



## Product Profile

LV and MV PFC Capacitors

PFC Key Components

MV Vacuum Contactor

MV Capacitor Switch

LV and MV APFC Systems

AC (MFD) Capacitors



# Product Profile

AC (mfd) and PFC Capacitors, Key Components and Systems

Power Quality Solutions

[www.tdk.co.jp](http://www.tdk.co.jp) [www.epcos.com](http://www.epcos.com)

## PhaseCap Capacitor



A hi-tech capacitor with stud mounting Cylindrical construction with inert gas impregnated winding having very good KVAR to volume ratio.

### Specification:

- Conformance to Standards IEC 60831-1 2/96 VDE 560-46 3/95

### Range:

- Phase Cap: Single units from 5 to 56 KVAR.
- Voltage: 230V to 800V

### Features:

- Manufactured using patented wave cut technology multilayer MPP film with heavy edge.
- Self healing property.
- Low energy consumption.
- Capable of withstanding high inrush current
- Dry-type, freedom from oil leakage.
- Explosion proof feature using pressure sensitive mechanical interrupter.
- Compact size and light weight.

### Pole Cap Capacitor:

A modified version of PhaseCap capacitor with connection cable, suitable for long- term out door applications and for mounting on the pole.

## PhiCap Capacitor



Stud mounting cylindrical type having very good KVAR to volume ratio.

### Specification:

- Conformance to Standards IEC 60831-1 and 2/96. IS 13340.

### Range:

- Single units up to 25 KVAR.
- Voltage: 220V to 525V.

### Available in two designs:

- Normal duty for linear inductive loads.
- Heavy duty for non-linear loads (up to 480V).

### Features:

- Manufactured using multilayer MPP film with heavy edge.
- Self healing property.
- Low energy consumption.
- Flexible PU resin as impregnant.
- Explosion proof feature using pressure sensitive mechanical interrupter.

## SquareCap Capacitor



Rectangular box type. Self standing units. Modular construction with sheet metal enclosure.

### Specification:

- Conformance to Standards IEC 60831-1 2/96, IS 13340

### Range:

- Single units up to 50 KVAR.
- Voltage: 415V to 525V

### Available in three designs:

- ENDC: EPCOS Normal Duty Capacitor for normal inductive loads.
- EHDLL: EPCOS Heavy Duty Long Life Capacitor for loads exhibiting some amount of non-linearity, presence of harmonics, medium size industries.
- ESHDC: EPCOS Super Heavy Duty Capacitor for non-linear arduous and fluctuating loads with higher degree of harmonics.

### Features:

- Manufactured using MPP film with heavy edge.
- Self healing property.
- Low energy consumption.
- Flexible PU resin as impregnant.
- Explosion proof feature for individual cell using pressure sensitive mechanical interrupter.
- Simplified modular construction using hermetically sealed single phase basic capacitor cells.
- Easy and quick reparability at site.

## AC (mfd) Capacitors



### Specifications:

- Complying to IS 2993 / IEC - 60252 (For Motors), IS 1709 (For Fans), IS 1569 (For Lighting Fixtures) and relevant International Standards.

### Range:

- 250 VAC to 600 VAC, 1mfd to 150 mfd.

### Applications:

- Lighting Fixtures.
- Motors, Pumps, Fans, Compressors.
- Aircon, Washers, Refrigerators.
- Generators / CVTs / UPS/ Invertors .

### Features:

- Manufactured using state-of-the art automatic computerised equipments.
- Multi layer Metallized polypropylene.
- Plastic or Aluminium Can construction.
- Safety device construction available.
- Dual rating capacitors also available.
- UL, CSA, CE approvals for various ratings (on request).

## Power Factor Controller



Power Factor Controllers are used for automatic reactive power compensation/ power factor improvement through switched capacitor banks.

### Range:

Series: BR4000, BR5000, BR6000, BR 7000.

- Relay output and transistor output (for dynamic PF control)
- 4, 6, 8, 12 and 16 steps.

