powerPerfector
energy saving like no other

powerPerfector and Ohm's Law

A common question

All engineers know that

	P = I x V
(that is,	**Power = Current x Voltage**
or	**Watts = Amps x Volts)**

So if you reduce voltage, current will rise and the power will remain constant.
How, then, does the powerPerfector save energy?

The answer:

The misconception about P = I x V is based on the assumption that electrical loads have constant power: that is, a 1kW motor will use 1kW, and if either current or voltage changes, the other will change to compensate in order to maintain that 1kW of power. That is not what this formula means. In fact, all it is saying is that the power being drawn is the product of current and voltage.

The principle of energy saving through voltage optimisation is that the nameplate power of a device (say, 1kW for a motor, or 60W for a light bulb) will be delivered at any voltage within an operating range, which is 207 - 253V in the UK. But above a certain optimum voltage, additional energy will be used for no improvement in performance. So a motor that is designed to work anywhere in Europe will have an optimum operating point at 220V. Above this voltage, for example at the UK supply average of 242V, the motor will deliver its rated power (i.e. torque), but will use additional energy as heat and vibration as the core is driven into saturation and iron and copper losses increase. So by efficiently removing the difference between the supply voltage and optimum voltage, the powerPerfector brings all equipment to its most efficient operating point, without affecting its performance.

All that we assume in the above analysis is that resistance is constant. Ohm's Law also tells us that V = I x R, so it follows that

	I	**= V / R**
and as	**P**	**= I x V from before,**
it follows that	**P**	**= V^2 / R, by substitution.**

So according to this, if you reduce voltage, power will also reduce as the square of voltage. This is what happens in real life with most electrical equipment, and is one of the reasons that the powerPerfector saves energy. It means that an 8% reduction in a 240V supply voltage on a 20Ω load will cause the power to drop from 2880W to 2420W, which is a 16% saving. Of course, not all real electrical equipment can be modelled as a simple resistance. Some equipment - particularly modern devices that use electronic power supplies - behave slightly differently. So the overall saving from a powerPerfector installation is 12-13%, rather than the full 16% predicted by Ohm's Law.

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