

## Operator's Manual

# WF-9900 Series

WF-9960 | WF-9990

(The Power Center model number is located on the front panel label next to the breakers)



**THE HEARTBEAT OF TODAY'S RVS**

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ARTERRA DISTRIBUTION

(877) 294-8997

Warranty: [warranty@wfcoelectronics.com](mailto:warranty@wfcoelectronics.com)

Fax (574) 294-8698

[www.wfcoelectronics.com](http://www.wfcoelectronics.com)



Power PROs Technical Support  
(877) 294-8997

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## ⚠️ WARNING

### RISK OF ELECTRICAL SHOCK

Disconnect or isolate all power supplies before making electrical connections. More than one disconnection or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

## NOTICE

All wiring must conform to local, national, and regional codes and regulations. Use copper conductors only for all wire connections. Do not exceed the electrical ratings for the WF-9900 Series Converter/Charger or the equipment connected to it. Failure to follow these precautions may cause equipment failure and/or electrical shock which could result in severe personal injury or death.

## ⚠️ CAUTION

### INSTALLATION AND SERVICING

This product should be installed and serviced by a certified or licensed electrician familiar with applicable safety codes and installation requirements. Failure to observe this precaution could result in electrical shock or bodily injury. Consult your servicing dealer before attempting any work on this product.

## ⚠️ WARNING

### SPARK HAZARD

This unit employs components that can produce arcs or sparks. To prevent fire or explosion, do not install in compartments containing batteries or flammable materials (LP gas). This product is NOT ignition protected.

## ⚠️ CAUTION

### DO NOT OBSTRUCT VENTILLATION

To prevent fire, do not cover or obstruct front cover ventilation openings as overheating may result. This series is a zero-clearance design and as such, the only means of ventilation is through the front cover openings.

## GENERAL INFORMATION

### WF-9900 Series Power Center Safety Features

### Reverse Battery Protection

The WF-9900 Series Power Centers will charge the 12-volt House battery if installed. A battery DOES NOT have to be installed for WF-9900 Series Power Center converter operation. When a battery is installed, two reverse polarity fuses protect the converter circuitry. The fuses are located along the left-center edge of the DC fuse board below the VCC+ lug. Refer to Figure 1 below. This feature prevents permanent damage to the converter from a battery connected into the circuit backwards. In addition to protecting the converter section, the reverse polarity fuses are the main connection between the converter and the DC fuse board.

The fuse values and quantity vary depending on which WF-9900 Series Power Center you have. Refer to the table below.

- WF-9960 - 20A (4)
- WF-9990 - 25A (4)

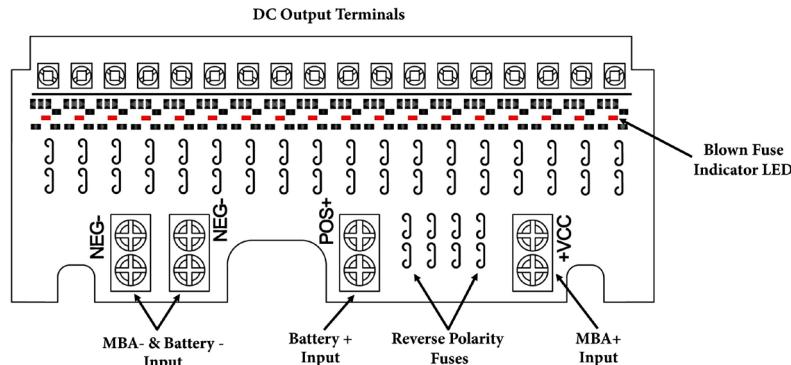


Figure 1

### Blown Fuse Indicators on DC Fuse Board

The DC Fuse Board has individual blown fuse indicators as standard equipment. Each of the 18 DC fuse circuits contain a Red LED to indicate a blown fuse. If one of the circuits draws more current than the rating of the fuse, the fuse will blow. When this occurs, the Red LED for that circuit will illuminate. **NOTE:** The fuse board employs surface mount LEDs which are barely visible to the naked eye when not illuminated. Replace the blown fuse with a known good fuse of the same rating. **NOTE:** If the replacement fuse blows again, check that circuit for a short or overload condition.

