
WESTCODE
E50.R29-205N1W
MKP 2000 µF ±10%
Un 900 V DC
-25°C...+70°C
IEC 1071 SH
Made in Germany 24.09.03
WESTCODE
WESTCODE
WESTCODE

Table of contents page

* As per Distributor/Representatives Listing in New Selector Guide

CAPACITORS FOR POWER ELECTRONICS

1. Introduction

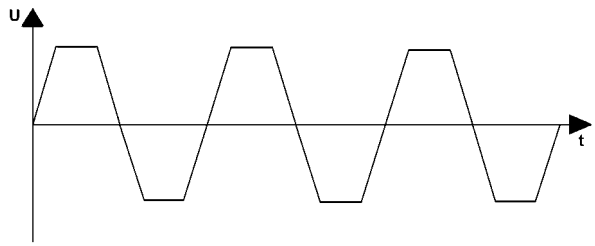
Enjoying a reputation as one of the World's leading manufacturers of power semiconductors with its origins in the 1920s, Westcode employs almost 300 people in the research, development, manufacture and marketing of silicon power products.

This catalogue details the Westcode range of power electronics capacitors for both Ac and DC applications and a variety of purposes which include filtering, smoothing, supporting, snubbing/clamping, commutation and general use. For information on application specific capacitors, GTO and IGBT snubbers and medium frequency capacitors, for induction heating processes, please contact either your local representative/distributor or our Sales Office, details at the end of this brochure.

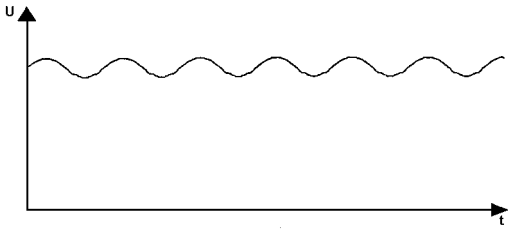
2. Application

Capacitors for power electronics can be used for a wide variety of applications, even where extremely non-sinusoidal voltages and pulsed currents are present. Both AC and DC capacitors are available. AC capacitors are periodically recharged during operation, DC capacitors are periodically charged and discharged without recharge.

Typical Voltage characteristics:



AC Application



DC Application

<u>Main Applications</u>:

Damping or Snubber Capacitors (AC) are usually connected in series with a resistor, and are designed for the damping of undesirable voltage spikes caused by the so-called carrier storage effect during the switching of power semiconductors.

Commutation Capacitors (AC) are switched in parallel to a thyristor and designed to quench its conductive state. Since commutating capacitors are periodically and abruptly recharged, the peak current may substantially exceed the rms value.

Smoothing Capacitors (DC) serve for the reduction of the AC component of fluctuating DC voltage in, for example;
- power supplies in radio and television technology (transmitters),
- high-voltage testing equipment, DC controllers,
- measurement and control technology, and
- cascaded circuits for generation of high DC voltage.

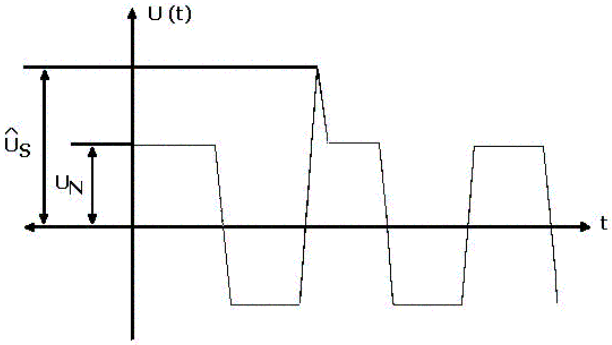
Supporting Capacitors, DC-Filter or Intermediate Circuit Capacitors (DC) are used for energy storage in intermediate DC circuits. They must be able to absorb and release very high currents within short periods, the peak value of the current being substantially greater than the rms value.

Examples of application:
- frequency converters for poly-phase drives
- transistor and thyristor converters

Surge (Pulse) Discharge Capacitors (DC) are capable of supplying or absorbing extreme short-time current surges. They are usually operated at low repetition frequencies.

Examples of application:
- laser technology
- lightning generators
- magnetising equipment

Definitions:
In accordance with IEC 1071.

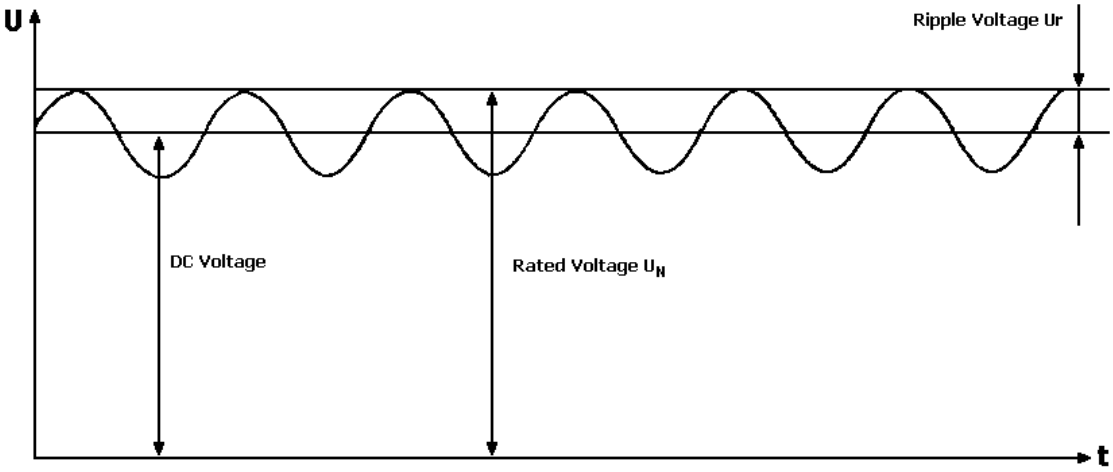


Rated Voltage U_N
The maximum or peak voltage of either polarity of a reversing or non-reversing type wave from for which the capacitor has been designed and rated (unlike other standards for AC capacitors, the rated voltage is not the rms value).

