



COMBINER FOR ENPHASE ENVOY® R

Instruction Manual



Features

- Three string combiner for micro-inverters
- 20 Amps per string - 60 Amps total
- Sturdy plastic case
- Envoy Included
- Low current outlet for ethernet over power line adapter
- Type 3R Rainproof Enclosure

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ENPHASE ENVOY™ R Combiner Instructions

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS - THESE INSTRUCTIONS CONTAIN IMPORTANT SAFETY AND OPERATING INSTRUCTIONS FOR ENVOY-R MODEL NUMBERS MNACENPR-2P20 and MNACENPR-3P20 that shall be followed during installation and maintenance of the power system.

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:

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 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.

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 MNACENPR-2P20 and MNACENPR-3P20 COMBINAIREUR 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 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.

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 entière.

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.



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Symbols used in this manual



Ground Symbol
Indicates an earth ground connection.



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What is a combiner, and why do I need one?

In general terms a combiner is used to combine two or more strings of solar panels, whether an A.C. (from microinverters) combiner or a D.C combiner straight from the panels into a single output.

A combiner provides individual protection for each string. This is very important! If one string fails, its output is limited to the output of that one string. The panels have a max output and the wiring is sized to 125% of that value. This provides a somewhat inherently safe condition for one string (overcurrent devices are always required). However if there is more than one string in the system the other string(s) would gang up on the faulty panel. Without a breaker on each string overheating and fire would very likely result.

A combiner may also be used as a disconnect when used with appropriate circuit breakers (fuses do *really* bad things when used as a disconnect) and the cover can be opened without the use of a tool. In an emergency you don't want to be asking "Now, where did I leave that screwdriver?".

This manual contains information specific to your model of combiner.
For more information contact your dealer or visit www.midnitesolar.com.

Installation

The following pages have overall dimensions for the combiner as well as mounting hole locations. The enclosure can be mounted using the feet provided or directly to the enclosure.

Select a suitable location for the combiner at least four feet from the floor/ground. Easy access and length of cable runs are considerations. The enclosure is of type 3R. This means rainproof but not watertight.

Mounting Feet. The combiner comes with four mounting feet that can each be re-oriented in a total of six positions. The feet can be adjusted as desired for the mounting location. #10 hardware long enough to secure the unit to the mounting surface.

The unit is now ready to be mounted.



