badge
14	1	PSR-SZ4	Seismic Mounting Kit option
15	2	PSR-SCT	Spill Containment Tray option
Not shown:			
16	1	656-0001-01	Hardware packet, PSR
17	1	900-0001-01	Users Manual

ASSEMBLY OF THE INNER STRUCTURE

Assembly of the Power system Rack is dependant on battery type, quantity and configuration.

The Battery enclosure is designed to accept vented or sealed types of batteries. **Each shelf** will accept either 4 T105's, 4 L16's, 4 Group 31's or 1 8D/4D. Other sizes may be suitable but have not been evaluated. Two shelves of the L16 size battery will physically fit in the box, however there will be insufficient room for hook up and or watering. This configuration is unsafe to connect up so is strongly recommended against. Use the PSR-F0 for two shelves of L16's. For purposes of this manual, eight T105 golf cart batteries are depicted hooked up all in parallel for a 6 volt configuration.

Step1. Refer to Figure 3. Using a No.3 Phillips screwdriver, and 16 of the #12 flat head sheet-metal screws per shelf, assemble the Battery Shelf Frames to the four corner vertical legs finger tight. Make sure the long portion of one shelf sits on top of the short section of the opposite shelf. Refer to figure 3 for an example of the corner overlap.

Four L16 batteries: Use one lower shelf for batteries (2nd & 3rd hole up from the floor) and place the bottom of the other shelf 26" off the floor, (holes 15 and 16). This will allow sufficient room for watering and will provide a place to hold your distilled water and turkey baster. Omit the front and rear screws for the upper shelf at this time as they will also mount the diagonal braces later.

Eight T105 (golf cart) batteries: Use the 2nd and 3rd hole from the floor for the lower shelf and place the bottom of the upper shelf at 19 ½" off the floor, (holes 11 & 12).

Twelve group 31or T105 sealed batteries: Use the 2nd and 3rd hole from the floor for the bottom shelf. Place the bottom of the middle shelf at 13 ¼" (hole 7 & 8). The bottom of the upper shelf should be at 25 ¾" (hole 15 and 16). Holes 15 and 16 will also be used to mount the diagonal braces so leave the front and rear screws out for now. Note that a PSR-SK shelf kit will be required for the third shelf.

The legs are universal – the vertical orientation is not important. If holes do not line up, turn the bracket upside down. Note that the bottom holes of the Vertical Legs are not used. This is to allow insulation to be placed under the bottom shelf. Insulation is not supplied with this kit, but 1" thick Styrofoam is readily available in sheets at local hardware stores. Do not install the diagonal Brace at this time.

Step 2. Install the remaining 2 shelf frames using the top two holes of the vertical standards. Turn the frames upside down as shown in figure 5.

Figure 3

This next figure shows the center shelf support in place as well as the side web plate. Each shelf gets a center shelf support and each side gets a side web plate.

Step 3. The center shelf supports are installed with 6mm flat head screws, washers and nuts. Use a 10mm wrench and #3 Phillips to tighten the nuts.

Step 4. The side web plates should be placed approximately midway up the rack. Four of the holes for the web plate will use the #12 x ½" flathead shelf screws and the other four holes will use 6mm loose hardware like on the center shelf supports.

