

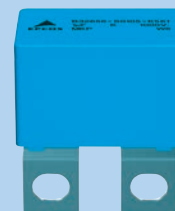
EPCOS Product Brief 2017

Capacitors

for Uninterruptible Power Supply Systems (UPS)

EPCOS is known as one of the world's leading manufacturer of electronic components. Hardly any other supplier offers one-stop-shopping for all key components. 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. 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. 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 AC series
B3236*
B33331V*
FilterCap MKD AC
Single-phase
B32370 ... B32374
Three-phase
B32377, B32378



Aluminum electrolytic capacitors

Screw, snap-in,
4-/5-pin snap-in terminals
and solder-pins
B435*, B436*, B437*



Film capacitors

MKP series
B32354S*
B3265*
B3267*
B3277*
MFP series
B3268*
MKP AC output filters
B3275*
Snubber series
B32656S* ... B32658S*
B32686S*



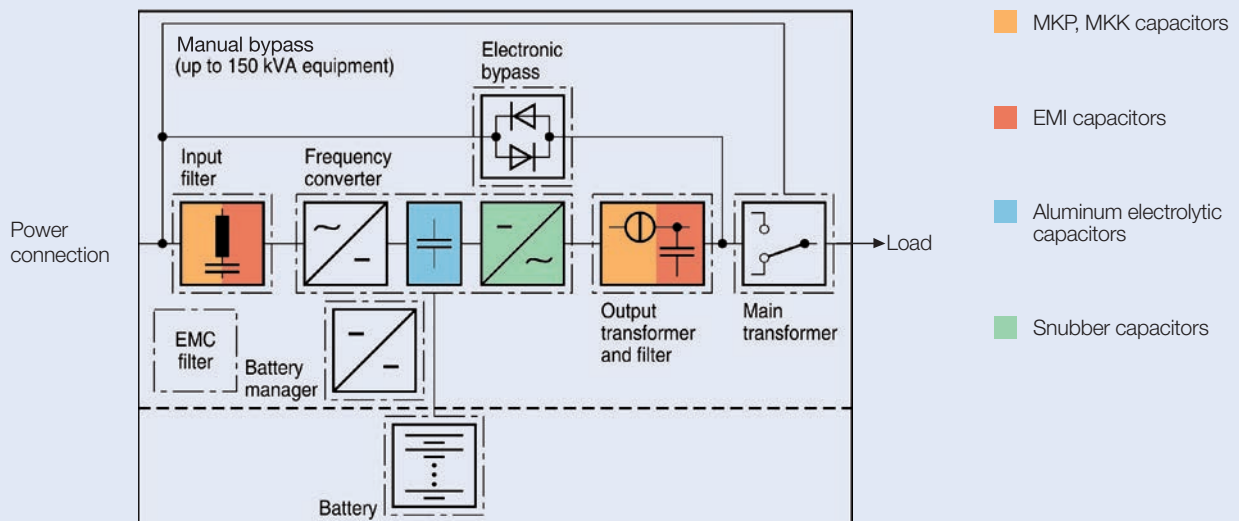
EMI suppression capacitors



Standard X and Y series
B3292*C/D
X1: B3291*
Y2: B3202*
X2 humidity
B3292*H/J
X2 industrial grade
B3292*A/B4



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 up to 480 V RMS
- Low-volume solutions
- Five different terminal styles
- Customized configurations

