



 **FLEXware™**

**PV 8 Combiner**

**PV 12 Combiner**

**User's Guide**

Includes Mounting and Installation Instructions





## About OutBack Power Systems

OutBack Power Systems is a leader in advanced energy conversion technology. Our products include true sine wave inverter/chargers, a maximum power point charge controller, system communication components, as well as breaker panels, breakers, accessories, and assembled systems.

## Notice of Copyright

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## Disclaimer

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(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 THE USE OF SUCH INFORMATION. THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK.

## Revision

March 2008

## Contact Information

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# TABLE OF CONTENTS

Warranty Introduction .....	3
Safety Instructions .....	4
Requirements.....	5
FWPV-8 Combiner Features .....	7
Sample FW-CBUS-8 (Bus Bar) Installations.....	8
FWPV-8 Combiner.....	9
FWPV-8 Knockouts and Dimensions.....	10
FLEXware PV-8 Combiner Wiring Sample (Circuit Breakers).....	11
Wiring Diagram .....	12
FLEXware PV-8 Combiner Wiring Sample (Fuses) .....	13
Wiring Diagram .....	13
Fuse Holder Installation.....	14
FWPV-12 Combiner Features .....	16
Sample FW-CBUS-12 (Bus Bar) Installations.....	17
FLEXware PV-12 Combiner.....	18
FWPV-12 Knockouts and Dimensions.....	19
FLEXware PV-12 Combiner Wiring Sample (Circuit Breakers).....	20
Wiring Diagram .....	21
FLEXware PV-12 Combiner Wiring Sample (Fuses) .....	22
Wiring Diagram .....	23
Product Registration.....	24

## Warranty Introduction

Dear OutBack Customer,

Thank you for your purchase of OutBack products. We make every effort to assure our power conversion products will give you long and reliable service for your renewable energy system.

As with any manufactured device, repairs might be needed due to damage, inappropriate use, or unintentional defect. Please note the following guidelines regarding warranty service of OutBack products:

- Any and all warranty repairs must conform to the terms of the warranty.
- All OutBack equipment must be installed according to their accompanying instructions and manuals with specified over-current protection in order to maintain their warranties.
- The customer must return the component(s) to OutBack, securely packaged, properly addressed, and shipping paid. We recommend insuring your package when shipping. Packages that are not securely packaged can sustain additional damage not covered by the warranty or can void warranty repairs.
- There is no allowance or reimbursement for an installer's or user's labor or travel time required to disconnect, service, or reinstall the damaged component(s).
- OutBack will ship the repaired or replacement component(s) prepaid to addresses in the continental United States, where applicable. Shipments outside the U.S. will be sent freight collect.
- In the event of a product malfunction, OutBack cannot bear any responsibility for consequential losses, expenses, or damage to other components.

Please read the full warranty at the end of this manual for more information.

# IMPORTANT SAFETY INSTRUCTIONS

## SAVE THESE INSTRUCTIONS

The OutBack FLEXware PV-8 and PV-12 Combiners are listed by ETL as PV Combiners under the following standards:

- UL 67, 11th Edition
- UL 1741, First Edition
- CSA C22.2, No.29-M1989

These enclosures meet Type 3R rainproof requirements when mounted vertically or leaning back to 14 degrees (3/12 pitch).

This enclosure is rated for up to 150VDC circuit breakers and up to 600VDC fuses.

**Grounding Instructions** – Each enclosure should be connected to a grounded, permanent wiring system. For most installations, the negative battery conductor should be bonded to the grounding system at one (and only one) point in the DC system. All installations must comply with all national and local codes and ordinances. System grounding as required by the National Electric Code, ANSI/NFPA 70-1996, or other appropriate codes is the responsibility of the system installer.

The equipment ground on FLEXware PV Combiner is marked with this symbol: 

**NOTE: Solar panels produce electrical current when light is present, even during overcast weather. Do not wire from the array to the PV-8 or the PV-12 Combiner. Complete all connections inside the combiner first and then connect at the array.**

## OutBack Power Systems' FLEXware

FLEXware is a convenient system of all-aluminum, powder-coated modular enclosures with associated mounting hardware and stainless steel fasteners for housing OutBack power components. Our indoor-rated enclosures and mounting plates offer secure and centralized installations for various combinations of FX Series Inverter/Chargers, OutBack Charge Controllers, the OutBack HUB, MATE, and Auto-Transformer, as well as breakers, bus bars, and balance-of-system components.

## General Wiring and Installation Instructions

- Remove any necessary knockouts before securing the combiner to its mounting surface.
- Mount the combiner, securing it appropriately.\*
- Slide the circuit breakers or fuse holders onto the DIN rail and lock in place.
- Secure the box lugs to the Combiner Bus Bar.
- Install the Combiner Bus Bar and secure it to either the fuse holders or the circuit breakers.
- Connect all wires to the fuse holders or circuit breakers and the box lugs, securing them according to the listed torque values.
- Connect the wires to the solar array.

\*FLEXware PV-8 and PV-12 Combiners are designed for weather-resistant outdoor installation when appropriate fasteners and secure mounting surfaces are used. The back of each combiner has knockouts to accommodate fasteners, U-bolts, or other hardware for secure attachment to a solid surface, including pole mounting. Both the surface and the fastening hardware must be sufficient to support the weight of the combiner.

## Requirements

- Use minimum 75° C copper conductors.
- Use only code-approved, appropriately listed circuit breakers, fuse holders, and fuses.

Maximum Fuse Rating	15 AMP , 600VDC
Maximum Circuit Breaker Rating	15 AMP, 150VDC
Total Maximum Current Rating	PV8—120 AMPS DC      PV12—180 Amps DC
Maximum Fuse Short Circuit Current	10kA
Maximum Breaker Short Circuit Current	10kA for 80V; 100A for 150V

### Torque Data\* for DC Negative Bus Bar Small Holes

WIRE SIZE		TORQUE	
AWG	mm <sup>2</sup>	in lbs	Nm
14-10	2.1-5.3	20	2.3
8	8.4	25	2.8
6	13.3-21.2	35	4.0

### Torque Data\* for Box Lug

WIRE SIZE		TORQUE	
AWG	mm <sup>2</sup>	in lbs	Nm
14-10	2.1-5.3	35	4.0
8	8.4	40	4.5
6-4	13.3-21.2	45	5.1
2/0-3	13.3-21.2	50	5.7

### Torque Data\* for DC Negative Bus Bar Large Holes

WIRE SIZE		TORQUE	
AWG	mm <sup>2</sup>	in lbs	Nm
14-10	2.1-5.3	35	4.0
8	8.4	40	4.5
6-4	13.3-21.2	45	5.1
2/0-3	13.3-21.2	50	5.7

### Torque Data\* for Ground Bus Bar

WIRE SIZE		TORQUE	
AWG	mm <sup>2</sup>	in lbs	Nm
14-10	2.1-5.3	20	2.3
8	8.4	25	2.8
6-4	13.3-21.2	35	4.0

DIN Rail Mounted Breaker and Fuse Holder Terminals are torqued 22 in lbs/2.5 Nm

\*Data is also listed on the product label attached to the combiner box.





