

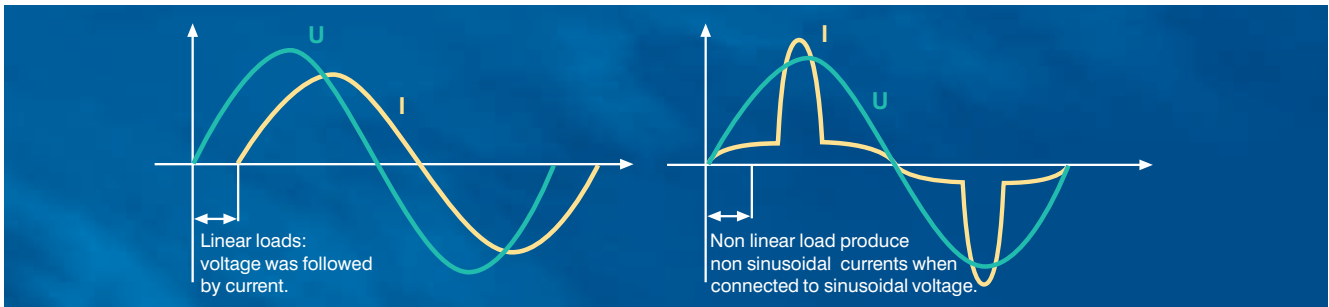
EPCOS Product Profile (India) 2013

# Power Factor Correction

Power Quality Solutions



# Preview



## General

The increasing demand of electrical power and the awareness of the necessity of energy saving is very up to date these days. Also the awareness of power quality is increasing, and power factor correction (PFC) and harmonic filtering will be implemented on a growing scale. Enhancing power quality – improvement of power factor – saves costs and ensures a fast return on investment. In power distribution, in low- and medium-voltage networks, PFC focuses on the power flow ( $\cos \varphi$ ) and the optimization of voltage stability by generating reactive power – to improve voltage quality and reliability at distribution level.

## How reactive power is generated

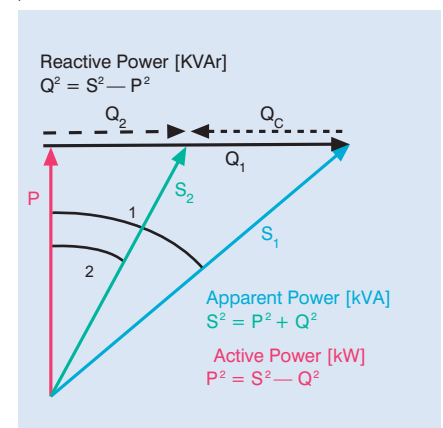
Every electric load that works with magnetic fields (motors, chokes, transformers, inductive heating, arc welding, generators) produces a varying degree of electrical lag, which is called inductance. This lag of inductive loads maintains the current sense (e.g. positive) for a time even though the negative-going voltage tries to reverse it. This phase shift between current and voltage is maintained, current and voltage having opposite signs. During this time, negative power or energy is produced and fed back into the network. When current and voltage have the same sign again, the same amount of energy is again needed to build up the magnetic fields in inductive loads. This magnetic reversal energy is called reactive power.

In AC networks (50/60 Hz) such a process is repeated 50 or 60 times a second. So an obvious solution is to briefly store the magnetic reversal energy in capacitors and relieve the network (supply line) of this reactive energy. For this reason, automatic

reactive power compensation systems (detuned /conventional) are installed for larger loads like industrial machinery. Such systems consist of a group of capacitor units that can be cut in and cut out and which are driven and switched by a power factor controller.

$$\begin{aligned} \text{Apparent power } S &= \sqrt{P^2 + Q^2} \\ \text{Active power } P &= S \cdot \cos \varphi \\ \text{Reactive power } Q &= S \cdot \sin \varphi \end{aligned}$$

With power factor correction the apparent power S can be decreased by reducing the reactive power Q.



## Power factor

### Low power factor ( $\cos \varphi$ )

Low  $\cos \varphi$  results in

- Higher energy consumption and costs,
- Less power distributed via the network,
- Power loss in the network,
- Higher transformer losses,
- Increased voltage drop in power distribution networks.

## Power factor improvement

Power factor improvement can be achieved by

- Compensation of reactive power with capacitors,
- Active compensation – using semiconductors,
- Overexcited synchronous machine (motor /generator).

## Types of PFC

### (detuned or conventional)

- individual or fixed compensation (each reactive power producer is individually compensated),
- group compensation (reactive power producers connected as a group and compensated as a whole),
- central or automatic compensation (by a PFC system at a central point),
- mixed compensation.

