

# WF-5110RS True Sine Wave Inverter

## WF-5110RS

(The Inverter model number is located on the label on top of the enclosure)



## THE HEARTBEAT OF TODAY'S RVs

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(877) 294-8997

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

Fax (574) 294-8698

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



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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 regulations. Use copper conductors only for all wire connections. Do not exceed the electrical ratings for the WF-5110R/RS Inverter as this could cause equipment failure and/or electrical shock which may result in severe personal injury or death.

**⚠ CAUTION**

**EQUIPMENT SERVICING**

This product should be installed by an experienced certified technician. CAUTION and care must be taken when servicing this equipment. To prevent severe shock or electrocution, consult your servicing dealer.

**⚠ 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. For continued protection against risk of fire or electric shock, replace faulty DC fuses and AC breakers with ones of the same type and ratings as are installed.

**⚠ CAUTION**

**BATTERY MAINTENANCE**

When using a battery with the WF-5110R/RS Inverter, follow battery maintenance procedures. Check the fluid level in any battery connected to RV charging system on a monthly basis.

## GENERAL INFORMATION

The WF-5110RS is a 1000 Watt standalone power inverter with AC run-through suitable for use in RV and other applications where clean 120 VAC voltage is required.

When 115 VAC utility power is applied to the WF-5110R Inverter through the Shore cord, 120 VAC will pass through the WF-5110RS Inverter to appliances. Should utility power be cut off, the WF-5110RS automatically switches to invert mode, providing clean 120 VAC to the appliances. When utility power is reapplied, the WF-5110R switches back to the run-through mode.

The WF-5110RS Inverter requires 12 VDC input from the house battery to operate in the invert mode. A convenient 120 VAC power cord is attached to the WF-5110RS for pass-through use. Simply plug the power cord into any standard (non-GFCI) 120 VAC receptacle.

Please read all instructions and cautionary statements in this manual before installation and use of the WF-5110RS Inverter.



## WF-5110RS INVERTER PRODUCT FEATURES

- Pure Sine Wave Output (THD less than 3%)
- 1000 Watt Continuous Output Power
- 2000 Watt Surge Capability to Handle Compressor/Motor Startup
- 16 Amp Resettable Circuit Breaker on AC Output
- Greater than 86% Efficiency at Full Load
- Automatically Resettable Reverse Polarity Protection
- Cooling Fans Enhance Efficiency; Fans Run when Unit is ON
- Remote Switch and 20 Foot Cable are Included as Standard Equipment
- Remote Switch Allows Manual On/Off Control and Displays Operation Mode
- Direct AC Pass-Through When Shore or Generator Power Present
- LED Indicators on Front Panel Show System Status
- Front Panel Digital Display Shows System Parameters
- Internal Transfer Switch Can Switch Up to a 20 Amp AC Load
- Less than 50 Millisecond Transfer Time on WF-5110RS Startup/Shutdown
- Protected Against Overload, Short Circuit, Reverse Battery Polarity, Over/Under Input Voltage, and Over Temperature
- Listings Include UL 458 and FCC Class B
- 2-Year Limited Warranty

## WF-5110RS INVERTER SAFETY FEATURES

### **DC Reverse-Polarity Battery Protection**

The WF-5110RS Inverter is protected from a reverse battery connection by an automatically resettable Reverse Polarity circuit. This feature prevents permanent damage to the inverter from a battery connected into the circuit backwards. Once the battery connections are corrected, the unit will operate normally.

### **Over-Temperature Protection**

If the internal temperature of the inverter exceeds a critical point, it will shut down. This protects the unit from excessive heat that may damage sensitive components. Remove or reduce the AC load and cycle the power button to restart the unit.

### **Electronic Current Limiting**

When the WF-5110RS Inverter is in the inverting mode, should the AC output current exceed the maximum rating, the unit will shut down. If this occurs, remove or reduce the connected load. Cycle the power button on the front panel to restart the inverter.



