



# MNLSOB

## Bleed Down Box Instructions



### **For use with the MNLSOB Rapid Shutdown System.**

Removes (bleeds down) stored charge from an inverters input.  
Safely reduces stored voltage to safe level in 30 seconds or less.

Waterproof type 4X enclosure



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## Bleed Down Box Instructions

# IMPORTANT SAFETY INSTRUCTIONS

**SAVE THESE INSTRUCTIONS** - THESE INSTRUCTIONS CONTAIN IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR the MNBLEEDER

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. All installations must comply with national and local electrical codes. Professional installation is recommended.

### GENERAL PRECAUTIONS:

WORKING WITH OR IN THE VICINITY OF A LEAD ACID BATTERY, SEALED OR VENTED IS DANGEROUS. VENTED BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL OPERATION. FOR THIS REASON, IT IS VERY IMPORTANT THAT BEFORE SERVICING EQUIPMENT IN THE VICINITY OF LEAD-ACID BATTERIES YOU REVIEW AND FOLLOW THESE INSTRUCTIONS CAREFULLY.

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 expose to rain or snow. NEVER attempt to charge a frozen battery. Do not smoke around batteries.

When it is necessary to remove a battery, make sure that the battery bank disconnect breaker is in the off position and that the PV breakers, grid breakers and any other sources of power to the inverter are in the off position. Then **remove the negative terminal from the battery first**.

To reduce risk of battery explosion follow these instructions and those published by the battery manufacturer as well as the manufacturer of any additional equipment used in the vicinity of the batteries.

Avoid producing sparks in the vicinity of the batteries when using vented batteries. Provide ventilation to clear the area of explosive gases. Sealed AGM and Gel batteries do not under normal conditions create explosive gases. Refer to the battery manufacturer's documentation. Be especially cautious when using metal tools. Dropping a metal tool onto batteries can short circuit them. The resulting spark can lead to personal injury or damage to the equipment. Provide ventilation to outdoors from the battery compartment when installing vented batteries such as golf cart T-105 batteries. The addition of a spill tray is also a good idea.

Clean all battery terminals. Very high currents are drawn from the batteries; even a small amount of electrical resistance can result in overheating, poor performance, premature failure or even fire.

Have plenty of fresh water and soap nearby in case battery acid contacts skin, clothing or eyes. Wear complete eye and clothing protection. Always avoid touching eyes while working near batteries. If battery acid or battery terminal corrosion contacts skin or clothing, wash immediately with soap and water. If acid enters the eyes, immediately flood with cool running water for at least 15 minutes and get medical attention immediately. Baking soda neutralizes battery acid electrolyte. Keep a supply near the batteries

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 batteries, 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.

To reduce the risk of injury, connect only deep cycle lead acid type rechargeable batteries. Other types of batteries may leak or burst, causing personal injury or damage.

Wiring methods used shall be in accordance with the Canadian Electrical Code, Part I.

Wiring must be done in accordance with the National Electrical Code Article 690 ANSI/NFPA 70. Use Class 1 wiring methods for field wiring connections to terminals of a Class 2 circuit. Use only 14-10 gauge AWM wire. Select the wire gauge used based on the protection provided by the circuit breakers/fuses. Overcurrent protection must be installed as part of the system installation. Refer to the wiring diagrams provided in this manual for breaker/fuse/GFDI sizes and model numbers.

**WARNING:** This unit is not provided with a GFDI device. This inverter or charge controller must be used with an external GFDI device as required by the Article 690 of the National Electrical Code for the installation location.

Use of attachments or accessories not approved by MidNite Solar could result in damage or injury.

Before making any connections verify that the circuit breakers are in the off position including the inverter breaker. Double check all wiring before applying power.



# INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

**CONSERVER CES INSTRUCTIONS** - CES INSTRUCTIONS CONTIENNENT DES INFORMATIONS IMPORTANTES POUR UTILISER LE MIDNITE SOLAR PRODUIT NOM ICI MODEL NUMBERS MODEL MN-BLEEDER EN TOUTE SÉCURITÉ.

Avant l'utilisez cet appareil lis et comprends toutes les instructions et avertissements.

Si vous ne comprenez pas l'une des concepts ou des instructions contenu dans cette manuel consulter un agent spécialisé.

Si des réparations sont nécessaires contactez MidNite Solar pour plus des informations. Danger de choc électrique et de risque de brûlure. 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.

Ne travaillez pas seul. Quelqu'un devrait toujours être à proximité pour aider en cas d'une situation d'urgence.

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.