Non repetitive peak (surge) voltage U_S:
Voltages beyond the rated voltage induced by switching or faults of the system or any part of it.
Maximum duration: 50 msec
Maximum count: 1000

Rms voltage U_{eff}:
Root mean square of the maximum permissible value of sinusoidal AC voltage in continuous operation.

Ripple voltage U_r:



This is the peak-to-peak, alternating component of the unidirectional voltage.

Rated capacitance C_N:
Capacitance value rated at 20°C/50Hz.

Maximum current I_{max}:
This is the maximum rms value of permissible current in continuous operation. The values given in the data sheets are related to either the specified maximum power dissipation or the current limits of the connection terminals.

Peak current $\hat{I}$:
Maximum permitted repetitive current amplitude during continuous operation.

Rate of voltage rise $(du/dt)_{max}$:
Maximum permitted repetitive rate of voltage rise of the operational voltage: $\hat{i} = C_N \times (du/dt)_{max}$

Non-repetitive peak current (surge) I_S:
This is the maximum current which may occur non-repetitively, and briefly, in the event of a fault.
Maximum duration: 50 msec
Maximum count: 1000

Maximum non-repetitive rate of voltage rise $(du/dt)_s$:
Peak rate of voltage rise that may non-repetitively and briefly in the event of a fault. $I_S = C_N \times (du/dt)_s$

Series resistance R_S:
Resistance of the capacitor which determines its heat dissipation ($I^2_{eff} \times R_S$).

Dielectric dissipation factor $\tan\delta_0$:
Constant dissipation factor of the dielectric material for all capacitors in their rated frequency.

Maximum power dissipation P_{max}:
Maximum permitted power dissipation for the capacitor's operation.

$$P_{max} = \frac{^{\Theta}HOTSPOT - ^{\Theta}U}{R_{th}}$$

Voltage test between terminals U_{BB}:
Routine test of all capacitors conducted at room temperature, prior to delivery. A further test with 80% of the test voltage stated in the data sheet may be carried out once at the user's location.

Voltage test between terminals and case U_{BG}:
Routine test of all capacitors between short-circuited terminals and case, conducted at room temperature. May be repeated at the user's location.

Insulation voltage U_i:
Rms value of the AC voltage for which the terminals to case insulation has been designed and tested. If not stated in the data sheets, the insulation voltage is $Ui = \frac{U_n}{\sqrt{2}}$

Ambient temperature Θ_u:
Measured 10 cm away and at 2/3 of the case height of the capacitor.

Lower category temperature Θ_{min}:
Lower permissible ambient temperature at which a capacitor may be used.

Upper category temperature Θ_{max}:
Highest permissible capacitor temperature, i.e. temperature at the hottest point of the case.

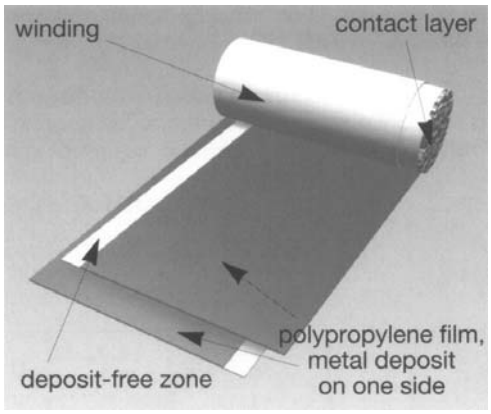
Hotspot temperature $\Theta_{HOTSPOT}$:
Temperature at the hottest spot inside the capacitor.

Thermal resistance R_{th}:
The thermal resistance indicates by how many degrees the capacitor temperature at the hotspot rises in relation to the dissipation losses.

Climatic categories:
C: maximum relative humidity 95% annual means, 100% occasional condensation permitted
F: maximum relative humidity 75% annual means, 95% 30 days/year condensation not permitted

3. Construction of the capacitors

MKP-Dielectric



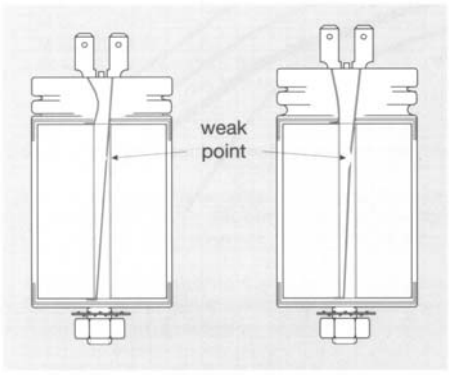
The MKP-type capacitors consist of a low-loss dielectric formed by pure polypropylene film. Thin self-healing metal layers are deposited directly on one side of the film. In some cases additional unmetallised foils are added between the metallised ones.

The capacitor elements are dried in a vacuum. After insertion into the capacitor case, a patented liquid polyurethane resin, mainly containing castor oil, is introduced. This protects the winding from environmental influence and provides an extended life expectancy and stable capacitance.
DC capacitors with a rated voltage below 1000V can also be made totally dry, i.e. without any impregnant.

4. Safety

Protection against Accidental Contact
All capacitors with metal case are checked by 100% routine test (voltage test between terminations and case) in accordance with IEC 1071. Accessible capacitors must be earthed at the bottom stud or with an additional earthing clamp. The terminals of the designs L1, L3, M1 and M3 comply with protection degree IP20. All other capacitors are not protected against accidental contact.