### Supply Voltage:

- 1)BR4000/ BR6000/ BR7000 :- 230 V
- 2)BR 5000:- 415 V (+20% to -40%)
- Single CT sensing and Three CT sensing.

### Features:

- Innovative and intelligent concept.
- User friendly operation.
- Large and Multifunctional LCD display (2 X 16 characters)
- Recall functions of recorded values.
- Large measuring voltage range (L-L 50 to 525 V)
- Display of large number of system parameters including harmonics. RS 232 / RS 485 Interface Optional.
- Two standard mounting dimensions (96 X 96 and 144 X 144mm)
- Available with both relay outputs (suitable for Contactors) and Transistor out put (suitable for Thyristor).
- Hybrid controller with both relay and transistor outputs are also available.
- Powerful alarm output.
- Control modes: LIFO, FIFO and self optimized Intelligent Control.

### Additional features in BR 5000

- 3 CT sensing for unbalanced loads.
- Data logging.
- Dual target Power Factor setting.
- Measurement of capacitor current.
- Automatic Synchronization.

### Additional features in BR 7000

- 15 switching outputs.
- Freely programmable for switching of 1 or 3 phase capacitors.
- Illuminated LCD graphic display 124 X 64 dots, 8 lines.
- 2 independent isolated RS 485 Interfaces.
- Error storage with time stamp.
- Optional MODBUS or ASCII protocol.

## Capacitor Duty Contactors



Use of capacitor duty contactor enhance the life of the capacitors also limits the system transients thus improving power quality. Contactors have additional auxiliary contacts with current limiting resistors in series with it.

### Specification:

- Technical data according to Standards IEC 947-4-1, IEC 947-5-1, EN 60947-4-1EN 60947-5-1 and VDE 0660

### Range:

- Rating: 5 KVAR to 100 KVAR.
- Optional Voltage Range (380 V to 440 V).
- Operational ambient temperature up to 60° C

### Features:

- Largest range.
- Excellent damping of inrush current by the use of leading contacts with wiper function and special resistors.
- Longer useful life of main contacts of capacitor Contactor.
- Soft switching of contactor and thus longer useful life.
- Weld resistant up to a possible peak inrush current of 200 times the rated capacitor current.
- Enhance mean life expectancy of PFC systems.
- Reduce Ohmic losses.
- Tamper proof and protected resistors.
- Suitable for use with or with out detuned reactors.
- Easy access for cable connection.

### For higher system voltage

(440 V to 750 V) and for higher current ratings, EPCOS offers special Vacuum Contactors.

These are widely used in various applications such as:

- Motor Switching.
- Inching applications.
- Crane duty switching.
- Capacitor Switching.
- Load Switching.
- Mining Industry.
- Refineries and Petro-chemical plants etc.

## Thyristor Switch Module



Thyristor switching is used when load variation is rapid as in case of cranes, lifts, spot welding, plastic extrusion etc. As there are no moving parts the switching life is very high as compared to contactors. The power electronic devices used have a rated PIV of 2200, one of the highest in its class, thus enhancing the reliability of the module.

### Range:

- Suitable for 10, 25 and 50 KVAR.
- Rated Voltage 400, 415, 440 and 690 V.

### Features:

- Suitable for real time power factor correction.
- Easy Installation: It can be used identically as a Contactor.
- Reaction time: 5 milli seconds.
- Permanent self- controlling of :
  - Voltage Parameter
  - Capacitor Current
  - Temperature of the thyristor switch.
- Alarm output per module.
- Manual operation possible.
- Automatic switch off in case of over current and over temperature.
- Display of:
  - Operations
  - Faults
  - Activation.

## M V Capacitors



Medium Voltage power capacitors are designed and manufactured by using latest technology high quality material. These capacitors employ a technique where in the dielectric comprises several layers of polypropylene film impregnated with a non PCB liquid. The fluid is biodegradable in environment. Electrodes are made from thin aluminum foils.

### Specification:

- Conformance to Standard IEC-60871, IS 13925.