# Preview



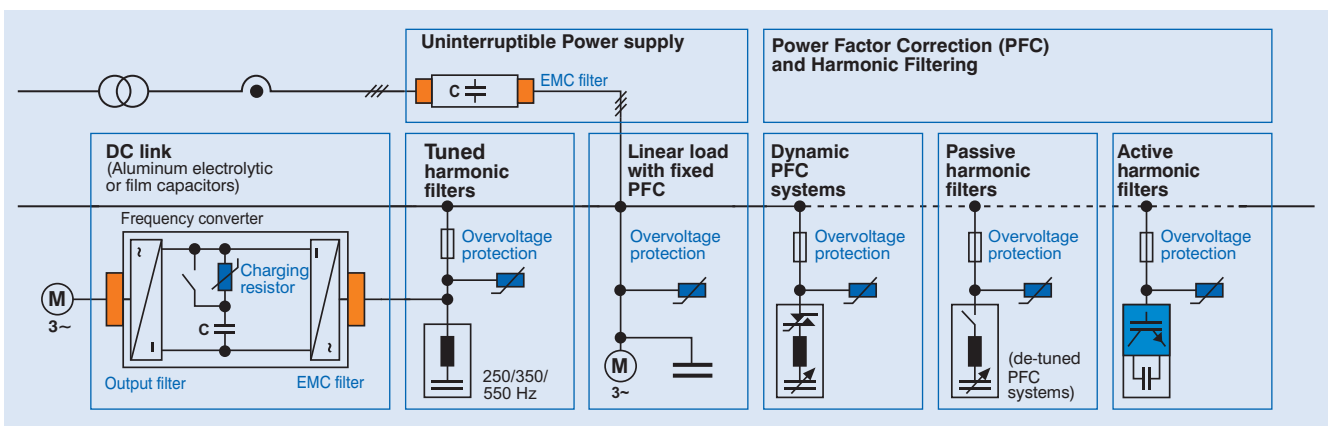
## Power Quality Solution strategy

Along with the emerging demand for power quality and a growing awareness of the need for environmental protection, the complexity in the energy market is increasing: users and decision-makers are consequently finding it increasingly difficult to locate the best product on the market and to make objective decisions. It is in most cases not fruitful to compare catalogs and data sheets, as many of their parameters are identical in line with the relevant standards. Thus operating times are specified on the basis of

tests under laboratory conditions that may differ significantly from the reality in the field. In addition, load structures have changed from being mainly linear in the past to non-linear today. All this produces a clear trend: the market is calling increasingly for customized solutions rather than off-the-shelf products. This is where Power Quality Solutions come into the picture. It offers all key components for an effective PFC system from a single source, together with:

- Application know-how
- Technical skills
- Extensive experience in the field of power quality improvement
- A worldwide network of partners
- Continuous development
- Sharing of information

These are the cornerstones on which Power Quality Solutions are built. On the basis of this strategy, EPCOS is not only the leading manufacturer of power capacitors for PFC applications but also a PQS supplier with a century of field experience, reputation and reliability.



# PFC Capacitor Series Overview



PFC Capacitor series for power factor correction capacitors			
<b>SquareCap-ENDC</b>		<b>B32457L . . .</b>	
<b>Power</b>	KVAr	1...50.0	
<b>Voltage range</b>	V	415...440 V*	
<b>Frequency</b>	Hz	50 Hz	
<b>Impregnation</b>		Non-PCB, semi-dry biodegradable resin	
<b>Life expectancy</b>	Hrs	Up to 100 000 hours	
<b>Inrush current</b>	A	200 • I <sub>R</sub>	
<b>SquareCap-EHDLL</b>		<b>B32459L . . .</b>	
<b>Power</b>	KVAr	1...60.0	
<b>Voltage range</b>	V	415...525 V*	
<b>Frequency</b>	Hz	50 Hz	
<b>Impregnation</b>		Non-PCB, semi-dry biodegradable resin	
<b>Life expectancy</b>	Hrs	Up to 125 000 hours	
<b>Inrush current</b>	A	250 • I <sub>R</sub>	
<b>SquareCap-ESHDC</b>		<b>B32455L . . .</b>	
<b>Power</b>	KVAr	1...50.0	
<b>Voltage range</b>	V	415...525 V*	
<b>Frequency</b>	Hz	50 Hz	
<b>Impregnation</b>		Non-PCB, semi-dry biodegradable resin	
<b>Life expectancy</b>	Hrs	Up to 150 000 hours	
<b>Inrush current</b>	A	350 • I <sub>R</sub>	
<b>LT-APP</b>		<b>B25160 . . .</b>	
<b>Power</b>	KVAr	1...100	
<b>Voltage range</b>	V	415...525 V*	
<b>Frequency</b>	Hz	50 Hz/ 60Hz	
<b>Impregnation</b>		Non PCB, biodegradable oil	
<b>Life expectancy</b>	Hrs	Up to 300 000 hours	
<b>Inrush current</b>	A	(400 to 500) • I <sub>R</sub>	

\*Other voltages on request.

