



Film Capacitors – Power Factor Correction

HomeCap Capacitors

Series/Type: MKP
Ordering code: B32340C....Jxxx
Date: November 2010
Version: 4

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Construction

- Dielectric: Polypropylene film
- Internally insulated, no grounding required
- Soft polyurethane resin, non PCB (NPCB)
- Aluminum can

Features

- Self-healing properties
- Low dissipation factor
- Overpressure disconnection device
- High insulation resistance


Typical applications

- Residential power factor correction unit

Mounting

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

Product composition

- Cable
- Plastic terminal protection cover
- Capacitor  file 106388

Cable

- Cross section: 1.5 mm² (14AWG)
- Length: 300 mm
- Rated voltage: 600 V AC
- Operation temperature: +105 °C
- Material: Electrolytic copper with PVC insulation



Technical data and specifications

Characteristics	
Rated capacitance C_N	According to dimension table, 5 to 33 μF
Tolerance	-5 / +10%
Connection	Cables
Rated voltage V_R	400 V (application voltage 127 ... 400 V)
Rated frequency f_N	50 Hz / 60 Hz
Output	According to dimension table 0.02 ... 1.66 kvar
Rated current I_R	According to power rating
$\tan \delta_0$ (dielectric)	0.5 W / kvar

Maximum ratings	
V_{max} (up to 8 h daily)	1.1 • V_R
V_{max} (up to 1 min)	1-3 • V_R
I_{max}	1.3 • I_R (A)
I_S	100 • I_R (A)

Test data	
V_{TT}	2.15 x V_R , 60 s (type test)
V_{TC}	3000 V AC / 50 Hz during 60 s
* $\tan \delta$ (120 Hz) at 20 °C	$\leq 1.0 \times 10^{-3}$

* Without discharge resistor

Design data	
Dimensions (d x h)	d1: 42.5 ± 1 mm h: see product table L1: 10 ± 1 mm L2: 58 ± 1 mm L3: 50 ± 5 mm L4: 10 ± 2 mm
Weight approx	See product table
Impregnation	Non PCB, soft polyurethane resin
Fixing	Al can stud or bracket
Max. torque (Al can stud)	4 Nm
Mounting position	Any mounting position possible

Mean life expectancy	
t_{LD}	up to 100 000 hours
Max. 5000 switchings per year acc. to IEC 60831	

Terminals	
Protection degree	IP53, indoor mounting
Terminal cross section	16 mm ²
Maximum terminal current	15 A
Creepage distance (min)	12.7 mm
Clearance (min)	9.5 mm

Safety	
Mechanical safety	Overpressure disconnecter
Max. short circuit current	(AFC: 10 kA)

Climatic category –25/D	
\ominus min	–25 °C
\ominus max	+55 °C
Storage temperature	–40 °C....+85 °C
Humidity	av. rel. < 65%
Maximum altitude	4 000 m above sea level
Degree of protection	IP 20

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

Discharge resistors are available upon request. Discharge resistor time according to IEC specification for specific types.

C _R μF	400 V AC kvar		240 V AC kvar		230 V AC kvar		220 V AC kvar		127 V AC kvar		Dimensions d x h mm	Weight kg	Ordering Code *
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz			
5	0.25	0.30	0.09	0.11	0.08	0.10	0.08	0.09	0.025	0.030	40 x 70	0.15	B32340C4056J000
7	0.35	0.42	0.13	0.15	0.12	0.14	0.11	0.13	0.04	0.04	40 x 70	0.15	B32340C4076J000
10	0.50	0.60	0.18	0.22	0.17	0.20	0.15	0.18	0.05	0.06	40 x 70	0.15	B32340C4106J000
15	0.75	0.90	0.27	0.33	0.25	0.30	0.23	0.27	0.08	0.09	40 x 80	0.16	B32340C4156J000
20	1.00	1.21	0.36	0.43	0.33	0.40	0.30	0.36	0.10	0.12	40 x 105	0.18	B32340C4206J000
25	1.25	1.51	0.45	0.54	0.42	0.50	0.38	0.46	0.13	0.15	40 x 105	0.18	B32340C4256J000
30	1.50	1.81	0.54	0.65	0.50	0.60	0.46	0.55	0.15	0.18	40 x 125	0.20	B32340C4306J000
33	1.66	1.99	0.60	0.72	0.55	0.66	0.50	0.60	0.17	0.20	40 x 125	0.20	B32340C4336J000

*)Types of products range by code identity.

Without studs in the aluminum can, cable length 300 mm: **Jxx0**.

Without studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 300 mm: **Jxx1**.

Without studs in the aluminum can, cable length 500 mm: **Jxx2**.