### Automatic Cooling Fan

The cooling fan in the WF-9900 Series Power Center is two-speed and is controlled by the current drawn out of the converter to the applied load. The on-board microprocessor increases fan speed as the total load increases and decreases fan speed as the load decreases. Unlike traditional temperature-controlled fans, the load-controlled fan provides better component cooling by avoiding temperature spikes which can lead to premature component failure.

### Over-Temperature Protection

If the internal temperature of the converter exceeds a critical point, it will shut down. This protects the unit from excessive heat that may damage sensitive components. The unit will restart once the temperature inside has dropped.

### Electronic Current Limiting

In the event that the output current exceeds the maximum rating for the WF-9900 Series Power Center converter, the output current will remain constant but the output voltage will begin to drop. If this occurs, the unit will recover once loads are reduced.

### Short-Circuit Protection

Should a short circuit occur in the RV, the WF-9900 Series Power Center converter will drop the voltage output to zero volts. If the short-circuit condition is removed and no other fault conditions are detected, the converter will resume normal operation. However, short-circuit conditions are **dangerous**, and the RV will require inspection by a qualified service technician.

# CIRCUIT PROTECTION

## WF-9900 Series Power Center Fuses and Breakers



### DC Fuses (12 Volts)

The DC fuse board has spaces for eighteen DC circuits. This includes three 30 Amp circuits (positions F16 through F18) to be used for slide-outs or other higher current loads. These circuits have a maximum rating of 30 Amps. The remaining fifteen circuits have a maximum 20 Amp rating. The circuit fuses and the Reverse Battery Protection fuses should be replaced with ATC or ATO automotive type fuses such as:

- Littelfuse type 257
- Bussmann type ATC

### AC Circuit Breakers (120/240 Volts)

The AC Breaker side of the WF-9900 Series Power Center is located on upper the left-center side. The WF-9900 Series Power Center accepts standard residential breakers. A total of fourteen breakers can be installed: two 50 Amp Main breakers and up to a maximum of twelve AC Branch circuits when using duplex breakers. A list of factory tested and approved breakers follows. The breakers may be purchased at most big-box department stores and home centers.

#### UL-Listed Main Circuit Breakers, Rated for 120V, Maximum 50A

The following breakers have been factory tested and approved for use as two pole 50 Amp Main breakers in the WF-9900 Series Power Center:

Manufacturer	Model/Cat. No./Type
Cutler Hammer	Type BR
ITE/Siemens	Type QP or QT
Square D	Type HOM
Murray	Type MP or MH
General Electric	Type THQL

#### UL-Listed Branch Circuit Breakers, Rated for 120V, Maximum 20A

The following breakers have been factory tested and approved for use as Branch breakers in the WF-9900 Series Power Center:

Manufacturer	Model/Cat. No./Type
Cutler Hammer	Type BRD
ITE/Siemens	Type QP or QT
Square D	Type HOMT
Murray	Type MPT or MHT
General Electric	Type THQL



When replacing any of the installed circuit breakers, the replacement should be of the same manufacturer, type designation, and equal or greater interrupting rating, not to exceed 50 A. The "Short-Circuit-Current" rating for the breaker should be 10,000 Amps at 120/240 VAC.  
Breaker Filler Plates: Model #FP-01 or FP-01B (Black)

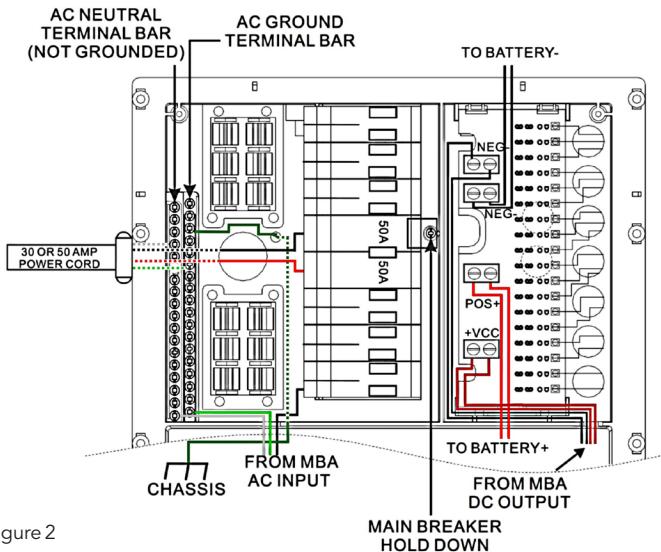


Figure 2

## OPERATIONAL FEATURES Converter Operation Modes



### Three-Stage Smart Charging

In order to maximize battery life, it is best to charge batteries slowly, keep them topped off with a trickle-charge when the RV is not being used. The 3-Stage "smart" charger continuously measures the battery voltage output and regulates the amount of charge using three modes of operation; Absorption, Bulk and Float modes.