# Important Notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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# SquareCap PFC Capacitors

Semi-dry biodegradable resin • Modular construction • Triple safety system



## General

The SquareCap box type capacitor is self standing in nature and is having modular construction (above 6KVAR) in a sheet metal enclosure.

It is a very popular capacitor design in India for many decades.

The SquareCap series is especially intended for use in industrial applications and locations such as commercial complexes, malls etc. The internal construction comprises of single phase basic capacitors cells connected to form delta construction externally within the enclosure. The terminal arrangement is of stud type.

SquareCap series is 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. (Preferably with detuning reactor).

**ESHDC:** EPCOS Super Heavy Duty Capacitor for non linear arduous and fluctuating loads and systems containing higher degree of harmonics. (Preferably with detuning reactor).



## Applications

- Stand alone capacitors (Fixed Compensation)
- Capacitor banks
- Detuned capacitor banks
- Dynamic PFC

## Features

- Box Type self standing Design
- Voltage Range: 415V .... 525V
- Range: 1kVAR to 60kVAR
- Resin Impregnated
- Available in three designs Viz. ENDC, EHDLL and ESHDC

## Mechanical and maintenance

- Reduced mounting costs
- Maintenance-free

## Electrical

- High pulse current withstand capability
- Very high life expectancy

## Safety

- Self-healing
- Overpressure disconnecter
- Sheet metal enclosure

# SquareCap PFC Capacitors

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Technical data : SquareCap PFC Capacitors			
	SquareCap-ENDC	SquareCap-EHDLL	SquareCap-ESHDC
Series type	B32457L	B32459L	B32455L
Power-KVAr	1...50 KVAr	1...50 KVAr	1...50 KVAr
Rated voltage-V (AC)	415...440 V*	415...525 V*	415...525 V*
Frequency	50 Hz	50 Hz	50 Hz
Transient peak current maximum permissible	upto 200 • I <sub>R</sub>	upto 250 • I <sub>R</sub>	upto 350 • I <sub>R</sub>
Maximum permissible temperature category	-10/D	-10/D	-10/D
Losses (without discharge resistors)	0.5 W/KVAr	0.5 W/KVAr	0.5 W/KVAr
Maximum permissible voltage	V <sub>R</sub> +10%(up to 8 h daily)/ V <sub>R</sub> +15% (up to 30 min daily)** V <sub>R</sub> +20%(up to 5 min daily)/ V <sub>R</sub> +30% (up to 1 min daily)**	V <sub>R</sub> +10%(up to 8 h daily)/ V <sub>R</sub> +15% (up to 30 min daily)** V <sub>R</sub> +20%(up to 5 min daily)/ V <sub>R</sub> +30% (up to 1 min daily)**	V <sub>R</sub> +10%(up to 8 h daily)/ V <sub>R</sub> +15% (up to 30 min daily)** V <sub>R</sub> +20%(up to 5 min daily)/ V <sub>R</sub> +30% (up to 1 min daily)**
Maximum permissible current	1.3 • I <sub>R</sub> ***	1.5 • I <sub>R</sub> ***	1.6 • I <sub>R</sub> ***
Safety	Self-healing, overpressure disconnecter	Self-healing, overpressure disconnecter	Self-healing, overpressure disconnecter
Impregnation	Non PCB, semi-dry biodegradable resin	Non PCB, semi-dry biodegradable resin	Non PCB, semi-dry biodegradable resin
Life expectancy	Up to 100 000 hours	Up to 125 000 hours	Up to 150 000 hours
Cooling	Natural or forced	Natural or forced	Natural or forced
Case shape/finish	Rectangular/powder coated Siemens grey colour	Rectangular/powder coated Siemens grey colour	Rectangular/powder coated Siemens grey colour
Terminal	Threaded stud terminals with ceramic bushing	Threaded stud terminals with ceramic bushing	Threaded stud terminals with ceramic bushing
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	IP 20	IP 20	IP 20
Discharge resistor	PCB mounted -included	PCB mounted -Included	PCB mounted -included
Connection	Delta	Delta	Delta
Casing of capacitor cell	Extruded aluminium can (hermetically sealed)	Extruded aluminium can (hermetically sealed)	Extruded aluminium can (hermetically sealed)
Dielectric	Polypropylene film (metallised)	Polypropylene film (metallised)	Polypropylene film (metallised)
No. of switching per annum	Max. 5000 switching	Max. 6000 switching	Max. 7500 switching
Reference standard	IS: 13340/41 (ISI mark applicable for 415 and 440V)	IS: 13340/41 (ISI mark applicable for 415 and 440V)	IS: 13340/41 (ISI mark applicable for 415 and 440V)

\* other voltages available on request

\*\* V<sub>R</sub> rated voltage

\*\*\* I<sub>R</sub> : RMS line current that occurs at rated sinusoidal voltage and rated frequency, excluding transients.