## FWPV-8 Combiner Features



Removable front cover

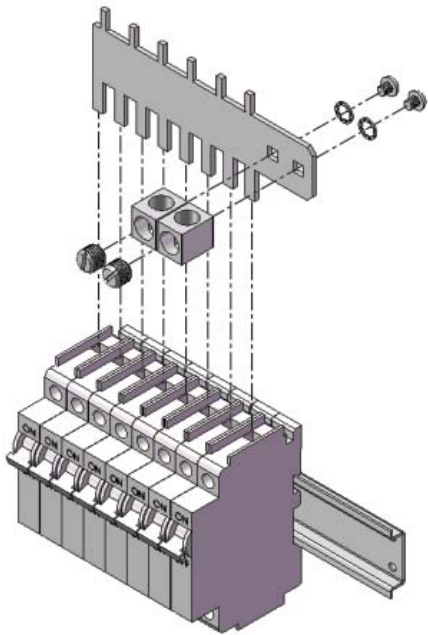
- Accommodates circuit breakers or fuse holders using a reversible\* combiner bus bar
- Two output set screw lugs for parallel positive strings capable of accepting 2/0 AWG/67.4 mm<sup>2</sup> output wires
- Comes with one ground bus bar and one negative bus bar
- 1" EKO bottom knockout punchable to 2" EKO
- 1" back knockout punchable to 1.5"
- Can be mounted on a 3", 4" or 6" pole\*\*
- Roof mountable at an angle down to 3-in-12 pitch (14°)

**\*NOTE:** A combiner can use either circuit breakers or fuses depending on the installation requirements, but it cannot use both at the same time.

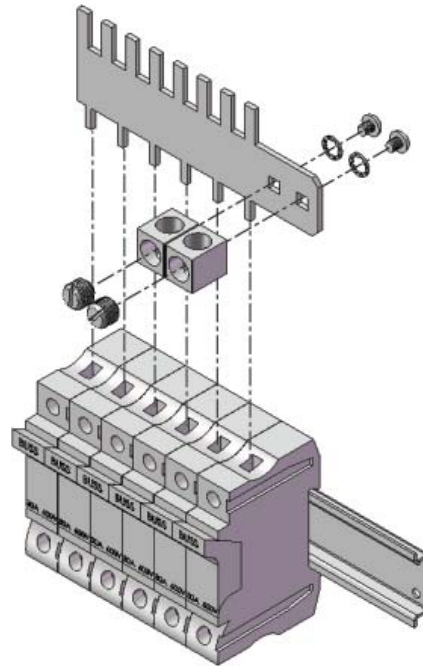
Each FWPV-8 comes with appropriate hardware for securing either circuit breakers or fuses and their conductors. Please see the separate *FW-CBUS-8 Instructions* for further information.

\*\*Requires fasteners not available from OutBack Power Systems

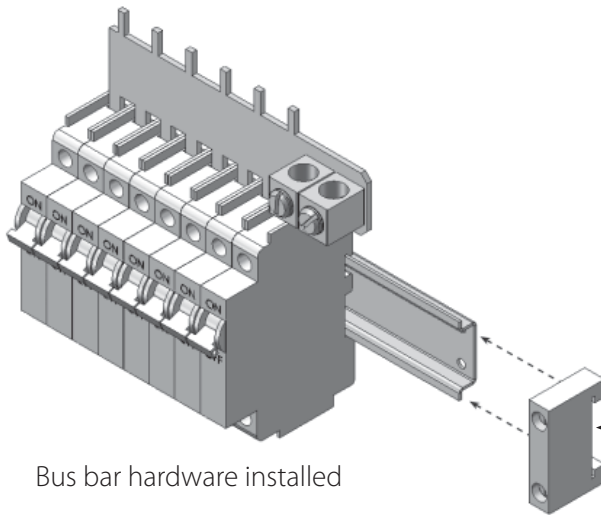
## Sample FW-CBUS-8 (Bus Bar) Installations



Circuit breaker installation using included bus bar hardware



Fuse holder installation



Bus bar hardware installed

Optional DIN Rail  
End Clamp  
(FW-EC-DIN)

# FWPV-8 Combiner



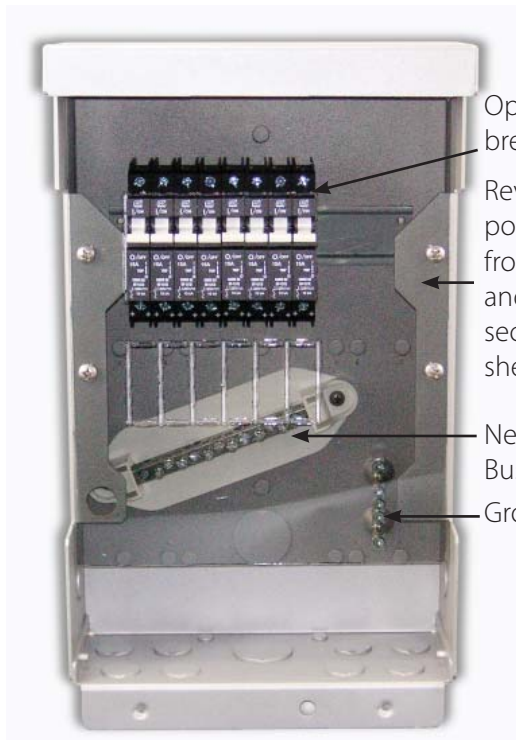
Two #12 sheet metal screws\* secure the combiner's front cover.



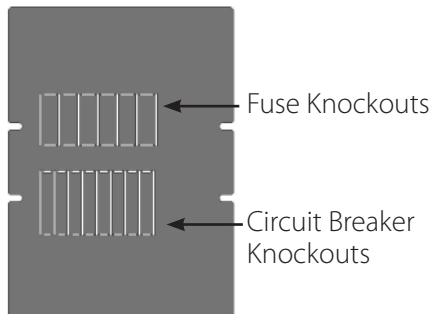
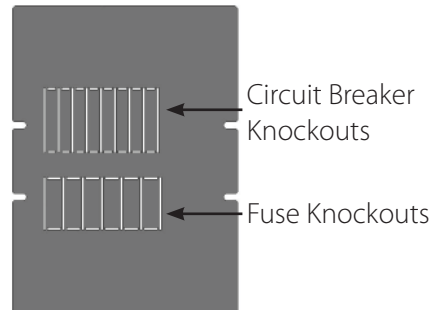
A 7/16" lock hole accepts a padlock to secure the cover.

Houses up to:

- Six "touch safe" OBFH fuse holders and knockouts for six input strings
- Eight DIN mount OBB circuit breakers
- Electrical knockouts capable of accommodating copper wire sizes from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>)



- Optional circuit breakers
- Reversible, tinted polycarbonate dead front with breaker and fuse knockouts is secured with four #12 sheet metal screws\*.
- Negative Terminal Bus Bar
- Ground Bus Bar

