

Low Voltage Reactive Power Management



Advantages

- Bi-axially oriented double hazy film to ensure good oil impregnation Suitable for flexi banking
- High peak inrush current withstand capability
- Specially vacuum processed, oil impregnated design
- Robust & Highly reliable capacitor performance

1Ø / 3Ø APP (Film + Foil) type for Power Factor improvement & Harmonic Filtering



An ISO 9001 : 2008 Certified Company

Magnewin
Enhancing Power

Low Voltage Reactive Power Management

Principles of Power Factor Correction

A vast majority of electrical loads in low voltage industrial installations are inductive in nature.

Typical examples are motors, transformers, drives & fluorescent lighting. Such loads consume both active and reactive power.

The active power is used by the load to meet its real output requirements whereas reactive power is used by the load to meet its magnetic field requirements.

The reactive power (inductive) as always 90 deg lagging with respect to active power as shown in figure 1, figure 2 & 3 show the flow of kW, kVAr and kVA in a network.

Flow of active and reactive power always takes place in electrical installations. This means that the supply system has to be capable of supplying both active and reactive power. The supply of reactive power from the system results in reduced installation efficiency due to :

- Increased current flow for a given load
- Higher voltage drops in the system
- Increase in the losses of transformers, switchgear and cables
- Higher kVA demand from supply system as given in figure 2
- Higher electricity cost due to levy of penalties / loss of incentives

It is therefore necessary to reduce & manage the flow of reactive power to achieve higher efficiency of the electrical system and reduction in cost of electricity consumed.

The most quick & cost effective method of reducing and managing reactive power is by power factor improvement through power capacitors. The concept of reduction in kVA demand from the system is shown in figure 3.

Heavy Duty Capacitors
APP (Film + Foil) type

Application

- PF correction in LV network

- Automatic power factor correction (Contactor / Thyristor switching).
- Fixed power factor correction
- Harmonic filters

Features

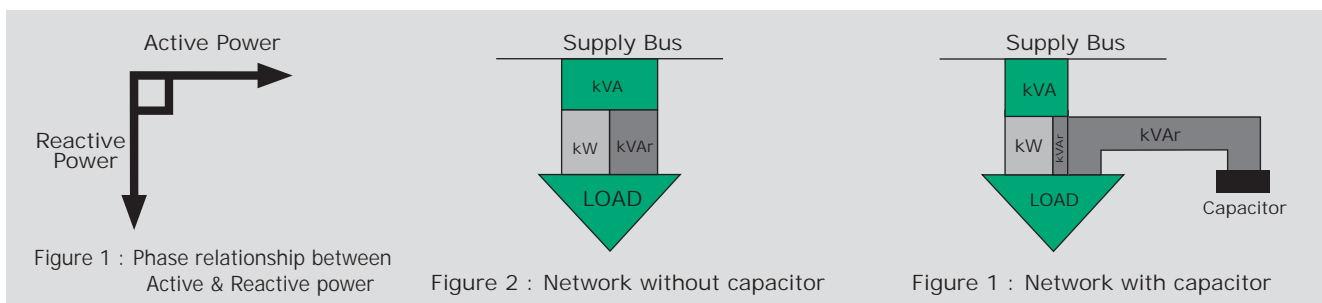
- Bi-axially oriented double hazy film to ensure good oil impregnation
- Suitable for flexi banking
- High peak inrush current withstand capability
- Specially vacuum processed, oil impregnated design
- Robust & Highly reliable capacitor performance

Safety

- Internal element fuse design
- Non polluting Non PCB oil
- Externally fitted Discharge resistors
- Protective steel enclosure

Life

- Life Expectancy min 20 Years



| | |
|-------------------------------|--|
| Standards | IS 13585-1994 |
| Rated Voltage | 415 / 440V (Other ratings on request) |
| Over Voltage | +10% (12h/24h), + 15% (30m/24h), +20% (5m) +30% (1m) As per clause 6.1 of IS 13585-1994 |
| Over current | 2.0 x In |
| Peak Inrush current | 350 x In |
| Operating losses (dielectric) | < 0.2 W / kVAr |
| Operating losses (total) | < 0.45 W / kVAr |
| Ambient temperature | -25° C to 55° C (other categories on request) |
| Impregnation | Non PCB insulating oil |
| Terminals | Bushing terminals designed for large size cable termination and direct busbar mounting for banking |
| Switching operations | 8000 |

General Technical Information

Effect of temperature rise

Every capacitor has a specific lowest and highest ambient temperature. Life of capacitor decreases when operated above that limit. Capacitor should not be exposed to heat and must be kept in a well ventilated position to avoid overheating.

