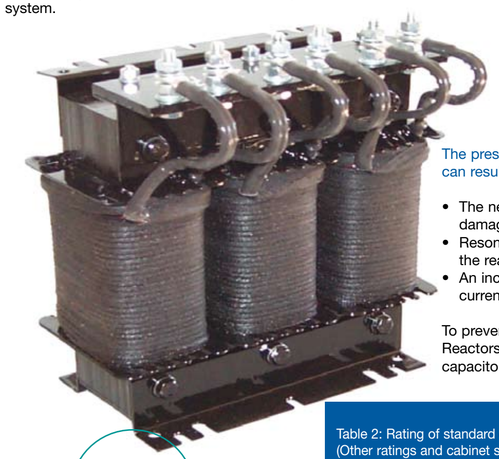
Harmonics

Advances in technology have increased the amount of harmonics created by electrical systems. The increasing use of transistors, thyristors and non-linear devices such as variable speed drives, computers, electric power supplies, low energy lighting etc. are largely responsible. They effect the supply system due to their ability to draw a large reactive non-sinusoidal current. Reactive current is composed of a series of sinusoidal currents consisting of the fundamental and harmonic currents. The injection of harmonic current into a supply system will result in the superimposition of harmonic voltages, consequently distorting the systems voltage. This can lead to disturbances of the supply system and may cause failure of capacitor banks and other equipment ie. computers, power supplies, motors etc. Additionally, an amplification of current and voltage will occur if the resonance frequency is close or equal to one of the harmonic frequencies within the system.



Reactor

Harmonic Blocking Reactor Specifications

- Three phase low loss harmonic blocking reactor for each capacitor step
- Losses at rated current < 100W per 50 kVAr reactor
- 189 Hz tuning frequency
- **Manufactured by Capacitor Technologies P/L**

Design

Similar in design to the Automatic Power Factor Systems except:

- Capacitors have a higher voltage rating
- Each capacitor step has a harmonic blocking reactor

Automatic Power Factor Improvement Systems with Blocking Reactors are based on our modular design with ratings of 25 and 50 kVAr (1 step) per module or 100kVAr (2 steps) for total segregation between reactors and capacitors.

The presence of harmonics in power systems can result in the following problems:

- The newly installed capacitor banks may be damaged
- Resonance between the capacitor bank and the reactive impedance of the supply
- An increase in the harmonic voltage and current after installation of capacitor banks

To prevent these conditions Harmonic Blocking Reactors are installed in series with the capacitors.

Table 2: Rating of standard equipment with Harmonic Blocking Reactors. (Other ratings and cabinet sizes are available on request)

Total Rating [kVAr]	**Type**	**Max. Dimensions** Width [mm]	Depth [mm]	Height [mm]	**Shipping Weight** [kg]
50	LSW50-415BR	600	680	1450	180
75	LSW75-415BR	600	680	1450	194
100	LSW100-415BR	600	680	1450	267
150	LSF150-415BR	600	680	2150	310
200	LSF200-415BR	600	680	2150	360
250	LDF250-415BR	1200	680	2150	547
300	LDF300-415BR	1200	680	2150	590
350	LDF350-415BR	1200	680	2150	666
400	LDF400-415BR	1200	680	2150	736
500	LTF500-415BR	1600	680	2150	1,006
800	LDF400-415BR + LDF400S-415BR	2400	680	2150	1,472
1600	LDF400-415BR + 3xLDF400S-415BR	4800	680	2150	3,100

Save on your electricity bill

Features and benefits of Automatic Power Factor Improvement Systems

Features	**Benefits**
Reliability	Design incorporates the latest leading edge technologies developed by Frako-Germany and Capacitor Technologies to provide long and trouble free life
Design	Modular construction for easy change and system expansion
Enclosure with zinc plating and powder coating	Provide excellent rust protection
Capacitors	Long life expectancy High ambient temperature rating of 60ºC Up to 175% continuous current rating Maintenance free terminals
Special capacitor contactor with "early make" contacts	Reduction of capacitor inrush current Reduced stress on electrical equipment Reduced voltage spikes during capacitor switching
Harmonic Blocking Reactors	Manufactured by Capacitor Technologies P/L and designed and tested to Australian Standards
Large Fans	Excellent cooling with thermostatic control Low noise level
Power Factor Controller with microprocessor and harmonic indication/protection Optional **Computer Interface**	Cyclic operation for long component life Prevention of overcompensation Equipment protection against excessive harmonics Computer display current, voltage power, harmonics etc
Busbar system with high fault level	Up to 70 kA
Safety	Components are shrouded
Quality control to AS/NZ ISO 9001/1994	Ensures high quality of manufactured product including traceability

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Quality System
Quality Endorsed Company
ISO 9001

PFC1-04.0003

CAPACITOR TECHNOLOGIES P/L

Improve your electrical efficiency

Better electrical utilisation and efficiency can be achieved with the use of Power Factor Improvement Systems, specifically:

- Reduction of electricity costs
- Reduction of load
- Reduced losses
- Increased machinery performance
- Decreased contribution to the greenhouse effect

Capacitor Technologies P/L Automatic Power Factor Improvement Systems can be used to achieve these goals.

