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POWER QUALITY AND ENERGY MANAGEMENT

WHAT IS POWER QUALITY?

Power quality refers to the ability of electrical equipment to consume the energy beinG supplied to it. A number of power quality issues including electrical harmonics, poor power factor, voltage instability and imbalance impact on the efficiency of electrical equipment. This has a number of consequences including:

- Higher energy usage and costs
- Higher maintenance costs
- Equipment instability and failure

Energy management is an important consideration for any business, and it is critical that power quality be assessed as part of any energy management strategy.

WHAT IS POWER FACTOR CORRECTION?

One contributing element to power quality is power factor. Power Factor Correction (PFC) aims to improve power factor, utilising capacitors to offset usually inductive loads, for example motors. PFC systems increase the efficiency of power supply, delivering immediate cost savings on electricity.

Power Factor is a measure of how effectively incoming power is used in your electrical system and is defined as the ratio of Real to Apparent (total) power where:

Real Power is the power that actually powers the equipment and performs useful, productive work.

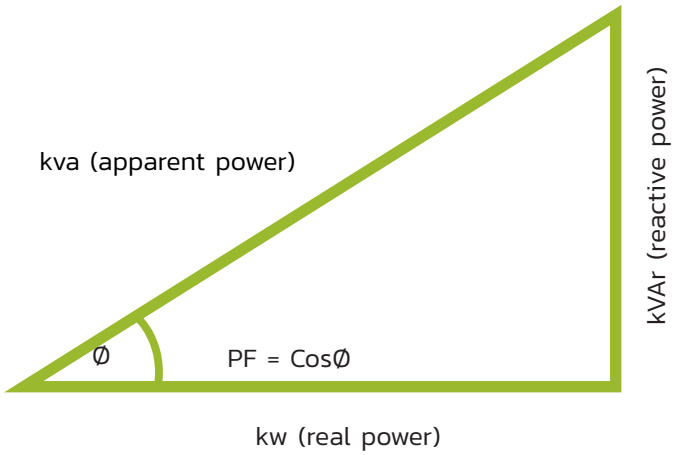
Reactive Power is required by some equipment (e.g. transformers, motors and relays) to produce a magnetic field for operation; however it does not perform any real work.

Apparent Power is the vector sum of Real and Reactive Power and corresponds to the total power required to produce the equivalent amount of real power for the load.

Power Factor Correction may be required where a system has a power factor of less than 90% (or 0.9). A poor power factor can contribute to equipment instability and failure, as well as significantly higher than necessary energy costs since it means that more current is required to perform the same amount of work. By optimising and improving the power factor, the demand on the electricity distribution system is reduced.

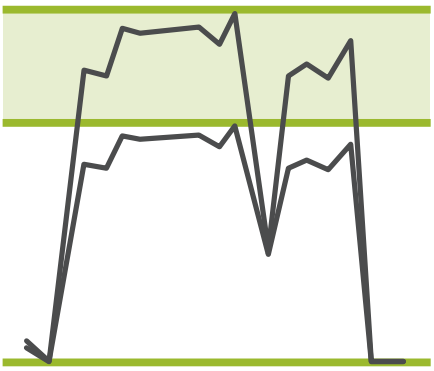
Power Factor Correction equipment achieves a decrease in the total amount of electrical demand by using a bank of capacitors to offset an inductive load (or reactors if the load is capacitive).

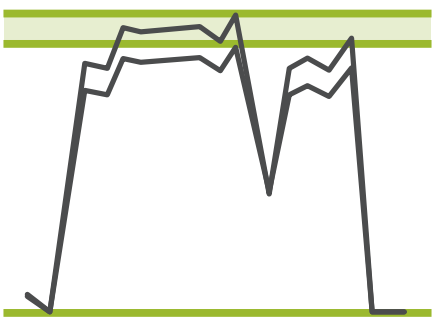
$$\text{Power Factor} = \frac{\text{kW (real power)}}{\text{kVA (apparent power)}}$$



WHEN IS POWER FACTOR CORRECTION RIGHT FOR YOU?

