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Ingenuity for life



# Power Factor Correction Capacitor and HRC Fuse System

Thailand

Edition  
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[www.siemens.co.th](http://www.siemens.co.th)

# Introduction :

The rational use of electrical energy calls for economical generation, transmission and distribution with little losses. Static capacitive compensation devices reduce the lagging reactive power component transmitted over the network. If grid conditions change, the required power can be matched in steps by adding or taking out single power capacitors (automatic PFC) for compensation.

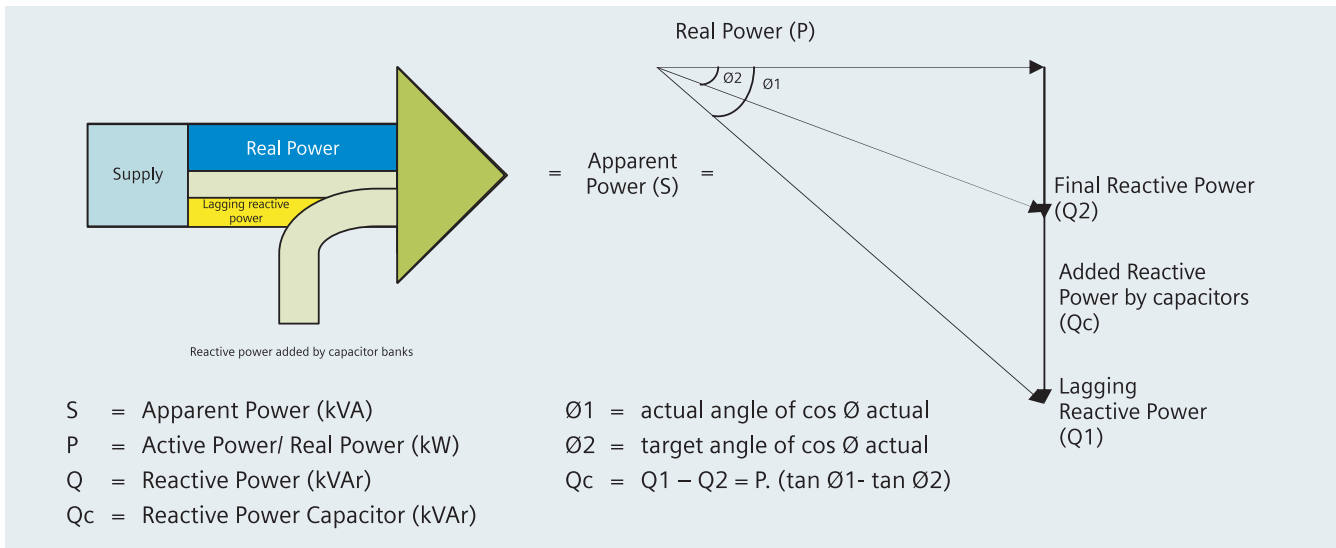
**Benefit of power factor correction**

- Enhancing power quality
- Improvement of power factor
- Saves costs and ensures a fast return on investment
- Reduction of reactive power in system
- Reduced voltage drops
- Reduced transmission losses
- Optimum cable design

