



FLEXware™ 250

Installation Manual

**Includes Mounting, Installation, and
Product Registration**

About OutBack Power Systems

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

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Disclaimer

UNLESS SPECIFICALLY AGREED TO IN WRITING, OUTBACK POWER SYSTEMS:

(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.

Warranty Summary

OutBack Power Systems Inc. warrants that the products it manufactures will be free from defects in materials and workmanship for a period of two (2) years subject to the conditions set forth in the warranty detail, found inside the back cover of this manual.

OutBack Power Systems cannot be responsible for system failure, damages, or injury resulting from improper installation of their products.

Notice of Copyright

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Trademarks

OutBack Power is a registered trademark of OutBack Power Systems.

Date and Revision

June 2009, Revision A

Part Number






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Important Safety Instructions

READ AND SAVE THESE INSTRUCTIONS!

This manual contains important safety instructions for the FLEXware™ 250. Read all instructions and cautionary markings on the FLEXware 250 and on any accessories or additional equipment included in the installation. Failure to adhere to these instructions could result in severe shock or possible electrocution. Exercise extreme caution at all times to prevent accidents.

Symbols Used

Symbol	Description
	Ground
	AC Current
	DC Current
	Single-Phase
	Sine Wave



WARNING: Hazard to Human Life

This type of notation indicates that the hazard could be harmful to human life.



CAUTION: Hazard to Equipment

This type of notation indicates that the hazard may cause damage to the equipment.



IMPORTANT:

This type of notation indicates that the information provided is important to the installation, operation and/or maintenance of the equipment. Failure to follow the recommendations in such a notation could result in voiding the equipment warranty.

Audience

- These instructions are for use by qualified personnel who meet all local and governmental code requirements for licensing and training for the installation of electrical power systems with AC and DC voltage up to 600 volts.

Important Safety Instructions

General Safety



WARNING: Limitations on Use

This equipment is NOT intended for use with life support equipment or other medical equipment or devices.



CAUTION: Equipment Damage

Only use components or accessories recommended or sold by OutBack Power Systems or its authorized agents.



IMPORTANT:

Do not attempt to install this equipment if it appears to be damaged in any way. See the Service section for instructions on how to return the equipment if you know, or suspect, it is damaged.

Personal Safety



WARNING: Personal Injury

- Use standard safety equipment such as safety glasses, ear protection, steel-toed safety boots, safety hard hats, etc. as prescribed by the Occupational Safety and Health Association (or other local codes) when working on this equipment.
- Use standard safety practices when working with electrical equipment (e.g., remove all jewelry, use insulated tools, wear cotton clothing, etc.)

Inverter Safety



WARNING: Lethal Voltage

- Review the system configuration to identify all possible sources of energy. Ensure ALL sources of power are disconnected before performing any installation or maintenance on this equipment. Confirm that the terminals are de-energized using a validated voltmeter (rated for a minimum 1000 Vac and 1000 Vdc) to verify the de-energized condition.
- Do not perform any servicing other than that specified in the installation instructions unless qualified to do so and have been instructed to do so by OutBack Power Systems Technical Support personnel.



WARNING: Fire Hazard

- Do not place combustible or flammable materials within 12 feet (3.7 m) of the equipment.
- Use only the recommended cable sizes (or greater) for AC and DC conductors in compliance with local codes. Ensure all conductors are in good condition. Do not operate the unit with damaged or substandard cabling.

Important Safety Instructions



CAUTION: Equipment Damage

When connecting cables from the inverter to the battery terminals, ensure the proper polarity is observed (positive-to-positive, negative-to-negative). Connecting the cables incorrectly can damage or destroy the equipment.



CAUTION: Equipment Damage

- Thoroughly inspect the equipment prior to energizing. Verify that no tools or equipment have been inadvertently left behind.
- Ensure clearance requirements are strictly enforced and that all vents are clear of obstructions that can prevent proper air flow around or through the unit.

Battery Safety



WARNING: Explosion, Electrocution, or Fire Hazard

- Ensure the cables are properly sized.
- Always use insulated tools. Avoid dropping tools onto batteries or other electrical parts.

Regulatory Listings

The FLEXware 250 (FW250) is listed by ETL as an indoor enclosure to UL standard UL 508A Industrial Control Panels.

This enclosure is intended for battery circuits configured for 12 to 48 volts nominal.