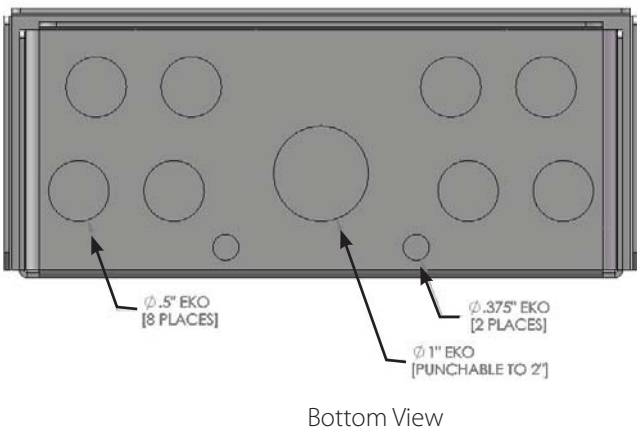
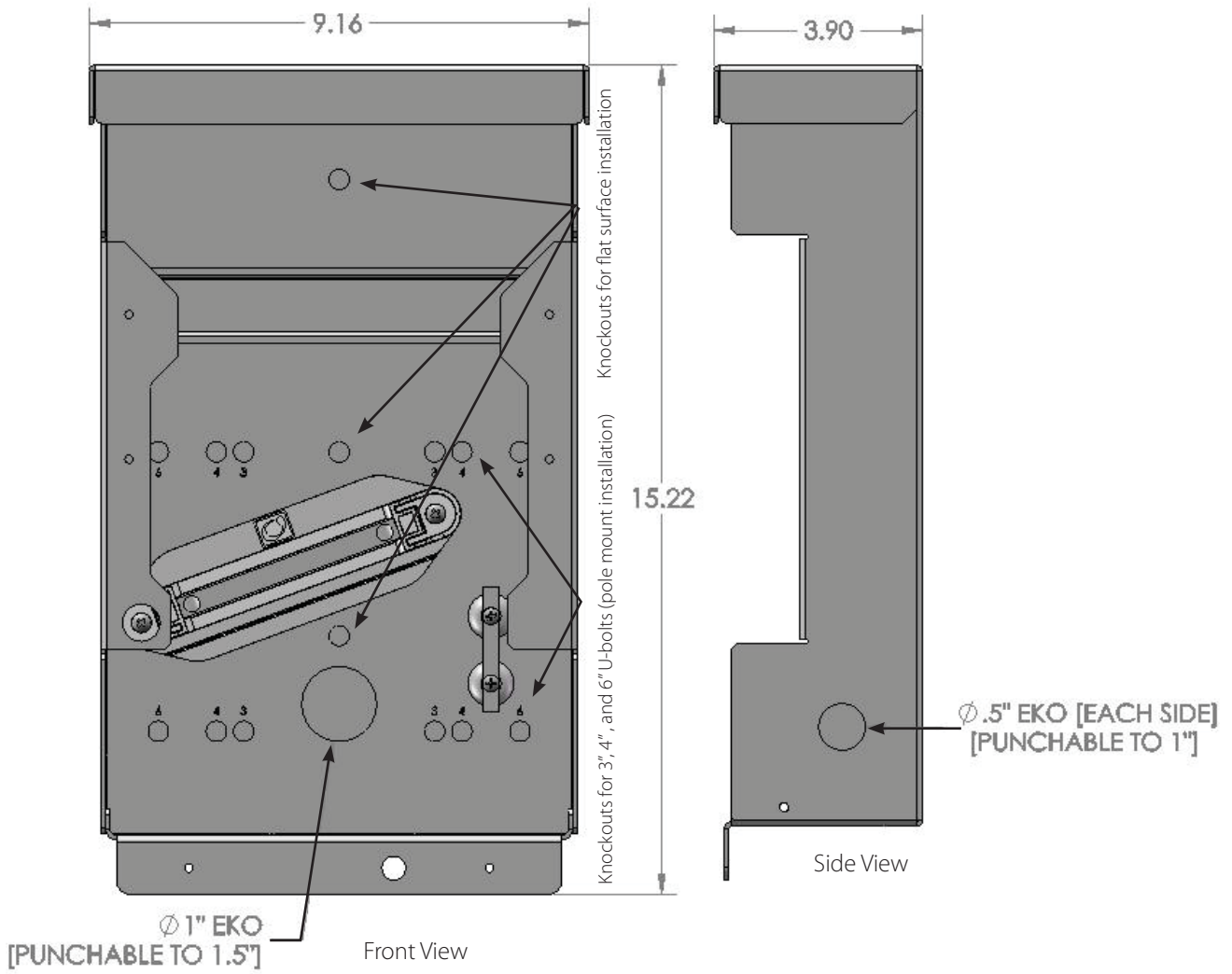


Dead front flips over to accommodate fuse holders or breakers

\*Finish torque to 14 in-lbs

# Knockouts and Dimensions

## FWPV-8 Combiner



## FLEXware PV-8 Combiner Wiring Sample (Circuit Breakers)

COMB(iner) Bus—combines all the PV array output “strings” or wiring at one bus which connects to the OutBack Charge Controller(s); lugs can accept cable sizes ranging from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>) copper wires.

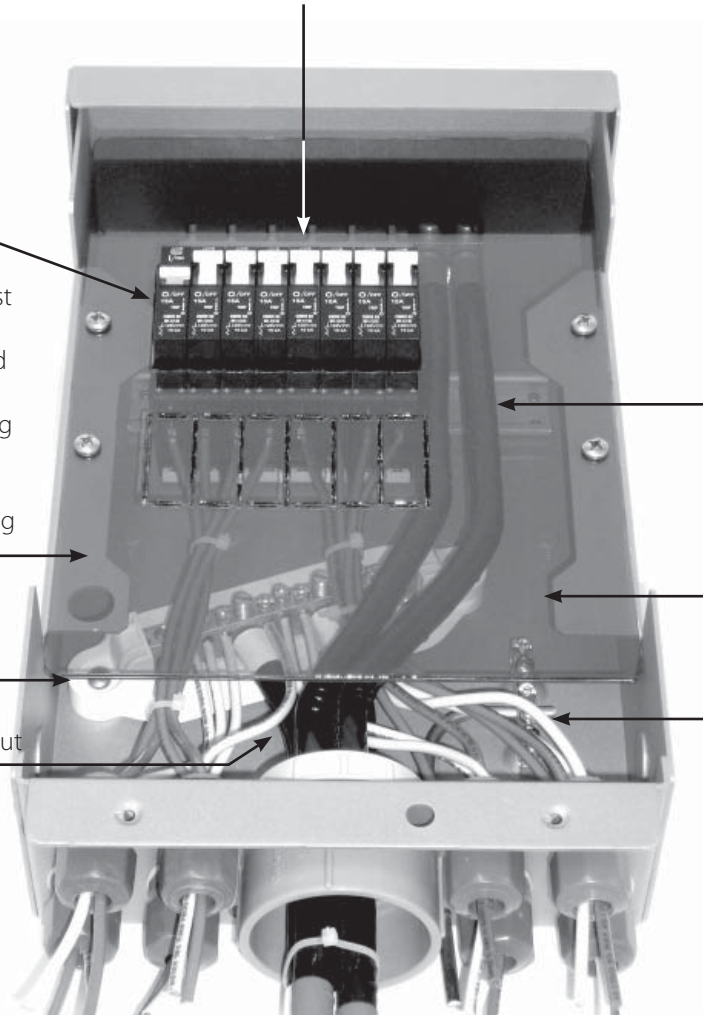
Individual PV circuit breakers (up to 15 amp/150 VDC) are available from OutBack.

Circuit breakers must be secured to the DIN rail and installed flush against the dead front mounting flange.

Dead front mounting flange.

