

**AIMS POWER™**

[www.aimscorp.net](http://www.aimscorp.net)

# DC to AC **PURE SINE WAVE**

Pure sine wave power inverter with automatic transfer switch

## **USER MANUAL**

### **Product Registration Instructions**

Please visit our website at [www.AIMSCorp.net](http://www.AIMSCorp.net) and click on the product registration link at the top of the page.

This will validate your warranty with AIMS Power and ensure that you get fast, expedited customer service if you need to repair or exchange your product.

Thank you for choosing



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USER MANUAL

Model number: PWRIX200012SUL

**WARNING:** Please read this manual in its entirety before using or connecting this inverter. It includes important instructions and safety tips.

## 1. BRIEF:

Our power inverter is an advanced tool of power conversion, and it can supply you with AC power converted from a DC power source. Not only can it be used in cars, vessels and camping, but also can be used in emergency situations when power fails.

This unit has many protections such as: battery Low-voltage protection, over load/short circuit protection, Thermal protection etc. It can automatically transfer between AC power and inverter power (dc or battery power) quickly very similar to a UPS. Meanwhile, the insulating design for input and output will protect users better.

In order to use the inverter efficiently and safely, please install and use it in a proper way. Please read the instructions carefully before installing and using the inverter.

## 2. WARNING AND SAFETY

- 1). Read the manual before use and keep it for future reference.
- 2). Don't put the inverter under sunshine, nearby heating source, moist or humid environment
- 3). The housing of the inverter may get hot when in use, please keep flammables (such as clothing, gasoline) at a safe distance as the high temperature may cause a fire or explosion.
- 4). Do not disassemble the unit unless you are a professional, it may cause fire or electric shock
- 5). Keep inverter away from children and don't allow them to play with the unit.
- 6). The power inverter will output AC power as utility power, please treat the output terminal as carefully as your home AC socket. Don't put any other things into the output terminal except electrical appliance plugs. It will cause a danger and potentially start a fire.
- 7). We recommend using the inverter when accompanied by another adult (at least for the first time)
- 8). Disconnect the battery and inverter when not in use. Keep battery cables and connectors clean and organized. This may help prevent reverse polarity and/or shorts

## 3. Specifications

- 1). Use of advanced microprocessor control.
- 2). Intelligent cooling fan: The fan will be off in ac mode or inverter temperature is lower than 104 °F or 40°C. Conformal coated circuit board to help protect against moisture and corrosion.
- 3). AC/Inverter transfer time:  $\leq 20\text{ms}$
- 4). DC Input voltage range: 10-16V DC (rated power 12VDC)
- 5). AC input voltage: 120VAC  $\pm 10\%$
- 6). Output voltage: 120VAC, 60Hz
- 7). Output wave-form: Pure sine wave (THD  $\leq 3\%$ )
- 8). Continuous power: 2000W
- 9). Surge power: 4000 W
- 10). Efficiency range 86% to 90%
- 11). Input over-voltage shutdown: 16VDC  $\pm 0.5\text{V}$
- 12). Input under-voltage shutdown: 10.0VDC  $\pm 0.5\text{V}$
- 13). Input under-voltage alarm: 10.3VDC  $\pm 0.3\text{V}$
- 14). Over temperature protection: 150  $\pm 5$  °F or 65  $\pm 5$  °C
- 15). Over-load protection: 2200W  $\pm 200\text{W}$
- 16). No-load current: 1.2A

## 13. WARRANTY

AIMS Power Warranty Instructions:

This product is designed using the most modern digital technology and under very strict quality control and testing guide lines. If however you feel this product is not performing as it should, please contact us:

techsupport@aimscorp.net or (775)359-6703

We will do our best to resolve your concerns. If the product needs repair or replacement, make sure to keep your receipt/invoice, as that will need to be sent back along with the package and RA# prepaid to AIMS. You have a full 1 year from date of purchase warranty.

This warranty is valid world wide with the exception that freight and duty charges incurred outside the contiguous 48 United States will be prepaid by customer.