- National Electric Code (NEC) Article 690, (current edition)
- Canadian Electrical Code, Part I (CSA 107.1)
- ETL listed to UL 508A Industrial Control Panels
- American National Standards Institute/National Fire Protection Agency (ANSI/NFPA) 70

Recycling Information



IMPORTANT: Recycle Electronics and Batteries

Batteries are considered hazardous waste and must be recycled according to local jurisdiction. Inverters and other electronics contain metals and plastics that can (and should) be recycled. The following are some websites and phone numbers that provide information and “how” and “where” to recycle batteries and other electronic equipment.

OutBack Power Systems strongly encourages you to learn about recycling and to dispose of recyclable items accordingly. *The Earth, and OutBack Power Systems, thanks you for that effort.*

Important Safety Instructions

Earth 911

Web site: www.Earth911.com
Address: 14646 N. Kierland Blvd., Suite 100
Scottsdale, AZ 85254
Phone: +1.480.337.3025 (direct)

OurEarth.org

There is a place on the website for contacting OurEarth.org using email. No direct email address is provided.

Web site: <http://www.ourearth.org/recycling.htm>

Environmental Protection Agency, USA

Web site: www.epa.gov/recyclecity/
Phone: +1.415.947.8000
(Monday –Friday 8:00 AM to 12:00 PM and 1:00 PM to 4:00 PM PST)
Email: r9.recyclecity@epa.gov

Keep America Beautiful, USA

Web site: www.kab.org/
Address: 1010 Washington Boulevard
Stamford, CT 06901
Phone: +1.203.659.3000 (Main number)
Fax: +1.203.659.3001
Email: info@kab.org

Natural Resources Canada

Address: 580 Booth, Ottawa, ON K1A 0E8
Phone: +1.613.995.0947
TTY: +1.613.996.4397
(Phone and TTY: Monday to Friday, 8:30 a.m. to 4:30 p.m. ET)
Web site: <http://www.nrcan-mcan.gc.ca/mms-smm/busi-indu/rec-rec-eng.htm>

Office of Waste Management, Canada

Address: Office of Waste Management
Conservation and Protection
Environment Canada
Ottawa, Ontario K1A 0H3
Phone: +1.819.997.2800
Web site: http://www.portaec.net/library/recycling/recycling_in_canada.html

National Institute of Recyclers, Mexico

Web site: <http://www.inare.org.mx/>
Email: a57841279@prodigy.net.mx, margarita@inare.org.mx
Phone: 55.57.85.9160
Fax: 55.57.84.1279



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Introduction

Welcome to OutBack Power Systems

FLEXware is a convenient, all-aluminum enclosure offering simple installation of OutBack power electronics components in a code-compliant power system.

Three versions of FLEXware are available:

- FLEXware 250 for single FX or VFX Series Inverter/Charger installations along with the desired AC and DC disconnects. (These inverter chargers will be referred to as the “FX” or “FX Series” throughout this manual.)
- FLEXware 500, which supports up to two FXs and two MX Series Charge Controllers, accommodating both split-phase and/or higher power output as needed.
- FLEXware 1000 accommodates up to four FXs and four MX Series Charge Controllers.

Note: Both the FLEXware 500 and the FLEXware 1000 power systems provide locations for FW-X240 Auto-Transformers, multiple DC shunts and other essential components required in higher kW systems.

This manual only covers the installation of the FLEXware 250.

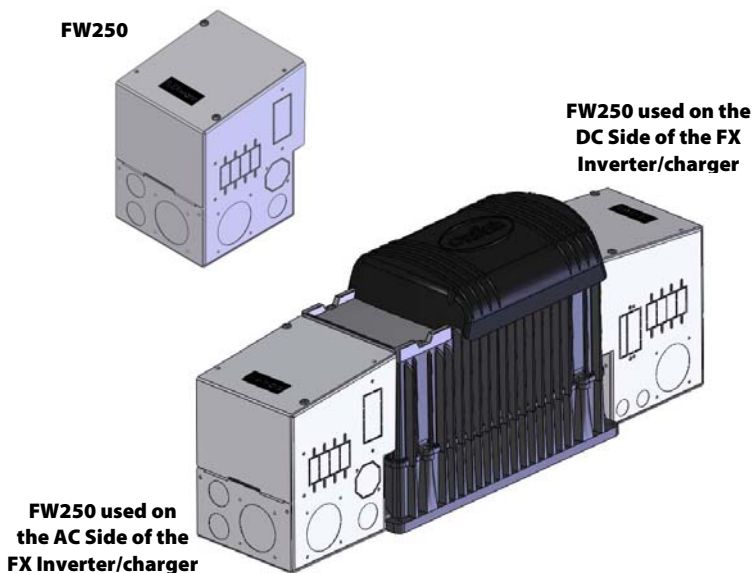


Figure 1 FLEXware 250

FLEXware 250 Components

The FLEXware 250 (FW250) consists of an aluminum chassis, or enclosure, which can be used for either the AC or DC side of an FX Series Inverter/Charger. Each FW250 includes:

- Installed ground bus bar and Neutral terminal bus bar
- Breaker Guard (for DC installations)
- Hardware Kit for mounting to an FX

Item	Qty	Item	Qty
#12 x 1/2" Sheet Metal Screws, Black	3	6-32 x 1/4" Machine Screws	20
#12 Lock Washers, Internal Tooth	3	M5 – 0.8 x 25 mm Machine Screws	2
10-32 x 1/2" Machine Screws	3	#10 Lock Washers, Internal Tooth	2
6-32 x 1/2" Machine Screws	3		

- Top Cover
- Breaker Label Kit

The chassis features electrical conduit knockouts for cabling (see Figure 3 on page 9) and rectangular breaker knockouts. It has one Shore Power knockout on each side and one on the end.

- DC installations include a slot for the inverter disconnect breakers designated OBB-125-125VDC-PNL, OBB-175-125VDC-PNL, or OBB-250-125VDC-PNL. The FLEXware 250 provides eight breaker positions for panel-mount breakers ranging between 1 and 80 amps, and/or for the GFDI. (See OutBack Power Catalog for available breakers.)
- AC installations allow for the optional 120 or 230 Vac Input/Output/Bypass Assembly (IOB) kits. Maximum AC breaker size is 60 amps.

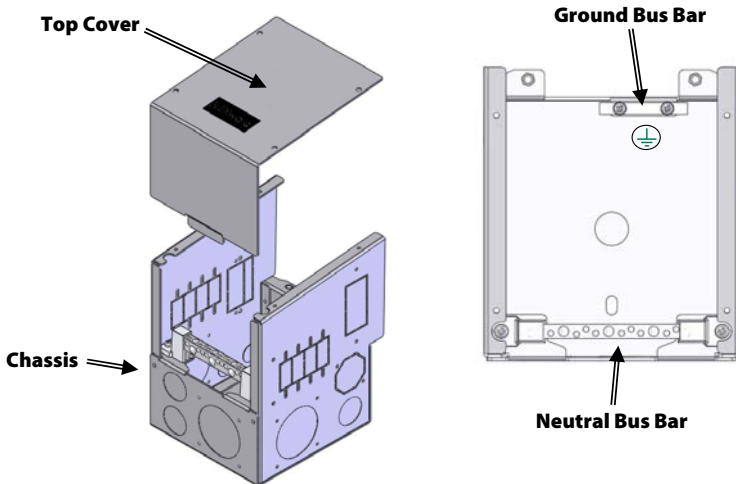


Figure 2 FW250 Features

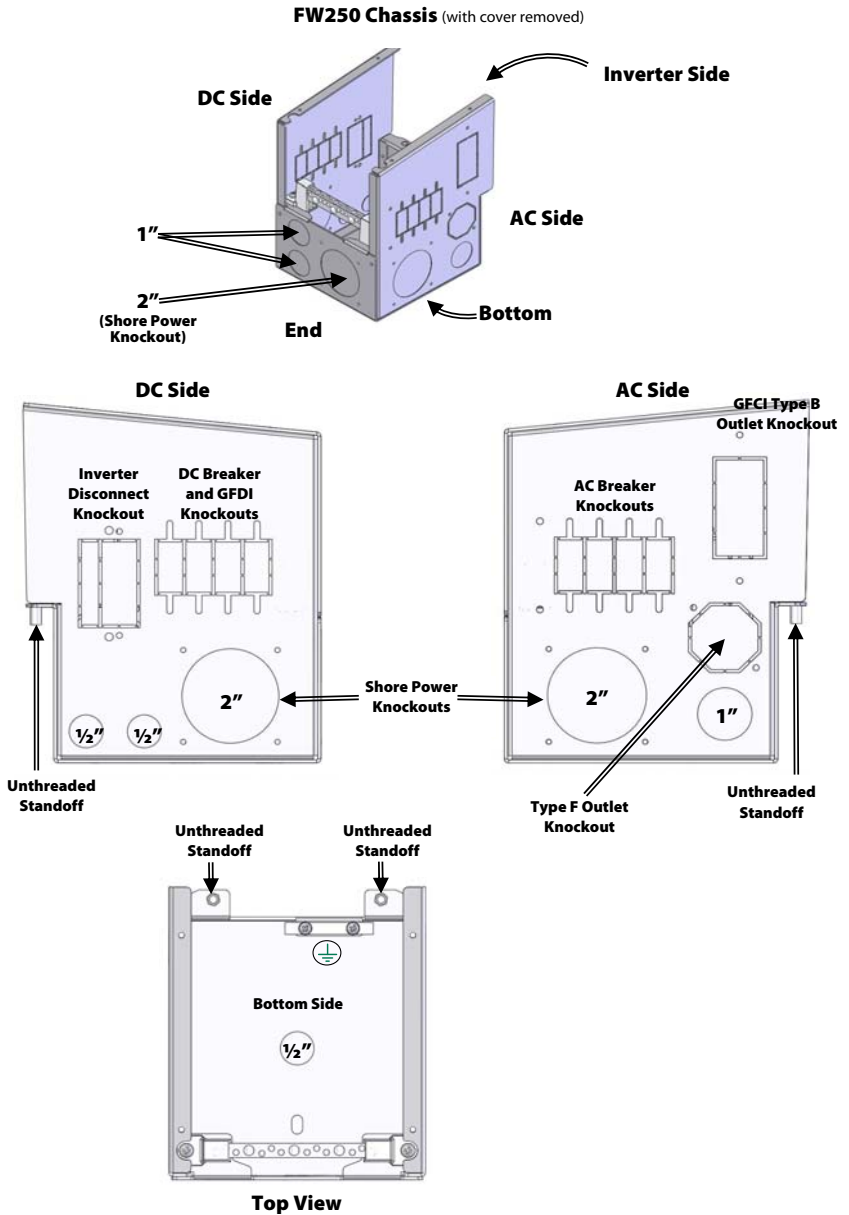


Figure 3 FW250 Knockouts

Dimensions

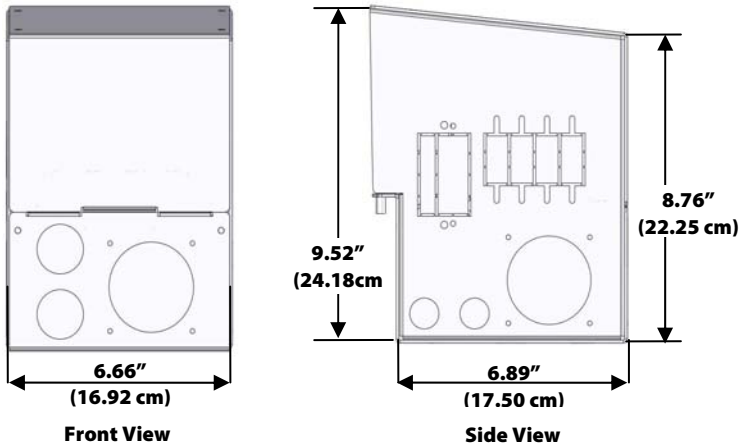


Figure 4 FW250 Dimensions

Optional Parts/Kits

- FW-IOB (Input/Output/Bypass Assembly) Kits for 120 Vac or 230 Vac (FW-IOB-S-120VAC, FW-IOB-S-230VAC)
- FLEXware 250 Mounting Plate
- FLEXware 250 Raceway
- Inverter Disconnect Breakers (OBB-125-125VDC-PNL, OBB-175-125VDC-PNL, or OBB-250-125VDC-PNL)
- DC Load Breakers (see OutBack Power Catalog for a complete listing of all panel-mount DC breakers)



Installation

Installing the FLEXware 250



IMPORTANT:

All connections must comply with local electric code and the Canadian Electric Code, Part 1. Refer to the FX Series Inverter/Charger Installation Manual and the FLEXware optional parts kits for specific wiring instructions.

With the FX Inverter/Charger secured in place, the FW250 installs on either DC or AC side of the FX. See Figure 1 on page 7.