## Short-Circuit Protection

Should a short circuit occur in the inverter circuit when in Pass-Through mode, the circuit breaker supplying AC power to the inverter, or the circuit breaker located on the back panel of the inverter, may trip. If the inverter is in inverting mode, the inverter's internal protection circuitry will shut the unit down.

Remove the connected load and check the wiring for a possible short circuit. If the WF-5110RS Inverter is in Pass-Through mode, reset the circuit breaker(s). If the inverter was in invert mode, the inverter will automatically reset. When the short-circuit condition has been removed, reconnect the load and cycle the ON-OFF pushbutton located on the front panel. Short-circuit conditions are **dangerous** and may require an inspection of the RV by a certified service technician.

## Over/Under Input Protection

The WF-5110RS Inverter has a DC input range of 10.75-16 VDC (nominal). If the battery input should fall outside this range, the inverter will shut down to protect the circuitry.

## AC Circuit Breaker

The AC output of the WF-5110RS Inverter, when in Pass-Through mode, is protected by a resettable circuit breaker (see Figure 1 below). A 16A/120 VAC breaker is located on the upper right on the unit's rear panel. The breaker will trip in a high current situation. Should a breaker trip, reduce or remove the connected AC load and reset the circuit breaker. Re-start the inverter and check for proper operation.

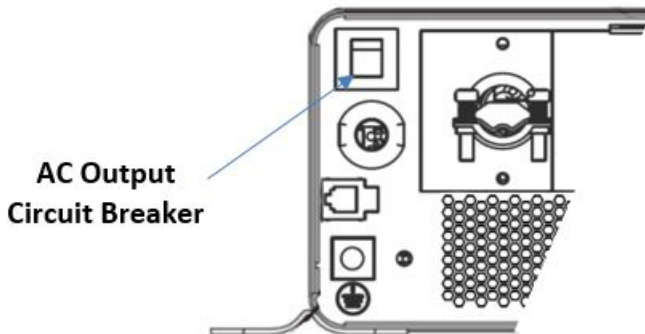


Figure 1

## Internal Cooling Fan

The WF-5110RS Inverter is equipped with two DC brushless fans to provide cooling for the circuitry when the Power Pushbutton is in the ON position. The fan will run continuously. The WF-5110RS Inverter has two fans, one located behind the front panel and the other located at the rear panel.



## OPERATIONAL FEATURES

### Front Panel Interface

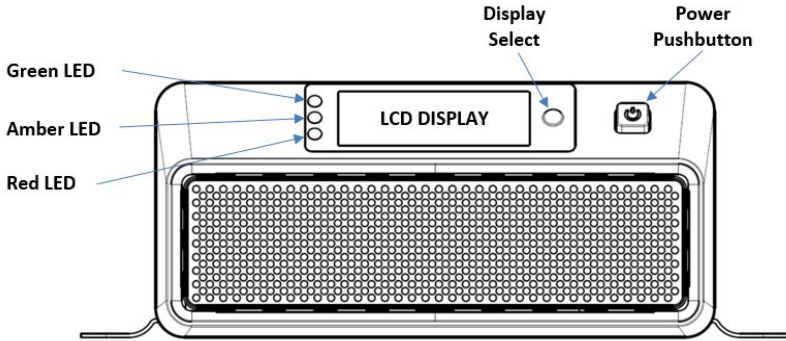


Figure 2

### Rear Panel Interface

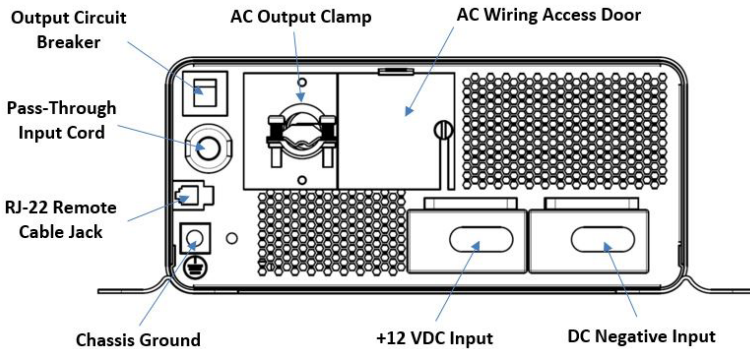


Figure 3

## Inverter Operation

The WF-5110RS Inverter is equipped with an internal transfer switch to automatically route either the incoming AC power or inverter produced AC voltage through to the output.

