

Power Inverter

User manual



A USA	B AUSTRALIA	C UNIVERSAL	D Europe/USA/Japan	E U.K.	F FRANCE	G GERMANY	GFCI USA-GFCI

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1. Introduction

Thank you for purchasing the Power Inverter. The inverter is a compact and highly portable power inverter, the leader in the field of high frequency inverter design. From the 12V/24V/48V DC outlet in your vehicle or boat , or directly from a dedicated 12V/24V/48V DC battery, the inverter will efficiently and reliably power a wide variety of household AC products, such as TVs, computers, VCRs, and many more. The inverter is designed to provide years of trouble-free operation and includes automatic safety monitoring circuitry to protect the inverter, and your battery, from inadvertent overload conditions.

Read this guide before installing or using the inverter and save it for future reference.

2. Safety

Incorrect installation or misuse of the inverter may result in danger to the user or hazardous conditions. We urge you to pay special attention to all CAUTION and warning statements. Caution statements identify conditions that may result in personal injury or loss of life.



WARNING! Shock hazard. Keep away from children.

- The inverter generates the same potentially lethal AC power as a normal household wall outlet. Treat it with the same respect that you would any AC outlet.
- Do not insert foreign objects into the inverter's AC outlets, fan or vent openings.
- Do not expose the inverter to water, rain, snow or spray.
- Do not under any circumstances, connect the inverter to utility power AC

distribution wiring.



WARNING! Heated surface.

The inverter's housing may become uncomfortably warm, reaching 140°F (60°C) under extended high power operation. Ensure at least 2 inches (5 cm) of air space is maintained on all sides of the inverter. During operation, keep away from materials that may be affected by high temperatures.



WARNING! Explosion hazard.

- Do not use the inverter in the presence of flammable fumes or gases, such as in the bilge of a gasoline powered boat , or near propane tanks. Do not use the

Please make sure you have known the basic characteristic of this power inverter before use .



1--- AC output sockets : can choose the socket type as you like . Any combination of 110V AC or 220V AC products with a total continuous power consumption of the continuous power or less may be plugged in.

2---USB port : DC 5V , 500mA

3---AC switch : turn on/off the AC output power.Enables output AC power at the AC outlets when switched ON.

4---Green LED light : indicates AC power is present at the AC outlets and the inverter is operating normally.

5---Red LED light : indicates inverter shutdown caused by low or high voltage, overload

inverter in an enclosure containing automotive-type, lead-acid batteries. These batteries, like sealed batteries, vent explosive hydrogen gas, which can be ignited by sparks from electrical connections.

● When working on electrical equipment always ensure someone is nearby to help you in an emergency.



CAUTION!

- Do not connect live AC power to the inverter's AC outlets. The inverter will be damaged even if it is switched off.
- Do not expose the inverter to temperatures exceeding 104°F (40°C)



CAUTION!

- Connect inverter only to batteries with a 12V/24V/48V DC nominal output. Wrong DC input will not supply enough voltage or damage the inverter.



CAUTION! Do not use the inverter with the following equipment:

- Small battery operated products such as rechargeable flashlights, some rechargeable shavers, and night-lights that are plugged directly into an AC receptacle to recharge.
- Certain battery chargers for battery pack used in hand powered tools. These chargers will have warning labels stating that dangerous voltages are present at the charger's battery terminals.
- Connect inverter only to batteries with a 12V/24V/48V DC nominal output. A battery with 6V/12V/24V nominal output will not supply enough voltage and a battery with 24V/48V/96V nominal output will damage the inverter.



CAUTION! Any internal adjustment on the inverter is prohibit!

3. Auto protect functions

These advanced safety features are built into the inverter. Electronic overload protection with automatic shutdown.

- Built-in internal backup DC fuse provides added safety.
- Low battery voltage warning followed by automatic shutdown.
- High input voltage protection with automatic shutdown.
- Over temperature protection with automatic shutdown.
- Output short circuit protection.

4. Product characteristic

or excessive temperature.

6---Thermovent : with small fan built inside , can lower the temperature of inverter . Should keep it clean during the inverter working .

7---Positive terminal : connect with the positive (+) side of the battery .

8---Negative terminal: connect with the negative (-) side of the battery .

9---Ground terminal : connect to the ground , counseling electrical power .

10--- Fuse : can protect the inverter when the current is too excessive .