Protection against Overload and Failure at the End of Useful Service Life
All described dielectric structures are "self-healing": In the event of a voltage breakdown the metal layers around the breakdown channel are evaporated by the temperature of the electric arc that forms between the electrodes. They are removed within a few microseconds and pushed apart by the overpressure generated in the centre of the breakdown spot. An insulation area is formed which is reliably resistive and voltage proof for all operating requirements of the capacitor. The capacitor remains fully functional during and after the breakdown.



In the event of overvoltage or ageing at the end of the capacitor's useful service life, an increasing number of self-healing breakdowns may cause rising pressure inside the capacitor. To prevent it from bursting, the capacitor is fitted with an obligatory "break action mechanism". This safety mechanism is based on an attenuated spot at one of the connecting wires inside the capacitor. With rising pressure the casing begins to expand, mainly by opening the folded crimp and pushing the lid upwards. As a result, the prepared connecting wire is separated at the attenuated spot, and the current path is interrupted irreversibly. It has to be noted that this safety system can act properly only within the permitted limits of loads and over loads.

The capacitors in rectangular case are provided with an overpressure switch that would signal a rising pressure inside the case. A corresponding external safety circuit, which disconnects the capacitor immediately in such event, has to be provided by the user.

Protection Against Overvoltages and Short Circuits
As previously indicated, the capacitors are self-healing and regenerated themselves after breakdowns of the dielectric. For voltages within the permitted testing and operating maximum the capacitors are overvoltage-proof. They are also proof against external short circuits as far as the resulting surge discharges do not exceed the specified current limits (I_S).

Permitted Overvoltages according to IEC 1071

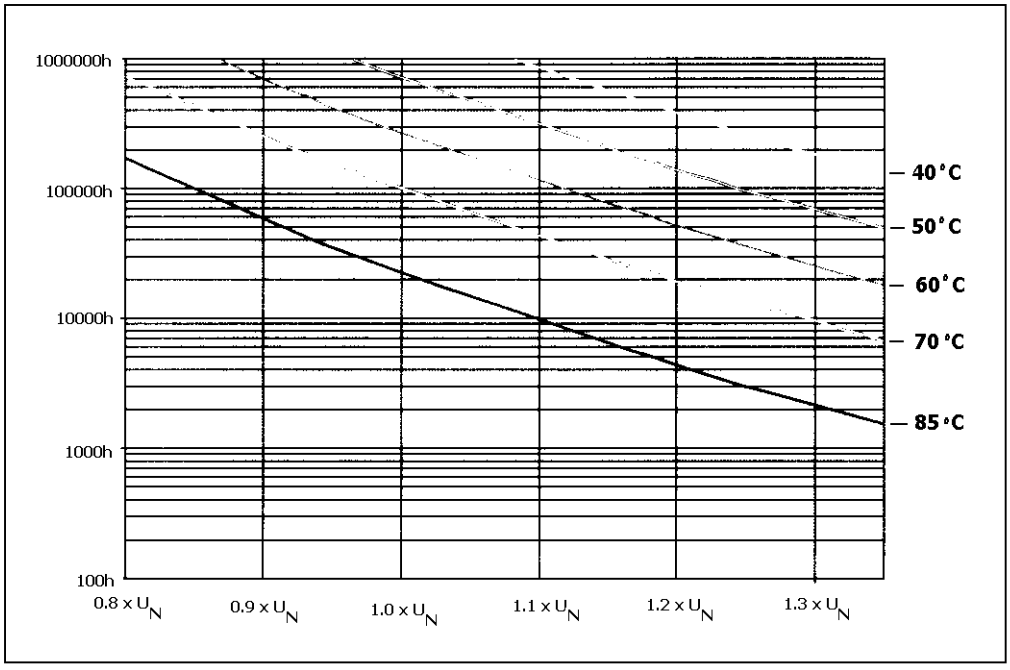
1.1 x U_N	30% of the service period
1.15 x U_N	30 min/d
1.2 x U_N	5 min/d
1.3 x U_N	1 min/d
1.5 x U_N	100ms/d

5. Operating life

Above all, the operating life of the capacitors depends on the temperature inside during operation, and the field strength in its dielectric. The capacitors have been designed for an average service life of 100,000 hrs (permitted failure rate 3%). These values are rated for the hotspot temperatures specified in the selection charts.

The following diagram demonstrates the correlation between service life, temperature, and operating voltage.

MKP / MKP



6. Mounting and Operating Instructions

Connection
Do not expose the soldering to excessive heat. It is not recommended to solder cables to the terminals. Use appropriate tab connectors to connect the cables.

Do not bend or turn or move otherwise the connecting terminals and the tab connectors.

Connection at threaded studs shall be made between two nuts. During connection the lower nut shall be backed up to avoid any transmission of the torque above the a.m. figures to the ceramic body.

Permitted torque for screw connections:

M5: 1.5 Nm
M6: 2.5 Nm
M10: 7 Nm
M12: 10 Nm
Screw terminal type L (M5): 3 Nm
Screw terminal type M (M6): 4 Nm

Connection of capacitors with break-action mechanism
Capacitors with break-action mechanism shall be connected with sufficiently flexible leads to permit the functioning of the mechanism, and sufficient space for expansion of the capacitor case must be left above the terminals. Depending on the specific dimensions of the capacitors the case could expand between 5mm and 15mm.

- Connect these capacitors only with flexible cables or elastic copper bands.
- Do not hold the folded crimps by retaining clamps.
- Accommodate a clearance of at least 20mm above the terminations for extension in case of overload. Mind that required clearances must be maintained even after a prolongation of the can (as a result of the break action mechanism).

