Operator's Manual

WF-68100 Series

Deckmount Converter-Charger

THE **HEARTBEAT** OF TODAY'S RVS

Distributed in the U.S.A. and Canada by
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(877) 294-8997

Warranty: warranty@wfcoelectronics.com

Fax (574) 294-8698

www.wfcoelectronics.com

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TABLE OF CONTENTS

⚠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 regulations. Use copper conductors only for all wire connections. Do not exceed the electrical ratings for the WF-68100 Converter-Charger or the equipment connected to it. May cause equipment failure and/or electrical shock which may 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 HAZZARD

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. DO NOT mount unit in zero-clearance compartment as overheating may result. This unit requires a 2 cubic foot (min.) vented area around the unit for cool air exchange.

⚠WARNING

BATTERY SYSTEM

Use converter only on appropriate battery systems. Other usage may cause personal injury and damage. Consult all battery manufacturer's recommendations for additional safety information before use.

GENERAL INFORMATION

WF-68100 Series Converter-Charger Safety Features

Reverse Battery Protection

The WF-68100 Series Converter-Chargers will charge the 12-volt house battery if installed. A battery does not have to be installed for WF-68100 Series Converter-Chargers operation. When a battery is installed, three reverse polarity fuses are installed to protect the converter circuitry. The fuses are located on the rear panel of the enclosure near the AC power cord (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-charger, the reverse polarity fuses are the main connection between the converter-charger and the DC fuse board of a distribution center.

Automatic Cooling Fan

The cooling fan in the WF-68100 Series Converter-Chargers is 2-stage 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.

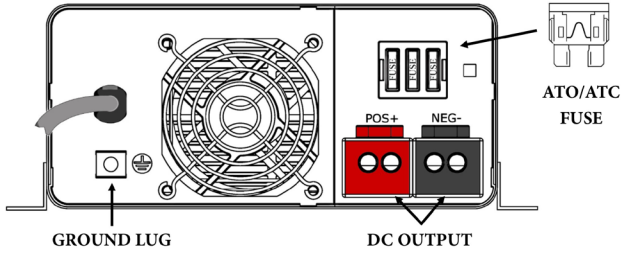

Figure 1

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-68100 Series Converter-Charger, 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-68100 Series Converter-Charger 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 an RV will require inspection by a qualified service technician.

CIRCUIT PROTECTION
WF-68100 Series Converter-Charger Fuses

DC Fuses (12 Volts)

The DC fuse receptacle on the rear panel of the WF-68100 Series Converter-Charger has space for 3 (three) identical Reverse Battery Protection fuses (see Figure 1 above). These fuses should be replaced with ATC or ATO automotive type fuses, such as Littelfuse type 257 or Bussmann type ATC. The fuses are 35 Amp.

OPERATIONAL FEATURES
Converter Operation Modes

Three-Stage Smart Charging

The three-stage "smart" charger continuously measures the battery voltage output and regulates the amount of charge using three modes of operation; Absorption, Bulk, and Float.

3-Stage Charging

WFCO converters of every style have become the favored brand for power conversion and electric distribution in the RV industry. They provide RV owners an efficient and cost-effective method to use an AC power source and provide power to DC components inside the RV, while charging accessory batteries at the same time.

Smart Engineering: Three Stage Charging is Better

WFCO's automatic three-stage converters handle every charging need for the RV while extending the battery's life. Well-maintained batteries should never need more than two-stage (Normal and Trickle) charging. Our third stage (Bulk) is provided for the rare times a battery needs extra power for charging. RVs are frequently sold with at least one 12 VDC accessory battery installed. This battery is normally a deep-cycle battery that has the ability to sustain a slower drain of power. RV owners find this useful when powering loads such as lights, radios, and refrigerators without being connected to AC power or running the motorhome engine. As soon as the RV is connected to AC power, the converter begins charging the battery as needed, while, at the same time, providing 12 VDC power to loads such as lights, radios, and refrigerators.

When the RV is connected to AC power, users frequently use the lights, refrigerators, fans, and other electronics as they would in their home. RV users also expect the battery to be fully charged when they want to disconnect from power and move the RV, or when they are dry camping and turn off their generator.