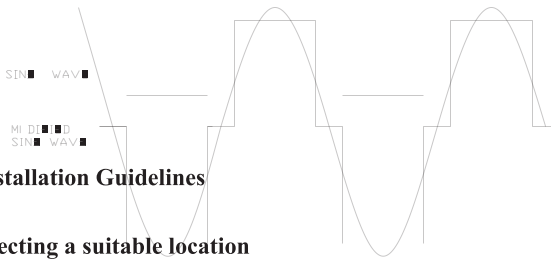
Output wave form :

The inverter is capable of continuously powering most 100-120V/220-240V AC products that use the rated continuous output power or less. Its AC output waveform, called

Pure sine wave

Modified sine wave

It is designed to function as the sine wave shape of utility power.



5. Installation Guidelines

Selecting a suitable location

For safe and optimum performance. Install the inverter in a location that is...

- **Dry.** Do not expose to water drip or spray.
- **Cool.** Better to be used in ambient temperatures between 32F(0C) and 104F(40C). Keep away from furnace heating vents or other heat producing equipment.
- **Well ventilated.** Allow at least 2 inches(5cm) clearance above and on all sides of the unit for proper cooling.
- **Safe.** Do not install inverter in a compartment with non-sealed batteries or flammable liquids, such as gasoline, or explosive vapors.

- **Clean and free of dust and dirt.** This is especially important if the inverter is used in a work environment.

Due to limitations in the common 12V/24V/48V outlet in a vehicle or boat, the inverter should only be used to supply AC power which is below the inverter rated power .

1. Before connecting your new inverter, you should make a visual inspection to ensure no visible damage has been caused by shipping. Then make sure the Main Power Switch of the inverter is Off (O).



CAUTION! A reverse polarity connection (positive to negative) may damage the inverter. Damage caused by a reverse polarity connection is not covered under warranty.

2. Tighten the nut on each DC terminal by hand until it is snug. Do not over tighten.
3. Insert the plug of this cable into the 12V/24V/48V DC outlet and switch the unit ON. See Section 4 if the inverter does not operate properly after being connected.
4. When the inverter is not in use, unplug it from the 12V/24V/48V DC outlet to prevent slight discharge of the battery.

6. Instruction of operation



Using the DC Cable Clips or Direct Connect Cables

By directly connecting the inverter to a 12V/24V/48V DC battery with the DC Cable-Chips, you can operate products with power requirements up to the rated continuous output power.

1. All inverters may be turned ON ("—") or OFF("O") using the main power switch,
2. The fan is thermally controlled and will only turn on as needed.
3. Now that you have confirmed the inverter is operating as expected, it is time to

connect your equipment to the inverter .

4. You are now ready to enjoy the use of your new inverter and may turn it on .

Using the Inverter

The power, or 'wattage', rating of AC products is average power they use. When many AC products are first switched on, they initially consume more power than their power rating. For loading such as motor rectifier, there is a surge current when starting. Please note the starting current can't exceed the maximum rated current. (The starting current of motor may be 7-12 times the rated current.)



CAUTION! Modified sine wave inverter can't take above mentioned load.

It is normal that the output voltage drops when a heavy load is present. You must take action in case of below conditions.

When the battery DC voltage is reduced below 11.5V/21V/42 V.

Solution:

- increase the battery capacity.
- reduce the load on inverter.

When output AC voltage drops below acceptable levels(106V/210V AC).

Solution:

- increase the battery capacity.
- reduce the load.

Although the inverter can supply momentary surge power, occasionally some products rated less than the rated continuous output power may exceed its surge capabilities and trigger its safety overload shut down feature. If this problem occurs when attempting to operate several AC products at the same time, try first switching on the inverter with all AC products switched off. Then one by one switch each on, starting with the high surge product first.

Inverter Operation

1. When properly connected to a 12V/24V/48V DC outlet or battery, turning the ON/OFF("—"/"O")switch ON("—"), will illuminate the green POWER light, and deliver AC power to the Outlets.
2. Plug the AC product(s) you wish to operate into the AC outlet(s) and switch them

on, one at a time.

