



# PowerSourcePure Pure Sine Wave Inverter

12V: RINVPA6 / RINVPA10 / RINVPA20 / RINVPA30

24V: RINVPB10 / RINVPB20



## Instructions

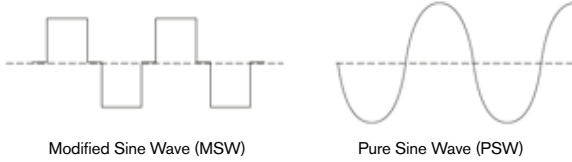
Retain these instructions for future reference



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

# 1. Overview

The Ring Pure Sine Wave (PSW) inverter provides a 230V supply which closely replicates the domestic mains supply. This makes it ideal for powering more sensitive equipment which may not be compatible with traditional Modified Sine Wave (MSW) inverters.



# 2. Contents



Inverter



Connecting cables



Protective covers  
(1000, 2000, 3000W models only)



Battery clamps

# 3. Optional Parts



RINVFRM LCD Frame kit

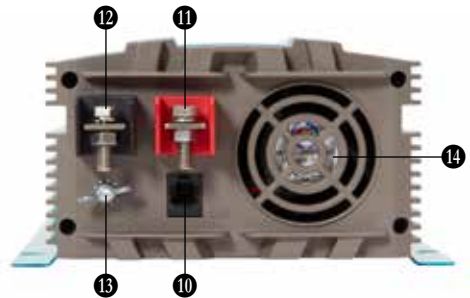
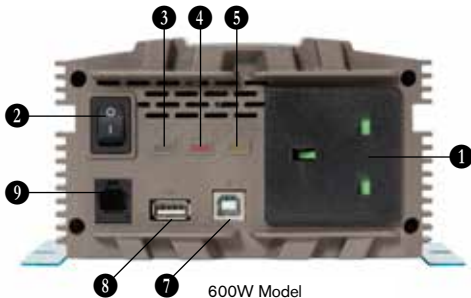


RINVLCD LCD Display & Frame kit



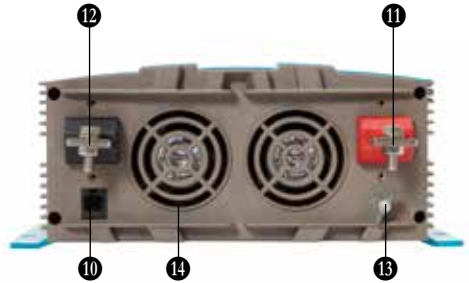
RINVCM Current Sensor kit

# 4. Features





1000/2000 Models



- |                                |                            |                         |
|--------------------------------|----------------------------|-------------------------|
| ① - Mains 230V AC outlets(s)   | ⑥ - LCD display*           | ⑪ - Battery positive(+) |
| ② - Power on/off switch        | ⑦ - Comms port (RJ-11)     | ⑫ - Battery negative(-) |
| ③ - Power indicator            | ⑧ - USB port (2.1A)        | ⑬ - Earth connection    |
| ④ - Over load indicator        | ⑨ - Display port (RJ-11)** | ⑭ - Cooling fan(s)      |
| ⑤ - Over temperature indicator | ⑩ - Sensor port (RJ-11)    |                         |

\*Only fitted on 1000/2000W models

\*\*Display port is behind LCD display on 1000/2000/3000W models

## 5. Safety

This manual contains important information about the operation of this product. Failure to comply with the instructions can cause electric shock, fire or serious injury. Responsibility will not be accepted for damage to persons or property caused by failure to follow the operating instructions.

- Installation should be carried out by a qualified electrician
- Do not expose the unit to moisture or flammable materials
- Do not remove the unit cover, dangerous voltages are present

## 6. Installation & Setup

### Location

This inverter is for indoor use only and should be installed in a well ventilated, cool, dry environment.

- To prevent overheating, do not install where ventilation openings may be obstructed
- Allow 10cm all around the inverter casing to ensure adequate ventilation
- Do not install near fuel tanks or within battery compartments

### Battery Connections

Connect the inverter to the battery using the supplied battery cables and terminals.