### AC Pass-Through Mode

When incoming AC power or inverter produced power is available, the transfer switch is designed to pass this voltage straight through to the inverter output. The WF-5110RS Inverter power switch does not have to be in the ON position for Pass-Through to work. This mode will also work with or without a battery attached. NOTE: if the power switch is in the ON position and incoming power is lost, the WF-5110RS Inverter will switch to invert mode to provide AC voltage to connected loads.

## Inverter Power Mode

When incoming AC power is not available, and the Power Pushbutton is in the ON position, the inverter will produce AC voltage at the output.

## Diagnostic Display Panel

The WF-5110RS Inverter has a backlit LCD display showing inverter status. Please refer to Figure 4 below. Symbols on the left side of the display indicate AC Pass-Through, low battery voltage, and inverter fault. The 3-digit display shows inverter produced AC voltage, battery voltage status and AC current being drawn out of the inverter. A pushbutton switch to the right of the display will cycle through these modes. The display also features a Fault Indicator.

Three LEDs to the left of the display will illuminate to indicate AC Pass-Through (Green), when in invert mode (Amber), and inverter fault (Red).

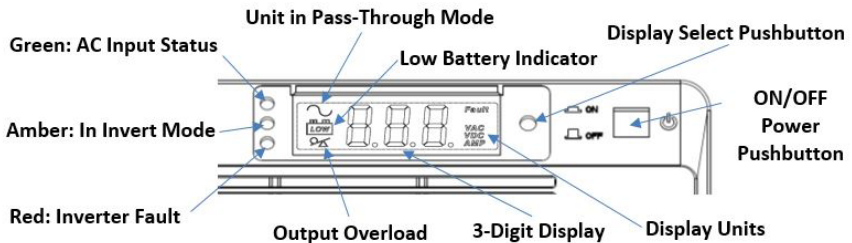


Figure 4

## Remote Switch Panel

The WF-5110RS Inverter has a remote switch panel that provides LED status information and ON/OFF control of the unit from a remote location.

The WF-5110RS Inverter remote replaces the ON/OFF Power Pushbutton located on the front panel of the main unit. It can be mounted up to 20' away using the supplied cable. In addition to the centrally located pushbutton, the remote panel features a Green power status LED. NOTE: the ON/OFF power switch on the inverter's front panel must be in the OFF or OUT position for the remote switch to function.

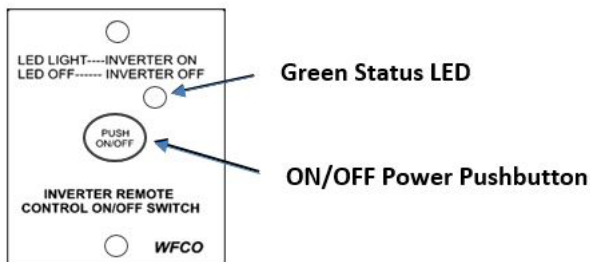


Figure 5



## TROUBLESHOOTING INSTRUCTIONS

### Troubleshooting the 5110RS Inverter

#### **CAUTION**

##### **EQUIPMENT SERVICING**

This product should be installed by an experienced certified technician. CAUTION and care must be taken when servicing this equipment. To prevent severe shock or electrocution, consult your servicing dealer.

### **Reverse Battery Polarity Protection**

Check to make sure the DC cables are connected to the proper input lug on the rear panel of the WF-5110RS Inverter. The Positive (+) DC cable MUST be connected to the Red or (+) lug. The Negative (-) DC cable MUST be connected to the Black or (-) lug on the back of the inverter. If these cables are connected backwards, even if for only a second at the inverter or at the battery, the internal Reverse Polarity protection circuitry will prevent damage from occurring. If a Reverse Polarity condition should exist, the internal circuitry will keep the WF-5110RS Inverter OFF until the fault is removed.