Note : for capacitors with different features/parameters than above, please check with our nearest sales office

# SquareCap PFC Capacitors

Semi-dry biodegradable resin • Modular construction • Triple safety system



SquareCap ENDC Capacitors - 3 Phase								
Rating KVAR	Voltage V (AC)	Material code	I <sub>r</sub> A	C <sub>N</sub> F (Basic cells x F)	H x W x D mm	Packing units	MOQ	Approx. weight Kg
<b>SquareCap ENDC - 415 V(AC) 3PH, 50Hz (Series B32457)</b>								
1	415	B32457P4001A 11	1.3	3 x 6.3	95 x 125 x 45	1	25	0.8
2	415	B32457P4002A 11	2.7	3 x 12.5	120 x 125 x 45	1	25	0.8
3	415	B32457P4003A 11	4.1	3 x 19	120 x 145 x 55	1	25	1.4
4	415	B32457P4004A 11	5.5	3 x 25	140 x 145 x 55	1	25	1.5
5	415	B32457L4005A 11	6.9	3 x 31	215 x 185 x 60	1	1	1.6
6	415	B32457L4006A 11	8.3	3 x 37.5	300 x 240 x 80	1	1	2.4
7	415	B32457L4007A 11	9.7	3 x 44	300 x 240 x 80	1	1	2.6
7.5	415	B32457L4007A511	10.4	3 x 46.5	300 x 240 x 80	1	1	2.7
8	415	B32457L4008A 11	11.1	3 x 49.5	300 x 240 x 80	1	1	2.8
9	415	B32457L4009A 11	12.5	3 x 56	300 x 240 x 80	1	1	3.0
10	415	B32457L4010A 11	13.9	3 x 62	300 x 240 x 80	1	1	3.1
12.5	415	B32457L4012A511	17.3	3 x 77	300 x 240 x 80	1	1	3.6
15	415	B32457L4015A 11	20.8	3 x 92.5	300 x 240 x 80	1	1	3.8
20	415	B32457L4020A 11	27.8	6 x 62	300 x 240 x 160	1	1	6.5
25	415	B32457L4025A 11	34.7	6 x 77	300 x 240 x 160	1	1	7.2
30	415	B32457L4030A 11	41.7	6 x 92.5	300 x 240 x 160	1	1	7.9
50	415	B32457L4050A 11	69.5	12 x 77	350 x 240 x 320	1	1	12.5
<b>SquareCap ENDC - 440 V(AC) 3PH, 50Hz (Series B32457)</b>								
1	440	B32457P5001A 11	1.3	3 x 5.5	95 x 125 x 45	1	25	0.8
2	440	B32457P5002A 11	2.6	3 x 11	120 x 125 x 45	1	25	0.8
3	440	B32457P5003A 11	3.9	3 x 16.5	120 x 145 x 55	1	25	1.4
4	440	B32457P5004A 11	5.2	3 x 22	140 x 145 x 55	1	25	1.5
5	440	B32457L5005A 11	6.6	3 x 27.5	215 x 185 x 60	1	1	1.6
6	440	B32457L5006A 11	7.9	3 x 33	300 x 240 x 80	1	1	2.2
7	440	B32457L5007A 11	9.2	3 x 38.5	300 x 240 x 80	1	1	2.4
7.5	440	B32457L5007A511	9.84	3 x 41.5	300 x 240 x 80	1	1	2.5
8	440	B32457L5008A 11	10.5	3 x 44	300 x 240 x 80	1	1	2.6
9	440	B32457L5009A 11	11.8	3 x 49.5	300 x 240 x 80	1	1	2.8
10	440	B32457L5010A 11	13.1	3 x 55	300 x 240 x 80	1	1	3.0
12	440	B32457L5012A 11	15.7	3 x 66	300 x 240 x 80	1	1	3.2
12.5	440	B32457L5012A511	16.4	3 x 69	300 x 240 x 80	1	1	3.3
15	440	B32457L5015A 11	19.6	3 x 82.5	300 x 240 x 80	1	1	3.8
20	440	B32457L5020A 11	26.2	6 x 55	300 x 240 x 160	1	1	6.1
25	440	B32457L5025A 11	32.8	6 x 69	300 x 240 x 160	1	1	7.0
35	440	B32457L5035A 11	45.9	12 x 48	350 x 240 x 320	1	1	8.0
40	440	B32457L5040A 11	52.5	12 x 54.8	350 x 240 x 320	1	1	8.8
50	440	B32457L5050A 11	65.6	12 x 69	350 x 240 x 320	1	1	12.4



