



Film Capacitors – Power Factor Correction

Square Cap _EPCOS Super Heavy Duty Capacitor (ESHDC)

Series/Type:
Ordering code: B32455L
Date: 2019-05-03
Version: 8.0

Constructi

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

Features

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

Typical applications

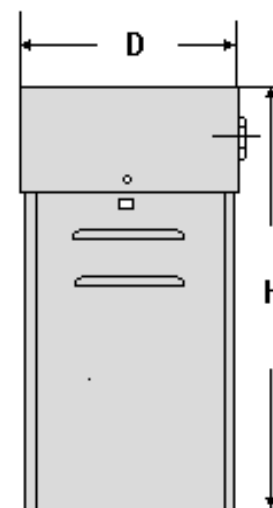
- For power factor correction

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	
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}	$1.6 \cdot I_R$ (A)
I_P	$350 \cdot I_R$ (A)

Test data	
V_{TT}	$2.15 \cdot V_f$ for 2 s
V_{TC}	3,600 V AC; for 2 s
* Losses (single phase cell)	$\leq 0.5 W / kVAr$

Climatic category / -10/D	
T_{\min}	-10 °C
T_{\max}	+55 °C
Storage temperature	-10 °C to 85 °C
Hot Spot Temperature	85 °C
Rel. humidity	av. < 95%
Maximum altitude	4,000 m

Mean life expectancy	
t_{LD}	up to 150,000 hours
Max. 7,500 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.

* Without discharge resistor

Safety	
Mechanical safety	Overpressure disconnecter
Max. short circuit current	AFC: 10 kA
Discharge resistor time	≤ 1 min (50 V)

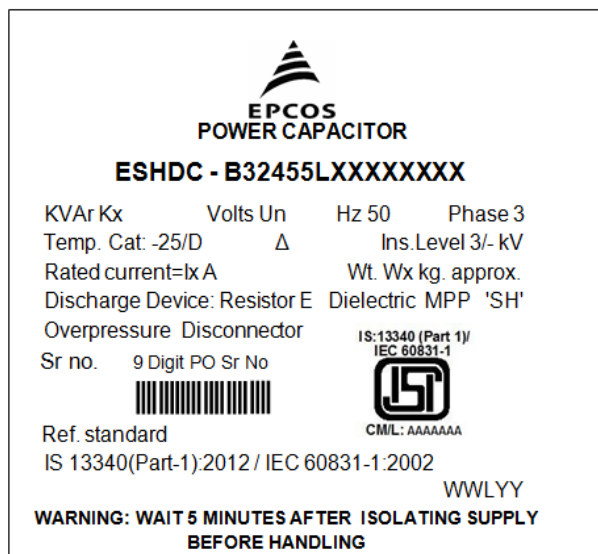
Reference Standards
IS: 13340/41 (ISI mark applicable for 400, 415 & 440V up to 50 kvar)

Ordering codes:

Volts V	KVAR	Capacitance µf	Rated Current (A)	Dimension (mm)			Ordering code
				H	W	D	
415	1	6.5	1.4	270	170	55	B32455L4001A011
	2	12.5	2.8	270	170	55	B32455L4002A011
	3	19	4.2	300	240	80	B32455L4003A011
	4	25	5.6	300	240	80	B32455L4004A011
	5	31	7.0	300	240	80	B32455L4005A011
	7.5	46.5	10.4	405	225	80	B32455L4007A511
	8	49.5	11.1	405	225	80	B32455L4008A011
	10	62	13.9	405	225	80	B32455L4010A011
	12.5	77	17.4	405	225	80	B32455L4012A511
	15	93	20.9	400	225	155	B32455L4015A011
	20	124	27.8	400	225	155	B32455L4020A011
	25	154	34.8	400	225	155	B32455L4025A011
	30	185	41.7	450	325	225	B32455L4030A011
	40	248	55.6	450	325	225	B32455L4040A011
50	308	69.6	450	325	225	B32455L4050A011	
440	1	5.5	1.3	270	170	55	B32455L5001A011
	2	11	2.6	270	170	55	B32455L5002A011
	3	16.5	3.9	300	240	80	B32455L5003A011
	4	22	5.2	300	240	80	B32455L5004A011
	5	27.5	6.6	300	240	80	B32455L5005A011
	6	33	7.9	405	225	80	B32455L5006A011
	7	38.5	9.2	405	225	80	B32455L5007A011
	7.5	41.5	9.8	405	225	80	B32455L5007A511