Design

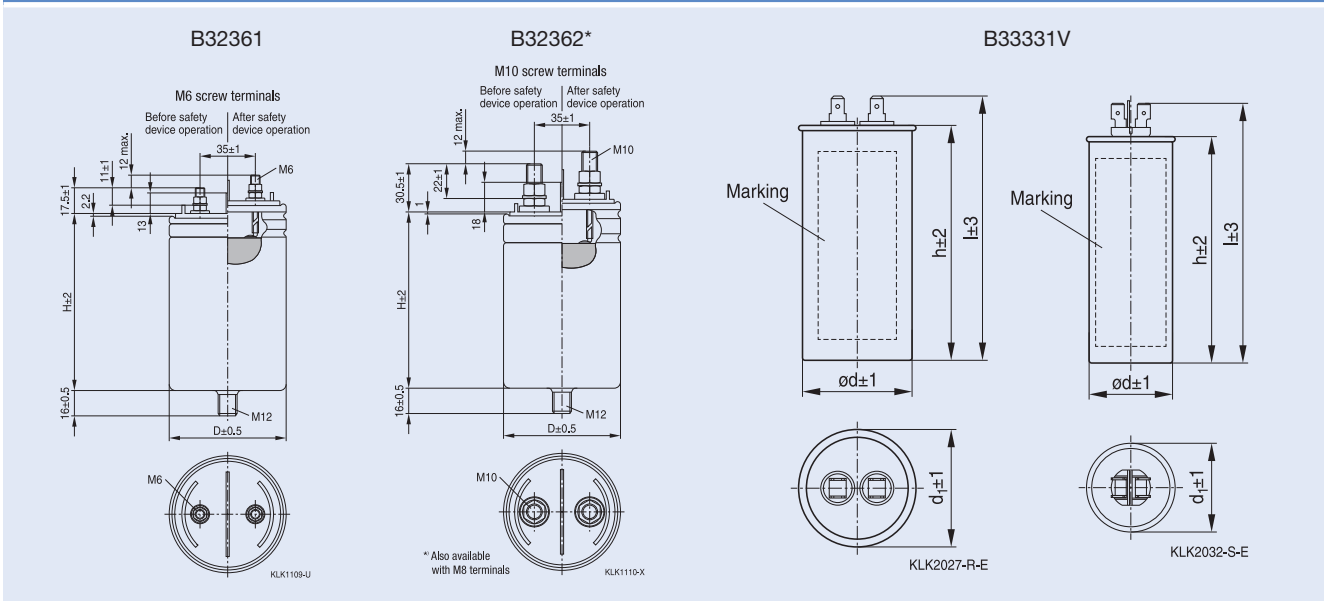
- Resin filling, non-PCB, soft polyurethane
- Safety device: overpressure disconnecter, self-healing technology
- Mounting and grounding by stud on bottom of aluminum can
- Naturally air-cooled or forced air cooling
- Indoor mounting
- Reference standards IEC61071
- UL-approval file E106388 (B32361, B32362)
- UL-approval file E238746 (B33331V)



Technical data

Type/series	V _R V AC	C _R µF
B32361	350	50 ... 200
	460	50 ... 100
	680	10 ... 70
B32362	350	150 ... 600
	460	100 ... 400
	680	60 ... 250
B33331V	460	2 ... 50

Dimensional drawings



Three-phase AC Power Capacitors for UPS Systems



General

Features

- Very high reliability
- High peak-current capability
- Voltage series up to 600 V RMS
- Five different terminal styles
- Customized configurations