3. As the battery is used up, battery voltage begins to fall. When the inverter senses that the voltage at its DC input has dropped to 10.9~11.5V/21.5~23.0V/43.0~46.0V, an audible alarm sounds. This allows time for computers or other sensitive devices to be shut down.
4. If the audible alarm is ignored the inverter will automatically shut down when the battery voltage drops to 10.3~11.0V/20.5~22.0V/41.0~44.0V. This prevents battery damage from excessive discharge. After auto shut down, the red FAULT light illuminates.



IMPORTANT: Vehicle batteries are designed to provide brief periods of very high current needed for engine starting. They are not intended for constant deep discharge. Regularly operating the inverter from a vehicle battery until the low voltage alarm sounds will shorten the life of the battery. Consider connecting the inverter to a separate deep discharge type battery if you will be frequently running electrical products for extended period of time.

5. If an AC product rated higher than the rated continuous power (or which draws excessive surge power) is connected, the inverter will shut down. The red FAULT light will turn on.
6. If the inverter exceeds a safe operating temperature, due to insufficient ventilation or a high temperature environment, it will automatically shut down. The red FAULT light will turn on and the audio warning will sound.
7. Should a defective battery charging system causes the battery voltage to rise to dangerously high levels, the inverter automatically shuts down.



CAUTION! Although the inverter incorporates protection against over-voltage, it may still be damaged if the input voltage exceeds 16.2 V/31V/62V DC.

8. The cooling fan is designed to operate only when the temperature is higher than 104°F (40 C).
9. In the event of an overload, low battery voltage or overheating, the inverter will automatically shut down (See Section 4 Troubleshooting).
10. The inverter will need to be manually reset when shut down by overload.

Battery Operating Time

Operating time will vary depending on the charge level of the battery, its capacity and the power level drawn by the particular AC load.

When using a vehicle as a power source, it is strongly recommended to start the vehicle every hour or two to charge the battery before its capacity drops too low. The inverter can operate while the engine is running, but the normal voltage drop that occurs during starting may trigger the inverter's low voltage shutdown feature.

Because the inverter draws less than the no load current draw with the ON/OFF ("—"/"O")

switch in ON ("—") position and with no AC products connected, it has minimal impact on battery operating times.

Interference with Electronic Equipment

Generally, most AC products operate with the inverter just as they would with household AC power. Below is information concerning two possible exceptions.

Buzzing Sound in Audio Systems and Radios

-some inexpensive stereo systems, boom boxes, and AM-FM radios have inadequate internal power supply filtering and buzz slightly when powered by the inverter. Generally, the only solution is audio product with a higher quality filter.

Television Interference

-The inverter is shielded to minimize its interference with TV signals. However, with weak TV signals interference may be visible in the form of lines scrolling across the screen. The following should minimize or eliminate the problem:

- Use an extension cord to increase the distance between the inverter and the TV, antenna and cables.
- Adjust the orientation of the inverter, television, antenna and cables. Maximize TV signal strength by using a better antenna and use shielded antenna cable where possible.
- Try a different TV. Different models of televisions vary considerably in
- Their susceptibility to interference.

Frequently Asked Question about Power Inverter

Q: Are there any disadvantages of using "modified sine wave " inverter?

"Square Modified Sine Wave" inverters will run most tools and appliances without any problem and are the most common type of inverter on the market.

Below are the advantages of "Pure Sine Wave" (also called True Sine Wave) inverters over modified sine wave inverters:

1. Reduces audible and electrical noise in fans, audio amplifiers, TV and some sensitive audio system.
2. Inductive loads like microwave ovens and motors might run faster, quieter and cooler.
3. The following devices that might not work with modified sine wave inverters:
 - Some battery chargers for cordless tools
 - Some new furnaces and pellet stoves with microprocessor control
 - Sensitive electrical or electronic items such as certain medical equipment

7. Troubleshooting

Possible Cause	Suggested Remedy
PROBLEM: AC product will not operate, no inverter lights are ON.	
Battery is defective.	Check battery and replace if required.
Inverter has been connected with reverse DC input polarity.	Check connection to battery. Probable inverter damage has occurred., Have unit repaired (not covered by warranty).
Loose cable connections	Check cables and connections. Tighten as required.
PROBLEM: Inverter will run some small loads, but not larger ones.	
Voltage drop across DC cables.	Reduce the cable and use bolder one
PROBLEM: Measured inverter output is too low.	
Standard average-reading AC voltmeter used to measure output voltage, resulting in an apparent reading below 100V or 200V AC.	Inverter's 'pure sine wave' Output Requires 'true RMS' voltmeter, such as Fluke 87 series multimeter, for accurate measurement.
Battery voltage is too low.	Recharge battery.
PROBLEM: Alarm is sounding.	
Low voltage shutdown or thermal shutdown has occurred.	Shorten cables or use heavier cables. Recharge battery. Allow unit to cool . Improve air circulation around unit . Locate unit to a cooler environment. Reduce load if continuous operation is Required.

