ROVIN

MI5003

500W Pure Sinewave Inverter

INSTRUCTION MANUAL

SAFETY INSTRUCTIONS

Incorrect installation and misuse of the inverter may result in danger to the user or hazardous conditions.

- Do not attempt to connect any other power source, including any AC power source.
- Make sure the opening to the ventilation fan and vent holes are not blocked.
- Avoid pulling on the cords and cables. Always grip plugs firmly when unplugging from power source and when disconnecting cables.
- To avoid electrical hazard, be sure to unplug the inverter from its external power source before inserting the AC plug.
- For indoor use only. Avoid exposure to external heat sources; direct, prolonged sunlight; dust; corrosive chemicals; and moisture.
- It is normal for inverters to become warm during use. Avoid touching the device during use.
- Avoid placing in direct sunlight or near heat-sensitive materials.
- Do not drop or subject the inverter to undue shock.
- Do not place anything on top of the inverter.
- Always use with the supplied cables and connectors as shown. Use of cables, connectors, or accessories not supplied with this product constitutes misuse and may result in injury or damage.
- Do not attempt to service or dissemble. The unit is not user-serviceable. Attempting to disassemble or service the unit can result in electrical hazard, including death from exposure to high voltage. If you experience problems with the unit, discontinue use and contact a service technician.
- When cleaning the inverter, please switch off power(unplug the inverter). Carefully clean with dry cloth. Do not use wet cloth or cleanser.
- Disconnect all AC and DC side connections before working on any circuits associated with the inverter. Turning the ON/OFF switch on the inverter to off position may not entirely remove dangerous voltage.
- Keep away from children.

FEATURES

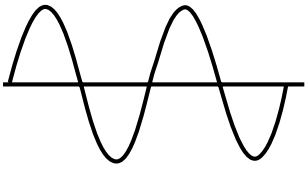
- 1.5 times rated power for 10s, 2 times for 2s
- LCD Remote control (Optional Accessory - MI5007)
- Power ON-OFF button
- USB : 5V, 2.1 A
- Two multiple controlled DC fans: Temperature and Load.
- Protection: LED Indicator & Audible Alarm.
- 12V DC input
- Input voltage range: -15% ~ +25%
- Output voltage regulation: +/- 10%
- Output waveform: Pure Sine Wave
- Frequency: 50Hz +/- 1%
- CE and RoHS Approved
- 12 months warranty

INTRODUCTION

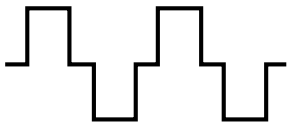
What is an Inverter?

Power inverter is an electronic device that convert DC (Direct Current) battery power to standard AC (Alternating Current) power. DC is the power that is produced by battery while AC is the standard power needed to run electrical equipment. A power inverter does the opposite of a rectifier and is used in places and situations where AC power is not available.

Pure Sine Wave Inverter



PURE SINE WAVE(PSW)



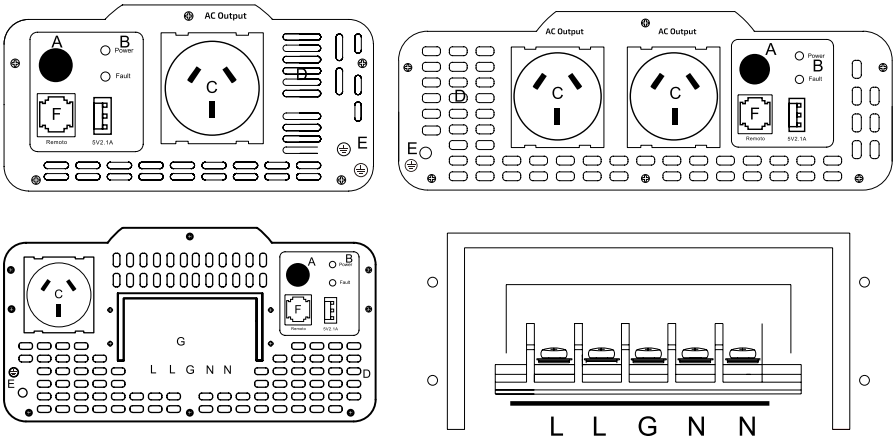
MODIFIED SINE WAVE (MSW)

If you want to run your equipment exactly to the manufacturer's specifications, choose a pure sine wave inverter. With pure sine wave, motor loads start easier and run cooler. Some equipment only operate properly with pure sine wave inverter, such as laser printers, variable speed motors and digital clocks.

