



MNSOB Shut Off Box Instructions



MNSOB4X-4P



MNSOB3R-4P

ETL Approved to:

UL 1741, Issue:2010/01/28 Ed:2 INVERTERS, CONVERTERS, CONTROLLERS AND INTERCONNECTION SYSTEM EQUIPMENT FOR USE WITH DISTRIBUTED ENERGY RESOURCES
CSA C22.2#107.1, Issue:2001/09/01 Ed:3 General Use Power Supplies - (R2011)

The MNSOB Shut off boxes provide a **Rapid System Shutdown** as required by NEC 690.12.

This Manual covers the following models:

- MNSOB4X-2P
- MNSOB4X-4P
- MNSOB4X-4P-75A
- MNSOB3R-2P
- MNSOB3R-4P
- MNSOB3R-2P-75A

Application:

- Rapid System Shutdown



Features:

- Outdoor enclosures available in Type 3R and Type 4X
- Available in 20A and 75A models
- Powder coated aluminum construction stands up to the elements
- Type 4X units are waterproof to two meters depth in any orientation
- Big Red Handle makes for easy to understand operation
- Clear Deadfront provides safety and a look inside
- Additional remote disconnects can be added
- Compatible with the Birdhouse for remote disconnect and other features (sold separately)
- Meets and exceeds NEC 2011 requirements

IMPORTANT SAFETY INSTRUCTIONS

These instructions contain important safety and operating instructions for the MidNite Solar MNSOB Shut Off Boxes.

If you do not fully understand any of the concepts, terminology, or hazards outlined in these instructions, please refer installation to a qualified dealer, electrician or installer. These instructions are not meant to be a complete explanation of a renewable energy system.

GENERAL PRECAUTIONS

If service or repair should become necessary, contact MidNite Solar Inc. Improper servicing may result in a risk of shock, fire or explosion. To reduce these risks, disconnect all wiring before attempting any maintenance or cleaning. Turning off the inverter will not reduce these risks. Solar modules produce power when exposed to light. When it is not possible to disconnect the power coming from the photovoltaics by an external means such as a combiner, cover the modules with an opaque material before servicing any connected equipment.

Do not work alone. Someone should be in the range of your voice or close enough to come to your aid when you work with or near electrical equipment.

Remove rings, bracelets, necklaces, watches etc. when working with photovoltaic modules or other electrical equipment. Power from an illuminated photovoltaic array makes a very effective arc welder with dire consequences if one of the welded pieces is on your person.

INSTRUCTIONS DE SECURITÉ IMPORTANTES

CONSERVER CES INSTRUCTIONS

Ces instructions contiennent des informations importantes pour utiliser le Midnite Solar MNSOB boîtes de déconnexion rapide en toute sécurité.

1. Avant l'utilisez cet appareil lis et comprends toutes les instructions et avertissements.
2. Si vous ne comprenez pas l'une des concepts ou des instructions contenu dans cette manuel consulter un agent spécialisé.
3. Si des réparations sont nécessaires contactez MidNite Solar pour plus des informations. Danger de choc électrique et de risque de brulure. Rien à dépanner à l'intérieure du cette appareil. Ne pas ouvrir le couver. Pour toute réparation ou service d'entretien, consulter un agent spécialisé. Il y'a peut-être plusieurs sources d'alimentation dans cette system. Débrancher toutes les interrupteurs avant toute d'entretien où nettoyage.
4. Ne travaillez pas seul. Quelqu'un devrait toujours être à proximité pour aider en cas d'une situation d'urgence.
5. Retirer bagues, bracelets, colliers, montres, et quelles choses comme ça. Il y'a risque des blessures graves s'il y'a un court-circuit. Cela pourrait ruiner votre journée entière.
6. Le câblage doit être fait en conformité avec le National Electrical Code ANSI / NFPA 70. Utiliser des méthodes de câblage de catégorie 1 pour les connexions de câblage sur des terminaux d'un circuit de classe 2. Utilisez uniquement des fils de AWM de calibre 14-1/0. Sélectionnez le type de câble utilisé sur la base de la protection prévue par les disjoncteurs / fusibles.

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Disclaimer of Liability

MidNite products are not intended for use in connection with Life Support Systems. MidNite Solar makes no warranty or representation in connection with their products for such uses.

Since the use of this manual and the conditions or methods of installation, operation, use of the Shut Off Box(es) are beyond the control of MidNite Solar, this company does not assume responsibility and expressly disclaims liability for loss, damage or expense, whether direct, indirect, consequential or incidental, arising out of or anyway connected with such installation, operation, or use.

Unless specifically agreed to in writing, MidNite Solar Inc.:

- (a) Makes no warranty as to the accuracy, sufficiency or suitability of any technical or other information provided in its manuals or other documentation.
- (b) Assumes no responsibility or liability for loss or damage whether direct, indirect, consequential or incidental, which might arise out of use of such information. The use of any such information will be entirely at the user's risk.

MNSOB Shut Off Box Instructions (continued)

Introduction

The MNSOB series of Rapid Shutdown boxes are designed for indoor / outdoor use. Type 4X have been tested to be watertight to two meters underwater, so they are sure to be watertight above sea level.