Cette appareil n'avoir pas un détecteur des fautes de terre. C'est nécessaire de emploi la protection contre des fautes de terre a l'extérieure de cette appareil en conformité avec le National Electrical Code.

Les méthodes de câblage utilisés doivent être conformes au Code canadien de l'électricité, Partie I.

Le câblage doit être fait en conformité avec le National Electrical Code Article 690 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.



# Bleed Down Box Instructions

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### Revision History

REV -	First Release	10-03-17
REV A	Added wire gauge	10-24-17

### Tools Needed:

#2 Phillips screwdriver,  
 5/32 (4mm) Allen key for PV wiring connections,  
 Drill motor and hole saw for conduit openings,  
 Wall anchors if mounting to drywall or other soft surface,  
 Pilot drill for wall anchors (if used).

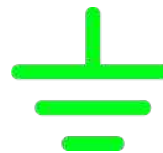
### Symbols used in this manual



**Caution!**  
 Indicates a risk of damage or injury.  
 Extra caution required



**High Voltage!**  
 Risk of lethal electric shock.  
 Extreme caution required.



**Earth Ground!**  
 Indicates a required earth ground connection.



# Bleed Down Box Instructions

## MN-Bleeder Installation

Select a location near the inverter. Drill appropriate sized holes in the bottom or lower sides for the conduit hubs to be used. To maintain type 4X waterproofing use only UL approved waterproof hubs.

The MNBleeder may be installed indoors or out. In each of the four corners near the cover mounting screws there is access to the enclosure mounting holes at the base. The mounting holes are 0.177" (4.5mm) and intended for a #8 (M4) screw. The hole spacing is 5.12" (130 mm) X 9.37" (238 mm).

Cover mounting (6)



Conduit hubs may be placed in any of these locations.

Unit mounting holes (4)  
At base of unit



# Bleed Down Box Instructions

## Wiring the MN-Bleeder.

The MN-Bleeder goes inline between the array(s) and the inverter acting as a pass-through.

There are two rows of box lugs at the bottom of the circuit board. Each connection in the front row is directly tied to the connector behind it in the back row.

Connect PV1 + from the array to the connector marked PV1+ and run a suitable wire from the other PV1+ connector to the Inverter PV+ input.

Connect PV2+ (if used) in a similar fashion.

Route one PV1+ and one PV2+ (If used) wire through the transmitter coil. It does not make a difference if the PV1+ and PV2+ wires routed through the transmitter coil are the wires in from the array(s) or out the wires out to the inverter.

PV1- and PV2- do not go through the transmitter coil.  
See wiring diagram on the next page.

## MN-Bleeder Box Theory of Operation

Rapid shutdown as defined in NEC 690.12 requires voltages on all conductors to be less than 30 Volts in a very short time. Most grid-tie inverters have a fair amount of capacitance on their input. Input voltages can approach 600-1000 VDC. It can take a considerable amount of time for this voltage to come down to a safe level on its own. With the MN-Bleeder Box in place as soon as a rapid shutdown event occurs and the array disconnects, a load is presented to the inverter input. This load brings the voltage on these connectors down to a safe level quickly enough to meet Rapid Shutdown requirements.

PV connections from the string(s) come in and pass through the MN-Bleeder and go to the inverter. A rapid shutdown is initiated when the AC output of the inverter is removed. The MNLSOB disconnects the string(s) then MN-Bleeder presents a load to the inverter input capacitors draining them to a safe level.



**Danger - Risk of Electrocutation.** Make sure all sources of power are disconnected before attempting any wiring or repairs. Hazardous voltages are throughout the system. Death or serious injury can result.



**Caution - Fire hazard.** Improper installation can lead to a risk of fire. Installation and maintenance should be performed by qualified personnel only.