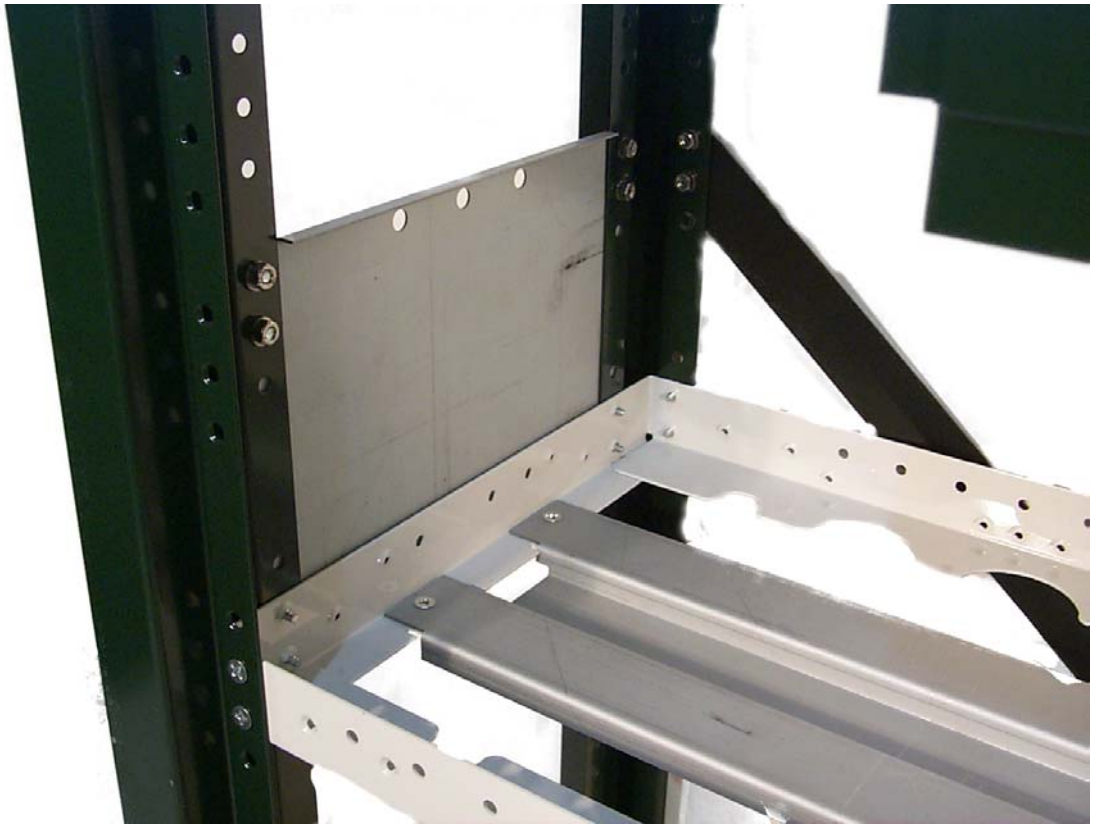

Figure 4

The top shelf frame is installed upside down. Note the end conduit bracket shown installed along with plastic inserts for the side and top panels.

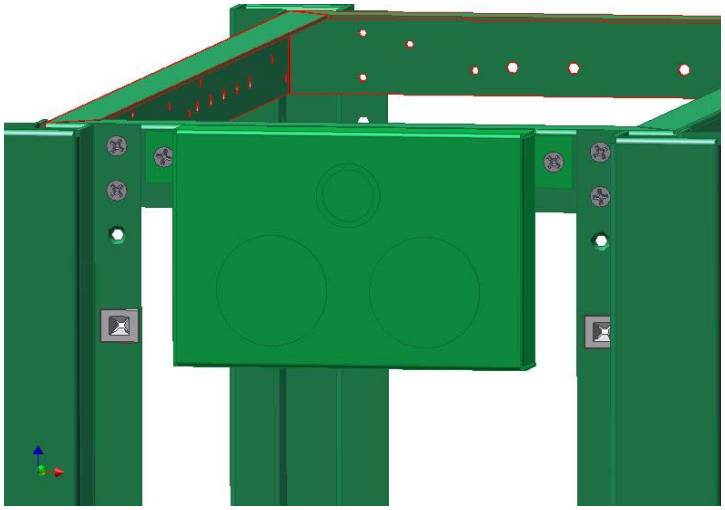

Figure 5

Step 5. Snap in the 20 plastic inserts into the rectangular holes. There are four on the front, rear, sides and top of each leg. Make sure you hear two clicks when inserting. If not, then push harder until both tabs of the insert are snapped into place.