Overview of size/ratings:

| | | |
|-------------------|------|---|
| MNSOB4X-2P | ---- | 2 position, internal conductor rating 20A, switch 100A per pole continuous, NEMA 4X |
| MNSOB3R-2P | ---- | 2 position, internal conductor rating 20A, switch 100A per pole continuous, NEMA 3R |
| MNSOB4X-4P | ---- | 4 position, internal conductor rating 20A, switch 100A per pole continuous, NEMA 4X |
| MNSOB3R-4P | ---- | 4 position, internal conductor rating 20A, switch 100A per pole continuous, NEMA 3R |

Installation

NOTE: The deadfront is marked as a photovoltaic combiner. The Shut Off Boxes do not act as a combiner, so do not get confused by this.

NOTE: The plastic dead front fits very tight. You must first remove the lid in order to remove the deadfront.

To remove the deadfront:

On Type 3R units, pry off the lid as shown using something like a screwdriver as a lever. The dead front then lifts out easily.

On Type 4X units, the deadfront is secured to a mounting bracket just above the terminal blocks. To remove it, gently lift it out from the top.

To reinstall the deadfront:

Press it gently into place. There will be a gentle snap when it seats.

Mounting:

The installation of a Shut Off Box is fairly straight forward. Select the location to install your Shut Off Box first. The SOB's are used to disconnect the PV array within 10 feet of the array as required by 2014 NEC 690.12. The 2017 NEC code (690.12) requires the PV array conductors within 1 foot of the array must have a rapid shutdown system.

Select a location where the Shut Off Box will be easily accessible in an emergency. Type 3R units are rain resistant and can be mounted outdoors. All unused holes should be blocked using RTV sealant or something similar in order to keep rain and insects out of the enclosure. Care must be taken to insure no water will get on internal parts when mounted less than vertical. Type 4X units are submersible to two meters in any orientation, so it will certainly be watertight above sea level. The Shut Off Box is required to disconnect inverters when their input capacitors won't drain within 10 seconds as required by NEC 690.12. Be sure to comply with all local and national code requirements including National Electrical Code, ANSI/NFPA 70. Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use only #14 - 1/0 gauge AWM wire. Select the wire gauge used based on the protection provided by the circuit breakers/fuses. Shut Off Boxes should be mounted with #10 or larger stainless steel hardware.

There are various wiring diagrams and system examples available at www.midnitesolar.com. Click on Documents at the top of the page for links to wiring diagrams in PDF as well as links to AutoCad wiring diagrams and even solid models aimed at aiding the system installer and designer. We request that they not be used for any other purpose.



Remove top cover prior to removing the deadfront on Type 3R units.

MNSOB Shut Off Box Instructions (continued)

CAUTION: Do not disconnect any cables under load. Remove power prior to connecting or disconnecting any cable connections. If necessary, cover the solar panels with opaque material to remove power. Extremely bad things **WILL** happen if connections are opened under load.

Enclosure Notes:

In order to ensure water-tightness on Type 4X units and rain-tightness on the Type 3R units, it is important to install connectors or hole plugs into every opening. Silicone sealant can be used to plug all openings on Type 3R units except for the two 1/8" drain holes on the bottom.

On Type 4X units, two 1/8" drain holes can be placed at the lowest point on the enclosure. The enclosure will not be as water-tight, but this will give any condensation that may build up a way out of the enclosure.

NOTE: Seal all conduit openings inside the SOB with sealant (Duct Seal, etc.) to prevent moisture intrusion. Conduits act like ductwork, carrying warm, moisture-laden air into the enclosures, causing condensation which can damage internal components. This is especially true in colder weather where the conduit is heated by the sun and the 4X box is cold. Moisture condenses on all interior surfaces; it has nowhere to go.



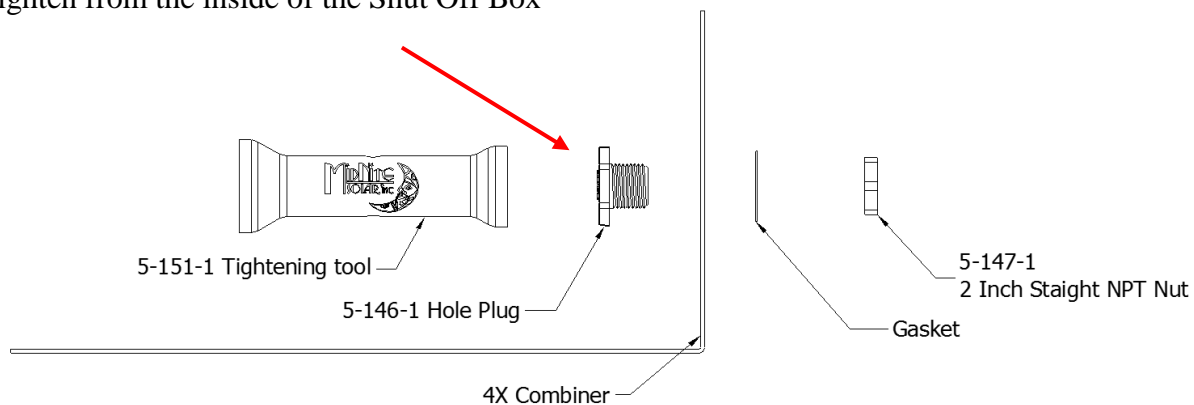
Typical Combiner/Shut Off Box
4X bottom Shown with plugs



On Type 4X units a special sealing screw is used for water-tightness. Use of other screw types will compromise the seal and should not be used.

