Power Inverters Explained

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The appliances in our homes are designed to run off an AC supply and they get that from the electrical outlets which all provide AC electricity. However, electricity produced by things such as solar panels and batteries produce DC electricity.

So, if we want to power our electrical devices from, renewable sources, battery banks or even our car, then we need to convert DC electricity into AC electricity and we do that with an inverter.

Inside a copper wire we find copper atoms. These have electrons which can move to other atoms, these are known as free electrons because they are free to move around. They will randomly move in all directions but that isn''t any use to us. We need lots of electrons to move in the same direction. We do that by applying a voltage difference across the wire, the voltage is like pressure and will push the electrons.

When we connect a wire to the positive and negative terminals of a battery, we complete the circuit and electrons begin to flow. We call this flow of electrons, current. The electrons always try to get back to their source, so if we place things such as lamps in the path of the electrons, they will have to pass through it and this will allow us to do work such as illuminating a lamp.

The electricity from solar panels and batteries is known as DC electricity. This is because in this type, the electricity flows in just a single direction. It flows from one terminal directly to the other terminal. If we reverse the battery, the electrons flow in the opposite direction.

These animations use Electron flow which is from negative to positive. But you might be used to seeing conventional current which is from positive to negative. Electron flow is what''s actually occurring, conventional current was the original theory and it''s still widely taught today, just be aware of the two and which one we''re using.

With AC electricity the electrons alternate by flowing forwards and backwards constantly. That''s how it gets its name because the current of electrons alternates in direction. You can think of this type of electricity like the tide of the sea, it constantly flows in and out between the maximums of high tide and low tide.

If we followed the copper wires back to the generator, the wires are connected to some coils of wire which sit within the generator. Inside a basic generator we also find a magnet at the centre which is rotating.

In north America and a few other parts of the world we find 60Hz electricity which means the sine wave repeats 60 times per second, and as each wave has a positive and negative half, this means its polarity will therefore reverse 120 times per second. In the rest of the world we mostly find 50 Hz electricity so the sine wave repeats 50 times per second and therefore the current reverses 100 times per second.

These can open and close super-fast in pairs to control the flow of electricity. By controlling the path which the electricity takes and how long it flows in the different paths, we can produce AC electricity from the DC source.

As we have a low voltage input, we"re going to get a low voltage output. To reach the 120V or 230V required to power our appliances, we will also need a transformer to step up the voltage to a useful level.

When we look at this through an oscilloscope, we get a square wave in the positive and negative regions. This is theoretically AC because it reverses direction, but it doesn"t look much like an AC sine wave. So how can we improve this?

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