### Range:

- Up to 600 KVAR. in single unit in 11KV range.
- Higher ratings in form of banks.

### Features:

- Extended foil design.
- Bushings with desired BIL.
- Low energy consumption.
- M. S / S. S Containers.
- Available with internal / external fuses.
- Suitable for indoor and out door application.
- Banking: Star / Delta / Double Star.

### Accessories: On request

- Series reactors
- RVT / NCT
- CT / PT
- Isolator, LA'S, Circuit breakers etc.

## MV Capacitor Switch



EPCOS offers state of art Vacuum Capacitor Switches for various applications. Vacuum capacitor switches have an age over gas / air /oil type switches because of highest dielectric strength of vacuum. The core of capacitor switch is a specially designed vacuum contactor suitable for capacitor switching. The switch comprises of vacuum contactor and other associated equipments such as measuring CT, PT, auxiliary transformer etc.

### Specification:

- Rating Voltage: 11 KV.
- Highest System Voltage: 12 KV
- Rated frequency: 50 / 60 Hz.
- Number of phases: 3
- BIL: 20 KV AC / 60 KV peak /28 KV AC / 75 KV peak.
- Rated Current: 200 A / 400 A.
- Rated Single bank capacitor switching current: 50 A / 75 A.
- Rated short time current: 4.5KA/6KA/ 10KA 1second.
- Peak making current: 9 KA / 15 KA peak.
- Electrical endurance: 10000 operations.
- Mechanical endurance: 25000 operations.
- Mechanism: Solenoid.
- Controller type: Single step / Multi step.
- Installation: Out door / Indoor.
- Mounting: Pole mounted / Structure mounted.
- Power Interface: 6 bushing / 7 bushing.
- Indication: Switch ON / OFF.

### Features:

- Most Compact in its series.
- Light Weight, can be mounted on single pole / double pole structure.
- Eco friendly and high power switching capacity.
- Offers various power interface, control and protection options to meet various customized application needs.

## MV Vacuum Contactors



EPCOS offers state of art Vacuum Contactors for various applications. Vacuum contactors have an age over gas / air /oil type switches because of highest dielectric strength of vacuum. Vacuum contactors use state of art vacuum interrupters selected to perform the required duty. Vacuum contactors are used for lower current breaking e.g. motor current, capacitive current and other low inductive currents.

### Specification:

- Rated Voltage: 6.6 KV / 11 KV.
- Highest system Voltage: 7.2 KV / 12 KV.
- Rated frequency: 50 / 60 Hz.
- BIL: 20 KV AC / 60 KV peak / 28 KV AC / 75 KV peak.
- Number of phases: 3 / 2 / 1
- Rated Current: 200 A / 400 A.
- Rated motor switching current: 100A
- Rated single bank capacitor switching current: 50A.
- Rated short time current: 10KA per second.
- Peak making current: 9 KA / 15 KA peak.
- Electrical endurance: 10000 operations.
- Mechanical endurance: 25000 operations.
- Mechanism: Solenoid / Mechanical latch.
- Indication: Switch ON / OFF.

### Range:

- Available from 200A to 630 A, 3.3 KV to 15 KV.

### Features:

- Encapsulated Vacuum Interrupter with a high dielectric strength and reliability.
- Choice of Solenoid and Mechanical mechanism.
- Mechanism tested for 30000 operations.
- Capable of operation from 70% to 120% of rated voltage of operating coil.
- Highly efficient in capacitor switching and DC switching applications.
- No arc produced is exposed to, atmosphere hence no fire hazards.
- Maintenance free electrical contacts. Compact with low foot prints saves panel space.
- High electrical and mechanical life.



### Pole Mounted RPC System



The Pole Mounted Reactive Power Compensation (RPC) Systems are built around critical key components such as capacitor, capacitor switches and damping reactors etc designed and manufactured by EPCOS. These Reactive Power Compensation Systems are specially designed for single step automatic reactive power compensation system ideal for 11 KV feeders. These are self powered, highly reliable and suitable for unmanned lines requiring low service. The inrush current and fault current handling capacity of the switch is optimized considering the application. The switch is provided with a customized single step control box with a special controller having monitoring, control and protection features. Both capacitor switch and control box are designed for IP55 ingress protection and are suitable for out door installation.