**Power quality products**

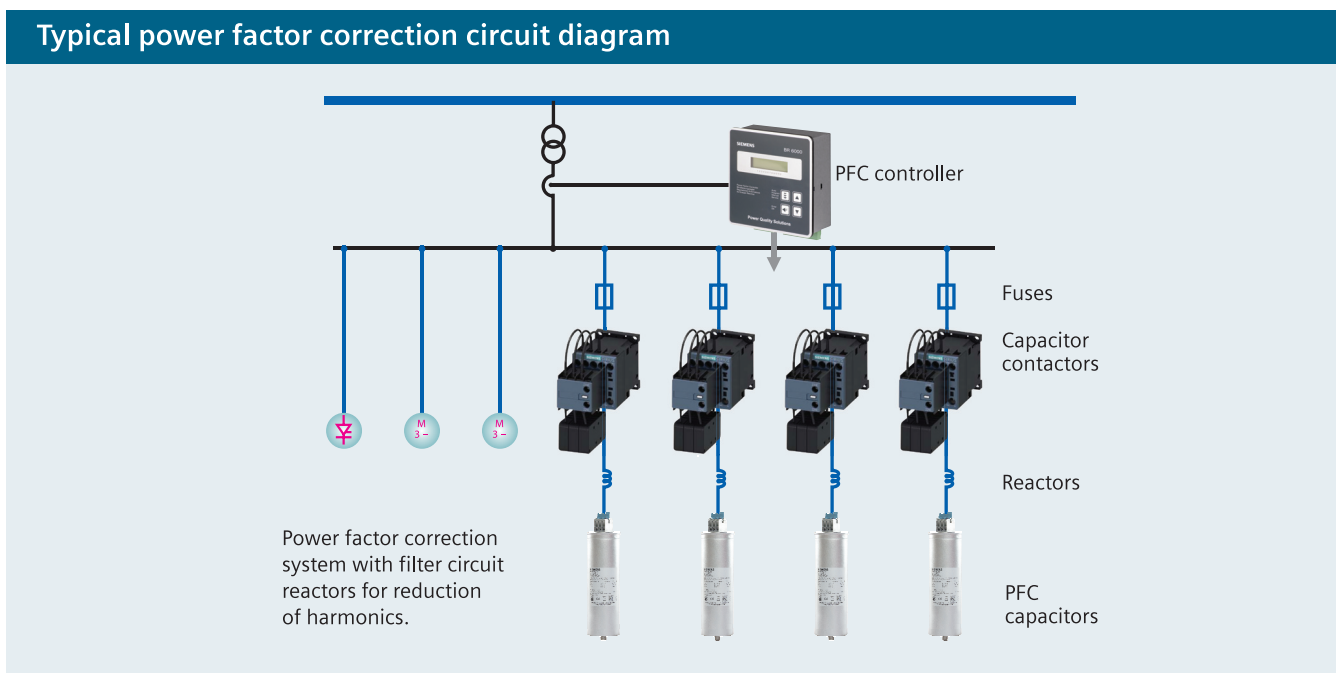
- Offer all key components from a single source
- Includes power factor controllers
- Multi measuring interfaces
- Capacitor contractors
- Discharge reactors

Incorporating power factor correction devices in the network help in generating leading reactive power to compensate lagging reactive power. This techniques help consumer to achieved power factor ( $\cos \theta$ ) close to unity. Picture 1



Picture 1

The capacitors connect can be fixed type for given fixed lagging pf of the system at a point in power system or variable in steps for a changing connected load. Picture 2



Picture 2

# LV Capacitors

## Capacitor

SIEMENS capacitor can withstand high inrush current caused while individual switching operation ( $>100IR$ ) as well while connected in parallel, i.e. as banks when the inrush current is increased to  $\geq 150 \cdot IR$ . The high inrush is because of the charging current comes from the power line as well as from other capacitor connected in parallel in the bank.

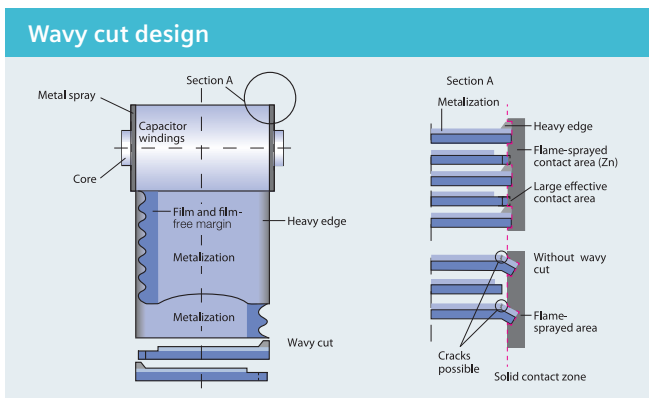
SIEMENS capacitor range broadly classified in two variants:



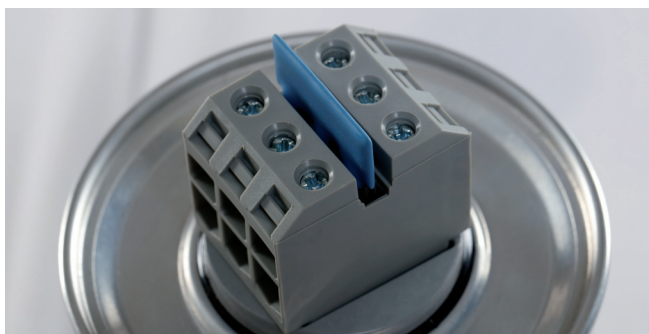
Siemens capacitor is based MPP technology [Metalized of Zinc Al alloy over Polypropylene dielectric] of film making with an impregnation of semi-dry biodegradable soft resin.

