

MNPV Installation Instructions



The MNPV3 & MNPV6 combiner is rated for outdoor use. Although designed primarily for combining PV strings up to 150VDC, the MNPV may be used for combining high voltage strings using fuses. The use of touch safe din rail mount fuse holders and fuses allow operation up to 600 Volts. This high voltage configuration requires a high voltage kit that consists of a bus bar and insulator to prevent arcing. Although the fuseholders are already UL listed to 600 volts, Underwriters Laboratories requires additional insulation when using these fuseholders with PV modules.

Applications:

PV combiner up to six strings using MNPV breakers rated for 150VDC
 PV combining up to four strings using industry standard touch safe fuse holders rated for 600VDC
 DC load center using MNPV breakers

Features:

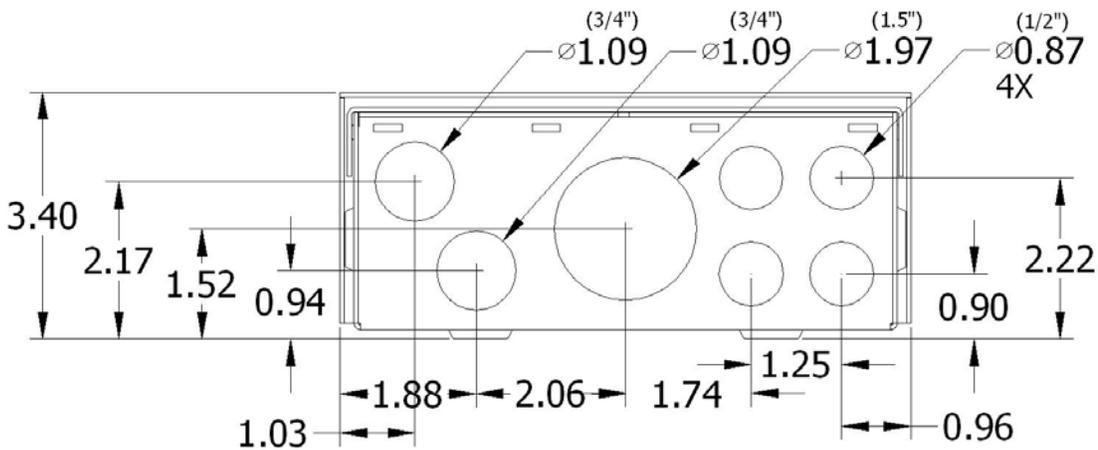
- All aluminum powder coated housing that won't rust
- Flip up cover that can stay in the open position during installation
- PV Negative bus bar with 14 useable openings (10 #14-6 and 4#1/0-14)
- Chassis ground bus bar with 14 useable openings (10 #14-6 and 4#1/0-14)
- Standard din rail to mount up to 6 breakers or 4 fuse holders
- Tin plated copper bus bar to combine breaker outputs (may be split in two)
- Dead front cover snaps into place after wiring is complete for safety
- Knock outs for PV in and PV out on bottom and sides
- Top surface is available to bring conduit in from directly above the enclosure

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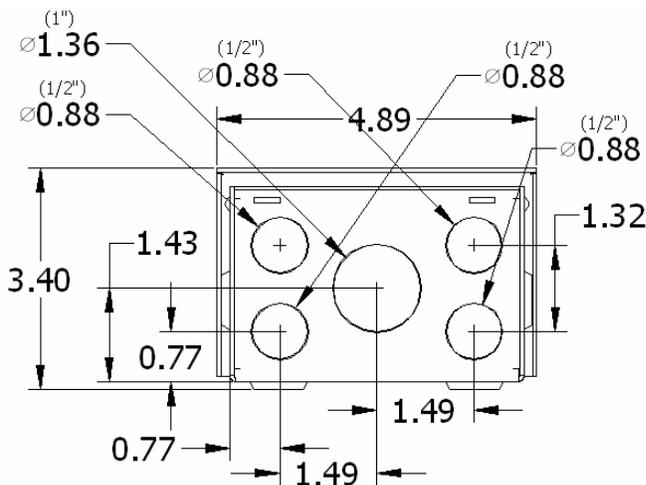
Note: The plastic dead front fits very tight. You must pull the cover off in order to remove the dead front.

The installation of a PV combiner is fairly straight forward. Select the location to install your combiner first. Some systems have the PV modules located close to the inverters and or battery system. If this is the case, you can elect to mount the MNPV inside and run each PV string down to the MNPV inside the house. This is convenient for trouble shooting and upgrading. For longer runs the combiner will be mounted outdoors on the pole for pole mounted PV arrays or similar mounting for rack mounted arrays. The combiner can be mounted in the vertical position or slanted backwards to accommodate up to a 3/12 roof pitch. All unused holes should be blocked using RTV sealant or some similar goop in order to keep rain and bugs out of the enclosure. It is very common for critters to enter through an unused mounting hole and take up roost. They will eventually degrade the performance of your system to say nothing of the yuk factor upon discovery of their nest.