1. Ensure that the inverter power on/off switch is in the OFF (O) position.
2. To protect inverter terminals against short circuit, protective covers should be fitted where provided.
3. Attach the black (-) cable to the black (-) terminal on the rear face of the inverter and to the black (-) terminal on the battery
4. Attach the red (+) cable to the red (+) terminal on the rear face of the inverter and to the red (+) terminal on the battery
5. To further protect against short circuit, it is recommended an in-line fuse (F1) be fitted near the positive battery post.



## CAUTION

There may be sparks produced when making battery connections, ensure no flammable materials are present. Incorrect connection of cables to the battery (reverse polarity) may damage the unit and is not covered by the warranty.

### Single Battery System

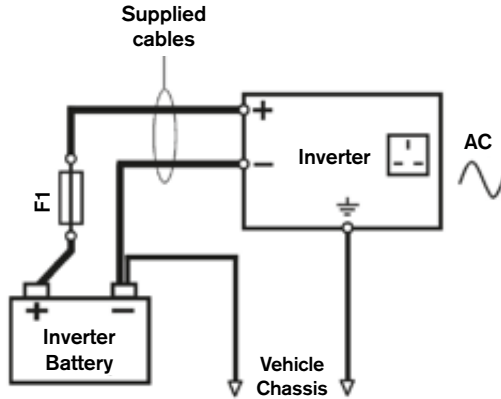


Fig1 – Example single battery system

### Dual Battery System

For heavy duty applications a secondary battery can be fitted to increase the inverter running time. An additional relay may also be fitted to allow this battery to be charged from the vehicle alternator when the vehicle engine is running. Fig2 shows an example installation.

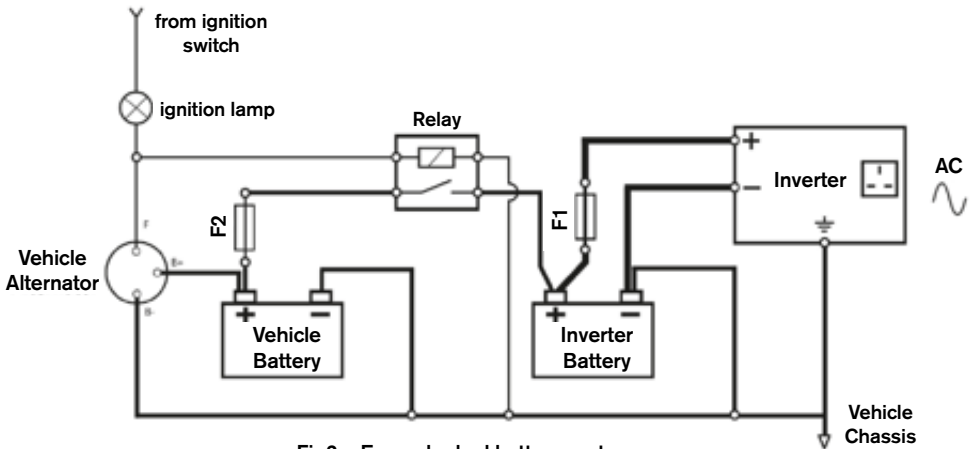


Fig2 – Example dual battery system

### Earth Connection

Ensure the inverter is earthed by connecting a cable from the inverter earthing bolt **13** to a suitable earth within the installation (normally the vehicle chassis).



## CAUTION

Do not operate the inverter without connecting it to ground, otherwise a fault condition may present an electric shock hazard.

### Earth Leakage Protection

When the inverter is used to power 230V socket outlets, which are a permanent part of the installation, a Residual Current Device (RCD) should be fitted to provide protection in the event of a fault. The diagram below shows recommended wiring for 230V sockets fitted with an integral RCD. Note: In order for an RCD device to trip effectively when used in a vehicle, the neutral output from the inverter should be linked to the earthing system of the installation. Fig3 below shows a recommended installation.