Foot Mounting
Back of unit



Mounting foot



Mounting
Screw



Foot mounted
horizontally



Foot mounted
at an angle

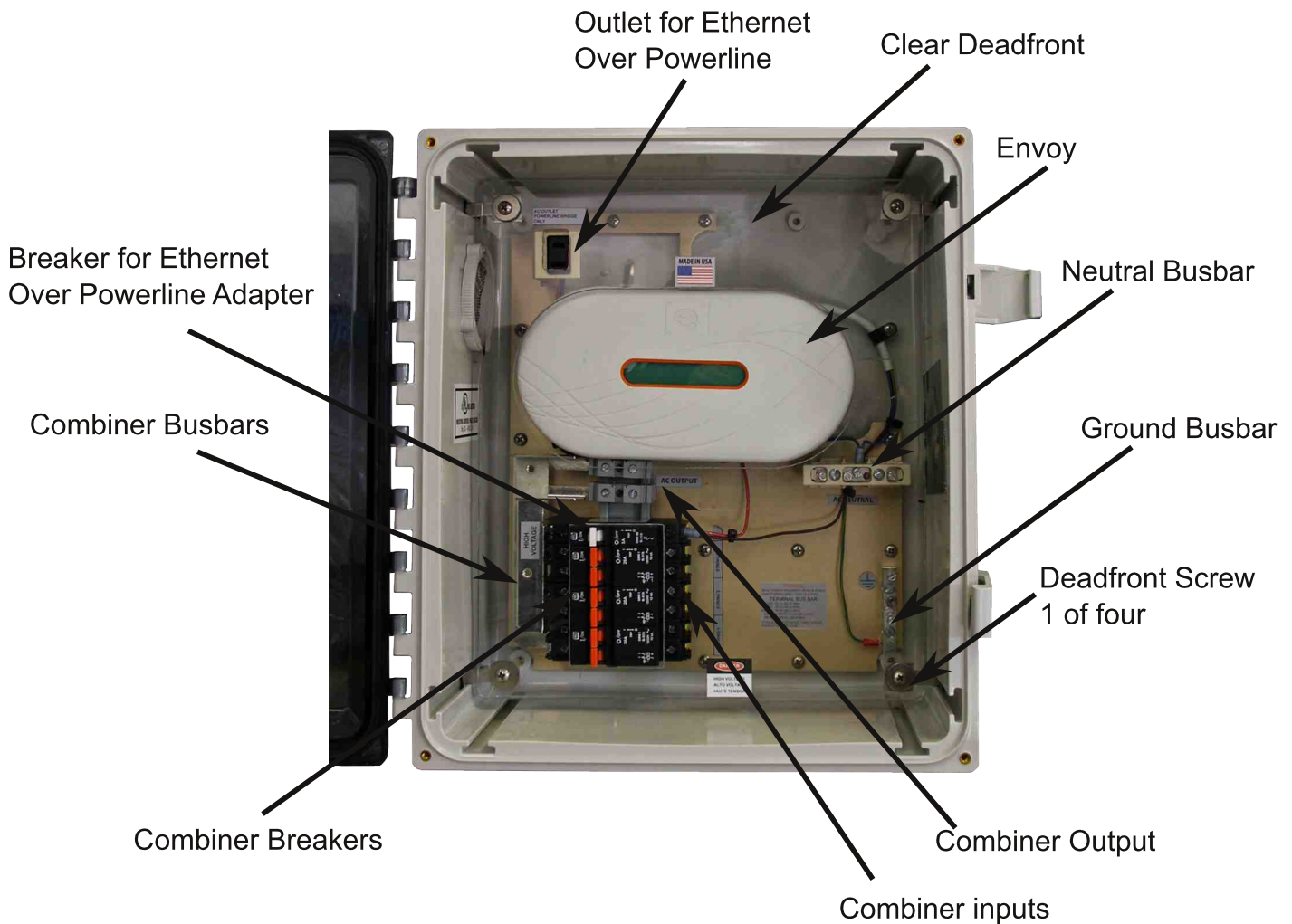


Foot mounted
vertically



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Component Locator



Ethernet over Powerline:

A Low current outlet for the ethernet over power line adapter is provided. This outlet should only be used for this purpose.

Circuit breaker wiring Notes:

Verify that all power is removed from the system before attempting any wiring.

Loosen but do not remove wiring screws on the breaker. Strip 3/8" and insert the wires into the breaker following the system wiring diagram. Torque wire binding screws to 20 in-lbs (2.4 Nm). Retorque after one hour. Do not skip this step. The copper conductors can cold flow and become surprising loose after the first tightening.



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Circuit Breakers

The combiner holds four DinRail circuit breakers. Three 2 pole breakers for combining inputs and one single breaker for the Ethernet over powerline adapter.



To install DinRail breakers, first remove the screws holding the deadfront and remove it.

It is necessary to remove the busbars in order to add or remove circuit breakers.

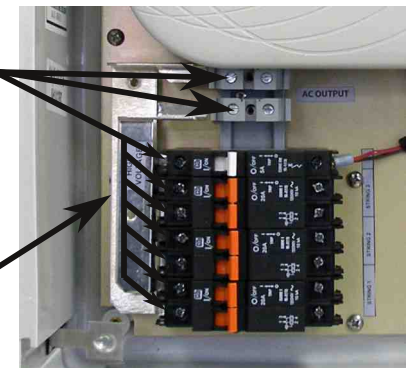
Loosen but do not remove the screws on the breakers that are holding the busbars. Also loosen but do not remove the two screws on the terminal blocks. Remove the busbars and set aside.

Pull back the small tab at the base of the circuit breaker (See above) and loosen but do not remove breaker screws.

Hook the breaker over the dinrail starting with the end of the breaker away from the tab. Secure into place and push the tab in to lock the breaker into place.

Loosen these screws to remove busbars

Remove the Busbars to add/remove breakers

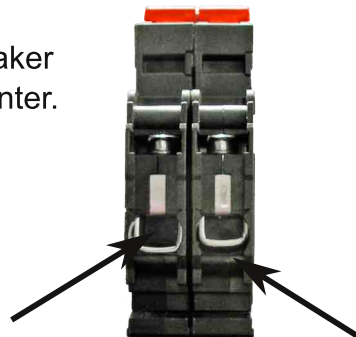


Important!

Be sure to loosen the wire binding screws on the breaker far enough to open it enough to allow the busbar to enter. Be sure that the busbar is going into the wire binding area and not below it.

Be sure that the busbar does enter here

Do not allow busbar to enter under here





ENPHASE ENVOY™ R Combiner Instructions

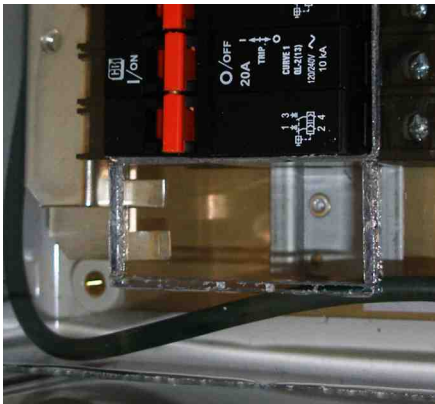
Installing/Reinstalling the busbars.

