



Film Capacitors – Power Factor Correction

DeltaCap Capacitors

Series/Type: MKDxxx-I-xx
Ordering code: B32300A*/ B32301A****A***/ B32301A****B***
Date: January 2018
Version: 9

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Construction

- Dielectric: Polypropylene film
- Non-PCB, Semi-dry biodegradable resin
- Extruded round aluminum can with stud
- Degree of protection: IP00 (optionally IP54 with terminal cover; additional cable gland at cable entry required)

Features

- Single-phase, provided with discharge resistors
- Double safety system:
 - overpressure disconnecter, self-healing technology
 - Naturally air cooled (or forced air cooling)
- Indoor mounting

Typical applications

- For Power Factor Correction

Terminals

- Fast-on terminals B32300A* series
- Screw terminals B32301A* series7

Mounting

- Threaded stud at bottom of can (max. torque for M12 = 10 Nm)



Technical data and specifications

Characteristics	
Rated capacitance C_R	According to specification table
Tolerance	-5 / +10%
Rated voltage V_R	According to specification table
Rated frequency f_R	50 and 60 Hz
Output	According to specification table
Rated current I_R	According to specification table

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B32301A**B*****

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Maximum ratings

V_{max}	$V_R + 10\%$ (up to 8 h daily) / $V_R + 15\%$ (up to 30 min daily) / $V_R + 20\%$ (up to 5 min daily) / $V_R + 30\%$ (up to 1 min daily)
I_{max}	Up to $1.3 \cdot I_R$ (up to $1.5 \cdot I_R$ including combined effects of harmonics, overvoltages and capacitance tolerance)
I_S	Up to $200 \cdot I_R$ (A)
*Power dissipation	≤ 0.2 W/kvar (dielectric) and ≤ 0.45 W / kvar (total)

* Without discharge resistor

Test data

V_{TT}	$2.15 \cdot V_R$ during 2 s
V_{TC}	3000 V AC / 50 Hz during 10 s
* $\tan \delta$ (50 Hz)	$\leq 1.0 \cdot 10^{-3}$

* Without discharge resistor

Climatic category –40/D

T_{min}	-40 °C
T_{max}	+55 °C
Storage temperature	-40 °C ... +85 °C
T_{max} Hotspot	+85 °C
Humidity	Av. rel. < 95%
Degree of protection	IP00 (optionally IP54 with terminal cover; additional cable gland at cable entry required)
Maximum altitude	4000 m

Mean life expectancy

t_{LD}	Up to 135000 hours at temperature class -40/C Up to 100000 hours at temperature class -40/D
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Max. 5000 switchings per year acc. to IEC 60831

Design data

Dimensions (d × h)	According to specification table
Weight approx	According to specification table
Impregnation	Non PCB, resin filling: soft polyurethane resin
Fixing	Threaded bolt M12
Max. torque (Al can stud)	10 Nm
Mounting position	Only in the vertical position. See "Maintenance and Installation Manual" for further details.


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Terminals	
Protection degree	IP00 for B32300 (optional IP54 with plastic terminal cap, additional cable gland at cable entry required); IP20 for B32301
Maximum terminal current	15 A (fast-on terminals) / 50 A (screw terminals)
Creepage distance (min)	12.7 mm
Clearance (min)	9.6 mm

Safety	
Mechanical safety	Overpressure disconnecter
Max. short circuit current	(AFC: 10 kA according UL 810 standard)
Discharge resistor time	≤ 60 s to 75 V or less

Reference standards	
IEC 60831–1/2, UL 810-5th edition	

Label design



EPCOS

Power Quality Solutions

DeltaCap™

MKD230-I-2.5


B32300A2022A530

151 µF	△ -5+5 %	SH
U _N	Q _N /50HZ	Q _N /60HZ
230V~	2.5Kvar	3.0Kvar
220V~	2.3Kvar	2.8Kvar
127V~	0.8Kvar	0.9Kvar
U _i =3/8Kv	IEC60831-1:2014	
-40/D	IEC60831-2:2014	

