

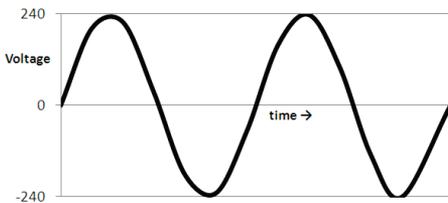
Inverters

The Inverter is an electronic device that converts direct current (DC) into alternating current (AC).

Renewable energy sources like PV solar panels and small wind turbines supply DC power, and all batteries store low voltage DC power. DC power is acceptable for some small applications such as lights, water pumps and some appliances (trucker's stores have all sorts of appliances that can run off DC). However most of the world operates on higher voltage AC. AC transmits more efficiently than DC and so has become a world standard. No technology currently exists to store AC so it must be produced as needed. If you want to run conventional household appliances from your renewable energy system you will need a device to produce an AC current on demand. That device is an inverter.

RESOURCE
RENEWABLE ENERGY

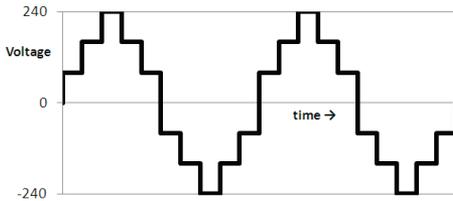
AC Sine Wave Power



AC Square Wave Power



AC Modified Sine Wave Power



DC 12 Volt Power



AC power is continually alternating between positive and negative whereas DC power is constant (the power is supplied to the load as negative and leaves as positive). In the UK the AC power supplied to domestic dwellings is 240V at 50Hz, which means 50 cycles per second. If these cycles are plotted against time we get a picture of a sine wave (see figure above). Early and cheap inverters supply square wave AC which causes problems for many appliances. Heaters or incandescent lights are fine; motors will usually get by with some heating and noise, but solid state equipment, especially some audio equipment, has a hard time with square wave resulting in humming, overheating or failure. Most modern cheaper inverters now supply a hybrid waveform called quasi-, synthesised or modified sine wave AC power.

Which inverter?

Inverters are sized according to how many Watts they can deliver, this is called the continuous rating. Modern inverters are capable of briefly sustaining much higher loads than they can run continuously, because some electric loads, like motors, require a surge or spike to get started. To size your inverter add up the Wattages of all the appliances you are likely to have on at one time and choose one close to that figure. The more power an inverter can supply, the more expensive it is so you may need to limit usage of appliances. For powering a whole household a 2,000W+ inverter will probably be required.

Inverter/chargers

Large pure sine wave inverters are often equipped with powerful battery chargers for hooking up to a back-up generator. In the case of no renewable input from wind or sun and the battery bank is running low a generator can be fired up automatically for an uninterrupted power supply (UPS) or turnkey system. This requires a clever and expensive inverter to do this but they are worth every penny if you are to live off them. A back up generator is useful for high loads such as power tools and washing machines; they can also be run on biodiesel.

Helpful Hints

Keep the inverter as close to the battery as possible BUT not in the battery compartment because of the fire risk. One to three metres as the DC low voltage input to the inverter transmits poorly whereas the AC high voltage output is easy to transmit.

Keep the inverter dry and as cool as possible, they don't mind being outside as long as they are protected.

Do not undersize cables, most manufacturers will provide recommendations.

Always fuse your inverter cables and any other circuits that connect to a battery.

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We are a community organisation set up to inspire and educate about renewable energy and sustainable living solutions.

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REsource provides solar and wind power for events and installs off grid systems across the UK.