



Voltage Optimisation

reducing energy consumption & CO2 emissions





What is Voltage Optimisation?

Quite simply it's reducing Voltage applied to electrical equipment to make an Energy Saving...

Why can voltages be reduced?

All electrical equipment intended for use in Europe must carry a CE mark to show that it complies with the European Harmonised Voltages between 207 and 253V. Because the European market is far larger than the UK market electrical equipment is predominantly designed to operate most efficiently at 220-230V. This means that A rated appliances are only A rated at 220-230V rather than 242V which we experience on average in the UK.

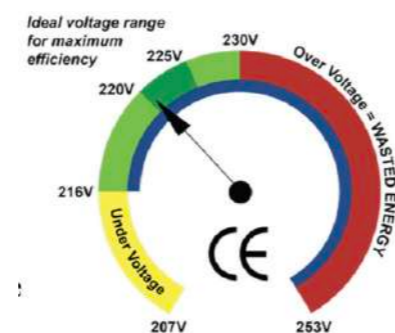
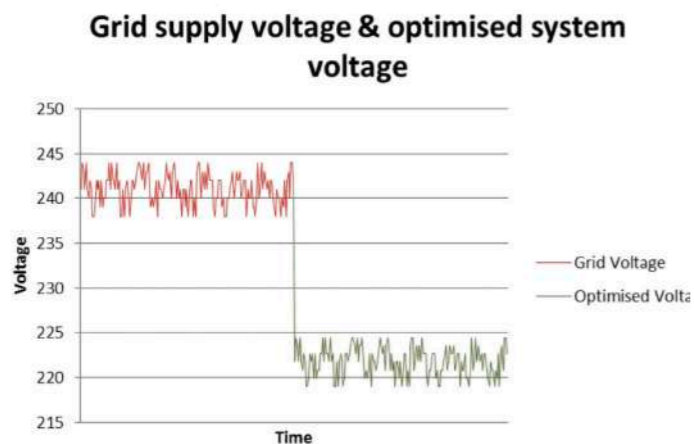
Therefore a large proportion of electrical equipment will consume more energy, the higher the supply voltage applied to it. Because of this it makes more sense to apply voltages that are nearer to the lower end of the CE voltage range. Voltage Optimisation is designed to provide a supply voltage of around 220V.

But if the voltage is reduced won't the current simply increase?

To explain this we need to consider Ohms Law : $P = V^2/R$ means for voltage dependent equipment, every 1% decrease in volts, a 2% decrease in Watts is achieved.



Energy		Washing machine
Manufacturer		
Model		
More efficient		A
A		
B		
C		
D		
E		
F		
Less efficient		
G		
Energy consumption kWh/cycle	0.85	
<small>(Based on standard test results for 60°C cotton cycle)</small>		
<small>Actual energy consumption will depend on how the appliance is used</small>		
Washing performance	A B C D E F G	
<small>A: higher G: lower</small>		
Spin drying performance	A B C D E F G	
<small>A: higher G: lower</small>		
Spin speed (rpm)	1400	
Capacity (cotton) kg	5.0	
Water consumption l	55	
Noise (dB(A) re 1 pW)	Washing 5.2	
	Spinning 7.8	
<small>Further information is contained in product brochures</small>		



voltage optimisation guarantee

We guarantee to reduce your voltage by between 6% and 10%, saving your company up to 19% on your electricity bill.

If after year one we have not met our guarantee we remove the voltage optimiser and return your money.

- Reduces your kWh Energy costs
- Reduces your Carbon footprint
- Prolongs the life of Electrical Equipment
- Reduces your maintenance costs
- Lights stay brighter and last longer!



Don't just take our word for it...

Hotel Manager, Sheffield

"We had an Eco-Max optimiser fitted to reduce our energy cost, and its done just that! We're saving over £6,000 a year."

Financial Director, Cepac Ltd.

"The system reduced annual electricity consumption by 365,940 KWhrs and cut our electricity cost by £10,624.00 providing a full return on investment in just 14.7months!"