The hermetic sealing of the capacitors is extremely important for a long operating life and for the correct functioning of the break action mechanism. Please pay special attention not to damage the following critical sealing points at the:

- bordering of the lid
- connection between screw terminal and lid
- rubber seal at the bottom of the tab connectors
- soldering at the bottom of the tab connectors
- ceramic insulators

Do not hit the bordering and the connecting terminals with heavy or sharp objects or tools (e.g. hammer, screw driver).

Vibration Stresses
The capacitors comply with testing standard FC according to DIN IEC 68 pt.2-6 as follows:

Capacitor Weight	< 0.5kg	0.5 - 3kg	> 3kg
Test Duration	30 cycles	30 cycles	Information upon Request
Frequency Range	10 - 500 Hz	10 - 500Hz	
Maximum Acceleration	50 m/s^2	10 m/s^2	
Maximum Displacement Amplitude	0.35mm	0.075mm	

Permitted torques at the mounting stud: M 8 4 Nm
M 12 7 Nm

Energy content in the event of fire
All capacitors are designed and manufactured in accordance with the relevant international standards. However, for technological requirements it cannot be avoided and must therefore be considered in the application that some materials, e.g. the filling resins, oils and winding elements are flammable. The energy content of an MKP capacitor is approximately 40 MJ/kg.

Mounting Location
The useful life of a capacitor may be reduced dramatically if exposed to excessive heat. To avoid overheating the capacitors must be allowed to emit their heat losses unhindered and shall be shielded from external heat sources. If attenuating circumstances give cause for doubt, special tests should be conducted to ensure that the permitted maximum temperature of the capacitors is not exceeded even under the most critical ambient circumstances. It should be noted that the internal heat balance of large capacitors is only reached after a couple of hours.

Mounting Position
MKP capacitors with liquid or viscous filling shall be installed upright with terminals facing upwards. Please contact us if a different mounting position is required. Capacitors with hard resin filling can be mounted in any position without restrictions.

Earthing
Capacitors with a metal case must be earthed at the mounting stud or by means of a separate metal strap or clamp.

Discharge
If there is no discharge of the capacitors provided by external circuits, the capacitors should be provided with discharge resistors. In any event, the poles of the capacitors must be short-circuited before being touched. Note that the capacitors with nominal voltages above 750V in particular may regenerate new voltage at their terminals after having been shot-circuited just for short periods. This condition results from the internal series connection of the capacitor elements and will be avoided by storing them permanently short-circuited.

Disposal
Our capacitors do not contain PCB, solvents or any other toxic or banned materials. The impregnants and filling materials contain vegetable oil or polyurethane mixtures. The capacitors are not rated as hazardous goods in transit and do not have to be marked under the Regulations for Hazardous Goods. They are rated WGK 0 (water risk category 0 "no general threat to water").

Westcode recommend disposing of the capacitors through professional recycling centres for electric/electronic waste. The capacitors can be disposed of as follows:

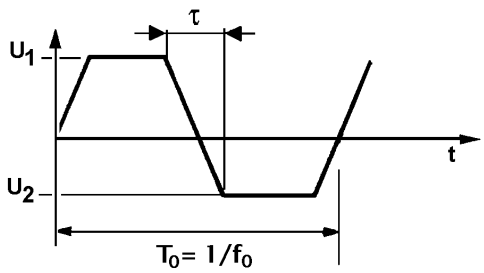
- Capacitors: according to European Waste Catalogue (EWC) No. 160216 "Components taken from discarded equipment"
- Liquid filling materials: according to EWC No 080402 "Waste adhesives and sealants free of halogenated solvents"
- Hardened filling materials: according to EWC No. 080404 "hardened adhesives and sealants"

Caution: *When touching or wasting capacitors with activated break-action mechanism, please consider that even after days and weeks these capacitors may still be charged with high voltages!*

7. Calculation Example

Typically the choice of capacitors for a special application should be as follows:

A capacitor with a capacity of 20µF is needed for a trapezoidal voltage wave form as below:



U_1	1000	V
U_2	500	V
f_o	120	Hz
τ	100	μs

Choice of the rated voltage:

The rated voltage of the capacitor must be equal to or bigger one of the two voltages U_1 and U_2.
For example; U_n > 1000V. Therefore an AC capacitor from the E62 series has to be selected.

Determination of the rate of voltage rise

$$\frac{dU}{dt} = \frac{U_1 + U_2}{\tau} = \frac{1500\ V}{100\ \mu s} = 15\ V / \mu s$$

Repetitive Peak Current

$$\hat{\imath} = C \cdot (dU / dt) = 15V\ \mu s \cdot 20\ \mu F = 300\ A$$

Rated (rms) Current

$$I_{eff} = \hat{\imath} \cdot \sqrt{2 \cdot \tau \cdot f_0} = 46.5\ A$$

Power Dissipation

According to IEC 1071, the power dissipation is determined by the following formula:

$$P_V = P_{VD} + P_{VR} = \hat{U}^2\ \pi \cdot f_0 \cdot C \tan\delta_0 + I_{eff}^2 \cdot R_S$$

For non-symmetric voltages, û has to be defined as (U1 + U2)/ 2.

In this example, the power dissipation factor is $P_V = P_{VD} + P_{VR}$ = 0.84 W + 2.81 W = 3.65 W

The values $\tan\delta_0 = 2 \times 10^{-4}$ and R_S = 1.3 mΩ have been taken from the E62.xxx data charts.