MAIN COMPONENTS

Front Panel

The front panel view shows the inverter's ON/OFF Button,AC Output Receptacle, LED Indicator Light, Vent Outlet, Remote Control port, Chassis Ground, USB.



A. ON/OFF Button - This Button controls ON/OFF operation of the inverter.

B. LED Indicator Light - Fault, Inverter.

- Fault: Turns Red shows fault, reference to Troubleshooting
- Inverter: This light will illuminate continuously whenever connected equipment is receiving battery-supplied, inverted AC power.

C. AC Output Receptacle - Suitable for Australian AC Mains operated electrical devices.

D. Vent Outlet - To decrease the temperature of the inverter.

E. Chassis Ground - Properly grounds the Inverter to vehicle grounding system or to earth ground.

F. Remote Switch Port (Optional) - Use to connect the remote ON/OFF switch via a communication cable. Refer to Appendix

G. Hardwire Terminal Block(3000W) - Note: When the load current is >15A, must use output terminal connection which can be found inside the AC output panel of the inverter.

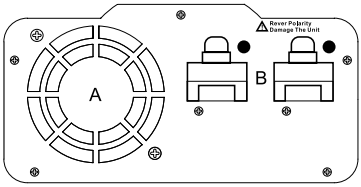
H. USB Port - Powers and charges USB-enabled devices.

Seek professional assistance if you are unfamiliar with electrical wiring.

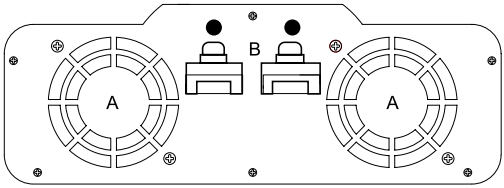
WARNING: Ensure the inverter is turned off if connecting the Hard Wire option.

Rear Panel

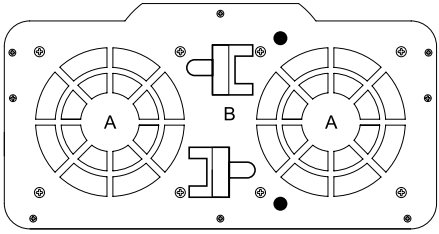
The rear panel view shows the inverter's Cooling fan, DC Battery Terminals, Fuse.



500/1000W



2000W



3000W

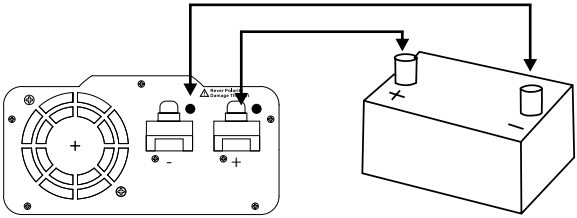
A. Temperature controlled Cooling Fan - Quiet, efficient fan prolongs equipment service life. Load >20% or inner temperature is more than 45°C, the fan will start work

B. DC Battery Terminals - Connect the inverter to battery or other power sources.

Negative (-) and Positive (+) DC terminals should be kept insulated to protect from acidentalal short circuits.

- Connect the black cable to the black post marked (-) on the back of the inverter. Connect the other end to the negative terminal on the battery.
- Connect the red cable to the red post marked (+) on the back of the inverter. Connect the other end to the positive terminal on the battery.

If you connect the cables to the incorrect terminals, you will reverse the polarity and cause damage to the inverter.



WARNING: PROHIBITED REVERSE POLARITY. DAMAGE CAUSED BY REVERSE POLARITY WILL NOT BE COVERED BY WARRANTY.

USAGE INSTRUCTIONS

Load consideration

When an appliance with a motor starts, it requires a momentary surge of power. This surge of power is the “starting load” or “peak load”. Once started, the appliance requires less power to continue to operate. This is known as the “continuous load”. It is important to know the starting loads and the continuous loads of the appliances that are to be powered by the inverter.

Appliance power is rated in watts. This information is usually stamped or printed on most appliances and equipment. In some cases, a tool will be rated in amperes. To convert from amps to watts, multiply:

Amps x AC voltage = Watts

This formula yields an approximation of the continuous wattage load of that appliance.

The startup load of an appliance is a major factor of whether this inverter can power it. Startup load is momentary. With many appliances, it is approximately twice the continuous load, but some appliance startup loads can be as high as eight times the continuous load.

To determine if an appliance or tool will operate with this inverter, run a test. This inverter will automatically shut down in the event of an output overload, so there is no danger of damaging either the inverter or the equipment. When lit, a red LED indicator and Buzzer signals a fault.