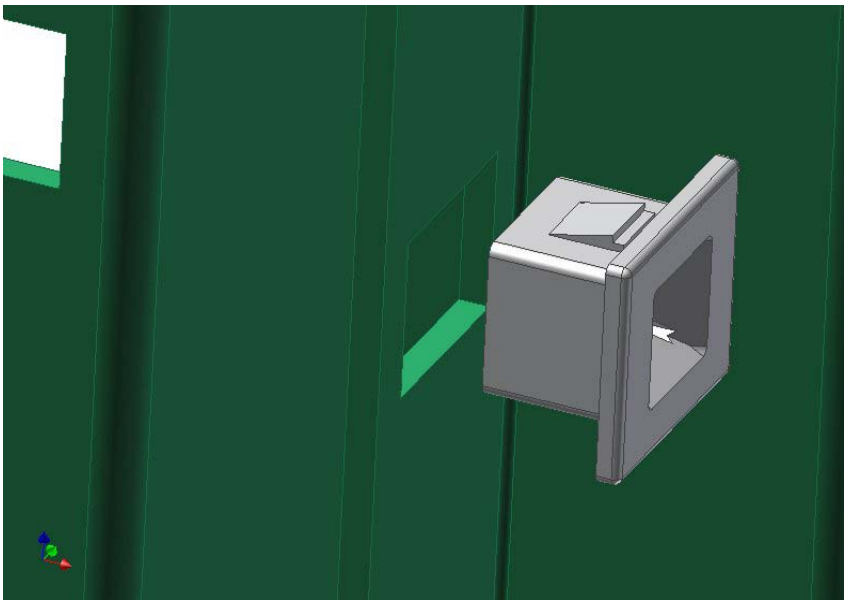

Figure 6

Step 6. Install two diagonal braces to the back of the enclosure. Use #12 flat head sheet-metal screws into same mounting holes as the bottom shelf frame. The top of diagonals will be secured using 6mm hardware or #12 flat head sheet-metal screws depending on shelf placement. You should now tighten down all screws installed so far.

Step 7. Install both end conduit brackets using the #12 sheet-metal screws.

Step 8. Install the back blank filler plate and front breaker bracket. As a suggestion, if no breakers are used in the PSR, then put the blank filler bracket on the front.

Step 9. Install the top conduit bracket as shown. Your rack should now look like this:

Figure 7

Also shown in figure 7 are the optional spill containment trays (PSR-SCT). These are highly recommended to reduce the possibility of damage from acid spills. The OutBack spill containment tray is custom designed and manufactured exclusively to fit the PSR rack. They are injection molded from polypropylene plastic, the same material that battery cases are made from. Commercial installations may require spill containment even when using sealed batteries. Consult your local code requirements.

Step 10. Place the structure where it is to be connected up and used as it will not be movable when fully loaded with batteries.

Depending on where the enclosure is placed, the rear panel or even an end panel may need to be snapped into place prior to final placement. See figure 8 for male snap in instructions.

If the Seismic kit is to be installed, then the mounting feet need to be secured to the bottom shelf frames. The lower shelf battery straps need to be sandwiched between shelf frames and mounting feet also. See figure 9 for seismic mounting detail.

Step 11. Install a male insert into each corner of the top, side and end panels. Using pliers, insert as shown in figure 7 and twist clockwise (to the right) 90 degrees until the male insert is seated.

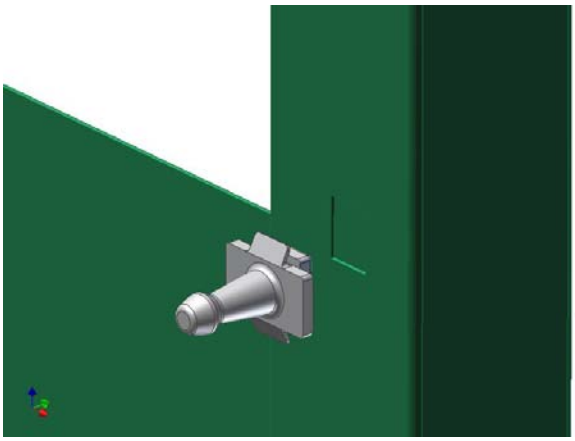

Figure 8

Battery Rack ready to be wired up. (Install front diagonals after cabling)