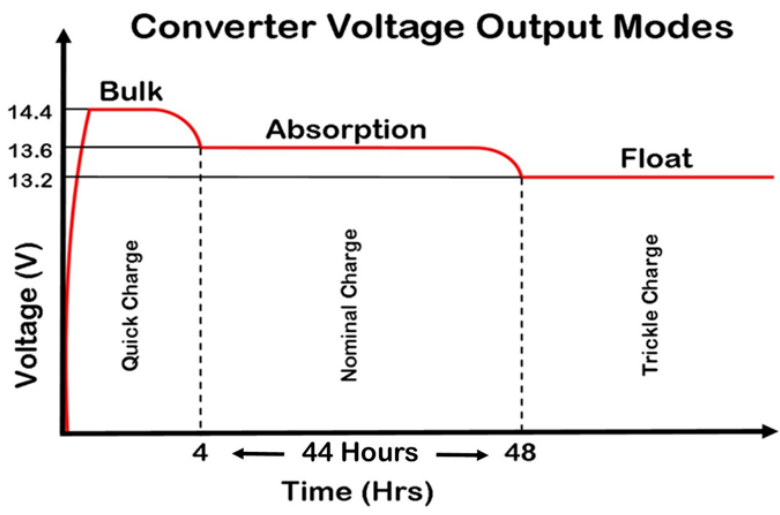

Figure 2

Absorption Mode:

This is the default, or normal operation, providing an output of 13.6 volts DC. Because RVs today are designed with converters sized to provide ample DC output power for all DC loads in normal usage, an RV will rarely require anything other than Absorption Mode.

When a WFCO converter is connected to a battery in Absorption Mode, power is available for charging that battery whenever the converter output is greater than the voltage level of the battery. If the battery is at or near fully charged, the current draw from the converter to the battery may be very small. On the other hand, if the battery were to be fully discharged, the current draw from the converter to the battery may be quite high.

Testing has shown that a completely discharged battery (11.9 VDC) connected to a WFCO converter in Absorption Mode with an output of 13.6 VDC and having a 20 Amp lighting load connected to the converter will charge the battery to its fully charged level of 12.7 VDC in fewer than three hours. Adding more DC loads will lessen the amount of current available and will lengthen the time required to charge the battery. Batteries with damaged cells will also require additional time to charge and may never reach a full charge voltage.

Because of the relationship between voltage and amperage, once the converter reaches its maximum rated operating current level, any increase in the DC load will start to decrease the voltage output level. When the output from the converter reaches a preset level, the converter will go into Bulk Mode.

Bulk Mode:

This is designed to charge a significantly discharged battery in a little less time than Absorption Mode. The microprocessor in WFCO converters continuously monitors the DC line voltage. When the microprocessor detects the preset voltage level, it will boost the converter voltage to 14.4 VDC. The increased voltage will help the battery charge faster, while still providing power to the DC appliances in the RV.

In Bulk Mode, it may not be possible to observe the 14.4 VDC output because of the voltage-current relationship. To measure the 14.4 VDC, reduce some DC loads while monitoring the voltage at the converter output. As the DC loads are removed, the voltage will begin to climb until 14.4 VDC (nominal) is shown on the meter.

As the battery continues to charge, the current drawn by the battery will gradually decrease. WFCO converters are designed to drop out of Bulk Mode when the total amperage draw from the converter reaches a preset point, indicating the battery is charged. If the amperage draw stays above the preset point, the converter will stay in Bulk Mode for a maximum of four hours. These features have been implemented to protect and extend the life of the battery.

Float Mode:

This is the third stage of converter operation. This mode is designed to provide a trickle charge to the battery. If the converter observes no significant variations in current draw for approximately 44 continuous hours, it will drop the output of the converter from 13.6 VDC to 13.2 VDC. This lower voltage will keep the battery charged while the RV is not in use. This also helps preserve the life of the battery, while keeping it charged and ready for use. A change in DC current will cause the converter to exit Float Mode and return to the default, or normal, Absorption Mode.

Note: The converter, while in Float Mode, will continue to supply a trickle charge to the battery. If the RV is in storage for thirty (30) days or more, be sure to check the battery and its fluid levels.

