VOLTAGE OPTIMISATION: SEPARATING FACT FROM FICTION FOR EFFICIENCY & SAVINGS

Voltage optimisation (VO) entails stabilising the voltage to ensure optimal levels for the load, while voltage reduction simply lowers the voltage. Merely lowering voltage does not constitute voltage optimisation. Several other criteria must be considered before claiming to offer voltage optimisation, which is why "fixed or guaranteed"savings cannot be accurate and must be analysed.

Voltage optimisation aims to improve our energy usage, assisting in net-zero goals, enhancing energy efficiency, and ensuring long-term cost savings. However, it faces scepticism, especially in regions where power is easily available. The scepticism arises from unrealistic promises of achievable savings, often advertised as guaranteed savings with a fixed payback period.

Misconceptions on the effectiveness of Voltage Optimisation due to some companies misleading their customer, have diminished its credibility, despite its benefits when understood and implemented with clear and correct objectives. Voltage Optimisation and energy saving is based on science and absolute criteria. It is impossible to circumvent these to produce more savings.

The three most important criteria are:

1. *Load or Equipment Type*
2. *The voltage level on site and the optimal voltage level the equipment will work at*
3. *Run time of the load or equipment (i.e. how many hours per day)*

This technical bulletin explores different load types and their effectiveness with iVolt, the difference between Voltage Reduction and Voltage Optimisation, and the key benefits of iVolt over fixed step-down transformers and mechanical servo systems.

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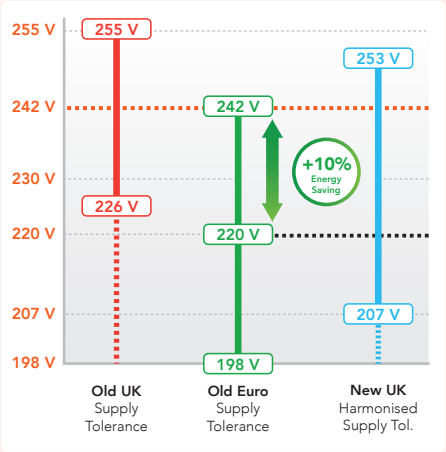
Load Types

Voltage Optimisation (equipment) is most effective when tailored to certain load types. By reducing the grid supply to the optimal voltage levels conducive for most appliances, VO effectively reduces energy consumption. Prior to any installation, evaluation of load types and site infrastructure is necessary to understand the potential savings achievable. Therefore, the requirements and potential savings associated with each site are inherently unique.

Voltage Level

The standard mains supply from the UK National Grid is typically 230V, whereas most appliances are engineered to function most efficiently at 220V. The current average voltage level in the UK is 242V and fluctuations in supply can increase voltage levels as high as 254V. Such high voltages pose a risk to the efficiency of equipment, potentially accelerating wear and consequently increased operational costs.

Reducing Mains Voltage to Save Energy and Reduce Costs



It is important to be wary of companies offering VO & "guaranteed" savings without a survey. A thorough site survey is essential for collecting data on critical criteria, enabling an electrical load profile to be established and an accurate calculation of potential savings. To ensure accurate runtime, follow these steps:

- Check the equipment Type
- Calculate total load of equipment on site
- Check the Voltage Level on site

Different Load Types and Effectiveness with iVolt®

Lighting Loads	
T8/T12 magnetic ballast	Yes
Incandescent / GLS	Yes
T5/HF lighting, electronic ballast	Yes
Metal Halide (HID)	Yes
High Bay / External (SON)	Yes
CFL / 2D	Yes
LED	Min.
Other Loads	
Refrigeration	Yes
Chiller / Evaporation	Low
HVAC *Direct Online*	Yes
HVAC *Invertor Driven*	Min.
Large Electrical Loads	Min.
Pump / Motor Load *Direct Online*	Yes
Pump / Motor Load *Invertor Driven*	Min.

Voltage Reduction vs. Voltage Optimisation

Often the terms 'voltage reduction' and 'voltage optimisation' are misused interchangeably. Voltage reduction does not equal savings. Voltage reduction uses a fixed step-down transformer to reduce the voltage level by a fixed percentage of "volts". While true stabiliser-based voltage optimisers will regulate the voltage and supplies a steady and accurate stable voltage to the equipment.