All WFCO power converters are automatic three-stage switching power supplies. The converter senses which mode it needs to be in by checking the RV system voltage.

The converter normally provides a constant target output voltage of 13.6 VDC (nominal) to power all the branch circuits. However, it is current limited, and if the output (load) current reaches its maximum, the output voltage will drop as necessary to hold the converter's maximum output current level (the Amperage rating) without exceeding it.

If the output current reaches its maximum (normally caused by a discharged battery), this will cause the converter to go into Bulk Mode, which means the target output voltage will change to 14.4 VDC and a timer will start. Although the converter is outputting 14.4 VDC, you will not be able to read that on a voltmeter due to the voltage-current relationship. From the paragraph above, as load current increases, output voltage decreases. The actual output voltage will not rise until the load current is reduced, which happens naturally as the battery charges or if 12 VDC appliances are turned off.

Bulk Mode will be maintained until the current draw drops to approximately five Amps, or until the timer reaches four hours (whichever happens first). Then the target output voltage is changed back to 13.6 VDC for Absorption Mode. Lights that are powered from the output may change brightness slightly at that time.

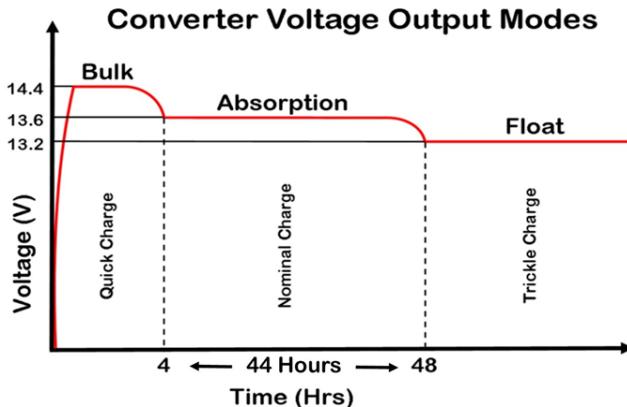


Figure 3

**Note:** For a detailed explanation of the charging modes, please refer to our publication "Theory of Operation", document #AD-TD-0001-0.

## TROUBLESHOOTING INSTRUCTIONS

### Troubleshooting the WF-8900 Series Power Center

Refer to the Troubleshooting Guide for the WF-9900 Series Power Center (Figure 4) below.

### Check Converter Output Voltage

Before checking the WF-9900 Series Power Center output voltage, disconnect the battery cables at the battery. Make sure the converter is plugged into an AC source (105-130 VAC). Check the converter output voltage at the battery with a voltmeter. Place the meter probes on the disconnected battery cables; place the **Positive** (red) meter probe on the + Positive red battery wire and place the **Negative** (black) meter probe on the - Negative black wire on the battery cable. Be sure you have good connections at the cables. If the voltage reads 13.6 VDC (+/- 0.2) with no load, the converter is functioning properly.

If the converter output voltage at the battery reads 0.0 VDC, or if the battery is not charging, check for an open inline fuse in the battery wire circuit. One may have been installed by the RV manufacturer. Also check for loose wiring connections.

### Reverse Polarity Fuses

If there is no DC output coming from the WF-9900 Series Power Center converter section, first check the reverse polarity fuses on the fuse board. Then, visually inspect the fuses for any breaks in the fuse element. If no breaks are found, use a continuity tester to check for continuity. If the reverse polarity fuses are blown, it means the RV battery was accidentally connected in reverse, either at the battery or at the converter. Investigate the connections and reconnect the cables properly. Replace the fuse with the same type and Amperage rating as the original.



**IMPORTANT:** These fuses protect the converter from damage in the event that the RV battery is accidentally connected in reverse. A reversed battery connection, even if for only a second, will cause these fuses to blow.

If the above checks have been made but the converter output still reads 0.0 VDC, the converter is not functioning properly. Contact the Arterra Distribution Power PROs at 1 (877) 294-8997. Before placing the call, please have available the WF-9900 Series Power Center model number from the front panel label and the 14-digit serial number from the bar code tag located on the MBA mounting plate.