Tighten hole plugs firmly on 4X units with MidNite Solar tool part number 5-151-1 or similar tool. Tighten from the inside of the Shut Off Box to avoid twisting the gasket.

Tighten from the inside of the Shut Off Box



Hole plug parts placement on Type 4X Chassis

Optional Accessories



MNBirdhouse

- Located at ground level, the Birdhouse provides a safe means to disconnect high voltage PV arrays from MidNite Disconnecting and combiners or Shut Off Box.
- Hard-wired connection gives positive feedback that the Disconnect on the roof has actually been thrown. Connection is via 600V or 1000V Cat 5 USE-2 cable.
- Up to four separate means of power including battery backup insures that the disconnect will be tripped when the button is pushed.
- Voice and LED confirm level of safety (day or night) to the person pushing the button.
- NEMA 3R UV resistant enclosure.
- Able to disconnect multiple PV Disco Combiners.
- Firefighter approved.
- 600V Cat 5 USE-2 90°C cable available from MidNite Solar.



When using the Birdhouse with any of the DISCO combiners, you must also add the MNDISCPSB Power Supply Board.

Installing the MNDISCOPSB

You will need:

3/16" Slotted screwdriver
#1 Phillips screwdriver

Wire strippers
¼" Nutdriver

Wire crimper to attach lugs

Included in the MNDISCOPSB Kit:



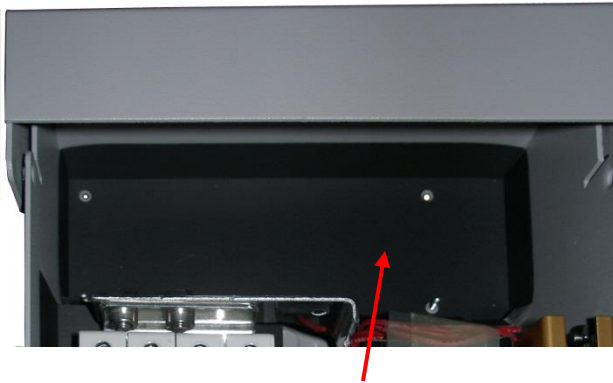
| Qty | Description | MidNite Solar PN |
|------|--------------------------|------------------|
| 1 | MNDISCOPSB | 8-037-10 |
| 1 | Formex Insulator | 5-144-1 |
| 2 Ft | Wire #18 AWG Red | 9-367-1 |
| 2 | Ring Terminal #18-22 AWG | 9-427-1 |
| 2 | Screw #6-32 | 6-060-1 |
| 2 | Standoff ½ Inch | 6-154-1 |
| 1 | Silicone Grease Packet | 9-757-1 |
| 2 | #6 Internal Tooth Washer | 6-155-1 |
| 2 | Circuit Board Support | 6-148-1 |

MNSOB Shut Off Box Instructions (continued)

Step 1: Remove the top cover and deadfront (Page 3).



Step 2: Remove plastic supports (2) by removing screws from the back side of the Shut Off Box. Set aside to reinstall later.



Step 3: Place the Formex insulator as shown.



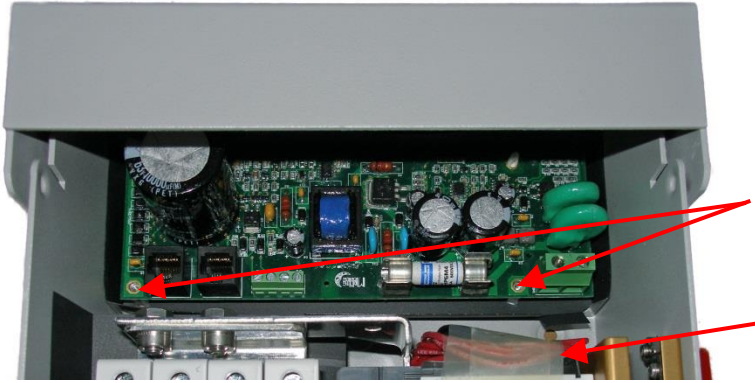
Step 4: Install metal standoffs (2) and reinstall plastic PCB supports removed in **Step 1**.



NOTE: Circuit board is shown without non-removable clear cover.

Step 5: Set board in place as shown.

MNSOB Shut Off Box Instructions (continued)

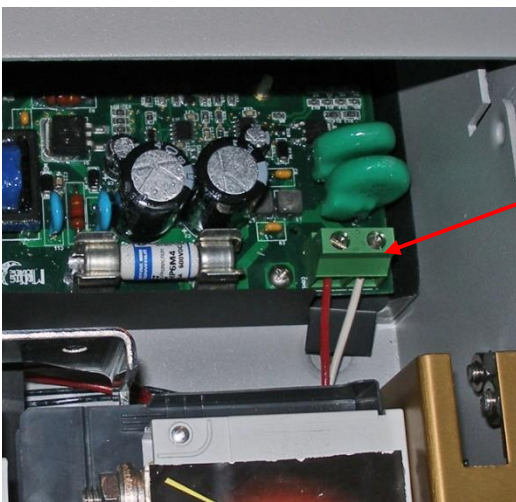


Step 6: Secure board with 6-32 screws (2).