PROBLEM: Battery run time is less than expected.	
AC product power consumption is higher than rated.	Use a larger battery to make up for increased power requirement.
Battery is old or defective.	Replace battery.
Battery is not being properly charged.	Many simple chargers are unable to charge a battery fully. Replace charger with better model such as a TRUECHARGE smart charger. Use shorter/heavier DC cables.
PROBLEM: AC product will not operate, red FAULT light ON.	
AC product(s) connected are rated at more than the rated continuous output power. overload shutdown has occurred.	Use product with a power rating less than the rated continuous output power;
AC Product is rated less than the rated continuous output power; high starting surge has caused overload shutdown.	Product exceeds inverter's surge capability. Use a product with starting surge power within the inverter's capability.
Battery is discharged (alarm is sounding).	Recharge battery.
Inverter has overheated due to poor ventilation and has caused over temperature shutdown.	Switch inverter OFF and allow to cool for 15 minutes. Clear blocked fan or remove objects covering unit. Locate unit to a cooler environment. Reduce load if continuous operation is required, restart.
Input voltage is greater than 16.0V/31V/61V DC.	Verify charging system is properly regulated and battery is 12V/24V/48V DC nominal.

8. Specifications

DC input voltage range	11.5~15.5V/23.0~31.0V/46.0~61.0VDC
AC output voltage (nominal)	110~120V/220~240VAC
AC output frequency(Pure sine wave)	50/60 ±0.5 Hz
AC output frequency(Modified sine wave)	50/60 ±2 Hz
Ambient operating temperature range	-15 °C~ 50 °C
Low battery alarm trigger range (nominal)	10.5~11.5V/21.5~23.0V/43.0~46.0VDC
Low battery shut down range (nominal)	9.5~10.5V/20.5~22.0V/41.0~44.0VDC
High battery shut down range (nominal)	15.5V/31V/61V DC

Pure Sine Wave Inverter

CP=Continuous Power

SP=Surge Power

THD=Total Harmonic Distortion

NL=No load Current Draw

Specifications subject to change without notice

Item	CP	SP	Efficiency	THD	NL
NV-P300	300W	600W	90%	≤3%	<0.4 A(12V),<0.3A (24V)
NV-P500	500W	1000W	90%	≤3%	< 0.5A(12V),<0.4A (24V)
NV-P600	600W	1200W	90%	≤3%	<0.5A(12V),<0.4A (24V)
NV-P1000	1000W	2000W	90%	≤3%	<0.8A(12V),<0.5A (24V)
NV-P1500	1500W	3000W	90%	≤3%	<1A(12V),<0.8A (24V)
NV-P2000	2000W	4000W	90%	≤3%	<1.2A(12V),<1A (24V)
NV-P2500	2500W	5000W	90%	≤3%	<1.5A(12V),<1A (24V),<0.8A (48V)
NV-P3000	3000W	6000W	90%	≤3%	<1.5A(12V),<1A (24V),<0.8A (48V)

Modified Sine Wave Inverter

Item	CP	SP	Efficiency	THD	NL
NV-M150	150W	300W	90%	≤3%	< 0.3A(12V),<0.2A (24V)
NV-M300	300W	600W	90%	≤3%	<0.4 A(12V),<0.3A (24V)
NV-M500	500W	1000W	90%	≤3%	<0.5A(12V),<0.3A (24V)
NV-M600	600W	1200W	90%	≤3%	<0.6A(12V),<0.5A (24V)
NV-M800	800W	1600W	90%	≤3%	<0.8A(12V),<0.6A (24V)
NV-M1000	1000W	2000W	90%	≤3%	<0.8A(12V),<0.6A (24V)
NV-M1200	1200W	2400W	90%	≤3%	<0.8A(12V),<0.6A (24V)
NV-M1500	1500W	3000W	90%	≤3%	<1A(12V),<0.8A (24V),<0.5A (48V)
NV-M2000	2000W	4000W	90%	≤3%	<1.5A(12V),<1A (24V),<0.8A (48V)
NV-M2500	2500W	5000W	90%	≤3%	<1.5A(12V),<1A (24V),<0.8A (48V)
NV-M3000	3000W	6000W	90%	≤3%	<1.8A(12V),<1.2A (24V),<1A (48V)