Ambient temperature

By means of the terminal resistance R_{th} taken from the capacitor chart we can calculate the temperature difference between the ambient temperature and the hottest spot inside the capacitor:

$$\Delta T = R_{th} \cdot P_V = 5.9\ K/W \cdot 3.65\ W = 21.5\ K$$

Given a desired service life of ≥100.000 hours, the hotspot temperature must not exceed 70ºC. This means that the maximum ambient temperature for this capacitor is $\Theta_U = \Theta_{HOTSPOT} - \Delta T$ = 48ºC

If the calculated power dissipation is too high, the following solutions may be considered:

- reduction of the permitted ambient temperature according to the diagram leading to an increase in the permitted power dissipation
- connection of a larger number of capacitors with smaller capacitance values (increase of the surface area)
- application of capacitors with a rated voltage higher than required by the operating voltage (larger dimensions, greater surface area and power dissipation)
- forced cooling
- a reduction of the series resistance by changes to the capacitor's internal construction

8. List of abbreviations

U_N rated voltage

U_{ms} rms voltage at sinusoidal voltage

U_r ripple voltage

U_S non-repetitive surge voltage

U_i insulation voltage

U_{BB} test voltage between terminals

U_{BG} test voltage between terminals and case

C_n rated capacitance

W_n rated energy content

I_{max} maximum current (rms value, maximum permissible rated current)

R_s series resistance

R_{th} thermal resistance

f_r resonance frequency

$\hat{I}$ maximum peak current

I_s peak surge current

K creepage distance

L clearance

D_1 rated can diameter

L_1 rated can length

9. Capacitor Data Tables

MKP AC/DC Capacitors:

9.1 E62.xxx – MKP AC/DC Capacitors

9.2 E62.xxx – Three Phase AC-Filter Capacitors

9.3 E63.xxx – DC Capacitors

9.4 E52.xxx – Low-inductance AC/DC Capacitors in axial design for GTO damping and for universal use in power electronics

9.5 E53.xxx – Low-inductance AC/DC Capacitors in axial design for general use in power electronics

9.6 E53.xxx – Low-inductance AC/DC Capacitors in radial design for universal use in power electronics

9.7 E61.xxx – DC capacitors for direct PCB mounting

9.8 E50.xxx (PK16) – Low-inductance DC capacitors (MKP)

DC Capacitors in Rectangular Case:

9.9 E56.xxx – DC Link capacitors in rectangular case with pressure switch for monitoring of internal pressure.

9.1 E62.xxx

MKP- AC/DC – capacitors

According to IEC 1071 / VDE 0560 part 120/121

Application

Universal use in power electronics, e.g. as commutation, supporting, smoothing, surge discharge capacitors.

- filled with liquid resin
- integrated overpressure protection (break-action mechanism)
- high specific ratio between capacitance and volume
- very good self-healing characteristics
- high AC-voltage handling capacity
- suitable for high rms and surge currents

General technical data

Internal protection	overpressure mechanism
$\tan\delta_0$	2×10^{-4}
operating temperature	-40…+85ºC
storing temperature	-40…+85ºC
capacitance tolerance	± 5%
service life	100,000 h at $\Theta_{HOTSPOT}$ ≤70ºC (permitted failure rate 3%)

U_N 700V DC - 420V AC U_{rms} 300V U_{BB} 1050V DC
U_s 1050V U_i 1000V U_{BG} 3000V AC

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
20	2.5	145	19	16	0.5	1.5	40	58	D1	0.09	E62.E58-203D1W
22	4.8	120	16	10	0.3	0.9	35	81	E2	0.1	E62.D81-223E2W
24	4.4	115	16	10	0.3	0.9	35	81	E2	0.1	E62.D81-243E2W
35	4.4	95	17.3	20	0.4	1.2	40	81	D1	0,11	E62.E81-353D1W
50	4.4	80	15.4	20	0.6	1.7	45	81	D1	0,14	E62.F81-503D1W
60	2.8	65	13.9	32	0.7	2.1	50	85	G1	0,18	E62.G85-603G1W
75	2.6	64	12.6	20	0.75	2.6	55	85	D1	0,21	E62.H85-753D1W
80	2.5	63	12.6	20	0.9	2.7	55	85	D1	0,21	E62.H85-803D1W
90	2.4	59	11.5	20	1.0	3.0	60	85	D1	0,25	E62.K85-903D1W
100	2.2	50	10.1	40	1.2	3.5	65	95	G1	0,3	E62.L95-104G1W
120	1.2	39	7.5	50	1.4	4.2	75	105	C2	0,5	E62.M10-124C2W
150	1.9	46	8.5	43	1.7	5.1	75	105	L1	0,5	E62.M10-154L1W
170	0.9	33	6.6	50	2.0	6.0	85	105	C2	0,6	E62.N10-174C2W
180	1.6	36	6.6	43	2.0	6.0	85	105	L1	0,6	E62.N10-184L1W
220	0.8	29	5.9	50	2.5	7.5	95	105	C3	0,8	E62.P10-224C3W
470	0.6	18	3.5	50	5.3	16	95	176	C3	1,3	E62.P17-474C3W
500	0.6	18	3.3	80	5.7	17	100	176	C3	1,5	E62.Q17-504C3W
700	0.7	17	2.9	80	8.0	20*	116	176	M1	2,0	E62.R17-704M1W
1100	0.5	13	2.1	80	13	20*	116	245	M1	2,7	E62.R24-115M1W
1500	0.5	11	1.8	80	15*	20*	136	245	M1	3,7	E62.S24-155M1W
2000	0.5	8	1.4	100	15*	20*	136	320	C3	4,9	E62.S32-205C3W

