



**SquareCap PFC Capacitors**

SquareCap - ENDC

SquareCap - EHDLL

SquareCap - ESHDC



# SquareCap

New Range of Cost Effective PFC Capacitors with more options and enhanced performance

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## EPCOS SquareCap PFC Capacitor

While the electrical energy is getting more scarce and expensive in the developing countries, the need for power factor improvement by installing capacitors is well understood by the users.

The improved power factor means:

- Reduced line losses
- Improved voltage profile
- Reduced system current
- Reduced cable sizes
- Optimum usage of transformer
- Monetary saving.

We are pleased to offer an all New SquareCap Series of Power Factor Correction Capacitors with enhanced performance.

It helps you to achieve better economy by selecting an application specific capacitor type.

The SquareCap Capacitor series is now available in three designs viz.

**ENDC** : EPCOS Normal Duty Capacitor for normal inductive linear 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 and systems containing higher degree of harmonics.

SquareCap PFC Capacitors are ISI approved and comply with IS 13340 and latest IEC specifications.

Basic Construction of the Capacitor

### 1. Film

The three layer Metalized (Silver-Zinc-Alluminium) Polypropylene Film (MPP) with heavy edge is manufactured in-house on the latest technology machines. This gives advantages of higher stability obtained from Zinc and longer shelf life obtained from Alluminium. Heavy edge construction of the film provides a better bonding between electrode and metal endspray (scooping), thereby enabling an increase in current carrying capacity and ensuring better withstanding to the electro-mechanical stress that occurs due to switching surges.

### 2. Winding

The basic single phase capacitors are wound on computer controlled automatic winding machines and impregnated with polyurethane resin (dry technology). Thus ionisation and carona discharge are eliminated resulting in capacitors with highly stable characteristics and long life.

### 3. Safety Systems

**A)** Burst proof safety device -To prevent the capacitor from bursting in case of permanent breakdown caused by very high voltage in repetitive peaks and which can not be "self - healed" by the self-regenerative property, the capacitor is provided with a safety switching device, which disconnects the capacitor from the power source. When the internal pressure increases to an unsafe level it produces expansion of the bellow and snapping of the inner connection to the supply terminal, thereby cutting off the supply and avoiding possible bursting. (See Fig. A)

**B)** Self-healing property - if the dielectric breakdown strength is exceeded locally at weak points, at pores or impurities in the dielectric, a dielectric breakdown occurs. The energy released by the arc discharge in the breakdown channel is sufficient to totally evaporated the thin metal coating in the vicinity of the channel. The rapid expansion of the plasma in the breakdown channel causes it to cool within few microseconds, thus quenching the discharge. This results in formation of insulated region around the faulty area-

thus the capacitor regains its full operation ability. (See Fig.B)

**C)** Due to polyurethane resin filling and non use of oil or PCB there is no risk of fire caused by spurting or leaking oil. In ecologically sensitive applications this design (dry) is a must.

### 4) Modular Construction

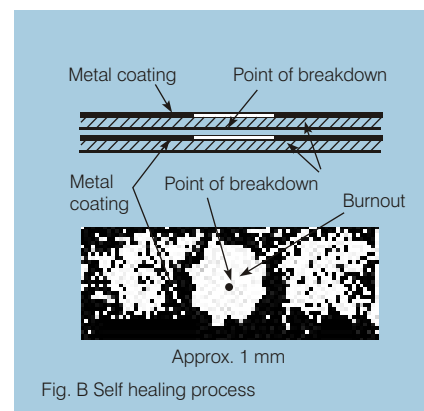
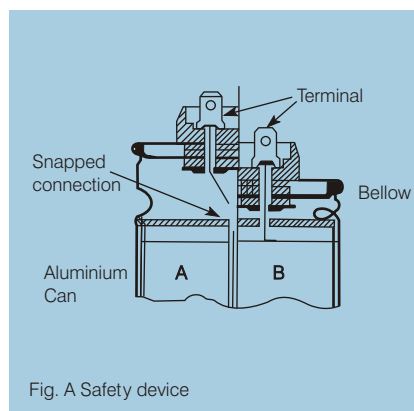
Single units in excess of 6KVAR are made up of the required number of basic single phase modules. These are housed in a single metallic container and are connected to the three terminals which are brought out through the terminal block. This construction enables easy and inexpensive repair at site and also considerably saves on spares inventory cost.

