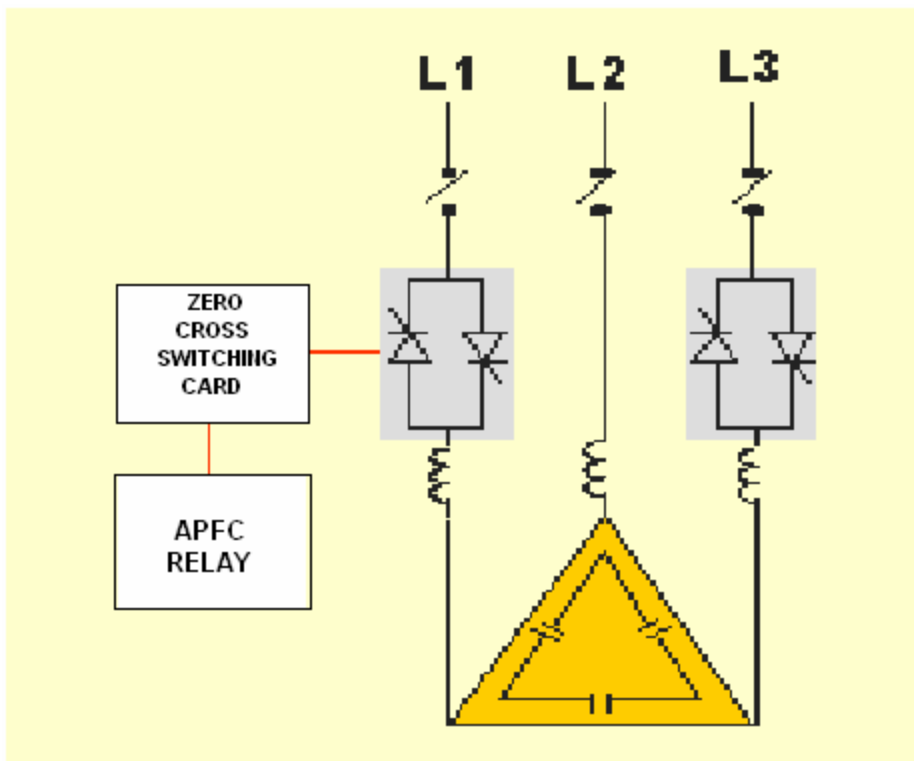


## High Speed Real Time Automatic Power Factor Correction System

**State-of-the art electronic switching device designed to replacement of electro-mechanically switched equipment in power factor correction systems**

High Speed power factor correcting systems are designed to compensate the reactive power of any load or equipment requiring P.F. correction within a very short time.



There is no contactor switching causing high voltage transient. Harmonics and other disturbances. Prevents voltage flickring. Reduces failures in highly sophisticated electronic equipments like PLCs. Computer and other control systems.

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### **BENEFITS OF REAL TIME HIGH SPEED PFC AGAINST CONVENTIONAL PFC**

- ❖ Power Factor will maintain almost near to unity so guaranteed P.F. bonus of 4 % to 5 % every month.
- ❖ Reduction in KVA demand by 15% to 20%.Result in saving in demand charges.
- ❖ Substantial saving in the electricity bill for HTP-1 & HTP-2 consumers in MOST of the state in India.
- ❖ Enhance the capacity of distribution transformer, switchgear and HT cable.
- ❖ Eliminate high voltage condition during no load. [i.e. vacation, recess, shift change, strikes, off load etc.]
- ❖ Saving in manpower for switching on & off the capacitors.
- ❖ Eliminate fixed losses of the capacitor during no load & less load condition.
- ❖ The system is maintenance free because it does not use contactors for switching the capacitors.
- ❖ Capacitors life is enhance minimum 3 to 4 times. Due to electronics switching & reactors available in the system. The reactors will filter the harmonics & prevents the possibility of resonance by shifting resonance frequency below 5<sup>th</sup> harmonics.
- ❖ The load current will be approximately reduced by 15% to 20% which in turn will reduce fluctuation in voltage and improve voltage quality and prevents damaged to sensitive electronics equipment.
- ❖ If used with D.G. sets, It can be additionally loaded by 15% to 20% & corresponding increase in fuel efficiency. When running on D.G. set the fluctuation in voltage is substantially reduce.
- ❖ Capacitor connection is through Thyristor and at zero current crossing, which doesn't generate transient.
- ❖ Due to fast correction of P.F. Large H.P. motor can be started on generators already running near full load capacity. Large HP motors do not require soft start starters if connected through FRPFC.
- ❖ Renders the distribution network stable & helps in improving system PF to 0.99 plus, without causing any problem to sophisticated electronics equipment & other loads of variable nature.
- ❖ Cost is comparable with conventional contactors switching APFC Systems.