Volts	KVA _r	Capacitance μf	Rated Current (A)	Dimension (mm)			Ordering code
				H	W	D	
440	8	44	10.5	405	225	80	B32455L5008A011
	9	49.5	11.8	405	225	80	B32455L5009A011
	10	55	13.1	405	225	80	B32455L5010A011
	12	67	15.7	405	225	80	B32455L5012A011
	12.5	69	16.4	405	225	80	B32455L5012A511
	15	83	19.7	400	225	155	B32455L5015A011
	20	110	26.2	400	225	155	B32455L5020A011
	25	138	32.8	400	225	155	B32455L5025A011
	30	166	39.4	450	325	225	B32455L5030A011
	35	192	45.9	450	325	225	B32455L5035A011
	40	220	52.5	450	325	225	B32455L5040A011
50	276	65.6	450	325	225	B32455L5050A011	
480	1	4.6	1.2	270	170	55	B32455L8001A011
	2	9.5	2.4	270	170	55	B32455L8002A011
	4	18.5	4.8	300	240	80	B32455L8004A011
	5	23	6.0	300	240	80	B32455L8005A011
	5.5	25.3	6.6	300	240	80	B32455L8005A561
	6	28	7.2	405	225	80	B32455L8006A011
	7.5	34.5	9.0	405	225	80	B32455L8007A511
	8	37	9.6	405	225	80	B32455L8008A011
	8.3	38.2	10.0	405	225	80	B32455L8008A361
	9	41.5	10.8	405	225	80	B32455L8009A011
	10	46	12.0	405	225	80	B32455L8010A011
	11.1	51.1	13.4	405	225	80	B32455L8011A161
	12	55.5	14.4	405	225	80	B32455L8012A011
	12.5	58	15.0	405	225	80	B32455L8012A511
	13.8	63.5	16.6	405	225	80	B32455L8013A861
	14.5	67	17.4	400	225	155	B32455L8014A511
	15	69	18.0	400	225	155	B32455L8015A011
	16.6	76.4	20.0	400	225	155	B32455L8016A661
	18	83	21.7	400	225	155	B32455L8018A011
	20	93	24.1	400	225	155	B32455L8020A011
22.1	101.7	26.6	400	225	155	B32455L8022A161	
25	116	30.1	400	225	155	B32455L8025A011	
27.7	127.5	33.3	400	225	155	B32455L8027A761	
29	134	34.9	450	325	225	B32455L8029A011	
50	232	60.1	450	325	225	B32455L8050A011	

Volts	KVAR	Capacitance µf	Rated Current (A)	Dimension (mm)			Ordering code
				H	W	D	
525	6.6	25.4	7.3	405	225	80	B32455L6006A611
	9.9	38.1	10.9	405	225	80	B32455L6009A911
	10	38.5	11.0	405	225	80	B32455L6010A011
	12.5	48	13.7	405	225	80	B32455L6012A511
	13.2	50.8	14.5	405	225	80	B32455L6013A211
	15	58	16.5	400	225	155	B32455L6015A011
	16.6	63.9	18.3	400	225	155	B32455L6016A611
	19.9	76.6	22.0	400	225	155	B32455L6019A911
	20	77	22.0	400	225	155	B32455L6020A011
	25	96	27.5	400	225	155	B32455L6025A011
	26.5	102.0	29.1	400	225	155	B32455L6026A511
	33.1	127.4	36.4	450	325	225	B32455L6033A111
	35	136	38.5	450	325	225	B32455L6035A011
50	192	55.0	450	325	225	B32455L6050A011	
600	25	74	24.1	400	225	155	B32455L7025A 11

IS marking details:


Un= Rated Voltage (ISI mark applicable for 400, 415 & 440V up to 50 kvar) Kx= Rated KVAR at 50 Hz

Ix = Rated Current

AAAAAAA = CM/L No (For Nasik 1432640)

WW= Week Code L = Location (N for Nasik) YY = Year Code Wx: - Weight in kg

Display of ordering codes for TDK Electronics products

The ordering code for one and the same product can be represented differently in data sheets, data books, other publications, on the company website, or in order-related documents such as shipping notes, order confirmations and product labels. **The varying representations of the ordering codes are due to different processes employed and do not affect the specifications of the respective products.** Detailed information can be found on the Internet under www.tdk-electronics.tdk.com/orderingcodes.

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 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 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 minutes. 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, 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 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

Square Cap _EPCOS Super Heavy Duty Capacitor (ESHDC)

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 for M8 stud and 10 Nm for M12 stud.

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 Product Profile.

Important notes

The following applies to all products named in this publication:

1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule we are either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether a product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or life-saving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
3. **The warnings, cautions and product-specific notes must be observed.**
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5. We constantly strive to improve our products. Consequently, **the products described in this publication may change from time to time**. The same is true of the corresponding product specifications. Please check therefore to what extent product descriptions and specifications contained in this publication are still applicable before or when you place an order.

We also **reserve the right to discontinue production and delivery of products**. Consequently, we cannot guarantee that all products named in this publication will always be available. The aforementioned does not apply in the case of individual agreements deviating from the foregoing for customer-specific products.

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7. **Our manufacturing sites serving the automotive business apply the IATF 16949 standard**. The IATF certifications confirm our compliance with requirements regarding the quality management system in the automotive industry. Referring to customer requirements and customer specific requirements ("CSR") TDK always has and will continue to have the policy of respecting individual agreements. Even if IATF 16949 may appear to support the acceptance of unilateral requirements, we hereby like to emphasize that **only requirements mutually agreed upon can and will be implemented in our Quality Management System**. For clarification purposes we like to point out that obligations from IATF 16949 shall only become legally binding if individually agreed upon.

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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