

EPCOS Product Profile 2014

# MotorCap P2 (S2) Aluminum Can

AC Film Capacitors for Motor Run Applications





## MotorCap P2 (S2) Aluminum Can AC Film Capacitors for Motor Run Applications



For film capacitors, the metalized technology is applied. An extremely thin metal film is deposited in a high vacuum onto the low-loss polypropylene film. Then two layers of metalized film are wound to form the electrodes. The impulse resistance is possible due to the so-called self-healing effect. By using polypropylene as the dielectric, the capacitors have a particularly low dissipation factor.

AC film capacitors are usable for general sine-wave applications as filters, inverters, UPS devices etc., but are also particularly suitable for the operation of asynchronous electric motors and electric compressors. As motor run capacitors, they assure smooth and energy-saving operation of electric motors used in applications such as refrigerators, freezers, electric compressors, washers, dryers, air-conditioning appliances, ventilators, pumps, electric doors and drives.

This brochure presents the MotorCap P2 (S2) aluminum can capacitors series B32330/B32332/32333/32335 of EPCOS. The use of MotorCap capacitors increases the energy efficiency of motors and compressors by up to 12 percent. They also significantly improve the torque response of the motor or compressor. This is important for motors and compressors in continuous operation. MotorCap capacitors are addressed particularly to manufacturers of air conditioning systems, washing and drying appliances, compressors for refrigerators and freezers, but also of general electric motors for a variety of applications. MotorCap capacitors comply to high safety standards (UL, VDE, TÜV, CQC).

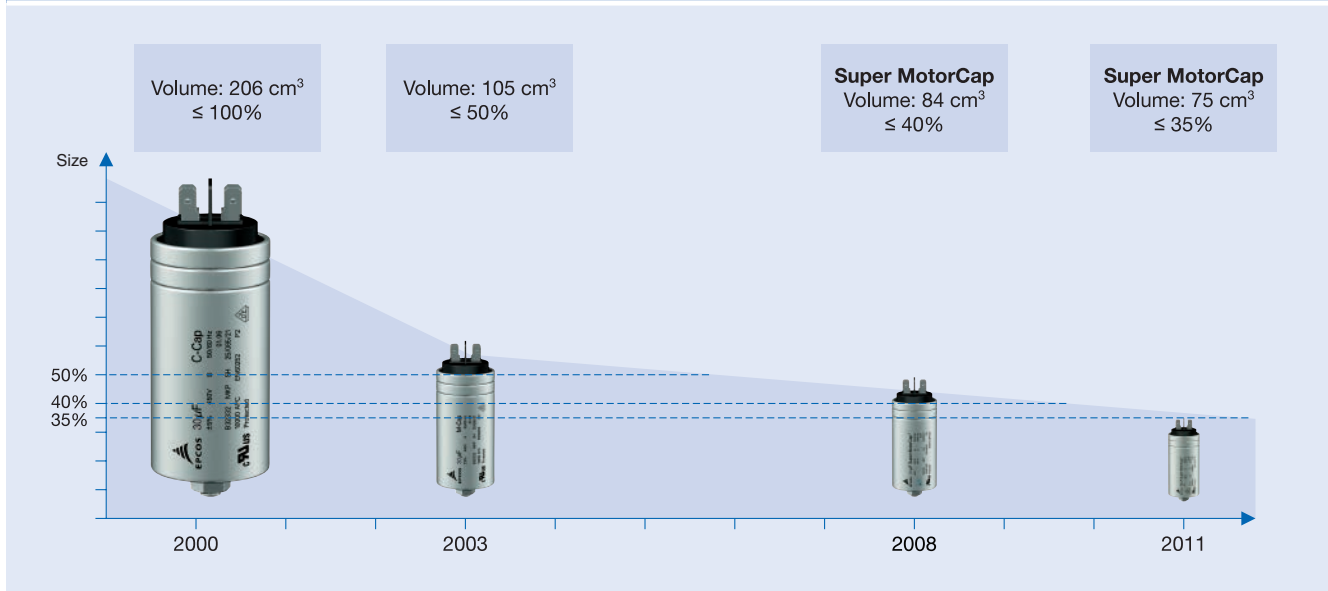
# Important Notes

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.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet ([www.epcos.com/material](http://www.epcos.com/material)). Should you have any more detailed questions, please contact our sales offices.
5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.  
  
**We also reserve the right to discontinue production and delivery of products.** Consequently, we cannot guarantee that all products named in this publication will always be available.  
  
The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.
6. Unless otherwise agreed in individual contracts, **all orders are subject to the current version of the “General Terms of Delivery for Products and Services in the Electrical Industry” published by the German Electrical and Electronics Industry Association (ZVEI)**.
7. The trade names EPCOS, BAOKE, Alu-X, CeraDiode, CeraLink, CeraPlas, CSMP, CSSP, CTVS, DeltaCap, DigiSiMic, DSSP, FilterCap, FormFit, MiniBlue, MiniCell, MKD, MKK, MLSC, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, SIP5D, SIP5K, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at [www.epcos.com/trademarks](http://www.epcos.com/trademarks).

# MotorCap P2 (S2) Aluminum Can

## Evolution of EPCOS MotorCap aluminum can capacitors

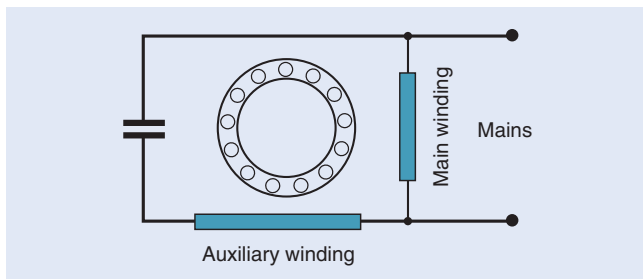


### Evolution of a proven technology

MotorCaps are AC voltage capacitors which use the advantages of MKP technology and allow the operation of asynchronous induction motors. Permanent R&D efforts assure high quality standards and improvements in costs and size.