9. Inverter operating equipments reference chart

Audio / Video Equipment	Power	150W	300W	600W	1000W	1500W	2000W
12 Inch colour TV	16W	✓	✓	✓	✓	✓	✓
Games console	20W	✓	✓	✓	✓	✓	✓
Satellite TV receiver	30W	✓	✓	✓	✓	✓	✓
Sharp HiFi stereo 4-head VCR	40W	✓	✓	✓	✓	✓	✓
Kenwood CD changer / mini system	60W	✓	✓	✓	✓	✓	✓
19 Inch colour TV	80W	✓	✓	✓	✓	✓	✓
Quasar 20 Inch TV/VCR combo	110W	✓	✓	✓	✓	✓	✓
27 Inch colour TV	170W		✓	✓	✓	✓	✓
RCA 240W RMS stereo amplifier	250W		✓	✓	✓	✓	✓
Home theatre system	500W			✓	✓	✓	✓
Domestic Appliance	Power	150W	300W	600W	1000W	1500W	2000W
Singer sewing machine	99W	✓	✓	✓	✓	✓	✓
Holmes halogen worklight	100W	✓	✓	✓	✓	✓	✓
Clothers washer (horizontal)	250W		✓	✓	✓	✓	✓
Blender	350W			✓	✓	✓	✓
Electric blanket	400W			✓	✓	✓	✓
Dishwasher - cool dry	700W				✓	✓	✓
Hair curler	750W				✓	✓	✓
Microwave - 750W	900W				✓	✓	✓
Vacuum cleaner	900W				✓	✓	✓
Coffeemaker	1200W					✓	✓
Dishwasher - hot dry	1450W					✓	✓
Trash compactor	1500W						✓
Large Hob	2000W						✓
Home Office	Power	150W	300W	600W	1000W	1500W	2000W
Fax machine - standby	5W	✓	✓	✓	✓	✓	✓
Inkjet printer	35W	✓	✓	✓	✓	✓	✓
Toshiba satellite laptop computer	40W	✓	✓	✓	✓	✓	✓
IBM thinkpad	42W	✓	✓	✓	✓	✓	✓
Fax machine - printing	50W	✓	✓	✓	✓	✓	✓
Desktop computer	55W	✓	✓	✓	✓	✓	✓
17 Inch colour monitor	100W	✓	✓	✓	✓	✓	✓
Bell fax, auto feed with cutter	165W		✓	✓	✓	✓	✓
Laser printer	900W				✓	✓	✓

Lighting	Power	150W	300W	600W	1000W	1500W	2000W
100W incandescent light	100W	✓	✓	✓	✓	✓	✓
Regent twin work light	900W				✓	✓	✓
Regent contractor grade work light	1066W					✓	✓
Power tools	Power	150W	300W	600W	1000W	1500W	2000W
Stanley glue gun	20W	✓	✓	✓	✓	✓	✓
Black & decker buffer	77W	✓	✓	✓	✓	✓	✓
Dremel moto tool	99W	✓	✓	✓	✓	✓	✓
Craftsman rotary power tool	126W	✓	✓	✓	✓	✓	✓
Weller soldering gun	132W	✓	✓	✓	✓	✓	✓
Makita Finishing sander	176W		✓	✓	✓	✓	✓
Iron smith 5 Inch bench grinder	180W		✓	✓	✓	✓	✓
Craftsman industrial sander	220W		✓	✓	✓	✓	✓
Makita 4 Inch disc grinder	529W			✓	✓	✓	✓
Jepson 1/2 Inch reversible drill	620W				✓	✓	✓
Dewalt H.D. reciprocating saw	720W				✓	✓	✓
Grinder, 1/2hp	1080W					✓	✓
McCulloch 14 Inch chain saw	1200W					✓	✓
Worm drive 7 ¼ Inch saw	1800W						✓
Table saw 10 Inch	1800W						✓
All manufactures names used are trademarks of their original owners and are recorded here only for information							

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