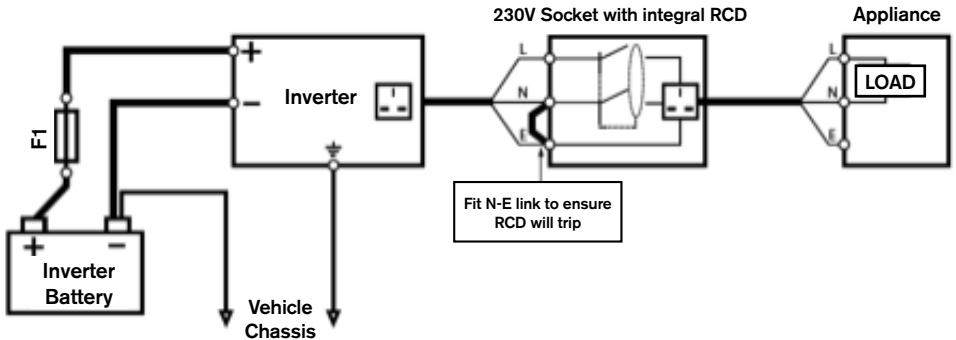


Fig3 – Example RCD installation



## CAUTION

It is recommended the inverter is wired and tested by a qualified electrician

### Remote Mounting LCD Display (1000/2000/3000W Models)

For installations where the inverter may be inaccessible, the LCD display can be removed from the inverter and mounted remotely using the optional LCD Frame Kit (RINVFRM)

1. Ensure that the inverter power on/off switch is in the OFF (0) position.
2. Remove 2 x screws holding LCD in position
3. Pull LCD forwards and unclip data connector from circuit board
4. Connect 6 metre extension lead to circuit board
5. Fit blanking plate and fix with 2 x screws, a slot is provided for cable to exit
6. Fix LCD into mounting frame using 2 x screws
7. Fit frame where display is required and attach 6 metre cable to rear
8. Snap fit endplates to cover screw fixings
9. Turn the power on/off switch to the ON (I) position.
10. Inverter can now be controlled remotely from the LCD display

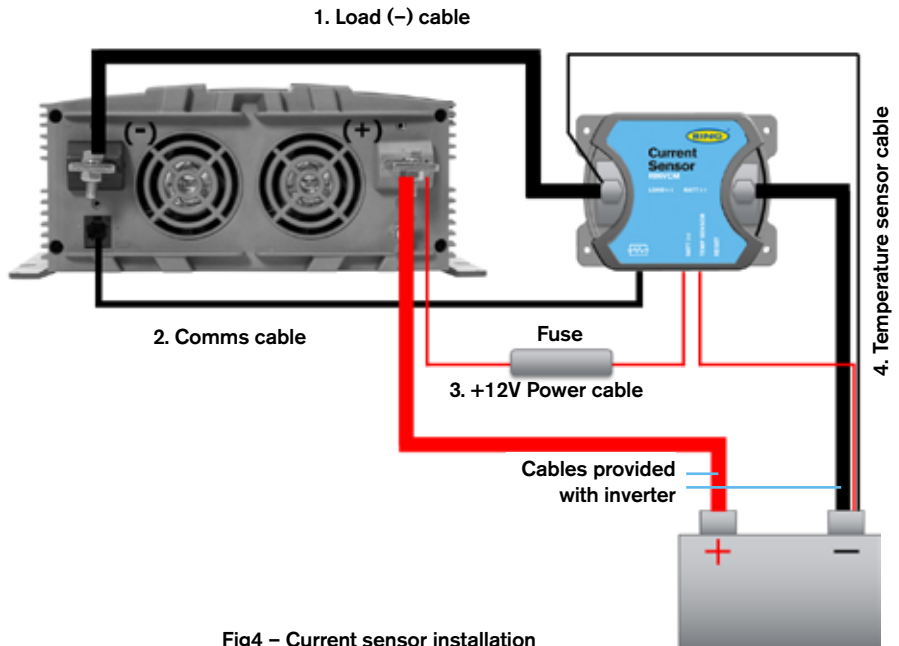
## Adding an LCD Display (600W Model)