### **Check DC Input Voltage**

For proper operation of the inverter, the WF-5110RS Inverter requires a DC input between 11.75-16 VDC (nominal). If the battery voltage is below 11.0 volts, a Low Battery symbol will appear on the center display (see figure 4). Recharge the battery for continued operation. If the voltage is above 16 VDC, as can happen with some tow vehicle alternators, the WF-5110RS Inverter will shut down to protect the internal circuitry.

### **Inverter Has No Pass-Through**

Check the 16 Amp circuit breaker located on the WF-5110RS Inverter's rear panel. If the breaker is not tripped, check to make sure the inverter's line cord is plugged into a receptacle that has 120 VAC present. Note: when the WF-5110RS Inverter is in Pass-Through mode, the Green LED on the front panel will be illuminated to indicate the presence of 120 VAC.

### **Remote Switch Will Not Turn Inverter ON/OFF**

The remote switch will only work if the main Power Pushbutton located on the WF-5110RS Inverter's front panel is in the OFF position. Check the remote switch cable that runs between the rear panel of the inverter to the back of the remote switch.

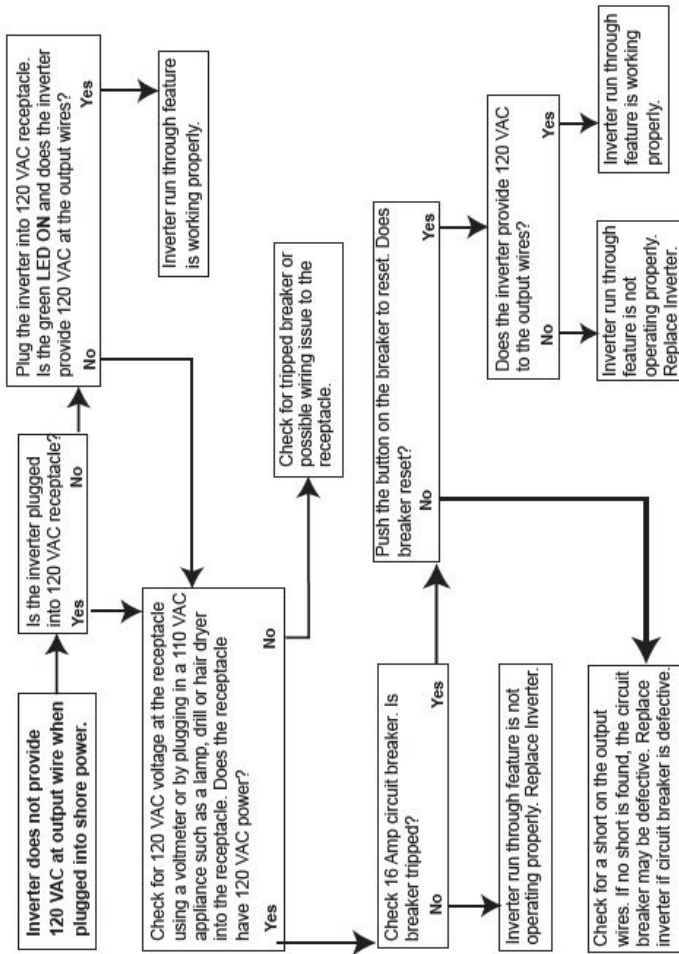
### **Unit Has Pass-Through but Nothing Works (Power Button in ON Position)**

Make sure the WF-5110RS Inverter's Power Pushbutton is in the OFF position. Disconnect the Negative (White) wire from the DC input lugs at the rear panel. Let the unit stand idle for approximately 5 minutes so the internal circuitry can normalize. Reconnect and securely tighten the Negative (White) wire. Push the Power Pushbutton to the ON position. The unit should work normally.

Contact the Arterra Distribution Power PROs at 1 (877) 294-8997.