Special film-cutting technique (optimized combination of wavy and smooth cuts) & heavy edge and produces a maximum effective surface for the metal spraying or contacting process, Picture 3

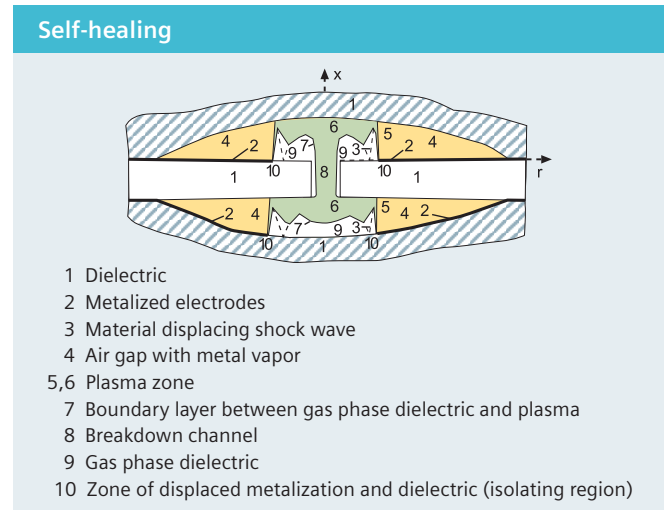
Siemens capacitors are most compact and light in weight



Picture 3



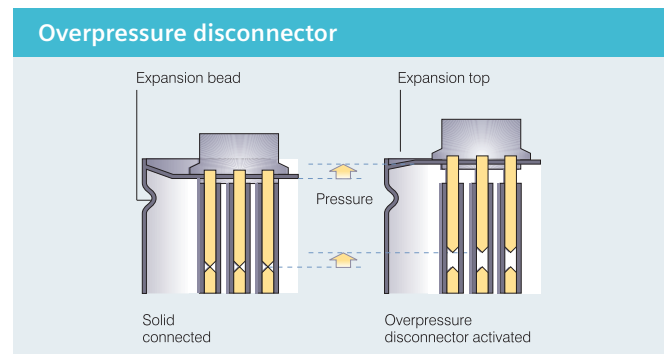
## Self-healing properties



Picture 4

In case of electrical overload the dielectric in the breakdown channel is broken down into highly compressed plasma that explodes out of the breakdown channel and pushes the dielectric layers apart. The discharge continues within the spreading plasma via the metal layers so that the metal surrounding the faulty area is completely burnt out. This produces perfect isolation of the faulty area within microseconds. The self-healing process results in negligible capacitance loss less than 100 pF per event. The capacitor remains fully functional during the entire process, Picture 4

## Overpressure disconnecter



Picture 5

At the end of the capacitor's service life or when a high pressure forms inside the can, the overpressure disconnecter is activated. The specially designed cover with an expansion bead moves upwards. Expansion beyond a certain degree will separate the wires and disconnect the capacitor safely from the line. The disconnecter is separated at its breakpoint (small notch) and the flow of current to the capacitor windings is interrupted. Picture 5

## Sigut terminals

Siemens capacitor comes with SIGUT terminal strip with electric shock protection (IP2X),

These terminal provides figure touch protection for users

These as well ensures reliable connection

# Premium Heavy Duty Cap

## Power Capacitors 3-phase, IP 20

### Overview

PremiumCap capacitors in cylindrical aluminum cases have been designed for power factor correction in low-voltage applications.

Loads like motors and transformers consume active power as well as reactive power.

Generators, supply cables and other electrical distribution equipment, in turn, should be relieved of reactive power.

The MKK (metalized plastic compact) AC series is intended to increase packing density per bank and cut component costs.

Improved thermal response and simplified installation are advantages of the cylindrical aluminum case.