Figure 9

Step 12. The cables going from the bottom shelf to the top must be secured to the Battery Shelf Frames. The exterior side and end panels will not install properly if battery cables protrude too far out from the shelf structure. Use the cable ties supplied to secure battery cables to the shelf frames. Battery cables can be routed on any of the four sides. Use any of the holes available on the middle shelf to secure battery cables. See figure 10 for a sample of cable tie placement.

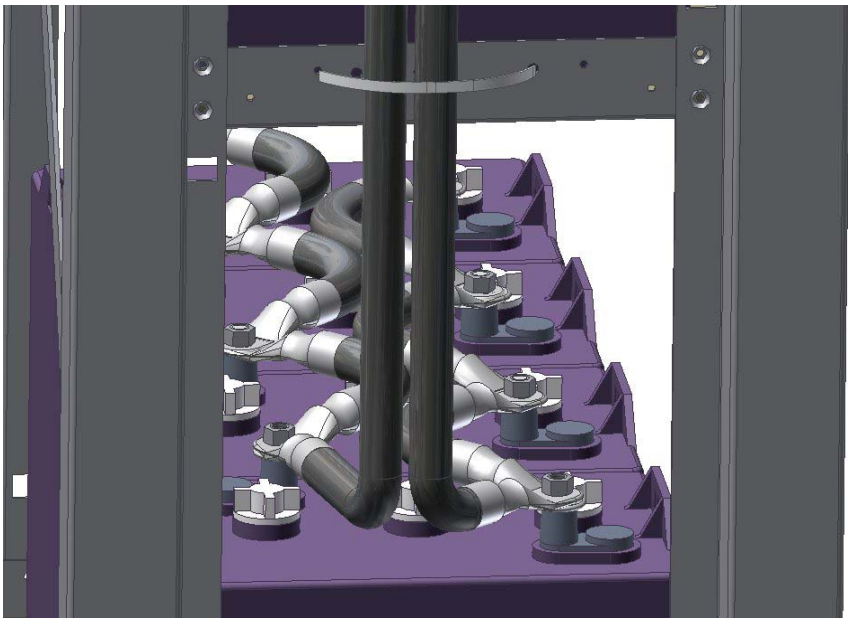

Figure 10

Many installations will have the battery cables exiting through the top conduit bracket and into a DC disconnect box. Cables may exit through any one of the 4 side brackets as well. This is especially useful when interconnecting multiple Battery Boxes. Multiple Battery Boxes can be installed next to each other by using close nipples or by using flex or rigid conduit from box to box. When battery enclosures are installed end to end, simply remove the end panels for cable routing. If wet batteries are used, take care to not block access to watering. Note: Inverter performance and longevity is improved by keeping the power loop as short as possible. Both the plus and minus conductors need to be routed together in order to minimize inductance. Tape these conductors together to insure the lowest possible inductance. Inductive kickback, a function of cable inductance, causes high voltages to be present at the inverter DC terminals during high current events such as overcurrent. Keeping the plus and minus conductors together minimizes this destructive inductive kickback.

OUTER PANEL INSTALLATION

Step 13. Install each of the 5 panels by lining up the male and female plastic inserts and pushing them together until they click into place. Secure each panel with a star washer for grounding and one #12 button head black oxide coated screw.

Figure 11

Note: 1 inch (25 mm) thick Styrofoam insulation can be added to the insides of panels as desired. Use a panel adhesive such as liquid nails to secure to the inside of panels. This should be done when batteries may be installed in unheated places.

Caution: Some Battery Boxes are placed where watering batteries may be difficult. These installations should use sealed batteries that do not require watering.

