hb001 CVT introduction the perfect sine wave

Outstanding Spike and Electrical Noise protection:
The very best power protection comes from a special type of transformer known as a Constant Voltage Transformer (CVT). Providing unparalleled reliability and conditioning performance, spikes and electrical noise are neutralised with attenuation as high as 75dB.
In addition the input (or primary) and output (or secondary) transformer windings are physically separated. Known as Galvanic isolation this separation ensures that there is no direct connection between the mains supply and load.
A CVT therefore provides an impenetrable barrier to spikes and high frequency electrical noise. This barrier also works in reverse mode to prevent a ‘noisy’ load from polluting the mains supply itself.

How does it work?
Although simple in concept the CVT is very difficult to explain, leading to some electronics experts to describe it as magic. Effectively the aim is to keep the Iron core of the secondary saturated, which keeps the voltage on the output winding constant.
The primary winding needs to be unsaturated to prevent unacceptably high losses.
This effect is achieved in two ways.
Firstly the two Magnetic Circuits are separated but inter-linked allowing the transfer of energy from Primary to Secondary.
Secondly the secondary circuit has a deliberate inductance introduced and is connected to a resonating capacitor. This LC circuit is tuned to resonate at the desired transformer frequency.
The consequence is that the secondary part of the transformer runs saturated and the output voltage is constant.

Superior Sag, Surge and Brownout protection:
Mains voltage sags and surges are automatically corrected by a CVT.
When faced with an extreme surge voltage such as a local lightning strike the power conditioner will present a low impedance to the mains to protect both itself and any connected loads.

Automatic Sine-wave generation:
Using ferro resonant transformer technology means that each power conditioner will always generate a pure stable sine-wave even when fed from a polluted mains or square-wave supply.
A = INPUT
B = OUTPUT
NO moving parts NO electronics
ONLY magnetic magic

**Perfect Switched Mode Power Supply (SMPS) driver:**
Ferro resonant transformer technology provides waveform shoulder-lifting - the CVT is the kindest way to drive a switched mode power supply. Input surges are reduced prolonging life and conduction times are lengthened. In addition the CVT provides harmonic buffering and improved reservoir capacitor hold up for the inevitable supply micro breaks which occur with grid protection switching.

**Constant Voltage Transformers don't care about the ambient**
Unlike some sensitive electronic stabilisers a CVT works in a very large range of conditions. Standard units can work at permanent temperatures of 40 deg C with 50 deg C not a problem for short periods, alternately a special design can cope with 70 deg C. CVT's will operate at minus 40 deg C although the heat generated by their operation means the transformer is soon warm to the touch.

**Overload protection**
The CVT is designed to supply an overload of 150% at around 200% overload the output waveform collapses to near 0V, WITH NO HARM TO THE CVT, direct short circuiting for long periods of time is not a problem for the CVT, as soon as the short is removed it will carry on supplying useable power.

Oscilloscope hold-up picture  ride-through picture

Something for nothing: so long as at least 30% of the normal supply voltage is present the suitably selected CVT can provide adequate power for your critical load.
**Regulation**

The output stays within 5% from zero to full load, if a tighter regulation is required trade-offs can be made. At 50% load the regulation is about 3%. Between zero to light loading (3%) is the greatest drop in output, so a permanent light load improves the regulation further. A Full to Zero load event may cause a momentary variation of 8% but the CVT settles in a couple of cycles.

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Output within 5% for zero to full load

Outstanding output regulation at low loads or high input voltages
**Stabilisation**
The output stays within 3% for an input swing of 15% at half load 3% output can be achieved for an input swing of approximately 30%

Output within 3% for nominal input +/-15% Even wider input swings at below nominal loads

**Regulation outside of specification**
The combined stability and regulation is 8% again improvements can be made by reducing the loading

Output within 8% for zero to full load and nominal input +/-20%

**Power Factor**
All units present a power factor to the supply which varies with output load. The CVT will drive a wide range of power factor loads (+/-0.75)
Small changes in the output voltage will be found in comparison to the setting with a resistive load.
Output changes with frequency of input

A 1% frequency change produces a 1.5% change in output voltage

Phase shift

There is a small phase shift across the CVT varying with load

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