



## SURGE PROTECTIVE DEVICE INSTALLATION MANUAL

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UL Standard for Safety, UL 1449

CSA C22.2 No. 8-M1986

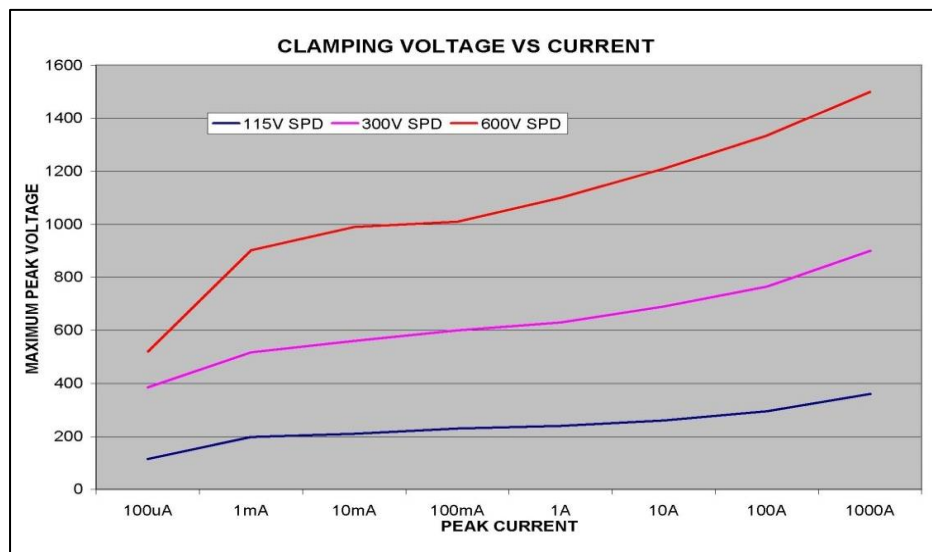
The MidNite Solar Surge Protective Device (MNSPD) is a Type 1 device, designed for indoor and outdoor applications. Engineered for both AC and DC electric systems, it protects both transformer and transformer-less inverters without interfering with the GFP protection circuit, it provides protection to service panels, load centers or where the SPD is directly connected to the electronic device requiring protection. Maximum protection will only be achieved if the SPD is properly installed. Please read the following installation manual carefully and follow the instructions.

The MidNite Solar SPD is offered in three different voltages to maximize the required protection level. Protection is achieved by reducing the clamping voltage to a safe voltage that your system can sustain without damaging any electronics in the system. By using the chart on page 2 select the SPDs that provide the protection your system requires.

The maximum operating voltage of the SPD must be higher than the system voltage. If the SPD operating voltage is equal to or lower than the system voltage the SPD will see this as an overvoltage event and begin shunting current to ground.

This can result in degraded performance, or failure of the SPD, and it is not so good for the system either. Selecting the correct voltage SPD will provide excellent protection and peace of mind for years to come.

Midnite Solar Surge Protection Device.		8-009-1	
Part No.	MNSPD115	MNSPD300AC and DC	MNSPD600
Nominal Voltage	0 to 90 VAC 0 to 115 VDC	0 to 250 VAC (AC model) 0 to 300 VDC (DC model)	0 to 485 VAC 0 to 600 VDC
MCOV VRMS @1mA	180V (162-198)	470V (423-517)	780V (702-858)
ClampV @ 100A Current 8/20µs	295V	775V	1290V
I peak (8/20µs) (Current)	100kA (Full Device) 50kA (Each Section)	100kA (Full Device) 50kA (Each Section)	100kA (Full Device) 50kA (Each Section)
Energy Absorption	1120 J (Full Device) 560 J (Each Section)	3130 J (Full Device) 1560 J (Each Section)	4320 J (Full Device) 2160 J (Each Section)
Suggested Placement	Up to 90 VAC circuits, 12V,24V,48V DC battery circuits	120/240VAC circuits, offgrid PV combiners and charge controller inputs up to 300VDC,	316V/480VAC circuits Grid tie PV combiners Grid tie inverter input
<b>Diagnostics</b>	<b>SPD300AC -LED indicators when voltage is present between L1+Ground and L2+ground SPD115, 300DC and 600- LED Indicators when voltage is present between DC+ and DC-</b>		
Operating Temperature Range	-40°c to +85°c		
Nominal Discharge Current INA	20kA		
Thermal Disconnecter Internal	Internal		
Response time	<15n sec.		





