PhaseCap Energy 4.0 PFC Capacitors

Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

EPCOS

General

The series PhaseCap Energy 4.0 represents a new generation of capacitors for power factor correction (PFC). On basis of the well proven MKK-technology, this follow-on development of the PhaseCap series offers some major enhancements. A service life expectation of up to 200 000 hours, an increased inrush current capability of up to 500 · I_R and reduced can dimensions make the PhaseCap Energy 4.0 the ideal capacitor for industrial applications that call for high reliability.

PhaseCap Energy 4.0 is available in two versions: Series B25674B is gas filled, series B25675B with semi-dry biodegradable soft resin. Both series are equipped with self-healing properties and three-phase overpressure disconnector. A voltage range from 230 to 690 V, outputs of 5.0 to 33.0 kvar and four different terminal types allow the selection of the customized capacitor type.

Applications

- Automatic PFC equipment, capacitor banks
- Individual fixed PFC (e.g. motors, transformers, lighting)
- Group fixed PFC
- Tuned and detuned capacitor banks
- Dynamic PFC

Features

- Compact design in cylindrical aluminum can with stud
- Stacked winding
- MKK-technology with wavy cut and heavy edge
- Voltage range 230 V … 690 V
- Output range 5.0 kvar … 33 kvar

Electrical

- Long life expectancy up to 200 000 hours at temperature class –40/D
- High pulse current withstand capability
- High long term stability

Mechanical and maintenance

- Reduced mounting costs
- Maintenance-free
- Highest packing density thanks to compact dimensions

Safety

- Self-healing
- Overpressure disconnector
- Shock hazard protected terminals
- Ceramic discharge resistor pre-mounted up to 600 V

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Technical data and limit values

Standards IEC 60831-1+2		
Overvoltage	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)
Overcurrent	I_{max}	up to 1.6 … 2.0 · I_R including combined effects of harmonics, overvoltages and capacitance tolerance
Inrush current	I_S	up to 500 · I_R, depending on the particular type
Losses: **– Dielectric** **– Total***		 < 0.2 W/kvar < 0.45 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		–5% / +10%
Test voltage, terminal / terminal	V_{TT}	2.15 · V_{R1}, AC, 2 s
Test voltage, terminal / case	V_{TC}	3600 V AC / 50 Hz, 2 s up to V_R = 525 V, 6000 V AC / 50 Hz, 2 s above V_R = 525 V
Mean life expectancy	$t_{LD(Co)}$	B25674B: up to 180 000 h (temp. class –40/D); up to 160 000 h (temp. class –40/60) B25675B: up to 200 000 h (temp. class –40/D); up to 180 000 h (temp. class –40/60)
Ambient temperature		–40/60; max. temp. +60 °C; max. mean 24 h = +50 °C; max. mean 1 year = +40 °C; lowest temperature = –40 °C
Cooling		natural or forced
Humidity	H_{rel}	max. 95%
Altitude		max. 4000 m above sea level
Mounting position		upright / horizontal
Mounting and grounding		threaded M12 stud on bottom of case
Safety		three-phase overpressure disconnector, self-healing, maximum allowed fault current 10 000 A in accordance with UL 810 standard
Discharge device		ceramic discharge module or discharge module block
Case		extruded aluminum can
Enclosure		IP20, indoor mounting (optionally with terminal cap for IP54)
Dielectric		polypropylene film
Impregnation		B25674B: inert gas B25675B: semi-dry biodegradable resin
Terminals		optimized capacitor safety terminal with electric shock protection (IP20), (VDE 0106 part 100), max. 25 mm² cable cross-section, max. current 80 A
Certification		Approvals pending
Number of switching operations		max. 15000 switchings per year

* Without discharge resistor

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Gas filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 230 V AC, delta connection										
MKK230-D-5.0-03	5.0	12.6	6.0	15.1	3 · 100.3	A	75 x 224	1.0	B25674B2052J030	6
MKK230-D-7.5-03	7.5	18.8	9.0	22.6	3 · 150.4	B	100 x 197	1.5	B25674B2072J530	6
MKK230-D-10.0-03	10.0	25.1	12.0	30.1	3 · 200.5	B	100 x 230	1.8	B25674B2102J030	4
MKK230-D-12.5-03	12.5	31.4	15.0	37.7	3 · 250.7	B	116 x 212	2.2	B25674B2122J530	4
MKK230-D-15.0-03	15.0	37.7	–	–	3 · 300.8	B	125 x 212	2.5	B25674B2152J030	4
Rated voltage 400 V AC, delta connection										
MKK400-D-5.0-03	5.0	7.2	6.0	8.7	3 · 33.2	A	75 x 169	0.8	B25674B4052J000	6
MKK400-D-6.3-03	6.3	9.1	7.6	11.0	3 · 41.8	A	75 x 169	0.8	B25674B4062J300	6
MKK400-D-7.5-03	7.5	10.8	9.0	13.0	3 · 49.7	A	75 x 206	0.9	B25674B4072J500	6
MKK400-D-8.3-03	8.3	12.0	10.0	14.4	3 · 55.0	A	75 x 206	0.9	B25674B4082J300	6
MKK400-D-10.4-03	10.4	15.0	12.5	18.0	3 · 69.0	A	75 x 224	1.0	B25674B4102J400	6
MKK400-D-12.5-03	12.5	18.0	15.0	21.7	3 · 82.9	A	85 x 206	1.2	B25674B4122J500	6
MKK400-D-15.0-03	15.0	21.7	18.0	26.0	3 · 99.5	A	85 x 224	1.3	B25674B4152J000	6
MKK400-D-16.7-03	16.7	24.1	20.0	28.9	3 · 110.7	B	100 x 212	1.7	B25674B4162J700	6
MKK400-D-20.0-03	20.0	28.9	24.0	34.6	3 · 132.6	B	100 x 230	1.8	B25674B4202J000	4
MKK400-D-25.0-03	25.0	36.1	30.0	43.3	3 · 165.8	B	116 x 197	2.0	B25674B4252J000	4
MKK400-D-28.1-03	28.1	40.6	–	–	3 · 186.3	B	125 x 197	2.4	B25674B4282J100	4
MKK400-D-30.0-03	30.0	43.3	–	–	3 · 198.9	B	116 x 230	2.4	B25674B4302J000	4
MKK400-D-33.0-03	33.0	47.6	–	–	3 · 218.8	B	125 x 212	2.5	B25674B4332J000	4
Rated voltage 415 V AC, delta connection										
MKK415-D-5.0-03	5.0	7.0	6.0	8.3	3 · 30.8	A	75 x 169	0.8	B25674B4052J015	6
MKK415-D-6.3-03	6.3	8.8	7.6	10.6	3 · 38.8	A	75 x 169	0.8	B25674B4062J315	6
MKK415-D-7.5-03	7.5	10.4	9.0	12.5	3 · 46.2	A	75 x 191	0.9	B25674B4072J515	6
MKK415-D-8.3-03	8.3	11.5	10.0	13.9	3 · 51.1	A	75 x 206	0.9	B25674B4082J315	6
MKK415-D-10.4-03	10.4	14.5	12.5	17.4	3 · 64.1	A	75 x 206	0.9	B25674B4102J415	6
MKK415-D-12.5-03	12.5	17.4	15.0	20.9	3 · 77.0	A	85 x 206	1.2	B25674B4122J515	6
MKK415-D-15.0-03	15.0	20.9	18.0	25.0	3 · 92.4	A	85 x 206	1.2	B25674B4152J015	6
MKK415-D-16.7-03	16.7	23.2	20.0	27.8	3 · 102.9	B	100 x 197	1.5	B25674B4162J715	6
MKK415-D-20.0-03	20.0	27.8	24.0	33.4	3 x 123.2	B	100 x 212	1.7	B25674B4202J015	6
MKK415-D-25.0-03	25.0	34.8	30.0	41.7	3 x 154.0	B	116 x 197	2.0	B25674B4252J015	4
MKK415-D-28.1-03	28.1	39.1	–	–	3 x 173.1	B	116 x 212	2.2	B25674B4282J115	4
MKK415-D-30.0-03	30.0	41.7	–	–	3 x 184.8	B	116 x 212	2.2	B25674B4302J015	4
MKK415-D-33.0-03	33.0	45.9	–	–	3 x 203.3	B	116 x 230	2.4	B25674B4332J015	4

*Packing units for capacitors equal minimum order quantity.
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EPCOS

Gas filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 440 V AC, delta connection										
MKK440-D-5.0-03	5.0	6.6	6.0	7.9	3 · 27.4	A	75 x 169	0.8	B25674B4052J040	6
MKK440-D-6.0-03	6.0	7.9	7.2	9.4	3 · 32.9	A	75 x 169	0.8	B25674B4062J040	6
MKK440-D-6.3-03	6.3	8.3	7.6	10.0	3 · 34.5	A	75 x 169	0.8	B25674B4062J340	6
MKK440-D-7.0-03	7.0	9.2	8.4	11.0	3 · 38.4	A	75 x 206	0.9	B25674B4072J040	6
MKK440-D-7.5-03	7.5	9.8	9.0	11.8	3 · 41.1	A	75 x 206	0.9	B25674B4072J540	6
MKK440-D-8.0-03	8.0	10.5	9.6	12.6	3 · 43.8	A	75 x 206	0.9	B25674B4082J040	6
MKK440-D-8.3-03	8.3	10.9	10.0	13.1	3 · 45.5	A	75 x 206	0.9	B25674B4082J340	6
MKK440-D-9.0-03	9.0	11.8	10.8	14.2	3 · 49.3	A	75 x 206	0.9	B25674B4092J040	6
MKK440-D-10.0-03	10.0	13.1	12.0	15.7	3 · 54.8	A	75 x 206	0.9	B25674B4102J040	6
MKK440-D-10.4-03	10.4	13.6	12.5	16.4	3 · 57.0	A	75 x 224	1.0	B25674B4102J440	6
MKK440-D-12.0-03	12.0	15.7	14.4	18.9	3 · 65.8	A	85 x 206	1.2	B25674B4122J040	6
MKK440-D-12.5-03	12.5	16.4	15.0	19.7	3 · 68.5	A	85 x 206	1.2	B25674B4122J540	6
MKK440-D-14.2-03	14.2	18.6	17.0	22.3	3 · 77.8	A	85 x 206	1.2	B25674B4142J240	6
MKK440-D-15.0-03	15.0	19.7	18.0	23.6	3 · 82.2	A	85 x 224	1.3	B25674B4152J040	6
MKK440-D-16.7-03	16.7	21.9	20.0	26.2	3 · 91.5	B	100 x 212	1.7	B25674B4162J740	6
MKK440-D-18.8-03	18.8	24.7	22.6	29.7	3 · 103.0	B	100 x 212	1.7	B25674B4182J840	6
MKK440-D-20.0-03	20.0	26.2	24.0	31.5	3 · 109.6	B	100 x 212	1.7	B25674B4202J040	6
MKK440-D-25.0-03	25.0	32.8	30.0	39.4	3 · 137.0	B	116 x 197	2.0	B25674B4252J040	4
MKK440-D-28.1-03	28.1	36.9	–	–	3 · 154.0	B	116 x 212	2.2	B25674B4282J140	4
MKK440-D-30.0-03	30.0	39.4	–	–	3 · 164.4	B	125 x 197	2.4	B25674B4302J040	4
MKK440-D-33.1-03	33.1	43.4	–	–	3 · 181.4	B	116 x 230	2.4	B25674B4332J140	4
Rated voltage 480 V AC, delta connection										
MKK480-D-5.0-03	5.0	6.0	6.0	7.2	3 · 23.0	A	75 x 169	0.8	B25674B4052J080	6
MKK480-D-6.3-03	6.3	7.6	7.6	9.1	3 · 29.0	A	75 x 169	0.8	B25674B4062J380	6
MKK480-D-7.5-03	7.5	9.0	9.0	10.8	3 · 34.5	A	75 x 206	0.9	B25674B4072J580	6
MKK480-D-8.3-03	8.3	10.0	10.0	12.0	3 · 38.2	A	75 x 206	0.9	B25674B4082J380	6
MKK480-D-10.4-03	10.4	12.5	12.5	15.0	3 · 47.9	A	75 x 206	0.9	B25674B4102J480	6
MKK480-D-11.0-03	11.0	13.2	13.2	15.9	3 · 50.7	A	85 x 206	1.2	B25674B4112J080	6
MKK480-D-12.5-03	12.5	15.0	15.0	18.0	3 · 57.6	A	85 x 206	1.2	B25674B4122J580	6
MKK480-D-13.8-03	13.8	16.6	16.6	20.0	3 · 63.5	A	85 x 206	1.2	B25674B4132J880	6
MKK480-D-15.0-03	15.0	18.0	18.0	21.7	3 · 69.1	A	85 x 224	1.3	B25674B4152J080	6
MKK480-D-16.7-03	16.7	20.1	20.0	24.1	3 · 76.9	B	100 x 212	1.7	B25674B4162J780	6
MKK480-D-20.0-03	20.0	24.1	24.0	28.9	3 · 92.1	B	100 x 212	1.7	B25674B4202J080	6
MKK480-D-20.8-03	20.8	25.0	25.0	30.1	3 · 95.8	B	100 x 230	1.8	B25674B4202J880	4
MKK480-D-22.0-03	22.0	26.5	26.4	31.8	3 · 101.3	B	100 x 230	1.8	B25674B4222J080	4
MKK480-D-25.0-03	25.0	30.1	30.0	36.1	3 · 115.1	B	116 x 197	2.0	B25674B4252J080	4
MKK480-D-28.1-03	28.1	33.8	–	–	3 · 129.4	B	116 x 212	2.2	B25674B4282J180	4
MKK480-D-30.0-03	30.0	36.1	–	–	3 · 138.1	B	125 x 197	2.4	B25674B4302J080	4
MKK480-D-31.0-03	31.0	37.3	–	–	3 · 142.7	B	125 x 197	2.4	B25674B4312J080	4
MKK480-D-33.0-03	33.0	39.7	–	–	3 · 152.0	B	116 x 230	2.4	B25674B4332J080	4