To attach the FW250 to the inverter:

1. Remove the two Top Cover screws and washers. Lift the Top Cover off the chassis.

Note: The FW250 ships with only two screws installed in the Top Cover. The two additional screws are included in the hardware kit that accompanies the chassis.

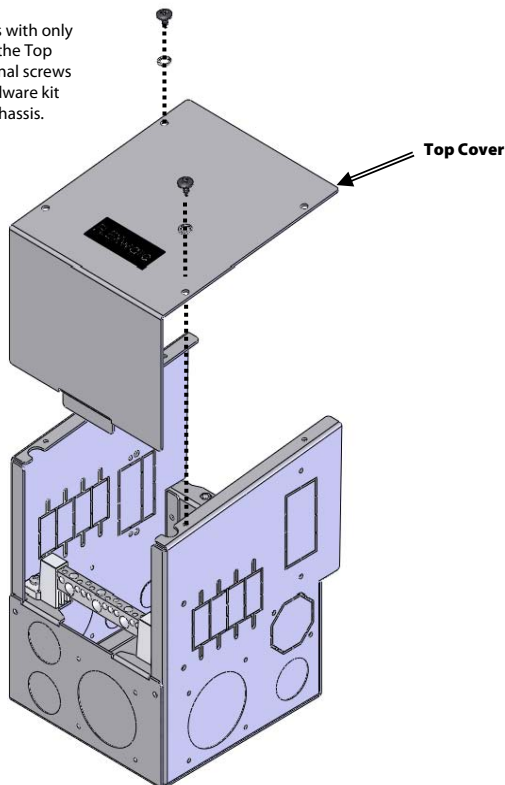


Figure 5 Removing the Top Cover

2. Verify which knockouts will be removed for the installation and remove those knockouts. See Figure 3 on page 9.
3. Using a 5 mm hex key, remove the two M5 × 12mm screws that secure the FX upper and lower casing halves. Remove only the screws on whichever side (AC or DC) you first install the FW250. See Figure 6.

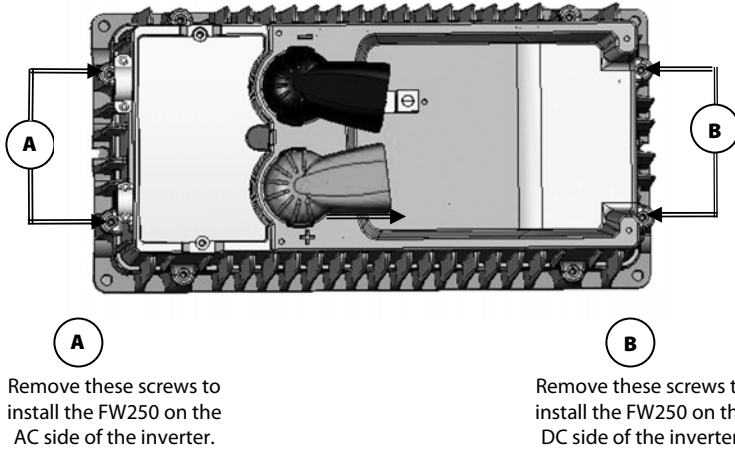


Figure 6 Preparing the FX Inverter for the FW250

4. Insert the unthreaded standoffs into the holes on the FX and then insert two M5 × 25 mm screws, included with the FW250, into the standoffs and tighten. Torque to 18 in-lb (2.03 Nm). See Figure 7.

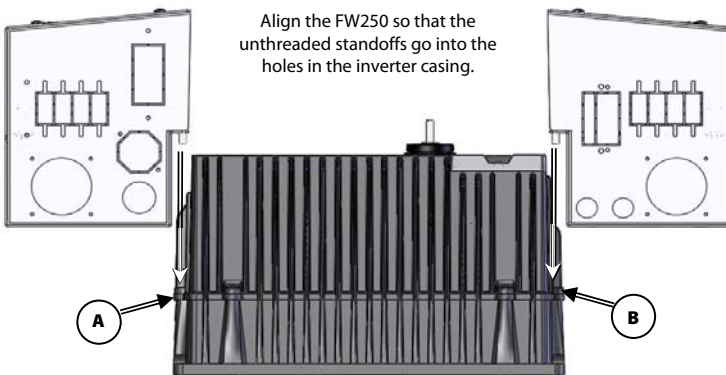


Figure 7 Attaching the FW250 to the FX Inverter


Note: For AC wiring instructions for the FW250, please see the schematics in the individual Input/Output/Bypass Assembly (IOB) kits.

