



Shunt Power Capacitor

Film-foil type, oil impregnated

Series/Type: Dura Cube Heavy Duty Capacitors
Ordering code: B25160D4***T*40
Date: December 2022
Version: 1

Application

Shunt Power Factor Correction

Technology

APP (film foil capacitor)

Material

Dielectric: Double layer Biaxially Oriented Hazy Polypropylene (BOPP) film

Electrode: Aluminum foil

Impregnant: Non PCB, biodegradable oil

Casing: Metallic, CRCA (Cold Rolled Cold Annealed)

Case Insulation: Pressphan paper

Bushings: Polymeric

Terminals: Brass stud with two plain washers and hex head nuts (refer drawing).

Discharge device (external): carbon film or metal oxide film or thick film resistor

Paint: Epoxy, light gray (shade 631 as per IS 5:2005)


Construction

Element: Flat, elliptical, extended foil type

Element connection: Soldered type

Internal fuse: Provided

Discharge device: Provided (external)

Sealing: Hermetically sealed

Technical data
Specifications

Rated output Q_N	Refer table No. 1
Rated capacitance C_R	
Rated current I_R	
Rated voltage V_R	440 V AC
Rated frequency f_R	50 Hz
Capacitance tolerance	-5 / +10%
No. of phases and connections	Three phase, internally Δ connected
$\tan \delta$ (dielectric)	$\leq 2 \cdot 10^{-4}$

Table No. 1

Ordering code	Rated output Q_N	Rated capacitance C_R	Rated current I_R
B25160D4010T040	10.0	82.2	13.1
B25160D4015T040	15.0	123.3	19.7
B25160D4020T040	20.0	164.4	26.2
B25160D4025T040	25.0	205.5	32.8
B25160D4033T040	33.0	271.3	43.3
B25160D4040T040	40.0	328.8	52.5
B25160D4050T040	50.0	411.0	65.6

Maximum permissible electrical operating conditions	
Long duration voltages	1.00 • V_R – Continuous 1.10 • V_R – 8 hours in every 24 hours 1.15 • V_R – 30 minutes in every 24 hours 1.20 • V_R – 5 minutes 1.30 • V_R – 1 minute
Long duration currents	2 • I_R (including combined effects of harmonics, over voltages and capacitance tolerance)
Switching operations	15000 per year
Switching current	400 x I_R
Life expectancy	300000 h (at rated voltage, rated frequency & -10/D temperature category)

Test data		
1	Sealing test	To check integrity of sealing
2	V_{TT}	4.3 • V_R DC for 10 s
3	Discharge device test	To check capacitor discharge time after isolation of electric supply.
4	V_{TC}	3 kV rms for 10 s / 3.6 kV rms for 2 s of power frequency
5	C measurement	At 0.9 to 1.1 x V_R between terminals
6	$\tan \delta$ measurement	At 0.9 to 1.1 x V_R between terminals
7	Visual	For dimensions, finish, marking

Note: Tests 2 to 7 carried out at room temperature.

All ac tests carried out at 50 Hz, 1- Φ

Limiting environmental conditions	
Application duty	Indoor
Altitude	2000 m (max.) above mean sea level
Ambient temperature T_{min}	Category: -10/D -10 °C
T_{max}	+55 °C (max. 1 hour / day) +45 °C (highest mean over any period of 24 hours) +35 °C (highest mean over any period of one year)
Casing temperature	60 °C max.
Humidity	20% to 95% RH
Degree of pollution	No corrosive salt, dust & sand laden. No chemical fumes, chloride gas, sulphide gas, acidic or alkaline fumes, etc. in surrounding air. No deposition of conducting particles.
Mould growth	Not conducive for mould growth. Should be protected from fungus and vermin.
Seismic zone factor	0.24 (max.) corresponding to seismic zone IV - severe 0.15g (both horizontal & vertical direction)
Vibrations	Not expected. To be installed on rigid, steady, level surface.

Charateristics	
Application	Indoor
Insulation class (IEC60085)	90
Degree of protection	IP00
Cooling	ONAN
Creepage distance	25 mm / kV
Discharge time	3 minutes
Residual voltage	Less than 75 V
Temperature rise at rated voltage, frequency & room temperature	10 °C (max.) container

