



VOLTAGE OPTIMISATION



[V.1.1]

# Voltage Optimisation

Retrofit Energy Saving Product



[SWITCH ON TO EFFICIENCY]

best.energy

# Contents

## Pages

2 Contents

---

3 The Overview

---

4 Fixed Voltage Reduction

---

5 Variable Ratio Voltage Optimiser

---

6 Technical Specifications

---

## What is Voltage Optimisation (VO)?

Voltage Optimisation covers a variety of technologies which seek to stabilise, regulate and reduce voltage use at your site. The overall effect is a reduction of energy use site-wide. By making sure we only supply the voltage you need, we can ensure a reduction in energy use site-wide.



*"We are proud to offer Voltage Optimisation as part of the BEST range of energy saving solutions. It makes perfect sense - why should you be paying for more power than you need?"*

*"Great energy saving starts at source. We've been looking long and hard for the right VO product to augment our technology stack, and we think we've got some great options for any scenario."*

**TROY WRIGLEY - CEO, BEST ENERGY**

## Lighting Example

Halogen lights typically provide 1.8–2% energy reduction per 1% voltage drop.

Eg. 415V down to 380V  
**= 9.1% voltage drop**  
**= 16.4% saving**

## Refrigeration Example

Refrigeration compressors, condenser and evaporator fans - VO can save 2% per 1% voltage drop.

Eg. 415V down to 380V  
**= 9.1% Voltage Drop**  
**= 18% Energy Saving**



# The Overview

If your site is being supplied with electricity at a higher voltage level than you need, you could be wasting energy, wasting money and producing excessive carbon emissions. Voltage optimisation can help.

Electrical equipment can sometimes consume more power at higher voltages. Voltage optimisation reduces the voltage of the electricity supplied to equipment, minimising consumption while remaining within the operating conditions specified by the equipment manufacturer.

Basic electrical laws mean the power required by certain loads is proportional to the square of the voltage. A supply voltage in excess of the territory nominal voltage, may result in excessive energy consumption.

## How Does it Work?

The basic principal of all voltage optimisation equipment is to reduce the voltage level from that of the incoming supply. To achieve this change in voltage level, an electrical transformer (static or electronic) is required.

The ratio of primary to secondary windings of these electrical transformers is set to provide the desired level of voltage reduction.

## Voltage Optimisation Techniques

There are two types of voltage optimisation equipment offered by BEST:

**Fixed ratio. This provides a fixed reduction at all times and is suitable for supplies that remain within their nominal tolerance. I.e. +/-6%**

If cost is the overriding factor, the voltage drop can be reduced so the voltage remains within an acceptable tolerance. However, energy savings will be reduced.

**Variable ratio. This provides a constant voltage, regardless of load conditions, through continuous adjustment.**

This type of equipment is suitable for supplies that DO NOT remain within their nominal tolerance. I.e. +/-6%

## Understanding Your Load

To determine whether voltage optimisation will reduce your energy consumption, you will need to understand what percentage of your load is 'voltage dependent'.

A voltage dependent load is an electrical device whose power consumption varies with the voltage being supplied to it. For example:

---

**Incandescent lamps, including tungsten filament, tungsten halogen and reflector lamps.**

---

**Fluorescent lamps (with inductive ballasts), the power consumed is proportional to the supplied voltage.**

---

**Metal Halide & Sodium lamps, fitted with no electronic ballasts.**

---

**Most motors. Most motors in use today are designed to operate at a wide voltage range. Either 220-240V 1 phase, or 380-440V 3 phase. Operating motors higher in their voltage range cause unnecessary losses. Refrigeration compressors are a good example.**

These examples are NOT typically voltage dependent:

**LED lighting, resistive heating loads, computers, audio/video and fluorescent lighting with electronic ballasts.**

# Fixed Voltage Reduction

## See Price List For Product Range

<b>Capacity</b>	1 KVA to 3000kVA
<b>Maximum Supply Voltage</b>	Up to 1140V
<b>Input Voltage Range</b>	Rated voltage $\pm 10\%$
<b>Output Voltage</b>	Rated voltage $\pm 2\%$ to $3\%$ when input voltage is at the rated voltage
<b>Efficiency</b>	Up to 99.5%
<b>Frequency</b>	50Hz or 60Hz
<b>Dielectric Strength</b>	3500V / 10mA / 60s
<b>Loading Capability current</b>	At 100% load, up to 300% for 5 seconds
<b>Insulation</b>	Class F
<b>Ambient Temperature</b>	$-15^{\circ}\text{C}$ to $+45^{\circ}\text{C}$
<b>Humidity</b>	$<95\%$
<b>Temperature Rise</b>	$<100^{\circ}\text{C}$
<b>Noise</b>	$<55\text{db}$
<b>THD</b>	No additional harmonics

## Product Features

Vacuum Impregnated Winding.