Except as provided above, AIMS makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no event shall AIMS be liable for indirect, special or consequential damages. This warranty only applies to AIMS Power branded products. All other name brand products are warranted by and according to their respective manufacturer. Please do not attempt to return non-AIMS Power branded products to AIMS Power.

For additional products such as:

- Modified sine wave inverters
- Pure sine wave inverters
- Low Frequency Inverters
- Solar Charge Controllers
- Micro Grid Tied Inverters
- Inverter Chargers and Automatic transfer switches
- Converters AC-DC and DC-DC
- Custom cut cables
- Batteries
- Solar Panels & Racks

Please visit our web site: [www.aimscorp.net](http://www.aimscorp.net)

To find out where to buy any of our products, you may also e-mail: [sales@aimscorp.net](mailto:sales@aimscorp.net) or call (775)359-6703.

## HI-POT TESTING OF DC to AC inverter

Most of our AC inverters are Listed by Intertek to conform to UL 458 One of the requirements of UL 458 is that all AC inverters pass a High Voltage Dielectric Withstand Test, commonly called the Hi-Pot Test. The voltage applied to the control is usually equal to 1,000 volts, plus two times the line voltage rating of the inverter. Therefore, the standard hi-pot voltage for 115 VAC inverter is 1,250 VAC. For 230 VAC or dual voltage inverters, the hi-pot voltage is 1,500 VAC. This Aims power inverter is hi-pot tested before it leaves the factory, with a UL Certified hi-pot tester, set to the voltages shown above.

For UL Listed equipment, UL requires that customers perform a final Hi-Pot test of their machine with the AC inverter installed. Hi-Pot testing is used to detect any electrical leakage between live metal components and the frame of the machine that is connected to earth ground. This helps prevent electrical shock to the user of the equipment should a live component touch the frame and the user touch the frame and ground at the same time.



(CAN/CSA-C22.2 No. 107.1) and are identified with the cETL Listed Mark.

## 12. Failure guidelines

Fault/Display	Cause	Solution
No output voltage, buzzer sounds continuously	Low input DC voltage	Recharge or replace the battery
	High input DC voltage	Do not use it when the battery is charging. Check the rated voltage of the battery and make sure that it is in the allowable range of the input voltage
	Overload	Reduce the load power.
	Over temperature	Cut off the load and allow to cool naturally for 10 to 30 minutes. Restart it after it reaches normal temperature. The load power is too large so reduce the total load power to the range of rated power. Avoid blocking the vent and improve the ventilation condition. Reduce the ambient
No output voltage	<ol style="list-style-type: none"> <li>The switch is off.</li> <li>The battery lead doesn't connect well</li> </ol>	<ol style="list-style-type: none"> <li>Turn on the power switch.</li> <li>Check the connection and make sure it's well connected.</li> </ol>
Incorrect output voltage	<ol style="list-style-type: none"> <li>RMS Multimeter measurement error</li> <li>The battery power of RMS Multimeter is low</li> <li>The input voltage is too high or too low</li> </ol>	<ol style="list-style-type: none"> <li>Use a true RMS multimeter to measure, such as model FLUKE 177/179.</li> <li>Try to maintain the input voltage in the range of rated power</li> <li>Change the battery of the multimeter then test again.</li> </ol>
Cannot drive the load	<ol style="list-style-type: none"> <li>Load power is too large, or the actual power of the appliance exceeds nominal power.</li> <li>The starting power is larger than rated power (such as motor)</li> </ol>	<ol style="list-style-type: none"> <li>Reduce the load power, or turn on appliance first, then turn on inverter.</li> <li>The inverter internal soft-start circuit will buffer start the appliance (perhaps).</li> </ol>
When using with TV or audio, visual snowflakes on the screen or noise over the audio	Disturbance	<ol style="list-style-type: none"> <li>Separate the inverter and antenna by a larger distance.</li> <li>Use screened antenna</li> </ol>

If the unit still doesn't work after using all the above methods, it maybe the inner fault of the circuit. Please return it to the supplier for maintenance.

17). Working temperature: 0-104°F / 0~40°C

18). Storage temperature: 14-113°F / -10~45°C

**Note:** Installation in recreational vehicles requires GFCI protection of certain branch circuits. Consult all applicable codes.