Configuring the Battery Bank

To determine the minimum battery ampere-hour rating that you will need to operate appliances from the inverter and any DC appliances powered by the battery bank, follow these steps:

- List the maximum continuous wattage that the inverter has to supply.
- Estimate the number of hours the appliances will be in use between battery recharges. This will vary depending on appliances. For example, a typical home-use coffee maker draws 500 watts during its brew time of 5 minutes. It maintains the temperature of the pot, requiring 100 watts. Typical use of a microwave oven is only for a few minutes. Some longer operating time appliances are lamps, TVs, computers and refrigerator/freezers.

Determine the total watt-hours of energy needed. This is done by multiplying average power consumption in watts by hours of run time. For example: 500 watts for 10 hours = 5000 watt hours. To get an estimate of the maximum current (in amps) that a battery bank must be capable of delivering to the inverter, divide the load watts by ten.

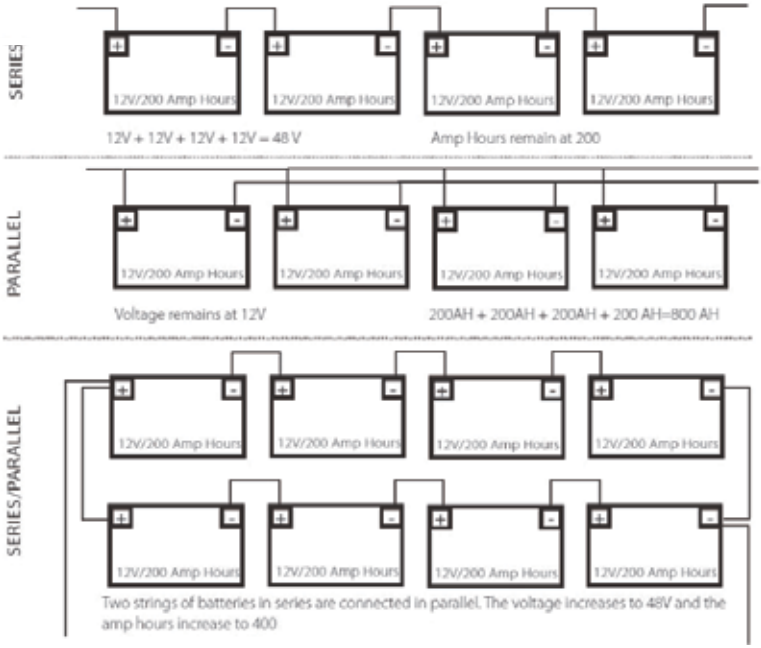
For example a 500 watt appliance load will need 50 amps at 12 volts DC. Using the 500 watts (or 50 amps) for 10 hours example as above, then 50 amps is needed for 10 hours. This provides us with the basic amp-hours (AH) of battery that is required. Ten hours at 50 amps equals 500 amp-hours (AH). There are additional factors that determine actual run time. These include:

- AC appliance load and time in use (basic AH).
- Cable gauge and length (cable losses).
- Charge level of the batteries (between use, chargers have to be able to fully charge the batteries).
- Temperature of the batteries (colder batteries provide fewer amps).
- Age and condition of the batteries (older batteries lose AH capacity).
- Compliance with turning off unnecessary AC loads.
- Use of DC appliances and compliance with turning off unnecessary DC loads.

Battery Wiring Examples

In renewable energy systems, batteries are connected to each other in one of three ways:

- Series (voltage increases, amperage stays the same as a single battery)
- Parallel (voltage stays the same as a single battery, amperage increases)
- Series/Parallel (both voltage and amperage increase)



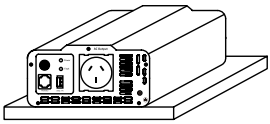
Placement of inverter

The location where to install inverter must be:

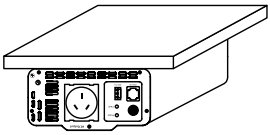
- Dry: Do not allow water to drip or splash onto it.
- Cool: Ambient air temperature should be between 0° C and 40° C - ideally between 15° C and 25°.Do not place the inverter on or near a heating vent or any piece of equipment which is generating heat above room temperature. Do not place the inverter in direct sunlight unnecessarily.
- Ventilated: Allow at least one inch of clearance around the unit for air flow. Do not place items on or over the inverter during operation. Make sure that air is allowed to circulate freely around the unit. A fan is helpful in the case where the inverter is operating at maximum
- Safe: Do not install the inverter in the same compartment as the batteries or in any compartment where flammable liquids or fumes may be or may become present.
- Dust: Do not install the inverter in dusty environments. The dust can be collected into the unit when the cooling fan is working.
- Close to batteries: Avoid excessive cable lengths. Do not install the inverter in the same compartment as batteries.