### 5. Inductor coil

For rating of 6KVAR and above each single phase capacitor module is provided with an inductor coil to control the inrush current to the capacitor, particularly in case of parallel switching and automatic control applications. This feature ensures long-term stability of KVAR output and extended life.

### 6. Discharge Resistor

All capacitors are provided with discharge resistors in order to discharge the capacitor to voltage less than 50Volts within one minute of disconnecting the supply. However, all capacitor terminals must be properly discharged before handling them.



## EPCOS Super Heavy Duty Capacitor (Double Dielectric Type):

These capacitors meet the demands of heavy duty industrial loads. These loads are of the type, rectifiers, arc or induction furnaces, large rolling mills, cement factories, textile spinning mills, welding divisions etc. The basic reason which makes these loads arduous in nature is that, each load gives rise to high over current or higher over voltage in an irregular manner. Rectifier load or arc furnace generates harmonic voltages which

would impose continuous and severe over current on capacitors.




In order to build up the correct degree of protection, a capacitor needs to be given a higher over current and also higher surge voltage withstand capacity. This dual consideration has been taken into account to evolve a different construction of capacitors. This design of the capacitors has been

evolved keeping in mind the basic simplicity of construction of primary MPP cell and its superiority in the capital and operating costs. The new design retains all these features and still raises by about a factor of two, over current as also the surge voltage withstand capacity making it a real Super Heavy Duty Capacitor.

Unit ratings are available from 1 to 50KVAR.

## Technical Data



	SquareCap (Normal Duty)	SquareCap (Heavy Duty Long Life)	SquareCap (Super Heavy Duty)
			
Parameter	SquareCap-ENDC (EPCOS Normal Duty Capacitor)	SquareCap-EHDLL (EPCOS Heavy Duty Long Life)	SquareCap-ESHDC (EPCOS Super Heavy Duty Capacitor)
Series Type	B32457N	B32459H	B32455A
Power-KVAr	1 to 60 KVAr	1 to 60 KVAr	1 to 50 KVAr
Rated Voltage-Vac	415, 440*	415, 440*	415, 440*
Frequency	50/60 Hz.	50/60Hz.	50/60Hz.
Transient Peak Current maximum permissible	100 x I <sub>n</sub> <sup>***</sup>	200 x I <sub>n</sub> <sup>***</sup>	300 x I <sub>n</sub> <sup>***</sup>
Temperature Category	-25° to 50°C	-25° to 50°C	-25° to 50°C
Losses (basic cell)	≤ 0.5 W/KVAr	≤ 0.5 W/KVAr	≤ 0.5 W/KVAr
Maximum Permissible Voltage	1.1 U <sub>n</sub> <sup>**</sup>	1.2 U <sub>n</sub> <sup>**</sup>	1.3 U <sub>n</sub> <sup>**</sup>
Maximum Permissible Current	1.3 I <sub>n</sub> <sup>***</sup>	1.4 I <sub>n</sub> <sup>***</sup>	1.5 I <sub>n</sub> <sup>***</sup>
Safety	Dry technology, overpressure Disconnecter, Self healing, Sheet metal enclosure	Dry technology, overpressure Disconnecter, Self healing Sheet metal enclosure	Dry technology, overpressure Disconnecter, Self healing Sheet metal enclosure
Impregnation	Non-PCB, PU resin	Non-PCB, PU resin	Non-PCB, PU resin
Useful Life	100,000 hours	125,000 hours	150,000 hours
Cooling	Natural	Natural	Natural
Case Shape/Finish	Rectangular/Powder coated Siemens Gray colour	Rectangular/Powder coated Siemens Gray colour	Rectangular/Powder coated Siemens Gray colour
Terminal	Threaded Stud Terminals	Threaded Stud Terminals with Ceramic bushings	Threaded Stud terminals with Ceramic bushings
Mounting and Grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding
Enclosure	IP41-fabricated sheet metal	IP41-fabricated sheet metal	IP41-fabricated sheet metal
Discharge resistor	Included	Included	Included
Connection	Delta	Delta	Delta
Casing of Capacitor cell	Extruded Aluminium (hermatically sealed)	Extruded Aluminium (hermatically sealed)	Extruded Aluminium (hermatically sealed)
Dielectric	Polypropylene film (Metallised)	Polypropylene film (Metallised)	Polypropylene film (Metallised)
No. of switching per annum	5000 nos as per IEC	5000 nos as per IEC	5000 nos as per IEC
Reference Standard	IEC 831-1+2,IS:13340	IEC 831-1+2,IS:13340	IEC 831-1+2,IS:13340

\*Other Voltages available on request.