**DANGER:** Electrical shock or burn hazard. Installation of this SPD should only be done by qualified personnel. Failure to lockout electrical power during installation or maintenance can result in fatal electrocution or severe burns.



**CAUTION:** Check to make sure system voltages do not exceed the SPD voltage requirement and the correct SPD voltage/model has been selected.



**CAUTION:** This unit must be installed in accordance with the National Electrical Code (ANSI/NFPA-70) and applicable local codes.



**CAUTION:** Ungrounded power systems are inherently unstable and can allow excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.

**ATTENTION:** les systèmes d'alimentation sans terre sont intrinsèquement instables et peuvent produire des tensions de ligne trop élevé-sol au cours de certaines conditions de défaut. Au cours de ces conditions de défaut, tout équipement électrique, y compris un SPD, peut être soumis à des tensions qui dépassent leurs notations conçu. Cette information est fournie à l'utilisateur afin qu'une décision éclairée puisse être prise avant l'installation de tout équipement électrique sur un système d'alimentation sans fondement.

**NOTICE:** *Do not cut wires until the SPD is mounted and minimum wire lengths have been verified. All connection leads should be cut to minimum possible length; never coil or push aside excess length.*

#### INSTALLATION INSTRUCTIONS

**1. \*Verify system voltage.** Measure L-N, L-G, L-L and N-G of the AC system. DC systems measure from positive and negative input. Confirm that the SPD is correctly rated for the system to which it is to be connected to. Do this by comparing the measured voltages to the SPD voltage ratings shown on the product's rating label. The measured voltage should NOT BE ABOVE the maximum continuous operating voltage (MCOV) of the surge protector device rating, during normal operation. Some circuits like PV arrays may need to be calculated for worst case maximum operating voltages.

**2. Identify proper location for the SPD.** Locate the unit as close as physically possible to the panel being protected and as close to the electrical connection as possible. Avoid excess lead lengths and the need for sharp bends in the wires. **Refer to fig 1.1 and fig 1.2as an example.**

**3. Install green wire to the GROUND bus bar.** In AC circuits it is not uncommon to connect the green wire to AC neutral, install the white sleeving over the green wire when connecting to AC neutral. Make sure the green wire takes the shortest path to earth ground!!

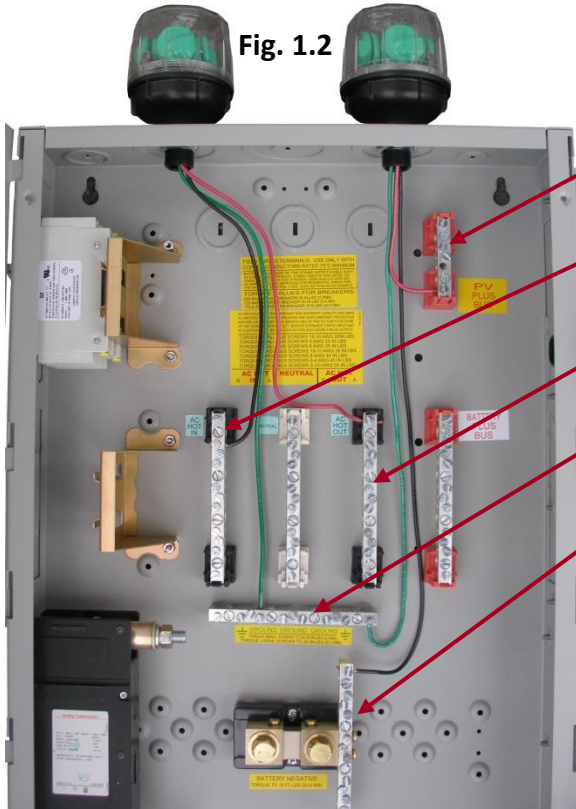
**4. Connect phase conductors.** The phase wires are black and red in color. The orientation is not critical to the operation. (AC) With the POWER OFF, connect one wire to AC HOT IN (line) and other wire to AC HOT OUT (load) as shown in **fig. 1.2** (DC) connect the red wire to PV + and the black wire to PV - or battery minus. PV combiners get installed as shown in **figure 1.1**