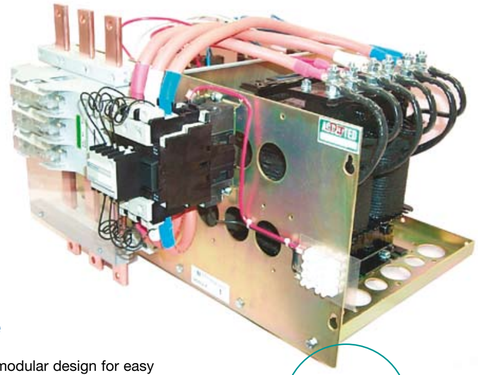
Cabinet

Cabinets

Design:
- Flexible design in modular construction
- Compact to save valuable switchroom space

Enclosure:
- Free standing cabinets constructed from 2mm thick mild steel
- Zinc plated sheet metal for additional rust protection
- Powder coated in electrical orange (or optional colours of your choice)
- Cabinet doors with lift off hinges and a three point locking mechanism
- Cable entry through either the top or bottom with aluminium gland plates

Cabinet Cooling:
- Large volume, low velocity fan
- Efficient motor with low noise
- Thermostatic fan control


Module

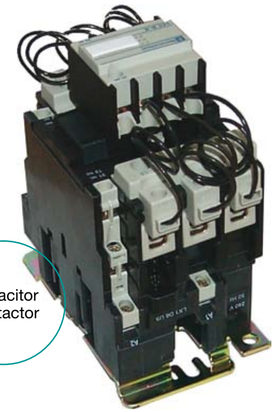
Module

- Compact modular design for easy installation and maintenance
- Segregation between capacitors and reactors
- Rating up to 100kVAr without reactors or up to 50kVAr with reactors

CAPACITOR TECHNOLOGIES P/L

Capacitor Contactor

- Specially designed for capacitor switching (AS3000-1991-4.16.2)
- Includes an inrush current limiting device:
- Reduces stress on capacitors and switchgear
- Reduced switching surges and voltage spikes during capacitor switching


Capacitor Contactor

PF Relay

Power Factor Control Relay

- Digital display showing PF, Current, Harmonic Voltage etc.
- Microprocessor controller to provide accurate PF control without overcompensation
- Cyclic operation to prolong life of contactors and capacitors
- Protection against harmonic overcurrent
- Counter for switching operation
- Remote monitoring display and control on a PC via a RS485 communication (optional)


Capacitor

Capacitors

Features
- Cylindrical aluminium casing
- Metallised polypropylene foil
- PCB free impregnate
- Self healing
- Overcurrent cut-off for extra protection
- Continuous current rating, up to 175% of rated current
- Low capacitor losses, < 0.5 W/kVAr (including discharge resistors)
- **Temperature rating of -10°C to + 60°C**; this allows the capacitor to cope with most severe conditions
- Long life expectancy
- Maintenance free terminals

Quality Control

- Continuous commitment to supply quality products
- Manufactured to AS/NZ 9001:1994

Safety

- Components are shrouded

Table 1: Rating of standard equipment
(Other ratings and cabinet sizes are available on request)

Total Rating [kVAr]	Type	Max. Dimensions Width [mm]	Depth [mm]	Height [mm]	Shipping Weight [kg]
50	LSW50-415	600	680	1450	144
75	LSW75-415	600	680	1450	150
100	LSW100-415	600	680	1450	155
125	LSW125-415	600	680	1450	166
150	LSW150-415	600	680	1450	177
200	LSW200-415	600	680	1450	199
250	LSF250-415	600	680	2150	254
300	LSF300-415	600	680	2150	265
350	LSF350-415	600	680	2150	298
400	LSF400-415	600	680	2150	309
500	LSF300-415 + LSF200S-415	1200	680	2150	519
800	LSF400-415 + LSF400S-415	1200	680	2150	618
1600	LSF400-415 + 3xLSF400S-415	2400	680	2150	927

Standard Equipment Specifications

Protection class	Indoor IP 31 Indoor dusty areas IP 51 Outdoor IP 54
Capacitors	Temperature class: -10°C to +60°C Voltage rating: 440V and 480V (525V for systems with harmonic blocking reactors). Complies with Australian (AS 1013-1971) and International (IEC831 part 1 & 2) standards
Main protection	Fuse isolators or circuit breakers for systems up to 300kVAr Circuit breakers for systems rated above 300kVAr
Busbar System	Fault level up to 70kA
Cable Entry	Top or bottom entry