Project Engineer, CPL

"The ECO-MAX...as projected, instantly reduced our energy consumption by around 12%"

Facilities Manager, West Yorkshire Playhouse

"Thank you for doing a professional job, I would certainly recommend voltage optimisation to any prospective customers in the future"

Group Leader, Facilities Engineering, 3M UK PLC.

"To help meet our energy efficiency targets, 3M has now installed VO optimisers at four of our UK sites, which last year reduced our annual electricity consumption by 820,640kWhrs, and saved us £32,313.00 in electricity charges"

Businesses allready Benefitting from Voltage Optimisation:



Eco - Max COMMERCIAL

'Off-the-shelf' range specifically for use in commercial and light industrial applications



Floorstanding Option:

- Three phase 32A (72kVA) – 400A (288kVA)
- Typical energy savings of 8-19%
- Typical payback 2-3 years
- BrownOut™ under voltage seamless inhibit
- Metering and monitoring
- Custom features
- Separate TrueBypass™ available
- Separate EasyLink™ available
- Handed and isolator options to suit installation requirements



Eco - Max POWER

ECO-MAX Power optimisers which are bespoke designed for specific applications

- 3Phase 400A (72kVa) – 4350A (3mVA)
- Typical energy savings of 8-19%
- Typical payback 2-4 years
- Custom features Power, quality etc.
- Bespoke, designed for specialist applications
- Power factor correction
- Harmonic mitigation
- Integral distribution



EMCi Remote Monitoring

Operate ECO-MAX from the comfort of your desk, or whilst 'on the go from your mobile device:

- Accessible from anywhere with internet access
- Uses SMS text messaging to communicate
- No need for a network connection
- No complicated set-up
- Applications available for iPad, iPhone & Android devices
- No upfront costs, 12 months free access to the cloud based system included in the ECO-MAX purchase
- Expandable – can monitor multiple meters including gas & water for total control
- Generate automated billing & send meter readings – great for landlords
- Helps Designers & Architects meet Part L of Building Regulations for commercial buildings
- Control energy consumption by increasing awareness

EMCi Remote Monitoring features:

- View the status of the optimiser
- Review historical grid voltage, optimised voltage and current down to minute intervals
- Review your half hour energy consumption
- Download data for analysis
- Alter optimiser settings
- Diagnose the optimiser
- Email notification facility to auto send messages under pre-set conditions eg. high out of hour consumption



Case Studies



Kelloggs, Trafford Park

Kelloggs have been working for years to continually improve their environmental performance, specifically looking at reducing their energy use, greenhouse gas emissions, water use and waste sent to landfill sites.

Part of this process involved surveying the facility, with a view to identifying actions to reduce energy consumption. It became clear that voltage optimisation would be beneficial in reducing the Manchester facility's energy consumption and offer considerable cost savings too.

Data logging allowed us to measure consumption and provide baseline figures. During this process it became clear that the site suffered from large loading swings which made it unsuitable for standard forms of fixed voltage optimisation.

Voltage optimisers were used to optimise the voltage to a single piece of equipment, localised area or an entire building. They can be supplied with fixed or variable outputs, with or without power factor correction. In this instance a voltage tracking (stabilised) optimiser was designed to deal with the specific issues identified, and to achieve the maximum possible energy saving. The unit was installed and further data logging carried out to measure the savings.

ECO – MAX PAID FOR ITSELF IN ONLY 21 MONTHS, REDUCING THEIR ANNUAL ELECTRICITY BILL BY £37,500 PER ANNUM

Saving Results:

- Reduction in Consumption PA – 463,176 KWh
- Reduction in Electricity Cost PA – £40,226.84
- Reduction in CO2 Emissions PA – 243 Tonnes
 - Total Project Cost – £71,061.52
 - Payback Period – 21.2 Months



The Bolton TRF

The Bolton TRF was looking for viable ways to make substantial energy savings. One of the technologies considered by the onsite engineering team was power optimisation. Voltage optimisation and power factor correction offer two different, but complementary power saving techniques.

Voltage optimisation directly reduces the amount of power drawn by the connected equipment by supplying it at a voltage nearer to its design voltage, whereas Power factor is a way of describing how efficiently electrical power is consumed.

The installation of an ECO – MAX combined voltage optimisation and power factor correction unit reduced the total amount of power drawn which translated into additional generator export revenue for the site.