Mounting position of the inverter

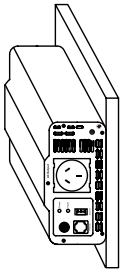
The inverter may be mounted horizontally on the top of a horizontal surface or under a horizontal surface. The inverter can also be mounted on a vertical surface horizontally



Horizontal on top of surface



Horizontal beneath surface



Vertical surface, Horizontally

Getting Connected

Follow the connection sequence described below.

1. Ensure that the ON/OFF switch on the Inverter is in the OFF position. If the power source is a DC power supply, switch it OFF as well.
2. Connect inverter to power source. Connect the DC cables to the DC battery terminals on the rear panel of the inverter. The red terminal is positive (+) and the black terminal is negative (-).
3. Connect inverter to appliances. Make sure the load power within the rated power of inverter and the start power should not exceed the peak power of the inverter. When having the inverter connected with appliances and a power supply, switch on the inverter and appliances. If you are operating several loads from the power inverter, turn them on separately after the inverter has been turned on. This will ensure that the power inverter does not have to deliver the starting currents for all the loads at once.

PROTECTION FEATURE

Inverter is equipped with numerous protection features to ensure safe operation.

Input Low Voltage Protection

- When battery voltage is below 10.5V ± 0.5V(for 12V input inverter) Buzzer sounds 2 times. which indicates DC power supply voltage is descending and batteries need to recharge.
- When input voltage is below 10.0V ± 0.5V(for 12V input inverter) Buzzer sounds 3 times and red light turns on, AC output will be automatically shut off.

Input Over Voltage Protection

When input voltage reaches 16.0V ± 0.5V Buzzer sounds 4 times and red light turns on, the AC output will be shut off automatically.

Short Circuit Protection

When a short circuit occurs, Buzzer will sound 6 times and the red light turns on, the AC output will be shut off automatically.

Overload Protection

When an overload occurs, Buzzer will constantly sound and the red light will turn on, the AC output will be shut off automatically, will attempt to reconnect after 60 seconds if load is reduced.

Over Temperature Protection

When heat sink temperature exceeds 45°C, the inner cooling fan will automatically turn on to cool the inverter.

When inner temperature exceeds 75°C, Buzzer will sound 5 times and red light will turn on, the AC output will be shut off automatically.

TROUBLESHOOTING

Acoustics buzzer alarms

When applying the inverter to acoustics devices, some inferior acoustics devices will buzz, this is because the output wave from the inverter is modified sine wave inverter.

TV Interference

You can get minimum interference through use of a filter. On some occasions, when the interference of every weak signals becomes too obvious, you can try the following:

- Place the inverter far from the TV and TV antenna.
- Try to change the direction of TV signals cable and TV antenna to reduce the interference to a minimum.
- Use high quality screened or shielded antenna cable.

SYMPTOM	POSSIBLE CAUSE	SOLUTIONS
ON/OFF switch is switched on, LED does not light. Buzzer is off. There is no AC voltage	There is no voltage at the DC input Terminals	• Check the continuity of the battery input circuit • Check that the battery fuse is intact. Replace if blown • Check that all connections in the battery input circuit are tight
Buzzer alarm is sounded 1 time. There is no AC voltage.	• Loose AC output connections. • Short circuit of AC Output wiring.	• Tighten AC output connections • Check AC wiring for short circuit.
Buzzer sound 2 times	Voltage at the DC input terminals reads below 10.5+/-0.5VDC (12V version)	• Check that the battery is fully charged. Recharge, if low • Check that the battery cables are thick enough to carry the required current over the required length. Use thicker cables, if required • Tighten connections of the battery input circuit
Buzzer sound 3 times and red light turn on	Voltage at the DC input terminals reads below 10.0+/-0.5VDC (12V version)	• Check that the battery is fully charged. Recharge, if low • Check that the battery cables are thick enough to carry the required current over the required length. Use thicker cables, if required • Tighten connections of the battery input circuit.

