Film capacitors – Power Factor Correction

PhaseCap HD

Series/Type: **MKK440-D-40.0-21**
Ordering code: **B25669A4657J375**

Date: June 2012
Version: 2

EPCOS AG is a TDK Group Company.

Construction

- Dielectric: Polypropylene film
- Gas-impregnated, dry type, Non-PCB
- Concentric winding
- Wave cut
- Extruded round aluminum can with stud
- Premounted discharge module
- Triple safety system

Features

- Three-phase, delta connected
- Self-healing technology
- Naturally air cooled (or forced air cooling)
- Indoor mounting

Typical applications

- For Power Factor Correction

Terminals

- Optimized capacitor safety terminal

Mounting

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

Technical data and specifications

Characteristics	MKK440-D-40-21	
Rated capacitance C_R	3 • 219 µF	
Tolerance	–5 / +10%	
Connection	D (Delta)	
Rated voltage V_R	440 V AC	
Rated frequency f_R	50 Hz	60 Hz
Output	40 kvar	48 kvar
Rated current I_R	52 A	62 A
tan δ (dielectric)*)	0.2 W / kvar	

*without discharge resistors

Maximum ratings	
V_{max} (up to 8 h daily)	480 V AC
V_{max} (up to 1 min)	570 V AC
I_{max}	1.5 • I_R (A) (including combined effects of harmonics, overvoltages and capacitance tolerance)
I_S	300 • I_R (A)

Test data	
V_{TT}	900 V AC / 50 Hz during 10 s
V_{TC}	3000 V AC / 50 Hz during 10 s
*tan δ (50 Hz)	≤ 0.45 W / kvar

* Without discharge resistor

Climatic category –40/D	
T_{min}	–40 ºC
T_{max}	+55 ºC
Humidity	Av. rel. < 95%
Maximum altitude	4000 m

Mean life expectancy	
t_{LD}	Up to 180 000 hours (temperature class -40/C); Θ_{HS} ≤ 70 °C Up to 130 000 hours (temperature class -40/D); Θ_{HS} ≤ 70 °C
Max. 5000 switchings per year acc. to IEC 60831	

Design data	
Dimensions (d × h)	136 × 317 mm
Weight approx	4.4 kg
Impregnation	Non PCB, dry, inert gas
Fixing	Threaded bolt M12
Max. torque (Al can stud)	10 Nm
Mounting position	Upright See “Maintenance and Installation Manual” for further details.

Terminals	
Protection degree	Isolated terminals, IP20
Max. torque	2.5 Nm
Terminal cross section	35 mm^2
Maximum terminal current	100 A
Creepage distance (min)	15 mm
Clearance (min)	12 mm

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

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

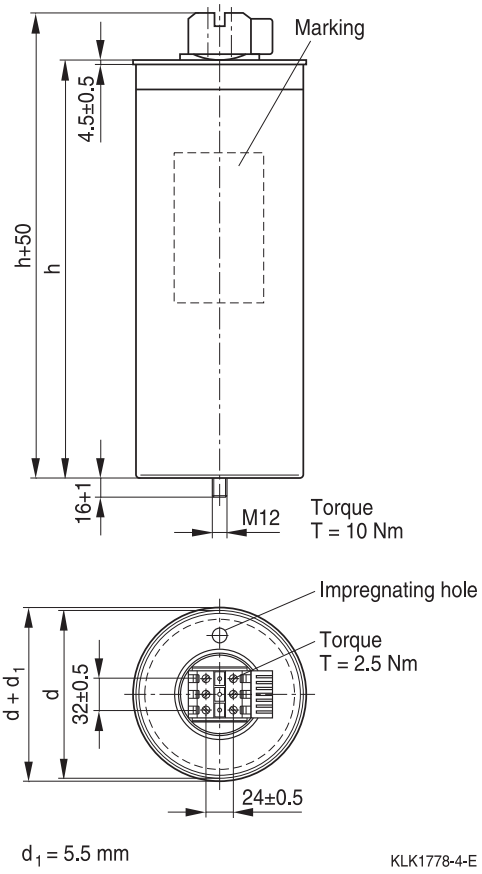
Label design

EPCOS
Power Quality Solutions

PhaseCap® HD
MKK440-D-40-21
B25669A4657J375

C_N = 3x219.0 µF +5/-5%		Δ SH
U_N	Q_N/50 Hz	Q_N/60 Hz
440 V	40,0 kvar	48,0 kvar
415 V	36,0 kvar	43,0 kvar
400 V	33,0 kvar	40,0 kvar
U_i = 3/-kV	-40/D	
Overpressure disconnector		Dry, Inert Gas
IEC 60831(96)		
Made by EPCOS	AMSO	03/10

Dimensional drawing



Important notes

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.
- This applies also in cases of oil leakages.
- To ensure the full functionality of the overpressure disconnector, 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 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. PhaseCap-capacitors either have a pre-mounted ceramic discharge module inserted from above into the middle section of the terminal, or for high voltages/high loads a plastic discharge module mounted at one side of the terminal; 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

Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from 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.

Important notes

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. 12 mm) for expansion above the connections. This will enable a longitudinal extension of the can to secure the overpressure disconnector 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*

Important notes

The following applies to all products named in this publication:

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Important notes

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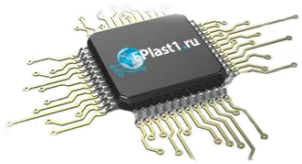
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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