



Product Brief 2009



Capacitors

for Uninterruptible Power Supply Systems (UPS)

EPCOS is known as one of the world's leading manufacturer of electronic components, especially in the field of capacitors. Hardly any other supplier offers one-stop-shopping for all key components, carefully harmonized to each other, from a single source. The growing sales of power-quality products has led EPCOS to develop a strategy for Power Quality Solutions. In conjunction with technical experts, the aim is to offer application know-how rather than just products. That means customized service packages put together by individual application experts and assembled by specialists close to where the systems are needed. In view of the growing importance of power quality, EPCOS is focusing on UPS solutions. The wide range of different powers means that UPS products are split

up into various segments: small single-phase UPS systems mostly with powers up to 12 kVA, followed by 3-phase mid and high-power ranges up to 50 kVA, 200 kVA and even above 200 kVA. When used as filters, power capacitors will smooth any irregularities in the power network and help to improve power quality and reliability. A typical UPS of the mid power range uses an average of ten power capacitors per system for filtering.

Aluminum electrolytic capacitors operate as DC link capacitors. EPCOS offers these components in different variants, for instance with screw, snap-in, 4-pin snap-in or solder-pin terminals.

The appropriate film capacitors for the input and output filters of UPS systems are the PhaseCap MKK, MKP or MFP series.

Capacitors for UPS Systems

Capacitor overview

Power capacitors

MKP series
B3236*



Three-phase AC power capacitors

PhaseCap MKK series
B25667
B25668



Aluminum electrolytic capacitors

Screw, snap-in,
4-pin snap-in,
solder-pin terminals
B433*, B434*, B435*
B436*, B437*



Film capacitors

MKP series
B3265*
B3267*
B3277*



Film capacitors

Snubber series
B3263*
B32656S*
B32686*

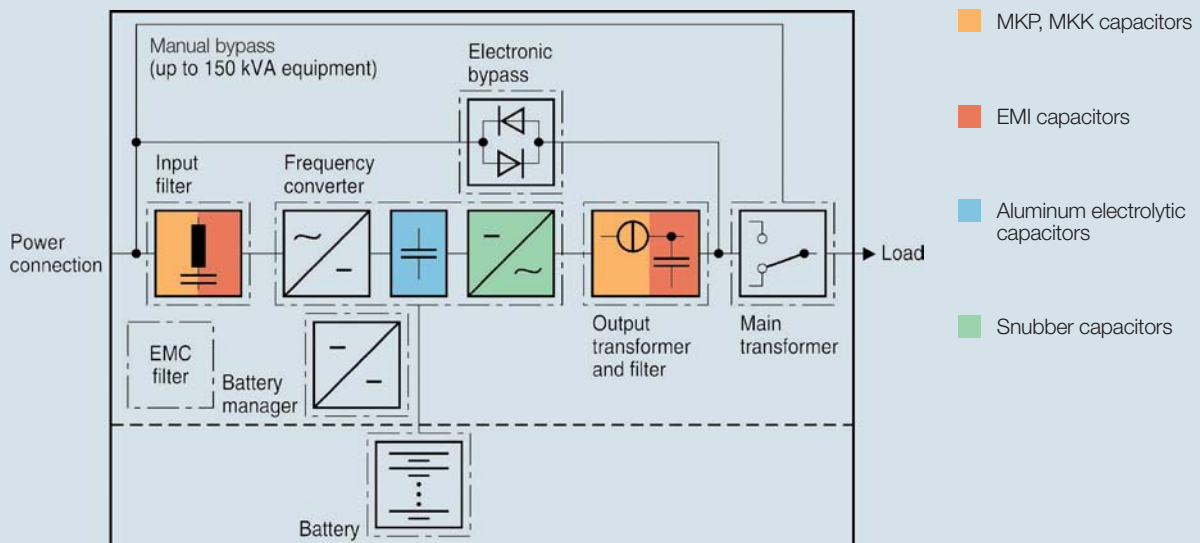


EMI capacitors

X and Y series
B3292*
B3202*



Block diagram of capacitors needed in state-of-the-art UPS systems



Power Capacitors for UPS Systems

General

Features

- Very high reliability
- High peak-current capability
- Voltage series with 850 V
- Low-volume solutions
- Five different terminal styles
- Customized configurations