## Troubleshooting Guide for Shore- Power Connection WF- 5110RS 1000 Watt Pure Sine Wave Inverter

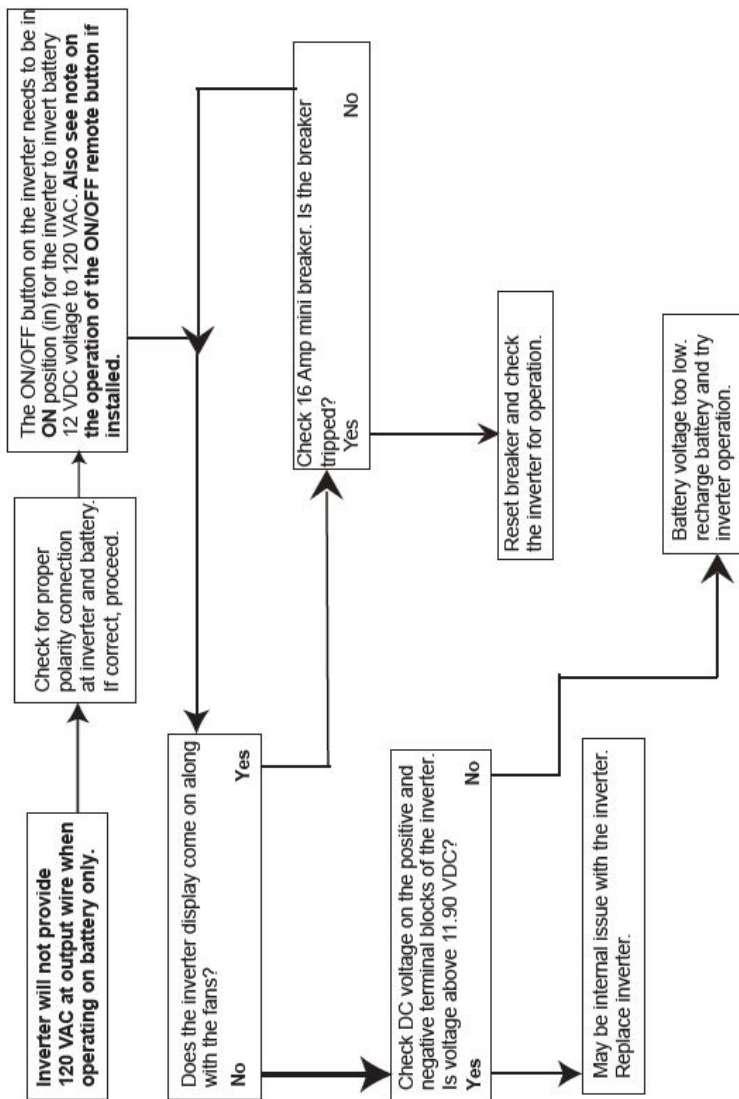


### Remote Operation

The remote feature of the inverter provides a method to turn the inverter ON or OFF from a remote location. In order for this feature to work properly, the ON/OFF button on the front of the inverter needs to be in the OFF (out) position. When turning the inverter ON from the remote location a green LED on the remote will light, indicating that the inverter is ON. Should the green LED stay on constantly but the remote button has no function, check the ON/OFF button on the front of the inverter verifying that the ON/OFF button is in the OFF (out) position.



## Troubleshooting Guide for Power Inverting from the Battery WF- 5110RS 1000 Watt Pure Sine Wave Inverter



## GENERAL COMPLIANCE INFORMATION

### Agency Listings



### UL

The WF-5110RS Inverter units 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-5110RS Inverter

#### Mounting the Enclosure

The WF-5110RS Inverter enclosure should be mounted near the house battery 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 and to allow access to the front panel controls. The WF-5110RS Inverter enclosure needs a mounting space of 13.23”L x 8.74”W x 3.97”H.