**5. Apply voltage to SPD.** Both LED's in the SPD should glow blue as a sign that voltage is present in system, SPD is connected correctly and working and the system is protected. *Note. LED's will only be on when voltage is present. In PV circuits the lights will go out at night because arrays are not producing voltage. This does not indicate that the SPD is broken. If voltage is present and the blue LED's are off, the SPD needs repair. When connecting one half of the SPD to PV- and ground, the PV- led will not light. The circuit is protected, but there is normally no voltage between PV- and ground.*

**Important!** A good grounding system is essential for both safety and lightning protection. The NEC recommends a ground resistance of 25 ohms or less. The lightning protection industry recommends 10 ohms or less. A thorough assessment of the grounding system is strongly recommended.

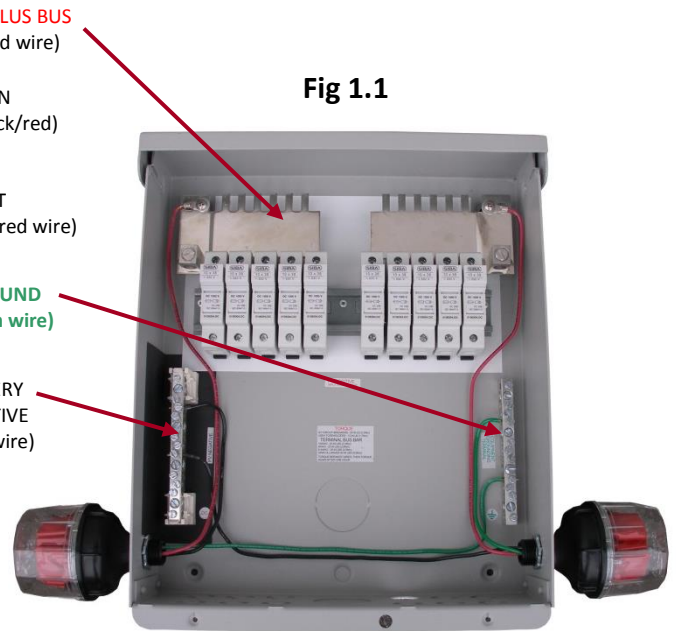
- 1) This product *contains No Serviceable Parts.*
- 2) USE SUPPLY WIRE SUITABLE FOR 90° C.

*The conductors used to connect the SPD to the line or bus shall not be any longer than necessary and shall avoid unnecessary bends*



