HomeCap capacitors for Power Factor Correction

MKP

Series/Type: **HomeCap**
Ordering code: **B32340C....Jxxx**

Date: September 2005
Version: 3

Construction

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

Features

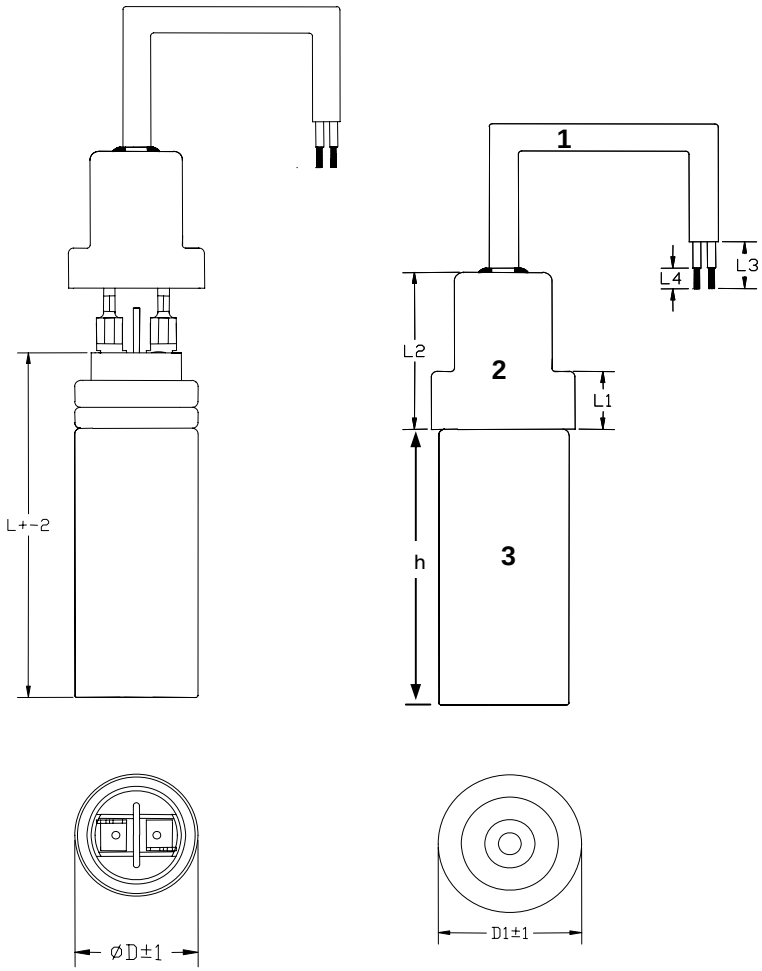
- Self-healing properties
- Low dissipation factor
- Overpressure disconnection device
- High insulation resistance

Typical applications

- Residential power factor correction unit

Product composition

- Cable (**1**)
- Plastic terminal protection cover (**2**)
- Capacitor cULus file 106388 (**3**)



Cable

- Cross section: 1.5 mm^2 (14AWG)
- Length: 300 mm

- Rated voltage: 600Vac
- Operation temperature: 105ºC
- Material: Electrolytic copper with PVC Insulation

Dimensions

- 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

Technical data and specifications

Characteristics	
Rated capacitance C_R	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_R	50 Hz / 60 Hz
Output 50/60 Hz	According to dimension table 0.25 …1.66 kvar
Rated current I_R	According with the power rating
tanδ (dielectric)	0.5 w/kvar

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

Test data	
V_{TT}	2.15 x V_R, 60 s (type test)
V_{TC}	3 000 VAC, 60 s (type test)
tanδ (120 Hz) at 20 °C	≤ 1.0 x 10^{-3}

Climatic category / -25/D	
T_{min} (-)	25 ºC
T_{max} (+)	55 ºC
Damp heat test t_{test}	21 days
Humidity	av. rel. < 65%
Maximum altitude	4 000 m

Mean life expectancy	
t_{LD}	Up to 100,000 hours
Max. 5 000 switching per year acc. to IEC 60831	

Design data	
Dimensions (∅ x l)	According dimension table
Weight approx	According dimension table
Impregnation	Soft polyurethane resin
Fixing	Al can stud or bracket
Max. torque (Al can stud)	4 Nm
Mounting position	Any mounting position possible. See “Maintenance and Installation Manual” for further details.