In detuned reactor application, the location of reactor affects the temperature of the air surrounding the capacitor. The reactor radiates heat and should be placed always above the capacitor, preferably on top or in a separate column.

The connecting cable between reactor and cables should be kept long to avoid heat transfer. It is always recommended to implement forced air cooling in detuned reactor filter panels. We should also consider the IP rating before opting for forced cooling.

Effect of current rating

The maximum allowed RMS current is given in technical data of the capacitor. Operating the capacitor beyond that level will reduce the life of the capacitor. Higher current drawn by capacitor means increased losses. This results in heating of the capacitor, thereby, reducing its life.

Effect of over voltage

Operating the capacitor beyond permissible limits of over voltage will damage the capacitor. Some levels of over voltages are accepted only for a short duration but they reduce the life of the capacitor. Such levels must not occur for more than 200 times in the life time of a capacitor.

Protection of capacitors

Capacitors have to be protected against short circuit currents by using fuses or thermal relay. The fuse & thermal relay should not operate for high inrush currents of the capacitor. HRC fuse should never be used for switching. It will result in capacitor failure and possible safety hazard for the operating personnel.

Switching capacitors

When the capacitor is switched to the network, high inrush currents flow. Fast acting contactors which are capable of handling the high currents level should be used. Capacitor contactors (connected with resistors) are better suited since they can damp the high currents.

Discharging Capacitors

Capacitor must be discharged before it is switched ON again.

This helps to maintain the life of capacitor. This also reduces the possibility of electrical shock or capacitor failure. The capacitor voltage must reduce to 75V within 3 mins. This is done by connecting a external discharge resistor across the capacitor terminals. No disconnecting device must be connected between the capacitor and discharge resistor.

Earthing of Capacitor

An earthing terminal has been provided at the lower side of the capacitor has to be used for earthing.

Mechanical Damage

A capacitor with any kind of damage should not be used. Any leakages and physical deformity should be reported to the manufacturer.

Resonance

Capacitors connected in harmonic rich environment face problems regarding resonance, current amplification and ultimately its failure. To avoid such problems, we need to use detuned reactor along with capacitor.

Surroundings

The capacitors should be kept in an ventilated atmosphere, free from any corrosive medium. They should be cleaned regularly to prevent build up of dust on the terminals.

Filter Reactor

| | |
|------------------------------------|--|
| Standards | IEC : 60289 / VDE 0532 / EN 61558 / IS : 5553 |
| Rated voltage and frequency | Un = 440V, 50 Hz |
| Series resonance frequency | 210 Hz (5.67%), 189 Hz (7%) and 134 Hz (14%) |
| Max. permissible operating voltage | 1.05 x Un continuously & 1.1 x Un for 8 hours daily |
| Max. permissible operating current | I = 1.60 x In, High linearity 1.75 x In continuously |
| Duty cycle (Ims) | 100% |
| Class of protection | I |
| Ambient temperature | 40° C |
| Temperature class | Class F (other class on request) |
| Fuse Protection | Internal Element Fuse provided |

De-tuned Harmonic Reactor

Iron Cored Reactors are used along with Capacitors to De-Tuned harmonic filter Capacitors can be any of the following types :

Application : Detuned filters for mitigating harmonics

- Available in 5.6, 7 & 14 %

Features

- High linearity
- Compact size and convenient mounting
- Low losses
- Low noise level

- Tested as per IS : 5553

Safety

- Temperature protection by providing thermal switch
- High insulation level

Note : Product improvement is a continuous process. For the latest information and special applications, please contact us..