An LCD display can also be added to models without this function by using the optional LCD Display & Frame Kit (RINVLCD)

1. Connect 6 metre extension lead to display port ⑩ on inverter
2. Fit frame where display is required and attach 6 metre cable to rear
3. Snap fit endplates to cover screw fixings
4. Turn the power on/off switch to the ON (I) position.
5. Inverter can now be controlled remotely from the LCD display

## Current Sensor Installation (optional)

To enable monitoring of the input current and hours remaining function, the optional current sensor (RINVCM) should be fitted as shown in Fig4



1. Using black battery cable supplied with inverter, attach one end to battery(-) terminal and other end to batt(-) terminal on Current Sensor
2. Using red battery cable supplied with inverter, attach one end to battery(+) terminal and other end to inverter(+) terminal
3. Now connect cables 1-4 (supplied with current sensor) as shown in Fig4
  - 1 - Load(-) cable, negative connection from inverter to sensor  
Use 1x4AWG cable for 600/1000W models  
Use 2x2AWG cable for 2000/3000W models
  - 2 - Comms cable, data connection from sensor port ⑩ on inverter to current sensor
  - 3 - +12V Power cable, 12V power supply to sensor
  - 4 - Temperature sensor cable, temperature compensation for a more accurate current reading

## 7. General Information

### Continuous & Surge Power

A Continuous rating is the amount of power the inverter can handle for a number of hours without overloading. The Surge rating is a brief burst of power the inverter can provide to help start certain types of load.

### Loads Requiring Surge Power

The power rating shown on most electrical appliances is a continuous rating but some appliances require up to five times this power for a brief period in order to start operating. This needs to be considered when rating the inverter to avoid overloading it.

When using a microwave oven it should also be noted that the electrical power required from the supply is around 50% higher than the actual cooking power of the microwave.

| Example Appliance       | Typical Rated Power | Typical Surge Power Required (<1 sec) |
|-------------------------|---------------------|---------------------------------------|
| Electric Drill          | 500W                | 1000W                                 |
| 800W Microwave Oven     | 1200W               | 2400W                                 |
| Angle Grinder           | 900W                | 2700W                                 |
| Portable Air Compressor | 200W                | 700W                                  |
| Laser Printer           | 500W                | 2500W                                 |

## 8. Operation

### Switching On

1. Ensure that the inverter power on/off switch is in the OFF (0) position.
2. Plug the appliance into the AC output socket on the inverter, ensuring it does not exceed the maximum output power of the inverter
3. Turn the power on/off switch to the ON (I) position.
4. The Power indicator will illuminate green and mains power will be available from the AC output socket(s). On models fitted with a display the LCD screen will also illuminate.

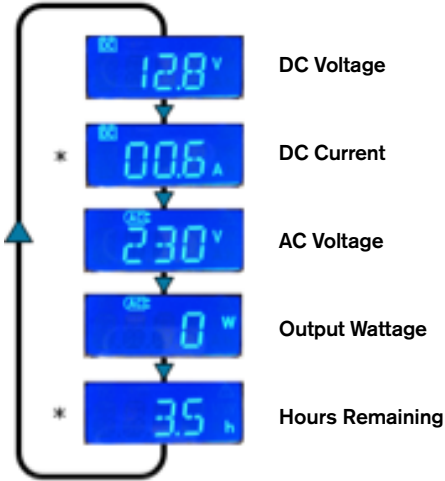
## 9. LCD Display & Indicators

Where fitted the LCD display provides additional information to help monitor and manage power from the inverter.