Design

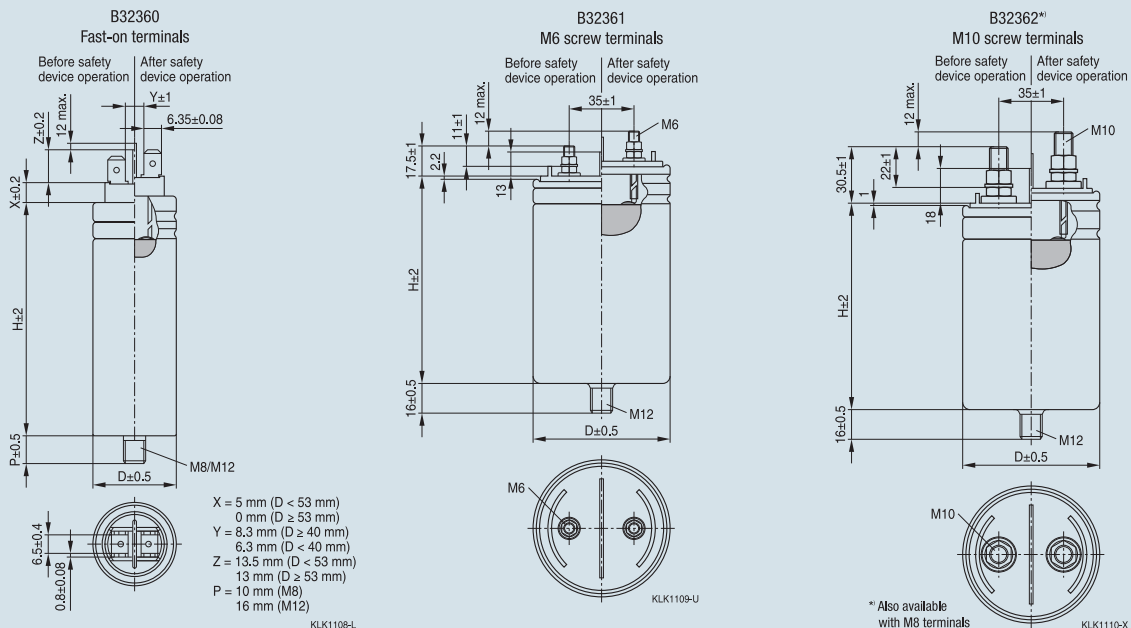
- Resin filling, non-PCB, soft polyurethane
- Safety device: overpressure disconnecter, self-healing technology
- Mounting and grounding by stud on bottom of aluminum can
- Naturally air-cooled or forced air cooling
- Indoor mounting
- Reference standards IEC1071
- UL-approval file E106388



Technical data

Type / series	B32360	B32361	B32362
V_R V_{AC}	C_R μF	C_R μF	C_R μF
350	10 ... 150	50 ... 200	150 ... 600
460	10 ... 100	50 ... 100	100 ... 400
680	3 ... 70	20 ... 70	60 ... 250
850	–	–	60 ... 220

Dimensional drawings



Three-phase AC Power Capacitors for UPS Systems

General

Major manufacturers of UPS equipment use an output transformer and PhaseCap filter capacitors, which together form the output filter. It generates a sinusoidal output voltage with a low distortion factor from the pulse sequence. The steep voltage edges also present the capacitor with a special challenge in terms of dv/dt strength. This is where the MKK-AC technology with a

wavy cut and contact-edge reinforcement technique patented by EPCOS and used in the PhaseCap shows its worth. Its advantage lies in a large effective contact area which ensures high pulse strength and a very good current handling capability.

Features

- Long life expectancy
- High pulse-current withstand capability up to $300 \cdot I_R$
- Maintenance-free
- Wavy cut
- Triple safety system

Design

- Impregnation with inert gas, polypropylene film
- Safety system: overpressure disconnecter, self-healing and dry technology
- Mounting and grounding by stud on bottom of the cylindrical aluminum can
- Naturally air-cooled or forced air cooling
- Indoor mounting
- Reference standards IEC 60831-1+2, UL 810 5th edition
- UL-approval file E238746



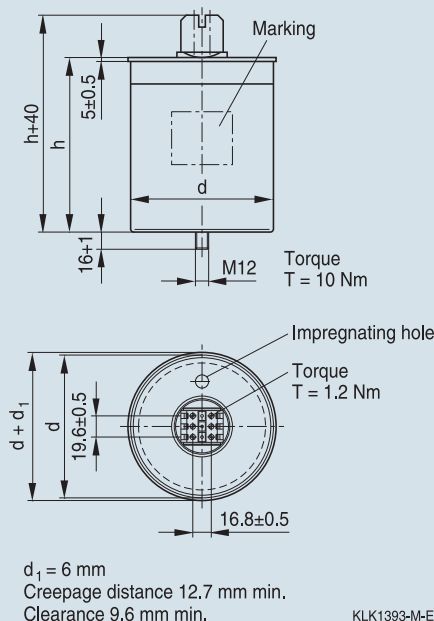
Technical data

Series B25667, B25668

Rated voltage: 230 ... 800 V,
three-phase, delta connection

Output range: 5 ... 33 kvar
 $3 \cdot 8 \dots 3 \cdot 251 \mu\text{F}$

Dimensional drawing



Aluminum Electrolytic Capacitors for UPS Systems

General

Screw terminals

Features

- High CV product
- High reliability and high ripple-current capability

Optional:

- Low-inductance design (13 nH)
- Self-extinguishing electrolyte

Design

- All welded construction ensures reliable electrical contact

Optional:

- Optimized construction for base cooling (heat-sink mounting)

Snap-in terminals

Features

- High CV product
- Long useful life
- High reliability and very good current handling capability
- Low ESR
- Voltage derating enables 105 °C operation for all 85 °C series

Design

- Different case sizes available for each capacitance value

Optional:

- Two terminals: 6.3 or 4.5 mm length
- Three terminals: 4.5 mm length to ensure correct insertion
- PET insulation cap on terminal side for insulating the capacitor from PCB
- PET insulation sleeve for the aluminum case



4-pin snap-in and solder-pin terminals

Features

- Very high volumetric efficiency
- High ripple-current capability
- Voltage derating enables 105 °C operation for all 85 °C series

Design

- Pinning ensures correct insertion
- Many different case sizes

Optional:

- 4-pin snap-in terminals 6.3 and 4.5 mm length
- Solder-pin mounting on circuit boards
- PET insulation cap on terminal side for insulating the capacitor from the PCB

Technical data

Screw terminals	Snap-in terminals	4-pin snap-in and solder-pin terminals
V _R : 200 ... 500 V	V _R : 200 ... 500 V	V _R : 350 ... 500 V
C _R : 1000 ... 33000 µF	C _R : 47 ... 2200 µF	C _R : 390 ... 2700 µF
Dimensions: 52 x 81 mm up to 91 x 220 mm	Dimensions: 22 x 25 mm up to 35 x 55 mm	Dimensions: 35 x 50 mm up to 45 x 100 mm
85 °C series: B43454/B43474, B43455/B43457, B43456/B43458, B43564/B43584	85 °C series: B43305, B43501, B43601, B43540	85 °C series: B43510, B43520, B43511, B43521
105 °C series: B43740/B43760, B43750/B43770	105 °C series: B43504, B43508, B43505	105 °C series: B43514, B43524

Film Capacitors for UPS Systems

General features

Snubber capacitors

In order to block voltage peaks, snubber capacitors are typically connected in parallel with semiconductors. Specifically designed for snubber applications, the B32632 ... B32634 and B32686S series can withstand dv/dt values up to 18000 V/ μ s and high I_{RMS} currents with frequencies exceeding 100 kHz. MKP capacitors from the B32656S and B32652 ... B32656 series feature a very good self-healing characteristic. They are also an excellent alternative for use in this circuit position.

DC link

Capacitors in the DC link module are designed to support the DC voltage after the AC/DC converter by supplying high current peaks when required. EPCOS offers MKP capacitors in various operating voltages, with its B32674 ... B32678 and B32774 ... B32778 series.

Output filters

The basic purpose of an output filter is to protect the load connected to the output by filtering the RF components coming from the inverter and to withstand the current peaks caused by pulses of rapidly changing voltages. High pulse-handling capability with dv/dt values up to 8000 V/ μ s and very low self-heating characteristics make the B32652 ... B32656 series suitable for this filter solution. This series covers the capacitance range up to 4.7 μ F with rated voltages of up to 2000 V DC.



EMC filters

EMC filters are usually composed of approved X2 and Y2 capacitors for use in across-the-line and line-to-ground positions. The approvals are based on the corresponding international standards (IEC, UL, CSA). The B32921 ... B32928 series offers compact X2 capacitors up to 45 μ F (lead spacing 10 ... 52.5 mm), with a maximum operating voltage of 305 V AC (50/60 Hz) and a maximum operating temperature of 110 °C. In addition, the B32021 ... B32026 series covers the demand for Y2 capacitors up to 1.0 μ F and a rated voltage of 300 V AC.

Design

- Dielectric polypropylene film (MKP)
- Plastic case (UL 94 V-0)
- Epoxy resin sealing, flame-retardant
- Terminals with parallel wire leads, lead-free tinned

Technical data

MKP capacitors	Snubber capacitors	EMI capacitors
2-pin series B32652 ... B32656	MFP series B32632 ... B32634, B32686	X2-Series B32921 ... B32928
V_R : 250 ... 2000 V DC	V_R : 630 ... 2500 V DC	V_R : 305 V AC
C_R : 1 nF ... 4.7 μ F	C_R : 0.47 ... 470 nF	C_R : 10 nF ... 45 μ F
2/4-pin series B32674 ... B32678	MKP series B32656S	Y2-Series B32021 ... B32026
V_R : 300 ... 875 V DC	V_R : 850 ... 2000 V DC	V_R : 300 V AC
C_R : 0.47 ... 60 μ F	C_R : 0.047 ... 3.3 μ F	C_R : 1 nF ... 1 μ F
2/4-pin series B32774 ... B32778	MFP series B32686S	
V_R : 450 ... 1300 V DC	V_R : 1000 ... 2000 V DC	
C_R : 1.5 ... 110 μ F	C_R : 22 ... 680 nF	

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