Loosen wire bundle from switch.
Trim wires to 5" and strip ¼" on ends.



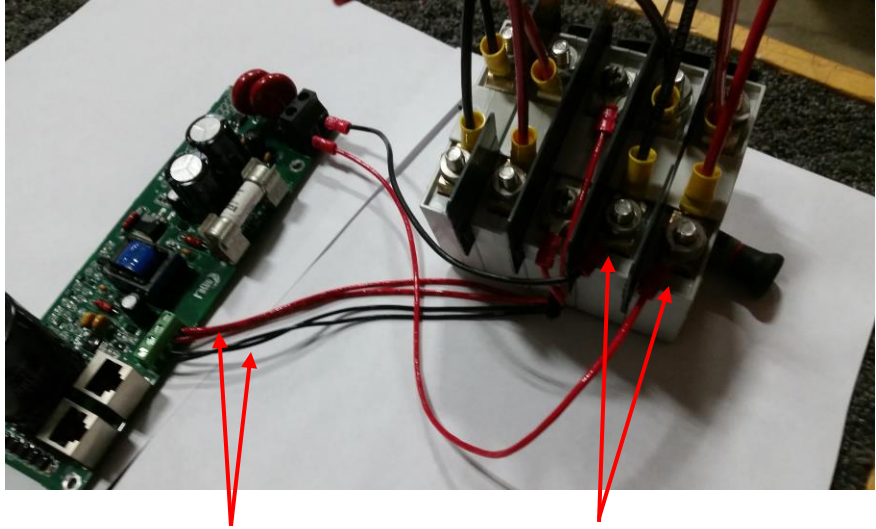
Step 7: Connect the two black wires to The left side of the terminal block marked "BK1" and "BK2." Connect the two red wires to the right side of the terminal block marked "S1" and "S2."



Step 8: Strip one end on the red wires included in the kit ¼" and connect them as shown with the red wire on the left side of the terminal block marked "PV+" and red wire (with black marking tape) on the right side marked "PV-."

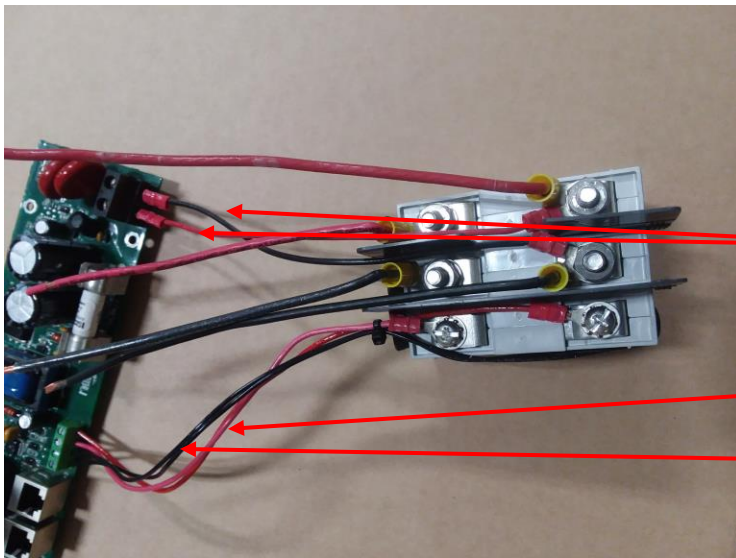
MNSOB Shut Off Box Instructions (continued)

Step 9: Wire the PSB as shown in the picture; shows 4P SOB switch.



Red wires – Sends switch position signal to the Birdhouse.
Black wires – Sends trip signal from the PSB to the switch when the Birdhouse is activated.

Red and black wires tap PV + and – off the switch, sends to PSB; PSB sends this PV energy to the Birdhouse to help maintain charge on 9V batteries.



Step 10: Wire the PSB as shown in the picture; shows 2P SOB switch.

Red and black wires tap PV + and – off the switch

Red wires – Sends switch position signal to the Birdhouse.
Black wires – Sends trip signal from the PSB to the switch when the Birdhouse is activated.