Negative Terminal Bus Bar

Back chassis knockout

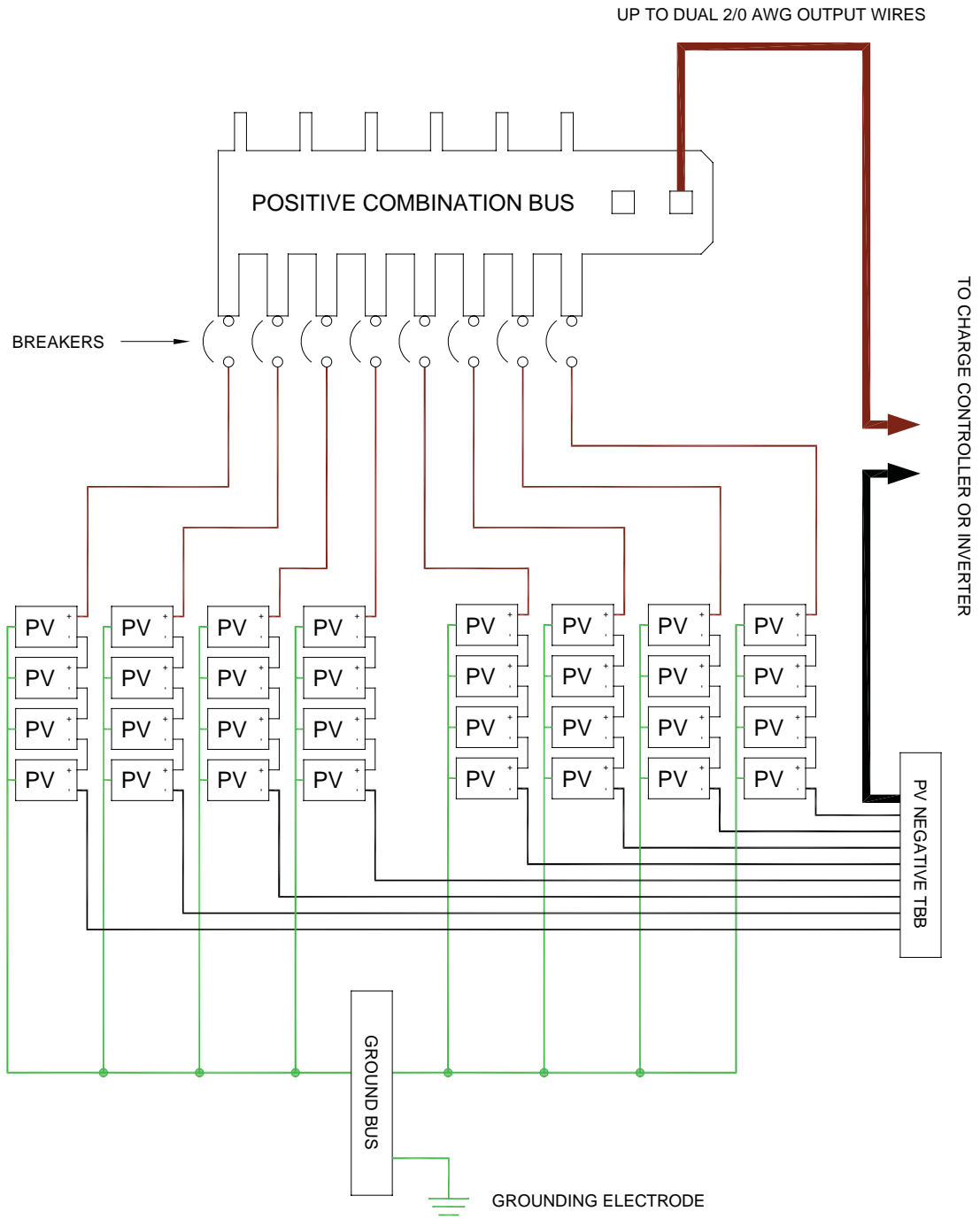


DIN rail

Dead front

Ground Bus Bar

Individual array wiring enters through the bottom knockouts to stay weather resistant.



FWPV-8 with circuit breakers

## FLEXware PV-8 Combiner Wiring Sample (Fuses)

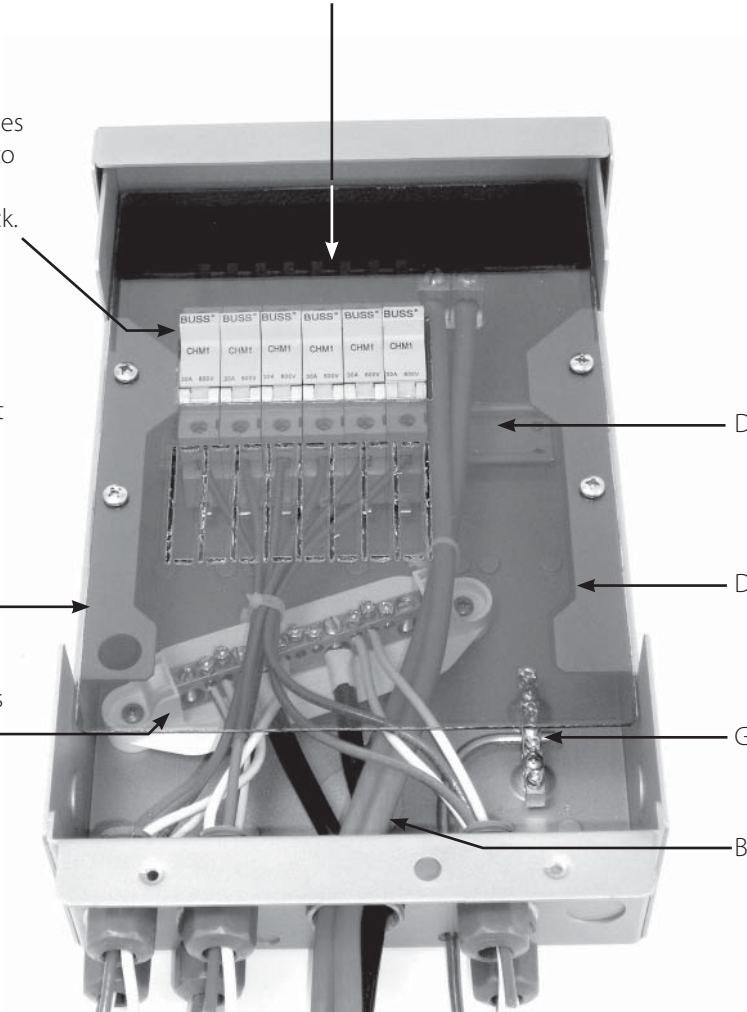
COMB(iner) Bus—combines all the PV array output “strings” or wiring at one bus which connects to the OutBack Charge Controller(s); lugs can accept cable sizes ranging from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>) copper wires.

Individual PV array fuses and fuse holders (up to 15 amp/600 VDC) are available from OutBack.

Fuse holders must be secured to the DIN rail and installed flush against the dead front mounting flange