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Gas filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 525 V AC, delta connection										
MKK525-D-5.0-03	5.0	5.5	6.0	6.6	3 · 19.2	A	75 x 169	0.8	B25674B5052J025	6
MKK525-D-6.3-03	6.3	6.9	7.6	8.4	3 · 24.2	A	75 x 169	0.8	B25674B5062J325	6
MKK525-D-7.5-03	7.5	8.2	9.0	9.9	3 · 28.9	A	75 x 191	0.9	B25674B5072J525	6
MKK525-D-8.3-03	8.3	9.1	10.0	11.0	3 · 31.9	A	75 x 206	0.9	B25674B5082J325	6
MKK525-D-10.4-03	10.4	11.4	12.5	13.7	3 · 40.0	A	85 x 191	1.1	B25674B5102J425	6
MKK525-D-12.5-03	12.5	13.7	15.0	16.5	3 · 48.1	A	85 x 206	1.2	B25674B5122J525	6
MKK525-D-13.2-03	13.2	14.6	15.8	17.4	3 · 50.8	A	85 x 206	1.2	B25674B5132J225	6
MKK525-D-15.0-03	15.0	16.5	18.0	19.8	3 · 57.7	A	85 x 224	1.3	B25674B5152J025	6
MKK525-D-16.7-03	16.7	18.4	20.0	22.0	3 · 64.3	B	100 x 212	1.7	B25674B5162J725	6
MKK525-D-20.0-03	20.0	22.0	24.0	26.4	3 · 77.0	B	100 x 230	1.8	B25674B5202J025	4
MKK525-D-20.8-03	20.8	22.9	25.0	27.5	3 · 80.1	B	100 x 230	1.8	B25674B5202J825	4
MKK525-D-25.0-03	25.0	27.5	30.0	33.0	3 · 96.2	B	116 x 212	2.2	B25674B5252J025	4
MKK525-D-26.5-03	26.5	29.1	31.8	35.0	3 · 102.0	B	116 x 212	2.2	B25674B5262J525	4
MKK525-D-28.1-03	28.1	30.9	–	–	3 · 108.2	B	125 x 197	2.4	B25674B5282J125	4
MKK525-D-30.0-03	30.0	30.0	–	–	3 · 115.5	B	125 x 212	2.5	B25674B5302J025	4
MKK525-D-33.1-03	33.1	36.4	–	–	3 · 127.4	B	136 x 197	2.8	B25674B5332J125	4
Rated voltage 600 V AC, delta connection										
MKK600-D-5.3-03	5.3	5.1	6.4	6.2	3 · 15.6	C	75 x 191	0.9	B25674B6062J200	6
MKK600-D-6.2-03	6.2	6.0	7.4	7.1	3 · 18.3	C	75 x 191	0.9	B25674B6062J900	6
MKK600-D-6.9-03	6.9	6.6	8.3	8.0	3 · 20.3	C	75 x 206	0.9	B25674B6082J300	6
MKK600-D-8.3-03	8.3	8.0	10	9.6	3 · 24.5	C	75 x 224	1.0	B25674B6102J400	6
MKK600-D-10.4-03	10.4	10.0	12.5	12.0	3 · 30.6	C	85 x 206	1.2	B25674B6122J500	6
MKK600-D-12.5-03	12.5	12.0	15.0	14.4	3 · 36.8	D	100 x 197	1.5	B25674B6132J900	6
MKK600-D-13.9-03	13.9	13.4	16.7	16.1	3 · 41.0	D	100 x 212	1.7	B25674B6142J600	6
MKK600-D-14.6-03	14.6	14.0	17.5	16.8	3 · 43.0	D	100 x 212	1.7	B25674B6162J700	6
MKK600-D-16.7-03	16.7	16.1	20.0	19.2	3 · 49.2	D	100 x 230	1.8	B25674B6202J000	4
MKK600-D-20.0-03	20.0	19.2	24.0	23.1	3 · 58.9	D	116 x 212	2.2	B25674B6202J800	4
MKK600-D-20.8-03	20.8	20.0	25.0	24.1	3 · 61.3	D	116 x 212	2.2	B25674B6252J000	4
MKK600-D-25.0-03	25.0	24.1	30.0	28.9	3 · 73.7	D	125 x 212	2.5	B25674B6282J000	4
MKK600-D-28.0-03	28.0	26.9	–	–	3 · 82.5	D	136 x 197	2.8	B25674B6302J000	4
MKK600-D-30.0-03	30.0	28.9	–	–	3 · 88.4	D	136 x 212	3.0	B25674B6062J200	4

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Gas filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 690 V AC, delta connection										
MKK690-D-5.3-03	5.3	4.4	6.4	5.4	3 · 11.8	C	75 x 191	0.9	B25674B6052J390	6
MKK690-D-6.2-03	6.2	5.2	7.4	6.2	3 · 13.8	C	75 x 191	0.9	B25674B6062J290	6
MKK690-D-6.9-03	6.9	5.8	8.3	6.9	3 · 15.4	C	75 x 206	0.9	B25674B6062J990	6
MKK690-D-8.3-03	8.3	6.9	10.0	8.4	3 · 18.5	C	75 x 206	0.9	B25674B6082J390	6
MKK690-D-10.4-03	10.4	8.7	12.5	10.5	3 · 23.2	C	75 x 206	0.9	B25674B6102J490	6
MKK690-D-12.5-03	12.5	10.5	15.0	12.6	3 · 27.9	C	85 x 206	1.2	B25674B6122J590	6
MKK690-D-13.9-03	13.9	11.6	16.7	14	3 · 31.0	C	85 x 206	1.2	B25674B6132J990	6
MKK690-D-14.6-03	14.6	12.2	17.5	14.6	3 · 32.5	D	100 x 197	1.5	B25674B6142J690	6
MKK690-D-16.7-03	16.7	14.0	20.0	16.7	3 · 37.2	D	100 x 197	1.5	B25674B6162J790	6
MKK690-D-20.0-03	20.0	16.7	24.0	20.1	3 · 44.6	D	100 x 212	1.7	B25674B6202J090	6
MKK690-D-20.8-03	20.8	17.4	25.0	20.9	3 · 46.3	D	100 x 230	1.8	B25674B6202J890	4
MKK690-D-25.0-03	25.0	20.9	30.0	25.1	3 · 55.7	D	116 x 197	2.0	B25674B6252J090	4
MKK690-D-28.0-03	28.0	23.4	–	–	3 · 62.4	D	116 x 212	2.2	B25674B6282J090	4
MKK690-D-30.0-03	30.0	25.1	–	–	3 · 66.8	D	125 x 197	2.4	B25674B6302J090	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

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PhaseCap Energy 4.0 PFC Capacitors

Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

EPCOS

Resin filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 230 V AC, delta connection										
MKK230-D-5.0-04	5.0	12.6	6.0	15.1	3 · 100.3	A	75 x 224	1.2	B25675B2052J030	6
MKK230-D-7.5-04	7.5	18.8	9.0	22.6	3 · 150.4	B	100 x 197	1.9	B25675B2072J530	6
MKK230-D-10.0-04	10.0	25.1	12.0	30.1	3 · 200.5	B	100 x 230	2.2	B25675B2102J030	4
MKK230-D-12.5-04	12.5	31.4	15.0	37.7	3 · 250.7	B	116 x 212	2.7	B25675B2122J530	4
MKK230-D-15.0-04	15.0	37.7	–	–	3 · 300.8	B	125 x 212	3.1	B25675B2152J030	4
Rated voltage 400 V AC, delta connection										
MKK400-D-5.0-04	5.0	7.2	6.0	8.7	3 · 33.2	A	75 x 169	1.0	B25675B4052J000	6
MKK400-D-6.3-04	6.3	9.1	7.6	11.0	3 · 41.8	A	75 x 169	1.0	B25675B4062J300	6
MKK400-D-7.5-04	7.5	10.8	9.0	13.0	3 · 49.7	A	75 x 206	1.2	B25675B4072J500	6
MKK400-D-8.3-04	8.3	12.0	10.0	14.4	3 · 55.0	A	75 x 206	1.2	B25675B4082J300	6
MKK400-D-10.4-04	10.4	15.0	12.5	18.0	3 · 69.0	A	75 x 224	1.2	B25675B4102J400	6
MKK400-D-12.5-04	12.5	18.0	15.0	21.7	3 · 82.9	A	85 x 206	1.4	B25675B4122J500	6
MKK400-D-15.0-04	15.0	21.7	18.0	26.0	3 · 99.5	A	85 x 224	1.6	B25675B4152J000	6
MKK400-D-16.7-04	16.7	24.1	20.0	28.9	3 · 110.7	B	100 x 212	2.0	B25675B4162J700	6
MKK400-D-20.0-04	20.0	28.9	24.0	34.6	3 · 132.6	B	100 x 230	2.2	B25675B4202J000	4
MKK400-D-25.0-04	25.0	36.1	30.0	43.3	3 · 165.8	B	116 x 197	2.5	B25675B4252J000	4
MKK400-D-28.1-04	28.1	40.6	–	–	3 · 186.3	B	125 x 197	2.9	B25675B4282J100	4
MKK400-D-30.0-04	30.0	43.3	–	–	3 · 198.9	B	116 x 230	2.9	B25675B4302J000	4
MKK400-D-33.0-04	33.0	47.6	–	–	3 · 218.8	B	125 x 212	3.1	B25675B4332J000	4
Rated voltage 415 V AC, delta connection										
MKK415-D-5.0-04	5.0	7.0	6.0	8.3	3 · 30.8	A	75 x 169	1.0	B25675B4052J015	6
MKK415-D-6.3-04	6.3	8.8	7.6	10.6	3 · 38.8	A	75 x 169	1.0	B25675B4062J315	6
MKK415-D-7.5-04	7.5	10.4	9.0	12.5	3 · 46.2	A	75 x 191	1.1	B25675B4072J515	6
MKK415-D-8.3-04	8.3	11.5	10.0	13.9	3 · 51.1	A	75 x 206	1.2	B25675B4082J315	6
MKK415-D-10.4-04	10.4	14.5	12.5	17.4	3 · 64.1	A	75 x 206	1.2	B25675B4102J415	6
MKK415-D-12.5-04	12.5	17.4	15.0	20.9	3 · 77.0	A	85 x 206	1.4	B25675B4122J515	6
MKK415-D-15.0-04	15.0	20.9	18.0	25.0	3 · 92.4	A	85 x 206	1.4	B25675B4152J015	6
MKK415-D-16.7-04	16.7	23.2	20.0	27.8	3 · 102.9	B	100 x 197	1.9	B25675B4162J715	6
MKK415-D-20.0-04	20.0	27.8	24.0	33.4	3 · 123.2	B	100 x 212	2.0	B25675B4202J015	6
MKK415-D-25.0-04	25.0	34.8	30.0	41.7	3 · 154.0	B	116 x 197	2.5	B25675B4252J015	4
MKK415-D-28.1-04	28.1	39.1	–	–	3 · 173.1	B	116 x 212	2.7	B25675B4282J115	4
MKK415-D-30.0-04	30.0	41.7	–	–	3 · 184.8	B	116 x 212	2.7	B25675B4302J015	4
MKK415-D-33.0-04	33.0	45.9	–	–	3 · 203.3	B	116 x 230	2.9	B25675B4332J015	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap Energy 4.0 PFC Capacitors

Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

EPCOS

Resin filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 440 V AC, delta connection										
MKK440-D-5.0-04	5.0	6.6	6.0	7.9	3 · 27.4	A	75 x 169	1.0	B25675B4052J040	6
MKK440-D-6.0-04	6.0	7.9	7.2	9.4	3 · 32.9	A	75 x 169	1.0	B25675B4062J040	6
MKK440-D-6.3-04	6.3	8.3	7.6	10.0	3 · 34.5	A	75 x 169	1.0	B25675B4062J340	6
MKK440-D-7.0-04	7.0	9.2	8.4	11.0	3 · 38.4	A	75 x 206	1.2	B25675B4072J040	6
MKK440-D-7.5-04	7.5	9.8	9.0	11.8	3 · 41.1	A	75 x 206	1.2	B25675B4072J540	6
MKK440-D-8.0-04	8.0	10.5	9.6	12.6	3 · 43.8	A	75 x 206	1.2	B25675B4082J040	6
MKK440-D-8.3-04	8.3	10.9	10.0	13.1	3 · 45.5	A	75 x 206	1.2	B25675B4082J340	6
MKK440-D-9.0-04	9.0	11.8	10.8	14.2	3 · 49.3	A	75 x 206	1.2	B25675B4092J040	6
MKK440-D-10.0-04	10.0	13.1	12.0	15.7	3 · 54.8	A	75 x 206	1.2	B25675B4102J040	6
MKK440-D-10.4-04	10.4	13.6	12.5	16.4	3 · 57.0	A	75 x 224	1.2	B25675B4102J440	6
MKK440-D-12.0-04	12.0	15.7	14.4	18.9	3 · 65.8	A	85 x 206	1.4	B25675B4122J040	6
MKK440-D-12.5-04	12.5	16.4	15.0	19.7	3 · 68.5	A	85 x 206	1.4	B25675B4122J540	6
MKK440-D-14.2-04	14.2	18.6	17.0	22.3	3 · 77.8	A	85 x 206	1.4	B25675B4142J240	6
MKK440-D-15.0-04	15.0	19.7	18.0	23.6	3 · 82.2	A	85 x 224	1.6	B25675B4152J040	6
MKK440-D-16.7-04	16.7	21.9	20.0	26.2	3 · 91.5	B	100 x 212	2.0	B25674B4162J740	6
MKK440-D-18.8-04	18.8	24.7	22.6	29.7	3 · 103.0	B	100 x 212	2.0	B25675B4182J840	6
MKK440-D-20.0-04	20.0	26.2	24.0	31.5	3 · 109.6	B	100 x 212	2.0	B25675B4202J040	6
MKK440-D-25.0-04	25.0	32.8	30.0	39.4	3 · 137.0	B	116 x 197	2.5	B25675B4252J040	4
MKK440-D-28.1-04	28.1	36.9	–	–	3 · 154.0	B	116 x 212	2.7	B25675B4282J140	4
MKK440-D-30.0-04	30.0	39.4	–	–	3 · 164.4	B	125 x 197	2.9	B25675B4302J040	4
MKK440-D-33.1-04	33.1	43.4	–	–	3 · 181.4	B	116 x 230	2.9	B25675B4332J140	4
Rated voltage 480 V AC, delta connection										
MKK480-D-5.0-04	5.0	6.0	6.0	7.2	3 · 23.0	A	75 x 169	1.0	B25675B4052J080	6
MKK480-D-6.3-04	6.3	7.6	7.6	9.1	3 · 29.0	A	75 x 169	1.0	B25675B4062J380	6
MKK480-D-7.5-04	7.5	9.0	9.0	10.8	3 · 34.5	A	75 x 206	1.2	B25675B4072J580	6
MKK480-D-8.3-04	8.3	10.0	10.0	12.0	3 · 38.2	A	75 x 206	1.2	B25675B4082J380	6
MKK480-D-10.4-04	10.4	12.5	12.5	15.0	3 · 47.9	A	75 x 206	1.2	B25675B4102J480	6
MKK480-D-11.0-04	11.0	13.2	13.2	15.9	3 · 50.7	A	85 x 206	1.4	B25675B4112J080	6
MKK480-D-12.5-04	12.5	15.0	15.0	18.0	3 · 57.6	A	85 x 206	1.4	B25675B4122J580	6
MKK480-D-13.8-04	13.8	16.6	16.6	20.0	3 · 63.5	A	85 x 206	1.4	B25675B4132J880	6
MKK480-D-15.0-04	15.0	18.0	18.0	21.7	3 · 69.1	A	85 x 224	1.6	B25675B4152J080	6
MKK480-D-16.7-04	16.7	20.1	20.0	24.1	3 · 76.9	B	100 x 212	2.0	B25675B4162J780	6
MKK480-D-20.0-04	20.0	24.1	24.0	28.9	3 · 92.1	B	100 x 212	2.0	B25675B4202J080	6
MKK480-D-20.8-04	20.8	25.0	25.0	30.1	3 · 95.8	B	100 x 230	2.2	B25675B4202J880	4
MKK480-D-22.0-04	22.0	26.5	26.4	31.8	3 · 101.3	B	100 x 230	2.2	B25675B4222J080	4
MKK480-D-25.0-04	25.0	30.1	30.0	36.1	3 · 115.1	B	116 x 197	2.5	B25675B4252J080	4
MKK480-D-28.1-04	28.1	33.8	–	–	3 · 129.4	B	116 x 212	2.7	B25675B4282J180	4
MKK480-D-30.0-04	30.0	36.1	–	–	3 · 138.1	B	125 x 197	2.9	B25675B4302J080	4
MKK480-D-31.0-04	31.0	37.3	–	–	3 · 142.7	B	125 x 197	2.9	B25675B4312J080	4
MKK480-D-33.0-04	33.0	39.7	–	–	3 · 152.0	B	116 x 230	2.9	B25675B4332J080	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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PhaseCap Energy 4.0 PFC Capacitors

Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

EPCOS

Resin filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 525 V AC, delta connection										
MKK525-D-5.0-04	5.0	5.5	6.0	6.6	3 · 19.2	A	75 x 169	1.0	B25675B5052J025	6
MKK525-D-6.3-04	6.3	6.9	7.6	8.4	3 · 24.2	A	75 x 169	1.0	B25675B5062J325	6
MKK525-D-7.5-04	7.5	8.2	9.0	9.9	3 · 28.9	A	75 x 191	1.1	B25675B5072J525	6
MKK525-D-8.3-04	8.3	9.1	10.0	11.0	3 · 31.9	A	75 x 206	1.2	B25675B5082J325	6
MKK525-D-10.4-04	10.4	11.4	12.5	13.7	3 · 40.0	A	85 x 191	1.3	B25675B5102J425	6
MKK525-D-12.5-04	12.5	13.7	15.0	16.5	3 · 48.1	A	85 x 206	1.4	B25675B5122J525	6
MKK525-D-13.2-04	13.2	14.6	15.8	17.4	3 · 50.8	A	85 x 206	1.4	B25675B5132J225	6
MKK525-D-15.0-04	15.0	16.5	18.0	19.8	3 · 57.7	A	85 x 224	1.6	B25675B5152J025	6
MKK525-D-16.7-04	16.7	18.4	20.0	22.0	3 · 64.3	B	100 x 212	2.0	B25675B5162J725	6
MKK525-D-20.0-04	20.0	22.0	24.0	26.4	3 · 77.0	B	100 x 230	2.2	B25675B5202J025	4
MKK525-D-20.8-04	20.8	22.9	25.0	27.5	3 · 80.1	B	100 x 230	2.2	B25675B5202J825	4
MKK525-D-25.0-04	25.0	27.5	30.0	33.0	3 · 96.2	B	116 x 212	2.7	B25675B5252J025	4
MKK525-D-26.5-04	26.5	29.1	31.8	35.0	3 · 102.0	B	116 x 212	2.7	B25675B5262J525	4
MKK525-D-28.1-04	28.1	30.9	–	–	3 · 108.2	B	125 x 197	2.9	B25675B5282J125	4
MKK525-D-30.0-04	30.0	30.0	–	–	3 · 115.5	B	125 x 212	3.1	B25675B5302J025	4
MKK525-D-33.1-04	33.1	36.4	–	–	3 · 127.4	B	136 x 197	3.4	B25675B5332J125	4
Rated voltage 600 V AC, delta connection										
MKK600-D-5.3-04	5.3	5.1	6.4	6.2	3 · 15.6	C	75 x 191	1.1	B25675B6052J300	6
MKK600-D-6.2-04	6.2	6.0	7.4	7.1	3 · 18.3	C	75 x 191	1.1	B25675B6062J200	6
MKK600-D-6.9-04	6.9	6.6	8.3	8.0	3 · 20.3	C	75 x 206	1.2	B25675B6062J900	6
MKK600-D-8.3-04	8.3	8.0	10	9.6	3 · 24.5	C	75 x 224	1.2	B25675B6082J300	6
MKK600-D-10.4-04	10.4	10.0	12.5	12.0	3 · 30.6	C	85 x 206	1.4	B25675B6102J400	6
MKK600-D-12.5-04	12.5	12.0	15.0	14.4	3 · 36.8	D	100 x 197	1.9	B25675B6122J500	6
MKK600-D-13.9-04	13.9	13.4	16.7	16.1	3 · 41.0	D	100 x 212	2.0	B25675B6132J900	6
MKK600-D-14.6-04	14.6	14.0	17.5	16.8	3 · 43.0	D	100 x 212	2.0	B25675B6142J600	6
MKK600-D-16.7-04	16.7	16.1	20.0	19.2	3 · 49.2	D	100 x 230	2.2	B25675B6162J700	4
MKK600-D-20.0-04	20.0	19.2	24.0	23.1	3 · 58.9	D	116 x 212	2.7	B25675B6202J000	4
MKK600-D-20.8-04	20.8	20.0	25.0	24.1	3 · 61.3	D	116 x 212	2.7	B25675B6202J800	4
MKK600-D-25.0-04	25.0	24.1	30.0	28.9	3 · 73.7	D	125 x 212	3.1	B25675B6252J000	4
MKK600-D-28.0-04	28.0	26.9	–	–	3 · 82.5	D	136 x 197	3.4	B25675B6282J000	4
MKK600-D-30.0-04	30.0	28.9	–	–	3 · 88.4	D	136 x 212	3.7	B25675B6302J000	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap Energy 4.0 PFC Capacitors

Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

EPCOS

Resin filled capacitors

Type	50 Hz		60 Hz		C_R	Terminal type	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF		mm	kg		
Rated voltage 690 V AC, delta connection										
MKK690-D-5.3-04	5.3	4.4	6.4	5.4	3 · 11.8	C	75 x 191	1.1	B25675B6052J390	6
MKK690-D-6.2-04	6.2	5.2	7.4	6.2	3 · 13.8	C	75 x 191	1.1	B25675B6062J290	6
MKK690-D-6.9-04	6.9	5.8	8.3	6.9	3 · 15.4	C	75 x 206	1.2	B25675B6062J990	6
MKK690-D-8.3-04	8.3	6.9	10.0	8.4	3 · 18.5	C	75 x 206	1.2	B25675B6082J390	6
MKK690-D-10.4-04	10.4	8.7	12.5	10.5	3 · 23.2	C	75 x 206	1.2	B25675B6102J490	6
MKK690-D-12.5-04	12.5	10.5	15.0	12.6	3 · 27.9	C	85 x 206	1.4	B25675B6122J590	6
MKK690-D-13.9-04	13.9	11.6	16.7	14	3 · 31.0	C	85 x 206	1.4	B25675B6132J990	6
MKK690-D-14.6-04	14.6	12.2	17.5	14.6	3 · 32.5	D	100 x 197	1.9	B25675B6142J690	6
MKK690-D-16.7-04	16.7	14.0	20.0	16.7	3 · 37.2	D	100 x 197	1.9	B25675B6162J790	6
MKK690-D-20.0-04	20.0	16.7	24.0	20.1	3 · 44.6	D	100 x 212	2.0	B25675B6202J090	6
MKK690-D-20.8-04	20.8	17.4	25.0	20.9	3 · 46.3	D	100 x 230	2.2	B25675B6202J890	4
MKK690-D-25.0-04	25.0	20.9	30.0	25.1	3 · 55.7	D	116 x 197	2.5	B25675B6252J090	4
MKK690-D-28.0-04	28.0	23.4	–	–	3 · 62.4	D	116 x 212	2.7	B25675B6282J090	4
MKK690-D-30.0-04	30.0	25.1	–	–	3 · 66.8	D	125 x 197	2.9	B25675B6302J090	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