Warning: Keep spills from touching the metal structure of the Battery Box. Sulfuric Acid is the electrolyte used in wet batteries and is extremely corrosive. It will eat through the metal structure if allowed to contact it. (take a look at the shelf of almost any automobile battery tray for a real eye opener). The addition of the spill containment tray option (PSR-SCT) is highly recommended for vented batteries.

Keep a box of baking soda handy in order to neutralize the effects of sulfuric acid spills. Keep battery posts clean and free from corrosion. Do not allow baking soda to enter into the cells of wet batteries as this will ruin the battery. Use the optional spill containment trays for peace of mind!

SEISMIC MOUNTING FEET AND BATTERY STRAP INSTALLATION

Note: The mounting feet can be installed such that the foot will extend out (shown) or inside. When using the inside method, remember to bolt them to the floor prior to installing batteries. Straps on the lower shelf must be sandwiched between shelf frame and mounting foot.

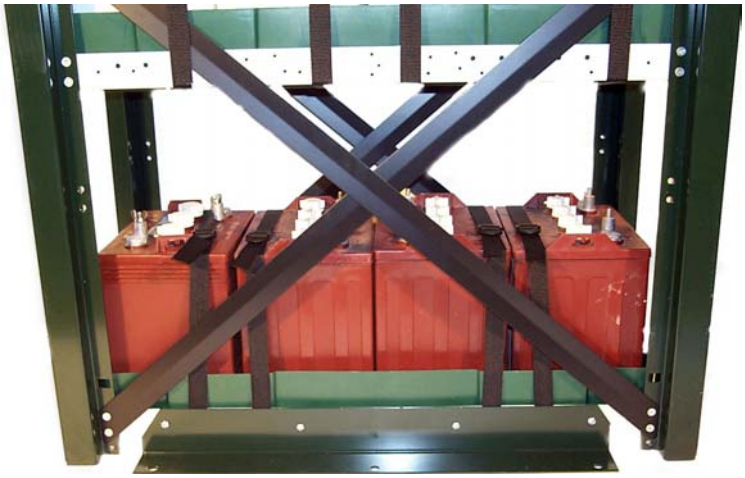

Figure 12

More battery tie down straps are shown below. The optional seismic kit comes with 12 straps and the two mounting feet.

Figure 13

This 3” long 2” threaded nipple, four lock nuts and two threaded bushings are required to connect an OutBack PSR to an OutBack PSDC disconnect box.

Knockouts are arranged so that alignment is assured when the PSDC is installed on an OutBack mounting plate (MP).

Figure 14

Other options for the PRS are:

PSR-HDT: Heavy duty top made from 16 gauge steel, this top has mounting holes and knock outs for an SW inverter with conduit box. The PSR-HDT also has knockouts to accommodate Three Solar Boost MPPT’s

PSR-BCK: Lockable UL listed outdoor rainproof UV resistant transparent breaker cover kit.

PSR-MP: Mounting plate for mounting controllers and inverters inside the PSR.

PSR-SCT: Spill containment tray. Fits on one shelf and holds 4 batteries. Made of injected molded polypropylene plastic for acid resistance. **Can be mounted upside down up against inside of top shelf to act as a collection hood with vent piping to prevent accumulation of hydrogen gas inside the enclosure.**

WARRANTY

The Outback Battery Box is warranted to be free from defects to the original purchaser for a period of one year. Damage from corrosion is not covered under this warranty. It is advised that you keep a copy of the sales receipt as proof of purchase. Damage or defect claims should be made in writing and faxed or mailed to:

OutBack Power Systems, Inc. 19009 62ND Ave NE, Arlington WA 98223 USA

Phone: 360-435-6030 **Fax**: 360-435-6019

E-mail: info@outbackpower.com **Web:** www.outbackpower.com

Include with your letter:

1. Your name, return shipping address and daytime telephone number. We cannot ship large parts to PO boxes.
2. Include a detailed description of the problem
3. Include a copy of your proof of purchase.