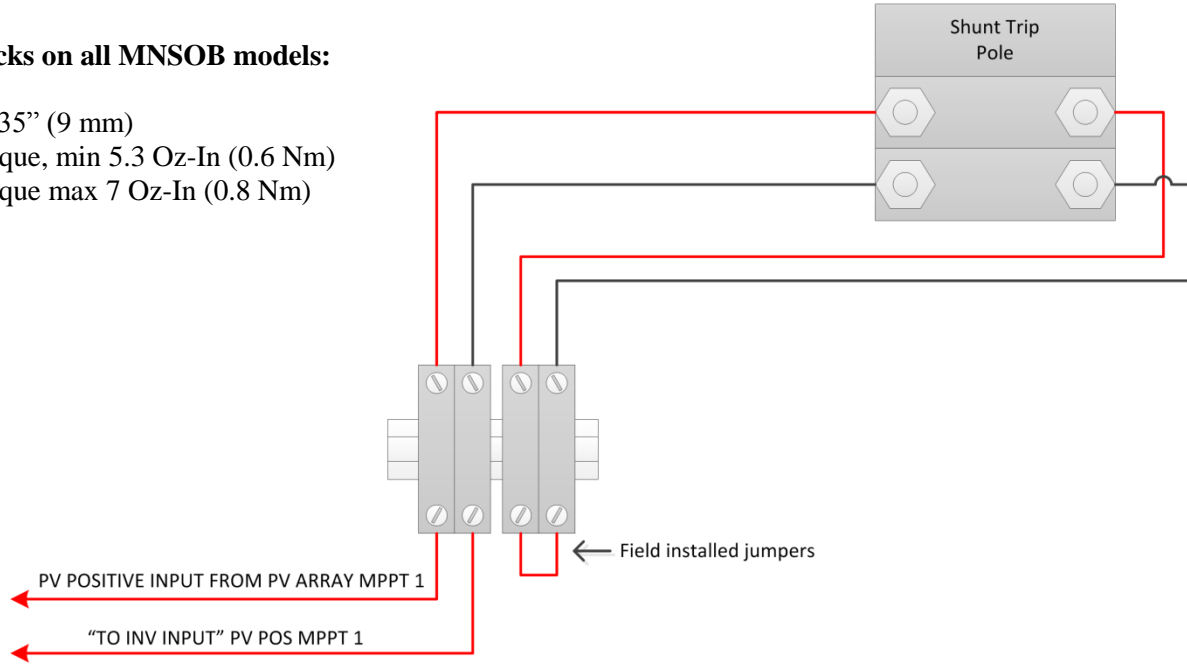
Step 11: Verify your work, then replace deadfront and top cover.

MNSOB Shut Off Box Instructions (continued)

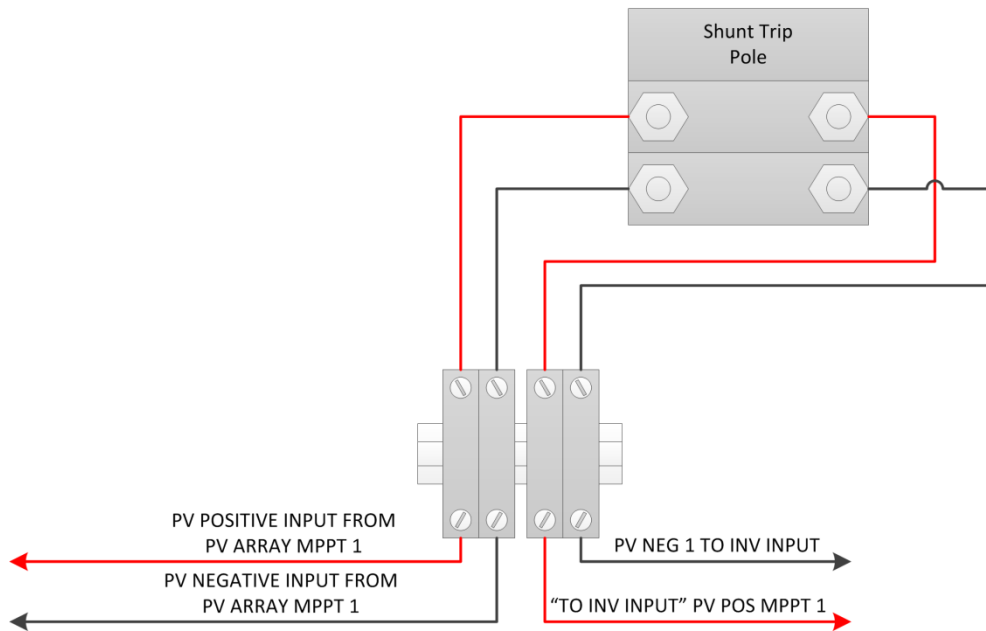
Wiring Diagrams

Terminal blocks on all MNSOB models:

Strip length 0.35" (9 mm)
Tightening torque, min 5.3 Oz-In (0.6 Nm)
Tightening torque max 7 Oz-In (0.8 Nm)