- Motor failure
- Electrical or electronic equipment failure
- Overheating of transformers, switchboards and cabling
- Nuisance tripping of circuit breakers or fuses
- Unstable equipment operation
- High energy usage and costs





SERVICES

Our Power Factor Correction equipment maintenance includes checking that the system is operating at optimum performance levels. We check the following:

- Electricity load reduction
- Voltage levels
- Harmonic content
- Equipment condition and operation

This level of maintenance is recommended by manufacturers to be undertaken regularly.

A comprehensive report is supplied upon completion. It includes specific recommendations for consideration.

WHAT IS VOLTAGE OPTIMISATION (VO)?

Voltage optimisation aims to reduce electricity usage costs and power demand by reducing supply voltage received. It can improve power quality by reducing harmonic and transient voltages as well as balancing phase voltages.

A reduction and balancing in electricity supply voltage achieves a saving in energy consumption (kWh) and a reduction in maximum demand (KW & KVA).

Voltage Optimisation is not the same as Power Factor Correction.

WHEN IS VOLTAGE OPTIMISATION RIGHT FOR YOU?

- Overheating of transformers, switchboards and cabling
- Nuisance tripping of circuit breakers or control equipment
- Unstable equipment operation
- High energy costs

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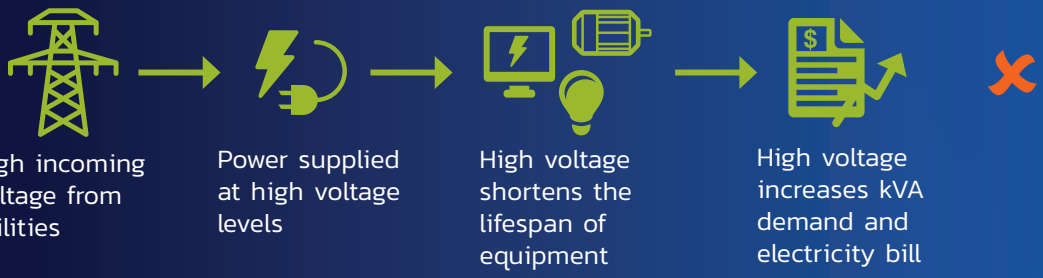
HOW DOES VOLTAGE OPTIMISATION WORK?

Network providers supply power to customers at a higher nominal value than generally required to operate equipment. They do this to ensure that all customers receive acceptable voltage levels taking into account voltage drop and customer loading on their network. This means that the voltage levels are generally higher than that required to efficiently operate equipment, and can results in over voltage issues such as overheating and malfunctions, as well as increased energy usage and costs.

Voltage optimisation devices are installed in series with the incoming supply and the end user equipment, like motors. They maintain a steady and reduced output voltage, with independent phase control that further protects electrical equipment and prolongs equipment life. Further, the ability to adjust the incoming voltage allows for a reduction in harmonics and transient voltage spikes to ensure a stable and reliable power supply to plant and equipment.

The benefits of voltage optimisation include improved power quality, less equipment maintenance, improved equipment life and reduced energy consumption. This can provide significant cost savings.



High incoming voltage from utilities

Power supplied at high voltage levels

High voltage shortens the lifespan of equipment

High voltage increases kVA demand and electricity bill

High incoming voltage from utilities

Power supplied at high voltage levels

Power supplied at steady 220V*

*can be set between 220 and 240V.

Equipment lasts longer

Electricity bill lowered

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WHAT WE OFFER

Ampcontrol are exclusive Australian and New Zealand distributors of Ortea voltage optimisation and energy saving systems.

Ortea's OPTInet Plus voltage optimisation systems optimise an incoming power supply resulting in reduced energy usage, reducing maximum demand and cost savings. The systems use a unique electro mechanical power circuit and sophisticated electronic controls to deliver voltage regulation, exceptional performance, robustness, fast response times, accurate output voltage and operating efficiency.

OPTInet Plus adjusts the incoming voltage to what is required for the site equipment to operate at an optimum level. The energy saving system also regulates the incoming voltage, out of balance phases or overvoltage experienced on the network.