### Benefits



- Compact design in cylindrical aluminum can with stud
- Concentric winding
- MKK-technology with wavy cut and heavy edge
- Voltage range 230 V ... 800 V
- Output range 5.0 kvar ... 36 kvar

### Applications

- Automatic PFC equipment, capacitor banks
- Individual fixed PFC (e.g. motors, transformers, lighting)
- Group fixed PFC
- Tuned and detuned capacitor banks
- Filter applications
- Dynamic PFC

### Electrical

- Longlife expectancy
- High pulse current withstand capability

### Mechanical and maintenance

- Reduced mounting costs
- Maintenance-free
- Highest packing density thanks to compact dimensions

### Safety

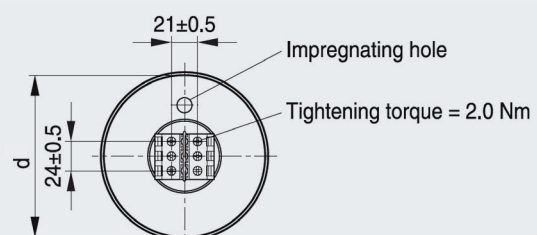
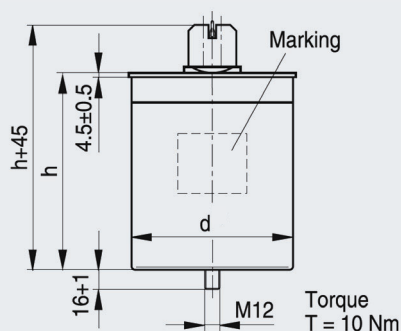
- Self-healing
- Overpressure disconnecter
- Shock hazard protected terminals
- Longterm approved
- cUL approval for B25667; for B25668 up to 690 V
- Ceramic discharge resistor pre-mounted

### Environmental

- Dry design, inert gas
- No oil leakage

### Dimensional drawings Note : h , d see dimension capacitors (DxH) in table (Page No.7)

#### Capacitor



## Technical specifications

Technical data and limit values		Heavy Duty Cap
<b>Standards IEC 60831-1+2, EN 60831-1+2, UL 810 5th edition</b>		
<b>Overvoltage</b>	$V_{max}$	VR + 10% (up to 8 h daily) / VR + 15% (up to 30 min daily) /VR + 20% (up to 5 min daily) / VR + 30% (up to 1 min daily)
<b>Overcurrent</b>	$I_{max}$	Up to $1.5 \cdot IR$ including combined effects of harmonics, overvoltages and capacitance tolerance
<b>Inrush current</b>	$I_s$	up to $300 \cdot IR$
<b>Losses</b> • Dielectric • Total		< 0.2 W/kvar < 0.45 W/kvar
<b>Rated frequency</b>	f	50/60 Hz
<b>Capacitance tolerance</b>		- 5% / +10%
<b>Test voltages, terminal / terminal</b>	$V_{TT}$	$2.15 \cdot VR1$ , AC, 10 s
<b>Test voltage, terminal / case</b>	$V_{TC}$	up to $VR \leq 660$ V: 3000 V AC, 10
<b>Mean life expectancy</b>	$t_{LD(CO)}$ up to 180 000 h up to 130 000 h	up to 180 000 h up to 130 000 h
<b>Ambient temperature</b>		-40/D; max. temp. 55 °C; max. mean 24 h = +45 °C; max. mean 1 year = 35 °C; lowest temperature = -25 °C
<b>Cooling</b>		natural or forced
<b>Humidity</b>	$H_{rel}$	max. 95%
<b>Altitude</b>		max. 4000 m above sea level
<b>Mounting position</b>		upright
<b>Mounting and grounding</b>		threaded M12 stud on bottom of case
<b>Safety</b>		dry technology Self-healing technology, overpressure disconnecter maximum allowed fault current 10,000 A in accordance with UL810 standard
<b>Discharge module</b>		Pre-mounted discharge module  external discharge module for > 660 V
<b>Case</b>		extruded aluminum can
<b>Enclosure</b>		IP20, indoor mounting (optionally with terminal cap for IP54)
<b>Dielectric</b>		polypropylene film
<b>Impregnation</b>		inert gas, Nitrogen (N2)
<b>Terminals</b>	25 mm <sup>2</sup> cable cross-section	safety terminal with(IP20),max.
<b>Certification</b>		-
<b>Number of switching operations</b> switchings per year according to IEC 60831-1+2		max. 5000