

## POWER FACTOR BACKGROUND

Our Power Factor Supplier is a specialist designer and manufacturer of Low Voltage Automatic Power Factor Correction Systems with many years experience, they average over 100,000kVAr per year of installations throughout Australia and overseas.

Established for 18 years in Australia with competent staff that have over 40 years experience in Electrical design, manufacturing and engineering.

With all the necessary resources to design, manufacture, install, commission and guarantee reliable Automatic Power Factor Correction Systems along with the capability to design to most specifications, produce detailed drawings and calculations to justify our design, manufacture to ISO9001 Quality standards, fully test, and deliver systems to meet those specifications.

## CLIENT HISTORY

Our suppliers experience and client history is second to none. They have designed, supplied and commissioned Automatic Power Factor Correction Systems for some of Australia's best known installations.

Just some of these include:-

- **Telstra Stadium** – “The Olympic Stadium” (focus of the 2000 Olympics)
- **Star City Casino**
- **Energy Australia**
- **19 NSW State Schools**
- **Sydney Opera House**
- **Sydney Water**
- **Big-W**
- **Southcorp**
- **Woolworths / Safeway**
- **Goodman Fielder**
- **Ingham's Chickens**
- **Kimberley Clark.**



Complete lists are available upon request so just ask!

## WHAT IS POWER FACTOR CORRECTION?

Power Factor of an electrical installation is the ratio of the “real” power consumed and the “apparent” power supplied to the installation. Real power is expressed in kilowatts (kW) and apparent power expressed in kilo Volt Amps (KVA). A power factor of 0.8 means that an installation is using 80% of the power being supplied to it, so improving the power factor can have some good benefits.

### EXAMPLE

An electrical installation has a “real” (kW) demand for electrical energy of 500kW and a power factor of 0.8. Power factor is expressed as kW/KVA, so the “apparent” power required to produce this “real” power would be  $500/0.8 = 625\text{KVA}$ . Improving the power factor will reduce this KVA and therefore reduce the supply transformer requirements or increase the available “real” power from the transformer.

The power factor can be improved by using “Power Factor Correction Equipment”, which contain capacitors and related protection and control equipment and are connected to the main switchboard. Following improvement of the power factor to, say, 0.99 the apparent power required to produce 500kW of real power is reduced to 505 KVA, a saving of 120KVA (at 415 Volts 3 phase, this is a reduction in switchboard current of 166 Amps per phase).

If the installation were being charged on a “KVA” demand basis then a real saving can be achieved eg. If the KVA demand charge is \$5/KVA/Mth, then a reduction in electricity charges of \$600/Mth would be available.

## WHY YOU NEED POWER FACTOR CORRECTION...

The Power Factor of an electrical installation is the ratio between the power that is actually used (kW) and the power that is actually supplied (kVA). It is a measure of how efficiently an installation uses electrical energy.

Most electricity suppliers charge on the basis of the energy that is supplied (kVA) to a customer installation and therefore it makes good sense to pay for the electricity you use and not the energy you are supplied.

A Power Factor close to 1.00 will ensure the power bill is as low as possible!

A properly engineered Automatic Power Factor Correction system, connected into the main electrical switchboard provides long life and low maintenance with a guaranteed reduction of electricity bill costs.

Power Factor correction equipment is usually suitable for installations that have loadings greater than 100 Amps/Phase and are charged on a (kVA) “Demand” basis. A power factor of 0.9 or less should be corrected because considerable savings may be available. The payback period on equipment used to correct power factor is usually less than 24 months!

Note: It is a requirement of most electricity distributors that all installations maintain a minimum Power Factor of 0.9

The latest technology microprocessor controlled reactive control relays, coupled with the appropriate amount of high quality capacitors can correct the power factor to 0.98 or better and ensure the lowest possible electricity costs by eliminating power factor penalties.

## WHAT YOU NEED...

An analysis of the power demand of your installation can be performed by skilled personnel using modern instruments or electricity demand data can be obtained from your electricity supplier. The maximum kVA (or kW) and Power Factor are required to enable determination of the required Capacitance (in kVAR) to correct the installation. A check on the distortion levels would be of assistance in the design.

A Power Factor Regulator keeps track of the power factor and automatically switches capacitors in and out as the load on the installation varies.

## POSSIBLE PROBLEMS...

Choose only capacitors that are designed and tested in accordance with the requirements of international standard IEC 831 Parts 1 and 2. Specify a minimum voltage level of 525Volts for use on nominal 415V 50Hz systems.

Power Factor Correction systems designed for use on installations with high harmonic levels (typically caused by variable speed electronic drives, UPS systems, switch mode power supplies and arc furnaces etc.) are "de-tuned" using series reactors to create a circuit tuned below harmonic frequencies. As well as protecting the Power Factor system it prevents the PF system from "resonating" with the supply system. A typical tuning frequency is 189Hz. Under these circumstances capacitors rated minimum 525V with series harmonic detuning reactors are used.

Adequate air movement around capacitors is essential for long life operation. All Automatic Power Factor Systems should be forced fan cooled. Cylindrical capacitors, housed in aluminium cases are most suited to the environment and high temperatures found in Australia. This design is the most effective method of dissipating heat from the core of the capacitor.

For Safety, the latest technology, self-healing capacitors with low watts loss that incorporate an over-pressure disconnection device and discharge resistors are used.

## THE COMPLETE PACKAGE

- Site Surveys, Harmonic Analysis
- Obligation Free Proposals
- Design and Manufacture
- Installation & Commissioning
- Service and Upgrades



Power Factor Correction systems are fully wired, assembled and tested prior to packing and dispatch. A test report is included with each system.

## SUPPORT & SERVICE

A Power Factor Correction system should be checked regularly to ensure continued savings. SCE Energy Solutions provide service and maintenance on all brands of Power Factor Correction systems. Programmed service checks with detailed reporting are available.

## STANDARD AUTOMATIC SYSTEMS

We can supply a range of standard Power Factor Correction systems for power systems with low and/or high levels of harmonics from 25 kVAR to 1200 kVAR. Systems are designed to accept rejection coils (to reject ripple control frequencies) and, where unacceptable levels of harmonics exist, de-tuning reactors. Separate compartments in the cubicle are provided for capacitors to give thermal separation from heat generating components such as detuning reactors.

For systems between 100 and 300kVAR the cubicle size is 1600mm (high) x 900mm (wide) x 500mm (deep). In this design, capacitors are separated from the heat generating reactors and protection equipment in a separately ventilated cubicle; this ensures capacitors are never heat stressed even if the forced ventilation fails. The digital power factor controller has over temperature protection and alarming to give further backup, in the event of over temperature (55°C) the steps are progressively switched off and alarm raised.

Systems over 300kVAR are available in cubicles 2,000mm (high) and systems over 400kVAR the width doubles to 1800mm. Special circumstances can be accommodated using combinations of our standard range.

## Testing

Strict testing and quality procedures are adhered to with all designs, standard or special.

A certified test report, signed by the builder, tester and checker is supplied with each system.



## MINI AUTOMATIC SYSTEMS

Our product range includes all types of Power Factor Correction systems to suit almost all applications.

The standard product range starts as low as 25kVAR and can be mounted in enclosures small enough to fit tight spaces

These small systems range from 25 to 100kVAR and have all the controls, indication and protection of the larger units. Size can be as small as 1000mm (high) x 600mm (wide) x 300mm (Deep).

## SERVICE AND MAINTENANCE

Regular service and checking is very important with Power Factor Correction systems. The life expectancy of a "detuned" power factor correction system, designed correctly, should be over 12 years, but this can be extended with regular care and maintenance.