Best-in-class performance:

- Can design
- Life time expectancy of 30 000 h / class A
- Temperature resistance at +85 °C
- Highest safety standards
- Required approvals



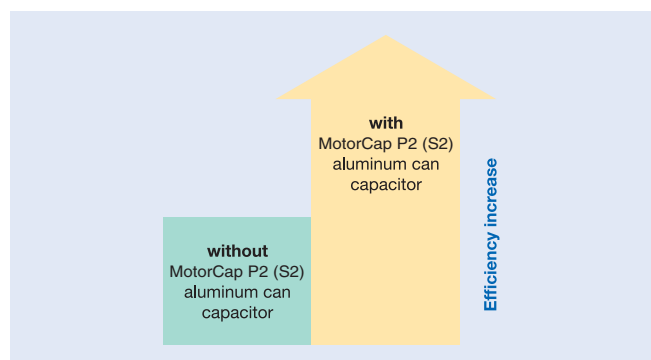
Benefits of the very robust and compact design:

- More mounting space
- Reduced material costs
- Smaller construction of final application
- Smaller packaging units
- Versions according RoHS

### Benefits of MKP technology

- Less thermal stress to motor and compressor
- Very low losses thanks to innovative film technology
- Less energy consumption
- High efficiency
- Lower noise level
- Improved torque
- Improved power factor correction

### Improving efficiency with the MotorCap P2 (S2) aluminum can capacitors

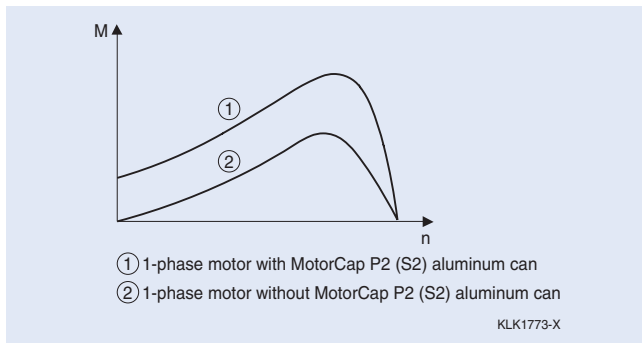


Efficiency of asynchronous motors or compressors

# MotorCap P2 (S2) Aluminum Can

## Improving the torque response

The use of the MotorCap P2 (S2) aluminum can increases the torque response of electric motors.



## Product certifications

All MotorCap P2 (S2) aluminum can capacitors are certified by leading authorities and test institutes, e.g. VDE, UL, CQC.



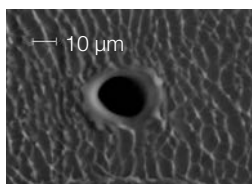
## Self-healing

- 1 Dielectric
- 2 Metalized electrodes
- 3 Material displacing shock wave
- 4 Air gap with metal vapor
- 5, 6 Plasma zone
- 7 Boundary layer between gas phase dielectric and plasma
- 8 Breakdown channel
- 9 Gas phase dielectric
- 10 Zone of displaced metalization and dielectric (isolating region)

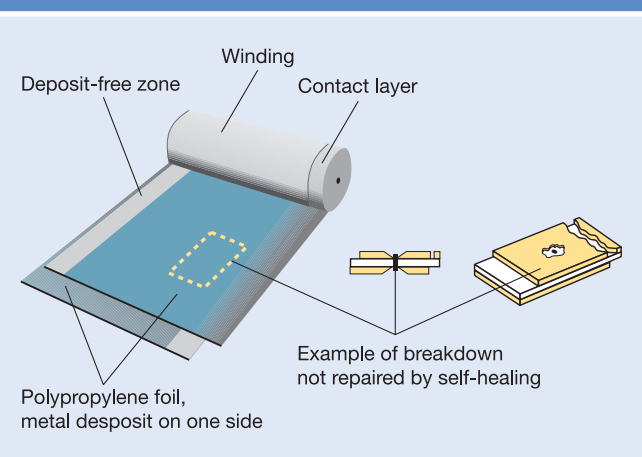
## Self-healing technology

An electric breakdown is possible as the result of thermal or electric overload or at the end of service life. This results in a small arc that evaporates the metalization in the region of the breakdown in a matter of microseconds. The gas pressure caused at this spot by the high temperature blows the metal vapour away of the breakdown region. This means that a non-conducting isolation region free of metalization is formed here.

During and after the breakdown the capacitor is fully functional. The reduction in capacitance caused by self-healing is less than 100 pF, i.e. of an order that can only be verified by a precision measuring instrument.

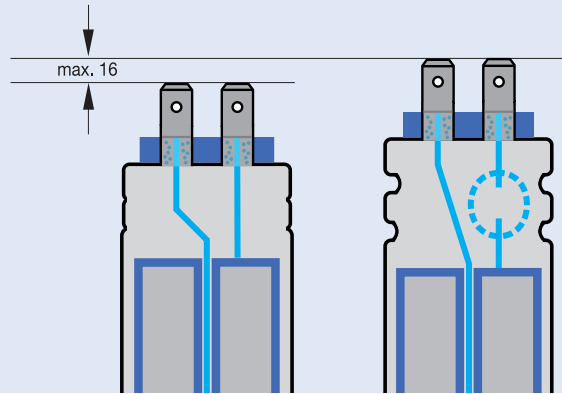


## Schematic representation of the self-protection function



# Innovations and Advantages

## MotorCap P2 (S2) aluminum can protection via overpressure disconnection device



### Overpressure protection with a break-action mechanism:

Electronic components do not have unlimited life expectancies. This applies to self-healing capacitors, too. Motor run capacitors of the series B32330/B32332/B32333/B32335 are conventionally constructed as aluminum cans with class P2 (S2) safety protection. They are fitted with a disconnecter that responds only to overpressure. Numerous electric breakdowns over time or as result of thermal or electric overload result in the formation of gas, which can cause the pressure to rise inside the capacitor case. This produces a change in length due to the curvature of the lid or stretching of the expansion bead. Expansion beyond a certain degree will separate the internal wires and disconnect the capacitor from the line. This disconnection takes place at a defined position (notch) after a total baffle expansion of 0.3 to 1.6 mm, depending on the size of the capacitor.