#### **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.

#### AC Ground Bonding

During AC wiring installation, the AC input and output grounds are connected to the inverter. The AC input ground wire must be connected to the incoming ground wire of the AC utility source. The AC output ground wire should be connected to the grounding point for your loads; for example, a distribution panel ground bar.

#### Neutral Grounding

The neutral conductor of the AC output circuit of the inverter is automatically connected to the safety ground during inverter operation. This conforms to National Electrical Code requirements that a derived AC source, such as an inverter or generator, must have their neutral conductors tied to ground in the same way that the neutral conductor from the utility is tied to ground at the AC breaker panel. When AC utility power is present and the Inverter is in bypass mode, this neutral to ground connection is not present. The utility power neutral is only connected to ground at the breaker panel.



## AC System Wiring

### **⚠ WARNING**

#### **AC INPUT PROTECTION REQUIRED**

The pass-through circuit must be protected by a 15 A circuit breaker installed by a certified or licensed electrician familiar with applicable safety codes and installation requirements. Failure to observe this precaution may result in electrical shock or bodily injury.

#### **Pass Through AC Input Wiring**

The WF-5110RS Inverter is supplied with a 3-foot cord with a molded AC plug. Plug this cord into a nearby 120 VAC grounded receptacle to provide pass through power to the WF-5110RS Inverter. Power will pass through the WF-5110RS Inverter to the connected AC load whenever the Shore cord is plugged in.

#### **Hardwired AC Output Section**

The WF-5110RS Inverter has a wiring box built into the upper left side of the rear panel. To access the box, rotate the black thumbscrew counter-clockwise one turn to loosen the cover plate. Remove access panel and Romex connector panel to expose AC output wire pigtails. Remove protective covering from Black, White, and Green wires. Pass the Romex cable through the Romex connector panel. Make secure connections to the WF-5110RS Inverter's output wires using listed wire connectors. Push the wires back into the wiring box and re-attach the Romex panel and access panel to the WF-5110RS Inverter rear panel. After wiring connections have been made, double-check to make sure the wires are installed correctly and all wires are secure.

#### **Resettable AC Output Circuit Breaker**

The 16 Amp resettable circuit breaker protects the AC pass through power against over current situations. If the circuit breaker trips, turn off the breaker in the main panel supplying power to the Pass-Through cord. Examine the load for any problems that would have caused the circuit breaker to trip. Reset the WF-5110RS Inverter's circuit breaker by depressing and releasing the push button. Turn the main panel breaker back on.

## DC Wiring Connections

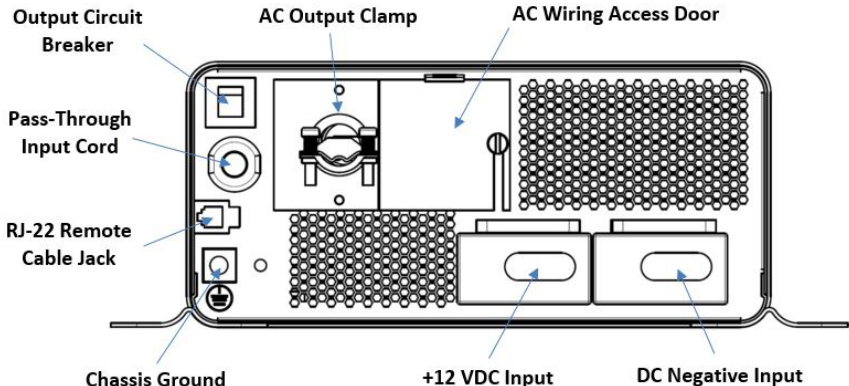


Figure 6



## **WARNING**

### **DC INPUT FUSE**

A fuse or circuit breaker **MUST** be installed in the Positive wire going to the Positive terminal on the WF-5110R/RS Inverter. Failure to place a fuse or circuit breaker in this line may cause damage to the WF-5110R/RS Inverter and void the warranty.

A fuse is required by the National Electrical Code (NEC) to protect the battery and cables. A UL listed 100 Amp DC rated slow blow fuse or circuit breaker must be installed in the Positive battery cable within 18 inches of the battery.