After the circuit breakers are in place, reinstall both busbars. Start with the large busbar, putting it into the uppermost terminal block and circuit breakers.

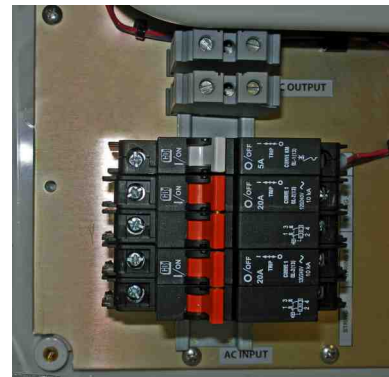
Torque to 20 in-lbs (2.4Nm).

Install the smaller busbar into the second highest terminal block and the remaining circuit breakers.

Torque to 20 in-lbs (2.4Nm).



Remove Breaker knockout by prying it out



Busbars removed and all circuit breakers installed



Large busbar re-installed



Both busbars re-installed

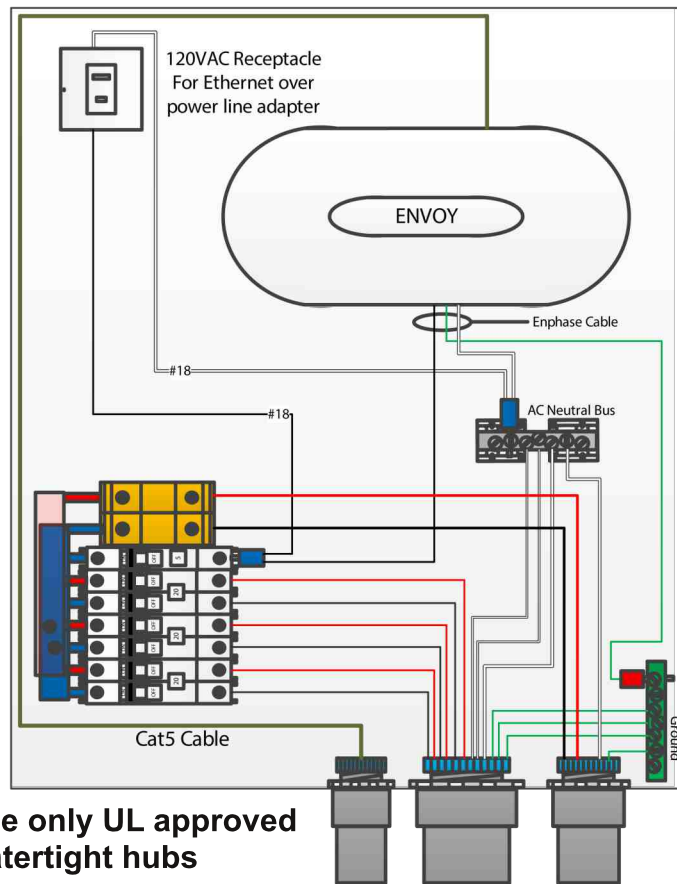
Check to make sure that the busbars are correctly installed into breakers, breakers are all tightened and that no debris is contacting the busbars.

More information, accessories and many helpful drawings are available on the web at www.midnitesolar.com.

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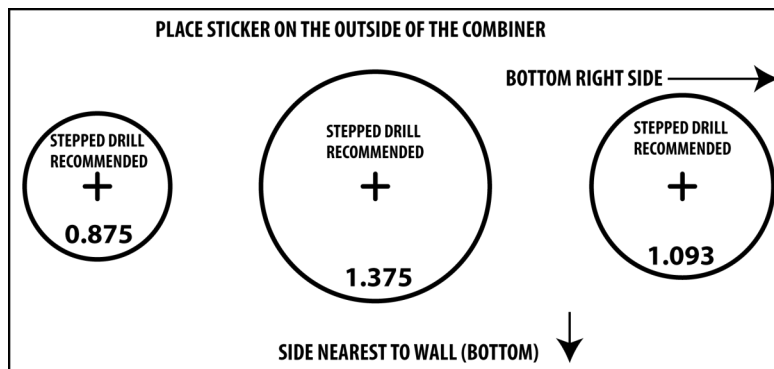


Typical wiring diagram.

Wiring:

Be sure to be aware of and follow all local and national codes.

First, select a convenient location on the enclosure to make a hole or holes to accept conduit fittings. A sticker is provided as a template for typical conduit placement. The center of the holes on the sticker are marked with a +. The use of a snap punch or other type of center punch is suggested to prevent the drill from wandering. A stepped drill bit is recommended for making the conduit holes. A hole saw may crack the plastic housing, however a sharp chassis punch may be used with caution. It may be helpful to drill a pilot hole with a smaller drill before using the step drill bit. The sticker should be removed after drilling.