### Troubleshooting Guide for the WF- 9900 Series Power Center

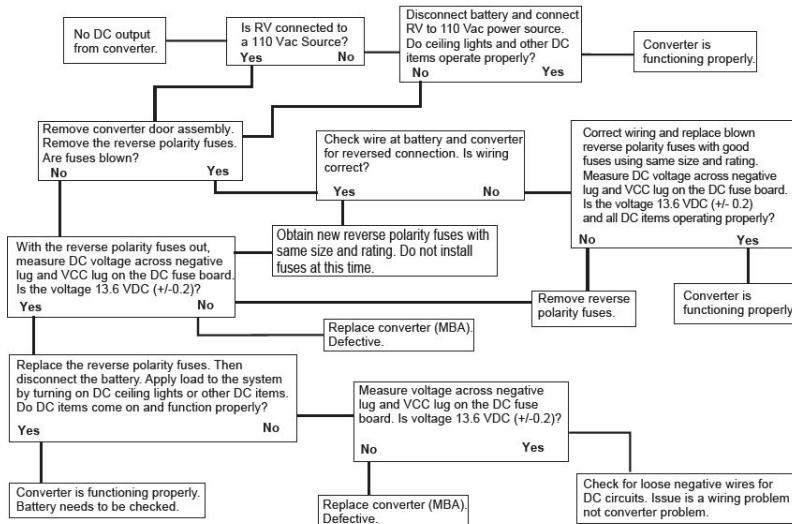


Figure 4

Should it be determined that the converter section of the WF-9900 Series Power Center needs to be replaced, removal of the Main Board Assembly is a simple process.

#### Replacing the Converter Section (MBA)

**Make sure no AC power is coming into the RV from either the Shore Power cord or an on-board generator. Remove and set aside the Reverse Polarity Fuses to disconnect the converter section from the rest of the RV DC power.**



Perform the following steps:

1. Push on the upper center of the door to drop it down. Remove the door assembly by loosening the two screws located in the upper left and right corners. The screws are captive and will not fall out. Pull forward and outward on the door assembly to clear the case.
2. In the upper left portion of the fuse board, loosen both NEG- lugs (White wires). In the lower left portion of the fuse board, loosen both VCC+ lugs (Red wires). Do not back the lug screws all the way out.
3. Locate the tab at the bottom of the fuse board holding the board in place. Gently depress the tab allowing the fuse board to be pulled forward.
4. With the fuse board pulled slightly away from its mounting, pull the Red and White wires out of the lugs.
5. In the AC section of the enclosure, locate the Black wire coming up from the converter (MBA) located in the lower section of the enclosure. As an extra precaution, **MAKE SURE THE CONVERTER BREAKER IS IN THE OFF POSITION**. Remove the wire from the breaker. NOTE: this wire has a metal pin terminal on the end that is inserted into the breaker. Remove and position out of the way any wire connected to the pigtail.
6. Locate and remove the converter's Green Ground wire attached to the AC Ground bar on the left side of the compartment. In a similar fashion, locate and remove the converter's White Neutral wire attached to the AC Neutral bar located just above the AC Ground bar.
7. In the converter compartment located below the breakers, remove the two screws at the front of the MBA holding it in place. Slide the MBA forward routing the wires through the slots in the case until the MBA clears the enclosure.

If the MBA is being returned under a warranty claim, follow the packaging instructions in your warranty claim packet.

When installing a replacement MBA, reverse the order of steps 1-7. Make sure all wiring connections are torqued to the proper values found in the torque chart located on the back of the door assembly.

## GENERAL COMPLIANCE INFORMATION

### Agency Listings

#### UL

The WF-9900 Series Power Centers are UL-Listed, and cUL-Listed (Canadian).

#### FCC Compliance Class B

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.



## INSTALLATION INSTRUCTIONS

### Installing the WF-9900 Series Power Center

#### Mounting the Enclosure

The WF-9900 Series enclosure should be mounted in an accessible area such as a wall or in the side of a cabinet. The front of the enclosure should not be obstructed to allow free air flow for the cooling fan. The enclosure will slide into a rough opening of 12 1/2" W x 13 3/4" H. The enclosure depth is 8". After wiring is completed, the enclosure fastens to the wall or cabinet using 8 wood screws (not supplied).