Design

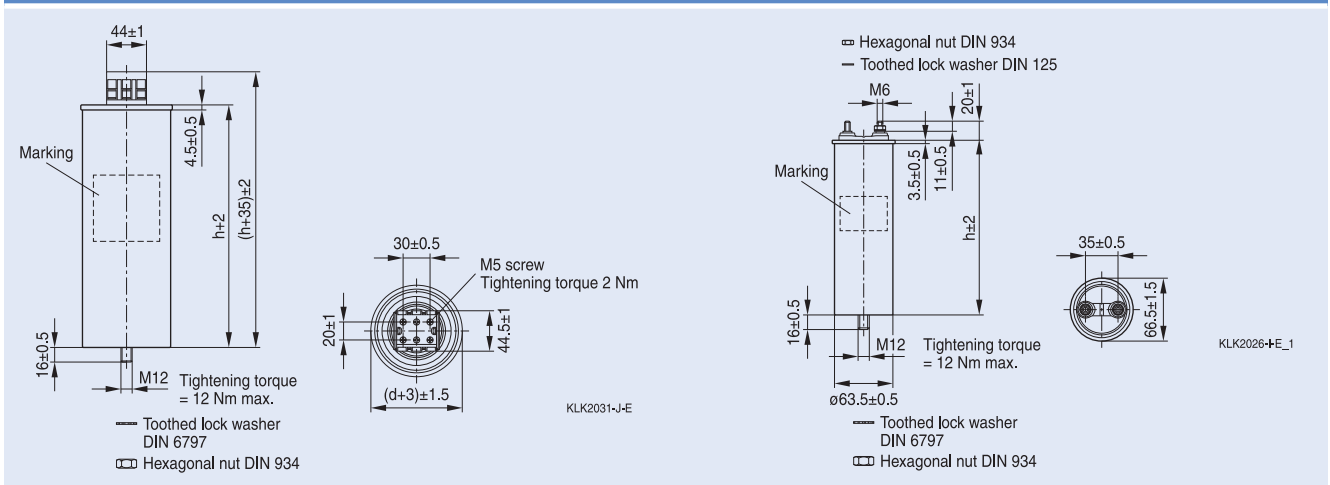
- Resin filling, non-PCB, soft polyurethane
- Safety device: over pressure disconnecter, self-healing technology
- Mounting and grounding by stud on bottom of aluminum can
- Naturally air-cooled or forced air-cooling
- Indoor mounting
- Reference standard IEC61071
- UL-approval file E487229



Technical data

Type/series	V _R V AC	C _R μF	Type/series	V _R V AC	C _R μF	Type/series	V _R V AC	C _R μF
B32370 (Fast-on)	350	10 ... 150	B32373 (M10 screw)	350	150 ... 600	B32377 (Delta connection)	350	3× 50 ... 3× 400
	460	10 ... 120		460	100 ... 500		460	3× 50 ... 3× 350
	590	10 ... 100		590	60 ... 400		590	3× 50 ... 3× 300
	680	6.8 ... 70		680	60 ... 350		680	3× 30 ... 3× 250
	750	10 ... 60		750	47 ... 330		750	3× 20 ... 3× 250
	850	5 ... 45		850	70 ... 300		850	3× 50 ... 3× 150
B32371 (M6 screw)	350	50 ... 200	B32374 (Screw clamp)	350	100 ... 400	B32378 (Star connection)	350	3× 150 ... 3× 400
	460	30 ... 120		460	100 ... 300		460	3× 150 ... 3× 300
	590	10 ... 100		590	60 ... 250		590	3× 80 ... 3× 250
	680	10 ... 70		680	100 ... 250		680	3× 70 ... 3× 200
	750	10 ... 50		750	100 ... 200		750	3× 60 ... 3× 120
	850	10 ... 40		850	100 ... 150		850	3× 50 ... 3× 100
B32372 (M8 screw)	350	100 ... 300						
	460	80 ... 300						
	590	60 ... 200						
	680	20 ... 250						

Dimensional drawings



Aluminum Electrolytic Capacitors for UPS Systems



General

Capacitors with 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)
- PAPER terminals available
- Versions with PET insulation upon request

Capacitors with 4-/5-pin snap-in terminals and solder-pins

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-/5-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

Snap-in capacitors

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
- Base cooling upon request

Design

- Different case sizes available for each capacitance value

Optional:

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



Technical data

	V _R V AC	C _R μF	Dimensions mm	85 °C series	105 °C series
Screw terminals	350 ... 600	10000 ... 680000	51.6 x 80.7 up to 91.0 x 221.0	B43701/B43721, B43712/B43732, B43703/B43723, B43704/B43724, B43705/B43725, B43713/B43733, B43700/B43720	
Snap-in capacitors	10 ... 500	1200 ... 68000	22 x 25 up to 35 x 50	B43630, B43624, B43634, B43541	B43509, B43544, B43545, B43640, B43641, B43642, B43643, B43644
4-/5-pin snap-in terminals and solder-pins	385 ... 450	220 ... 1800	35 x 40 up to 50 x 95	B43512, B43522, B43513, B43523	B43516, B43526