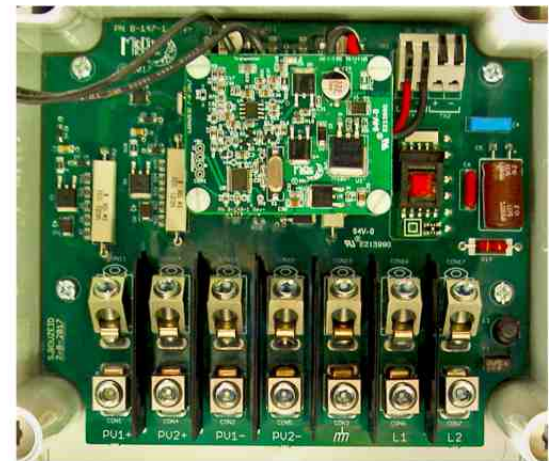
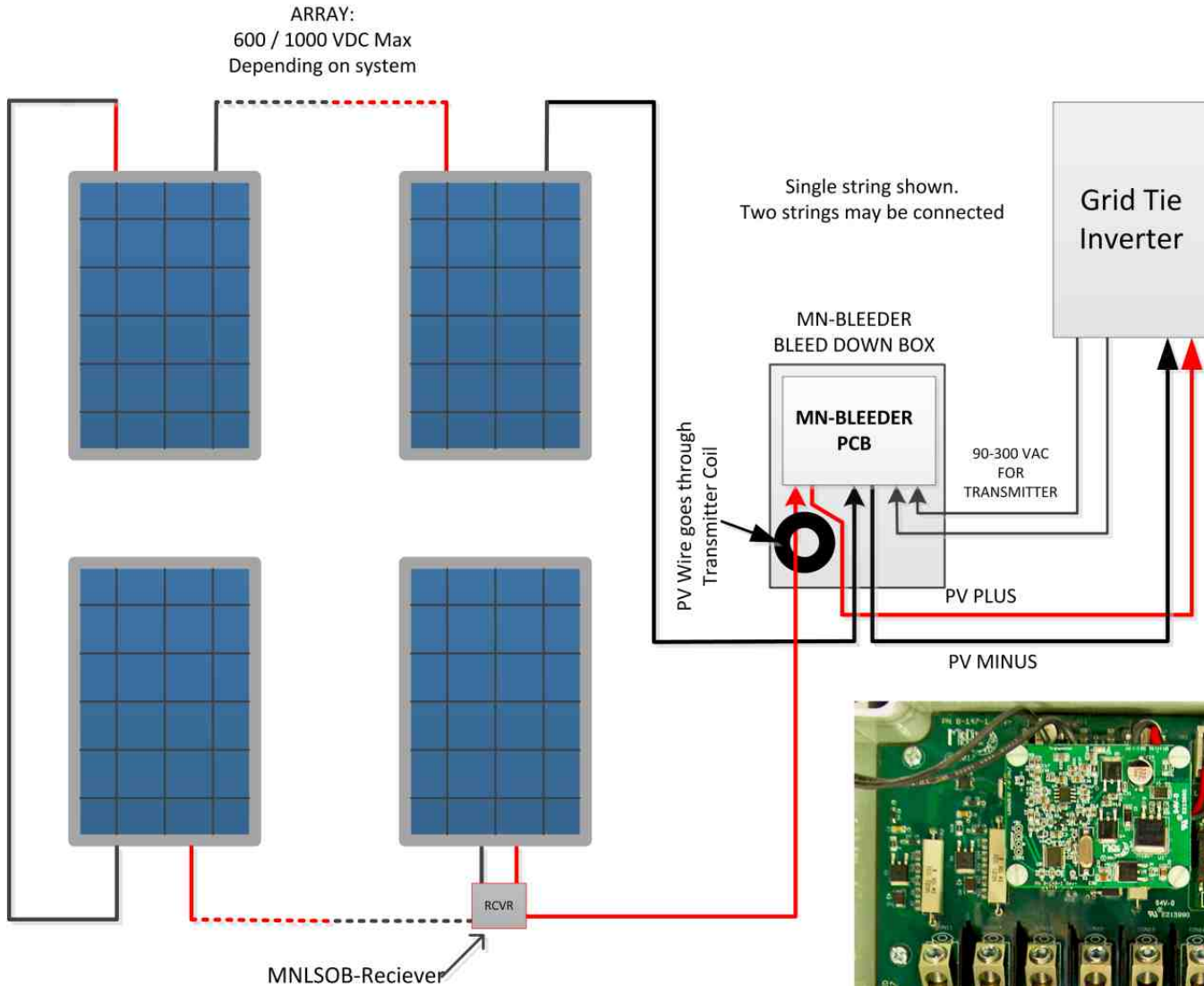


# Bleed Down Box Instructions

## MN-Bleeder Electrical Connections

MIDNITE BLEED DOWN BOX Wiring diagram

REV – 9-27-17



PV1+ PV2+ PV1- PV2- GND L1 L2

Use 2-14 AWG wire.  
Maximum 50 IN-LBS (5.65 NM).

**RATINGS:**

PV 1000 VDC 12 Amps MAX  
300 VAC 3 Watts (TRANSMITTER)  
TEMPERATURE RANGE -40°C to +60°C.

**Note!**

Required grounds are not shown in this diagram.

- PV1+ String 1 Positive In/Out
- PV2+ String 2 Positive In/Out
- PV1- String 1 Negative In/Out
- PV2- String 2 Negative In/Out
- GND Ground
- L1 AC1 In
- L2 AC2 In