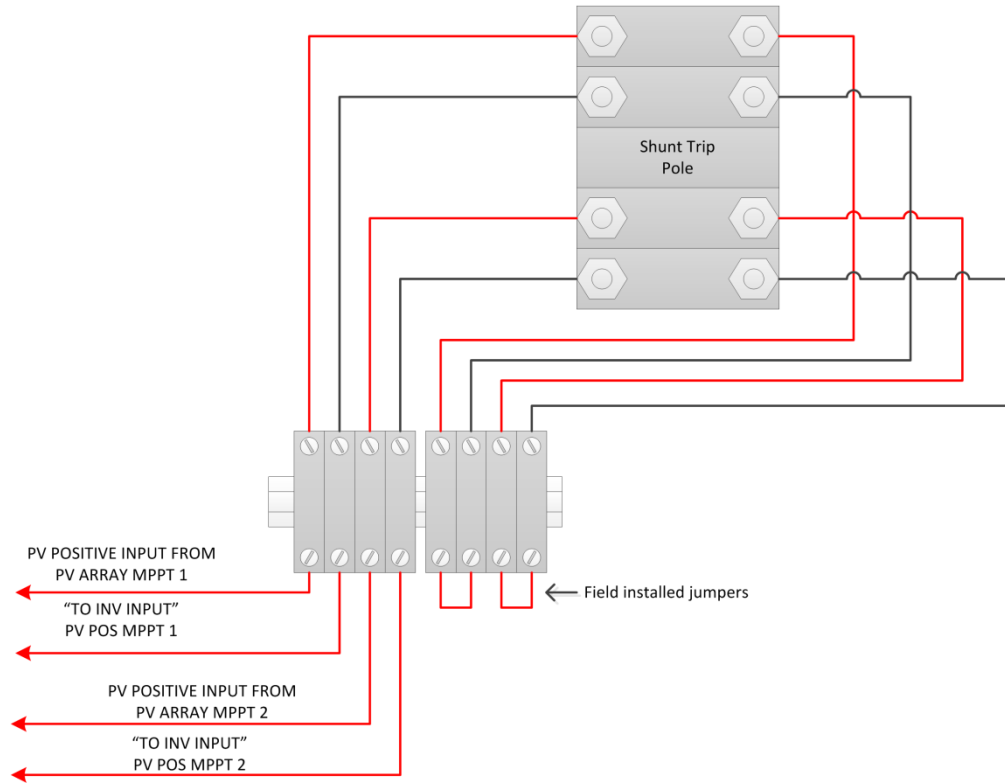


1 Channel SOB provides one 600V positive MPPT Channel

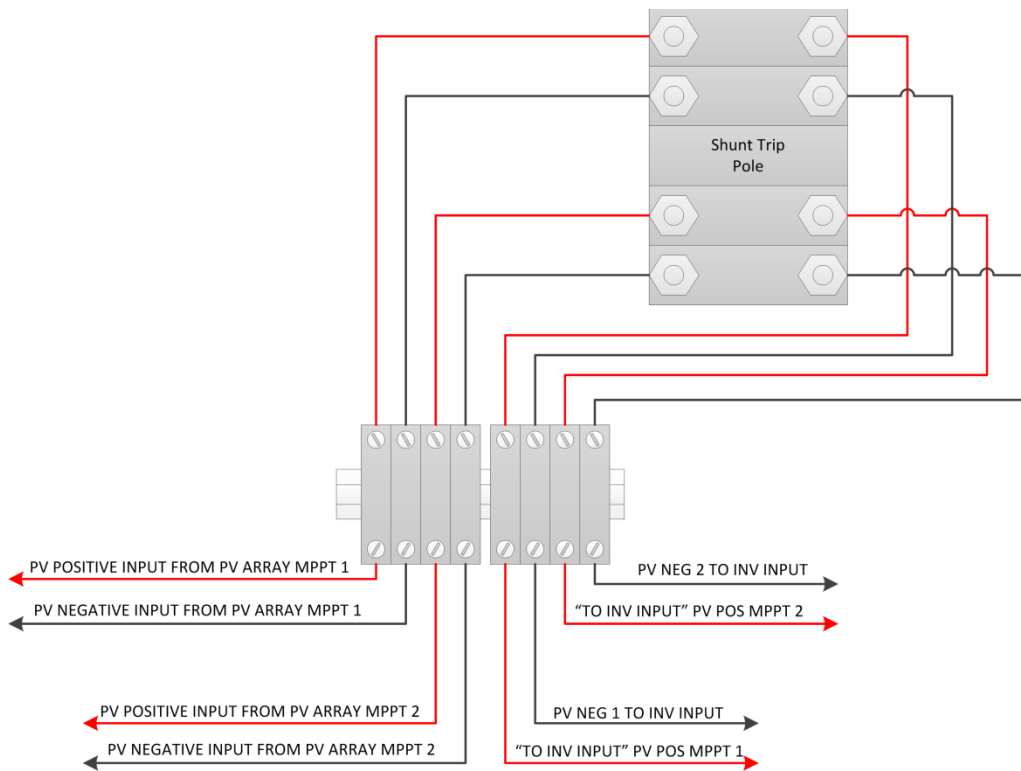


2 Channel SOB provides one 600V Transformerless MPPT Channel

MNSOB Shut Off Box Instructions (continued)