Ⓒ Protected 10K AFC Non PCB
Overpressure disconnecter

Made by EPCOS 287Z 2018

Discharge before handling



12345678901

Ordering codes

Type	50 Hz		60 Hz		C _R μF	d x h mm	Weight kg	Ordering code	Packing unit pcs
	Output kvar	I _R A	Output kvar	I _R A					
Rated voltage 230 V AC, 50/60 Hz, single phase									
MKD230-I-0.8	0.8	3.5	1.0	4.2	48	63.5 x 64.5	0.3	B32300A2002A830	12
MKD230-I-1.7	1.7	7.4	2.0	8.9	102	63.5 x 102	0.4	B32300A2012A730	12
MKD230-I-2.5	2.5	10.9	3.0	13.1	151	63.5 x 127	0.5	B32300A2022A530	12
Rated voltage 250 V AC, 50/60 Hz, single phase									
MKD250-I-0.8	0.8	3.2	1.0	3.8	41	50 x 77	0.2	B32300A2002A850	50
MKD250-I-1.7	1.7	6.8	2.0	8.2	87	63.5 x 92	0.4	B32300A2012A750	12
MKD250-I-2.0	2.0	7.8	2.4	9.4	100	63.5 x 92	0.4	B32300A2022A050	12
MKD250-I-2.5	2.5	10.0	3.0	12.0	127	63.5 x 102	0.5	B32300A2022A550	12
MKD250-I-5.0	5.0	20.0	6.0	24.0	255	75 x 166	0.7	B32301A2052#050*	6
MKD250-I-7.5	7.5	30.0	9.0	36.0	382	85 x 196	1.1	B32301A2072#550*	4
MKD250-I-10	10.0	40.0	12.0	48.0	510	85 x 216	1.2	B32301A2102#050*	4
Rated voltage 400 V AC, 50/60 Hz, single phase									
MKD400-I-0.8	0.8	2.0	1.0	2.4	16	50 x 64.5	0.2	B32300A4002A800	50
MKD400-I-1.7	1.7	4.3	2.0	5.2	34	63.5 x 62.5	0.3	B32300A4012A700	12
MKD400-I-2.5	2.5	6.3	3.0	7.6	50	63.5 x 77	0.3	B32300A4022A500	12
MKD400-I-3.3	3.3	8.3	4.0	10.0	66	63.5 x 102	0.4	B32300A4032A300	12
MKD400-I-4.2	4.2	10.5	5.0	12.6	84	63.5 x 102	0.4	B32300A4051A000	12
MKD400-I-5.0	5.0	12.5	6.0	15.0	100	63.5 x 127	0.5	B32300A4052A000	12
Rated voltage 415 V AC, 50/60 Hz, single phase									
MKD415-I-0.8	0.8	1.9	1.0	2.3	15	50 x 64.5	0.2	B32300A4082A310	50
MKD415-I-1.7	1.7	4.0	2.0	4.8	31	63.5 x 64.5	0.3	B32300A4012A710	12
MKD415-I-2.5	2.5	6.0	3.0	7.2	46	63.5 x 102	0.4	B32300A4022A510	12
MKD415-I-3.3	3.3	8.0	4.0	9.6	61	63.5 x 102	0.4	B32300A4032A310	12
MKD415-I-5.0	5.0	12.0	6.0	14.4	92	63.5 x 127	0.6	B32300A4052A010	12
Rated voltage 440 V AC, 50/60 Hz, single phase									
MKD440-I-0.7	0.7	1.6	0.8	1.9	12	50 x 64.5	0.2	B32300A4001A840	50
MKD440-I-1.4	1.4	3.2	1.7	3.8	23	63.5 x 64.5	0.3	B32300A4011A740	12
MKD440-I-2.1	2.1	4.8	2.5	5.8	35	63.5 x 77	0.3	B32300A4021A540	12
MKD440-I-2.8	2.8	6.4	3.4	7.7	46	63.5 x 102	0.4	B32300A4031A340	12
MKD440-I-3.3	3.3	7.5	4.0	9.0	54	63.5 x 102	0.4	B32300A4032A340	12
MKD440-I-4.2	4.2	9.5	5.0	11.4	69	63.5 x 127	0.5	B32300A4051A040	12
MKD440-I-5.0	5.0	11.4	6.0	13.7	82	63.5 x 127	0.5	B32300A4052A040	12

* Available either as B32301A****A*** series (2-terminal design, integrated resistor) or B32301A****B*** series (4-terminal design, pluggable ceramic resistor). Please replace # with the right character before ordering.

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B32301A**B*****

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Type	50 Hz		60 Hz		C _R	d x h	Weight	Ordering code	Packing unit pcs
	Output kvar	I _R A	Output kvar	I _R A	μF	mm			
Rated voltage 480 V AC, 50/60 Hz, single-phase									
MKD480-I-0.7	0.7	1.5	0.8	1.8	10	50 x 64.5	0.2	B32300A4001A880	50
MKD480-I-1.4	1.4	2.9	1.7	3.5	19	63.5 x 64.5	0.3	B32300A4011A780	12
MKD480-I-2.1	2.1	4.4	2.5	5.3	29	63.5 x 77	0.3	B32300A4021A580	12
MKD480-I-2.8	2.8	5.8	3.4	7.0	39	63.5 x 102	0.4	B32300A4031A380	12
Rated voltage 525 V AC, 50/60 Hz, single-phase									
MKD525-I-1.4	1.4	2.7	1.7	3.2	16	63.5 x 64.5	0.3	B32300A5011A730	12
MKD525-I-2.8	2.8	5.3	3.4	6.4	32	63.5 x 102	0.4	B32300A5031A320	12
MKD525-I-3.3	3.3	6.3	4.0	7.6	38	63.5 x 102	0.4	B32300A5032A320	12
MKD525-I-4.2	4.2	8.0	5.0	9.6	49	63.5 x 127	0.5	B32300A5051A020	12
MKD525-I-25.0	25.0	47.6	30.0	57.1	289	116 x 200	1.9	B32301A5252#025*	4

* Available either as B32301A****A*** series (2-terminal design, integrated resistor) or B32301A****B*** series (4-terminal design, pluggable ceramic resistor). Please replace # with the right character before ordering.