The DC connecting cables should be made of copper wire. To achieve maximum battery voltage at the WF-5110RS's terminals, keep the cable lengths as short as possible. If the wire gauge is too small, inverter performance will decrease.

#### **+12 VDC Input**

Using a 5/32" hex wrench, carefully back one of the two Positive (Red) lug screws up by turning the wrench counterclockwise. Insert a 2AWG or 4AWG wire from this lug to the Positive 12 Volt lug on the house battery. Torque this lug to 45 in-lbs.

#### **DC Negative Input**

In a similar fashion, back out one of the two Negative (Black) lugs. Insert a 2AWG or 4AWG wire from this lug to the Negative lug on the house battery. Torque this lug to 45 in-lbs.

NOTE: Use the same size wire for both connections.

## **Other Connections**

### **Chassis Ground**

Using a 5/32" hex wrench, loosen the Ground lug screw located on the lower left side of the rear panel. Insert an 8AWG copper wire from this lug to chassis ground. Tighten the lug to 20 in-lbs.

### **RJ-22 Remote Cable**

The Remote switch is an optional device that is included with the WF-5110RS Inverter. If remote operation of the WF-5110RS Inverter is desired, mount the Remote switch within 20' of the rear panel. Make a 2 1/4" square cutout in the cabinet or wall where the switch is to be located.

Using the supplied connecting cable, plug one end of the cable into the RJ-22 connector on the left side of the WF-5110RS Inverter's rear panel. Route the cable through the RV to the Remote switch mounting location. Plug the other end of the cable into the back of the Remote switch. Attach the switch to the cabinet or wall with 4 screws (not supplied).



## SPECIFICATIONS

| Model                                  | WF-5110R   | WF-5110RS       |
|--|--|-----------------|
| <b>Ac Output</b>                       |  |                 |
| Continuous Power                       | 1 kW   |                 |
| Continuous Current                     | 8.5 A  |                 |
| Voltage / Frequency                    | 120 Vac, 60 Hz   |                 |
| AC Voltage Regulation                  | ±3% from no load to full load under battery range                |                 |
| Output THD                             | Pure sinewave, resistive load <3%                                |                 |
| Peak Output Current                    | 25.5 A, 50 ms  |                 |
| Efficiency (Full Load)                 | >86%   |                 |
| <b>Dc Input</b>                        |  |                 |
| Input Nominal Voltage                  | 12 Vdc   |                 |
| Input Voltage Range                    | 10.5 ~ 16.2 Vdc (nominal)  |                 |
| Low Battery Cutoff                     | 10.5 Vdc (nominal)   |                 |
| Standby Current                        | <2.4 A   | 1.2 A           |
| <b>Control</b>                         |  |                 |
| Power On/off                           | Switch (latching) on front panel or remote-control panel         |                 |
| Transfer Switch                        | 2- SPDT relays with 20 A, 125 Vac contact rating                 |                 |
| Transfer Time                          | <50 milliseconds   | 20 milliseconds |
| Remote Control Panel                   | Switch (latching) with 20-foot line, RJ22 (4P4C) connector       |                 |
| <b>Display</b>                         |  |                 |
| LCD Display                            | Digital readout of inverted and pass through ac, battery voltage |                 |
| Low Battery Indication                 | 11 Vdc   |                 |
| Green LED                              | Operating on <u>ac</u> pass through                              |                 |
| Amber LED                              | Unit is in invert mode   |                 |
| Red LED                                | Unit is in Overload or Fault condition                           |                 |
| Remote Display                         | LED ON/OFF status  |                 |
| <b>Protection</b>                      |  |                 |
| Overload                               | Current limiting   |                 |
| Short Circuit                          | System shutdown  |                 |
| Over-temperature                       | System shutdown  |                 |
| Output Power                           | Protected by a 16 A, 125 Vac resettable circuit breaker          |                 |
| Internal Cooling                       | 2 brushless dc fans  |                 |
| Reverse Polarity                       | Automatic power shutdown and recovery                            |                 |
| Output Connection                      | Hardwired ac   |                 |
| Input Connection                       | #2 or #4 AWG wire  |                 |
| <b>Input Protection</b>                |  |                 |
| AC Pass Through                        | Installer-supplied 15 A circuit breaker (required)               |                 |
| Battery Power                          | 100 A inline fuse (required)                                     |                 |
| <b>Mechanical</b>                      |  |                 |
| Dimension: LxWxD                       | 371.5 x 281.8 x 99.5mm / 14.6 x 11.0 x 3.9 in                    |                 |
| Weight                                 | 5.31 kg / 11.72 lb   |                 |
| Environmental                          | 0°C - 40°C / 32°F - 104°F, 20% - 90% RH non-condensing           |                 |
| <b>Approved GFCI Devices</b>           |  |                 |
| General <del>Protect</del> Group, Inc. | DG15   |                 |
| American Electric Depot                | G1501  |                 |
| Leviton MFG Co. Inc                    | 7599, S7599, N7599, X7599, WR599                                 |                 |
| Bryant Hubbell Inc                     | GF15, GF82   |                 |
| Pass & Seymour Inc                     | Type S   |                 |

