



Film Capacitors – Power Factor Correction

SquareCap _ EPCOS Normal Duty Capacitor (ENDC)

Series/Type:
Ordering code: B32457L
Date: 2019-05-03
Version: 10.0

Construction

- Dielectric: Polypropylene film
- Semi dry; high viscosity PU resin; non-PCB
- Container type/finish: MS sheet metal / powder coated grey colour

Features

- Three phase
- Self-healing technology
- Naturally air cooled or forced
- Over pressure disconnecter
- Discharge resistor

Typical applications

- For Power Factor Correction

Terminals

- Stud terminals with ceramic bushing

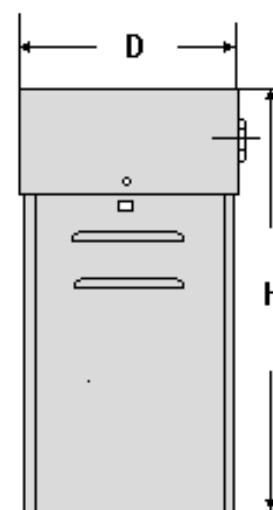
Mounting parts

- Mounting plates at bottom

Technical data and specifications

Characteristics	
Rated capacitance C_R	As per table
Tolerance	0 /+10%
Connection	D (Delta)
Rated voltage	As per table
Rated frequency f_R	50 Hz
Output	As per table
Rated current I_R	As per table
$\tan \delta_0$ (dielectric)	$\leq 0.2 \text{ W / kvar}$

Maximum ratings

Dimensional drawings


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V_{max} (up to 8 h daily)	$(V_R+10\% V_R) V AC$
V_{max} (up to 1 min)	$(V_R+30\% V_R) V AC$
I_{max}	$1.3 \cdot I_R (A)$
I_P	$100 \cdot I_R (A)$

Test data

V_{TT}	$2.15 \cdot V_R, V AC, 2s$
V_{TC}	3600 V AC; for 2 s
* Losses (single phase cell)	$\leq 0.5 W / kvar$
* Without discharge resistor	

Climatic category / -10/D

T_{min}	-10 °C
T_{max}	+55 °C
Storage temperature	-10 °C to 85 °C
Hotspot temperature	85 °C
Rel. humidity	av. < 95%
Maximum altitude	4000 m

Mean life expectancy

t_{LD}	Up to 100 000 hours
Max. 5000 switching per year to IEC 60831	

Design data

Dimensions (H x W x D)	As per table
Impregnation	Biodegradable soft resin
Fixing	Mounting plates
Mounting position	Vertical position. See "Maintenance and Installation Manual" for further details.

Safety

Mechanical safety	Overpressure disconnecter
Max. short circuit current	AFC: 10 kA
Discharge resistor time	$\leq 1 \text{ min (50 V)}$

Reference Standards

IS: 13340/41 (ISI mark applicable for 400 V, 415 V & 440 V up to 50 kvar)

Ordering codes:

Volts V	Power kvar	Capacitance μ f	Rated Current A	Dimension (mm)			Ordering code
				H	W	D	
415	1	6.3	1.4	170	125	45	B32457L4001A011
	2	12.5	2.8	170	125	45	B32457L4002A011
	3	19	4.2	215	185	60	B32457L4003A011
	4	25	5.6	215	185	60	B32457L4004A011
	5	31	7.0	215	185	60	B32457L4005A011
	6	37.5	8.3	285	185	60	B32457L4006A011
	7	44	9.7	285	185	60	B32457L4007A011
	7.5	46.5	10.4	285	185	60	B32457L4007A511
	8	49.5	11.1	285	185	60	B32457L4008A011
	9	56	12.5	285	185	60	B32457L4009A011
	10	62	13.9	285	185	60	B32457L4010A011
	12.5	77	17.4	300	240	80	B32457L4012A511
	15	92.5	20.9	300	240	80	B32457L4015A011
	20	124	27.8	300	240	160	B32457L4020A011
	25	154	34.8	300	240	160	B32457L4025A011
	30	185	41.7	300	240	160	B32457L4030A011
50	308	69.6	350	240	320	B32457L4050A011	

Volts V	Power kvar	Capacitance μ f	Rated Current A	Dimension (mm)			Ordering code
				H	W	D	
440	1	5.5	1.3	170	125	45	B32457L5001A011
	2	11	2.6	170	125	45	B32457L5002A011
	2.5	14	3.3	215	185	60	B32457L5002A511
	3	16.5	3.9	215	185	60	B32457L5003A011
	4	22	5.3	215	185	60	B32457L5004A011
	5	27.5	6.6	215	185	60	B32457L5005A011
	6	33	7.9	285	185	60	B32457L5006A011
	7	38.5	9.2	285	185	60	B32457L5007A011
	7.5	41.5	9.8	285	185	60	B32457L5007A511
	8	44	10.5	285	185	60	B32457L5008A011
	9	49.5	11.8	285	185	60	B32457L5009A011
	10	55	13.1	285	185	60	B32457L5010A011
	12	66	15.7	300	240	80	B32457L5012A011
	12.5	68.5	16.4	300	240	80	B32457L5012A511
	15	82.5	19.7	300	240	80	B32457L5015A011
	20	110	26.2	300	240	160	B32457L5020A011
	25	138	32.8	300	240	160	B32457L5025A011
	30	165	39.4	300	240	160	B32457L5030A011
	35	198	45.9	350	240	320	B32457L5035A011
	40	220	52.5	350	240	320	B32457L5040A011
50	276	65.6	350	240	320	B32457L5050A011	

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Cautions and warnings

- In case of dents 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 disconnecter, elastic elements must not be hindered and a minimum space of 12 mm has to be kept above each capacitor basic cell.
- 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 50 V or less within 1 minute. There must be not any switch, fuse or any other disconnecting device in the circuit between the power capacitor and the discharging device. SquareCap-capacitors have a pre-mounted ceramic discharge module;. 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.

Overpressure disconnecter

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

1. The elastic elements must not be hindered.
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 IS 13340 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

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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 are avoided.

Grounding

The bolt of the capacitor top cover 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.

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 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 TDK PFC Square Cap Product Profile.

Important notes

The following applies to all products named in this publication:

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Important notes

8. The trade names EPCOS, CeraCharge, CeraDiode, CeraLink, CeraPad, CeraPlas, CSMP, CTVS, DeltaCap, DigiSiMic, ExoCore, FilterCap, FormFit, LeaXield, MiniBlue, MiniCell, MKD, MKK, MotorCap, PCC, PhaseCap, PhaseCube, PhaseMod, PhiCap, PowerHap, PQSine, PQvar, SIFERRIT, SIFI, SIKOREL, SilverCap, SIMDAD, SiMic, SIMID, SineFormer, SIOV, ThermoFuse, WindCap are **trademarks registered or pending** in Europe and in other countries. Further information will be found on the Internet at www.tdk-electronics.tdk.com/trademarks.

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