\*\*Un: RMS Voltage, fundamental Frequency, no Harmonics.

\*\*\*In: RMS line Current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note: For capacitors with different features than above, please check with our nearest sales office.

# Option

## Technical Data



	SquareCap (Normal Duty)	SquareCap (Heavy Duty Long Life)	SquareCap (Super Heavy Duty)
			
Parameter	SquareCap-ENDC (EPCOS Normal Duty Capacitor)	SquareCap-EHDLL (EPCOS Heavy Duty Long Life)	SquareCap-ESHDC (EPCOS Super Heavy Duty Capacitor)
Series Type	B32457N	B32459H	B32455A
Power-KVAr	1 to 60 KVAr	1 to 60 KVAr	1 to 50 KVAr
Rated Voltage-Vac	415, 440*	415, 440*	415, 440*
Frequency	50/60 Hz.	50/60Hz.	50/60Hz.
Transient Peak Current maximum permissible	100 x I <sub>n</sub> <sup>***</sup>	200 x I <sub>n</sub> <sup>***</sup>	300 x I <sub>n</sub> <sup>***</sup>
Temperature Category	-25° to 50°C	-25° to 50°C	-25° to 50°C
Losses (basic cell)	≤ 0.5 W/KVAr	≤ 0.5 W/KVAr	≤ 0.5 W/KVAr
Maximum Permissible Voltage	1.1 U <sub>n</sub> <sup>**</sup>	1.2 U <sub>n</sub> <sup>**</sup>	1.3 U <sub>n</sub> <sup>**</sup>
Maximum Permissible Current	1.3 I <sub>n</sub> <sup>***</sup>	1.4 I <sub>n</sub> <sup>***</sup>	1.5 I <sub>n</sub> <sup>***</sup>
Safety	Dry technology, overpressure Disconnecter, Self healing, Sheet metal enclosure	Dry technology, overpressure Disconnecter, Self healing Sheet metal enclosure	Dry technology, overpressure Disconnecter, Self healing Sheet metal enclosure
Impregnation	Non-PCB, PU resin	Non-PCB, PU resin	Non-PCB, PU resin
Useful Life	100,000 hours	125,000 hours	150,000 hours
Cooling	Natural	Natural	Natural
Case Shape/Finish	Rectangular/Powder coated Siemens Gray colour	Rectangular/Powder coated Siemens Gray colour	Rectangular/Powder coated Siemens Gray colour
Terminal	Threaded Stud Terminals	Threaded Stud Terminals with Ceramic bushings	Threaded Stud terminals with Ceramic bushings
Mounting and Grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding	Self standing with mounting plates and screws for grounding
Enclosure	IP41-fabricated sheet metal	IP41-fabricated sheet metal	IP41-fabricated sheet metal
Discharge resistor	Included	Included	Included
Connection	Delta	Delta	Delta
Casing of Capacitor cell	Extruded Aluminium (hermatically sealed)	Extruded Aluminium (hermatically sealed)	Extruded Aluminium (hermatically sealed)
Dielectric	Polypropylene film (Metallised)	Polypropylene film (Metallised)	Polypropylene film (Metallised)
No. of switching per annum	5000 nos as per IEC	5000 nos as per IEC	5000 nos as per IEC
Reference Standard	IEC 831-1+2,IS:13340	IEC 831-1+2,IS:13340	IEC 831-1+2,IS:13340

\*Other Voltages available on request.

\*\*Un: RMS Voltage, fundamental Frequency, no Harmonics.

\*\*\*In: RMS line Current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note: For capacitors with different features than above, please check with our nearest sales office.