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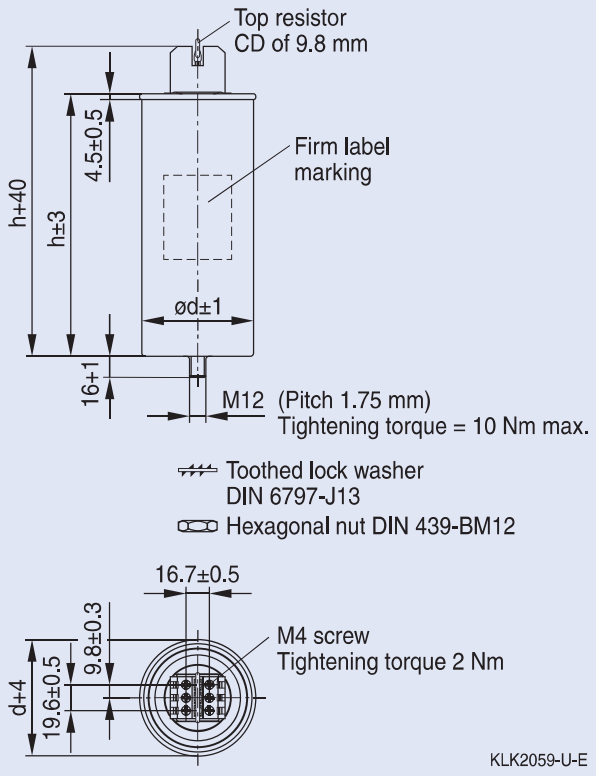
PhaseCap Energy 4.0 PFC Capacitors

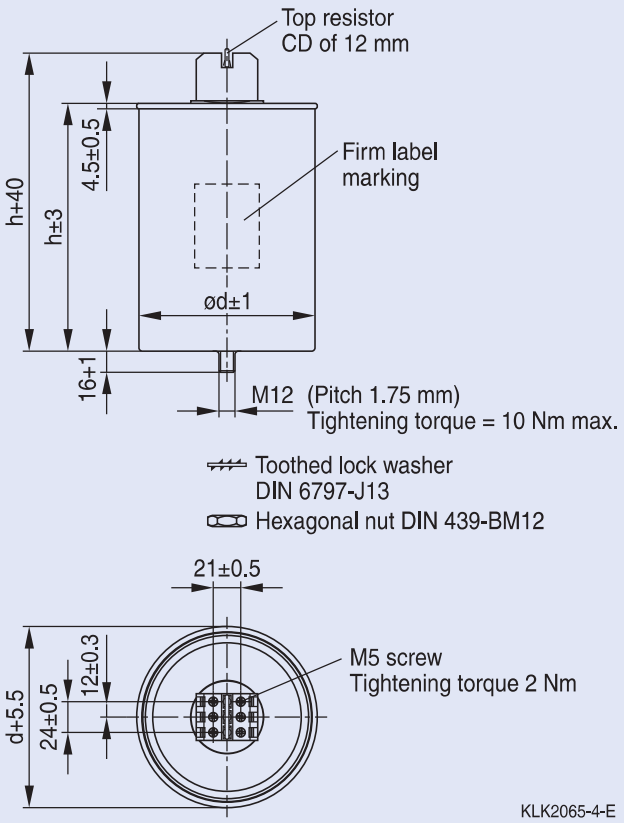
Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

Dimensional drawings

Terminal type A



Terminal type B

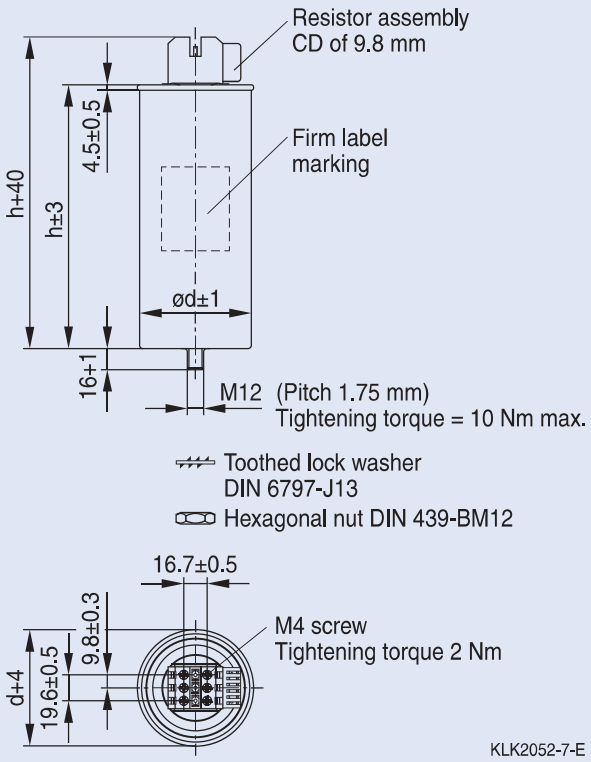


PhaseCap Energy 4.0 PFC Capacitors

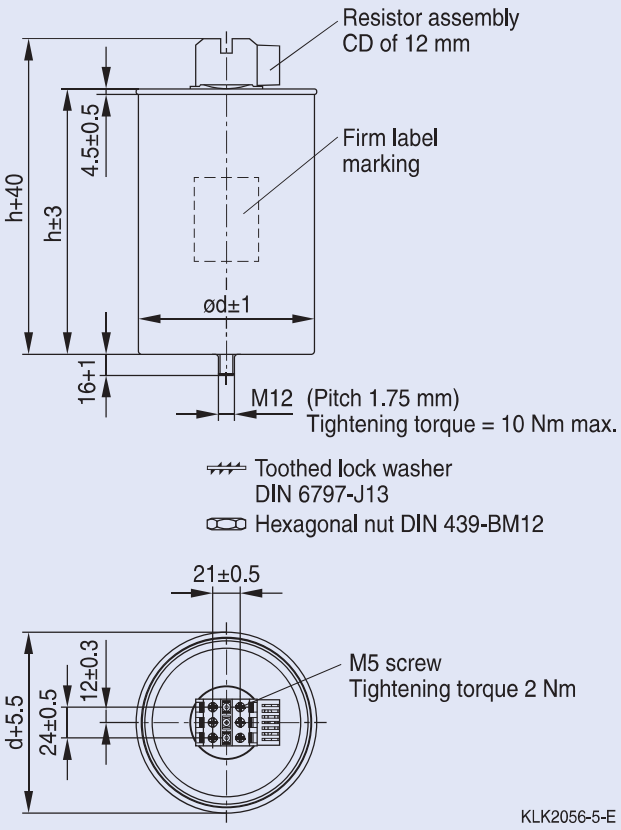
Gas or soft resin impregnated ● Stacked winding ● Wavy cut ● Automated Roboline series

Dimensional drawings

Terminal type C



Terminal type D



Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

EPCOS

General

PhaseCap capacitors in cylindrical aluminum cases have been designed for power factor correction in low-voltage applications.

Loads like motors and transformers consume active power as well as reactive power.

Generators, supply cables and other electrical distribution equipment, in turn, should be relieved of reactive power.

The MKK (metalized plastic compact) AC series is intended to increase packing density per bank and cut component costs.

Improved thermal response and simplified installation are advantages of the cylindrical aluminum case.

Applications

- Automatic PFC equipment, capacitor banks
- Individual fixed PFC (e.g. motors, transformers, lighting)
- Group fixed PFC
- Tuned and detuned capacitor banks
- Dynamic PFC

Features

- Compact design in cylindrical aluminum can with stud
- Concentric winding
- MKK-technology with wavy cut and heavy edge
- Voltage range 230 V … 800 V
- Output range 5.0 kvar … 33 kvar

Electrical

- Long life expectancy
- High pulse current withstand capability

Mechanical and maintenance

- Reduced mounting costs
- Maintenance-free
- Highest packing density thanks to compact dimensions

Safety

- Self-healing
- Overpressure disconnector
- Shock hazard protected terminals
- Longterm approved
- cUL approval
- Ceramic discharge resistor pre-mounted

Environmental

- Dry design, inert gas
- No oil leakage

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

EPCOS

Technical data and limit values

Standards IEC 60831-1+2, EN 60831-1+2, UL 810 5th edition		
Overvoltage	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)
Overcurrent	I_{max}	up to 1.6 · I_R including combined effects of harmonics, overvoltages and capacitance tolerance
Inrush current	I_S	up to 300 · I_R
Losses: **– Dielectric** **– Total***		 < 0.2 W/kvar < 0.45 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		–5% / +10%
Test voltage, terminal / terminal	V_{TT}	2.15 · V_{R1}, AC, 2 s
Test voltage, terminal / case	V_{TC}	up to $V_R \leq$ 660 V: 3000 V AC, 10 s; above V_R = 660 V: 6000 V AC, 10 s
Mean life expectancy	$t_{LD(Co)}$	up to 180 000 h (temp. class –40/C); up to 130 000 h (temp. class –40/D)
Ambient temperature		–40/D; max. temp. +55 °C; max. mean 24 h = +45 °C; max. mean 1 year = +35 °C; lowest temperature = –40 °C
Cooling		natural or forced
Humidity	H_{rel}	max. 95%
Altitude		max. 4000 m above sea level
Mounting position		upright / horizontal
Mounting and grounding		threaded M12 stud on bottom of case
Safety		dry technology, overpressure disconnector, self-healing, maximum allowed fault current 10 000 A in accordance with UL 810 standard
Discharge device		ceramic discharge resistor pre-mounted up to 660 V; external discharge module for > 660 V
Case		extruded aluminum can
Enclosure		IP20, indoor mounting (optionally with terminal cap for IP54)
Dielectric		polypropylene film
Impregnation		inert gas, Nitrogen (N_2)
Terminals		optimized capacitor safety terminal with electric shock protection (IP20), (VDE 0106 part 100), max. 25 mm² cable cross-section, max. current 80 A
Certification		cUL file # E238746, GOST
Number of switching operations		max. 7500 switchings per year

* Without discharge resistor

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PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