Important remark

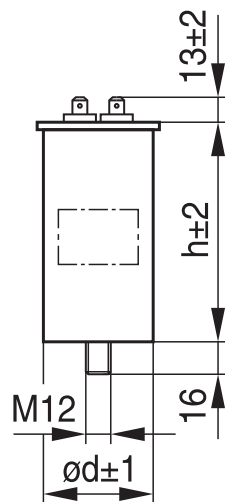


Hereafter mentioned capacitors with the wildcard character “#” are available either with integrated resistors with 2 terminals (B32301****A*** series) or with pluggable ceramic base discharge resistor with 4 terminals (B32301****B*** series).

The main difference between B32301A****A*** series and B32301A****B*** series is the way of assembling the discharge resistor. The resistor of B32301A****A*** series is assembled inside of capacitor terminal cover, the ceramic resistor of B32301A****B*** is plugged into the terminal pin.

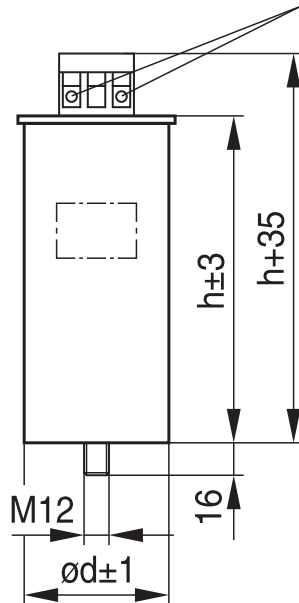
Dimensional drawings

B32300A*



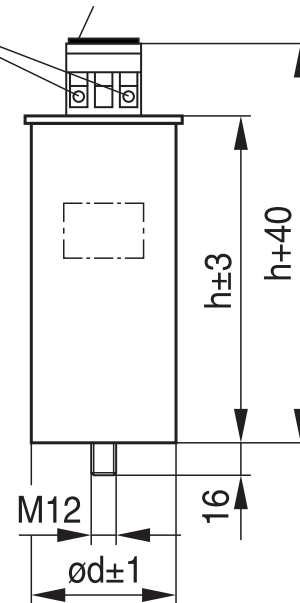
B32301A****A***

Max. cable cross section = 25 mm²

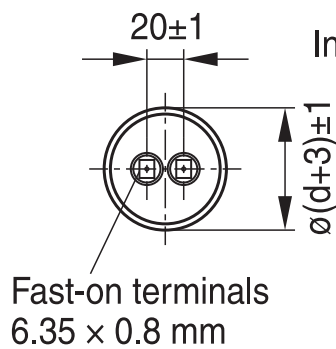


B32301A****B***

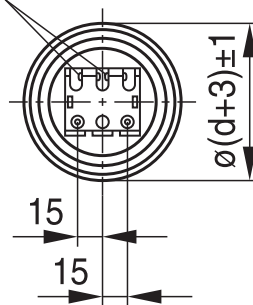
Pluggable ceramic resistor



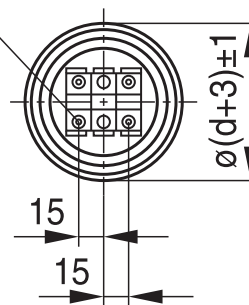
Torque = 10 Nm, Toothed washer J12 DIN 6797, Hex nut BM 12 DIN 439



Integrated resistors



Max. torque = 2.5 Nm



Creepage distance > 12.7 mm
Distance in air > 10 mm

KLK1950-6-E

Cautions and Warnings

These figures apply to the capacitor alone. Because the fixing and the terminals may influence the vibration properties, it is necessary to check stability when a capacitor is built in and exposed to vibration. Irrespective of this, you are advised not to locate capacitors where vibration amplitude reaches the maximum in strongly vibrating equipment.

Mechanical protection

The capacitor has to be installed in a way that mechanical damages and dents in the aluminum can be avoided.

Grounding

The threaded bottom stud of the capacitor has to be used for grounding. In case grounding is done via metal chassis that the capacitor is mounted to, the layer of varnish beneath the washer and nut should be removed. The maximum tightening torque is 10 Nm.

Maintenance

- Check tightness of the connections/terminals periodically.
- Take current reading twice a year and compare with nominal current. Use a harmonic analyser or true effective RMS-meter.
- In case of current above the nominal current check your application for modifications.
- If a significant increase in the amount of non-linear loads has been detected, then a consultant has to be called in for a harmonic study.
- In case of the presence of harmonics installation of a de-tuned capacitor bank (reactors) must be considered.
- Check the discharge resistors/reactors and in case of doubt, check their function:
 - (1) Power the capacitor up and down.
 - (2) After ≤ 60 seconds the voltage between the terminals must decline to less than 75 V.
- Check the temperature of capacitors directly after operation for a longer period, but make sure that the capacitors have been switched off. In case of excessive temperature of individual capacitors, it is recommended to replace these capacitors, as this should be an indication for loss factor increase, which is a sign for reaching end of life.

Storage and operating conditions

Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. In dusty environments regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground.

Note

For detailed information about PFC capacitors and cautions, refer to the latest version of EPCOS PFC Product Profile.

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