The following dimensioned drawings show the location and size of knockouts available on the MNPV3&6 enclosure. Note that on the MNPV6 the center bottom knock out is sized for a 1 1/2" conduit adapter. The bottom left has two knock outs for 3/4" conduit and the bottom right has four 1/2" knock outs. The left and right side each have a 1/2" knock out for either wire entry or for lightning arrestors. Do not use the side knockouts outdoors. Rain may get on terminal busbars.

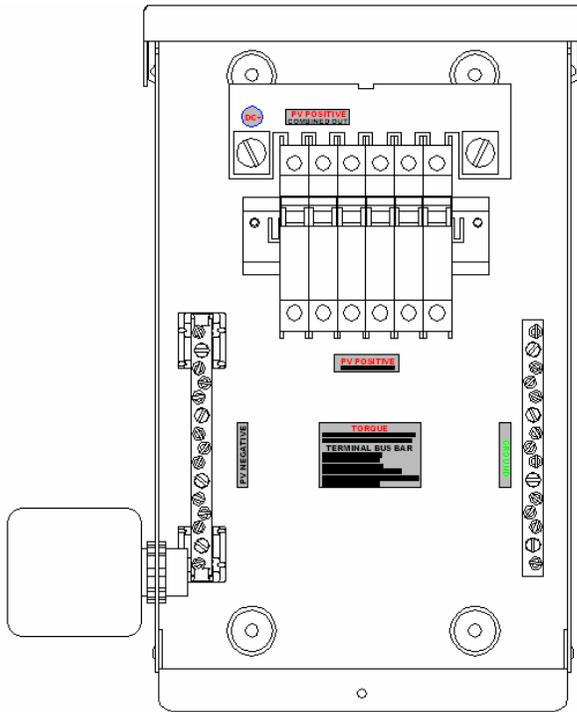


MNPV6 Bottom conduit locations and sizes



MNPV3 Bottom conduit locations and sizes

MNPV Installation Instructions (continued)



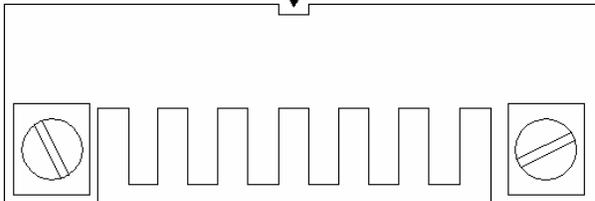
MNPV6 shown with lightning arrester



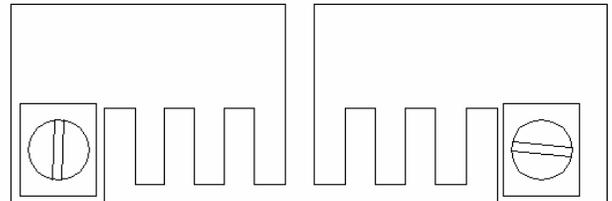
MNPV3

The MNPV6 enclosure can be split into two sections. This is sometimes done in 12 and 24V systems where more controllers are required for additional power. For instance in a 24 volt system using the MX60 charge controller, you are limited to about 1600 watts of PV per controller. If using Kyocera KC130 modules, you can make three strings of 4 modules in series. This adds up to 1560 watts per controller. That is a good match of PV vs. controller capability. The MNPV3 can accommodate this arrangement directly, but the MNPV6 can accommodate two of these systems, thus saving wiring, space and money. See the following figure on splitting the busbar into two systems.

CUT SLICE OUT OF BUSBAR TO ACCOMMODATE TWO CONTROLLERS EACH CONTROLLER CAN HAVE THREE STRINGS OF PV MODULES



THIS PROVIDES TWO SEPARATE PLUS OUTPUTS TO FEED INTO TWO CONTROLLERS. NEGATIVE BUSBAR IS COMMON IN THIS CONDITION. CHECK TO INSURE YOUR CONTROLLER CAN USE COMMON NEGATIVES



When selecting breakers for use with the MidNite combiners, first check with the PV manufacturer to determine the proper “series fuse”. The term fuse is used even though you are probably using breakers. This is a carry over from UL terminology.

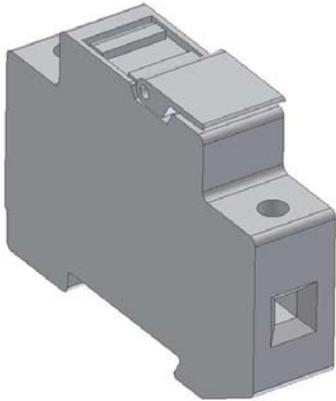
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MidNite Solar offers PV combiner breakers rated up to **150VDC**. They come in these amp ratings. 10, 15, 20, 30 and 63. Other sizes are available on special order.