EPCOS

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 230 V AC, 50 / 60 Hz, delta connection									
MKK230-D-5.0-01	5.0	13	6.0	16	3 · 100	116 x 164	1.3	B25667C3297A375	4
MKK230-D-7.5-01	7.5	19	9.0	23	3 · 150	116 x 164	1.3	B25667C2457A375	4
MKK230-D-10.4-01	10.4	26	12.5	31	3 · 209	116 x 164	1.5	B25667C2627A375	4
MKK230-D-12.5-01[3]	12.5	31	15.0	37	3 · 251	116 x 200	1.7	B25667C2757A375	4
Rated voltage 400 V AC, 50 / 60 Hz, delta connection									
MKK400-D-5.0-01	5.0	7	6.0	9	3 · 32	116 x 164	1.1	B25667C5966A375	4
MKK400-D-7.5-01	7.5	11	9.0	13	3 · 50	116 x 164	1.2	B25667C3147A375	4
MKK400-D-10.0-01	10.0	14	12.0	17	3 · 64	116 x 164	1.2	B25667C4197A375	4
MKK400-D-12.5-01	12.5	18	15.0	22	3 · 83	116 x 164	1.1	B25667C3247A375	4
MKK400-D-15.0-01	15.0	22	18.0	26	3 · 100	116 x 164	1.3	B25667C3297A375	4
MKK400-D-20.0-01	20.0	30	24.0	36	3 · 133	116 x 164	1.5	B25667C3397A375	4
MKK400-D-25.0-01	25.0	36	–	–	3 · 165	116 x 200	1.8	B25667C3497A375	4
Rated voltage 415 V AC, 50 / 60 Hz, delta connection									
MKK415-D-5.0-01	5.0	7	6.0	8	3 · 32	116 x 164	1.1	B25667C5966A375	4
MKK415-D-6.2-01	6.2	8	7.5	10	3 · 39	116 x 164	1.2	B25667C5127A375	4
MKK415-D-10.4-01	10.4	15	12.5	17	3 · 64	116 x 164	1.2	B25667C4197A375	4
MKK415-D-12.5-01	12.5	17	15.0	21	3 · 77	116 x 164	1.3	B25667C4237A375	4
MKK415-D-15.0-01	15.0	21	18.0	25	3 · 93	116 x 164	1.4	B25667C4287A375	4
MKK415-D-16.7-01	16.7	23	20.0	28	3 · 103	116 x 164	1.5	B25667C4307A375	4
MKK415-D-20.0-01	20.8	29	25.0[2]	35[2]	3 · 128	116 x 200	1.7	B25667C4387A375	4
MKK415-D-25.0-01	25.0	35	–	–	3 · 154	136 x 200	2.1	B25667C4467A375	4
Rated voltage 440 V AC, 50 / 60 Hz, delta connection									
MKK440-D-5.0-01	5.0	7	6.0	8	3 · 27	116 x 164	1.2	B25667C4826A375	4
MKK440-D-7.5-01	7.5	10	9.0	12	3 · 41	116 x 164	1.2	B25667C4127A375	4
MKK440-D-10.4-01	10.4	14	12.5	16	3 · 57	116 x 164	1.3	B25667C4177A375	4
MKK440-D-12.5-01	12.5	16	15.0	20	3 · 69	116 x 164	1.4	B25667C4207A375	4
MKK440-D-14.2-01	14.2	19	17.0	22	3 · 77	116 x 164	1.3	B25667C4237A375	4
MKK440-D-15.0-01	15.0	20	18.0	24	3 · 83	116 x 164	1.4	B25667C4247A375	4
MKK440-D-16.7-01	16.7	22	20.0	26	3 · 92	116 x 200	1.8	B25667C4277A375	4
MKK440-D-18.8-01	18.8	25	22.6	30	3 · 103	116 x 164	1.5	B25667C4307A375	4
MKK440-D-20.0-01	20.0	26	24.0	31	3 · 111	116 x 200	1.7	B25667C4337A375	4
MKK440-D-25.0-01	25.0	33	30.0	39	3 · 137	136 x 200	2.0	B25667C4417A375	4
MKK440-D-28.1-01[3]	28.1	37	–	–	3 · 154	136 x 200	2.1	B25667C4467A375	4
MKK440-D-30.0-01[3]	30.0[1]	39[1]	–	–	3 · 164	136 x 200	2.4	B25667C4497A375	4
MKK440-D-33.0-01[3]	33.0[1]	43[1]	–	–	3 · 181	136 x 200	2.5	B25667C4547A375	4

Types for voltages 220 V, 240 V, 600 V, 660 V and other kvar-outputs are available upon request.

[1] Temperature class deviation –40/C max. +50 °C
[2] Temperature class deviation –40/B max. +45 °C
[3] Discharge time ≤ 75 V in 90 s
* Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

EPCOS

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 480 V AC, 50 / 60 Hz, delta connection									
MKK480-D-6.25-01	6.25	8	7.5	9	3 · 29	116 x 164	1.2	B25667C4866A375	4
MKK480-D-8.3-01	8.3	10	10.0	12	3 · 39	116 x 164	1.2	B25667C5127A375	4
MKK480-D-10.4-01	10.4	12	12.5	14	3 · 48	116 x 164	1.3	B25667C5147A375	4
MKK480-D-12.5-01	12.5	15	15.0	18	3 · 58	116 x 164	1.5	B25667C5177A375	4
MKK480-D-15.0-01	15.0	18	18.0	22	3 · 69	116 x 164	1.4	B25667C4207A375	4
MKK480-D-16.7-01	16.7	20	20.0	24	3 · 77	116 x 200	1.8	B25667C5237A375	4
MKK480-D-20.0-01	20.0	24	24.0	29	3 · 92	116 x 200	1.8	B25667C4277A375	4
MKK480-D-25.0-01	25.0	30	30.0	36	3 · 115	136 x 200	2.2	B25667C4347A375	4
MKK480-D-30.0-01[2]	30.0[1]	36[1]	–	–	3 · 138	136 x 200	2.4	B25667C4417A365	4
Rated voltage 525 V AC, 50 / 60 Hz, delta connection									
MKK525-D-8.3-01	8.3	9	10.0	11	3 · 32	116 x 164	1.1	B25667C5966A375	4
MKK525-D-10.0-01	10.0	11	12.0	13	3 · 39	116 x 164	1.2	B25667C5127A375	4
MKK525-D-12.5-01	12.5	14	15.0	17	3 · 48	116 x 164	1.3	B25667C5147A375	4
MKK525-D-15.0-01	15.0	17	18.0	20	3 · 58	116 x 164	1.5	B25667C5177A375	4
MKK525-D-16.7-01	16.7	18	20.0	21	3 · 64	116 x 164	1.6	B25667C5197A375	4
MKK525-D-20.0-01	20.0	22	24.0	26	3 · 77	116 x 200	1.8	B25667C5237A375	4
MKK525-D-25.0-01	25.0	28	30.0	33	3 · 96	136 x 200	2.3	B25667C5287A375	4
MKK525-D-30.0-01[2]	30.0[1]	33[1]	–	–	3 · 115	136 x 200	2.4	B25667C5347A375	4
Rated voltage 570 V AC, 50 / 60 Hz, delta connection									
MKK570-D-27.5-01	27.5	27	33	32.4	3 · 90	136 x 200	2.5	B25667C5277A375	4
Rated voltage 690 V AC, 50 / 60 Hz, delta connection									
MKK690-D-5.0-01	5.0	4.2	6	5.0	3 · 11	116 x 164	1.3	B25667C6336A375	4
MKK690-D-10.0-01	10.0	8.4	12	10.1	3 · 23	116 x 164	1.4	B25667C6676A375	4
MKK690-D-12.5-01	12.5	10.5	15	12.6	3 · 28	116 x 164	1.5	B25667C6836A375	4
MKK690-D-15.0-01	15.0	12.6	18	15.1	3 · 34	116 x 164	1.5	B25667C6107A375	4
MKK690-D-20.8-01	20.8	17.5	25	21.0	3 · 47	136 x 200	2.0	B25667C6137A375	4
MKK690-D-25.0-01	25.0	21.0	30	25.1	3 · 56	136 x 200	2.2	B25667C6167A375	4
Rated voltage 765 V AC, 50 / 60 Hz, delta connection									
MKK765-D-30.0-01	30	23	36	28	3 · 55	136 x 200	2.4	B25667C7167A375	4
Rated voltage 800 V AC, 50 / 60 Hz, delta connection									
MKK800-D-5.0-01	5.0	3.6	6	4.3	3 · 8	116 x 164	1.2	B25667C7246A375	4
MKK800-D-7.5-01	7.5	5.4	9.0	6.5	3 · 12.4	121 x 164	1.2	B25667C7376A375	4
MKK800-D-10.0-01	10.0	7.2	12	8.7	3 · 17	116 x 164	1.3	B25667C7496A375	4
MKK800-D-12.5-01	12.5	9.0	15	11.0	3 · 21	116 x 164	1.4	B25667C7626A375	4
MKK800-D-15.0-01	15.0	11.0	18	13.0	3 · 25	116 x 164	1.5	B25667C7746A375	4
MKK800-D-20.0-01	20.0	14.5	24	17.3	3 · 33	136 x 200	2.0	B25667C7996A375	4
MKK800-D-25.0-01	25.0	18.0	30	22.0	3 · 41	136 x 200	2.3	B25667C7127A375	4
MKK800-D-28.0-01	28.0	20.0	33	24.0	3 · 46	136 x 200	2.4	B25667C7137A375	4

Types for voltages 220 V, 240 V, 600 V, 660 V and other kvar-outputs are available upon request.

[1] Temperature class deviation –40/C max. +50 °C
[2] Temperature class deviation –40/B max. +45 °C
[3] Discharge time ≤ 75 V in 90 s
* Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

EPCOS

Single-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 230 V AC, 50 / 60 Hz									
MKK230-I-5.0-01	5.2	23	6.2	28	313	116 x 164	1.1	B25667C2317A175	4
MKK230-I-6.6-01	6.6	29	7.9	34	397	116 x 164	1.4	B25667C2397A175	4
MKK230-I-7.5-01	7.5	33	9.0	40	457	116 x 164	1.3	B25667C2457A175	4
MKK230-I-8.3-01	8.3	36	10.0	43	502	116 x 164	1.3	B25667C2507A175	4
MKK230-I-9.1-01[1]	9.1	38	–	–	548	116 x 164	1.4	B25667C2557A175	4
Rated voltage 400 V AC, 50 / 60 Hz									
MKK400-I-10.4-01	10.4	26	12.5	31	207	116 x 164	1.2	B25667C3207A175	4
MKK400-I-12.5-01	12.5	31	15.0	37	249	116 x 164	1.3	B25667C3247A175	4
Rated voltage 440 V AC, 50 / 60 Hz									
MKK440-I-6.9-01	6.9	16	8.3	19	116	116 x 164	1.3	B25667C5117A175	4
MKK440-I-8.3-01	8.3	19	10.0	23	144	116 x 164	1.5	B25667C5147A175	4
Rated voltage 525 V AC, 50 / 60 Hz									
MKK525-I-10.0-01	10.0	19	12.0	23	116	116 x 164	1.3	B25667C5117A175	4
MKK525-I-12.5-01	12.5	24	15.0	29	144	116 x 164	1.5	B25667C5147A175	4
MKK525-I-15.0-01[1]	15.0	29	18.0	35	173	116 x 200	1.7	B25667C5177A175	4
MKK525-I-18.6-01[1]	18.6	36	22.3	43	215	136 x 200	2.0	B25667C5217A175	4

Plastic protective terminal cover[2]

Capacitor d x h	For cable gland	Cable diameter outside	Dimensions Ø d_1	Ø d_2	Ordering code
mm		mm	mm	mm	
116 x 164	PG 13.5	9–13	116	125	B44066K0135A000
116 x 200	PG 16	10–14	116	125	B44066K0160A000
136 x 200	PG 21	14–18	137	145	B44066K0210A000

Types for voltages 220 V, 240 V, 600 V, 660 V and other kvar-outputs are available upon request.