Tested GFCIs Compliance with UL standards requires that AIMS test and recommend specific GFCIs for use on the output of the inverter.

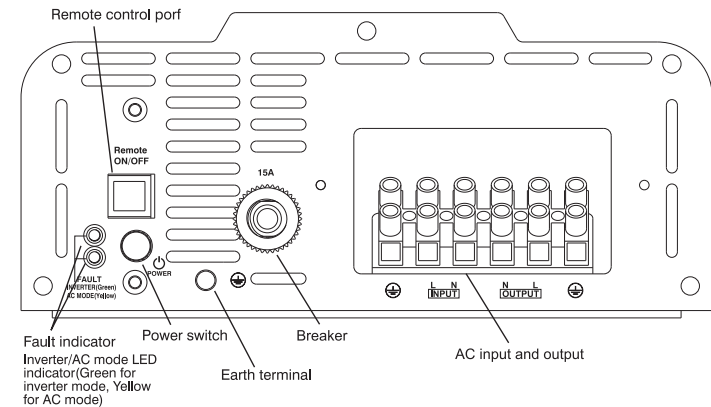
Table 1 lists models that have been tested and will function properly when connected to the AC output of the Inverters.

**Table 1 Tested GFCI Models**

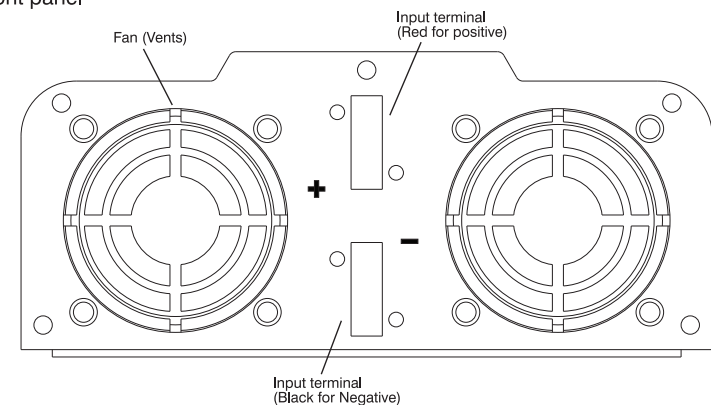
Manufacturer	Model Number
Hubbell	GFR5252WA
Leviton	8599-GY
Pass & Seymour	1594-W

## 4. Parts list

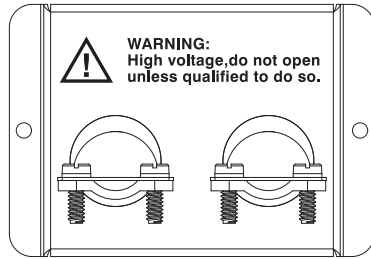
1). back panel:



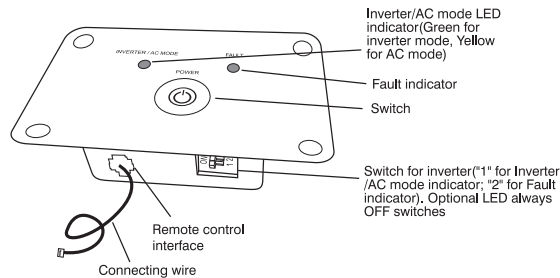
2). Front panel



### 3). Terminal Bloch Cover



### 4). Remote control box (Optional remote not included)



## 5. Installation:

### 1. Where to install:

First ensure that there is enough space to install the inverter. Ensure the installation location meets the following requirements:

- (1) Dry: the inverter must be kept in a dry location. Moisture will cause inverter to short and may be hazardous
- (2) Cool: the working environment is 0-40°C (32-104°F), 10-25°C (50-80°F) is preferred, or a temperature as low as possible within this range
- (3) Ventilation: There should be a certain distance between inverter and other objects, to avoid blocking the products vents. Our recommendation is at least 30cm (1 ft) for non-flammables. Flammables such as gasoline should be kept in a separate room.
- (4) Clean: Don't install the inverter in dirty environment with dust, wood or metal chips. The operation and temperature of the inverter will degrade and cause failure.
- (5) Inverters will produce an arc or spark when connected, so never connect around flammables such as gasoline, alcohol, etc.