#### Specification:

- Size / Rating: 100 to 1200 KVAR.
- Rated Voltage: 12 KV
- Number of Steps: Single.
- Control mode: Auto / Manual.
- Control Parameter: Load current / load power factor.
- Damping reactor: 0.2% and 6% (optional)
- Configuration: Delta / Star.
- Installation: Out door.

#### Features:

- Self Powered highly reliable, suitable for unmanned lines requiring low services.
- Suitable for direct out door installation as designed with IP 55 ingress protection.
- The complete unit is self contained and does not need any auxiliary supply.

### Pad Mounted RPC System



EPCOS offers indoor as well as out door Pad mounted / metal clad Reactive Power Compensation System for various applications. These are metal clad switched or fixed capacitor banks of various configurations customized for specific applications. Switched capacitor banks have specially designed and manufactured Vacuum contactors for switching of capacitor banks. The panels are designed for indoor as well out door installations with various degrees of ingress protection. Depending upon the application and configuration various values of damping reactors are provided to enhance the performance.

#### Specification:

- Size / Rating: 100 to 3600 KVAR.
- Rated Voltage: 3.3 / 6.6 / 11 KV
- Number of Steps: 1 - 8
- Control mode: Auto / Manual.
- Control Parameter: Load current / load power factor.
- Damping reactor: 0.2% and 6% (optional)
- Configuration: Delta / Star / Double star.
- Installation: Indoor / out door.

#### Features:

- Requires less space suitable for indoor / out door installation.
- Optimum compensation of reactive KVA in case of switched capacitor banks.
- Choice of cable entry locations.

### Station Type RPC System



EPCOS offers turnkey solutions for station type Reactive Power Compensation Systems. These are open execution shunt capacitor banks of various ratings and configurations. The banks are fixed or switched. Switched bank use either special capacitor switches or Vacuum circuit breakers for switching. The capacitor switches are designed for multi-step switching and have capability of switching parallel connected capacitor banks with appropriate current limiting reactors. The banks are complete with PT, CT, NCT / RVT, Isolators, Lightning arrestors, Series Reactors and Circuit breaker with customized Control and Relay panel.

#### Specification:

- Size / Rating: 200 to 10000 KVAR.
- Rated Voltage: 6.6 / 11 / 22 / 33 KV
- Number of Steps: 1- 8
- Control mode: Auto / Manual.
- Control Parameter: Load Power Factor.
- Damping reactor: 0.2% and 6% (optional)
- Configuration: Delta / Star / Double star.
- Installation: Out door.

#### Features:

- Optimum compensation of reactive KVA in case of switched capacitor banks.
- Controllers with Data logging, remote control and communication facility.
- A single control panel with multi step controller to control multiple switches.

## Three Phase Filter Reactor



Anti-resonance three phase filter reactor. Detuned reactors are used with shunt capacitor banks to prevent harmonic resonance and also harmonic overloading of capacitor banks. These reactors are characterized by high linearity, low loss and compact size.

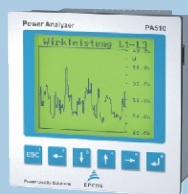
### Range:

- Effective Filter out put 5 KVAR to 100 KVAR.
- Filtering factor: - (5.67%, 7% and 14% corresponding to tuning frequencies of 210 Hz, 189 Hz and 134 Hz for the base of 50 Hz)
- Rated Voltage: (230 V to 690 V)
- Available in three designs
  1. Aluminum Strip Wound.
  2. Aluminum Foil Wound.
  3. Copper Conductor wound.

### Features:

- Highest linearity, low risk of reactor tilting.
- Low losses and noise level.
- High over loading capability.
- Low weight in case of aluminum windings.
- Safety devic - temperature micro switch.