[1] Discharge time ≤ 75 V in 90 s
[2] Note: The new terminal covers can be used for B25667B series; the formerly available terminal covers do not fit for the B25667C series
* Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

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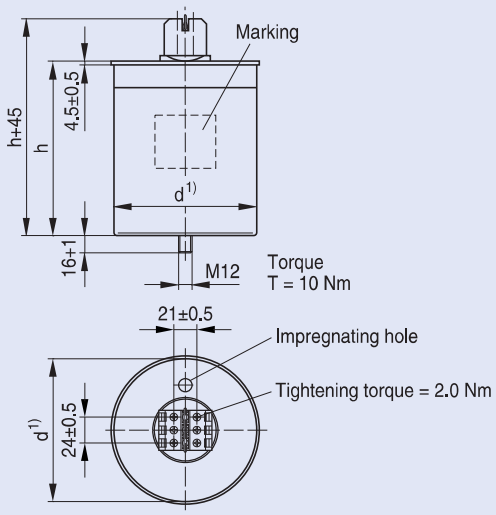
Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap Premium PFC Capacitors

Gas-impregnated ● Dry type ● Concentric winding ● Wavy cut ● Triple safety system

Dimensional drawings

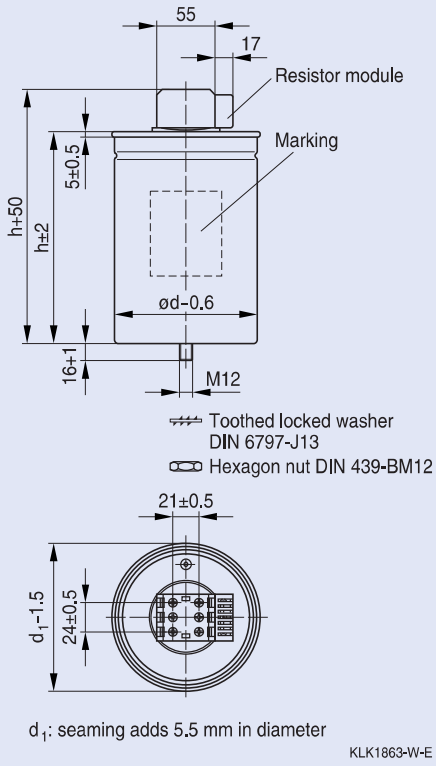
Capacitor up to 660 V AC



1) Seaming adds 5.5 mm in diameter

KLK1841-1-E

Capacitor > 660 V AC

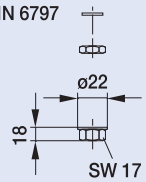


d_1: seaming adds 5.5 mm in diameter

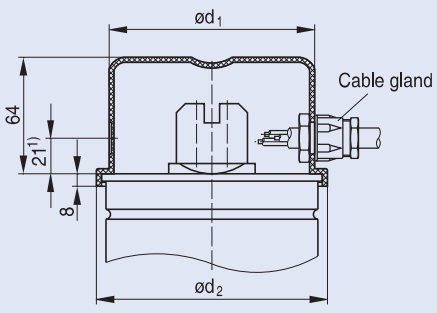
KLK1863-W-E

Mounting / Protective cover for terminal

Toothed washer J 12.5 DIN 6797
Hex nut BM12 DIN 439
or
nut C61010-A415-C15



KLK1394-V



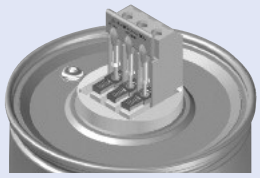
1) Perforation for second cable gland

KLK1837-8-E

Protective terminal cover IP54

Ceramic discharge resistors

Pre-mounted for series B25667, B25673 and B32344; available as spare parts upon request



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PhaseCap HD PFC Capacitors

High density type ● Up to 60 kvar ● Gas-impregnated ● Wavy cut ● Triple safety system

EPCOS

General

The PhaseCap HD series is a follow-on development of the MKK AC series, covering the power range above 40 through 60 kvar with just one capacitor in a cylindrical aluminum case.

The PhaseCap HD is especially intended for industrial applications with demands for long life, constant capacitance and high inrush current withstand capability up to 300 · I_R.

Such applications require typical power steps of 25 or 50 kvar switched by a PFC controller via each capacitor contactor.

This MKK AC series was developed to increase packing density per bank and cut component costs.

Applications

- Automatic PFC equipment, capacitor banks
- Individual fixed PFC (e.g. motors, transformers, lighting)
- Group fixed PFC
- Tuned and detuned capacitor banks
- Dynamic PFC
- PFC systems with space constraints

Features

- Compact design in cylindrical aluminum can with stud
- Stacked winding
- MKK-technology with wavy cut and heavy edge
- Voltage range 400 V … 525 V
- Output range 40 kvar (50 Hz) … 60 kvar (60 Hz)

Electrical

- Low losses
- High pulse current withstand capability (up to 300 · I_R)

Mechanical and maintenance

- Reduced mounting costs
- Maintenance-free

Safety

- Self-healing
- Overpressure disconnector
- Shock hazard protected terminals
- Long-term approved
- Pre-mounted discharge resistor module

Environmental

- Dry design, inert gas
- No oil leakage

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

PhaseCap HD PFC Capacitors

High density type ● Up to 60 kvar ● Gas-impregnated ● Wavy cut ● Triple safety system

EPCOS

Technical data and limit values

Standards IEC 60831-1+2, EN 60831-1+2, UL 810 5th edition		
Overvoltage	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)
Overcurrent	I_{max}	up to 1.5 · I_R including combined effects of harmonics, overvoltages and capacitance tolerance
Inrush current	I_S	up to 300 · I_R
Losses: **– Dielectric** **– Total***		 < 0.2 W/kvar < 0.45 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		–5% / +10%
Test voltage, terminal / terminal	V_{TT}	2.15 · V_{R1}, AC, 2 s
Test voltage, terminal / case	V_{TC}	up to $V_R \leq$ 660 V: 3000 V AC, 10 s
Mean life expectancy	$t_{LD(Co)}$	up to 180 000 h (temperature class –40/C) up to 130 000 h (temperature class –40/D)
Ambient temperature		–40/D; max. temp. +55 °C; max. mean 24 h = +45 °C; max. mean 1 year = +35 °C; lowest temperature = –40 °C
Cooling		natural or forced
Humidity	H_{rel}	max. 95%
Altitude		max. 4000 m above sea level
Mounting position		upright
Mounting and grounding		threaded M12 stud on bottom of case
Safety		dry technology, overpressure disconnector, self-healing, maximum allowed fault current 10 000 A in accordance with UL 810 standard
Discharge device		pre-mounted discharge module
Case		extruded aluminum can
Enclosure		IP20, indoor mounting
Dielectric		polypropylene film
Impregnation		inert gas, Nitrogen (N_2)
Terminals		optimized capacitor safety terminal with electric shock protection (IP20), (VDE 0106 part 100), max. 35 mm² cable cross section, max. current 130 A
Number of switching operations		max. 5000 switchings per year according to IEC 60831-1+/2

* Without discharge resistor

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PhaseCap HD PFC Capacitors

High density type ● Up to 60 kvar ● Gas-impregnated ● Wavy cut ● Triple safety system

Three-phase capacitors

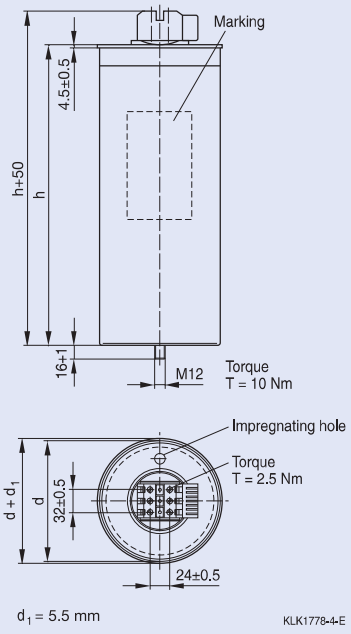
Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit[2]
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 400 V AC, 50 / 60 Hz, delta connection									
MKK400-D-40.0-21	40.0	58	48.0	69	3 · 265	136 x 317	4.4	B25669A3796J375	2
MKK400-D-50.0-21	50.0	72	60.0[1]	87[1]	3 · 332	136 x 355	4.7	B25669A3996J375	2
(Suitable also for 415 V with 7.6% higher output)									
Rated voltage 440 V AC, 50 / 60 Hz, delta connection									
MKK440-D-40.0-21	40.0	52	48.0	63	3 · 219	136 x 317	4.4	B25669A4657J375	2
MKK440-D-50.0-21	50.0	66	60.0[1]	79[1]	3 · 274	136 x 355	4.7	B25669A4827J375	2
MKK440-D-56.0-21	56.0	74	–	–	3 · 307	136 x 355	4.7	B25669B4927J375	2
Rated voltage 525 V AC, 50 / 60 Hz, delta connection									
MKK525-D-40.0-21	40.0	44	48.0	53	3 · 154	136 x 355	4.7	B25669A5467J375	2

Customized products available upon request.

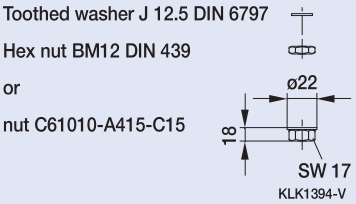
[1] Temperature class deviation –40/B max. +45 °C
[2] Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

Dimensional drawings

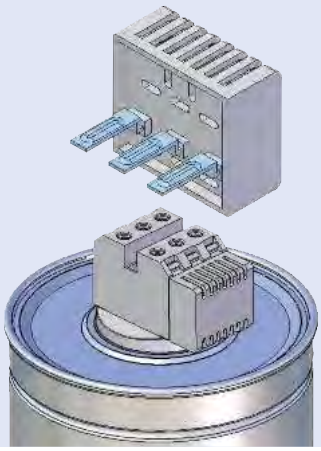
Capacitor



Mounting



Discharge resistor



DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

General

Based on the well-proven MKP technology with stacked windings, DeltaCap capacitors are especially developed for LV-PFC applications in industrial installations. The cost-effective design offers abroad output range from 0.5 to 33.0 kvar. The voltage range covers 230 to 525 V.

Applications

- Power Factor Correction
- Automatic capacitor banks
- Fixed PFC applications, e.g. motor compensation
- AC power electronics
- Tuned and detuned PFC systems

Features

- Compact design in cylindrical aluminum can with stud
- MKD technology with stacked windings
- Output range 0.5 … 33 kvar
- Voltage range 230 … 525 V

Safety

- Self-healing technology
- Overpressure disconnector
- Isolated terminal (IP20) for B32301 and B32304 series

Electrical

- Up to 33 kvar per capacitor for three-phase applications
- Long life expectancy up to 150 000 hours (at temperature class –40/C)
- High inrush current withstand ability (up to 200 · I_R)

Mechanical and maintenance

- Reduced mounting costs, easy installation and connection
- Low weight and compact volume
- Maintenance-free

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

Technical data and limit values

Standards IEC 60831-1+2, IS: 13340/41		
Overvoltage	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)
Overcurrent	I_{max}	up to 1.3 · I_R (up to 1.5 · I_R including combined effects of harmonics, overvoltages and capacitance)
Inrush current	I_S	up to 200 · I_R
Losses: **– Dielectric** **– Total***		 < 0.2 W/kvar < 0.45 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		–5% / +10%
Test voltage, terminal / terminal	V_{TT}	2.15 · V_R, AC, 2 s
Test voltage, terminal / case	V_{TC}	3000 V AC, 10 s
Mean life expectancy	$t_{LD(Co)}$	up to 150 000 h (temperature class –40/C) up to 115 000 h (temperature class –40/D)
Ambient temperature		–40/D; max. temp. +55 °C; max. mean 24 h = +45 °C; max. mean 1 year = +35 °C; lowest temperature = –40 °C –40/C; max. temp. +50 °C; max. mean 24 h = +40 °C; max. mean 1 year = +30 °C; lowest temperature = –40 °C
Cooling		natural or forced
Humidity	H_{rel}	max. 95%
Altitude		max. 4000 m above sea level
Mounting position		upright
Mounting and grounding		threaded M12 (10 Nm) for case size diameter ≥ 50 mm
Safety		self-healing technology, overpressure disconnector, max. allowed fault current 10 000 A in accordance with UL 810 standard
Discharge resistor		discharge resistor included in the delivery for B32300*/B32303*, pre-mounted for B32301* and B32304*
Case		extruded aluminum can
Enclosure		IP00 for B32300 and B32303 IP20 for B32301 and B32304
Dielectric		polypropylene film
Impregnation		biodegradable soft resin, semi-dry
Terminals		screw terminal for B32304 series, max. 25 mm² cable cross-section; fast-on terminals for B32300, B32301 and B32303 series
Number of switching operations		max. 5000 switchings per year according to IEC 60831-1+/2