Prior to installation a detailed site survey was carried out together with datalogging to obtain base information. The site was then logged again following installation and comparisons made.

9% average power (kWh) reduction achieved by the ECOMAX, equating to a financial saving of £212,852 per year, with a project payback of 3.6 months!





Euro Garages, Rivington

Euro Garages engaged in a program to reduce their Co2 emissions by an estimated 1.1 Tonnes a year. During this they replaced all their internal and external lighting across their Motorway Service Station sites with energy efficient LED's.

Euro Garages were experiencing premature failure of the LED drivers and the LED lighting manufacturer established the cause was high / over voltage.

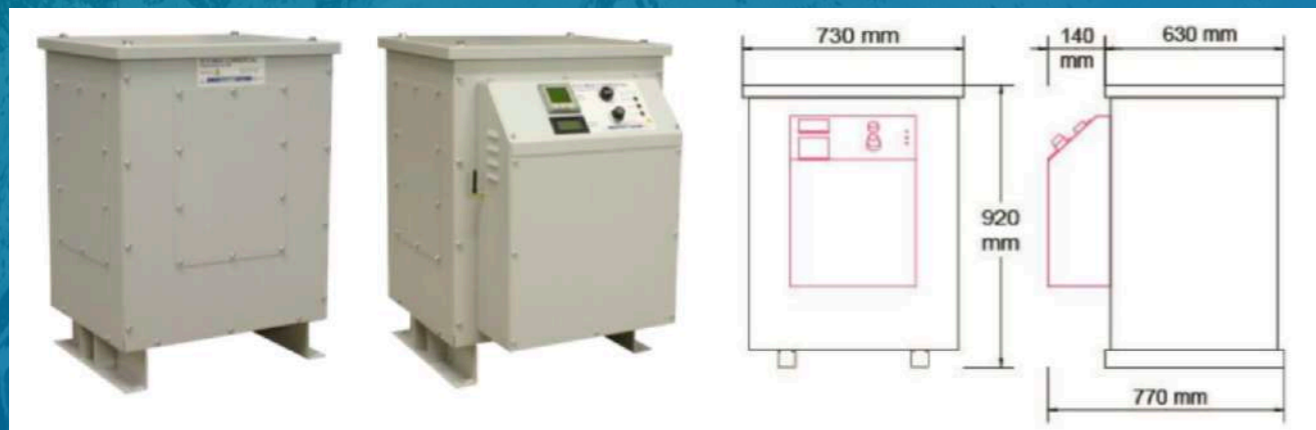
A survey was carried out at the Rivington South Motorway Services site on the M61 and we discovered that voltages were climbing higher than CE and grid tolerances allow. This was due to prevailing high grid voltages in the area, being boosted further still by the solar PV system generation, which is all too common.

OUR ECO – MAX SOLUTION:

An ECO MAX EMC250i, (3phase 250A Voltage Optimiser) was installed, which comes with in-built metering and remote monitoring. This reduced the damaging high voltages being applied to the whole site, including the expensive LED light fittings, which no longer fail prematurely. Their solar panels alone are generating 1.6 million KW of energy so the eco-max works in harmony alongside their important Solar PV system to stop the damaging voltages.

ADDED BONUS:

Euro Garages, Rivington South also receives an energy saving of 6.9% from the eco-max Voltage Optimiser, on top of the cost savings from reduced lighting maintenance and repairs! This alone allows the whole project to pay for itself in just 20 months!



Betfred, Warrington

Betfred is a large independent Bookmakers, established in 1967. With their head office in Birchwood, Warrington, have a large portfolio of premises nationwide. Betfred are passionate about the implementation of energy saving measures throughout their business to help them reduce their overall energy spend and achieve their green energy targets.

Betfred decided to use the ECO MAX voltage optimisers following an extensive search within the VO marketplace. Contributing factors were a great reputation with blue-chip clients (e.g. Tesco, Amazon, Deutsche Bank) and the possibility to produce the volume of units, to a high quality standard, within specified time frames, and they considered excellent customer service of paramount importance.