Dead front mounting flange

Negative Terminal Bus Bar



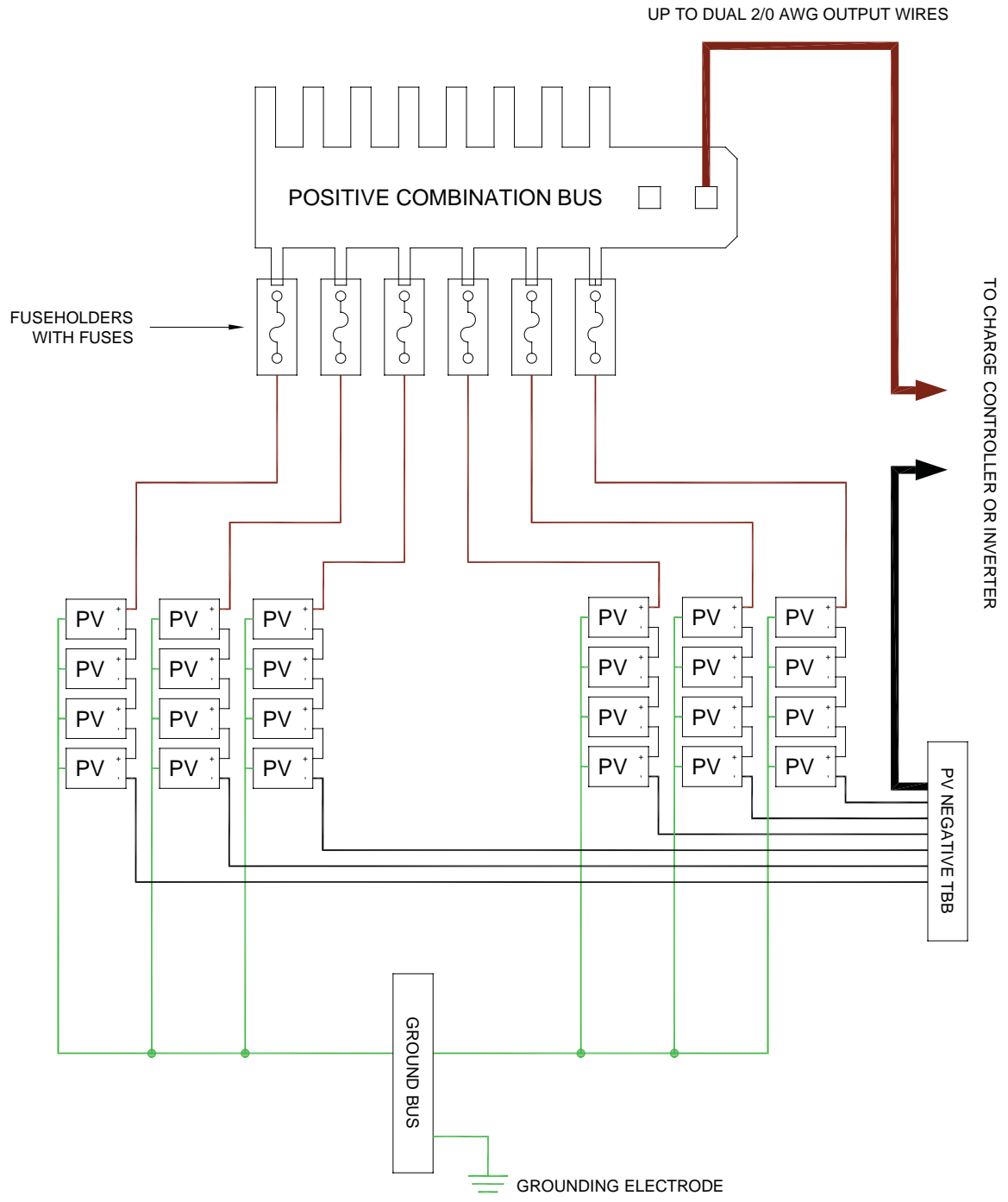
DIN rail

Dead front

Ground Bus Bar

Back chassis knockout

Individual array wiring enters through the bottom knockouts to stay weather resistant.



FWPV-8 with fuses





## FWPV-12 Combiner Features



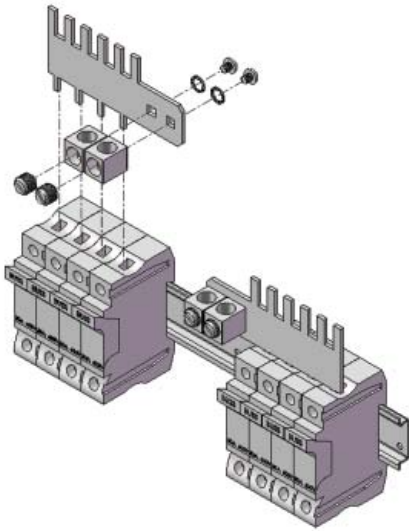
Removable front cover

- Accommodates circuit breakers or fuse holders using a reversible\* combiner bus bar
- Four output set screw lugs for positive parallel strings capable of accepting 2/0 AWG (67.4 mm<sup>2</sup>) output wires
- Comes with two ground bus bars and two negative bus bars
- 1" EKO bottom knockout punchable to 2" EKO
- 1" back knockout punchable to 1.5"
- Can be mounted on a 6" or 8" pole
- Roof mountable at an angle down to 3-in-12 pitch (14<sup>o</sup>)

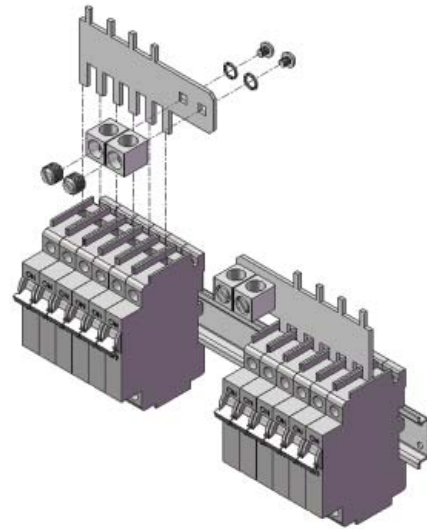
**\*NOTE:** A combiner can use either circuit breakers or fuses depending on the installation requirements, but it cannot use both at the same time. Positive combiner bus bars can be combined per NEC 2008 standards.

Each FWPV-12 comes with appropriate hardware for securing either circuit breakers or fuses and their conductors (see next page).

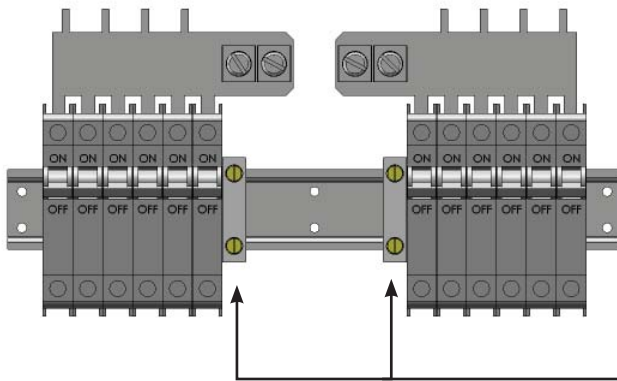
# Sample FW-CBUS-12 (Bus Bar) Installations



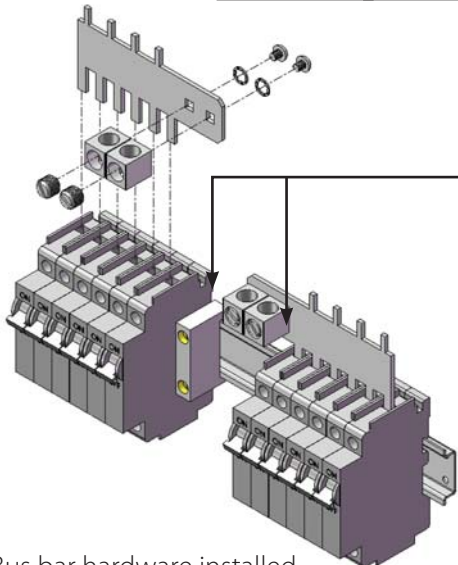
Fuse holder installation using included bus bar hardware



Circuit breaker installation



Optional DIN Rail End Clamps (FW-EC-DIN)



Bus bar hardware installed

# FLEXware PV-12 Combiner



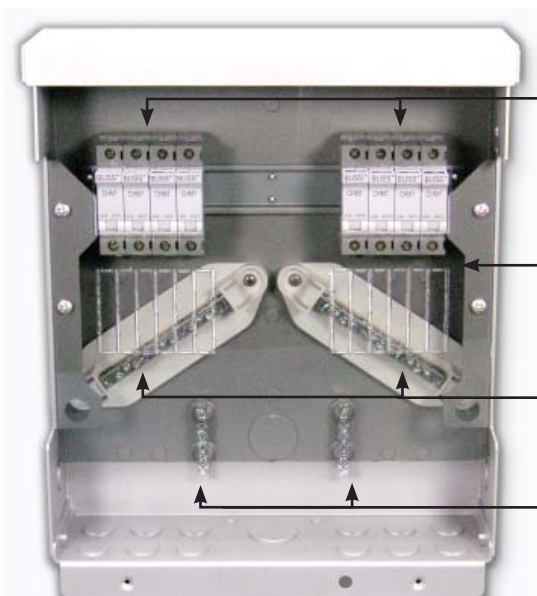
Two #12 sheet metal screws\* secure the combiner's front cover.



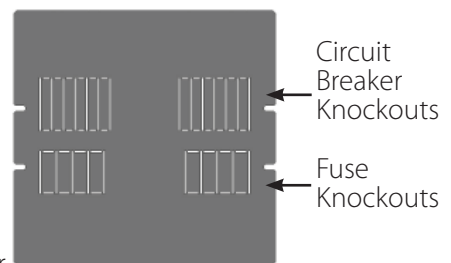
A 7/16" lock hole accepts a padlock to secure the cover.