U_N 840V DC - 500V AC U_{rms} 360V U_{BB} 1260V DC
U_s 1250V U_i 1000V U_{BG} 3000V AC

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
1	18	650	37	6	0.1	0.3	25	48	E1	0.06	E62.B48-102E1W
25	4.9	113	17.3	20	0.4	1.1	40	81	D1	0,11	E62.E81-253D1W
33	4.9	98	15.4	20	0.5	1.4	45	81	D1	0,14	E62.F81-333D1W
40	3.2	80	13.9	30	0.6	1.7	50	85	G1	0,18	E62.G85-403G1W
50	4.1	80	12.6	20	0.7	2.1	55	85	D1	0,21	E62.H85-503D1W
60	3.8	73	11.5	20	0.8	2.5	60	85	D1	0,25	E62.K85-603D1W
75	2.3	58	10.1	40	1.0	3.0	65	95	G1	0,3	E62.L95-753G1W
100	2.6	48	7.5	43	1.4	4.2	75	105	L1	0,5	E62.M10-104L1W
160	1.5	38	5.9	43	2.2	6.6	95	105	L1	0,8	E62.P10-164L1W
200	2.7	31	4.5	43	2.8	8.4	75	176	L1	0,8	E62.M17-204L1W
300	0.6	23	2.7	80	4.1	12.0	95	176	C3	1.50	E62.P17-304C3W
300	0.9	25	3.5	80	4.1	12	95	176	M1	1,3	E62.P17-304M1W
350	0.8	24	3.3	80	4.8	14	100	176	M1	1,5	E62.Q17-354M1W
500	0.8	20	2.9	80	6.9	20*	116	176	M1	2,0	E62.R17-504M1W
620	0.7	16	1.6	100	9.0	15.0	116	245	C3	3.20	E62.R24-624C3W
750	0.6	14	2.1	100	10	20*	116	245	C3	2,7	E62.R24-754C3W
1000	0.6	12	1.8	100	14	20*	136	245	C3	3,7	E62.S24-105C3W
1500	0.5	9	1.4	100	15*	20*	136	320	C3	4,9	E62.S32-155C3W

U_N 1000V DC - 640V AC				U_{rms} 450V			U_{BB} 1500V DC				
U_s 1500V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
5	4.9	290	26	10	0.26	0.8	30	58	E1	0.06	E62.C58-502E1W
6.8	4	250	22	16	0.35	1	35	58	E2	0.07	E62.D58-682E2W
10	3.1	210	19	20	0.40	1.2	40	58	D1	0.08	E62.E58-103D1W
15	5	150	14	20	0.24	0.7	40	81	D1	0.11	E62.E81-153D1W
18	5.6	133	14	20	0.29	0.9	40	81	D1	0,11	E62.E81-183D1W
22	3.9	120	12	20	0.35	1.1	45	81	D1	0.14	E62.F81-223D1W
25	3.6	113	12	20	0.4	1.2	45	81	D1	0,14	E62.F81-253D1W
30	3.5	92	10	33	0.5	1.4	50	85	G1	0,18	E62.G85-303G1W
40	4.2	89	10	20	0.6	1.9	55	85	D1	0,21	E62.H85-403D1W
47	3.9	82	8.7	20	0.8	2.3	60	85	D1	0,25	E62.K85-473D1W
50	2.6	71	7.2	40	0.8	2.4	65	95	G1	0,3	E62.L95-503G1W
75	2.7	55	5.7	43	1.2	3.6	75	105	L1	0,5	E62.M10-753L1W
80	1.9	54	5.0	43	1.3	3.8	85	105	L1	0,6	E62.N10-803L1W
120	1.6	44	4.5	43	1.9	5.8	95	105	L1	0,8	E62.P10-124L1W
200	0.8	28	2.7	80	3.5	10.5	95	176	C3	1.50	E62.P17-204C3W
250	0.7	25	2.5	80	4.0	12	100	176	C3	1,5	E62.Q17-254C3W
250	1.9	28	2.7	43	4.0	12	95	176	L1	1,3	E62.P17-254L1W
350	0.6	21	2.2	80	5.6	17	116	176	C3	2,0	E62.R17-354C3W
500	0.6	17	1.6	100	8.0	20*	116	245	C3	2,7	E62.R24-504C3W
800	0.6	14	1.3	100	13	20*	136	245	C3	3,7	E62.S24-804C3W
1000	0.6	12	1.0	100	15	20*	136	320	C3	4,9	E62.S32-105C3W

U_N 1120V DC - 680V AC				U_{rms} 480V			U_{BB} 1680V DC				
U_s 1500V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
12	6.8	162	17.3	18	0.2	0.7	40	81	D1	0,11	E62.E81-123D1W
20	5.5	126	15.4	20	0.4	1.1	45	81	D1	0,14	E62.F81-203D1W
25	3.6	101	13.9	28	0.5	1.4	50	85	G1	0,18	E62.G85-253G1W
30	4.5	103	12.6	20	0.5	1.6	55	85	D1	0,21	E62.H85-303D1W
33	4.3	98	11.5	20	0.6	1.8	60	85	D1	0,25	E62.K85-333D1W
40	2.8	80	10.1	38	0.7	2.2	65	95	G1	0,3	E62.L95-403G1W
60	2.8	62	7.5	43	1.1	3.3	75	105	L1	0,5	E62.M10-603L1W
68	1.9	58	6.6	43	1.2	3.7	85	105	L1	0,6	E62.N10-683L1W
100	1.6	48	5.6	43	1.8	5.5	100	105	L1	0,9	E62.Q10-104L1W
180	1.9	33	3.5	43	3.3	9.9	95	176	L1	1,3	E62.P17-184L1W
200	0.7	28	3.3	80	3.7	11	100	176	C3	1,5	E62.Q17-204C3W
280	0.6	24	2.9	80	5.1	15	116	176	C3	2,0	E62.R17-284C3W
400	0.6	19	2.1	100	7.3	20	116	245	C3	2,7	E62.R24-404C3W
600	0.6	16	1.8	100	11	20*	136	245	C3	3,7	E62.S24-604C3W
800	0.6	13	1.4	100	15	20*	136	320	C3	4,9	E62.S32-804C3W