# SquareCap PFC Capacitors

Semi-dry biodegradable resin • Modular construction • Triple safety system



SquareCap EHDLL Capacitors - 3 Phase								
Rating KVAR	Voltage V (AC)	Material code	I <sub>R</sub> A	C <sub>N</sub> F (Basic cells x F)	H x W x D mm	Packing units	MOQ	Approx. weight Kg
<b>SquareCap EHDLL - 415 V(AC) 3PH, 50Hz (Series B32459)</b>								
1	415	B32459L4001A 11	1.3	3 x 6.3	170 x 125 x 45	1	20	1.0
2	415	B32459L4002A 11	2.7	3 x 12.5	170 x 125 x 45	1	20	1.1
3	415	B32459L4003A 11	4.1	3 x 19	215 x 185 x 60	1	20	1.5
4	415	B32459L4004A 11	5.5	3 x 25	215 x 185 x 60	1	20	1.6
5	415	B32459L4005A 11	7.0	3 x 31	215 x 185 x 60	1	1	1.8
7	415	B32459L4007A 11	10.4	3 x 46.5	300 x 240 x 80	1	1	3.2
7.5	415	B32459L4007A511	10.4	3 x 49.5	300 x 240 x 80	1	1	3.3
10	415	B32459L4010A 11	13.9	3 x 62	300 x 240 x 80	1	1	3.4
12.5	415	B32459L4012A511	17.3	3 x 77	300 x 240 x 80	1	1	3.5
15	415	B32459L4015A 11	20.8	3 x 92	300 x 240 x 80	1	1	4.0
20	415	B32459L4020A 11	27.8	6 x 62	300 x 240 x 160	1	1	6.1
25	415	B32459L4025A 11	34.7	6 x 77	300 x 240 x 160	1	1	6.5
30	415	B32459L4030A 11	41.7	6 x 92.4	300 x 240 x 160	1	1	7.5
40	415	B32459L4040A 11	55.6	12 x 61.6	350 x 240 x 320	1	1	11.0
50	415	B32459L4050A 11	69.5	12 x 77	350 x 240 x 320	1	1	11.8
<b>SquareCap EHDLL - 440 V(AC) 3PH, 50Hz (Series B32459)</b>								
1	440	B32459L5001A 11	1.3	3 x 5.5	170 x 125 x 45	1	20	0.9
2	440	B32459L5002A 11	2.6	3 x 11	170 x 125 x 45	1	20	0.9
3	440	B32459L5003A 11	3.9	3 x 16.5	215 x 185 x 60	1	20	1.5
4	440	B32459L5004A 11	5.2	3 x 22	215 x 185 x 60	1	20	1.5
5	440	B32459L5005A 11	6.5	3 x 27.5	215 x 185 x 60	1	1	1.6
6	440	B32459L5006A 11	7.9	3 x 33	300 x 240 x 80	1	1	2.7
7	440	B32459L5007A 11	9.2	3 x 38.5	300 x 240 x 80	1	1	3.0
7.5	440	B32459L5007A511	9.8	3 x 41.5	300 x 240 x 80	1	1	3.0
8	440	B32459L5008A 11	10.5	3 x 44	300 x 240 x 80	1	1	3.2
9	440	B32459L5009A 11	11.8	3 x 50	300 x 240 x 80	1	1	3.3
10	440	B32459L5010A 11	13.1	3 x 55	300 x 240 x 80	1	1	3.3
12	440	B32459L5012A 11	15.8	3 x 67.5	300 x 240 x 80	1	1	3.4
12.5	440	B32459L5012A511	16.4	3 x 69	300 x 240 x 80	1	1	3.4
15	440	B32459L5015A 11	19.6	3 x 82.5	300 x 240 x 80	1	1	3.5
20	440	B32459L5020A 11	26.2	6 x 55	300 x 240 x 160	1	1	6.1
25	440	B32459L5025A 11	32.8	6 x 69	300 x 240 x 160	1	1	6.3
30	440	B32459L5030A 11	39.4	6 x 82.2	300 x 240 x 160	1	1	6.5
40	440	B32459L5040A 11	52.5	12 x 54.8	350 x 240 x 320	1	1	11.0
50	440	B32459L5050A 11	65.6	12 x 69	350 x 240 x 320	1	1	12.1
60	440	B32459L5060A 11	78.7	12 x 82.2	350 x 240 x 320	1	1	12.1