Note: For examples of DC wiring, see Figure 8. See the FX Inverter/Charger Installation Manual for more instructions.



IMPORTANT: Grounding Requirements

The frame of this enclosure should be connected to a grounded, permanent wiring system. The AC and DC circuits are not bonded to the FLEXware chassis. System grounding, when required by sections 690.41, 690.42, and 690.43 of the National Electric Code, ANSI/NFPA 70, is the responsibility of the installer. All installations should comply with all national and local codes and ordinances.

The equipment ground is marked with this symbol: 

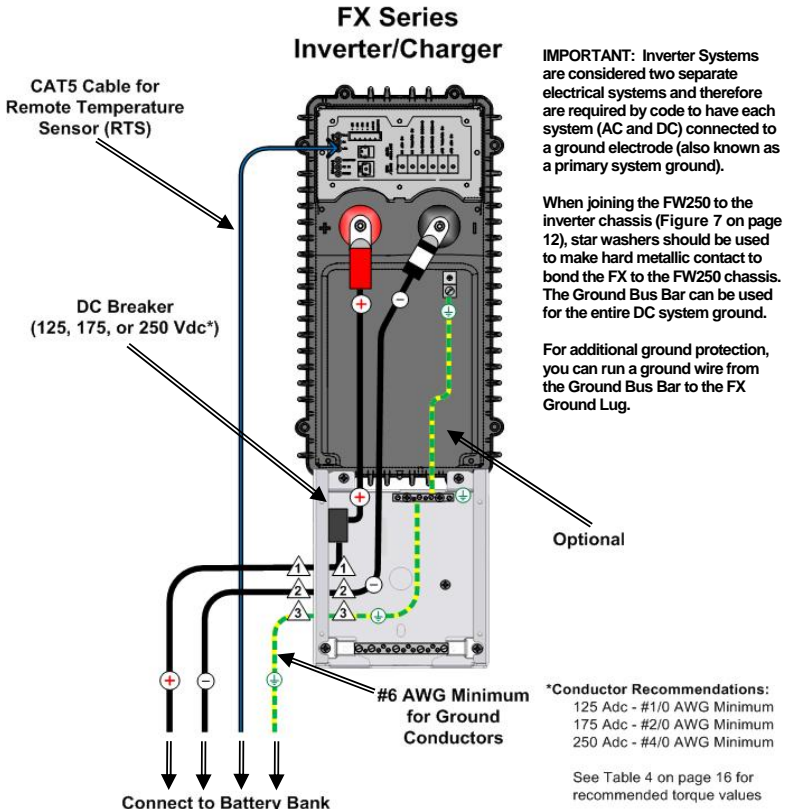


Figure 8 DC Wiring

5. After all wiring has been completed, install the FX Inverter's DC Cover (DCC) or Turbo cover. (The use of a DCC or Turbo will depend on model. Please install the appropriate part based on that model's instructions.) Secure with four M5 × 12mm screws. Torque to 18 in-lb (2.03 Nm). See Figure 9.

Align the DCC over the top of the inverter and secure with the hardware provided.

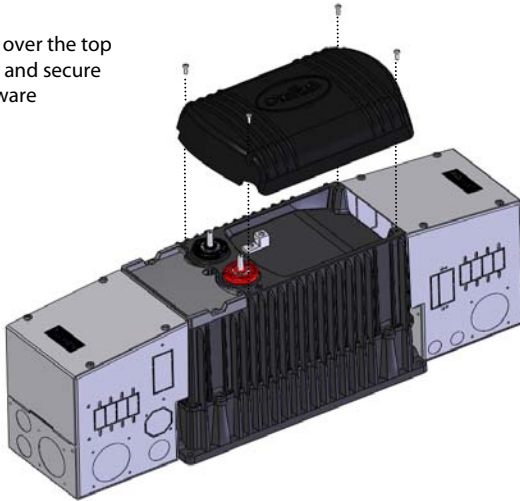


Figure 9 Attaching the Inverter Top Cover

6. Install each FW250 top cover and secure the four 10 × 3/8 sheet metal screws. See Figure 10.

Align the FW250 Top Cover over the top of the chassis and secure with the 4 screws and lock washers provided.

