

## Frequently Asked Questions About Power Inverters

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### 1. What is a Power Inverter?

A power inverter is a DC (battery) powered device that converts DC (Direct Current) power into AC (Alternating Current) power. The output is usually 120 VAC, 60 Hz (North American domestic power) or 230 VAC, 50 Hz, International power. (MajorPower.Com offers many other single and 3-phased outputs.)

### 2. What Can I Use an Inverter For?

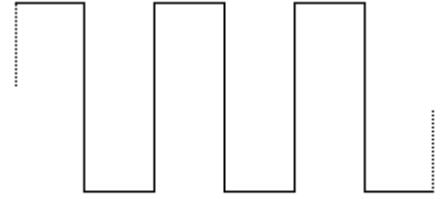
With a large enough battery bank, or a large enough alternator output from your vehicle, and a powerful enough inverter, most anything, within reason, can be operated from a power inverter. Everyday appliances such as microwaves, power tools, TVs and VCRs, lights, audio/visual equipment, battery chargers, and computers. A heavy inrush inverter can be used to power air compressors, water pumps, heaters, ventilation fans, and air conditioners. Pure sine inverters are ideal for running sensitive test equipment: oscilloscopes, scales, stereos & video equipment, etc.

### 3. What is the Difference Between Square, Modified & Pure Sine Wave?

#### a. Square Wave

First, a word about Square Wave Inverters.

MajorPower.Com neither recommends nor offers any inverters that produce a "square" wave. Square Wave units are not efficient and could be harmful to some electronic equipment. Square Wave units were the pioneers of inverter development and, like the horse and buggy, do not figure on today's power inverter highway.

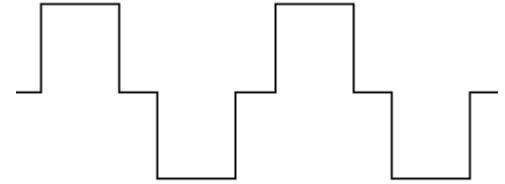


**Square Wave**

#### b. Modified Sine Wave

The most common, general-use inverters available are of the "Modified Sine Wave" variety, usually available at more moderate and competitive pricing. Modified or Quasi Sine Wave output inverters are designed for efficiency while still being inexpensive to make.

Although scientifically designed to somewhat simulate Pure Sine Wave output, Modified Sine Wave inverters do not offer the same "perfect" electrical output (see diagram below). As such, a by-product of Modified sine wave output units is electrical noise. Some lower-grade TVs and stereos use power supplies incapable of eliminating common mode noise. This may cause a "hum" on your radio or sound system or a "grain" or small amount of "snow" on your video picture.



**Modified Sine Wave**

The main drawback with Modified sine wave inverters is that some appliances with timing devices, light dimmers, and some battery chargers, as well as variable speed devices may not work well, or indeed, may not work at all.

Modified or Quasi Sine Wave output inverters are more than adequate for operating computers, drills, saws, microwaves, refrigerators, fans, pumps, and general electrical equipment including most small motors (except for some variable speed motors). For your kids to watch TV in the car, or to power lights at the summer cabin, Modified sine wave output should be quite satisfactory.

#### c. Pure Sine Wave

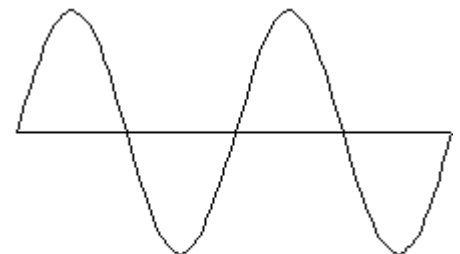
For any device that requires sensitive calibration, it is advisable to use a Pure Sine Wave inverter.

Pure or True Sine Wave inverters provide electrical power similar to the output of your wall plug, which is highly reliable and does not produce the electrical noise interference, which may result from use of a modified sine wave unit. With its "perfect" sine wave output, the power produced fully assures that your "sensitive loads" will be correctly powered, with no interference.

Some appliances which are likely to require Pure Sine Wave include digital clocks, battery chargers, light dimmers, variable speed motors, and audio/visual equipment.

If your application is an important video presentation at work, opera on your \$1000 sound system at the beach, surveillance video, a telecommunications application, any calibrated measuring equipment, or any other sensitive load, Pure Sine Wave is ideal for you.

Oxygen concentrators and breathing operators require a Pure Sine Wave inverter output, usually 1000 Watts, Model ProSine1000/12.



**Pure Sine Wave**

## 4. What Size Inverter do I Need?

The size of your inverter is dependant on the load you will be powering. You will need to calculate the total (Watts or Amps) of all appliances you plan to power. Virtually all AC powered equipment will bear a label (usually placed near where the wire enters the unit), indicating how many Amps or Watts of electricity the unit uses.