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SquareCap EHDLL Capacitors - 3 Phase								
Rating KVAR	Voltage V (AC)	Material code	I <sub>r</sub> A	C <sub>N</sub> F (Basic cells x F)	H x W x D mm	Packing units	MOQ	Approx. weight
<b>SquareCap EHDLL - 480 V(AC) 3PH, 50Hz (Series B32459)</b>								
5	480	B32459L8005A 61	6.0	3 x 23	215 x 185 x 60	1	1	1.8
5.5	480	B32459L8005A561	6.6	3 x 25.3	215 x 185 x 60	1	1	2.3
6	480	B32459L8006A 61	7.2	3 x 28	300 x 240 x 80	1	1	2.6
7.5	480	B32459L8007A561	9.0	3 x 34.5	300 x 240 x 80	1	1	2.8
8.3	480	B32459L8008A361	10	3 x 38.2	300 x 240 x 80	1	1	2.9
9	480	B32459L8009A 61	10.8	3 x 41.5	300 x 240 x 80	1	1	3.0
10	480	B32459L8010A 61	12.0	3 x 46.5	300 x 240 x 80	1	1	3.1
11.1	480	B32459L8011A161	13.4	3 x 51.1	300 x 240 x 80	1	1	3.2
12	480	B32459L8012A 61	14.4	3 x 55.5	300 x 240 x 80	1	1	3.3
12.5	480	B32459L8012A561	14.4	3 x 58	300 x 240 x 80	1	1	3.3
13.8	480	B32459L8013A861	16.6	3 x 63.6	300 x 240 x 80	1	1	3.4
14.5	480	B32459L8014A561	17.4	3 x 67.5	300 x 240 x 80	1	1	3.4
15	480	B32459L8015A 61	18.0	3 x 69	300 x 240 x 80	1	1	3.5
16.6	480	B32459L8016A661	20	3 x 76.4	300 x 240 x 160	1	1	3.5
18	480	B32459L8018A 61	21.6	6 x 41.5	300 x 240 x 160	1	1	5.8
20	480	B32459L8020A 61	24.0	6 x 46.5	300 x 240 x 160	1	1	6.0
22.1	480	B32459L8022A161	26.6	6 x 51.1	300 x 240 x 160	1	1	6.2
25	480	B32459L8025A 61	30.0	6 x 58	300 x 240 x 160	1	1	6.3
27.7	480	B32459L8027A761	33.3	6 x 63.6	300 x 240 x 160	1	1	6.5
29	480	B32459L8029A 61	34.8	6 x 67.5	300 x 240 x 160	1	1	6.7
50	480	B32459L8050A 61	60.1	12 x 58	350 x 240 x 320	1	1	11.2
55	480	B32459L8055A 61	66.1	12 x 63.5	350 x 240 x 320	1	1	11.4
<b>SquareCap EHDLL - 525 V(AC) 3PH, 50Hz (Series B32459)</b>								
6.6	525	B32459L6006A611	7.3	3 x 25.4	300 x 240 x 80	1	1	1.8
10	525	B32459L6010A 11	11	3 x 38.5	300 x 240 x 80	1	1	3.0
12.5	525	B32459L6012A511	13.7	3 x 48	300 x 240 x 80	1	1	3.2
13.2	525	B32459L6013A211	14.5	3 x 50.8	300 x 240 x 80	1	1	3.3
15	525	B32459L6015A 11	16.5	3 x 58	300 x 240 x 80	1	1	3.4
16.6	525	B32459L6016A611	18.3	3 x 63.9	300 x 240 x 160	1	1	3.5
19.9	525	B32459L6019A911	22	3 x 76.6	300 x 240 x 160	1	1	3.6
20	525	B32459L6020A 11	21.9	6 x 38.5	300 x 240 x 160	1	1	5.8
25	525	B32459L6025A 11	27.4	6 x 48	300 x 240 x 160	1	1	6.5
26.5	525	B32459L6026A511	29.1	6 x 50.8	300 x 240 x 160	1	1	6.5
30	525	B32459L6030A 11	32.9	6 x 58	300 x 240 x 160	1	1	6.8
33.1	525	B32459L6033A111	36.4	6 x 63.9	300 x 240 x 160	1	1	7.0
50	525	B32459L6050A 11	55	12 x 48	350 x 240 x 320	1	1	11.0