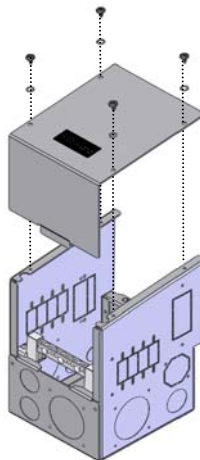


Figure 10 Attaching the FW250 Top Cover



Specifications

Mechanical Specifications

Table 1 Mechanical Specifications

Specification	FW250
FW250 Dimensions (H x W x D)	9.52 × 6.66 × 6.89" (24.18 × 16.92 × 17.50 cm)
Shipping Dimensions (H x W x D)	12.00 × 9.00 × 10.00" (30.48 × 22.86 × 25.40 cm)
Weight	2.2 lbs (1 kg)
Shipping Weight	5 lbs (2.27 kg)
Enclosure Type	Powder-Coated Aluminum
Knockouts	2" (x3) Round 1" (x3) Round ½" (x3) Round Type F Outlet Knockout (x1)
Breaker Slots	Single-pole AC Breakers (x4) Single-pole DC Breakers (x4) Single-pole GFDI Breaker (occupies 2)

Environmental Specifications

Table 2 Environmental Specifications

Environmental Specifications	FW250
Rated Temperature Range (meets all specifications)	0 - 25 °C (32 - 77 °F)
Installation Location	Indoor

Recommended Wire Sizes and Torque Values



IMPORTANT:

All connections must comply with local electric code and the Canadian Electric Code, Part 1.

Table 3 Torque Data for Terminal Bus Bar and Ground Bar

Wire Size		Torque	
AWG	mm ²	In-lb	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
#3	26.7	35	4.0
#2	33.6	40	4.5
#1	42.4	50	5.7
#1/0	53.5	50	5.7

Table 4 Torque Data For Breaker Lugs

Breaker Stud	Torque	
	In-lb	Nm
M8	20	2.3
¼ - 20	35	4.0
5/16 – 18	50	5.7
3/8 – 16	225	25.5



Warranty

Limited Warranty for FLEXware Products

OutBack Power Systems, Inc. (“OutBack”) provides a two-year (2) limited warranty (“Warranty”) against defects in materials and workmanship for its FLEXware products (“Product”) if installed in fixed location applications within the United States and Canada. OutBack provides a five-year (5) limited warranty if installed on an OutBack FLEX system.

The term of this Warranty begins on the Product(s) date of manufacture or the initial purchase date as indicated on the warranty registration card submitted to OutBack, whichever is later. This Warranty applies to the original OutBack Product purchaser, and is transferable only if the Product remains installed in the original use location. The warranty does not apply to any Product or Product part that has been modified or damaged by the following:

- Installation or Removal;
- Alteration or Disassembly;
- Normal Wear and Tear;
- Accident or Abuse;
- Corrosion;
- Lightning;
- Repair or service provided by an unauthorized repair facility;
- Operation or installation contrary to manufacturer product instructions;
- Fire, Floods or Acts of God;
- Shipping or Transportation;
- Incidental or consequential damage caused by other components of the power system;
- Any product whose serial number has been altered, defaced or removed; or
- Any other event not foreseeable by OutBack.

OutBack’s liability for any defective Product, or any Product part, shall be limited to the repair or replacement of the Product, at OutBack’s discretion. OutBack does not warrant or guarantee workmanship performed by any person or firm installing its Products. This Warranty does not cover the costs of installation, removal, shipping (except as described below), or reinstallation of Products or parts of Products.

THIS LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY APPLICABLE TO OUTBACK PRODUCTS. OUTBACK EXPRESSLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTIES OF ITS PRODUCTS, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. OUTBACK ALSO EXPRESSLY LIMITS ITS LIABILITY IN THE EVENT OF A PRODUCT DEFECT TO REPAIR OR REPLACEMENT IN ACCORDANCE WITH THE TERMS OF THIS LIMITED WARRANTY AND EXCLUDES ALL LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION ANY LIABILITY FOR PRODUCTS NOT BEING AVAILABLE FOR USE OR LOST REVENUES OR PROFITS, EVEN IF IT IS MADE AWARE OF SUCH POTENTIAL DAMAGES. IF YOU ARE A CONSUMER THAT PURCHASED THIS PRODUCT IN A MEMBER STATE OF THE EUROPEAN UNION, YOU MAY HAVE ADDITIONAL STATUTORY RIGHTS UNDER DIRECTIVE 1999/44/EC. THESE RIGHTS MAY VARY FROM EU MEMBER STATE TO EU MEMBER STATE. SOME STATES (OR JURISDICTIONS) MAY NOT ALLOW THE EXCLUSION OR LIMITATION OF WARRANTIES OR DAMAGES, SO THE ABOVE EXCLUSIONS OR LIMITATIONS MAY NOT APPLY TO YOU.