Houses up to:

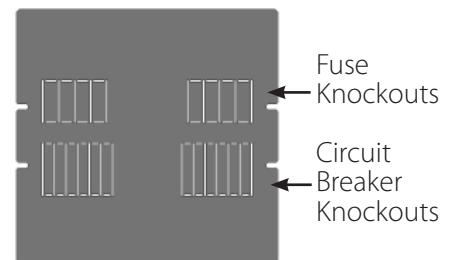
- Eight "touch safe" OBFH fuse holders and OBF fuses and knockouts for eight input strings
- 12 DIN mount OBB circuit breakers
- Electrical knockouts capable of accommodating copper wire sizes from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>)



- Combiner shown with optional fuse holders mounted to DIN rail.
- Tinted polycarbonate dead front with breaker and fuse knockouts secures with four #12 sheet metal screws\*.
- Negative Terminal Bus Bars
- Ground bus bars



- Circuit Breaker Knockouts
- Fuse Knockouts



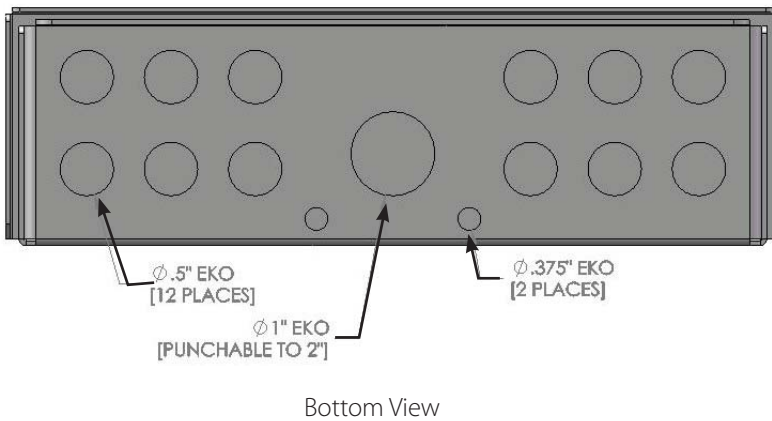
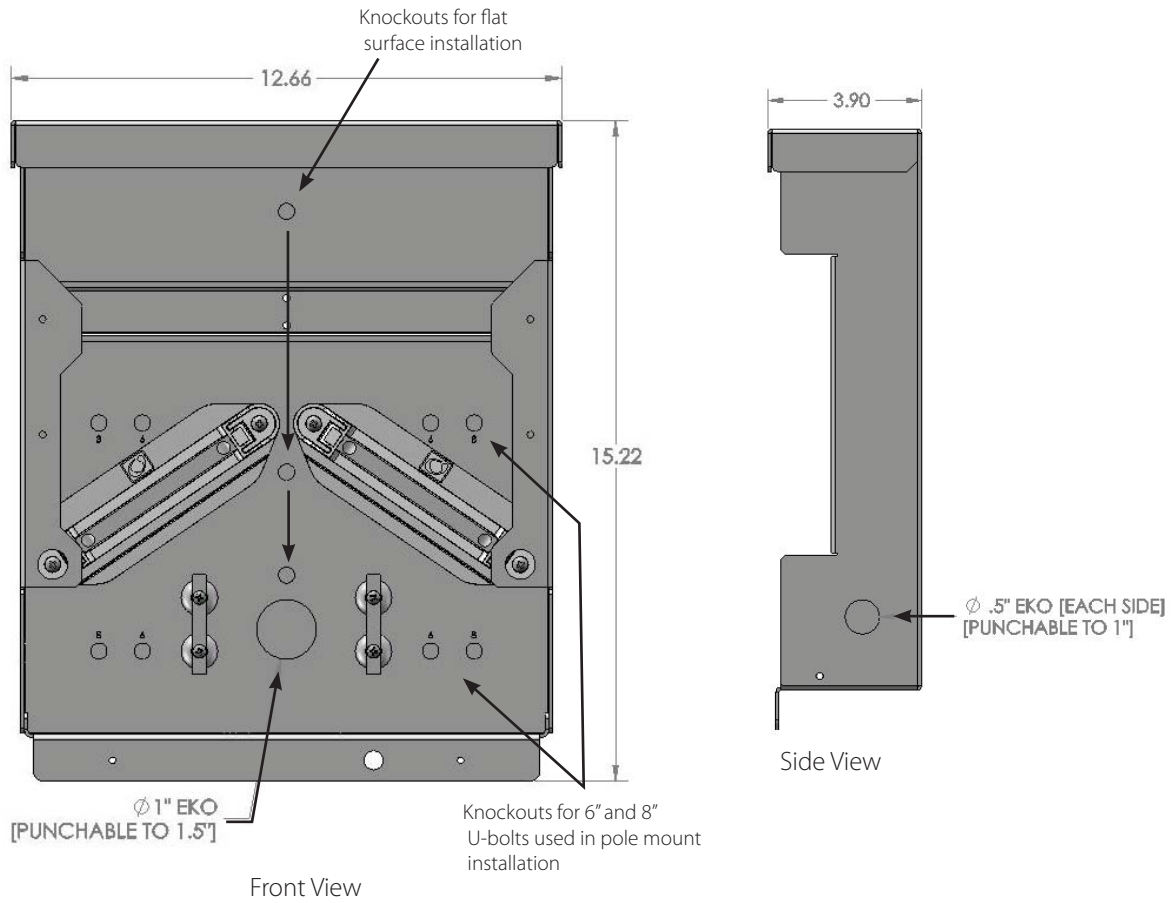
- Fuse Knockouts
- Circuit Breaker Knockouts