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### **DISADVANTAGE OF CONTACTOR SWITCHING APFC**

- ❖ Slow response time. Typically 30 to 120seconds.
- ❖ Generate electrical noise & spikes, which can be damaging computers, CNC machines or other digital equipments.
- ❖ Due to large inrush current, life of capacitor is very less say, 2-3 years.
- ❖ The contactors get welded based on the frequency of operation and needs replacement.
- ❖ Not suitable for use on D.G.SETS.
- ❖ Takes much longer time to correct voltage sag. Hence, starting current is much higher for longer period, requires Higher capacity of switch gears/cables to cope up with high starting current.
- ❖ Due to high starting current, starting torque is much lower. Drives need to be of higher rating to compensate for the low starting torque. Set up will incur more losses because of lower load efficiency.
- ❖ Adds wide range of harmonics because of random switching operation.
- ❖ Does not incorporate inductor (REACTOR). Hence resonance may occur at times, which can damage the switchgears as well as generating sets without visible notice.
- ❖ Requires regular maintenance.

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**DISADVANTAGES OF DIRECTLY CONNECTED CAPACITORS TO THE SYSTEM**

- ❖ Fix capacitors make the power factor in leading condition, during no load and less load condition. These over correction leads to over voltages, which can damage electrical equipments. This over voltage appears across the terminals of the capacitor it self and can affect its life too.
- ❖ With increase in voltage a demand increases proposal to the square of the voltages in certain cases and it depends on the characteristic of the load. As a rule of thumb, the maximum demands of load increase by 1.6 times the increase in voltage. i.e. for every 1% increase in voltage the maximum demand will increase 1.6 percent. The average demand will increase one third to one percent voltage rise.
- ❖ Watt loss of capacitors varies from .5w to 2.5w per KVAR. So if capacitors are connected directly to the system, there is a watt loss during no load & less load conditions.
- ❖ Directly connected capacitors are remain permanently in the system in charged condition all the time, which will leads to temp. Rise and affect the life span of the capacitors.
- ❖ Directly connected capacitors required periodic checking for verifying capacitor rating.
- ❖ If fixed capacitors are directly connected across the motor terminal exceeds 85% of the no load magnetizing KVA of the motor, then there are chances of resonance, which is undesirable.
- ❖ If fixed capacitors is connected across the motor employing star delta starters, care should be taken that there should be no disconnection of the motor capacitor group from the supply changeover from star to delta, other wise these may damage motor winding, because fully changes capacitor tends to discharge suddenly when the starter changes from star to delta.

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TECHNICAL SPECIFICATION

1	Rating	35-200 KVAR and above....
2	Incomer	ACB / SFU / MCCB
3	Rated operating voltage	3-Phase Delta Connected, 415 V $\pm$ 10%
4	Rated frequency	50 $\pm$ 3 HZ
5	Groups	Varies according to LOAD
6	Switching Sequence	5+10+20+...
7	Smallest Group	5 KVAR
8	Maximum Acquisition Time	<1 Sec.
9	Ambient Temperature	45°C
10	Enclosure	CRCA Sheet, Epoxy Power Coated [Siemens Gray]
11	Protection Class	IP - 20
12	Insulation Level	2.5KV
13	Internal parts	Rust Proof
14	Termination	TOP/BOTTOM Cable Entry
15	Type of Switching	Static Soft Switching
16	Iron Core Reactors	Low Hysterisis Loss, CRGO Lamination with 46 / 51 Grade, Insulation Grade F
17	Capacitors	Low Loss [0.4W/KVAR] MPP type, Heavy Duty, Self Healing properties, Over pressure tear off FUSE, 440/480 V & capable to cop up with over Voltage conditions.
18	Controller	Microprocessor Based Display System of Power Factor, Smart enough to select & Correct pf within 1 sec. Sensing of Voltage & Current from LT Side, Visual /Alarm system which continuously Monitors pf and indicates the cause of drop below set value like, fuse blow, capacitor fail, MCB trip. etc. ( also available with load manager )

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