### MotorCap P2 (S2) aluminum can

#### Construction

- Dielectric: Polypropylene film
- Electrode: Metalized film
- Epoxy resin, self-extinguishing
- Plastic top material to IEC 60335-1 (fire retardant)

#### Features

- Self-healing properties
- Low dissipation factor
- P2 (S2) safety class as per IEC/EN 60252-1
- High insulation resistance
- 10 000 A fault current-proof
- Low noise operation
- IEC/EN 60335 compatible on request
- RoHS compatible

### Terminals

The MotorCap P2 (S2) aluminum can offers customized terminals.

#### Electrical terminals

- Fast-on terminal
- Double fast-on terminal
- Cable

#### Mechanical terminals

- For clamping (with no further fixing)
- Threaded stud at bottom of can (M8, max. torque = 5 Nm)

### P2 (S2) definition according IEC/EN 60252-1 and UL 810

To prevent case rupture under fault conditions, the capacitor has been designed to fail in the open-circuit mode only. It is protected against fire and electrical shock hazards. The IEC/EN 60252-1 standard applies to all motor run capacitors designed by EPCOS.

Remark: Definition P2 will be replaced by S2 in 2014. EPCOS MotorCap P2 aluminum capacitors fulfill the S2 requirements.

### Environment

All EPCOS MotorCap series are RoHS compatible. The compatibility is regularly checked during production.

The EPCOS Group operates an environmental management system that conforms to the requirements of ISO 14001. Currently, our locations in Europe and the Americas, as well as our locations in Asia are certified to this standard.



# Applications



## Operation

The MotorCap P2 (S2) aluminum can capacitor is simply plugged into the auxiliary winding of the motor or compressor and can remain permanently connected there. The capacitor is designed for continuous operation.

## Applications

The MotorCap P2 (S2) aluminum can was optimized for use in the following applications, but may be used equally well for general drive motors.

- Refrigerators and freezers
- Electrical compressors
- Washers and dryers
- Dishwashers
- Air conditioners
- Heat pumps

## Requirements of IEC 60335-1

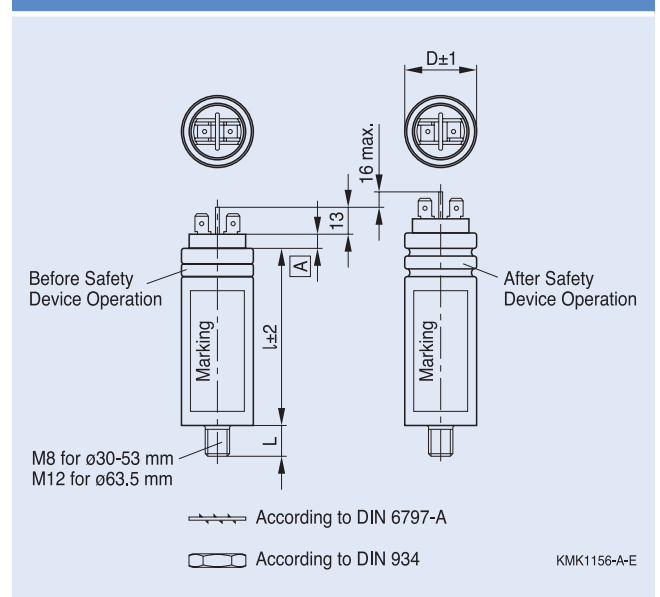
Domestic appliances are subject to the IEC 60335-1 standard. If a motor run capacitor is used in a domestic appliance that is subject to this standard, there may be additional requirements on the capacitor.

These refer essentially to the materials used as well as to the creepage and clearance distances.

The approval is granted for the complete capacitor assembly and not for individual raw materials only.

The materials as well as the creepage and clearance distances selected for the EPCOS MotorCap P2 (S2) aluminum make it ideal for use in domestic appliances.

## Dimensional drawing





# MotorCap P2 (S2) Aluminum Can

## Single Capacitance, B32330/B32332/B32333 Series



### Technical data



Type/ series	B32330/ B32332	B32330/ B32332 Super MotorCap	B32333 Super MotorCap	
Terminals	Single fast-on Double fast-on		Wire cable terminals	

### Electrical ratings

Rated voltage	$V_R$	250	450	450	V AC
Rated capacitance	$C_R$	4 ... 60	1 ... 60	1 ... 60	$\mu\text{F}$
Rated frequency	$f_R$	50/ 60			Hz
Capacitance tolerance		$\pm 5$			%
Max. permissible voltage	$V_{\text{max}}$	$1.1 \cdot V_R$			V
Max. permissible current	$I_{\text{max}}$	$1.3 \cdot I_R$			A
Dissipation factor (20 °C, 120 Hz)	$\tan \delta$	$\leq 1.0 \cdot 10^{-3}$			

### Safety

Safety class	P2 (S2) to IEC 60252-1			
Life expectancy to IEC/EN 60252	250 V: 10 000 h (class B)	450 V: 30 000 h (class A)	450 V: 30 000 h (class A)	

### Climatic parameter to IEC 60068-1

Temperature limit	$T_{\text{min}}/T_{\text{max}}$	-25/ +85	-25/ +85	-25/ +85	°C
Test duration (damp heat test)	$t_{\text{test}}$	21			days