Dead front flips over to accommodate fuse holders or breakers

\*Finish torque to 14 in-lbs

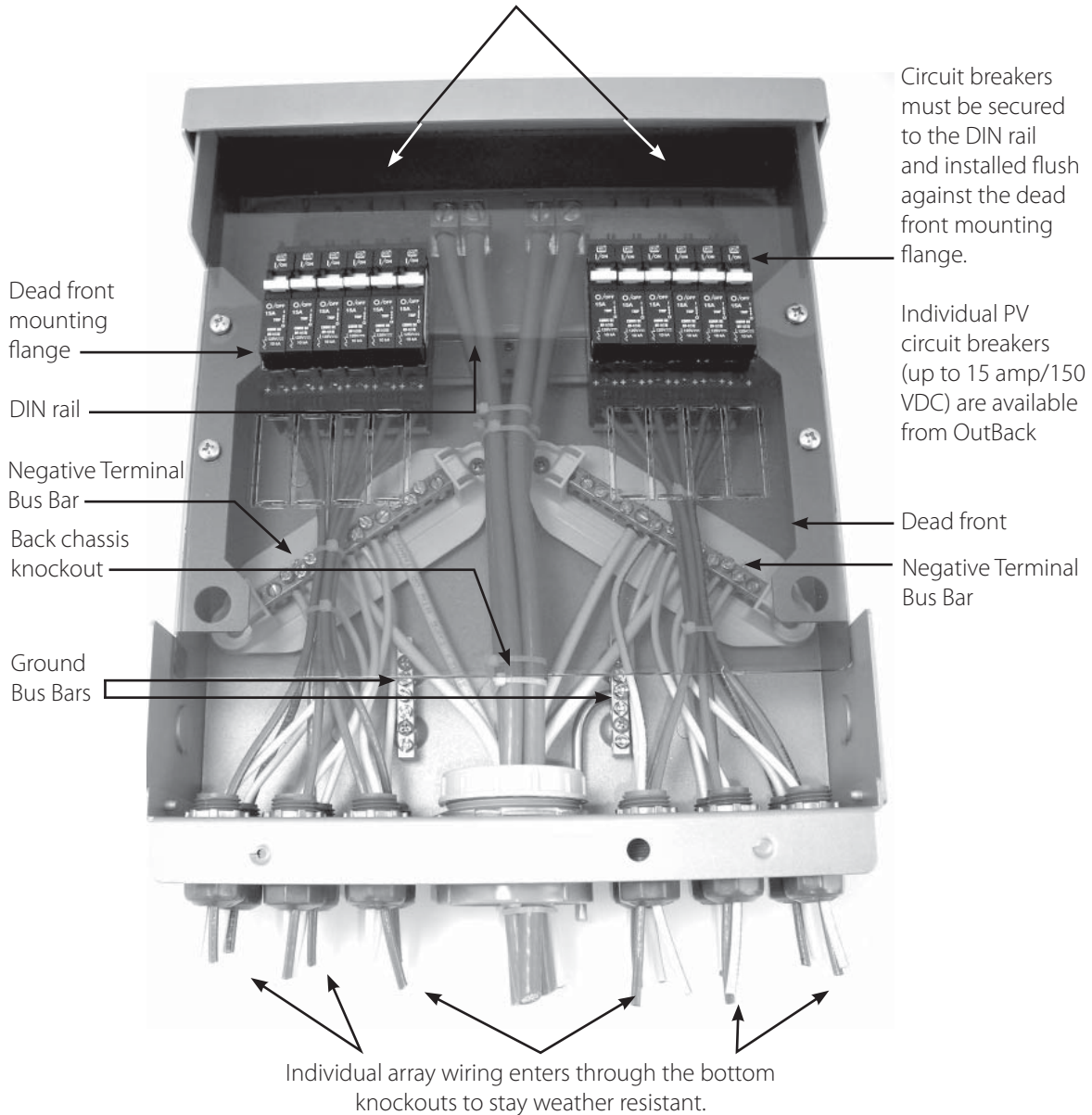
# Knockouts and Dimensions

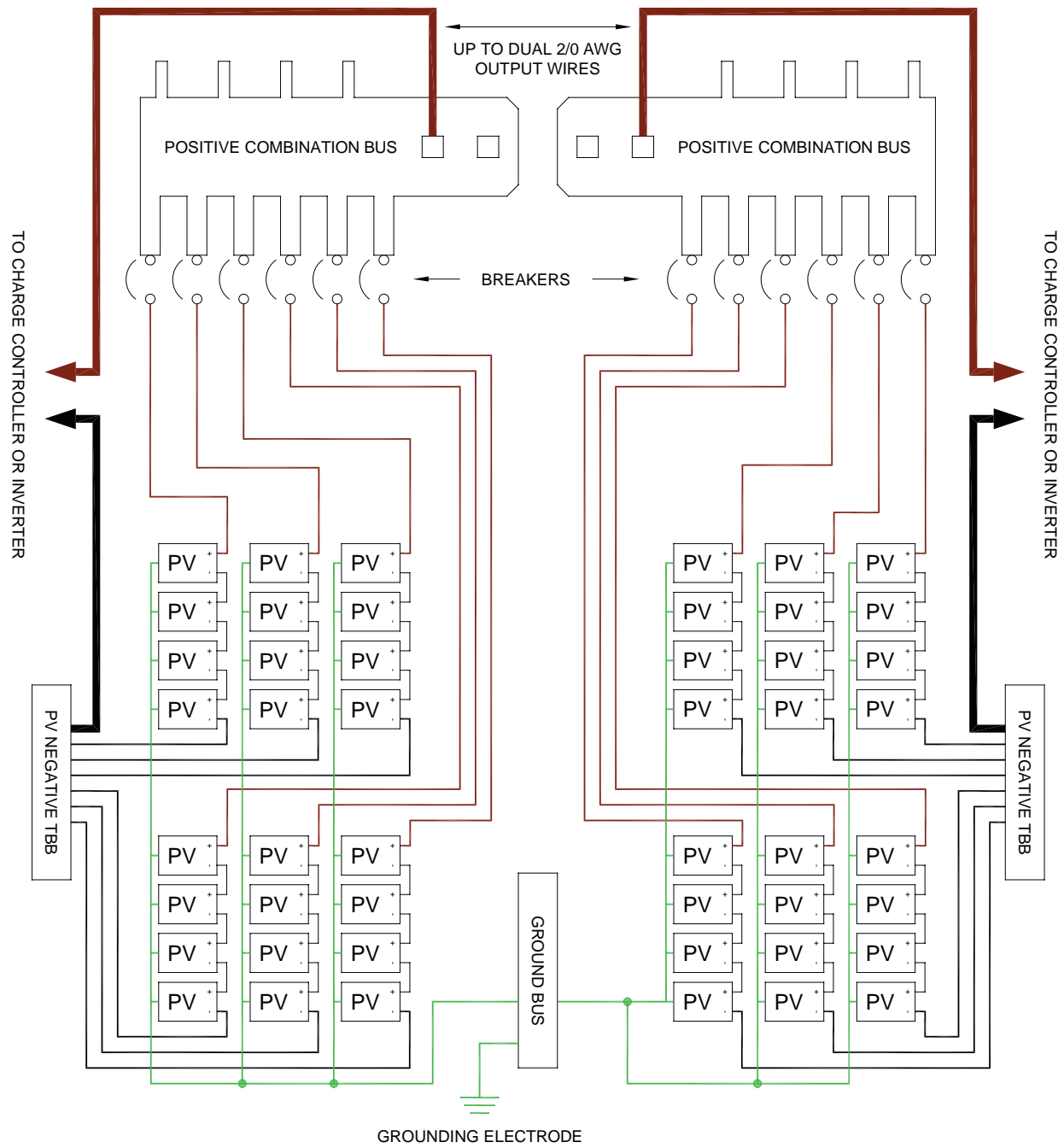
## FWPV-12 Combiner



## FLEXware PV-12 Combiner Wiring Sample (Circuit Breakers)

COMB(iner) Bus Bars—combine all the PV array output “strings” or wiring at two bus bars which connect to the OutBack Charge Controller(s); lugs can accept cable sizes ranging from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>) copper wires.