Sticker showing typical conduit locations Found on the bottom of the combiner



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Inputs from Micro inverters: The combiner comes with 20 Amp circuit breakers. (16 Amp continuous). Use 10 AWG wiring on the inputs. This minimum size requirement is independent of the NEC wire sizing tables.

Bring in the wires from each inverter. Connect the neutrals (white wires) to the neutral bus and the grounds (green or green/yellow wires) to the ground bus.

Note: AC output neutral is not bonded to neutral in this equipment.

Connect the hot leads, L1 and L2 (usually one black and one red) from each inverter to the circuit breakers. Important! L1 and L2 must be wired as shown in the diagram, with L1 and L2 alternating. Damage to inverters or other bad things can happen from mis-wiring.

A Listed 240V 60 A output breaker must be installed as part of the system.

For conduit hubs, use only UL Listed raintight, or wet location hubs for entry into the enclosure

Ethernet Cable -If equipped.

The Cat 5 Ethernet cable should be separate from the AC wiring in a separate conduit.

Use cabling rated for 300V.

Electrical Ratings:

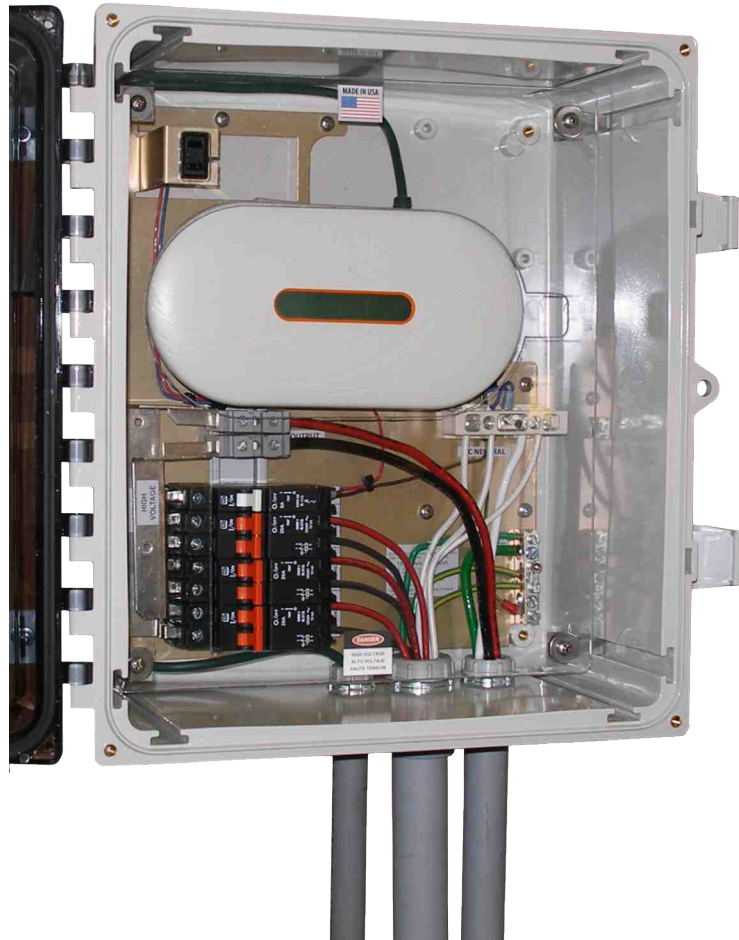
Model	MNACENPR-3P20	MNACENPR-2P20
Maximum system voltage (ac)	240 V	240 V
Rated output current - (ac)	48 A	32 A
Rated input current per DG input - (ac)	16 A	16 A
Maximum Circuit breaker rating (DG input)	20 A	20 A
Maximum fuse / Circuit breaker rating (output)	60 A	40 A
Number of input circuits	3	2

Environmental Ratings:

Maximum ambient temperature	50°C	50°C
Enclosure Type	3R Rainproof	3R Rainproof



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Combiner fully wired

Above: Combiner fully wired, with Envoy, deadfront installed.

Output Connections: Output wiring (Hot, Neutral and Ground) sizing is determined by the input breakers. 6AWG or larger for two string and 4AWG for three string combiners.

The two dinrail terminal blocks above the circuit breakers are the output connections. Install the black wire into the lower terminal block and the red into the upper terminal block. Torque to 21 inch pounds (2.4 Nm). The Neutral (White wire) goes to the neutral busbar. The Ground (Green or Green/Yellow wire) goes to the busbar marked "Ground"

Ground and Neutral busbar tightening torque:

- 10AWG - 20 IN LBS (2.3Nm)
- 8AWG - 25 IN LBS (2.8Nm)
- 6-4AWG - 35 IN LBS (4.0Nm)
- 2AWG & LARGER 50 IN LBS (5.6Nm)