2 Channel SOB provides two 600V positive MPPT Channels

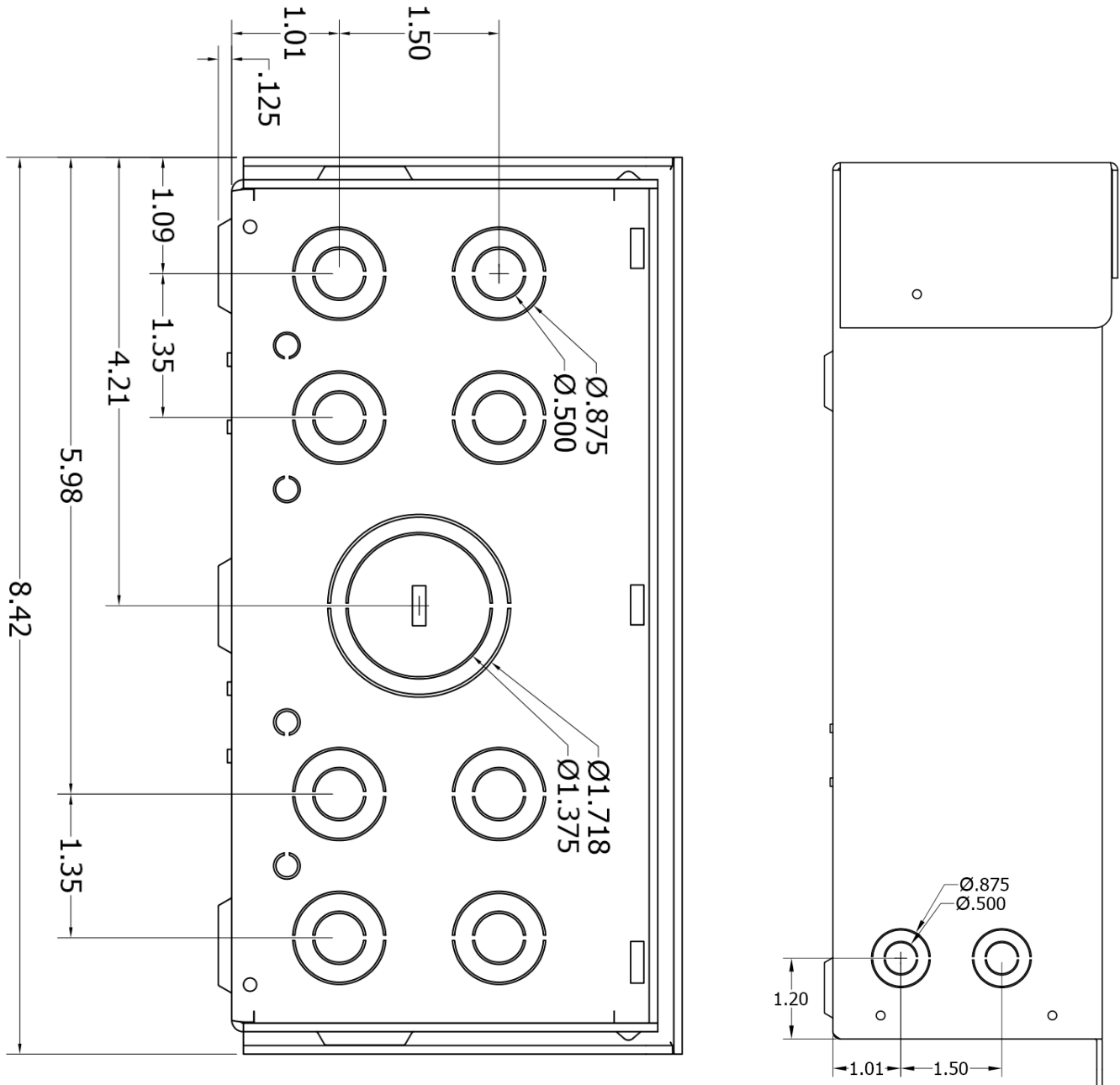


4 Channel SOB provides two 600V Transformerless MPPT Channels

MNSOB Shut Off Box Instructions (continued)