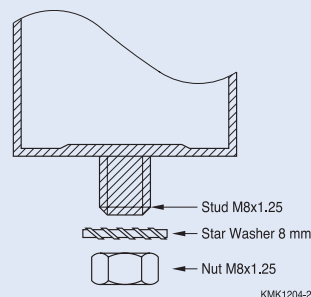
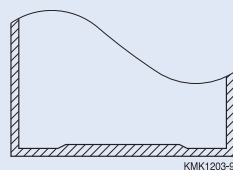
### Construction

Reference standards	IEC 60252-1, EN 60252, UL 810			
Can	Aluminum can with overpressure disconnection device			
Terminal top	UL 94 V2/V0 compatible; glow wire test to IEC/EN 60695-2-1/1; compatible to IEC/EN 60335-1 as an option			
Dimensions	$\varnothing 30 \dots 40 \text{ mm}$ H: 68 ... 103 mm	$\varnothing 30 \dots 40 \text{ mm}$ H: 52 ... 103 mm	$\varnothing 30 \dots 40 \text{ mm}$ H: 74 ... 125 mm	

### Approvals

	UL 810 component	VDE UL 810 component CQC on request TÜV	VDE UL 810 component TÜV	
--	------------------	--	--------------------------------	--

### Mounting options



# MotorCap P2 (S2) Aluminum Can

## Single Capacitance, B32330/B32332 Series



Ordering codes and packing units								
V <sub>R</sub>	C <sub>R</sub>	Max. dimensions D × H	Ordering code	Approvals				Packing units
				VDE 450 V	TÜV	UL	CQC on request	
V AC	µF	mm						
<b>B32330/B32332</b>								
250	upon request							
450	1	30 × 52	B3233*I6105J0#x	A	A	●	●	49
	1.5	30 × 52	B3233*I6155J0#x	A	A	●	●	49
	2	30 × 52	B3233*I6205J0#x	A	A	●	●	49
	2.5	30 × 52	B3233*I6255J0#x	A	A	●	●	49
	3	30 × 52	B3233*I6305J0#x	A	A	●	●	49
	3.5	30 × 52	B3233*I6355J0#x	A	A	●	●	49
	4	30 × 52	B3233*I6405J0#x	A	A	●	●	49
	5	30 × 52	B3233*I6505J0#x	A	A	●	●	49
	6	30 × 52	B3233*I6605J0#x	A	A	●	●	49
	7	30 × 52	B3233*I6705J0#x	A	A	●	●	49
	7.5	30 × 68	B3233*I6755J0#x	A	A	●	●	49
	8	30 × 68	B3233*I6805J0#x	A	A	●	●	49
	9	30 × 68	B3233*I6905J0#x	A	A	●	●	49
	10	30 × 68	B3233*I6106J0#x	A	A	●	●	49
	12	30 × 78	B3233*I6126J0#x	A	A	●	●	49
	15	30 × 78	B3233*I6156J0#x	A	A	●	●	49
	17	30 × 93	B3233*I6176J0#x	A	A	●	●	49
	18	30 × 93	B3233*I6186J0#x	A	A	●	●	49
	20	30 × 93	B3233*I6206J0#x	A	A	●	●	49
	22	35 × 93	B3233*I6226J0#x	-	A	●	●	36
	25	35 × 93	B3233*I6256J0#x	-	A	●	●	36
30	35 × 93	B3233*I6306J0#x	-	A	●	●	36	
35	35 × 103	B3233*B6356J0#x	-	A	●	●	36	
40	40 × 103	B3233*B6406J0#x	-	A	●	●	36	
45	40 × 103	B3233*B6456J0#x	-	A	●	●	36	
50	45 × 103	B3233*B6506J0#x	-	A	●	●	25	
55	45 × 103	B3233*B6556J0#x	-	-	●	●	25	
60	45 × 103	B3233*B6606J0#x	-	-	●	●	25	

### Composition of ordering code

**\*: Terminals**

- 0 Single fast-on terminals
- 2 Double fast-on terminals

**#: Construction of can and plastic top**

- 5 Aluminum can, Option A: UL 94 V2 top
- 6 Aluminum can, Option B: UL 94 V2/V0 top/IEC 60335-1
- 7 Aluminum can with M8 bolt, Option A: UL 94 V2 top
- 8 Aluminum can with M8 bolt, Option B: UL 94 V2/V0 top/IEC 60335-1

**x: Terminal details**

- 0 Fast-on terminals
- 1 ... 9 Ordering codes will be created based on cable length and receptacles on request

# MotorCap P2 (S2) Aluminum Can

## Single Capacitance, B32333 Series



Ordering codes and packing units							
V <sub>R</sub>	C <sub>R</sub>	Max. dimensions D × H	Ordering code	Approvals			Packing units
V AC	μF	mm		VDE 450 V	TÜV	UL	
<b>B32333</b>							
250	upon request						
450	1	30 × 74	B32333I6105J0#x	A	A	●	80
	1.5	30 × 74	B32333I6155J0#x	A	A	●	80
	2	30 × 74	B32333I6205J0#x	A	A	●	80
	2.5	30 × 74	B32333I6255J0#x	A	A	●	80
	3	30 × 74	B32333I6305J0#x	A	A	●	80
	3.5	30 × 74	B32333I6355J0#x	A	A	●	80
	4	30 × 74	B32333I6405J0#x	A	A	●	80
	5	30 × 74	B32333I6505J0#x	A	A	●	80
	6	30 × 74	B32333I6605J0#x	A	A	●	80
	7	30 × 74	B32333I6705J0#x	A	A	●	80
	7.5	30 × 90	B32333I6755J0#x	A	A	●	80
	8	30 × 90	B32333I6805J0#x	A	A	●	80
	9	30 × 90	B32333I6905J0#x	A	A	●	80
	10	30 × 90	B32333I6106J0#x	A	A	●	80
	12	30 × 100	B32333I6126J0#x	A	A	●	80
	15	30 × 100	B32333I6156J0#x	A	A	●	80
	17	30 × 115	B32333I6176J0#x	A	A	●	80
	18	30 × 115	B32333I6186J0#x	A	A	●	80
	20	30 × 115	B32333I6206J0#x	A	A	●	80
	25	35 × 115	B32333I6256J0#x	–	A	●	63
30	35 × 115	B32333I6306J0#x	–	A	●	63	
35	35 × 125	B32333B6356J0#x	–	A	●	63	
40	40 × 125	B32333B6406J0#x	–	A	●	48	
45	40 × 125	B32333B6456J0#x	–	A	●	48	
50	45 × 125	B32333B6506J0#x	–	A	●	36	
55	45 × 125	B32333B6556J0#x	–	–	●	36	
60	45 × 125	B32333B6606J0#x	–	–	●	36	