#### WARNING

##### RISK OF ELECTRICAL SHOCK

Disconnect or isolate all power supplies before making electrical connections. More than one disconnection or isolation may be required to completely de-energize equipment. Contact with components carrying hazardous voltage can cause electric shock and may result in severe personal injury or death.

#### Wiring the AC Breakers

**Make sure no AC power is coming into the RV from either the Shore Power cord or an on-board generator.** Determine the proper size breakers for the loads the WF-9900 Series Power Center will be powering. You can use either single or duplex breakers, or a combination of both. We recommend that all the breakers used be of the same brand. When using duplex style circuit breakers, a total of 14 breakers can be mounted in the WF-9900 Series Power Center: 2-50 Amp Main breakers and up to 12 Branch breakers. Refer to the tables on page 5 for a selection of approved breakers. The Main breakers are to be installed in the center-most positions. See the wiring diagram below. A hold down clip is provided to keep the breakers securely in place.

The 50 Amp power cord is routed through the large knockout in the AC wiring compartment and secured with a Romex clamp. The Black (Hot) wire is connected to one of the 50 Amp Main breaker as shown. The Red (Hot) wire is connected to the other 50 Amp Main breaker. The White (Neutral) wire is connected to the Neutral Terminal bar on the left side of the wiring compartment. The Green (Ground) wire is connected to the Ground Terminal bar also located to the left side of the compartment.

Route the Romex leads for the Branch circuits through the Strain Reliefs in the back of the wiring compartment. The strain reliefs are self-sealing once the wire is pushed through and do not require cable clamps. Connect the Black wire to the Branch breaker and the White and Ground wires to the appropriate Terminal bar.

The Black power wire for the converter has a pigtail connection. The metal pin is inserted in the Branch breaker designated for converter power. The end with the wire nut can be used to power another circuit if necessary. If not used, leave the wire nut installed and push the wire to the side. Make sure all terminals are torqued to the specifications listed on the back of the door assembly.

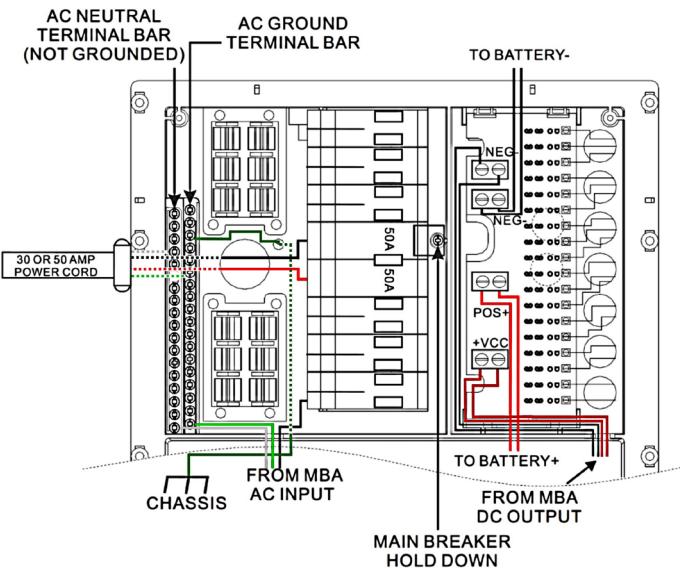


Figure 5

## Wiring the DC Fuse Board

**Make sure the house battery is disconnected before beginning the DC wiring.** Determine what DC loads are to be connected to the fuse board and what position they will occupy. Circuits F16 through F18 can be used for slide-outs or other higher current loads and can have a maximum 30 Amp ATO or ATC fuse installed. The remaining circuits are general purpose and can have up to 20 Amp ATO or ATC fuses installed. Make sure the fuses are seated properly.

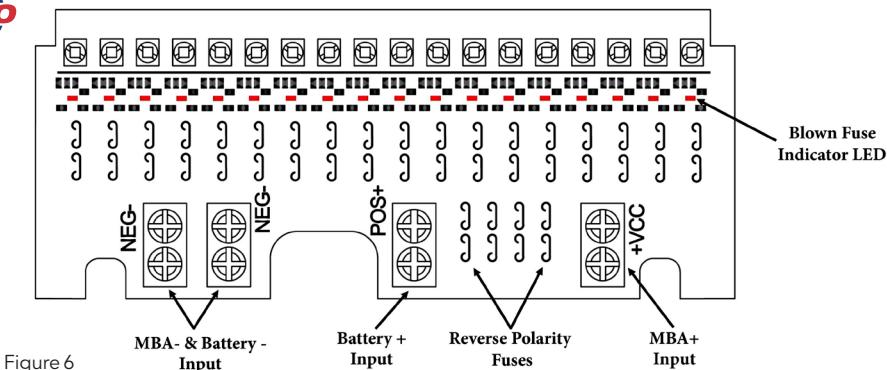
All models have output screw terminal connections. Strip approximately 1/4" of insulation from the load's wire and insert into the screw terminal. Tighten the terminal to the torque specified on the back of the enclosure.