**Fig. 1.2**

*Use screw, washer, nut & ring terminal on MNPV Combiner.*



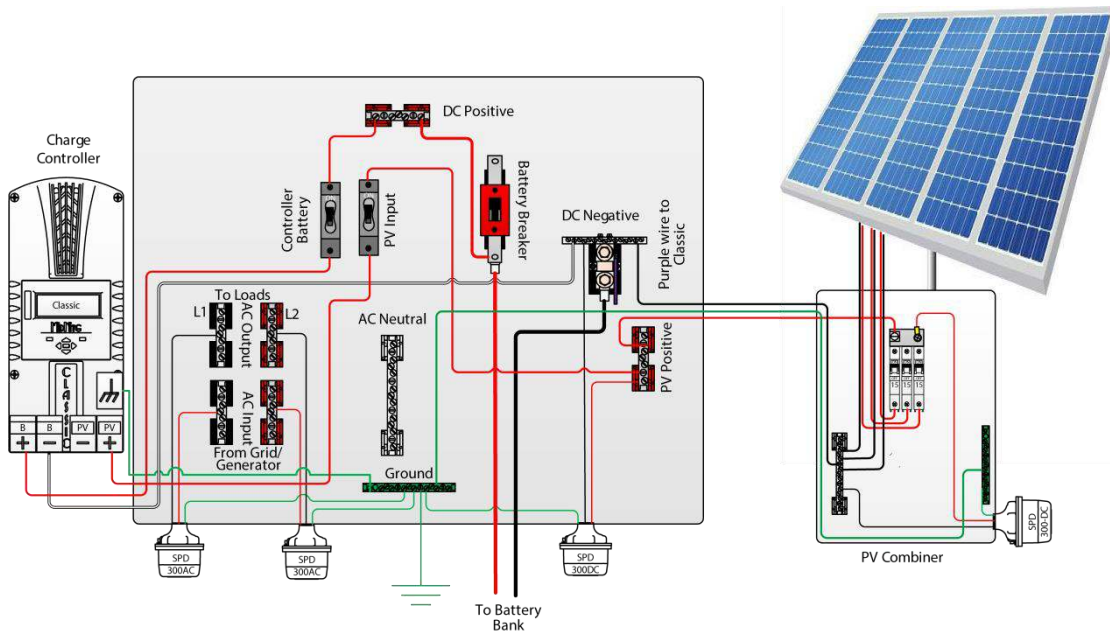
**Fig 1.1**

*Installation shown in an MNPV12. Configured for 2 grid tie inverters.*

*Installation shown in a MidNite Solar 120v E-Panel.*

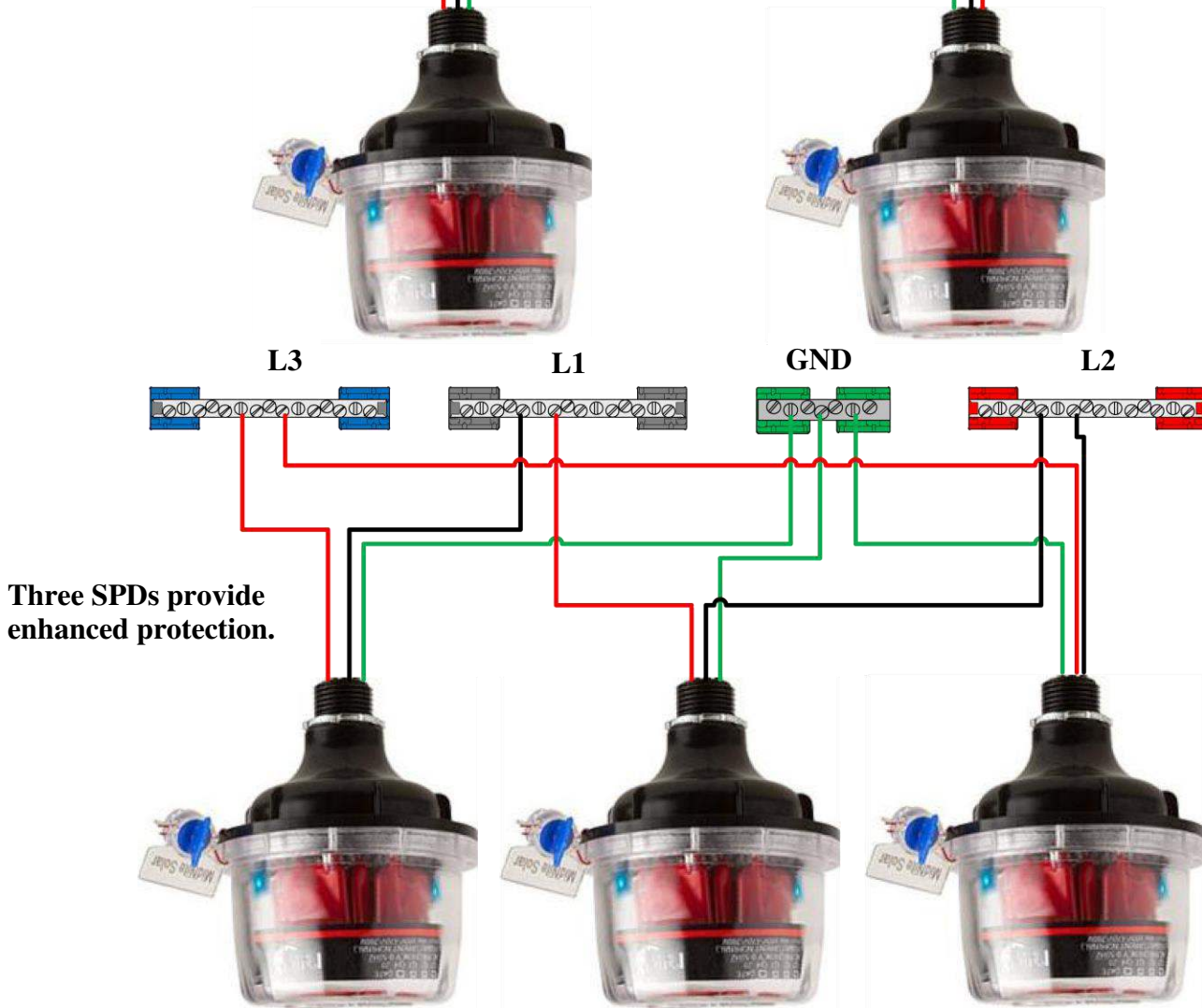
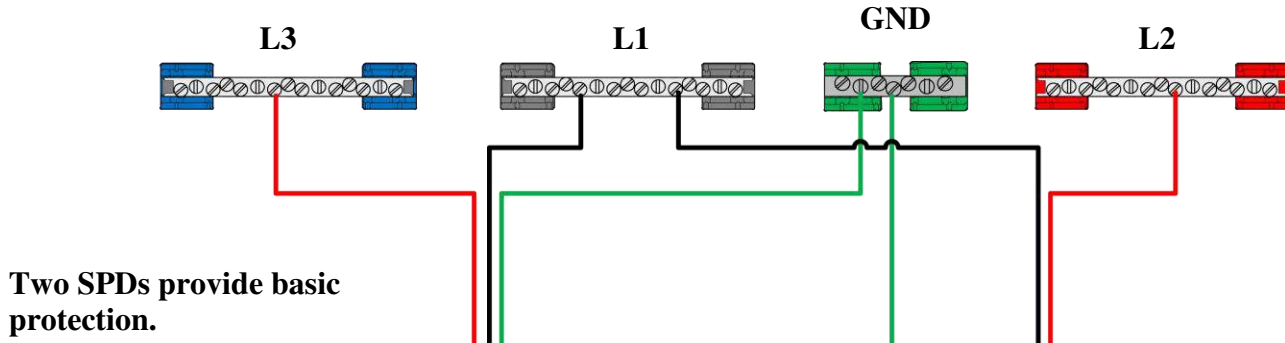
**INSTALLATION SHOWN WITH MIDNITE SOLAR E-PANEL AND COMBINER BOX. SPD CAN BE USED WITH ANY ELECTRIC PANEL THAT IS WITHIN THE SPD RATINGS.**

The following represents a wiring diagram of SPDs in a typical system.



## Three Phase wiring.

Midnite SPDs can be used for 3 phase applications.  
As shown in the diagram, two or three SPDs can be used.