* Without discharge resistor

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit**
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 230 V AC, 50/60 Hz, delta connection									
MKD230-D-0.5	0.5	1.3	0.6	1.6	3 · 10	50 x 150	0.4	B32303A2002A530	50
MKD230-D-0.7	0.7	1.8	0.8	2.2	3 · 14	50 x 150	0.4	B32303A2002A730	50
MKD230-D-1.0	1.0	2.5	1.2	3.0	3 · 20	50 x 150	0.4	B32303A2012A030	50
MKD230-D-1.5	1.5	3.8	1.8	4.6	3 · 30	63.5 x 150	0.6	B32303A2012A530	12
MKD230-D-2.0	2.0	5.0	2.4	6.0	3 · 40	63.5 x 150	0.6	B32303A2022A030	12
MKD230-D-2.5	2.5	6.3	3.0	7.6	3 · 50	63.5 x 150	0.8	B32303A2022A530	12
MKD230-D-5.0	5.0	12.6	6.0	15.1	3 · 100	75 x 200	1.1	B32304A2052#030*	6
MKD230-D-7.5	7.5	18.8	9.0	22.6	3 · 151	75 x 275	1.4	B32304A2072#530*	6
MKD230-D-10.0	10.0	25.1	12.0	30.1	3 · 201	85 x 275	1.7	B32304A2102#030*	4
MKD230-D-12.5	12.5	31.4	15.0	37.7	3 · 251	85 x 350	2.2	B32304A2122#530*	4
MKD230-D-15.0	15.0	37.7	18.0	45.2	3 · 301	85 x 350	2.2	B32304A2152#030*	4
Rated voltage 400 V AC, 50/60 Hz, delta connection									
MKD400-D-1.0	1.0	1.4	1.2	1.7	3 · 6.6	50 x 150	0.4	B32303A4012A000	50
MKD400-D-1.5	1.5	2.2	1.8	2.6	3 · 10	50 x 150	0.4	B32303A4012A500	50
MKD400-D-2.0	2.0	2.9	2.4	3.5	3 · 13	50 x 150	0.4	B32303A4022A000	50
MKD400-D-2.5	2.5	3.6	3.0	4.3	3 · 17	50 x 150	0.4	B32303A4022A500	50
MKD400-D-5.0	5.0	7.2	6.0	8.6	3 · 33	63.5 x 150	0.6	B32303A4052A000	12
MKD400-D-6.3	6.3	9.1	7.6	10.9	3 · 42	75 x 163	0.8	B32304A4071#500*	6
MKD400-D-7.5	7.5	10.8	9.0	13.0	3 · 50	75 x 163	0.9	B32304A4072#500*	6
MKD400-D-8.3	8.3	12.0	10.0	14.4	3 · 55	75 x 200	1.1	B32304A4101#000*	6
MKD400-D-10.0	10.0	14.4	12.0	17.3	3 · 66	75 x 200	1.1	B32304A4102#000*	6
MKD400-D-12.5	12.5	18.0	15.0	21.6	3 · 83	75 x 275	1.4	B32304A4122#500*	6
MKD400-D-15.0	15.0	21.7	18.0	26.0	3 · 100	75 x 275	1.4	B32304A4152#000*	6
MKD400-D-16.7	16.7	24.1	20.0	28.9	3 · 111	85 x 275	1.8	B32304A4201#000*	4
MKD400-D-20.0	20.0	28.9	24.0	34.7	3 · 133	85 x 275	1.8	B32304A4202#000*	4
MKD400-D-25.0	25.0	36.1	30.0	43.3	3 · 166	85 x 350	2.2	B32304A4252#000*	4
MKD400-D-30.0	30.0	43.3	–	–	3 · 199	96 x 275	2.4	B32304A4302#000*	4
Rated voltage 415 V AC, 50/60 Hz, delta connection									
MKD415-D-1.0	1.0	1.4	1.2	1.7	3 · 6.2	50 x 150	0.4	B32303A4012A010	50
MKD415-D-1.5	1.5	2.1	1.8	2.5	3 · 9.2	50 x 150	0.4	B32303A4012A510	50
MKD415-D-2.0	2.0	2.8	2.4	3.4	3 · 12	50 x 150	0.4	B32303A4022A010	50
MKD415-D-2.5	2.5	3.5	3.0	4.2	3 · 15	63.5 x 150	0.6	B32303A4022A510	12
MKD415-D-5.0	5.0	7.0	6.0	8.4	3 · 31	63.5 x 150	0.8	B32303A4052A010	12
MKD415-D-6.3	6.3	8.8	7.6	10.6	3 · 39	75 x 200	1.0	B32304A4071#510*	6
MKD415-D-7.5	7.5	10.4	9.0	12.5	3 · 46	75 x 200	1.1	B32304A4072#510*	6
MKD415-D-10.0	10.0	13.9	12.0	16.7	3 · 62	75 x 275	1.4	B32304A4102#010*	6
MKD415-D-12.5	12.5	17.4	15.0	20.9	3 · 77	75 x 275	1.4	B32304A4122#510*	6
MKD415-D-15.0	15.0	20.9	18.0	25.1	3 · 93	85 x 275	1.7	B32304A4152#010*	4
MKD415-D-20.0	20.0	27.8	24.0	33.4	3 · 123	85 x 275	2.2	B32304A4202#010*	4
MKD415-D-20.8	20.8	28.9	25.0	34.7	3 · 128	85 x 350	2.4	B32304A4251#010*	4
MKD415-D-25.0	25.0	34.8	30.0	41.8	3 · 154	85 x 350	2.4	B32304A4252#010*	4
MKD415-D-30.0	30.0	41.7	36.0	50.0	3 · 185	96 x 350	2.7	B32304A4302#010*	4

* Available either as B32304A****A*** series (3-terminal design, integrated resistor) or B32304A****B*** series (6-terminal design, pluggable ceramic resistor). Please replace # with the right character before ordering.

** Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit**
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 440 V AC, 50/60 Hz, delta connection									
MKD440-D-0.9	0.9	1.2	1.1	1.4	3 · 5.2	50 x 127	0.4	B32303A4011A040	50
MKD440-D-1.0	1.0	1.3	1.2	1.6	3 · 5.5	50 x 127	0.4	B32303A4012A040	50
MKD440-D-1.2	1.2	1.6	1.4	1.9	3 · 6.6	50 x 127	0.4	B32303A4011A540	50
MKD440-D-1.5	1.5	2.0	1.8	2.4	3 · 8.8	50 x 127	0.4	B32303A4012A540	50
MKD440-D-2.0	2.0	2.6	2.4	3.1	3 · 11	50 x 150	0.5	B32303A4022A040	50
MKD440-D-2.1	2.1	2.8	2.5	3.4	3 · 12	50 x 150	0.5	B32303A4021A540	50
MKD440-D-2.5	2.5	3.3	3.0	4.0	3 · 14	63.5 x 150	0.7	B32303A4022A540	12
MKD440-D-4.2	4.2	5.5	5.0	6.6	3 · 23	63.5 x 150	0.7	B32303A4051A040	12
MKD440-D-5.0	5.0	6.6	6.0	7.9	3 · 27	63.5 x 150	0.8	B32303A4052A040	12
MKD440-D-6.3	6.3	8.3	7.6	10.0	3 · 35	75 x 163	0.8	B32304A4071#540*	6
MKD440-D-7.5	7.5	9.8	9.0	11.8	3 · 41	75 x 200	1.1	B32304A4072#540*	6
MKD440-D-8.3	8.3	10.9	10.0	13.1	3 · 46	75 x 200	1.1	B32304A4101#040*	6
MKD440-D-10.0	10.0	13.1	12.0	15.7	3 · 55	75 x 275	1.4	B32304A4102#040*	6
MKD440-D-10.4	10.4	13.6	12.5	16.3	3 · 57	75 x 275	1.4	B32304A4121#540*	6
MKD440-D-12.5	12.5	16.4	15.0	19.7	3 · 69	75 x 275	1.4	B32304A4151#040*	6
MKD440-D-15.0	15.0	19.7	18.0	23.6	3 · 82	85 x 275	1.7	B32304A4152#040*	4
MKD440-D-16.7	16.7	21.9	20.0	26.3	3 · 92	85 x 275	1.7	B32304A4201#040*	4
MKD440-D-20.0	20.0	26.2	24.0	31.5	3 · 110	85 x 275	1.9	B32304A4202#040*	4
MKD440-D-20.8	20.8	27.3	25.0	32.8	3 · 114	85 x 350	2.2	B32304A4251#040*	4
MKD440-D-25.0	25.0	32.8	30.0	39.4	3 · 137	85 x 350	2.2	B32304A4252#040*	4
MKD440-D-28.0	28.0	36.7	33.6	44.0	3 · 154	85 x 350	2.2	B32304A4282#040*	4
MKD440-D-30.0	30.0	39.0	–	–	3 · 164	96 x 350	2.7	B32304A4302#040*	4
MKD440-D-33.0	33.0	43.3	–	–	3 · 181	96 x 350	2.7	B32304A4332#040*	4
MKD440-D-33.8	33.8	44.4	–	–	3 · 185	96 x 350	2.7	B32304A4332#840*	4
Rated voltage 480 V AC, 50/60 Hz, delta connection									
MKD480-D-1.5	1.5	1.8	1.8	2.2	3 · 6.9	50 x 127	0.4	B32303A4012A580	50
MKD480-D-2.0	2.0	2.4	2.4	2.9	3 · 9.2	50 x 150	0.5	B32303A4022A080	50
MKD480-D-2.5	2.5	3.0	3.0	3.6	3 · 12	63.5 x 150	0.7	B32303A4022A580	12
MKD480-D-5.0	5.0	6.0	6.0	7.2	3 · 23	75 x 163	0.8	B32304A4052#080*	6
MKD480-D-6.3	6.3	7.6	7.6	9.1	3 · 29	75 x 163	0.8	B32304A4071#580*	6
MKD480-D-7.5	7.5	9.0	9.0	10.8	3 · 35	75 x 200	1.1	B32304A4072#580*	6
MKD480-D-8.3	8.3	10.0	10.0	12.0	3 · 38	75 x 200	1.1	B32304A4101#080*	6
MKD480-D-10.4	10.4	12.5	12.5	15.0	3 · 48	75 x 275	1.4	B32304A4121#580*	6
MKD480-D-12.5	12.5	15.0	15.0	18.0	3 · 58	75 x 275	1.4	B32304A4151#080*	6
MKD480-D-15.0	15.0	18.0	18.0	21.6	3 · 69	85 x 275	1.7	B32304A4152#080*	6
MKD480-D-16.7	16.7	20.1	20.0	24.1	3 · 77	85 x 275	1.8	B32304A4162#780*	6
MKD480-D-20.0	20.0	24.1	24.0	28.9	3 · 92	85 x 350	2.2	B32304A4201#080*	4
MKD480-D-20.8	20.8	25.0	25.0	30.0	3 · 96	85 x 350	2.2	B32304A4202#080*	4
MKD480-D-25.0	25.0	30.1	30.0	36.1	3 · 115	85 x 350	2.2	B32304A4252#080*	4
MKD480-D-30.0	30.0	36.0	36.0	43.0	3 · 138	96 x 350	2.7	B32304A4302#080*	4
MKD480-D-33.0	33	39.7	–	–	3 · 152	96 x 350	2.7	B32304A4332#080*	4

* Available either as B32304A****A*** series (3-terminal design, integrated resistor) or B32304A****B*** series (6-terminal design, pluggable ceramic resistor). Please replace # with the right character before ordering.

** Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit**
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 525 V AC, 50/60 Hz, delta connection									
MKD525-D-1.0	1.0	1.1	1.2	1.3	3 · 3.9	50 x 150	0.4	B32303A5012A020	50
MKD525-D-1.5	1.5	1.6	1.8	1.9	3 · 5.8	50 x 150	0.4	B32303A5012A520	50
MKD525-D-2.0	2.0	2.2	2.4	2.6	3 · 7.7	63.5 x 150	0.6	B32303A5022A020	12
MKD525-D-2.5	2.5	2.7	3.0	3.2	3 · 9.6	63.5 x 150	0.6	B32303A5022A520	12
MKD525-D-5.0	5.0	5.5	6.0	6.6	3 · 19	75 x 163	0.8	B32304A5061#020*	6
MKD525-D-6.3	6.3	6.9	7.6	8.3	3 · 24	75 x 200	1.0	B32304A5071#520*	6
MKD525-D-8.3	8.3	9.1	10.0	10.9	3 · 32	75 x 275	1.4	B32304A5101#020*	6
MKD525-D-10.4	10.4	11.4	12.5	13.7	3 · 40	75 x 275	1.4	B32304A5121#520*	6
MKD525-D-12.5	12.5	13.7	15.0	16.4	3 · 48	75 x 275	1.4	B32304A5151#020*	6
MKD525-D-16.7	16.7	18.4	20.0	22.1	3 · 64	85 x 275	1.8	B32304A5201#020*	4
MKD525-D-20.8	20.8	22.9	25.0	27.5	3 · 80	85 x 350	2.2	B32304A5202#020*	4
MKD525-D-25.0	25.0	27.5	30.0	33.0	3 · 96	85 x 350	2.2	B32304A5252#020*	4
MKD525-D-30.0	30.0	33.0	36.0	39.0	3 · 115	96 x 350	2.7	B32304A5302#020*	4
MKD525-D-40.0	40.0	44.0	48.0	52.8	3 · 150	136 x 255	4.2	B32304A5402B025	4

* Available either as B32304A****A*** series (3-terminal design, integrated resistor) or B32304A****B*** series (6-terminal design, pluggable ceramic resistor). Please replace # with the right character before ordering.

** Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

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DeltaCap PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system

EPCOS

Single-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit**
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
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	40.0	12	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, delta connection									
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
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.

** Packing units for capacitors equal minimum order quantity. Orders will be rounded up to packing unit or multiple thereof.

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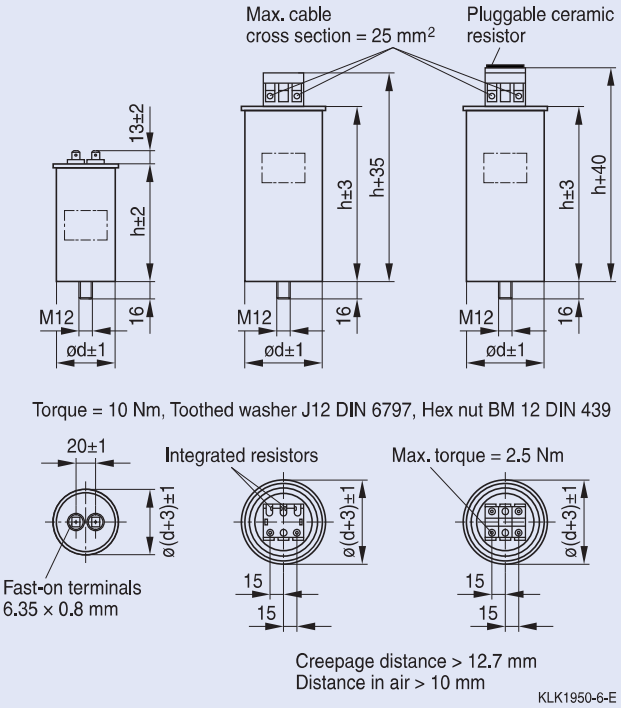
Please read *Important notes* on page 12 and *Cautions* on page 121–125

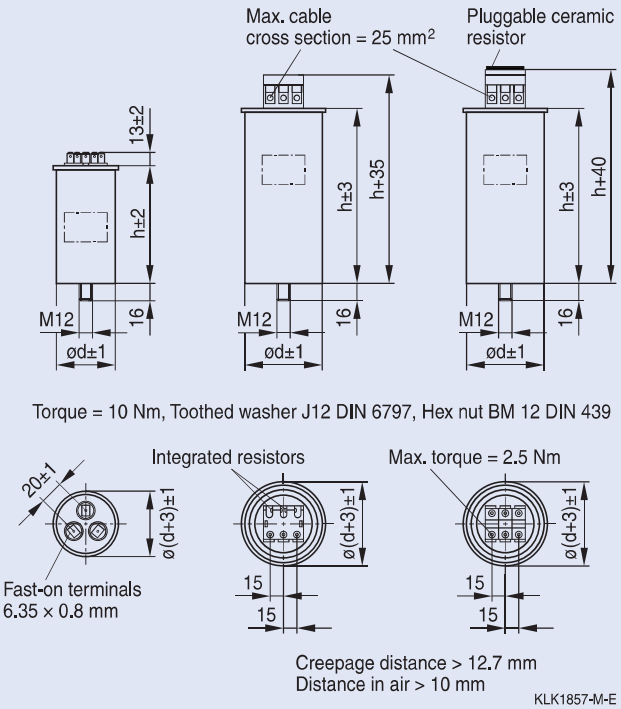
Dimensional drawings: 1-phase capacitors

B32300A/B32301A**A***/B32301A****B***



Dimensional drawings: 3-phase capacitors

B32303A**A***/B32304A****A***/B32304A****B***



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DeltaCap X Black Premium PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system ● Highly robust design

EPCOS

General

Based on the well-proven MKP technology with stacked windings, DeltaCap X Black Premium capacitors are especially developed for LV-PFC applications especially in harsh industrial installations. This highly robust design offers a very selective output range from 20 to 44 kvar. The voltage options are 440 to 850 V.

Applications

- Automatic PFC banks
- Fixed compensation, e.g. motor compensation
- Dynamic PFC
- Tuned and detuned PFC system

Features

- Compact design in black cylindrical aluminum can with stud
- MKD technology with stacked windings
- Output range 20 … 44 kvar
- Voltage range 440 to 850 V

Safety

- Self-healing technology
- Overpressure disconnector
- Isolated terminal (IP20)
- Ceramic discharge resistor pre-manted

Electrical

- 20 to 44 kvar per capacitor for three-phase applications
- Long life expectancy up to 300 000 hours (at temperature class –40/55)
- High inrush current withstand ability (up to 500 · I_R)

Mechanical and maintenance

- Reduced mounting costs, easy installation and connection
- Compact volume
- Maintenance-free
- Mounting position upright/horizontal

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Please read *Important notes* on page 12 and *Cautions* on page 121–125

DeltaCap X Black Premium PFC Capacitors

LV-PFC in industrial applications ● Stacked winding ● Dual safety system ● Highly robust design

EPCOS

Technical data and limit values

Standards IEC 60831-1+2, UL 810 5th edition		
Overvoltage	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)
Overcurrent	I_{max}	up to 1.5 · I_R (including combined effects of harmonics, overvoltages and capacitance)
Inrush current	I_S	up to 500 · I_R
Losses: **– Dielectric** **– Total***		 < 0.2 W/kvar < 0.5 W/kvar
Rated frequency	f	50/60 Hz
Capacitance tolerance		–5% / +5%
Test voltage, terminal / terminal	V_{TT}	2.15 · V_R, AC, 2 s
Test voltage, terminal / case	V_{TC}	3000 V AC, 10 s
Mean life expectancy	$t_{LD(Co)}$	up to 300 000 h (temperature class –40/55) up to 200 000 h (temperature class –40/60) up to 100 000 h (temperature class –40/65)
Ambient temperature		–40/55; max. temp. +55 °C; max. mean 24 h = +45 °C; max. mean 1 year = +35 °C; lowest temperature = –40 °C –40/60; max. temp. +60 °C; max. mean 24 h = +50 °C; max. mean 1 year = +40 °C; lowest temperature = –40 °C –40/65; max. temp. +65 °C; max. mean 24 h = +55 °C; max. mean 1 year = +45 °C; lowest temperature = –40 °C
Cooling		natural or forced
Humidity	H_{rel}	max. 95%
Altitude		max. 4000 m above sea level
Mounting position		upright/horizontal
Mounting and grounding		threaded M12 (10 Nm) for case size diameter ≥ 50 mm
Safety		self-healing technology, overpressure disconnector, max. allowed fault current 10 000 A in accordance with UL 810 standard
Discharge resistor		discharge resistor, pre-mounted for entire range
Case		extruded aluminum can
Enclosure		IP20
Dielectric		polypropylene film
Impregnation		biodegradable soft resin, semi-dry
Terminals		optimized capacitor safety terminal with electric shock protection, max. 35 mm² cable cross section, max. current 100 A
Number of switching operations		max. 62 000 switchings per year according to IEC 60831-1+/2

* Without discharge resistor

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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DeltaCap X Black Premium PFC Capacitors

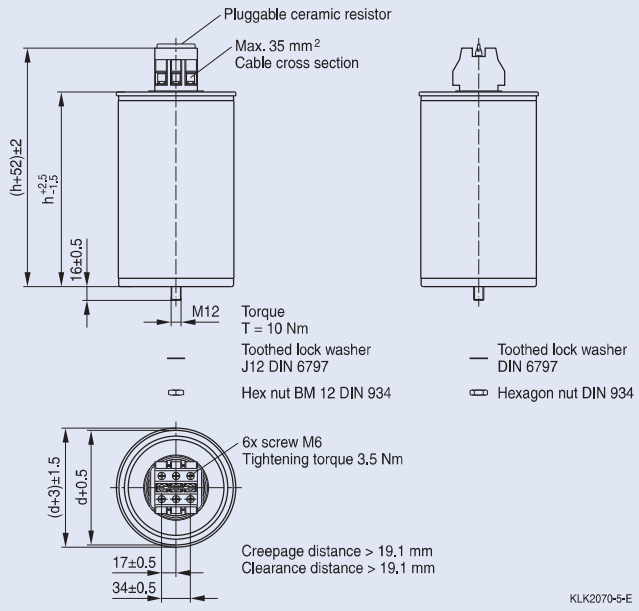
LV-PFC in industrial applications ● Stacked winding ● Dual safety system ● Highly robust design

Three-phase capacitors

Type	50 Hz		60 Hz		C_R	d x h	Weight	Ordering code	Packing unit*
	Output kvar	I_R A	Output kvar	I_R A	µF	mm	kg		
Rated voltage 440 V AC, delta connection									
MKD440-D-20.0-X	20.0	26.2	24	31.4	3 · 110	136 x 245	4.2	B32305A4202B040	4
MKD440-D-25.0-X	25.0	32.8	30	39.4	3 · 137	136 x 245	4.2	B32305A4252B040	4
MKD440-D-28.1-X	28.1	36.9	33.7	44.3	3 · 154	136 x 245	4.2	B32305A4282B140	4
MKD440-D-30.0-X	30.0	39.4	36	47.3	3 · 165	136 x 275	4.6	B32305A4302B040	4
Rated voltage 480 V AC, delta connection									
MKD480-D-25.0-X	25.0	30.1	30	36.1	3 · 115	136 x 245	4.2	B32305A4252B080	4
MKD480-D-28.0-X	28.0	33.7	33.6	40.4	3 · 129	136 x 230	3.9	B32305A4282B080	4
MKD480-D-30.0-X	30.0	36.1	36.0	43.3	3 · 138	136 x 245	4.2	B32305A4302B080	4
MKD480-D-33.0-X	33.0	39.7	39.6	47.6	3 · 152	136 x 230	3.8	B32305A4332B080	4
Rated voltage 525 V AC, delta connection									
MKD525-D-20.0-X	20.0	22.0	24.0	26.4	3 · 77	136 x 200	3.6	B32305A5202B025	4
MKD525-D-25.0-X	25.0	27.5	30	33	3 · 96	136 x 230	3.9	B32305A5252B025	4
MKD525-D-28.0-X	28.0	30.8	33.6	37.0	3 · 108	136 x 230	4.0	B32305A5282B025	4
MKD525-D-33.0-X	33.0	36.3	39.6	43.6	3 · 127	136 x 245	4.2	B32305A5332B025	4
MKD525-D-37.0-X	37.0	40.7	44.0	48.8	3 · 143	136 x 245	4.2	B32305A5372B025	4
Rated voltage 850 V AC, delta connection									
MKD850-D-35.0-X	35.0	23.8	42	28.5	3 · 51	136 x 230	4.3	B32305A8352B050	4

*Packing units for capacitors equal minimum order quantity.
Orders will be rounded up to packing unit or multiple thereof.

Dimensional drawing



PhiCap PFC Capacitors

Biodegradable soft resin impregnated ● Stacked winding ● Dual safety system

EPCOS

General

PhiCap capacitors are a tried and tested series of MKP (metalized polypropylene) capacitors from TDK which have been used for PFC applications for more than 15 years.

The power range varies from 0.5 to 30.0 kvar and 0.7 to 6.0 kvar per single capacitor can, depending on a three-phase or single-phase capacitor design.

The PhiCap capacitor is especially intended for power factor correction in industrial applications.

The capacitors are manufactured using metalized polypropylene film as the dielectric and housed in a cylindrical aluminum case.

Applications

- Power Factor Correction (PFC)
- Automatic capacitor banks
- Fixed PFC applications, e.g. motor compensation
- Detuned PFC systems
- Dynamic PFC systems

Features

- Compact design in cylindrical aluminum can with stud
- Stacked winding
- MKP technology
- Voltage range 230 … 525 V
- Output range 0.5 … 30 kvar

Electrical

- Up to 30 kvar per case for three-phase applications
- Up to 6 kvar per case for single-phase applications
- Long life expectancy of up to 135 000 hours
- High pulse current withstand capability (up to 200 · I_R)

Mechanical and maintenance

- Reduced mounting costs, easy installation and connection
- Low weight and compact volume
- Maintenance-free

Safety

- Self-healing
- Overpressure disconnector
- Shock hazard protected optimized capacitor safety terminal for B32344 series

Please read *Important notes* on page 12 and *Cautions* on page 121–125.
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