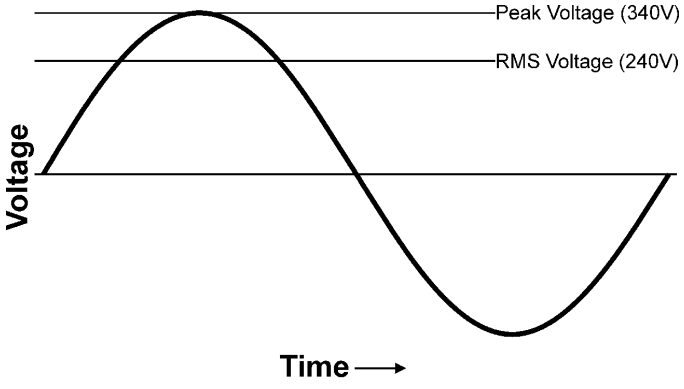
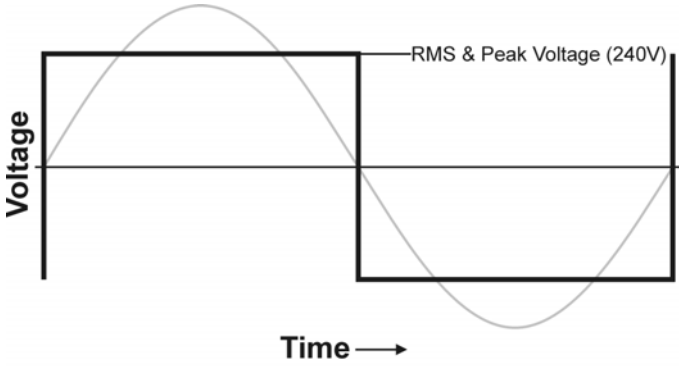
Sine Wave and Square Wave Electricity

The power drawn from the battery bank is DC (Direct Current). The 240 volt mains power supplied by the electricity grid is AC (Alternating Current).

The power created by many inverters is 240 volt AC, but will not be exactly the same as the electricity available via an electricity authority. AC electricity as supplied in Australia reverses in direction fifty times per second and does so with a constantly varying force, surging forwards, slowing to a stop, surging in reverse, slowing to a stop and surging forwards again. This steady increase and decrease in force as the current changes from forwards to reverse and to forwards again is referred to as "sine wave".

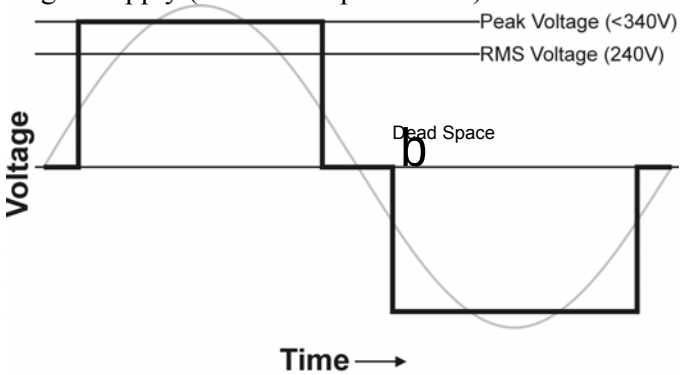


Sine Wave



Square Wave

Some (particularly the older style) solid state inverters produce "square wave", "modified square wave" or "stepped wave" electricity. "Square wave" is the term used when the electricity has a constant force, such as it has with DC but switches direction more or less instantly at the same kind of frequency as the normal grid supply (at 50 times per second).



Modified Square Wave

"Modified square wave" or "stepped wave" is where the force of the electricity is varied by having an intermediate step in between changing direction. This wave form approximates more closely to a sine wave than does the "square wave".

"Digitally synthesized sine wave" inverters are steadily becoming more common place and replacing the more problematic `square' and `modified square' wave inverters. 'Quasi sine wave' or 'modified sine wave' are often used to describe the output wave form of an inverter. Such terminology is very misleading in its reference to 'sine wave' when the output is purely a 'modified square wave'.

Different appliances will be affected to greater and lesser degrees by the different forms of AC. Resistive and universal motor loads will be unaffected. Resistive loads are found in incandescent light bulbs and heat producing appliances such as kettles, jugs, irons, radiators and stoves. Universal motors with brushes and commutators are found in most hand tools and many kitchen appliances such as food processors, blenders and centrifugal type juice extractors.

Inductive loads may run with a little more noise and get warmer. Inductive loads are found in voltage transformers and motors like those often found in refrigerators, freezers and washing machines. Induction motors also need a comparatively high surge current to start up. For a 'modified square wave' inverter to handle an inductive load well, it not only needs to have a good surge capacity, but it also needs to have a feature referred to as 'dead-space clamp'.

Some appliances will run noticeably less well on square and stepped wave AC than on pure sine wave. Those affected include:

- Some of the latest sewing machines
- Some programmable timers
- Microwave ovens (which operate more slowly)
- Some battery chargers
- Some cordless appliances
- Some dimmer switches
- Some digital clocks
- Some variable speed devices such as fans
- Some hi-fi and other sound equipment
- Some TVs and video equipment
- Some Fax's and Laser Printers
- Iron ballasted fluorescent lights

Certain equipment may be damaged by wave forms other than sine wave. Some devices will operate better with the installation of a line conditioner (choke or transformer) on the inverter, although some square wave inverters may destroy line conditioners. There may also be less costly and more effective ways of running certain appliances than by using an inverter.

If you do find that you are having a problem with certain appliances - we recommend that you consult us.

Note: Many inverters make a noise, so some thought should be given to its location (and your battery bank).