Front Panel Features:

Three front panel LEDs show the converter's operating status at a glance:

- Green LED – Normal operation, connected to 110 VAC.
- Amber LED – Steady ON: the battery is discharging when operating on battery only.
  Flickering: the battery is approaching a low level
- Red LED – A fault has been determined in one of the protection circuits: Overload, Over-Temperature or Short-Circuit. The LED does not light if a battery Reverse Polarity occurs.

A Manual Override switch is provided to force the converter into Bulk Mode to quick charge the batteries if necessary. **NOTE:** Placing the converter into Bulk Mode with a fully charged battery could overcharge the battery.

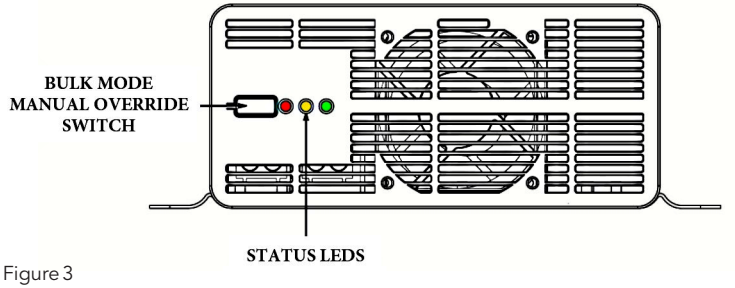

Figure 3

⚠CAUTION

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Converter Output Voltage

Before checking the WF-68100 Series Converter-Charger output voltage, disconnect the battery cables at the battery. Make sure the converter is plugged into an AC source (105-130 Volts). 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 (Figure 4). Be sure you have good connections at the cables. If the voltage reads 13.6 - 14.4 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-68100 Series Converter-Charger output lugs, first check the reverse polarity fuses on the rear panel. 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 if the RV battery is accidentally connected in reverse. A reversed battery connection, even if for only a second, will cause these fuses to blow.

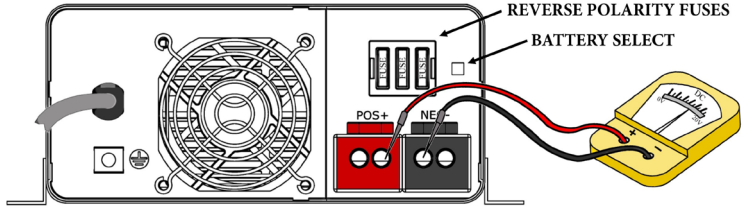

Figure 4

Battery Select Switch

The Battery Select switch is a 2-position slide switch that selects either Lead Acid/AGM or Gel battery. In the Lead Acid/AGM position, the converter will output both Absorption and Bulk Mode voltages.

With the Battery Select switch in the GEL position, the output will remain in Absorption Mode. Bulk Mode is disabled to prevent damage to the GEL batteries.

If the above checks have been made but the converter output still reads 0.0 VDC, the converter is not functioning properly.

Troubleshooting Guide for the WF- 68100 Series Deck Mount

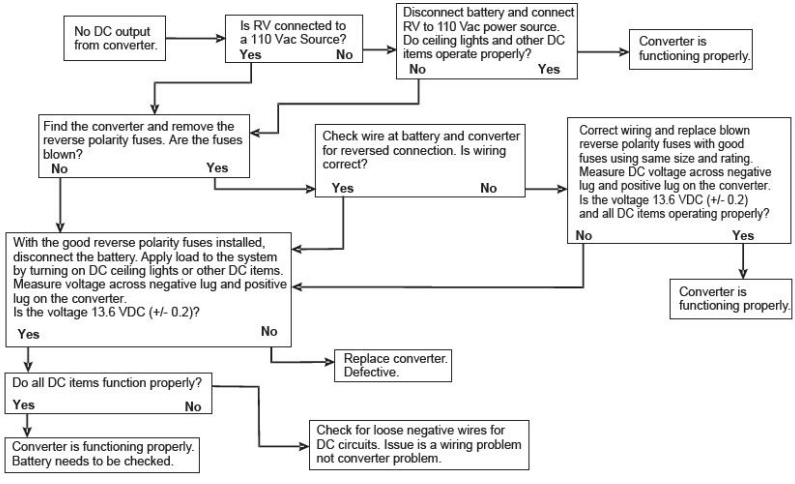

Figure 5

GENERAL COMPLIANCE INFORMATION
Agency Listings

UL

The WF-68100 Series Converter-Chargers 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.