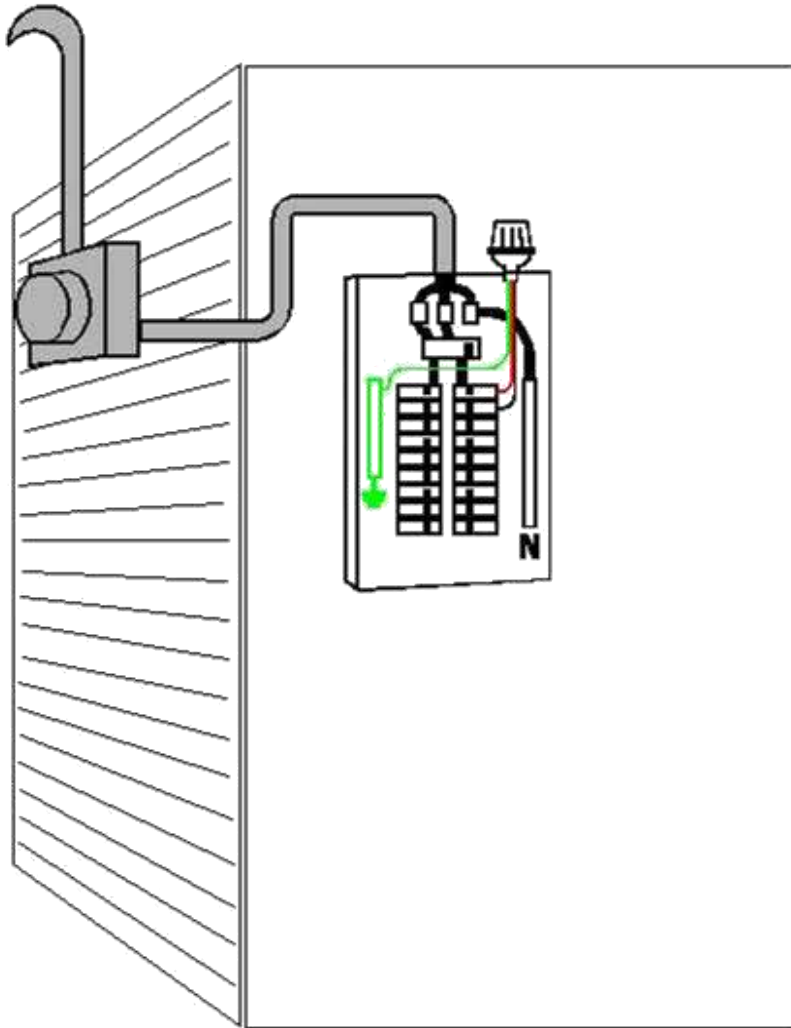


Fig 1.5

In a utility connected home, one of the most vulnerable points of entry is the service entrance panel. All house wiring connects to the service entrance panel and therefore everything plugged in is at risk. The MidNite SPD300AC provides protection against near lightning strikes up to 100,000 amps of surge current. Hooking up to the service entrance can be done in a few different ways.

Figure 1.6 shows the two hot wires connected to a 240V circuit breaker. The circuit breaker in this case has no other house loads and is dedicated strictly to the SPD. This was done just to have a convenient place to connect the hot leads of the SPD to the panel.