## Power Analyser



Power analyzers are fast becoming an integral part of power system to monitor and control the quality of power. Monitoring quality has become the necessity to initiate or prioritize system improvement measures, enhance reliability, reduce operating costs, conserve energy, understand equipment failures etc. EPCOS range of power analyzers span the entire spectrum from stand alone multi-function panel meters to integrated / network wave form / disturbance recorders and transient analyzers.

### Range:

- PA96L 255V 3 ph. to PA510 500V 3 ph.

### Features:

- Advanced harmonic profiling, unbalance, flickers are measured and logged.
- Suitable for monitoring quality of power which helps in system improvement measures.
- Enhance reliability.
- Reduce operating cost.
- Helps to conserve energy.
- Understand equipment failures, etc.
- Compact size and light weight.

## LV APFC Panels



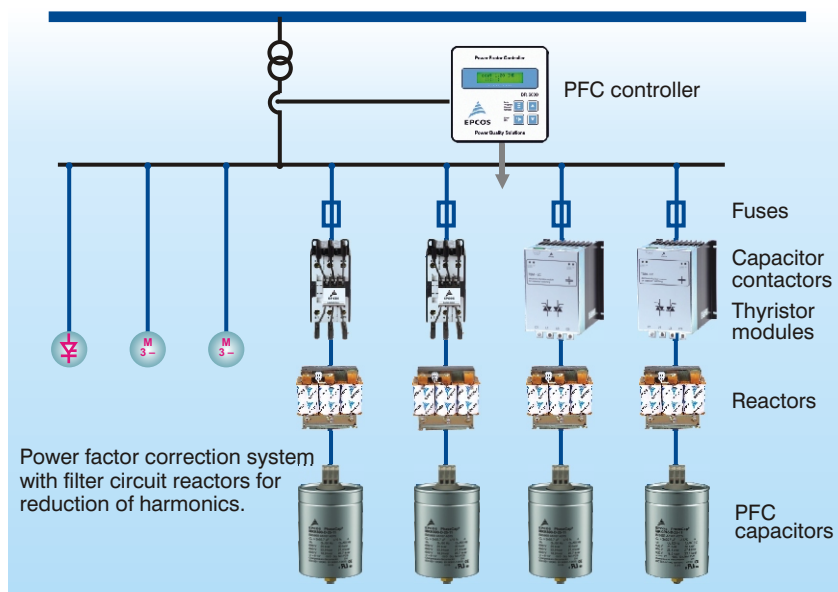
EPCOS offers wide range of automatic switched capacitor panels for Power Factor correction in various configurations for a wide range of applications. The Panels are both Contactor switched and Thyristor switched type.

### Specification of APFC Panel:

- Rated Voltage: 380/400/415/440/690 V.
- Rated Frequency: 50 / 60 Hz.
- Rated Out Put: 20 -1000 KVAR.
- Configuration: Delta / Star floating / Star grounding.
- Number of steps: 1-16
- Step Distribution: Equal / Binary / Unequal.
- Series Reactor: 0%, 0.2%, 5.6%, 7%, 14%.
- Reactor winding: Copper/ Al. strip / Al.foil.
- Switching device: Thyristor /Capacitor duty contactor.
- Panel Type: Standard / Modular / Compartmentalized.
- Branch Protection: HRC fuse/ semiconductor fuse / SFU / MCCB.
- Capacitors: Resin filled / Gas filled / APP.
- Protections: OV / UV / SC / EF / OT.
- Controller: BR 4000 / BR 5000 / BR 6000.
- Measuring CT: 1 or 3.
- Data logging: Through controller internal memory (select models).
- Communication interface: Optional (RS 232, RS 585, Profibus).
- Power analyzer: Optional.

### Features:

- Wide choice of capacitors.
- High quality reactors with highest linearity.
- Appropriate switching devices.
- State of art controllers.
- Thyristor modules for real time power factor correction.



For more details on products and applications please contact our nearest sales office or write to us at [sales.in@epcos.com](mailto:sales.in@epcos.com)

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