**It is not recommended to run two heavy pieces of equipment simultaneously, such as a refrigerator and a microwave or a vacuum cleaner and a microwave, unless a very large capacity inverter is being used.**

A 100-Watt light bulb consumes just under 1 Amp of electricity per hour. (120 Watts = 1 Amp of AC power)

8 Amps draw of electricity (9 x 100-Watt light bulbs) are approximately the equivalent of 960 Watts or just under 1 kW (1000 Watts of power).

### a. Starting Load

Some appliances require an initial surge of power to start up, called a Starting Load (or Peak Surge). The Starting Load is considerably higher than the Continuous Load and must be considered when sizing the inverter, the battery and the cables that connect the two.

Watts x 2 = Starting Load\*

\*This is an approximation. Some appliances may require a greater starting load (3 to 7 times the continuous rating).

### b. Continuous Load

The Continuous load of your application is the amount of power it needs to run over the long term. Once started, an appliance needs less power to continue operation than it needed to start up.

Amps x 120 (AC Voltage) = Watts\*

\*This is an approximation.

## 5. What is the Difference Between Solid State and Heavy Duty?

Most inverters in use (including utility and Telecom applications) are of "solid state" electronic construction, and are adequate for most light duty applications.

Industrial loads with frequent starting surges (as with pumps, compressors, big fans, heavy power tools) and applications with long run requirements will require industrial quality inverters with transformer based technology. "Heavy duty" applications require "heavy duty" inverters. Heavy duty applications will often damage a light duty quality inverter unit.

## 6. What is the Difference Between an Automotive "Cranking" and Deep Cycle Battery?

Automotive batteries are usually adequate for small inverters, (< 500 Watts). When used in a car, we suggest you run the vehicle of your engine occasionally while operating your inverter. If you use the inverter while the engine is off, you should start the engine regularly and let it run to charge the battery. Deep Cycle (marine) batteries are best for larger inverters as they are designed for several hundred charge/discharge cycles. (Automotive batteries wear out much more quickly after heavy discharge).

## 7. How Do I Charge the Battery For My Inverter?

Because inverters operate from a DC (Direct Current) power source, usually a battery bank (one or more batteries), the battery source will have to be recharged at some point. (Remember that a battery discharged more than 50% is probably close to being dead.)

Most cars and trucks recharge their batteries from an onboard alternator. Depending on the inverter load and runtime required, most power use applications will be covered by the charged battery, augmented by the operating alternator supplying a continuous charge to the battery.

If the load is large (air conditioner, large draw power tools, large microwave, food freezer, ice cream machine, etc.), verify that the installed vehicle alternator is of large enough capacity to operate the vehicle's power requirement as well as to fulfill the capacity of the inverter load.

If not, a motor throttle installation may be required to carry a small load, a larger alternator may be required, or a larger alternator, battery isolator and additional onboard battery bank may be required in order to meet the power requirement of your large load. Remember: it takes 10 DC Amps to run 1 AC Amp of power.

## 8. How Long Can I Run the Inverter on my Battery?

To run the inverter from a battery bank over a long period of time, you will need to meet the continuous load demands of the appliance. To calculate this power drain on your battery, it is first necessary to estimate the reserve power (Amp/Hour) of the battery, and the Amps the inverter will require.

(N.B. It will take approximately 10 DC Amps to power 1 AC Amp of power use.)

Typically, every battery has a "Reserve Minutes" rating marked on its label, next to the "Cold Cranking Amps" rating. The reserve minutes multiplied by 0.3 tells you the battery Amp/Hour reserve power.

Reserve Minutes x 0.3 = Amp/Hours (Eg: 150 x 0.3 = 45 A/H)

To estimate the maximum battery power the inverter will require to run an appliance, divide its continuous load wattage requirement by 10.

Continuous Load (Watts) / 10 = Maximum Battery Power (Eg: 450 / 10 = 45)

(Eg: 45 A/H / 45 Amp Draw = 1 Hour)

\*Large electrical loads will require large battery banks to power them. Batteries will only discharge to 50% of their rating. Sizing a battery bank required expert configuration skills.

## 9. What are Some Safety Precautions to Keep in Mind?

Improper use of a power inverter could result in personal injury. Please read this carefully.

The inverter should not be installed in the engine compartment. Keep the inverter free from moisture as liquids conduct electricity, which may lead to serious damage or injury! Do not use the inverter near flammable materials or where fumes or gases may accumulate.

### Note

If you are looking for:

General Inverter Specs please [click here](#).

A Heavy Duty Inverter please [click here](#).

A Telecom Inverter please [click here](#).

A Utility Inverter please [click here](#).

A Tso'd Avionic (Aircraft) Inverter please [click here](#).

If you require further assistance with your Inverter application, please [contact MajorPower.Com](#).