### WARNING: FIRE AND EXPLOSION HAZARD



This equipment contains components that tend to produce arcs and sparks. To prevent fire or explosion, do not install the PURE SINE in compartments containing non-sealed batteries or flammable materials or in locations that require ignition-protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, or joints, fittings, or other connections between components of the fuel system.

## 9. Operating your inverter

1. Now that the inverter is properly connected and tested, last thing to make sure is that the equipment you plan to use is 110-120Vac. Do not use with 220-240Vac equipment. This inverter is not designed for that.
2. If the inverter and ac in power is OFF, go ahead and connect or plug in your ac loads as desired.
3. Now that you are sure all your connections and powers are proper, turn on the inverter using the power button or optional remote. You may also turn your ac source on at this point. You should see a green led lit.
4. you may now turn on your ac devices for use. Try it one at a time to ensure all is operational and your batteries can support the load.
5. To save your battery power it is recommended to turn off your ac loads when not needed. Also turn off your inverter if you will not be using it for an extended period.

## 10. Soft-start tech.

Definition: the Gradual voltage ramp-up during inverter startup. This helps eliminate the high currents on startups and is useful for inductive loads. If you have a high surge inductive load you may need a larger inverter but you can use our soft start as well by turning the load on and then turning on the inverter. The slow ramp up may just work.

## 11. Function

1. Input under-voltage alarm: When the input DC voltage is lower than  $10.3VDC \pm 0.3V$ , the buzzer will whistle intermittently to remind that the inverter will go into the under voltage protection.
2. Under voltage protection: The inverter will automatically shut down when the input DC voltage is lower than  $10.0VDC \pm 0.5V$ . The buzzer will whistle continuously and the green light turns off, the red light on. Please turn off the inverter and use it after recharging the battery.
3. Over voltage protection: The inverter will automatically shut down when the input DC voltage is higher than  $16VDC \pm 0.5V$ . The buzzer will whistle continuously and the fault indicator light is on. Please turn off the inverter and adjust the input voltage to the admissible range.
4. Overload protection: The inverter will automatically shut down when the load power is higher than the rated power. The buzzer will whistle continuously. Turn off the inverter and resume to normal operation after taking away the excessive load.
5. Thermal protection: The unit will be hot during operation. If the temperature is higher than  $65^{\circ}C$  (150F), the inverter will automatically shut down. Then the buzzer will whistle continuously and the green light is off, red light is on. Please turn off the inverter, and continue using it after the temperature goes back to normal. Meanwhile find out the factors that caused the fault, such as: ventilation, ambient temperature, vent, load power and so on. This will help you to prevent this from future occurrences.

- Now that the ac wires are prepped, insert the INPUT cable through the cable clamp and repeat for OUTPUT, but do not tight clamp at this point.
- Verify that the Input cable is the hot in and on the correct side of the terminal block and the Output cable is you load cable. Connect to terminal block and tighten set screws. Ensure all strands are inside terminal block and not potentially shorting to the next wire
- Mount Terminal Block cover.
- While you tighten the Cable Clamp strain relief for the ac input and output cables, push the cables slightly to relieve any possible pulling on them internally.
- You may now connect your load device to the Output cable. The inverter is ready for use.

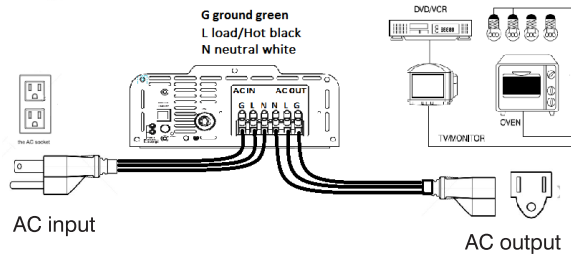
**IMPORTANT Note and Warning:** This inverter has been designed to throughput ac power from AC Input even when inverter is OFF or NOT connected to a battery source. Never assume the Output is not Live or Hot.