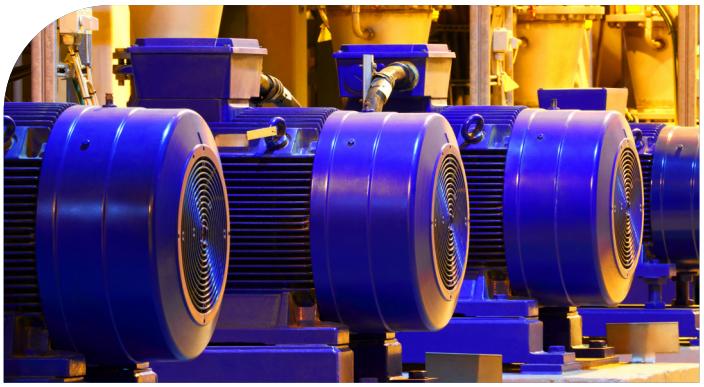
Each system is custom built to suit the exact needs of an individual site, determined through a site survey and study.

We can analyse your system and provide a feasibility business case for your consideration.

OPTInet Plus is a field proven trusted technology, reliably operating in challenging environments all over the world for decades.

OPTINET ENERGY SAVING SYSTEM PROVIDES:

- Voltage regulation, adjustment, voltage stabilisation and phase balancing in a single unit
- Reduced energy consumption and maximum demand resulting in energy savings and lower power costs
- Optimised performance of installed equipment and increase life expectancy
- Improved power factor
- Protection of vital electrical systems from voltage fluctuations



HOW MUCH CAN BE SAVED?

Ultimately the level of energy saving achieved will be dictated by a combination of the incoming supply voltage level and the types of electrical equipment in use. The higher the supply voltage, the greater the potential to make energy savings.

However different types of electrical equipment deliver different levels of energy saving for the same reduction in voltage.

Voltage optimisation works best on inductive loads, such as electric motors that are not fully loaded (air conditioning and refrigerators, pumps and fans) and incandescent and magnetically ballasted lighting.

Energy savings that can be achieved at sites where the majority of electrical consumption is from this type of equipment can be as much as 10-15%.

WHO CAN SAVE?

Voltage optimisation can benefit facilities with inductive loads such as three-phase

induction motors, air conditioning and refrigeration including:

- Commercial, office, retail buildings and supermarkets
- Government and educational facilities
- Manufacturing, processing and warehouse operations

HOW DOES HARMONIC FILTERING WORK?

Harmonic filtering can improve equipment performance and reduce energy costs by eliminating unwanted harmonics in electrical systems created by non-linear loads.

Harmonic voltages and currents are caused by non-linear loads such as variable speed drives (VSD), uninterruptible power supplies (UPS), low energy lighting and switched mode power supplies in devices such as personal computers. Non-linear loads generate harmonics by drawing current in abrupt short pulses, rather than in a smooth sinusoidal manner, introducing currents of additional frequencies which are reflected back into the system, distorting the AC waveform.

Harmonics increase the amount of power required by the system due to a reduction in power quality, contributing to a lower power factor and higher energy costs as a result of the reduced efficiency of the system.

Harmonic filtering acts to filter out the harmonics in a system. This can reduce overheating of equipment, reduce nuisance tripping of circuit breakers and fuses and improve power quality contributing to reduced energy costs.

WHEN IS HARMONIC FILTERING RIGHT FOR YOU?

- Overheating of transformers and conductors
- Generator instability
- Capacitor failure
- Nuisance tripping of fuses and circuit breakers
- Damage to or failure of sensitive electronic equipment including drive failure
- Telephone interference
- Motors experiencing overheating, audible noise and reduced service life
- High energy costs
- Downtime and loss of production due to equipment instability.

TYPES OF HARMONIC FILTERING

LINES AND LOADS REACTORS

Reactors are used to provide current limiting. Reactors oppose rapid changes in current and hence limit spikes as a result of current pulses.

PASSIVE HARMONIC FILTERING

Uses a combination of reactors and capacitors to filter out harmonic frequencies.

Active Harmonic Filtering provides harmonic compensation by being installed on the line side of the offending load (for example, VSD). They introduce current waveforms which cancel out undesired harmonic components.

WHAT WE OFFER

As a leading supplier of filter solutions in Australia, Ampcontrol offer our services to suit any installations and budgets. Our products range from efficient robust line reactors to the most sophisticated harmonic-eliminator passive filters.

All systems are designed to ensure compliance to IEE-519 “Practices and Requirements for Harmonic Control in Electric Power Systems”.

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