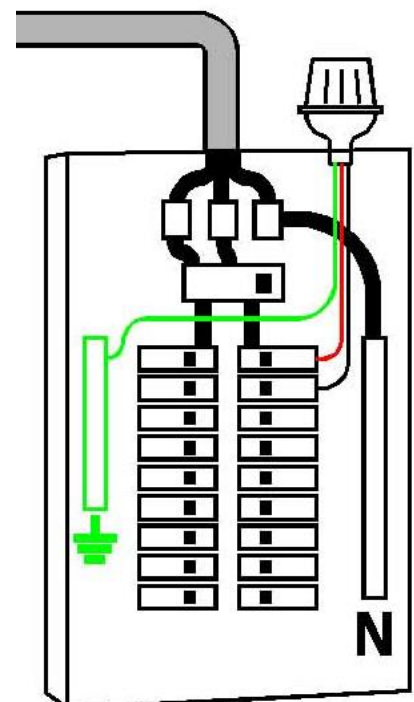


Fig 1.6

Figure 1.7 shows a more economical method to connect the SPD to the service entrance distribution panel. This installation utilizes a 240V breaker that is already in use. This could be a deep well pump, air conditioner etc. Unless the circuit breaker is listed to have two wires connected, you must pigtail the wiring as shown. Breakers that are listed for two wires are very rare, so this method of installing the SPD is probably your best bet.

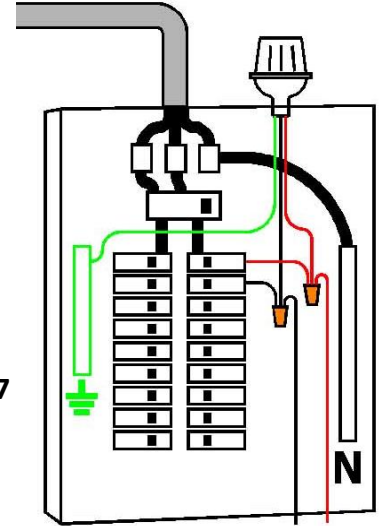


Fig 1.7

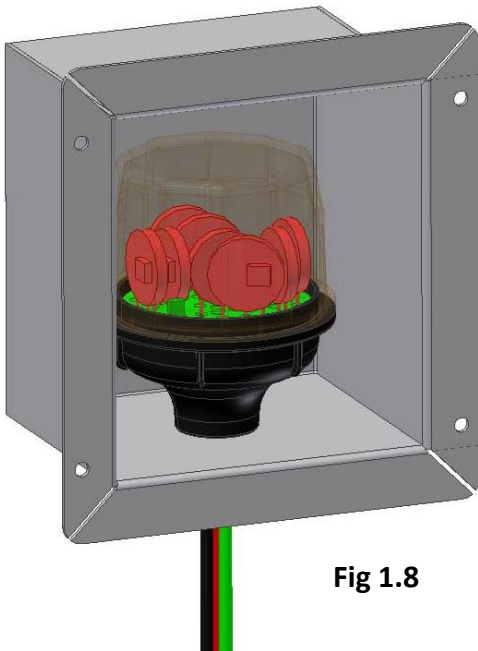


Fig 1.8

Some homes have surface mounted distribution panels. Those are easy to add an SPD to. Simply pop out a 7/8" diameter knockout and mount the SPD on the hole.

Other homes have service entrances that are flush mounted and are not exposed. This type of installation will benefit from the MidNite SPD Flush mount box. Cut a hole in the sheet rock close to the distribution panel and mount the box in the hole. Secure the box after wiring is completed using drywall anchors. Make sure to grommet the hole in the distribution box.

**\*MIDNITE SOLAR INC. LIMITED WARRANTY. MidNite Solar Surge Protection Device (SPD)**

Midnite Solar Inc. warrants to the original customer that the SPD products shall be free from defects in materials and workmanship for a period of five (5) years. At its option, MidNite Solar will repair or replace at no charge any SPD 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 shipping charges to 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 IF SPD MCOV RATING IS CHOSEN BELOW SYSTEM'S NOMINAL VOLTAGE. 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 shall not in any case be liable for any event occurring or defect discovered with regard to said product unless written notice thereof is given to MIDNITE SOLAR within ninety (90) days of such product delivery to customer. MIDNITE SOLAR is not responsible for loss or damage to other products owned by customer and beyond MIDNITE SOLAR's control. This warranty is in lieu of all other warranties expressed or implied.