**Warning:**

- Make sure there is no ac out (inverter off and no ac in) before connecting to ac out. We recommend measuring ac out with an ac volt meter prior to wiring.
- Ensure all cables and wires are connected properly and are in good condition prior to use

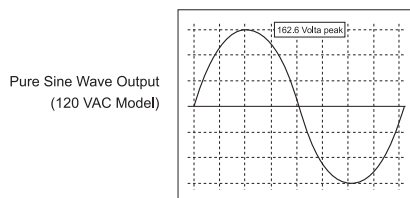
**4) AC connection**

Insert the inverter AC input cable to power socket or hardwire connection.



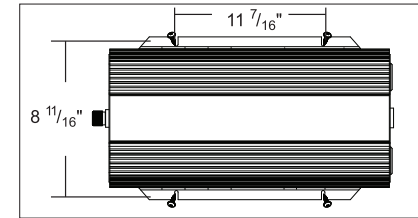
**8. The output wave form**

The output wave form of this inverter is a Pure Sine Wave, which is often cleaner than that supplied by the utility company. Pure sine wave is useable for most loads, such as Linear Adaptors, switching power supplies, transformers, motors and so on. Compared to Modified wave form, for inductive loads such as a refrigerator or electric fans, pure sine wave form can improve its power factor, the battery use ratio and reduce operating noises from appliances. For capacitive loads such as adapters for lap-tops, a pure sine wave can reduce the load current and reduce interferences and increase reliability and the life of the product.



**2. Inverter Mounting**

The weight of the inverter is very heavy. Be sure to place the inverter on a stable surface, such as the floor, a table, or stand etc. Make sure that areas you place the inverter on can withstand the weight of the inverter. In addition, be sure to affix the product with the provided screws to keep the inverter from falling or moving.



**3. Assemble the remote control box (Optional equipment)**



- the remote is designed to be mounted on a dash or other surface where a hole should be cut so that it sits flush. This is not a requirement however just a recommendation.
  - The remote cable should be plugged into inverter and the remote before mounted.
- Note:** Optional remote is not needed for inverter operation. The main power switch will work the power on / off.

**6. Battery selection**

**1. Voltage and current of battery**

The battery will provide the DC input voltage to the inverter. The voltage rating must comply with inverter's input voltage (12Vdc nominal). Excess voltage may cause over voltage protection and will likely destroy the inverter. This will not be covered by our warranty. The battery or battery bank must be capable of supplying enough current for the inverter to operate. Under a large load, the battery voltage will drop and may cause inverter to shut down due to low voltage. When load is removed, you will notice the voltage jumped back up to a useable level. The inverter will not turn back on until 12.5Vdc is reached. This helps to prevent inverter cycling. If this happens, you need a larger battery (bank).

To calculate battery load (current) = Power (W) / 12Vdc. Since the inverter uses about 10% additional the actual battery drain is 110% of load. For example: battery voltage is 12V DC, load is 1000W, the actual current is : 1000W ÷ 12V × 110% ≈ 92A

**2. Battery operating time**

Battery operating time depends on battery capacity (AH) and load power (W), the calculation formula for operating time is: battery capacity (AH)/actual current = battery capacity (AH) × battery output voltage(V) ÷ load power (W) ÷ 110%  
For example: battery specification: 12V 200Ah, load power is 500W, then the operating time is: 200 × 12 ÷ 500 ÷ 110% ≈ 4 hours



**Note:** Above battery capacity is based on 20hrs discharging capacity. When discharge current is more than this, capacity will decrease. If the discharging time will be less than the above formula, please refer to factory's battery manual.

**Table for your reference:**

Appliance	Total	Battery size	Working time
TV+FAN+light×2+laptop (100W+60W+2x40W+120W)	360W	12V, 200Ah	6h
		12V, 400Ah	12h
		12V, 600Ah	18h

Note: most batteries should not be 100% discharged or they will lose some long term storage capability. 50% is the typical preferred maximum recommended discharge amount

**7. Connection:**

1) Earth connection:

The rear panel of the inverter has a terminal marked "Grounding" or "⊕" symbol, for the inverter case grounding. This connects the internal ground, case and ac outlets to ground.