Terminals	
Enclosure	IP53, indoor mounting
Cable cross section	1.5 mm^2 (14 AWG)
Maximum terminal current	15 A
Creepage distance	12.7 mm minimum
Clearance	9.5 mm minimum

Safety	
Mechanical safety	Overpressure disconnector
Max. short circuit current	10 KA

Reference standards
IEC 60831-1/2 and UL 810

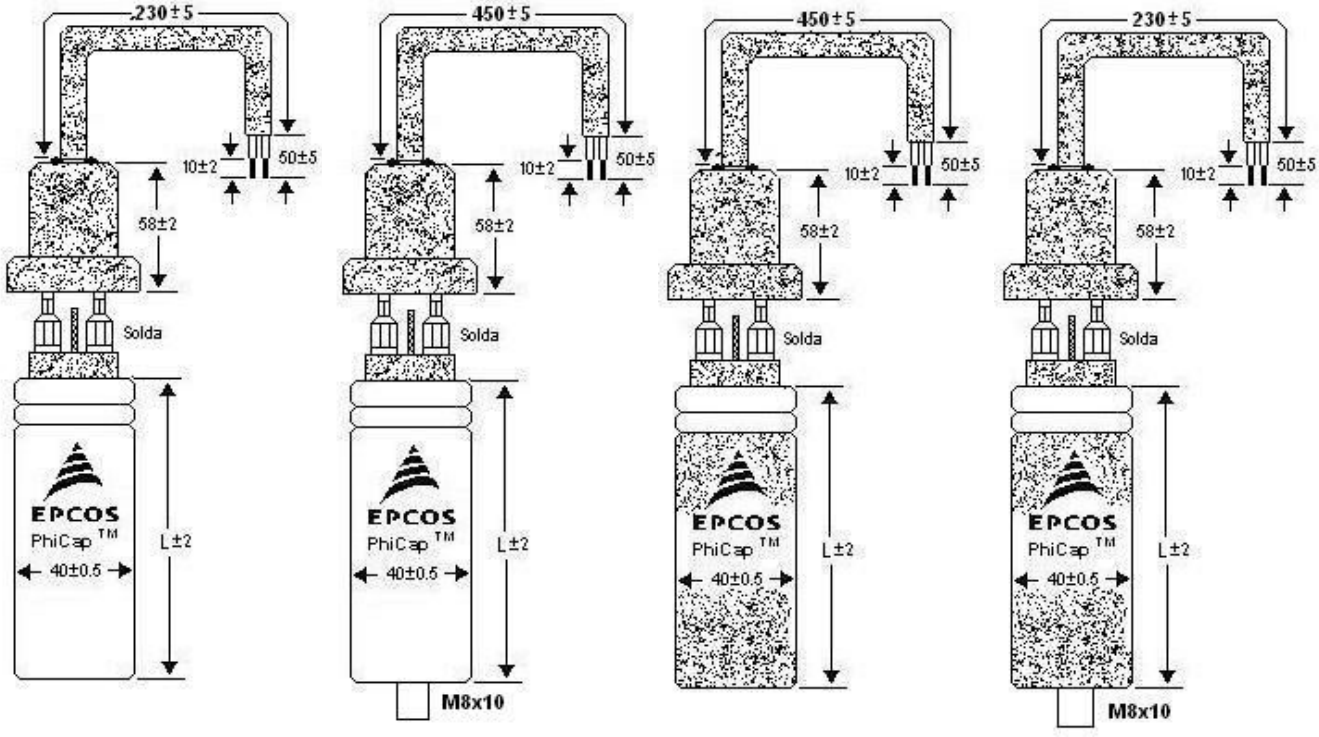
Discharge resistors are available upon request. Discharge resistor time according IEC specification for specific types .