Appendix A

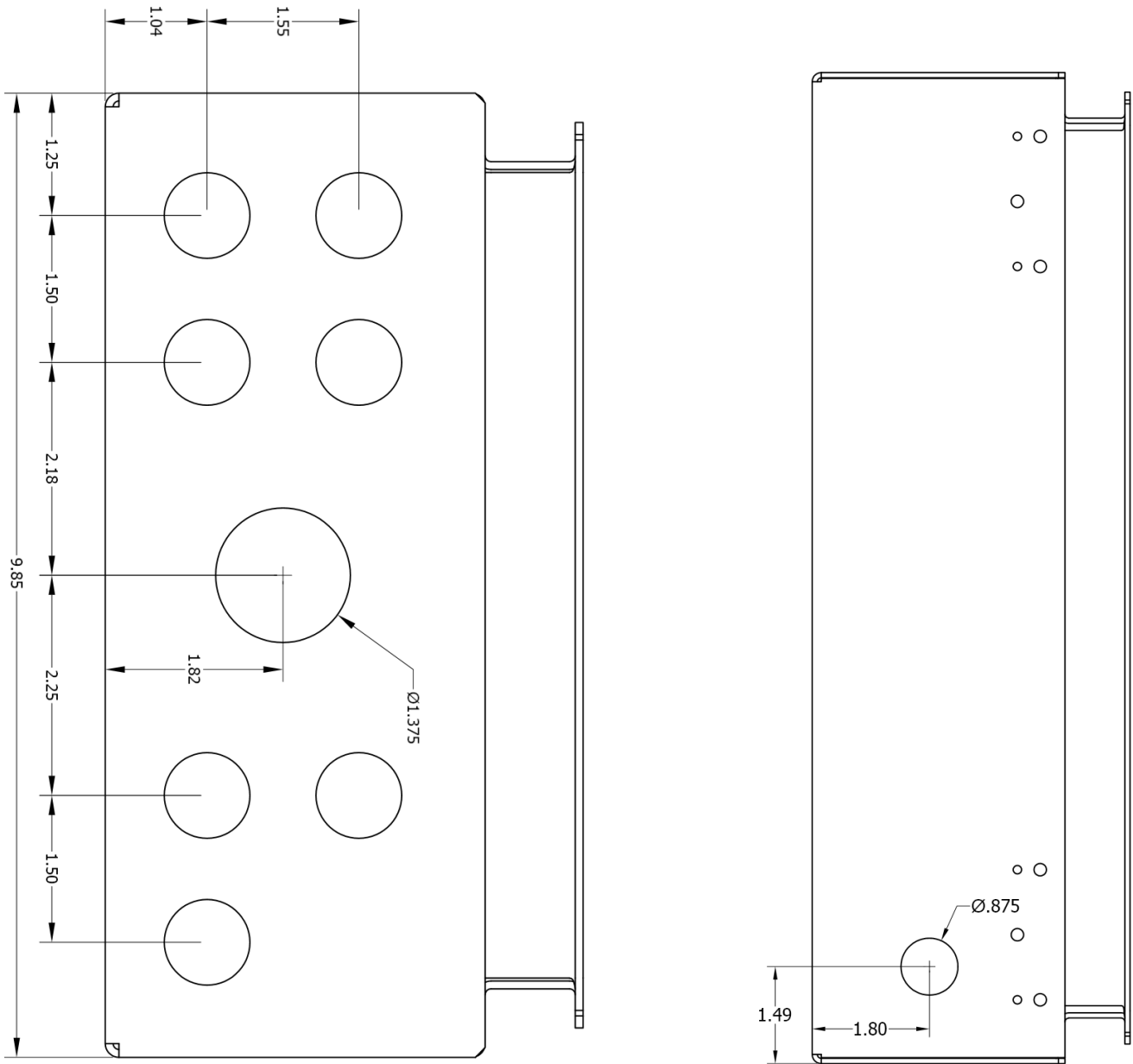
MNSOB3R



MNSOB3R Bottom and side knockout location and size. Not to scale.

MNSOB Shut Off Box Instructions (continued)

MNSOB4X



MNSOB4X Bottom and side knockout location and size. Not to scale.

MNSOB Shut Off Box Instructions (continued)

MIDNITE SOLAR INC. LIMITED WARRANTY **MidNite Solar Power electronics, sheet metal enclosures and accessories**

MidNite Solar Inc. warrants to the original customer that its products shall be free from defects in materials and workmanship. This warranty will be valid for a period of five (5) years for all products except the MNBRAT Charge Controller along with the MNBIRDHOUSE1 batteries, these will be two (2) years. MidNite Solar will not warranty third party inverter components used in MidNite's pre-wired systems. Those components are warranted by the original manufacturer.

MidNite Solar offers an extended warranty for all the Classic MPPT charge controllers. Six months prior to the end of the warranty period customers can ship their Classic back to MidNite Solar with a check for \$147 dollars plus shipping and we will replace any wearable parts and do a general tune-up. This will extend the warranty by 2 additional years.

At its option, MidNite Solar will repair or replace at no charge any MidNite product that proves to be defective within such warranty period. This warranty shall not apply if the MidNite Solar product has been damaged by unreasonable use, accident, negligence, service or modification by anyone other than MidNite Solar, or by any other causes unrelated to materials and workmanship. The original consumer purchaser must retain original purchase receipt for proof of purchase as a condition precedent to warranty coverage. To receive in-warranty service, the defective product must be received no later than two (2) weeks after the end of the warranty period. The product must be accompanied by proof of purchase and Return Authorization (RA) number issued by MidNite Solar. For an RMA number contact MidNite Solar Inc., 17722 67th Ave NE, Arlington, WA 98223 (360) 403-7207. Purchasers must prepay all delivery costs or shipping charges to return any defective MidNite Solar product under this warranty policy. Except for the warranty that the products are made in accordance with, the specifications therefore supplied or agreed to by customer:

MIDNITE SOLAR MAKES NO WARRANTY EXPRESSED OR IMPLIED, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEEDS THE FOREGOING WARRANTY IS HEREBY DISCLAIMED BY MIDNITE SOLAR AND EXCLUDED FROM ANY AGREEMENT MADE BY ACCEPTANCE OF ANY ORDER PURSUANT TO THIS QUOTATION. MIDNITE SOLAR WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES, LOSS OR EXPENSE ARISING IN CONNECTION WITH THE USE OF OR THE INABILITY TO USE ITS GOODS FOR ANY PURPOSE WHATSOEVER. MIDNITE SOLAR'S MAXIMUM LIABILITY SHALL NOT IN ANY CASE EXCEED THE CONTRACT PRICE FOR THE GOODS CLAIMED TO BE DEFECTIVE OR UNSUITABLE.

Products will be considered accepted by customer unless written notice to the contrary is given to MidNite Solar within ten (10) days of such delivery to customer. MIDNITE SOLAR is not responsible for loss or damage to products owned by customer and located on MIDNITE SOLAR'S premises caused by fire or other casualties beyond MIDNITE SOLAR'S control. This warranty is in lieu of all other warranties expressed or implied.

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MNSOB Shut Off Box Instructions (continued)



All MidNite Solar products are assembled under the watchful eye of MidNite the Cat.