There may be one or two wires (typically Red) coming from the battery. Connect these wires to the POS+ lug located directly above the Reverse Polarity fuses. Each lug position will accept up to a 2 AWG wire. Make sure the lugs are torqued properly.

As a last step, install a separate bus bar in a location behind the converter. If installing a WF-9960 Power Center, run an 8 AWG wire from the lower NEG- lug towards the top left of the DC fuse board to this bus bar. If installing a WF-9990 Power Center, run two 8 AWG or one 6 AWG wire from this NEG- lug to the bus bar. Connect the battery Negative wire to this bus bar along with all the negative DC load wires. Also, run a wire from the bus bar to chassis ground.



DC Output Terminals



#### WF-9900 Power Center Specification

Model No.	WF-9960	WF-9990
<b>Converter Input Power:</b>		
Voltage:	105-130VAC	
Frequency:	50Hz/60 Hz (47 ~ 63 Hz)	
Power Factor:	≥ 0.98	
Max. Input Current @105VAC	9.9A	14.9A
Max Power	1020 Watts	1530 Watts
<b>Converter Output Power</b>		
Continuous Power:	815 Watts	1225 Watts
Rated DC Output Voltage	13.6V	
Rated DC Current	60A	90A
Charging Control	Automatically controlled by the microprocessor	
Charging Modes	3-stage Intelligent charge	
Intelligent Charge Modes	Absorption - Bulk - Float (Storage)	
Battery Adaptability	LA/AGM	
Absorption Charge Voltage	13.6V	
Bulk Charge Voltage: (4 Hrs)	14.4V	
Float (Storage) Voltage	13.2V	
Regulation	± 1% accuracy against input or load changes	
Cooling Fan	Two speed according to the DC load Amperage	
Efficiency:	> 80% (on 100% of load condition)	
<b>Protection:</b>		
Overload	Current-limiting & shut down; auto recovery upon return to normal load	
Short-Circuit	Shut down & auto recovery upon return to normal load	
Over-Temperature	Shut down & auto recovery upon return to normal load	
Battery Reverse Polarity	Protected by fuse; same rated fuse replacement required	
<b>AC Distribution</b>		
Mains Rating	Max. 50A / 240VAC	
Breakers	50A Mains with up to 12 AC Branch Circuits	
Romex Strain Reliefs	12 position Romex strain reliefs for AC Branch Circuits	
<b>DC Distribution Board</b>		
Standard DC Output loops	3 x 30 AMP ; 15 x 20 AMP max. each	
LED on Fuse Board:	Total 18 chip-LEDs; Red indicating fuse blown status of loops and reverse polarity	
Visual Window:	Special design transparent window for ease in reading LED status	
<b>Mechanical:</b>		
Zero Clearance:	Special design air cooling duct to avoid heat dissipating into confined space	
Dimension: W x H x D	14.13 x 14.37 x 8.13 inch / 359 x 365x 207 mm	
Cutout Size: W x H	12.6 x 13.78 inch / 320 x 350 mm	
Weight:	13 lbs /5.9 kg	14.8 lbs /6.7 kg
Environmental Condition:	20 ~ 90% Non-condensing	
Agency:	UL458 /UL67 certified; FCC Class B compliance	

12 Figure 7

## **CONSUMER LIMITED WARRANTY for WFCO Electronic Products**



WFCO extends, to the original owner, a Two Year Limited Product Warranty. This warranty is in effect from the date of original purchase for a period of two (2) years. This limited warranty is extended specifically for and is limited to Recreational Vehicle application and is only valid within the continental United States, Alaska, Hawaii and the Provinces of Canada. WFCO warrants, to the owner, that its products are free from defects in material and workmanship under normal use and service based on its intended use and function. This warranty is limited to the repair or replacement, at WFCO's discretion, of any defective parts or defective assembly. Any implied warranties of merchantability or fitness for intended use are limited in duration unless applicable State Law provides otherwise. You may have other rights as specified by each individual state.