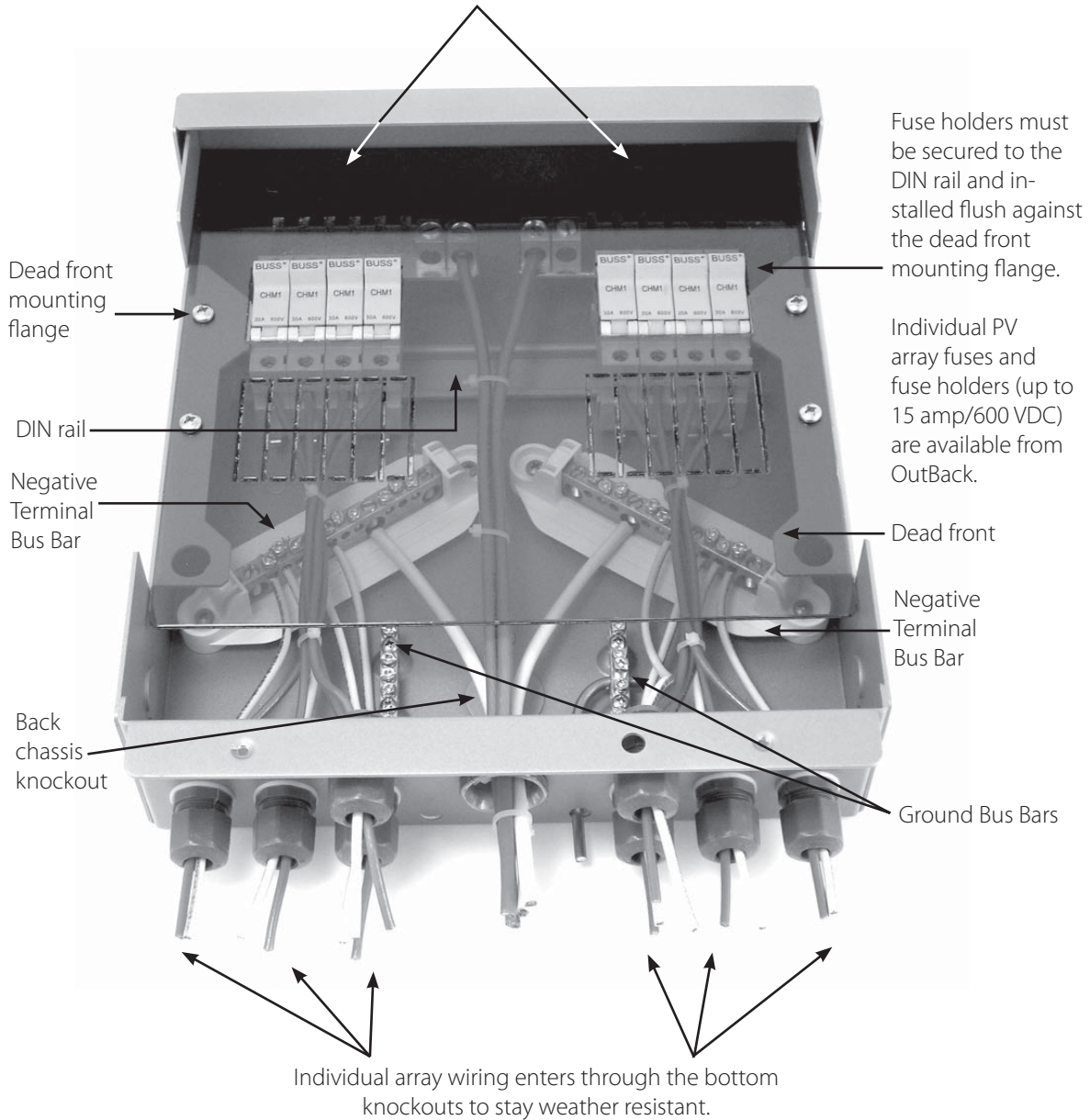




FWPV-12 with circuit breakers

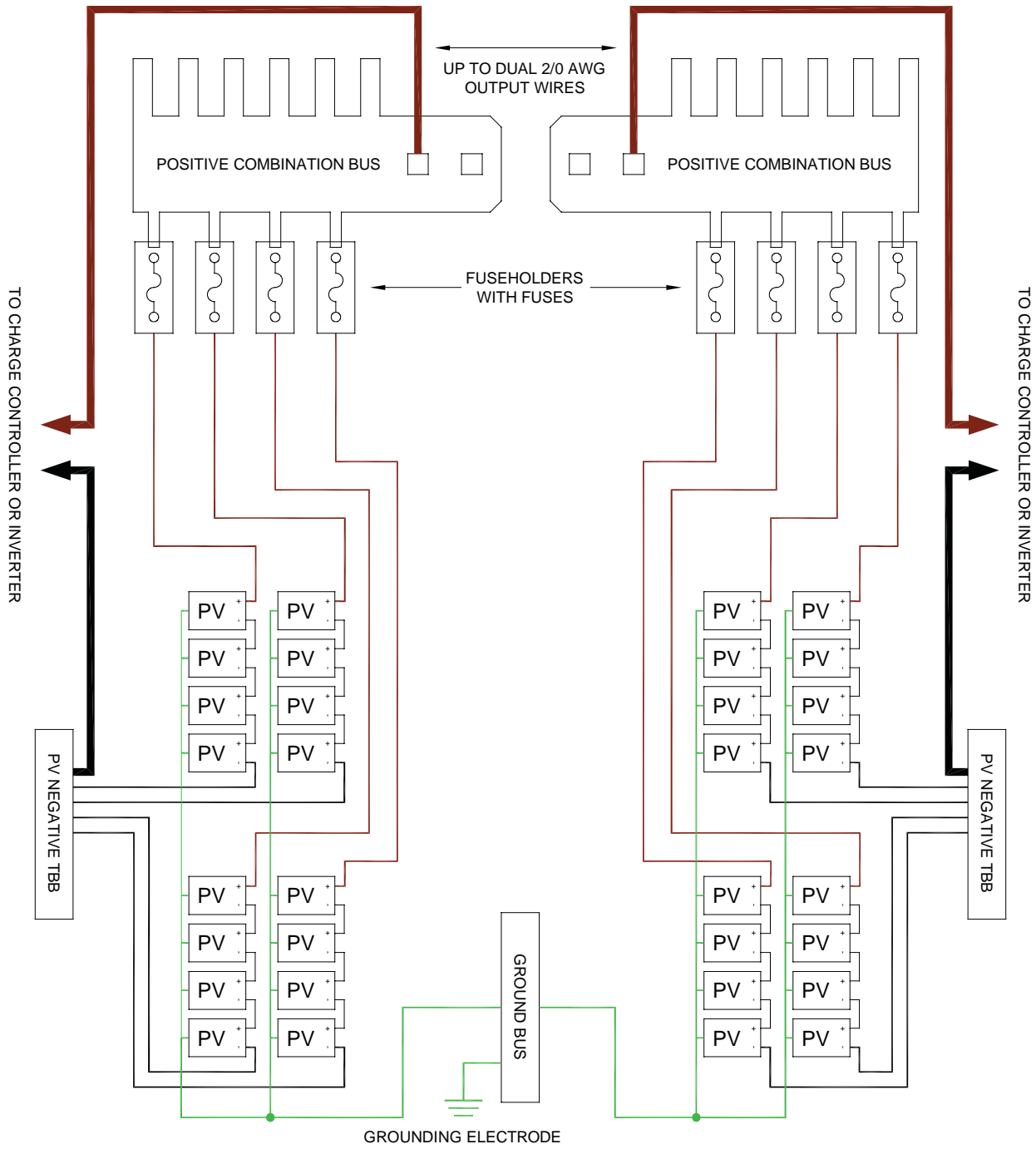
## FLEXware PV-12 Combiner Wiring Sample (Fuses)

COMB(iner) Bus Bars—combine all the PV array output “strings” or wiring at two bus bars which connect to the OutBack Charge Controller(s); lugs can accept cable sizes ranging from 2/0 to 14 AWG (67.4 mm<sup>2</sup> to 2.08 mm<sup>2</sup>) copper wires.



**NOTE:** Please see page 15 for fuse holder installation information.





FWPV-12 with fuses



# FLEXware™ Product Registration

Please take a moment to register and provide us with some important information and return it to:  
Outback Power Systems Inc.  
19009 62nd Ave. NE  
Arlington, WA 98223

**NOTE:** Please complete one form for all installed FLEXware product.

FLEXware Product Registration				
<b>System Owner</b>				
Name: _____		Address: _____		
City, State, Zip Code: _____		Country: _____		
Telephone Number: _____		E-mail: _____		
<b>Installer</b>				
Company: _____		Contractor Number: _____		
Installer Address: _____		Installer City, State, Zip: _____		
Installer E-mail: _____				
<b>System</b>				
System Install/Commission Date: _____		Purchase Date: _____		
Sold by: _____				
<b>Please circle type of application:</b>				
Off-Grid	Grid-Interactive	AC Coupled	Backup	Mobile
<b>Please circle installed components:</b>				
<b>FLEXware Enclosures and Mounting Components</b>		<b>IOB Kits</b>		
FLEXware 250	FLEXware MP	FW-IOB-S-120VAC	FW-IOB-T-120/208VAC	
FLEXware 500 AC	FLEXware PV 8	FW-IOB-S-230VAC	FW-IOB-T-230/400VAC	
FLEXware 500 DC	FLEXware PV 12	FW-IOB-D-120/240VAC	FW-IOB-Q-120/240VAC	
FLEXware 1000 AC		FW-IOB-D-120VC	FW-IOB-Q-230VAC	
FLEXware 1000 DC		FW-IOB-D-230VAC		
<b>The system is equipped with (circle one):</b>				
FW-X240	PSX-240	PSX-240-Relay		
<b>Please circle the three most important factors affecting your purchase decision:</b>				
• Price	• Product Reputation	• Product Features	• Reputation of OutBack Power Systems	• Value
<b>I am interested in receiving information concerning OutBack Power Systems products and events (circle one):</b>				
Yes	No			





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