### Composition of ordering code

#### #: Construction of can and plastic top

- 5 Aluminum can, Option A: UL 94 V2 top
- 6 Aluminum can, Option B: UL 94 V2/V0 top/IEC 60335-1
- 7 Aluminum can with M8 bolt, Option A: UL 94 V2 top
- 8 Aluminum can with M8 bolt, Option B: UL 94 V2/V0 top/IEC 60335-1

#### x: Terminal details

- 0 Fast-on terminals
- 1 ... 9 Ordering codes will be created based on cable length and receptacles on request

### Display of ordering codes for EPCOS products

The ordering code for one and the same EPCOS product can be represented differently in data sheets, data books, other publications, on the EPCOS website, or in order-related documents such as shipping notes, order confirmations and product labels. The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products. Detailed information can be found on the Internet under [www.epcos.com/orderingcodes](http://www.epcos.com/orderingcodes)

# MotorCap P2 (S2) Aluminum Can

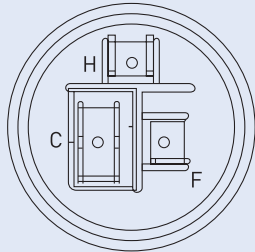
## Dual Capacitance, B32335 Series



Technical data		
Type/ series	B32335 (250 V)	B32335 (450 V)
Terminals	Fast-on terminals – Single fast-on – Double fast-on – Quadruple	
<b>Electrical ratings</b>		
Rated voltage	$V_R$ 250 V	450 V
Rated capacitance	$C_R$ 15+2 ... 30+8 $\mu\text{F}$	10+1 ... 60+10 $\mu\text{F}$
Rated frequency	$f_R$ 50/ 60 Hz	
Capacitance tolerance	$\pm 5\%$	
Max. permissible voltage	$V_{max}$ 1.1 $\cdot V_R$	
Max. permissible current	$I_{max}$ 1.3 $\cdot I_R$	
Dissipation factor (20 °C, 120 Hz)	$\tan \delta \leq 1.0 \cdot 10^{-3}$	
<b>Safety</b>		
Class of safety	P2 (S2) to IEC/EN 60252-1	
Life expectancy to IEC/EN 60252	250 V: 10 000 h (class B)	Up to 450 V: 10 000 h (class B)
<b>Climatic parameter to IEC/EN 60068-1</b>		
Temperature limits	$T_{min}/T_{max}$ -25 °C/ +85 °C	
Test duration (damp heat test)	$t_{test}$ 21 days	
<b>Construction</b>		
Reference standards	IEC 60252-1, EN 60252, UL 810	
Can	Aluminum can with overpressure disconnection device	
Terminal top	UL 94 V2 compatible; glow wire test to IEC/EN 60695-2-1/1; compatible to IEC/EN 60335-1 as an option	
Dimensions	$\varnothing$ 40 ... 63 mm H: 70 ... 124 mm	$\varnothing$ 40 ... 53 mm H: 70 ... 105 mm
<b>Approvals</b>		
	UL 810 component	UL 810 component TÜV
<b>Mounting options</b>		

The Dual MotorCap is designed as a dual run electrical capacitor. To create a rotating magnetic field, it alters the current to one or more windings of an electric motor. It is used in air conditioners, washing machines and heat pumps.

A dual run capacitor supports two electric motors, such as in large air conditioner or heat pump units, with both a fan motor and a compressor motor. The dual capacitor has 3 terminals labeled "C", "F", and "H" for the common, fan, and hermetic compressor connections.



Round dual run capacitors are commonly used for air conditioning and to help starting and running the compressor or condenser fan motor. Dual capacitors are available in a variety of sizes, depending on capacitance, e.g. 40 plus 5  $\mu\text{F}$ , and on voltage.

For series B32335, all characteristics of the MotorCap P2 (S2) aluminum can series are valid as well, and therefore comply in the same way to the highest EPCOS standards.