15% average energy savings achieved by Voltage Optimisation saving £3,353 per year, across five trial shops

“It was decided across the board that implementing a voltage optimisation project would effectively reduce our site voltages to a more desirable level, minimising stresses on branch equipment, reducing overall energy consumption and reducing the cost of our electricity bills”

– Len Hodges (Estates Manager, Betfred)



The Dakota Hotel, Leeds



All businesses can benefit from voltage optimisation. Hotels in particular will gain from extended working life of equipment.

The Dakota Hotel In Leeds Reduced Their Electricity Bill By £10,828 Per Year.

- 59.2% Return on investment
- Energy consumption reduction by 8.55%
- Harmful carbon emissions cut by 35,529 Kg
- Equipment will last up to 50% longer!



The Mere Hotel, Golf Resort and Spa



The Mere Hotel, Golf Resort and Spa, near Knutsford in Cheshire was first established as a Country club in 1934, but it wasn't until 2012 that a major investment programme saw the addition of the 70-bedroom hotel and Spa. To Golfers and Non-Golfers alike, Mere enjoys an enviable reputation for high standards in every aspect of the services it offers.

At the start of our dialogue with the Mere Management team, we were advised that over 1500 lightbulbs had been changed in the latest 12 month period! It quickly became clear that higher than average grid voltage was playing a significant part in shortening the working life of those bulbs!

An 800amp Optimiser was installed between the main meter and distribution board, in July this year. A late-notice requirement to alter the timing of the necessary power-off part of the work overnight was accommodated and the overall job was completed with the minimum of disruption (4 hours of power-off time, at night).

During The Month Of November 2019, The Intelligent Monitoring Reports Have Confirmed A Consistent 24/7 Reduction In Kwh Consumption Of 9.75%.



£3,854 Annual Energy Savings Achieved By The ECO-MAX, With A Payback Of 3 Years

Bupa were concerned about the suitability of their load profile for whole-site VO. The primary concern was that of "risk", avoiding any adverse effect on the operation of sensitive medical equipment was paramount. The secondary concern was the extent of the energy saving to be gained, as a large proportion of the electrical equipment in use was electronics based so which delivers little or no energy saving from VO.

After carrying out an extensive survey of two separate sites we confirmed that Bupa's concerns were rightly justified. We identified that the sites energy consumption was equally split across the admin/building services block and the residential wings.

Only the energy consumption of the admin block could be significantly reduced by the implementation of VO. It therefore made more sense both operationally and commercially to opt for a localised VO approach. It totally removed any operation "risk" issues; it reduced the cost of the project whilst delivering a similar level of saving to the whole site approach. Energy savings have been monitored and are exactly as predicted in our business case prior to installation.

Saving Results:

Annual energy saving: 38,543 KWh

Reduction in electricity cost, per annum: £3,854

Total Project cost: £11,696

Payback period : 36 months

Reduction in CO² emissions, per annum: 21 tonnes

We were contacted as a potential supplier to supply a single solution to handle all of the specific site issues. Data logging allowed us to measure consumption and provide baseline figures.

During this process it emerged that the site suffered from large voltage swings which made it unsuitable for standard forms of fixed voltage optimisation. In this instance a three stage optimiser with power factor correction was designed to deal with the specific issues identified, and to achieve the maximum possible energy saving. The unit was installed and further data logging carried out to measure the savings.

The installation of the Staged Voltage Tracking Unit has mitigated the problems associated with large voltage fluctuations on site. Holiday Inn have seen a reduction in equipment failures, and associated replacement/maintenance costs as well as reduced electricity bills.

12.5% average energy savings achieved by
the ECO-MAX, and savings of £5,837 per year,
with a payback of 25 months





Voltage Optimisation

Next Steps:

What information do we need?

- **Electricity Billing Information**

This is key information when looking at energy savings – if we don't know how much you use and spend, we can't calculate how much you can save!

Ideally we require 12 months of half hour data which can be obtained from your electricity supplier, if that's not available we need to look at 12 months of your bills (all pages).

- **Existing Installation Configuration**

This ensures the optimiser can be correctly sized

- **Voltage Readings**

This allows us to recommend an appropriate level of voltage reduction

Request a free energy reduction survey.

Just give us call on 01624 049024
or visit www.emissis.com

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