SYMPTOM	POSSIBLE CAUSE	SOLUTIONS
Buzzer sound 4 times and red light turn on	Higher input DC voltage than 16.0VDC (12V version)	• Check that the voltage at the DC input terminals is more than 16V DC. • Ensure that the maximum charging voltage of the battery charger / alternator / solar charge controller is below 16V DC. • Ensure that an un-regulated solar panel or wind turbine is not used to charge a battery
Buzzer sound 5 times and red light turn on	System overheating	• Check that the fan is working. If not, the fan / fan control circuit may be defective. Call Technical Support • If the fan is working, check that the ventilation slots on the suction side and the openings on the discharge side of the fan are not obstructed • If the fan is working and the openings are not obstructed, check that enough cool replacement air is available. Also check that the ambient air temperature is less than 45° C • Reduce the load to reduce the heating effect • After the cause of overheating is removed and the unit cools down, it will reset automatically
Red light constantly on	The loads is 200% higher than rated power.	• Disconnect the load • Reduce the load • Cool the unit.

Note: While in overload protection the AC output load will need to be reduced in order for the inverter to continue working. After 60 seconds the inverter will try to restart provided the load power has been reduced. If the load has not been reduced after 10 auto restart attempts the system will shut down completely and require a manual restart to switch it back on again.

MAINTENANCE

To keep your inverter operating properly, there is very little maintenance required. You should clean the exterior periodically with a dry cloth to prevent accumulation of dust and dirt. At the same time, tighten the screws on the DC input terminals.

APPENDIX

Remote Control Switch (MI5007) - Not Included (Sold Separately)

A. Battery Indication
B. Battery voltage
C. AC output running
D. Power consumption
E. AC output voltage
F. Inner Temperature
G. Fan working

Display of protection function - Error Code

ERROR CODE	DESCRIPTION
E-1	Low Voltage Protection
E-2	Over Voltage Protection
E-3	High Temperature
E-4	Over Load Protection
E-5	Short-circuit Protection

Connecting the Communications Cable

The communications cable is a 6-conductor cable (wired like a normal telephone-type cable). This cable is connected to the RJ11 jack on the rear of the remote control and to the REMOTE port located on the rear of the inverter.

Note: The Inverter and Remote Control ON/OFF Switch is wired in parallel. To use this remote control, you must turn the inverter's ON/OFF Switch to the OFF selection, and vice versa.

Recommendations

For correct operation, the battery voltage should be between 0.9xVnom and 1.29xVnom where Vnom is 12V, and must be able to supply sufficient current to your inverter. The following table displays the recommended guidelines (Battery Cable, Fuse, Battery Capacity) per inverter type

INVERTER TYPE	INPUT VOLTAGE	DC BATTERY CABLE	FUSE	BATTERY CAPACITY
500W	12V	6mm^2 (1Red/1Black)	35A*4	≥100Ah
1000W	12V	10mm^2 (1Red/1Black)	35A*4	≥160 Ah
2000W	12V	16mm^2 (2Red/2Black)	35A*8	≥320Ah
3000W	12V	16mm^2 (2Red/2Black)	35A*12	≥480Ah

SPECIFICATIONS

Rated Power	500W
Surge Power	120%<Load<150% Rated power for 10s, 150%<Load<200% Rated power for 2s
AC Voltage	230V
	AC output regulation: 10%
	Frequency:50Hz±0.5
Waveform	Pure Sine Wave (THD<3%) at rated input voltage
Protection	AC short circuit, Overload, Over temperature
Batt. Voltage Range	10.5V-16.0V(12V version) 21.0V-32V(24V version)
Efficiency	More than 85%
Protection	Battery Low Alarm, Battery Low Shutdown
Battery Types	Open & sealed lead acid battery
Dimension	21 x 15 x 8 cm (L x W x H)
AC Out Receptacle	Australia
Cooling	Temperature and Load Controlled
Operating Temperature	-15° C to 40° C
Storage Temperature	-40 to 85° C
Relative Humidity	20% ~ 90% RH non-condensing

Note: The specifications are subject to change without prior notice for further improvement of products.

WARRANTY INFORMATION

Our product is guaranteed to be free from manufacturing defects for a period of 12 Months.

If your product becomes defective during this period, Electus Distribution will repair, replace, or refund where a product is faulty; or not fit for intended purpose.

This warranty will not cover modified product; misuse or abuse of the product contrary to user instructions or packaging label; change of mind and normal wear and tear.

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and failure does not amount to a major failure.

To claim warranty, please contact the place of purchase. You will need to show receipt or other proof of purchase. Additional information may be required to process your claim.

Any expenses relating to the return of your product to the store will normally have to be paid by you.

The benefits to the customer given by this warranty are in addition to other rights and remedies of the Australian Consumer Law in relation to the goods or services to which this warranty relates.

This warranty is provided by:

Electus Distribution
Address 46 Eastern Creek Drive, Eastern Creek NSW 2766
Ph. 1300 738 555