# SquareCap PFC Capacitors

Semi-dry biodegradable resin • Modular construction • Triple safety system



SquareCap ESHDC Capacitors - 3 Phase								
Rating KVAR	Voltage V (AC)	Material code	I <sub>r</sub> A	C <sub>n</sub> F (Basic cells x F)	H x W x D mm	Packing units	MOQ	Approx. weight Kg
<b>SquareCap ESHDC - 415 V(AC) 3PH, 50Hz(Series B32455)</b>								
1	415	B32455L4001A 11	1.3	3 x 6.5	270 x 170 x 55	1	10	2.1
2	415	B32455L4002A 11	2.7	3 x 12.5	270 x 170 x 55	1	10	2.1
3	415	B32455L4003A 11	4.1	3 x 19	300 x 240 x 80	1	10	2.8
4	415	B32455L4004A 11	5.5	3 x 25	300 x 240 x 80	1	10	2.9
5	415	B32455L4005A 11	6.9	3 x 31	300 x 240 x 80	1	1	3.2
7.5	415	B32455L4007A511	10.4	3 x 46.5	405 x 225 x 80	1	1	4.6
8	415	B32455L4008A 11	11.1	3 x 49.5	405 x 225 x 80	1	1	4.7
10	415	B32455L4010A 11	13.9	3 x 62	405 x 225 x 80	1	1	5.0
12.5	415	B32455L4012A511	17.3	3 x 77	405 x 225 x 80	1	1	5.8
15	415	B32455L4015A 11	20.8	6 x 46.5	400 x 225 x 155	1	1	8.2
20	415	B32455L4020A 11	27.8	6 x 62	400 x 225 x 155	1	1	8.5
25	415	B32455L4025A 11	34.7	6 x 77	400 x 225 x 155	1	1	8.8
30	415	B32455L4030A 11	41.7	12 x 46.2	450 x 325 x 225	1	1	14.0
40	415	B32455L4040A 11	55.6	12 x 61.6	450 x 325 x 225	1	1	15.5
50	415	B32455L4050A 11	69.5	12 x 77	450 x 325 x 225	1	1	17.0
<b>SquareCap ESHDC - 440 V(AC) 3PH, 50Hz (Series B32455)</b>								
1	440	B32455L5001A 11	1.3	3 x 5.5	270 x 170 x 55	1	10	2.0
2	440	B32455L5002A 11	2.6	3 x 11	270 x 170 x 55	1	10	2.0
3	440	B32455L5003A 11	3.9	3 x 16.5	300 x 240 x 80	1	10	2.7
4	440	B32455L5004A 11	5.2	3 x 22	300 x 240 x 80	1	10	2.9
5	440	B32455L5005A 11	6.5	3 x 27.5	300 x 240 x 80	1	1	3.1
6	440	B32455L5006A 11	7.9	3 x 33	405 x 225 x 80	1	1	4.2
7	440	B32455L5007A 11	9.2	3 x 38.5	405 x 225 x 80	1	1	4.4
7.5	440	B32455L5007A511	9.8	3 x 41.5	405 x 225 x 80	1	1	4.5
8	440	B32455L5008A 11	10.5	3 x 44	405 x 225 x 80	1	1	4.6
9	440	B32455L5009A 11	11.8	3 x 49.5	405 x 225 x 80	1	1	4.7
10	440	B32455L5010A 11	13.1	3 x 55	405 x 225 x 80	1	1	4.8
12	440	B32455L5012A 11	15.7	3 x 67	405 x 225 x 80	1	1	5.2
12.5	440	B32455L5012A511	16.4	3 x 69	405 x 225 x 80	1	1	5.5
15	440	B32455L5015A 11	19.6	6 x 41.5	400 x 225 x 155	1	1	8.1
20	440	B32455L5020A 11	26.24	6 x 55	400 x 225 x 155	1	1	8.4
25	440	B32455L5025A 11	32.8	6 x 69	400 x 225 x 155	1	1	9.5
30	440	B32455L5030A 11	39.4	12 x 41.1	450 x 325 x 225	1	1	14.5
35	440	B32455L5035A 11	45.9	12 x 48	450 x 325 x 225	1	1	15.0
40	440	B32455L5040A 11	52.5	12 x 54.8	450 x 325 x 225	1	1	15.5
50	440	B32455L5050A 11	65.6	12 x 69	450 x 325 x 225	1	1	17.5