# MotorCap P2 (S2) Aluminum Can

## Dual Capacitance, B32335 Series



### Ordering codes and packing units

V <sub>R</sub> V AC	C <sub>R</sub> μF	Max. dimensions D × H mm	Ordering code	Approvals		Packing units
				TÜV	UL	
<b>B32335</b>						
250	upon request					
450	10+ 1	40 × 70	B3233516116J0#0	-	●	36
	10+ 1.5	40 × 70	B3233516116J5#0	-	●	36
	10+ 2	40 × 70	B3233516126J0#0	-	●	36
	12+ 1.5	40 × 70	B3233516136J5#0	-	●	36
	12+ 2	40 × 70	B3233516146J0#0	-	●	36
	12+ 5	40 × 70	B3233516176J0#0	-	●	36
	13+ 1.5	40 × 70	B3233516146J5#0	-	●	36
	13+ 1.8	40 × 70	B3233516146J8#0	-	●	36
	13+ 2	40 × 70	B3233516156J0#0	-	●	36
	13+ 5	40 × 70	B3233516186J0#0	-	●	36
	15+ 1.5	40 × 70	B3233516166J5#0	-	●	36
	15+ 2	40 × 70	B3233516176J0#1	B	●	36
	15+ 2.5	40 × 70	B3233516176J5#0	B	●	36
	15+ 3	40 × 70	B3233516186J0#1	B	●	36
	15+ 4	40 × 70	B3233516196J0#0	B	●	36
	15+ 5	40 × 70	B3233516206J0#0	B	●	36
	17+ 1.8	40 × 80	B3233516186J8#0	B	●	36
	20+ 1.5	40 × 80	B3233516216J5#0	B	●	36
	20+ 2	40 × 80	B3233516226J0#0	B	●	36
	20+ 4	40 × 80	B3233516246J0#0	B	●	36
	20+ 5	40 × 80	B3233516256J0#0	B	●	36
	25+ 1.5	40 × 80	B3233516266J5#0	B	●	36
	25+ 2	40 × 80	B3233516276J0#0	B	●	36
	25+ 2.5	40 × 80	B3233516276J5#0	B	●	36
	25+ 3	40 × 80	B3233516286J0#0	B	●	36
	25+ 4	40 × 80	B3233516296J0#0	B	●	36
	25+ 5	40 × 80	B3233516306J0#0	B	●	36
	25+ 7.5	40 × 94	B3233516326J5#0	B	●	36
	25+ 8	40 × 94	B3233516336J0#0	B	●	36
	25+10	40 × 94	B3233516356J0#0	B	●	36
	30+ 1.5	40 × 103	B3233516316J5#0	B	●	36
	30+ 1.8	40 × 103	B3233516316J8#0	B	●	36
	30+ 2	40 × 103	B3233516326J0#1	B	●	36
	35+ 1.5	40 × 103	B3233516366J5#0	B	●	36
	35+ 2	40 × 103	B3233516376J0#1	B	●	36
	35+ 3	40 × 103	B3233516386J0#0	B	●	36
	35+ 5	40 × 103	B3233516406J0#0	B	●	36
	35+ 6	40 × 103	B3233516416J0#0	B	●	36
	35+ 8	40 × 103	B3233516436J0#0	B	●	36
	35+10	40 × 103	B3233516456J0#0	B	●	36
	40+ 5	40 × 103	B3233516456J0#1	B	●	36
	45+ 4	45 × 103	B3233516496J0#0	B	●	25
	45+ 5	45 × 103	B3233516506J0#0	B	●	25
	46+ 6	45 × 103	B3233516526J0#0	B	●	25
	45+10	45 × 103	B3233516556J0#0	B	●	25
	50+ 4	45 × 103	B3233516546J0#0	B	●	25
	50+ 5	45 × 103	B3233516556J0#1	B	●	25
	55+ 5	53 × 105	B3233516606J0#0	B	●	25
	60+10	53 × 105	B3233516706J0#0	B	●	25

### Composition of ordering code

- #: Construction of can and plastic top
- 5 Aluminum can, without mounting, V2 top
- 6 Aluminum can, without mounting, V0 top/IEC 60335-1
- 7 Aluminum can with M8 bolt, UL 94 V2 top
- 8 Aluminum can with M8 bolt, UL 94 V2/V0 top/IEC 60335-1

# Cautions and Warnings

- The MotorCap P2 (S2) aluminum can should be operated in line with its typical approved usage.
- Handle the capacitor units carefully, as they may be charged even after disconnection.

- Observe the appropriate engineering practice.
- The capacitor terminals, connected busbars and cables as well as any other devices connected to them must be regarded as live. The device is electrically charged.

## Storage and operating conditions

Do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acids, alkalis, salts or similar substances are present. In a dusty environment, regular maintenance and cleaning, especially of the terminals, is required to avoid formation of a conductive path between phases and/or phases and ground.

## Ambient temperature

The capacitor must not be exposed to direct heat or fire. The permissible range of minimum and maximum temperatures is specified on the capacitor i.e.

25/70/21 = minimum permissible temperature:  $-25\text{ }^{\circ}\text{C}$ , max. permissible temperature:  $+70\text{ }^{\circ}\text{C}$ .

25/85/21 = minimum permissible temperature:  $-25\text{ }^{\circ}\text{C}$ , max. permissible temperature:  $+85\text{ }^{\circ}\text{C}$ .

Temperature is one of the main stress factors for polypropylene type capacitors. It has a major influence on their useful operating life. It should be noted that this useful life is considerably shorter in the case of higher temperature requirements. If the maximum permissible temperature is exceeded, the safety device may become inoperative.

**⚠** Do not expose the capacitor to a direct heat source! Direct exposure or proximity to heat sources can create hot spots on the capacitor much hotter than the ambient temperature and can cause sudden internal failures.

## Operating voltage $V_{op}$

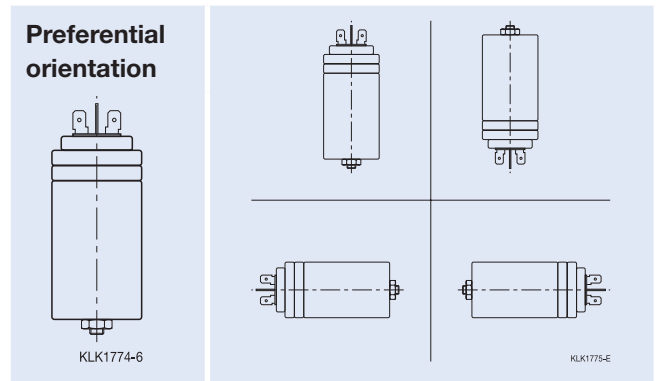
The capacitors have been designed for continuous operation at the rated voltage stated on the label. This voltage may be exceeded only within the limits permitted by the applicable standards at room temperature:

$V_{op}$	Operating duration
$1.1 \cdot V_R$	24 h/day
$1.2 \cdot V_R$	5 min/day
$1.3 \cdot V_R$	1 min/day

## Installation

### Mounting orientation

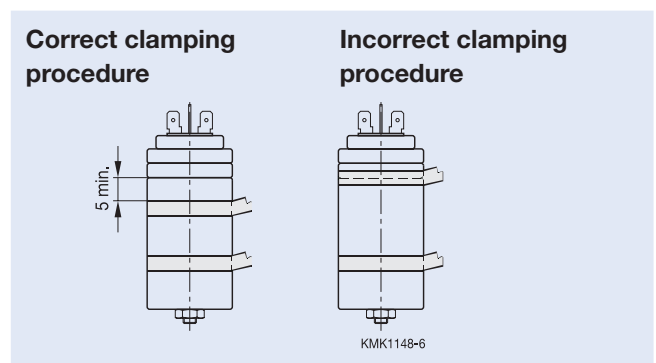
Motor-run capacitors may be mounted in any orientation. However, the capacitor is preferentially mounted with its terminals facing upwards.