High Efficiency.

High Reliability.

Custom Design Available.

Voltage Optimisation Transformer.

Auto Transformer (Step Up/ Step Down Transformer).

Improve the balance of the phase voltage and provide a steady neutral point.

Harmonics Mitigation.

Isolation Transformer.



# Variable Ratio Voltage Optimiser



## Product Features

**Silent design without moving brushes or rollers. High reliability and low maintenance.**

**Digital control, fast response.**

**Rich protection functions.**

**Efficiency up to 99%.**

**Independent phase voltage regulation. Changeable through LCD display on site.**

**Automatic bypass. Manual bypass (optional).**

**Remote monitoring by RS485 or RS232 or CAN (optional) .**

# Technical Specifications

<b>Input Voltage</b>	BOVM1 Single phase: 220V or 230V or 240V BOVM3 Three phase: 380V or 400V or 415V
<b>Input Voltage</b>	-20% to +20% as standard. -45% to +45% available on request.
<b>Frequency</b>	50 or 60HZ
<b>Output Voltage</b>	BOVM1 Single phase: 220V or 230V or 240V BOVM3 Three phase: 380V or 400V or 415V
<b>Output Voltage Tolerance</b>	+/-2% typical (up to +/-1% available on request)
<b>Response Time</b>	<10ms
<b>Correction Time</b>	200ms
<b>Over Load Capacity</b>	300% 1 sec, 200% 2 sec, 160% 1 min
<b>Protection</b>	97% (typical; model below 50kVA); >99% (typical; model above 50kVA) voltage stabilization before power output; under/over voltage, over load, over current, =short circuit, phase loss, auto-bypass, manual bypass (optional), surge arrester (optional), EMI filter (optional), phase loss (optional).
<b>Cooling</b>	Nature air convection for models below 250kVA. Force cooling for 250kVA and above.
<b>Operating Temperature</b>	-10° to 40°C

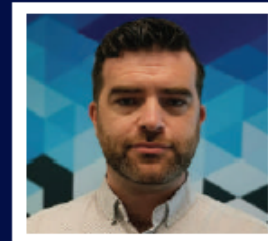
## Why Choose VO For Your Estate?

A single device installed where power enters the building can have a sitewide effect.

That effect can be up to 18% energy savings, which is a massive difference to your energy bill.

Our products offer very high reliability and up to 99% efficiency in operation.

VO helps you get closer to using only the energy you have to. That means if you invest in renewable energy (like solar), you won't be buying more than you need.



*“Most retrofit energy saving technologies just impact one area, like air conditioning. That’s great, but a product that can impact multiple areas all at once is invaluable. Voltage optimisation is that product and it has made a big difference to energy saving projects we run the world over.”*

DAVID GRINSTED -  
HEAD OF PROJECTS,  
BEST ENERGY

## Technical Specifications

Model	Dimensions (cm) W x D x H	Weight (kg)
BOVM3-10kVA	35x60x78(With wheels)	54
BOVM3-20kVA	35x60x78(With wheels)	82
BOVM3-30kVA	35x60x78(With wheels)	112
BOVM3-50kVA	39x65x90(with wheels)	150
BOVM3-80kVA	46x65x120	220
BOVM3-100kVA	46x65x120	240
BOVM3-120kVA	46x65x120	264
BOVM3-150kVA	76x66x160	350
BOVM3-180kVA	76x66x160	387
BOVM3-200kVA	76x66x160	410
BOVM3-225kVA	76x66x160	425
BOVM3-250kVA	110x80x200	615
BOVM3-320kVA	110x80x200	700
BOVM3-400kVA	110x80x200	760
BOVM3-500kVA	110x80x200	1010
BOVM3-600kVA	110x80x200	1145
BOVM3-800kVA	180x100x220	1700
BOVM3-1000kVA	180x100x220	2000
BOVM3-1200kVA	240x100x210	2350
BOVM3-1400kVA	240x100x220	2550
BOVM3-1600kVA	240x100x220	2700
BOVM1-3kVA	22x50x37	20
BOVM1-5kVA	22x50x37	25
BOVM1-10kVA	22x50x37	31
BOVM1-10kVA	28x60x43	38
BOVM1-15kVA	35x60x64 (with wheels)	45
BOVM1-20kVA	35x60x64 (with wheels)	59
BOVM1-30kVA	35x60x64 (with wheels)	81
BOVM1-50kVA	35x60x64 (with wheels)	115



# SafetyNet Energy Management

MEASURE | MANAGE | SAVE

**Safety Net**



**safetynetenergymgt.com**  
**866.918.8546**

[SWITCH ON TO EFFICIENCY]