How to Arrange for Warranty Service

During the warranty period beginning on the invoice date, OutBack Power Systems will repair or replace products covered under this limited warranty that are returned to OutBack Power Systems' facility or to an OutBack Power Systems authorized repair facility, or that are repaired on site by an OutBack Power Systems authorized repair person.



IMPORTANT:

For full Warranty description, see previous page.

Contacting OutBack

To request warranty service, the customer must contact OutBack Technical Support at **360.435.6030** or direct at **360.618.4363** or **support@outbackpower.com**. To ensure warranty coverage, this contact must be within the effective warranty period. If service is required, the OutBack Technical Support representative will issue a Return Material Authorization (RMA) number.

Troubleshooting

In the event of a Product failure, the customer will need to work with an OutBack Technical Support representative to perform the necessary troubleshooting. This is a required step before a return can be performed. Troubleshooting requires a qualified technician to be present at the site of the Product, with a quality voltmeter that measures both DC and AC. The OutBack representative will request voltmeter readings, Product error messages, and other information. Many, many problems can be resolved on-site. If the customer is not willing or able to provide these readings (or is not willing or able to visit the site), and the Product is found to have no problems upon return, OutBack may choose to charge additional labor and handling fees up to \$180.00 U.S.

Return Material Authorization (RMA)

A request for an RMA number requires all of the following information:

1. Product model and serial number;
2. Proof-of-purchase in the form of a copy of the original Product purchase invoice or receipt confirming the Product model number and serial number;
3. Description of the problem; and
4. Shipping address for the repaired or replacement equipment.

Upon receiving this information, the OutBack representative can issue an RMA number.

Returning Product to OutBack

After receiving the RMA number, the customer must pack the Product(s) authorized for return, along with a copy of the original purchase invoice and warranty certificate, *in the original Product shipping container(s) or packaging providing equivalent or reasonable protection*. The RMA number must be written on the outside of the packaging where it is clearly visible.

Warranty Information

The Product(s) must be shipped back to OutBack Power Systems in their original or equivalent packaging, to the following address:

OutBack Power Systems

RMA # _____
6115 192nd Street NE
Arlington, WA 98223 USA

The customer must insure the shipment, or accept the risk of loss or damage during shipment. If a shipping box is needed for return of a Product, OutBack will, upon request, send a shipping box.



IMPORTANT:

OutBack is not responsible for shipping damage caused by improperly packaged Products, the repairs this damage might require, or the costs of these repairs.

If, upon receipt of the Product, OutBack determines the Product or Product part is defective and that the defect is covered under the terms of this Warranty, OutBack will then and only then ship a repaired or replacement Product or Product part to the purchaser freight prepaid, non-expedited, using a carrier of OutBack's choice, where applicable.

If Product fails in ninety (90) or fewer days from original purchase date, OutBack will replace with a new Product. If Product fails after ninety (90) days and up to expiration of warranty, OutBack will, at its discretion, either repair and return a Product, or ship a replacement Product. OutBack will determine whether a Product is to be repaired or replaced in accordance with Product age and model. OutBack will authorize advance shipment of a replacement based on Product age and model.

In cases where an OutBack dealer or distributor replaces a Product more than ninety (90) days old with a new Product, OutBack will NOT compensate that dealer or distributor with new stock unless the exchange was authorized in advance by OutBack.

Out of Warranty

If Product is out of warranty, OutBack will repair and return Product for a fee. Alternately, if applicable, upon request, OutBack will advance-ship replacement parts for a fee.

If a shipping box is needed for return of out-of-warranty Product, OutBack will, upon request, send a shipping box. The customer is responsible for paying shipping to OutBack.

The warranty period of any repaired or replacement Product or Product part is ninety (90) days from the date of shipment from OutBack, or the remainder of the initial warranty term, whichever is greater.

This Warranty is void for any Product that has been modified by the customer without authorization by OutBack. A Product with a voided warranty will be treated the same as one with an expired warranty.



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