### **EXCLUSIONS and LIMITATIONS**

The OEM warranty specifically does not apply to the following:

- Any WFCO product that has been repaired or altered by an unauthorized person;
- Any damage caused by misuse, faulty installation, testing, negligence, accident or any WFCO product installed in a commercial vehicle;
- Any WFCO product, whose serial number has been defaced, altered or removed;
- Any WFCO product, whose installation has not been in accordance to the WFCO written instructions;
- Any consequential damages arising from the loss of use of the product including but not limited to: inconvenience, loss of service, loss of revenue, loss or damage to personal property, cost of all services performed in removing or replacing the WFCO product. Specifications are subject to change without notice or obligation.
- Any WFCO Electronics products sold through unauthorized Internet sources (Example: eBay) will be excluded from all warranty coverage offered by Arterra Distribution / WFCO.

### **CONSUMER WARRANTY CLAIM PROCEDURE**

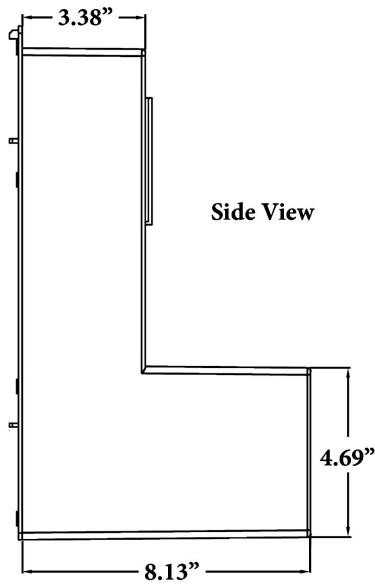
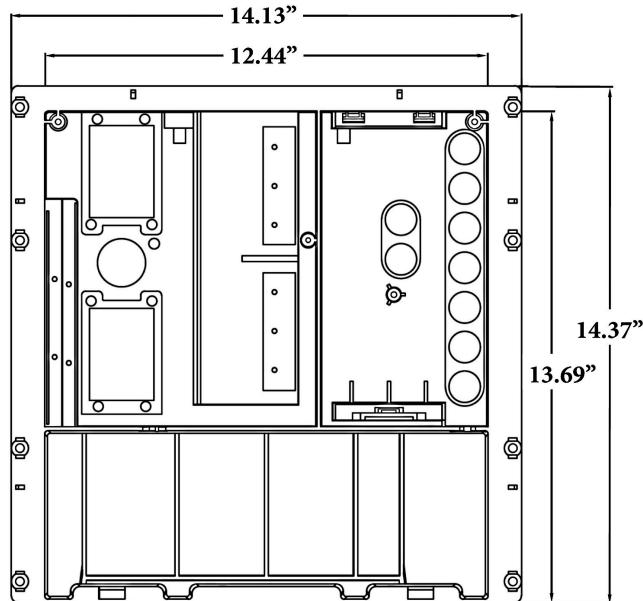
Upon determination and validation by an authorized OEM dealer that a WFCO product has a defect, a Return Goods Authorization (RGA) number will be required before the product can be returned. The RGA number can be requested by completing the Warranty Information Fax Sheet and appropriate Troubleshooting Form found at [www.wfcoelectronics.com](http://www.wfcoelectronics.com). Once these forms have been completed, email the forms along with Proof of Purchase to [warranty@wfcoelectronics.com](mailto:warranty@wfcoelectronics.com) or fax the three documents to the Warranty Department at (574) 294-8698. After receipt of the forms, an RGA number will be issued. This number shall appear on all correspondence with warranty service. Upon validation of the warranty, WFCO shall replace the product with a like product. The RGA number shall be placed on the outside of the carton used to return the product for ease of identification. Do not mark directly on the product. The product must be packaged properly to avoid further product damage which could cause a non-warrantable condition.

### **WARRANTY ASSISTANCE**

The consumer may contact the selling Dealer or OEM for warranty assistance. The consumer may also contact Arterra Distribution, exclusive distributor to WFCO Products at: (574) 294-8997 or Fax (574) 294-8698.



## WF-9900 Series Dimensional Drawing







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