**⚠** In case of dents deeper than 0.5 mm, do not install the capacitor.

### Fixation

Motor-run capacitors must be installed in a cool and well-ventilated place away from objects radiating heat. The maximum torque of capacitors with an M8 bolt is 5 Nm. This bolt is used for grounding the aluminum case. If the capacitor is fixed with a clamp, make sure this does not block or disable its safety device.



Note: For proper operation of the overpressure disconnecter see page 15.

# Cautions and Warnings

## Connectors

In case of fast-on terminals, the female connectors must be appropriate for the terminal. A good contact must be ensured.

Do not solder cables directly onto the fast-on terminals. The terminal may overheat, the capacitor may leak and any safety device will not operate properly.

**⚠** If the female connector becomes loose, the terminal may overheat, the capacitor may leak and any safety device will not operate properly.

The hermetic seal of the capacitor is extremely important for a long operating life and correct functioning of the break-action mechanism of the overpressure disconnecter. Do not damage the rubber seal and the soldering at the tab connectors. The safety feature of the capacitor may not function properly if the capacitor is short-circuited across the terminals. Sufficient precautions must be taken when connecting the capacitor.

## Harmonics

Harmonics are sinusoidal voltages and currents whose frequencies are multiples of a 50 Hz or 60 Hz power supply frequency. They result from the operation of electrical loads with non-linear voltage-current characteristics. These loads are largely associated with modern electronic devices such as converters, electrical drives, welding machines and uninterruptible power supplies (UPS).

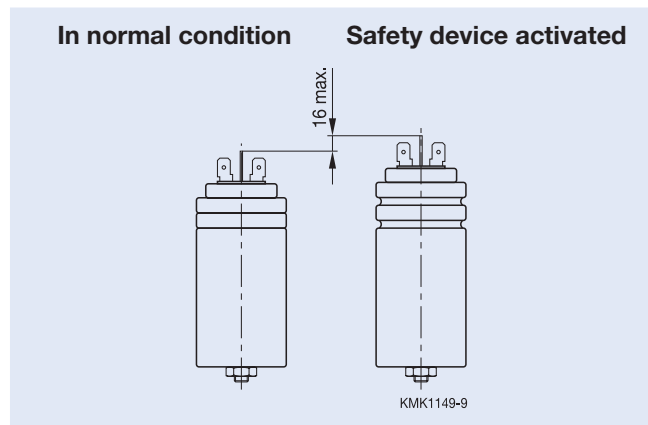
Harmonics may cause a higher than rated current to flow through the capacitors, which may overheat and become damaged. This may cause operational failures, bursting and fire.

The maximum permissible current (incl. fundamental and harmonic currents) specified in the technical data of the relevant series must not be exceeded under any circumstances.

## Overpressure disconnecter

Electrical components do not have an unlimited operating life; this also applies to self-healing capacitors. All capacitors of the B32330, B32332, B32333 and B32335 series are consequently fitted with a disconnecter that responds to overpressure. If numerous electrical breakdowns occur at the end of the capacitor's operating life or as a result of thermal or electrical overload, the formation of gas increases the pressure inside the capacitor case.

This causes the expansion bead to expand. If it does so beyond a certain point, the internal wires will separate (tear-off fuses) and disconnect the capacitor from the line opening at a predefined position (notch) at an expansion of 0.3 to 1.6 mm, depending on the capacitor size. This safety mechanism is irreversible. Once the safety device has operated, the capacitor will remain switched off. Because the notch of the mechanical safety mechanism is the weakest section in the connection, P2 (S2) aluminum capacitors should be handled properly during transportation to avoid damaging the break-action mechanism.



## Maintenance

There are no serviceable or repairable parts inside the capacitor, so please refrain from opening it.

For more details, please refer to the actual "Applications warning, Installation and Maintenance Instructions" at [www.epcos.com/ac\\_capacitors](http://www.epcos.com/ac_capacitors)

# Get in Contact

## Europe

**Austria, Bulgaria, Greece, Macedonia**  
EPCOS OHG  
Vienna/Austria  
T +43 51 70 72 56 39  
F +43 51 70 75 56 45  
sales.csee@epcos.com

**Czech Republic**  
EPCOS s.r.o.  
Prague  
T +420 2 33 03 22 81  
F +420 2 33 03 22 89  
sales.czech@epcos.com

**Finland, Estonia**  
EPCOS Nordic OY  
Espoo  
T +358 9 54 80 70 00  
F +358 9 54 80 70 01  
sales.nordic@epcos.com

**France, Belgium, Luxembourg, Malta**  
EPCOS SAS  
Pantin/France  
T +33 1 49 46 67 89  
F +33 1 49 46 67 67  
sales.france@epcos.com

**Germany, Liechtenstein, Netherlands, Switzerland**  
EPCOS AG  
Customer Service  
Munich/Germany  
T (D) 0180 500 33 48  
(0.14 Euro/min.)  
(NL) +31 70 33 10 611  
(CH) +49 89 54020 2691  
F +49 89 54020 2913  
sales.germany@epcos.com