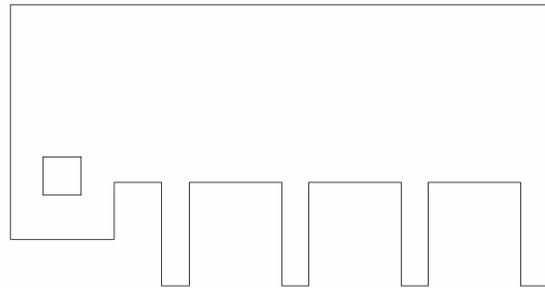
Part numbers for breakers are as follows:

MNEPV10, MNEPV15, MNEPV20, MNEPV30 AND MNEPV63

The MidNite MNPV6 can also utilize touch safe fuse holders and fuses rated for up to 600 volts DC for high voltage strings. The MNPV6 comes with a special busbar that has four legs to accommodate four of these USM1 type fuse holders made by Ferraz Shawmut.



USM1 Fuse touch safe fuse holder



3-079-1 Busbar, Fuse Holder

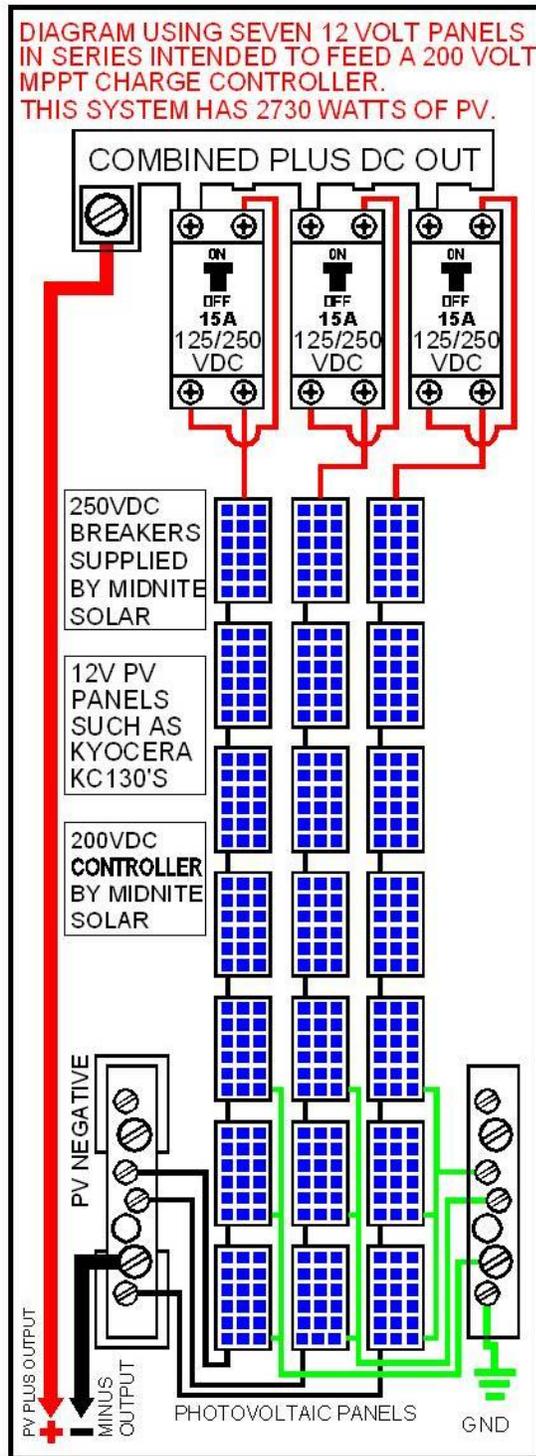
The following wiring diagrams are intended to help you decide which type of combiner installation to do.

There are numerous ways to hook up a PV array. There are no “best” or “correct” ways to accomplish this. They all have merit. For instance if the battery bank is 24 volts and you have six 24 volt PV modules, what would be the best way to wire them? For this installation we will assume an MX60 or similar charge controller that allows the freedom to change PV array voltages.

1. This array could have all 6 panels hooked in parallel using the MNPV6 combiner and 6 MNEPV15 breakers. This array would be ok if situated close to the battery bank. It requires larger wires than higher voltage arrays, but has the advantage of temporarily directly connection to the battery bank in case the controller fails. You can also substitute a PWM controller for the MPPT in the event it becomes necessary.
2. The array could be wired in three strings of two panels in series for a 48 volt nominal array. This is a very common installation and could be made in the MNPV3 with 3 breakers. This hook up is safe from a cold VOC standpoint, but you cannot directly connect it to the battery bank. You cannot easily hook up a PWM controller either. If the PV array is between 30 and 100 feet from the battery bank, this hook up may offer the best power production.
3. The array could also be hooked up in two strings of three modules in series. The MNPV3 and two breakers will accommodate this array. You have room to grow this system without adding another combiner if only three more modules are added later. Combiners can also be combined for additional power, so if six modules or more get added later, you can simply add an additional MNPV3. When putting three 24 V modules in series you must pay attention to VOC during cold spells so that you do not over voltage the controller. MidNite Solar breakers are all rated for 150 volts DC which is higher than any present MPPT controller (2006). This configuration works very well especially when the

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This is a special configuration that is going to be possible with the advent of the MidNite Solar Classic charge controller. The breakers used in this configuration will be available at the same time as the Classic MPPT controller sometime in 2007.



MNPV6 and MNPV3