## 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

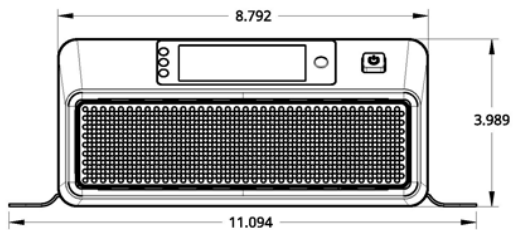
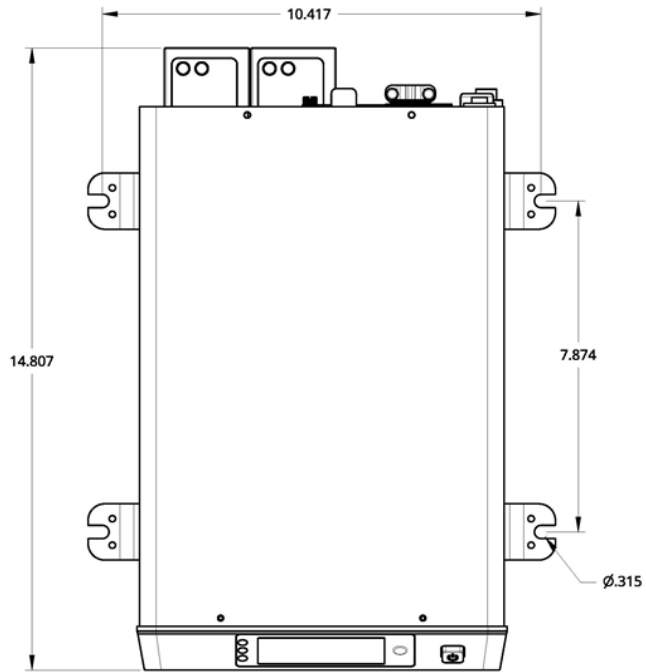
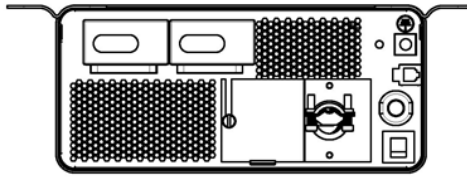
Upon determination and validation by an authorized OEM dealer that a WFCO product has a defect, a Return Goods Authorization (RGA) number will be required before the product can be returned. The RGA number can be requested by completing the Warranty Information Fax Sheet and appropriate Troubleshooting 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 [warran-ty@wfcoelectronics.com](mailto:warran-ty@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, at: (574) 294-8997 or Fax (574) 294-8698.



# WF-5110RS INVERTER DIMENSIONAL DRAWING









**THE HEARTBEAT OF TODAY'S RVS**

[WFCOELECTRONICS.COM](http://WFCOELECTRONICS.COM)