**Hungary**  
EPCOS Elektronikai  
Alkatrészes Kft.  
Budapest  
T +36 1 436 07 20  
F +36 1 436 07 21  
sales.hungary@epcos.com

**Italy**  
TDK-EPC Italy S.r.l.  
Milan  
T +39 02 50 99 54 25  
F +39 02 50 99 54 55  
sales.italy@epcos.com

**Poland, Latvia, Lithuania**  
EPCOS Polska Sp. z o.o  
Warsaw/Poland  
T +48 22 24 60 409  
F +48 22 24 60 400  
sales.poland@epcos.com

**Portugal**  
EPCOS 2 Portugal LDA  
Évora  
T +351 91 75 67 927  
F +351 21 49 33 476  
sales.portugal@epcos.com

**Romania**  
EPCOS Sales Representative  
Timisoara  
T +40 72 31 14 111  
sales.romania@epcos.com

**Russia, Belarus, Kazakhstan, Moldavia, Ukraine**  
EPCOS LLC  
Moscow/Russia  
T +7 495 663 21 00 / 22  
sales.cis@epcos.com

**Slovakia**  
EPCOS Sales Representative  
Dolný Kubín  
T +42 1 43 5 82 36 73  
F +42 1 43 5 82 37 33  
sales.slovakia@epcos.com

**Slovenia, Serbia, Croatia, Bosnia & Herzegovina, Montenegro**  
EPCOS Sales Representative  
Škofljica/Slovenia  
T +386 599 56 35 3  
F +386 599 56 35 4  
sales.slovenia@epcos.com

**Spain**  
EPCOS Electronic Components S.A.  
Getafe  
T +34 91 514 71 61  
F +34 91 514 70 14  
sales.iberia@epcos.com

**Sweden, Iceland, Denmark, Norway**  
EPCOS Nordic AB  
Kista/Sweden  
T +46 8 4 77 27 00  
F +46 8 4 77 27 01  
sales.nordic@epcos.com

**Turkey**  
EPCOS AG  
Liaison Office  
Istanbul  
T +90 216 5 69 81 01  
F +90 216 4 64 07 56  
sales.turkey@epcos.com

**United Kingdom, Ireland**  
EPCOS UK Limited  
Bracknell/UK  
T +44 13 44 38 15 10  
F +44 13 44 38 15 12  
sales.uk@epcos.com

## Asia

**Afghanistan, Iran, Iraq, Jordan, Lebanon, Pakistan, Syria**  
EPCOS AG  
Liaison Office  
Istanbul/Turkey  
T +90 216 5 69 81 01  
F +90 216 4 64 07 56  
sales.turkey@epcos.com

**China**  
EPCOS (Shanghai), Ltd.  
Shanghai  
T +86 21 22 19 15 00  
F +86 21 22 19 15 99  
sales.cn@epcos.com

**Hong Kong**  
EPCOS Limited  
Hong Kong  
T +852 36 69 82 00  
F +852 36 69 82 56  
sales.cn@epcos.com

**India, Bahrain, Bangladesh, Kuwait, Nepal, Oman, Qatar, Saudi Arabia, Sri Lanka, United Arab Emirates**  
EPCOS India Private Ltd.  
Bangalore/India  
T +91 80 40 39 06 15  
F +91 80 40 39 06 03  
sales.in@epcos.com

**Israel**  
Nisko Projects Electronics & Communications (1999) Ltd.  
Tel Aviv  
T +972 37 65 73 00  
F +972 37 65 73 33  
sales.israel@epcos.com

**Japan**  
TDK Corporation  
Tokyo  
T +81 3 68 52 73 00  
inquiry@jp.tdk.com

**Korea**  
TDK-EPC Korea Co. Ltd.  
Seoul  
T +82 2 21 56 68 18  
F +82 2 21 56 68 98  
sales.kr@epcos.com

**Malaysia**  
EPCOS RDC SDN. BHD.  
Nilai  
T +60 6 79 98 168  
F +60 6 79 98 162  
sales.asean@epcos.com

**Philippines**  
c/o TDK Electronics Philippines Corporation  
Biñan  
T +63 49 541 31 41 66 30 / 31  
F +63 49 541 31 40  
sales.asean@epcos.com

**Singapore, Indonesia, Thailand, Vietnam**  
EPCOS PTE LTD  
Singapore  
T +65 68 41 20 11  
F +65 67 44 69 92  
sales.asean@epcos.com

**Taiwan**  
EPCOS Taiwan Co. Ltd.  
Taipei  
T +886 2 26 55 76 76  
F +886 2 27 82 03 89  
sales.tw@epcos.com

## Americas

**USA, Canada, Mexico**  
EPCOS Inc.  
Iselin, NJ/USA  
T +1 732 9 06 43 00  
F +1 732 9 06 43 95  
sales.usa@epcos.com

**South America**  
EPCOS do Brasil Ltda.  
São Paulo/Brazil  
T +55 11 36 12 51 87  
F +55 11 36 12 51 65  
sales.br@epcos.com

## Australia

**Australia, New Zealand**  
Electronic Component Solutions Pty Ltd  
Melbourne/Australia  
T +61 3 95 66 72 17  
F +61 3 95 66 72 99  
sales.au@epcos.com

## Africa

**Egypt**  
EPCOS AG  
Liaison Office  
Istanbul/Turkey  
T +90 216 5 69 81 01  
F +90 216 4 64 07 56  
sales.turkey@epcos.com

**Morocco, Tunisia**  
EPCOS SAS  
Pantin/France  
T +33 1 49 46 67 89  
F +33 1 49 46 67 67  
sales.france@epcos.com

**South Africa**  
Electrocomp (PTY) Ltd.  
Sandton  
T +27 11 458 90 00 32  
F +27 11 458 90 34  
sales.southernafrica@epcos.com

The addresses of our worldwide distributors and regional sales offices are available at [www.epcos.com/sales](http://www.epcos.com/sales)