# SquareCap PFC Capacitors

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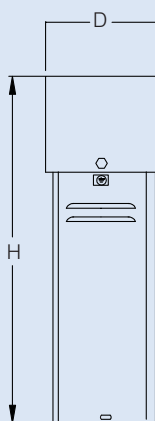
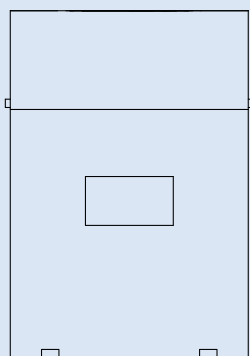
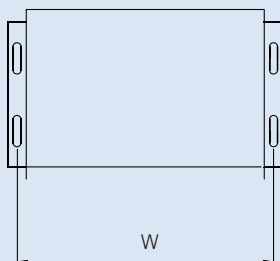
SquareCap ESHDC Capacitors - 3 Phase								
Rating KVAR	Voltage V (AC)	Material code	I <sub>r</sub> A	C <sub>N</sub> F (Basic cells x F)	H x W x D mm	Packing units	MOQ	Approx. weight Kg
<b>SquareCap ESHDC - 480 V(AC) 3PH, 50Hz (Series B32455)</b>								
5	480	B32455L8005A 11	6.0	3 x 23	300 x 240 x 80	1	1	2.9
5.5	480	B32455L8005A561	6.6	3 x 25.3	300 x 240 x 80	1	1	3.1
6	480	B32455L8006A 11	7.2	3 x 28	405 x 225 x 80	1	1	4.0
7.5	480	B32455L8007A511	9.0	3 x 34.5	405 x 225 x 80	1	1	4.3
8	480	B32455L8008A 11	9.6	3 x 37	405 x 225 x 80	1	1	4.4
8.3	480	B32455L8008A361	10	3 x 38.2	405 x 225 x 80	1	1	4.4
9	480	B32455L8009A 11	10.8	3 x 41.5	405 x 225 x 80	1	1	4.5
10	480	B32455L8010A 11	12.0	3 x 46	405 x 225 x 80	1	1	4.5
11.1	480	B32455L8011A161	13.4	3 x 51.1	405 x 225 x 80	1	1	4.6
12	480	B32455L8012A 11	14.4	3 x 55.5	405 x 225 x 80	1	1	4.6
12.5	480	B32455L8012A511	15.0	3 x 58	405 x 225 x 80	1	1	4.8
13.8	480	B32455L8013A861	16.6	3 x 63.5	405 x 225 x 80	1	1	5.2
14.5	480	B32455L8014A511	17.4	6 x 33.5	400 x 225 x 155	1	1	7.8
15	480	B32455L8015A 11	18.0	6 x 34.5	400 x 225 x 155	1	1	7.8
16.6	480	B32455L8016A661	20	6 x 38.2	400 x 225 x 155	1	1	7.9
18	480	B32455L8018A 11	21.6	6 x 41.5	400 x 225 x 155	1	1	7.9
20	480	B32455L8020A 11	24.0	6 x 46	400 x 225 x 155	1	1	8.1
22.1	480	B32455L8022A161	26.6	6 x 51.1	400 x 225 x 155	1	1	8.3
25	480	B32455L8025A 11	30.0	6 x 58	400 x 225 x 155	1	1	8.5
27.7	480	B32455L8027A761	33.3	6 x 63.5	400 x 225 x 155	1	1	9.0
29	480	B32455L8029A 11	34.8	12 x 33.5	450 x 325 x 225	1	1	14.0
50	480	B32455L8050A 11	60.1	12 x 58	450 x 325 x 225	1	1	17.5
<b>SquareCap ESHDC - 525 V(AC) 3PH, 50Hz (Series B32455)</b>								
6.6	525	B32455L6006A611	7.3	3 x 25.4	405 x 225 x 80	1	1	3.2
10	525	B32455L6010A 11	11	3 x 38.5	405 x 225 x 80	1	1	4.4
12.5	525	B32455L6012A511	13.7	3 x 48	405 x 225 x 80	1	1	4.6
13.2	525	B32455L6013A211	14.5	3 x 50.8	405 x 225 x 80	1	1	4.6
15	525	B32455L6015A 11	16.5	6 x 28.9	400 x 225 x 155	1	1	7.7
16.6	525	B32455L6016A611	18.3	6 x 32	400 x 225 x 155	1	1	7.8
20	525	B32455L6020A 11	21.9	6 x 38.5	400 x 225 x 155	1	1	8.1
25	525	B32455L6025A 11	27.4	6 x 48	400 x 225 x 155	1	1	8.3
26.5	525	B32455L6026A511	29.1	6 x 50.8	400 x 225 x 155	1	1	8.5
33.1	525	B32455L6033A111	36.4	12 x 32	450 x 325 x 225	1	1	14.5
35	525	B32455L6035A 11	38.4	12 x 34	450 x 325 x 225	1	1	14.5
50	525	B32455L6050A 11	54.9	12 x 48	450 x 325 x 225	1	1	17.5

# SquareCap PFC Capacitors

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## SquareCap : Overall dimensions and information table



KVAr rating	Mounting brackets fixed/ separate/ sliding	Louvers/ holes	Basic cell	Mounting
<b>ENDC/EHDLL</b>				
1 to 2	fixed bracket	no	3	- - - -
3 to 5	fixed bracket	no	3	2 holes
6 to 15	seperate bracket	holes	3	2 slot
16 to 30	sliding bracket	2 louvers	6	4 slot
31 to 60	sliding bracket	8 louvers	6	12 slot
<b>ESHDC</b>				
1 to 2	fixed bracket	no	3	- - - -
3 to 5	fixed bracket	holes	3	2 slot
6 to 13	seperate bracket	holes	3	2 slot
14 to 25	sliding bracket	4 louvers	6	4 slot
26 to 50	sliding bracket	8 louvers	12	4 slot

## SquareCap : Exploded view