Product table

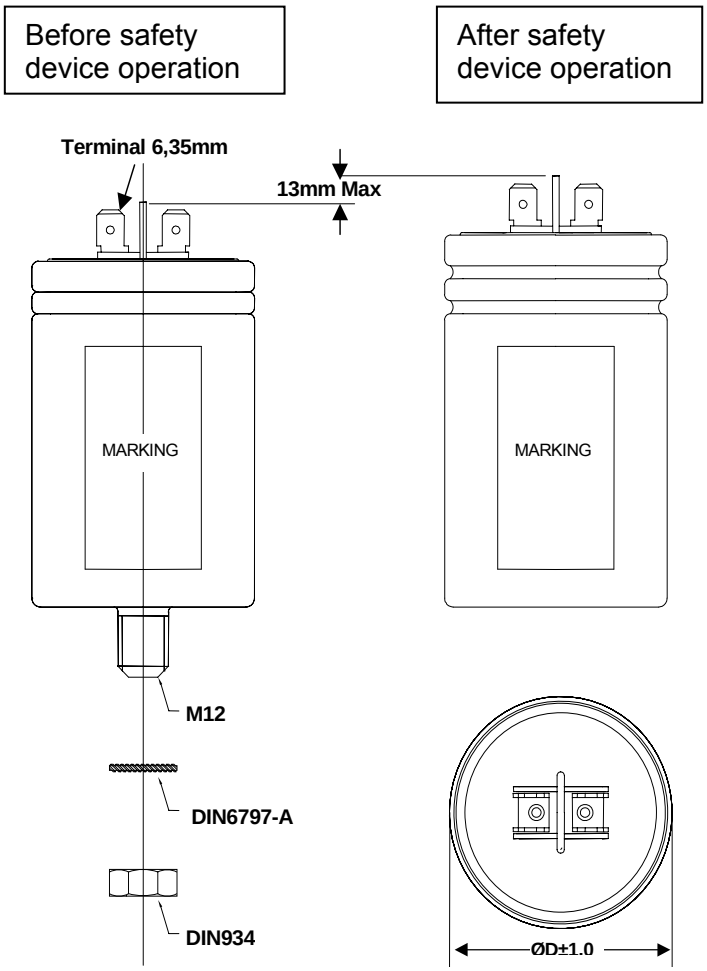
C_R	400 Vac (kvar)		240 Vac (kvar)		230 Vac (kvar)		220 Vac (kvar)		127 Vac (kvar)		Dimensions d x h	Weight	Ordering Code*)
µF	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	(mm)	(kg)	
5	0.25	0.30	0.09	0.11	0.08	0.10	0.08	0.09	0.025	0.030	40 x 70	0.15	B32340C4056J000
7	0.35	0.42	0.13	0.15	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: Jxx**0**.
Without studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 300 mm: Jxx**1**.
Without studs in the aluminum can, cable length 500 mm: Jxx**2**.
Without studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 500 mm: Jxx**3**.
With studs in the aluminum can, cable length 300 mm: Jxx**4**.
With studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 300 mm: Jxx**5**.
With studs in the aluminum can, cable length 500 mm: Jxx**6**.
With studs in the aluminum can, aluminum can with PVC cover 180 um thickness, cable length 500 mm: Jxx**7**.



Visual fault indicator



Cautions and warnings

- In case of dents of more than 2 mm depth or any other mechanical damage, capacitors must not be used at all.
- To ensure the full functionality of the overpressure disconnector, elastic elements must not be hindered and a minimum space of 5 cm has to be kept above each capacitor.
- Do not handle the capacitor before it is discharged to max. 10% of rated voltage.
- 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 over current and short circuit.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.

Discharging

Capacitors must be discharged to a maximum of 10% of rated voltage before they are switched in again. This prevents an electric impulse discharge in the application, influences the capacitor's service life and protects against electric shock. The capacitor must be discharged to 75 V or less within 3 minutes. There must be not any switch, fuse or any other disconnecting device in the circuit between the power capacitor and the discharging device. PoleCap capacitors have a pre-mounted ceramic discharge module; alternatively discharge reactors are available from EPCOS. Discharge and short circuit capacitor before handling!

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

- Ensure good, effective grounding for capacitor enclosures.
- Provide means of disconnecting and insulating a faulty component/bank.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
- Follow good engineering practice.

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 overcurrent 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.

Overtemperature

Exceeding maximum allowed temperature may set the safety device out of operation.

Overpressure disconnector

To ensure full functionality of an overpressure disconnector, 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. 5 cm) for expansion above the connections (see "Clearing distance for overpressure disconnector").
   - folding beads must not be retained by clamps.
2. 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.

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	2 h
Frequency range 1	0 ... 55 Hz corresponding to max. 0.7 g
Displacement amplitude	0.75 mm

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 aluminium can are avoided.

Clearing distance for overpressure disconnector

Above each capacitor, a minimum space of 5 cm has to be kept. This will allow the visual control to work and enable a longitudinal extension of the can to secure the over-pressure disconnector work.

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 the nut should be removed. The maximum tightening torque is 4 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 50 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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The following applies to all products named in this publication:

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