Shunt Power Capacitor


B25160D4*T*40**

Film-foil type, oil impregnated

Dura Cube Heavy Duty Capacitors

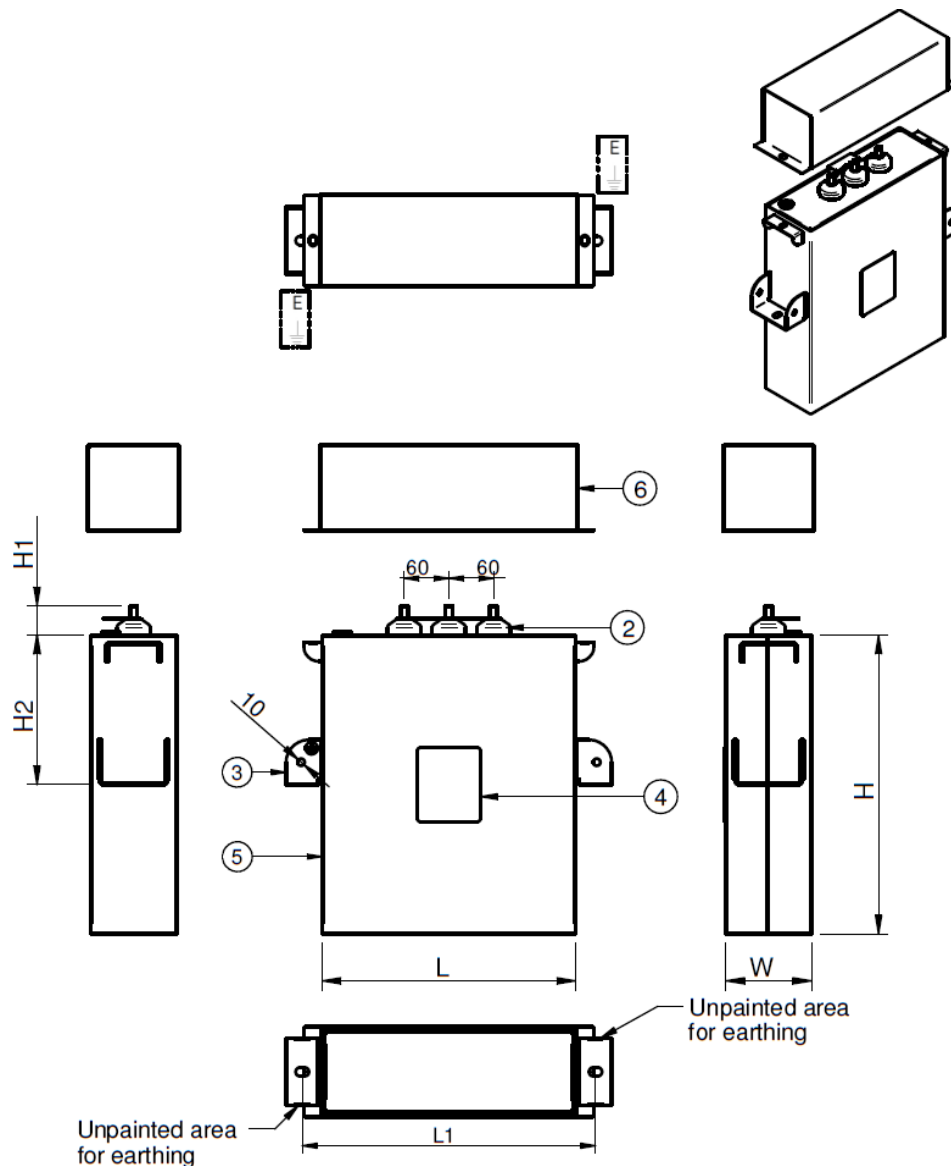
Reference standards

IS 13585 (Part 1): 2012 / IEC 60931-1 : 1996

Approval mark	Reference standards	Certificate
	IS 13585 (Part 1): 2012 / IEC 60931-1 : 1996	ISI Mark applicable to 440 V, 480 V and 525 V ratings

Dimensions and mounting

Container dimensions	As per drawing
Net weight	As per drawing
Earthing	Separate unpainted brackets provided on two sides.
Mounting / Lifting	Metal brackets provided on sides.
Mounting position	Vertical/Horizontal Should not be mounted upside down (bushing at bottom) or in cantilever position.
Terminal tightening torque	M10 terminal – 6.0 to 7.0 Nm

Drawings


ITEM NO	DESCRIPTION	MATERIAL	QTY
1	TERMINAL M10	BRASS (TIN PLATED)	3
2	BUSHING	EPOXY (RED)	3
3	MOUNTING BRACKET	STAINLESS STEEL-409	2
4	RATING STICKER	POLYSTER	1
5	CONTAINER	CRCA	1
6	TERMINAL COVER	CRCA	1

Note:-
 1. Indoor installation
 2. IP class 00

Shunt Power Capacitor
B25160D4*T*40**
Film-foil type, oil impregnated
Dura Cube Heavy Duty Capacitors

Sr. No.	V _R V	Q _N kVAr	L1 mm	L mm	W mm	H mm	H2 mm	Terminal	Cable entry hole Ø mm	Mounting slot mm	Approximate weight kg
1	440	10	394	340	115	200	200	M10	30	10 x 15	18
2	440	15	394	340	115	275	200	M10	30	10 x 15	20
3	440	20	394	340	115	350	200	M10	30	10 x 15	24
4	440	25	394	340	115	400	200	M10	30	10 x 15	29
5	440	33	394	340	135	450	200	M10	30	10 x 15	39
6	440	40	394	340	135	525	200	M10	30	10 x 15	45
7	440	50	394	340	150	550	200	M10	30	10 x 15	54

Note: The dimensions in datasheet are tentative. Please get in touch with respective sales at the time of ordering.