## Overall Dimensions and Current of Three-phase Capacitors: 50 Hz, delta connection

Output $Q_n$ KVar	415v		440v		SquareCap Normal Duty (ENDC)		SquareCap Havy Duty Long Life (EHDLL)		SquareCap Super Heavy Duty (ESHDC)	
	Current $I_n$ amps	Cn $\mu F$	Current $I_n$ amps	Cn $\mu F$	Dimensions of module in mm H x W x D	Ordering Code* (for 440V) Series type <b>B32457N..</b>	Dimensions of module in mm H x W x D	Ordering Code* (for 440V) Series type <b>B32459H..</b>	Dimensions of module in mm H x W x D	Ordering Code* (for 440V) Series type <b>B32455A..</b>
1	1.39	3 x 6.3	1.31	3 x 5.5	170 x 125 x 45	..5001T011	170 x 125 x 45	.. 5001J011	265 x 185 x 60	.. 5001J011
2	2.78	3 x 12.5	2.62	3 x 11	170 x 125 x 45	..5002T011	170 x 125 x 45	.. 5002T011	265 x 185 x 60	.. 5002T011
3	4.17	3 x 19	3.93	3 x 16.5	240 x 185 x 60	..5003T011	240 x 185 x 60	.. 5003J011	325 x 240 x 80	.. 5003J011
4	5.56	3 x 25	5.24	3 x 22	240 x 185 x 60	..5004J011	240 x 185 x 60	.. 5004J011	325 x 240 x 80	.. 5004J011
5	6.95	3 x 31.5	6.55	3 x 27.5	240 x 185 x 60	..5005J011	240 x 185 x 60	.. 5005J011	325 x 240 x 80	.. 5005J011
7.5	10.43	3 x 46.5	9.83	3 x 41.5	325 x 210 x 70	..5007T511	325 x 240 x 80	.. 5007J511	425 x 240 x 80	.. 5007T511
10	13.09	3 x 62	13.01	3 x 55	325 x 240 x 80	..5010T011	325 x 240 x 80	.. 5010T011	425 x 240 x 80	.. 5010T011
12.5	17.04	3 x 77	16.04	3 x 69	325 x 240 x 80	..5012T511	325 x 240 x 80	.. 5012T511	425 x 240 x 80	.. 5012T511
15	20.09	3 x 93	19.07	3 x 83	325 x 240 x 80	..5015T011	325 x 240 x 80	.. 5015T011	425 x 250 x 165	.. 5015T011
20	27.08	6 x 62	26.02	6 x 55	325 x 240 x 160	..5020T011	325 x 240 x 160	.. 5020T011	425 x 250 x 165	.. 5020T011
25	34.08	6 x 77	32.08	6 x 69	325 x 240 x 160	..5025J011	325 x 240 x 160	.. 5025T011	425 x 250 x 165	.. 5025T011
50	69.05	12 x 77	65.05	12 x 69	375 x 240 x 320	..5050T011	375 x 240 x 320	.. 5050T011	480 x 250 x 325	.. 5050T011

\*The complete ordering code is formulated by writing the ordering code of a desired rating in continuation with the Series type starting with 'B' eg.  
25Kvar / 440V SquareCap Heavy Duty Long Life will have ordering product code as B32459H5025T011.  
Note: Please check with our sales office or channel partners for the ratings other than stated above

### Recommended size/rating for accessories (cables, fuses and switch gear) for use with 415/440 VAC, 50 cycles, three-phase delta-connected PFC capacitors

Output $Q_n$ KVar	Rated Current $I_n$		Switch rating (A)	HRC Fuse rating (A)	Cu cable $mm^2$	Al cable $mm^2$
	415 V	440 V				
1	1.4	1.3	16	4	0.75	1.5
2	2.8	2.6	16	4	0.75	1.5
3	4.2	3.9	16	16	1.5	1.5
4	5.6	5.2	16	16	1.5	1.5
5	7	6.5	16	16	2.5	4
6	8.4	7.8	32	16	2.5	4
7	9.8	9.1	32	16	2.5	4
8	11.2	10.4	32	25	2.5	4
9	12.5	11.7	32	25	4	6
10	14	13	32	25	4	6
12.5	17.5	16.3	32	35	6	10
15	21	19.5	63	35	6	10
20	28	26	63	50	10	16
25	35	32.5	63	63	16	25
30	42	39	100	80	25	35
40	56	52	125	100	35	70
45	63	58.5	125	125	35	70
50	70	65	160	125	50	95
60	84	78	200/250	160	50	95
75	105	97.5	200/250	160	70	185
100	140	130	300	200	120	240

Authorized Dealer

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### EPCOS India Pvt. Ltd.

#### Corporate Office:

Bangalore Tel: 080-2555 9640-41. Fax: 080 - 2555 9645.  
Email : eiplsales@epcos.com

www.epcos.com

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#### Regional Offices:

South: Bangalore Tel: 080 - 2555 9640-41. Fax: 080 - 2555 9645.  
North: Delhi Tel: 011 - 2370 4143/45. Fax: 011 - 2370 4146.  
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