## Information Mode

Various information modes are available by pressing ▲▼ buttons to move forward or backwards through the screens.



|                 |                                                                                                                                                                                              |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC Voltage      | Input voltage available from the battery supply.                                                                                                                                             |
| DC Current      | Input current being used from the battery supply in order to power the load.<br>*The optional <b>Current Sensor</b> must be fitted to enable measurement of input current.                   |
| AC Voltage      | Output voltage available from the AC outlets.                                                                                                                                                |
| Output Wattage  | Output power being consumed by the connected loads.                                                                                                                                          |
| Hours Remaining | An estimate of time remaining before the battery will be depleted based on the current load.<br>*The optional <b>Current Sensor</b> must be fitted to enable measurement of hours remaining. |



## Setup Mode

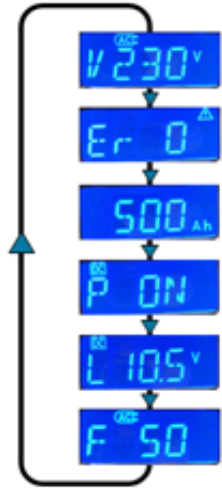
The inverter can be configured by entering the setup mode

To enter Setup Mode press & hold  $\leftarrow$  key

Press  $\blacktriangle$ / $\blacktriangledown$  keys to select item then press  $\leftarrow$ , chosen setting will then flash

Adjust setting using  $\blacktriangle$ / $\blacktriangledown$  then press  $\leftarrow$  to set





Press and hold  $\leftarrow$  key to exit back to **Information Mode**













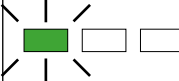


|                     | Setting                        | Default |
|---------------------|--------------------------------|---------|
| Output Voltage      | 200/220/230/240V               | 230V    |
| Last Error Code     | N/A                            | N/A     |
| Battery Size        | 90 – 540Ah<br>(in 30Ah steps)  | 90Ah    |
| Power Saving Mode   | ON/OFF                         | ON      |
| Low Voltage Cut-off | 9.5 – 11.0V<br>(in 0.5V steps) | 10.0V   |
| Output Frequency    | 50/60Hz                        | 50Hz    |

- Output Voltage** Sets the AC output voltage. Only change if the application requires a different voltage for optimum performance
- Last Error Code** Allows the last error code to be viewed
- Battery Size** Sets the Ah rating of the battery supplying the inverter. The value is used when calculating input current and hours remaining in conjunction with the Current Sensor
- Power Saving Mode** If the inverter does not detect a load for 10 minutes it will enter a sleep mode to reduce drain on the battery. In this mode the power indicator will flash green
- Low Voltage Cut-Off** Sets the voltage at which the inverter will switch off should the input voltage become too low
- Output Frequency** Sets the output frequency of the inverter. Only change if the application requires a different frequency for optimum performance

## Indicator & Error modes

-  Power      Illuminates green to show the unit is switched on and power is available from the AC output socket(s)
-  Overload      Illuminates red if the units has been overloaded due to excessive current or a short circuit
-  Over Temperature      Illuminates yellow if the unit has overheated
-  Audible Alarm      An alarm sound will be heard if the unit has switched off due to a fault

| Error code                                                                         | Description                   | LEDs<br> | Inverter Status | Action                                                                                                          |
|------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------|
| -                                                                                  | Normal operation              |          | ON              | None                                                                                                            |
|    | Battery low voltage warning   |          | ON              | Check for low battery voltage<br>Check cable connections are not loose<br>Reduce load to extend battery life    |
|    | Battery low voltage shutdown  |          | OFF             | Switch inverter off, recharge battery then switch back on                                                       |
|  | Battery high voltage shutdown |        | OFF             | Check battery voltage is correct for inverter model e.g. 24volt battery for a 24volt inverter                   |
|  | Overload shutdown             |        | OFF             | Total load exceeded continuous rating<br>Startup current exceeded surge rating<br>Appliance short circuit fault |
|  | Over temperature shutdown     |        | OFF             | Check for adequate ventilation around inverter<br>Check inverter cooling fans are working                       |
| -                                                                                  | Power saving mode             |        | SLEEP           | None                                                                                                            |