Mounting the Enclosure

The WF-68100 Series Converter-Charger enclosure should be mounted in an accessible area such as a wall or in the side of a cabinet. Select a mounting location near the shore power and battery (batteries), in an area where the owner is unlikely to store items as this could reduce clearance requirements, obstruct ventilation openings and affect the performance of the converter. The location should be selected to prevent excessive heat, water, moisture, dust and dirt entering the unit installed. As a rule, allow a minimum of two cubic feet of clear airspace and or any additional venting as necessary to prevent the unit from overheating. The front of the enclosure should not be obstructed to allow free air flow for the cooling fan (Figure 6).

An 8AWG copper conductor shall be used to bond the WF-68100 Series Converter-Charger to the vehicle frame.

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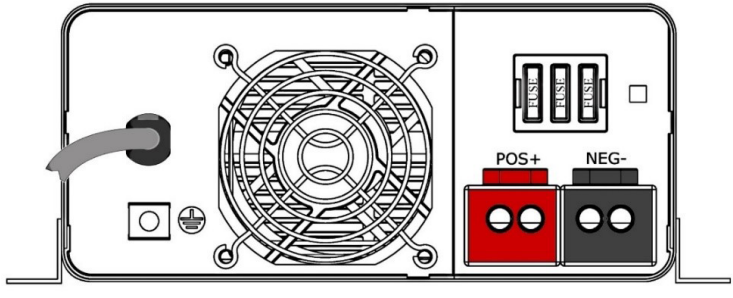


Figure 6

DC Connections

Connect a Red 2 AWG wire to the POS+ lug on the distribution center's fuse board. Make sure this lug is torqued properly. In a similar fashion, connect a Black 2 AWG wire to the NEG- lug on the distribution center's fuse board.

AC Connections

The WF-68100 Series Converter-Chargers receive power from the power cord located to the left of the rear panel fan. Due to the higher current required from the AC line to produce the high DC current output, a 20 Amp power plug is provided.

The 20 Amp plug and corresponding receptacle are shown in Figure 7 below. The 20 Amp receptacle must be wired back to the fuse box using 12AWG wire minimum.

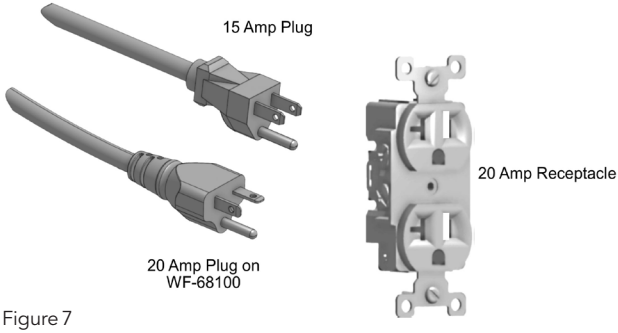


Figure 7

WF-6800 Converter Specification	
Model No.	**WF-68100**
Converter Input Power	
Voltage:	105-130VAC
Frequency:	50Hz/60 Hz (47 ~ 63 Hz)
Power Factor:	≧ 0.98
Max. Input Current @105VAC	16.5A
Max Power	1700 Watt
Converter Output Power	
Continuous Power:	1360 Watt
Rated DC Cutput Voltage	13.6V
Rated DC Current	100A
Charging Control	Automatically controlled by microprocessor
Charging Modes	3-stage intelligent charge
Intelligent Charge Mode	Absorption, Bulk and Float (Storage)
Battery Adaptability	LA/AGM
Absorption Charge Voltage	13.6V
Bulk Charge Voltage: (4 Hrs)	14.4V
Float Charge 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)
Protection	
Overload	Current-limiting & shut down; auto recovery upon normal load
Short-Circuit	Shut down & auto recovery upon return to normal
Over-Temperature	Shut down & auto recovery upon return to normal
Battery Reverse Polarity	Protected by fuse; same rated fuse replacement required
Display	
Green LED	Normal operation
Amber LED	Steady on - battery discharging; flickering - battery approaching low level
Red LED	All protection circuits except battery reverse protection
Button	Bulk mode (Press and hold the button for 5 seconds)
Dip switch	AGM/LEAD-ACID or GEL-CELL
DC Distribution Board	
DC Battery Lugs: NEG-,POS+	Lugs accept 2 to 14 AWG wire; Lug screws are 5/16" Allen Head
Mechanical	
Dimension: W x H x D	9.94 x 3.88 x 13.44 inches / 252 x 99 x 342 mm
Weight:	10.25 lbs. / 4.65 kg
Environmental Condition	20 ~ 90% Non-condensing
Agency	UL458 certified; FCC Class B compliant