Protections required for capacitor

Following protection should be provided to each capacitor bank:

- 1) Short circuit / earth fault protection using external fuses OR MCB/MCCB.
- 2) Over voltage protection. (Setting \leq 110% of nominal system voltage).
- 3) Under voltage / no voltage sensing with time delay interlock to avoid sudden re-switching of capacitor.

In case of voltage interruption, time delay interlocking of minimum 3 minutes to be provided between disconnection (power OFF) and re-connection (power ON) of capacitor. Voltage sensing in case of switching with solid state switch, ensure residual voltage at capacitor terminal at the instant of switching shall be equal to system voltage. This is required to avoid phase-opposition and resulting high inrush currents.

Following protections should be provided under specific conditions:

- 1) Over current protection for capacitor banks expected to face harmonics, over current.
(Fuses generally do not provide suitable over current protection)
- 2) Surge arrester for capacitors subjected to high over voltage transients, lightning surges.
- 3) Current limiting series reactor/Capacitor duty contactor/Zero crossing switching with the help of solid-state switch for capacitors subjected to heavy transient currents (e.g. parallel switching, system with high fault level, fluctuating loads on same or nearby network, etc.)
- 4) Detuned / tuned series reactor for capacitors which are subjected to harmonics.
(Reactor linearity shall be greater than capacitor current at site condition)

Check voltage & current harmonics and network characteristics before & after installing capacitor & major changes in load / system parameters. Resonating conditions should always be avoided.

Specific application considerations

1) Capacitors directly connected across induction motor terminals:

(a) Motor self-excitation: Capacitor connected across induction motor such that after 'switching off' supply, capacitor remains connected across motor terminals while motor rotation has not stopped. Under such situation, motor will act as a generator with capacitor supplying required excitation. Capacitor current should be less than 90% of no-load magnetizing current of motor. Even after switching OFF supply, do not touch live terminals till motor stops rotating.

(b) Connecting capacitor across motor will reduce combined current. Reduce over Current relay setting when capacitor is connected across motor terminals after CT.

(c) Star-delta / soft starter: Connect capacitor on line side of starter. Switch 'ON' capacitor after motor stabilizes in normal running mode.

2) Capacitor to compensate power factor of generator, isolated from grid: Check generator characteristics and voltage regulation control with capacitive load.

(a) During sudden reduction of load, generator should not get over-excited, increasing voltage.

(b) Active power rating of generator should not be exceeded by compensating reactive power. Due to capacitive compensation, current may not exceed, thus defeating Over Current protection.

3) Capacitors used for harmonic filter application
Complete system details, harmonic details & filter details should be communicated during enquiry to offer capacitor suitable for filtering application.

4) Light load conditions can cause voltage rise, saturation of transformer core, abnormal harmonics, amplification by resonance between transformer & capacitor.
It is recommended to disconnect capacitor bank during light load conditions.

5) Switching device for capacitor bank should be restrike free. Restriking causes switching transients amplification, leading to premature failure of capacitor, switching device & other components.

6) Any bad contact or joints in capacitor circuit giving rise to arcing can cause high frequency oscillations & stressing capacitor.
Bad contact at capacitor terminals may cause heating of stud; affecting sealing integrity, oil leakage / moisture ingress in capacitor unit causing premature failure.

Cautions and warnings

- In case of dents of more than 2 mm depth on metallic container or chipping/breakage of bushing or any other mechanical damage, capacitors must not be used at all.
- In case of oil leakages, capacitor must not be used.
- A minimum required electrical clearance has to be kept around live terminals.
- Adequate ventilation should be provided around capacitor to reduce capacitor temperature rise.
- Handle capacitors carefully, because they will still be charged even after disconnection.
- Do not handle the capacitor before it is discharged.
- Resonance cases must be avoided by appropriate application design in any case.
- Protect the capacitor properly against over current and short circuit.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.

Safety

Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor, impact of broken porcelain pieces having sharp edges or from expulsion of oil or melted or burning 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. Discharge capacitors before touching any part electrically connected to capacitor terminals.
- Installation, commissioning & product application to follow good engineering practice.

Storage and operating conditions

Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulphide gas, ammonia, acid, alkali, salt, fumes or the like are present.

Note

For detailed information about PFC capacitors and cautions, refer to the latest version of TDK PFC Product Profile.

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.

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.**
4. In order to satisfy certain technical requirements, **some of the products described in this publication may contain substances subject to restrictions in certain jurisdictions (e.g. because they are classed as hazardous)**. Useful information on this will be found in our Material Data Sheets on the Internet (www.tdk-electronics.tdk.com/material). Should you have any more detailed questions, please contact our sales offices.
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.

6. Unless otherwise agreed in individual contracts, **all orders are subject to our General Terms and Conditions of Supply**.
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.

Release 2018-10