For example, a fixed VO might reduce the voltage level by 10%. If the incoming voltage is 252V, the output will be 226V. If the incoming voltage drops to 220V, it will drop the output voltage to 198V! Whilst an iVolt will always supply 220V ± 1.5%, even if the incoming voltage fluctuates between 220V and 252V.

iVolt® offer a vast range of product sizes, ranging from 63A to 3,000A and above in both single and three phase, with a number of installations having been completed throughout the commercial, retail, manufacturing, leisure and public sectors.

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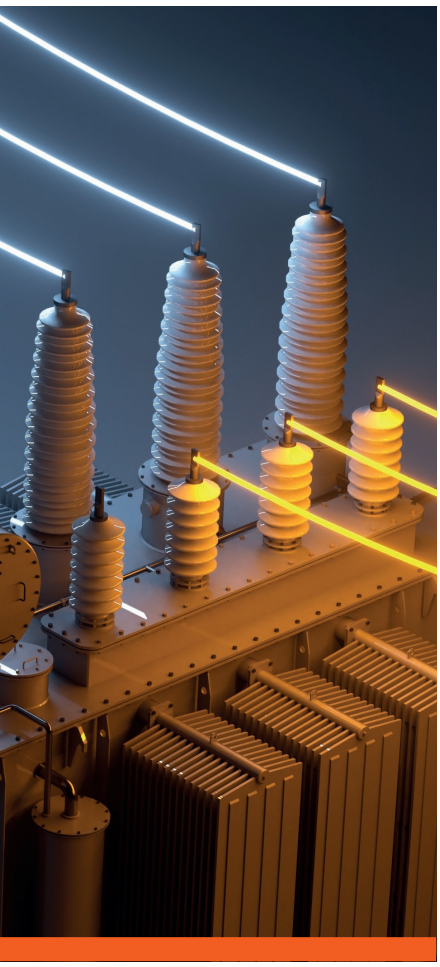

Voltage Optimisation Comparison Table

	Fixed step-down transformers	Mechanical servo systems	iVolt®	iVolt® **Benefits**
Maximises energy saving	✗	✓	✓	Greater savings and faster project ROI
Microprocessor controlled	✗	✗	✓	Improves stability of voltage
Maintenance-free	✓	✗	✓	No ongoing maintenance costs
Reduces risk of undervoltage	✗	✓	✓	Protects equipment against damaging voltage dips (brown outs)
Compensates for fluctuations	✗	✓	✓	Creates a more stable voltage and maximises savings
Improves power quality	✓	✓	✓	Reduced maintenance costs on electrical equipment
Integrated IRT Energy Monitor®	✗	✗	✓	Real-time measurement and reporting of energy saving
Output voltage accuracy (+/-)	8%	0.5 to 2%	1.5%	Increased voltage stability
Adjustable output voltage	✗	✓	✓	Flexibility to reflect changing site conditions
Independent balancing of phases	✗	✓	✓	Independent phase balancing gives greater energy savings

Voltage Reduction vs. Voltage Optimisation (Continued)

Voltage reduction is lowering the voltage supplied to electrical devices without considering the specific needs of each load. This oversimplified approach, promoted by certain VO entities, overlooks the specific requirements of electrical loads.

Blanket statements promising vast percentage savings in short periods should be questioned. True savings are achieved through reduction in power consumption, not a reduction in the voltage supplied to the existing electrical infrastructure. It isn't merely the installation of voltage optimisation equipment that is providing energy savings, but how the existing site infrastructure is impacted by the reduction of voltage. Broad claims from VO providers regarding guaranteed savings, without considering the above-mentioned criteria, must be challenged.

Harm To Reputation

Providing accurate information is essential, not only to meet customer expectations but also to uphold the credibility of voltage optimisation as a genuine energy efficiency tool. Customers experiencing adverse outcomes based on reckless promises may lose trust in voltage optimisation.

Such a negative perception can impede the widespread adoption of valid energy efficiency strategies, ultimately hindering environmental initiatives and objectives. A damaged reputation carries ripple effects, prompting some companies to entirely ignore voltage optimisation as a valid option.

Conclusion

Voltage Optimisation serves as a highly effective strategy that businesses should employ to bolster their energy efficiency, cut costs, and contribute to their environmental goals. In addition, an iVolt will produce a balanced 3 phase output voltage, helping to reduce stresses on 3 phase loads. However, businesses must exercise caution against the allure of quick-fix promises offered by deceptive entities guaranteeing vast savings in minimal timeframes.

For more information on iVolt:
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The iVolt® was designed in the UK and production takes place at its facility near Heathrow Airport. The company is part of the global Sollatek group and is accredited to ISO9001:2015

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