The AICap tool for the calculation of life expectancies for the series listed here is available at www.epcos.com/alcap

Film Capacitors for UPS Systems



General

Snubber capacitors

In order to block voltage peaks, snubber capacitors are typically connected in parallel with semiconductors. MKP capacitors of the B32652 ... B32658 series feature a high I_{RMS} current, a very good self-healing characteristic and a wide variety of terminals (throughhole and 17 strap terminals for screw to IGBT, B32656S ... B32658S).

The B32671L ... B32672L series also offers an excellent AC voltage capability.

For higher pulse handling capability the B32682 ... B32686 and B32686S series can withstand dv/dt values up to 20 000 V/ μ s and very high I_{RMS} current with frequencies exceeding 100 kHz.

DC link capacitors

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 series (higher current capability) and B32774 ... B32778 series (high density of capacitance, also available in THB version).

Capacitors for output filtering

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.

With the new MKP AC series B3275* EPCOS introduces a capacitor range with an optimized AC voltage performance vs size. To be highlighted is the high humidity capability of this new AC series, what is qualified by a 1000 h test at 60 °C, 95% RH, V_R .

EMI suppression capacitors

EMC filters are usually composed of approved X2 and Y2 EMI suppression 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 30 μ F, with a maximum operating voltage of 305 V AC (50/60 Hz). 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. If reinforced insulation is demanded with higher voltage withstanding, X1 (B32911 ... B32916) and Y1 (B81123) are available.

The new X2 humidity B3292*H/J series of X2 EMI suppression capacitors features stable capacitance values, even under extremely humid conditions. The B3292*H/J series for operating voltages of up to for 305 V AC comprises types with rated capacitances ranging from 0.1 to 15 μ F.

A new X2 industrial grade series of robust MKP X2 capacitors (B3292xA/B4) offers a higher rated voltage of 350 V AC, whereas conventional types are designed for rated voltages of 305 V AC. This makes the new X2 capacitors suitable for EMI suppression in input filters, specifically for applications on the North American market and for output filters.

Design

- Dielectric polypropylene film (MKP)
- Plastic case (UL 94 V-0)
- Epoxy resin sealing, flame-retardant
- Lead free tinned terminals: Strap, 2-pin and 4-pin versions. Special lead lengths available on request.



Film Capacitors for UPS Systems



Technical data					
EMI suppression					
C _X (EMC)			C _Y (EMC)		
X2	X2 industrial grade	X2 humidity	X1	Y2	Y1
B3292*	B3292xA/B4	B3292xH/J	B3291*	B3202*	B81123
305 V AC	350 V AC	305 V AC	305 V AC	300 V AC	250 V AC
10 nF ... 30 µF	0.47 ... 10 µF THB 85 °C/85% RH/ 330 V AC/1000 h	0.1 ... 15 µF THB 85 °C/85% RH/ 240 V AC/1000 h	10 nF ... 6.8 µF	1 nF ... 1 µF	1 nF ... 22 nF

Technical data					
DC link		Snubbing		Output filtering	
C _{BUS} (DC filtering)		C _S (snubber)		C _F (AC filtering)	
MKP	MKP	MKP	MFP	MKP AC	X2 industrial grade
B3277*	B3267*	B3265* B3267xL	B3268* ... B32686*	B3275*	B3292xA/B4
450 ... 1300 V DC		250 ... 2500 V DC		250 ... 310 V AC	
0.47 µF ... 480 µF		1 nF ... 40 µF		1 µF ... 70 µF	
				0.47 ... 10 µF THB 85 °C/85% RH/ 330 VAC/1000 h	

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