U_N 1260V DC - 750V AC				U_{rms} 530V			U_{BB} 1890V DC				
U_s 1900V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
10	6	152	13.8	16	0.45	1.35	40	81	D1	0.16	E62.E81-103D1W
15	7.4	124	15.4	16	0.3	0.9	45	85	B1	0,14	E62.F85-153B1W
20	3.9	113	13.9	27	0.4	1.2	50	85	G1	0,18	E62.G85-203G1W
24	6.0	98	12.6	16	0.5	1.5	55	85	B1	0,21	E62.H85-243B1W
28	5.7	91	11.5	16	0.6	1.7	60	85	B1	0,25	E62.K85-283B1W
33	2.9	88	10	37	0.7	2.0	65	95	G1	0,3	E62.L95-333G1W
47	3.0	70	7.5	43	1.0	2.9	75	105	L1	0,5	E62.M10-473L1W
60	1.9	62	6.6	43	1.2	3.7	85	105	L1	0,6	E62.N10-603L1W
75	1.7	55	5.9	43	1.5	4.6	95	105	L1	0,8	E62.P10-753L1W
150	2.0	36	3.5	43	3.1	9.3	95	176	L1	1,3	E62.P17-154L1W
220	0.7	27	2.9	80	4.5	14	116	176	C3	2,0	E62.R17-224C3W
330	0.6	21	2.1	100	6.8	20	116	245	C3	2,7	E62.R24-334C3W
500	0.6	17	1.8	100	10	20*	136	245	C3	3,7	E62.S24-504C3W
600	0.6	15	1.4	100	12	20*	136	320	C3	4,9	E62.S32-604C3W

U_N 1400V DC - 850V AC				U_{rms} 600V			U_{BB} 2100V DC				
U_s 2100V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
2	7.6	460	26	10	0.18	0.5	30	58	E1[1] / E4	0.07	E62.C58-202E1W
2.2	7	440	26	10	0.2	0.6	30	58	E1[1] / E4	0.07	E62.C58-222E1W
4	10	280	18	10	0.18	0.5	30	81	E1[1] / E4	0.08	E62.C81-402E1W
12	7.9	139	12	16	0.3	0.8	45	85	B1	0.14	E62.F85-123B1W
16	4.2	126	10	30	0.4	1.1	50	85	G1	0.18	E62.G85-163G1W
25	3.2	101	7.2	40	0.6	1.7	65	95	G1	0.3	E62.L95-253G1W
33	3.3	84	5.7	38	0.8	2.3	75	105	L1	0.5	E62.M10-333L1W
47	2.1	70	5.0	43	1.1	3.2	85	105	L1	0.6	E62.N10-473L1W
60	1.8	62	4.5	43	1.4	4.1	95	105	L1	0.8	E62.P10-603L1W
120	0.8	36	2.7	80	2.7	8.2	95	176	C3	1.3	E62.P17-124C3W
130	0.8	35	2.5	80	3.0	8.9	100	176	C3	1.5	E62.Q17-134C3W
180	0.7	30	2.2	80	4.1	12	116	176	C3	2.0	E62.R17-184C3W
270	0.7	23	1.6	100	6.2	19	116	245	C3	2.7	E62.R24-274C3W
400	0.605	19	1.3	100	9.2	20*	136	245	C3	3.7	E62.S24-404C3W
500	0.6	16	1.0	100	11.4	20*	136	320	C3	4.9	E62.S32-504C3W

[1] U_{NDC} limited to 1200V

U_N 1680V DC - 1000V AC				U_{rms} 720V			U_{BB} 2520V DC				
U_s 2500V				U_i 1250V			U_{BG} 3500V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
1.5	5.3	530	26	10	0.3	0.9	30	58	E1[1] / E4	0.07	E62.C58-152E..W
3	6.9	320	18	10	0.35	1.05	30	81	E1[1] / E4	0.08	E62.C81-302E..W
4	5.6	280	16	10	0.45	1.35	35	81	E2 [1]	0.09	E62.D81-402E2W
5	4.8	250	14	20	0.6	1.8	40	81	D1 [1]	0.12	E62.E81-502D1W
6.8	3.9	220	12	20	0.8	2.4	45	81	D1 [1]	0.14	E62.F81-682D1W
8	4.4	170	12	16	0.5	1.4	45	85	B1	0.14	E62.F85-802B1W
10	3.8	159	10	32	0.6	1.7	50	85	G1	0.18	E62.G85-103G1W
12	5.9	139	10	16	0.7	2.1	55	85	B1	0.21	E62.H85-123B1W
15	5.5	124	8.7	16	0.9	2.6	60	85	D1 [1]	0.25	E62.K85-153D1W
16	3.6	120	7.2	40	0.95	2.9	65	95	G1	0.3	E62.L95-163G1W
18	2.7	119	7.2	40	1.0	3.1	65	95	G1	0.3	E62.L95-183G1W
20	1.7	95	5.7	50	1.2	3.5	75	105	C2	0.5	E62.M10-203C2W
28	1.3	80	5.0	50	1.6	4.9	85	105	C2	0.6	E62.N10-283C2W
33	1.1	74	4.5	50	1.9	5.7	95	105	C3	0.8	E62.P10-333C3W
68	0.8	48	2.7	80	3.9	12	95	176	C3	1.3	E62.P17-683C3W
80	0.7	44	2.5	80	4.6	14	100	176	C3	1.5	E62.Q17-803C3W
120	0.6	36	2.2	80	7.0	20	116	176	C3	2.0	E62.R17-124C3W
180	0.6	29	1.6	100	10.4	20*	116	245	C3	2.7	E62.R24-184C3W
220	0.7	25	1.2	100	14.0	20.0	116	320	C3	4.1	E62.R32-224C3W
250	0.6	24	1.3	100	14.5	20*	136	245	C3	3.7	E62.S24-254C3W
330	0.6	20	1.0	100	15*	20*	136	320	C3	4.9	E62.S32-334C3W