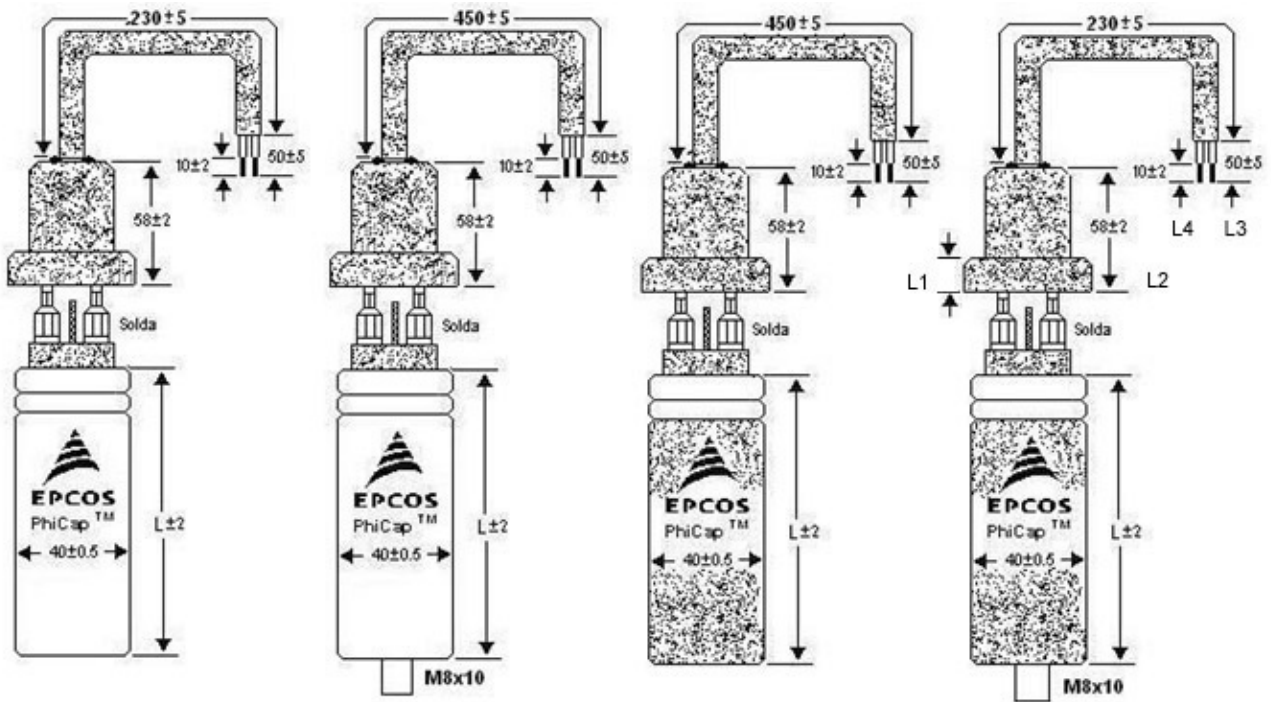
Without studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 500 mm: **Jxx3**.

With studs in the aluminum can, cable length 300 mm: **Jxx4**.

With studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 300 mm: **Jxx5**.

With studs in the aluminum can, cable length 500 mm: **Jxx6**.

With studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 500 mm: **Jxx7**.



Cautions and warnings

- In case of dents of more than 1 mm depth or any other mechanical damage, capacitors must not be used at all.
- In case of oil leakages, capacitors must not be used at all.
- To ensure the full functionality of the overpressure disconnecter, elastic elements must not be hindered and a minimum space of 12 mm has to be kept above each capacitor.
- Do not handle the capacitor before it is discharged.
- Resonance cases must be avoided by appropriate application design in any case.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- Protect the capacitor properly against overcurrent and short circuit.
- Failure to follow cautions may result, worst case, in premature failures, bursting or fire.

Discharging

Capacitors must be discharged to a maximum of 10% of rated voltage before they are switched on again. This prevents an electric impulse discharge in the application, influences the capacitor's service life, and protects against electric shock.

Service life expectancy

Electrical components do not have an unlimited service life expectancy; this applies to self-healing capacitors, too. The maximum service life expectancy may vary depending on the application the capacitor is used in.

Safety

Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result in bursting of the capacitor or in expulsion of oil or melted material due to mechanical disruption of the capacitor.

- Ensure good, effective grounding for capacitor enclosures.
- Provide means of disconnecting and insulating a faulty component/bank.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

Thermal load/over-temperature

After installation of the capacitor, it is necessary to verify that maximum hot-spot temperature is not exceeded at extreme service conditions.

Overpressure disconnecter

To ensure full functionality of an overpressure disconnecter, the following must be observed:

1. The elastic elements must not be hindered, i.e.
 - Connecting lines must be flexible leads (cables).
 - There must be sufficient space (min. 12 mm) for expansion above the connections. This will enable a longitudinal extension of the can to secure the overpressure disconnecter work.
 - Folding beads must not be retained by clamps.
2. The maximum allowed fault current of 10000 A in accordance with UL 810 standard must be assured by the application.
3. Stress parameters of the capacitor must be within the IEC60831 specification.

Overcurrent and short circuit protection

- Use HRC fuses or MCCBs for short circuit protection. Short circuit protection and connecting cables should be selected so that 1.5 times the rated capacitor current can be permanently handled.
- HRC fuses do not protect a capacitor against overload – they are only for short circuit protection.
- The HRC fuse rating should be 1.6 to 1.8 times rated capacitor current.
- Do not use HRC fuses to switch capacitors (risk of arcing).
- Use thermal magnetic over current relays for overload protection.

Resonance cases

Resonance cases must be avoided by appropriate application design in any case. Maximum total RMS capacitor current (incl. fundamental harmonic current) specified in technical data must not be exceeded.

Re-switching vs. phase-opposition

In case of voltage interruption, a sufficient discharge time has to be ensured to avoid phase-opposition and resulting high inrush currents.

Vibration resistance

The resistance to vibration of capacitors corresponds to IEC 68, part 2–6.

Max. test conditions:

Test duration	6 h*
Frequency range 1	10 ... 55 Hz*
Displacement amplitude	0.75 mm*

*corresponding to max. 98.1 m/s or 10 g

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 4 Nm.

Maintenance

- 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.
- 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.

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