# 10. Specifications

| Part No.                         | RINVPA6                     | RINVPA10                    | RINVPB10                 | RINVPA20                    | RINVPB20                 | RINVPA30                    |
|----------------------------------|-----------------------------|-----------------------------|--------------------------|-----------------------------|--------------------------|-----------------------------|
| Voltage                          | 12V                         | 12V                         | 24V                      | 12V                         | 24V                      | 12V                         |
| Cont Power Rating (up to 12 hrs) | 600 watts                   | 1000 watts                  |                          | 2000 watts                  |                          | 3000 watts                  |
| Peak Power Rating (up to 200ms)  | 1200 watts                  | 2000 watts                  |                          | 4000 watts                  |                          | 6000 watts                  |
| Output Voltage                   | 200/220/230/240V<br>AC ±10% | 200/220/230/240V<br>AC ±10% |                          | 200/220/230/240V<br>AC ±10% |                          | 200/220/230/240V<br>AC ±10% |
| Output Frequency                 | 50/60Hz                     | 50/60Hz                     |                          | 50/60Hz                     |                          | 50/60Hz                     |
| Output Waveform                  | Pure Sine Wave              | Pure Sine Wave              |                          | Pure Sine Wave              |                          | Pure Sine Wave              |
| Input Voltage Range              | 9.5V – 16.5V<br>(12V nom)   | 9.5V – 16.5V<br>(12V nom)   | 19V – 33V<br>(24V nom)   | 9.5V – 16.5V<br>(12V nom)   | 19V – 33V<br>(24V nom)   | 9.5V – 16.5V<br>(12V nom)   |
| Input Current                    | 59amps (max)                | 98amps<br>(max)             | 49amps<br>(max)          | 196amps<br>(max)            | 98amps<br>(max)          | 294amps (max)               |
| Efficiency @ 75% load            | 90%                         | 90%                         |                          | 90%                         |                          | 90%                         |
| No Load Current                  | < 1.5amp                    | < 1.6amp                    | < 1.1amp                 | < 2.0amp                    | 1.5amp                   | < 3.0amp                    |
| Power Saving Mode                | Yes                         | Yes                         |                          | Yes                         |                          | Yes                         |
| Power Saving Mode Current        | < 0.2amp                    | < 0.2amp                    |                          | < 0.2amp                    |                          | < 0.2amp                    |
| Low Battery Alarm                | 10.0V-11.5V<br>±0.5 volt    | 10.0V-11.5V<br>±0.5 volt    | 20.0V-23.0V<br>±0.5 volt | 10.0V-11.5V<br>±0.5 volt    | 20.0V-23.0V<br>±0.5 volt | 10.0V-11.5V<br>±0.5 volt    |
| Low Battery Shutdown             | 9.5V-11.0V<br>±0.5 volt     | 9.5V-11.0V<br>±0.5 volt     | 19.0V-22.0V<br>±0.5 volt | 9.5V-11.0V<br>±0.5 volt     | 19.0V-22.0V<br>±0.5 volt | 9.5V-11.0V<br>±0.5 volt     |
| Thermal Protection               | 60 ± 10°C                   | 60 ± 10°C                   |                          | 60 ± 10°C                   |                          | 60 ± 10°C                   |
| USB Port                         | 2.1amp                      | 2.1amp                      |                          | 2.1amp                      |                          | 2.1amp                      |
| Display Panel Port               | Yes                         | Yes                         |                          | Yes                         |                          | Yes                         |
| Current Sensor Port              | Yes                         | Yes                         |                          | Yes                         |                          | Yes                         |
| Comms Port                       | Yes                         | Yes                         |                          | Yes                         |                          | Yes                         |
| Dimensions (LxWxH)               | 340 x 170 x 81.5mm          | 320 x 247 x 118.5mm         |                          | 420 x 247 x 118.5mm         |                          | 500 x 170 x 162mm           |
| Weight                           | 2.8kg                       | 4.3kg                       |                          | 5.9kg                       |                          | 8.0kg                       |
| <b>Optional Parts</b>            |                             |                             |                          |                             |                          |                             |
| LCD Display & Frame Kit          | RINVLCD                     | N/A                         |                          | N/A                         |                          | N/A                         |
| LCD Frame Kit                    | N/A                         | RINVFRM                     |                          | RINVFRM                     |                          | RINVFRM                     |
| Current Sensor Module            | RINVCMM                     | RINVCMM                     |                          | RINVCMM                     |                          | RINVCMM                     |



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