Figure 8

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:

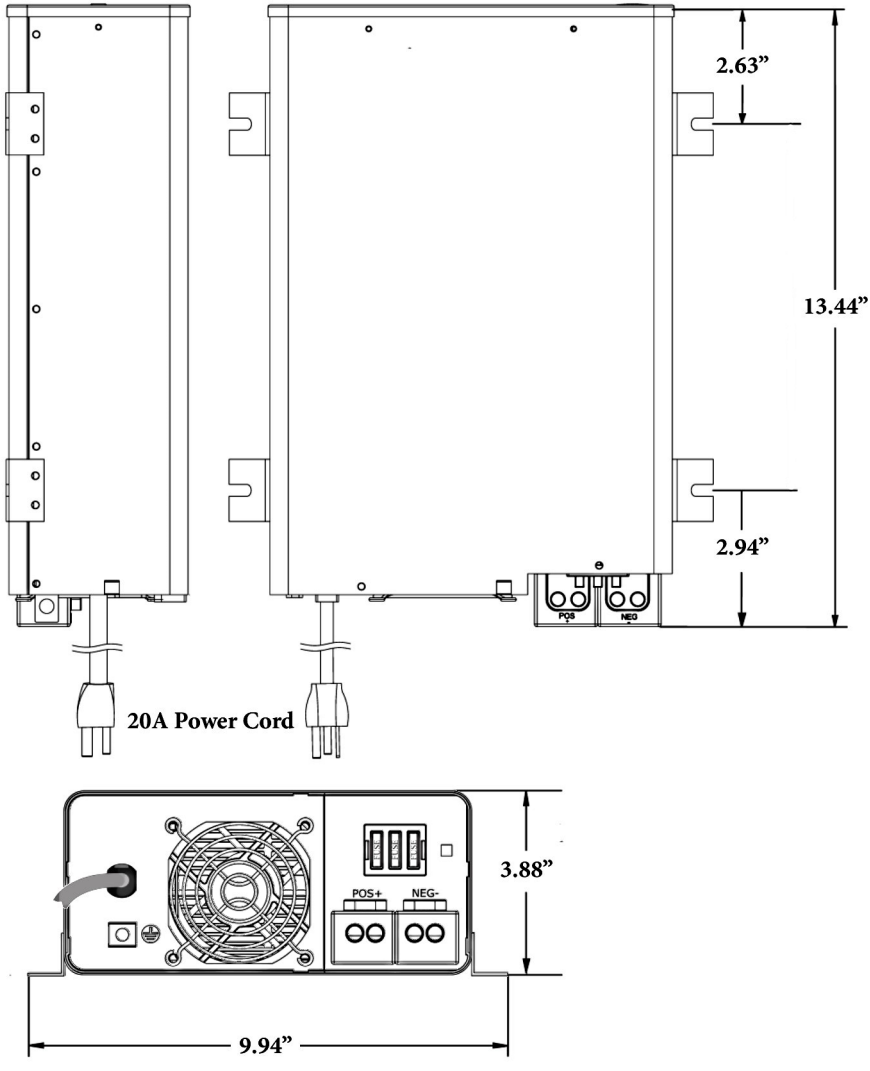
- Any WFCO product that has been repaired or altered by an unauthorized person;
- Any damage caused by misuse, faulty installation, testing, negligence, accident or any WFCO product installed in a commercial vehicle;
- Any WFCO product, whose serial number has been defaced, altered or removed;
- Any 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. Once these forms have been completed, email the forms along with Proof of Purchase to 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.


2.63”
13.44”
2.94”
POS
NEG
20A Power Cord
3.88”
POS+
NEG-
9.94”

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