Although functionally the inverter will operate fine without the ground connected, it is strongly recommended to use a ground wire to connect to a proper earth. This is primarily for safety. A few examples of where to connect are: in a car - to automobile chassis; in a ship - to the grounding system; in a fixed position to a copper water pipe or grounding rod

**Warning:**

- The grounding wire must use 14AWG (2.08mm<sup>2</sup>) or larger wire and ensure that the connection is firm. We recommend using 8 Awg.
- Do not use inverter without first connecting the grounding wire so as to avoid the risk of electric shock.

2) Battery connection

1. Prior to connecting the inverter to a power source (battery) you should ensure all protection measures have been met. This includes proper grounding, fusing (250Amp), cable size (2Awg ok but 1 Awg recommended), mounting etc. Then check whether the battery voltage and inverter input voltage are same (12Vdc nominal). This voltage is set by the inverter and can not be changed.
2. The battery cables must be at least 2Awg to carry the max current. It is recommended to keep the battery (ies) and inverter close to each other to minimize this distance. If long distance is required, a larger gauge cable will need to be used such as 1Awg. We recommend 13ft (4m) maximum. The ac is a higher voltage and thus easier to carry over a longer distance.
3. If you are concerned about the dc wire size, you should put a heavy load on the inverter and measure the battery voltage and the voltage coming into the inverter (both sides of the battery cable). The voltage should be the same (or close) under your heaviest load.
4. Firstly the battery negative line is connected to the negative terminal of the inverter on the front panel(black), then connect the positive column of battery to the positive terminal of the inverter (red), and tighten.

**Warning:**

- (1) It is always a good idea to wear goggles to protect your eyes when working around batteries and power equipment.
- (2) If you get battery acid in your eyes you should rinse with light soap water or clean water and immediately see a doctor.
- (3) When first connecting to a battery, the final connection made will complete the electric loop and will cause an arc. Please ensure no flammables are near by.
- (4) Many batteries vent a flammable gas and should be ventilated and kept away from the inverter.  
RECOMMENDATION: buy a sealed agm battery (bank). They do not emit gasses and are maintenance free. Do not use car, truck or golf cart batteries without proper ventilation.
- (5) Loose battery connections will cause excessive current drain, which causes heat, and may burn out inverter and or your battery bank. Ensure and occasionally tighten your battery connections.
- (6) If the battery Positive and Negative get reversed to the inverter, the fuses will blow and this will likely cause permanent damage to the inverter. This is not covered by our warranty.
- (7) Take off all metal jewelry (watches, rings and so on) while connecting, to prevent the battery from short circuit. This will cause a burn.
- (8) The inverter is equipped with an over-voltage protection, however if the voltage is too high (over 17Vdc) the inverter may become permanently damaged. Again this is not covered by our warranty.

3) AC input/output cable connection:

Connecting the ac wires:

- black is hot
- white is neutral
- green is ground

Make sure not to mix up the input and the output. The input is your city or generator supply power. Make sure it is not Live as you are working on the connections. Inverter must also be OFF and/or disconnected from battery (ies).

Recommendation: prior to connecting the ac output, we recommend you power up the inverter and have a meter on the ac output to ensure all is operating properly. If you get the 110-120Vac output then turn off / disconnect ac power source and turn off the inverter and make output connection.

1. You will need 2 x 3 wire (10 Awg recommended Black, White, Green) ac cables not provided with this product. Measure the required length for your particular application. 1 cable for ac input and another for ac output of the inverter. Recommended to add 6-12 inches length or more for slop. AIMS Power recommends labeling each as the INPUT and the OUTPUT to avoid improper wiring.
2. Remove terminal block cover if not already removed and be careful not to lose the mounting screws.
3. Connections to the inverter will require you to strip 1/4 inch to bare wire and we prefer those to be soldered to avoid potential short circuit caused by lose strands crossing over
4. Ac input is typically a standard 110 plug with grounding (3 prong).
5. Ac output may be a 3 prong socket or hardwired depending on your needs.