[1] U_{NDC} limited to 1200V

U_N 1200V AC				U_{rms} 850V			U_{BB} 2100V DC				
U_s 2000V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
0.1	21	2050	31	8	0.10	0.3	25	58	E1	0.05	E62.B58-101E1W
0.15	14	1678	26	8	0.10	0.3	30	58	E1	0.06	E62.C58-151E1W
0.22	10	1390	26	10	0.20	0.6	30	58	E1	0.05	E62.C58-221E1W
0.33	9	1130	26	10	0.20	0.6	30	58	E1	0.05	E62.C58-331E1W
0.47	9	950	26	10	0.20	0.6	30	58	E1	0.05	E62.C58-471E1W
0.5	8.5	919	26	10	0.16	0.48	30	58	E1	0.05	E62.C58-501E1W
0.68	7.2	790	26	10	0.22	0.7	30	58	E1	0.05	E62.C58-681E1W
1	6.5	650	26	10	0.25	0.8	30	58	E1	0.05	E62.C58-102E1W
2	7.7	459	26	15	0.3	0.9	30	58	E1	0.06	E62.C58-202E1W
2.2	10	360	16	10	0.2	0.6	30	93	E1	0.08	E62.C93-222E1W
4	5	280	14	20	0.3	0.9	40	81	D1	0.12	E62.E81-402D1W
5	4.3	250	12	20	0.35	1.1	45	81	D1	0.14	E62.F81-502D1W
6.8	3.6	220	10	20	0.5	1.5	50	85	D1	0.18	E62.G85-682D1W
10	3.0	180	8.7	20	0.7	2.1	60	85	D1	0.25	E62.K85-103D1W
22	4.9	110	4.9	20	1.2	3.6	60	151	D1	0.4	E62.K15-223D1W
30	4.3	80	4.3	20	1.0	3	65	160	D2	0.6	E62.L16-303D2W

CAPACITORS FOR POWER ELECTRONICS

U_N 2000V DC 1200V AC **U_{rms} 850V** **U_{BB} 3000V DC**
U_s 2000V **U_i 1500V** **U_{BG} 4000V AC**

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
1	6.5	650	26	10	0.25	0.8	30	58	E4	0.07	E62.C58-102E4W
2.2	10	360	16	10	0.2	0.6	30	93	E4	0.08	E62.C93-222E4W
6.8	3.6	190	10.5	33	0.5	1.5	50	85	G1	0.18	E62.G85-682G1W
10	3.3	160	7.2	40	0.7	2.1	65	95	G1	0.33	E62.L95-103G1W
15	3.8	120	6.3	40	0.8	2.4	65	109	G1	0.38	E62.L10-153G1W
30	4.3	80	4.3	40	1.0	3	65	160	G1	0.6	E62.L16-303G1W
40	0.8	63	3.0	80	2.7	8.1	85	176	C2	1.2	E62.N17-403C2W
100	1.8	41	2.2	80	3.2	9.6	116	176	C4	2.1	E62.R17-104C4W

U_N 2250V DC - 1350V AC **U_{rms} 960V** **U_{BB} 3375V DC**
U_s 3300V **U_i 1600V** **U_{BG} 4200V AC**

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
4	5.5	230	10.5	26	0.32	0.96	50	85	G1	0.18	E62.G85-402G1W
5	5.1	225	13.9	25	0.4	1.2	50	85	G1	0.18	E62.G85-502G1W
6.8	6.6	184	12.6	16	0.5	1.6	55	85	B1	0.21	E62.H85-682B1W
10	2.3	135	7.5	45	0.8	2.3	75	105	C2	0.5	E62.M10-103C2W
15	1.1	119	5.0	50	1.1	3.3	85	105	C2	0.8	E62.N10-153C2W
16	1.6	106	6.6	50	1.2	3.7	85	105	C2	0.6	E62.N10-163C2W
20	1.3	95	5.9	50	1.5	4.6	95	105	C3	0.8	E62.P10-203C3W
40	0.9	63	3.5	80	3.1	9.3	95	176	C3	1.3	E62.P17-403C3W
47	0.8	58	3.3	80	3.6	11	100	176	C3	1.5	E62.Q17-473C3W
68	0.7	48	2.9	80	5.3	16	116	176	C3	2.0	E62.R17-683C3W
100	0.7	39	2.1	100	7.7	20*	116	245	C3	2.7	E62.R24-104C3W
150	0.6	32	1.8	100	11.6	20*	136	245	C3	3.7	E62.S24-154C3W
200	0.6	26	1.4	100	15*	20*	136	320	C3	4.9	E62.S32-204C3W

U_N 2800V DC - 1700V AC **U_{rms} 1200V** **U_{BB} 4200V DC**
U_s 4200V **U_i 2000V** **U_{BG} 5000V AC**

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
0.33	9	1130	26	10	0.2	0.6	30	58	E4	0.07	E62.C58-331E4W
0.47	9	950	26	10	0.2	0.6	30	58	E4	0.07	E62.C58-471E4W
1	11	560	18	10	0.2	0.6	30	81	E4	0.08	E62.C81-102E4W
2.5	10.2	291	15	16	0.2	0.7	45	85	B2	0.14	E62.F85-252B2W
3.3	8.8	253	14	16	0.3	1.0	50	85	B2	0.17	E62.G85-332B2W
4.7	7.4	212	13	16	0.5	1.4	55	85	B2	0.21	E62.H85-472B2W
6.8	2.6	163	7.5	46	0.7	2.0	75	105	C2	0.5	E62.M10-682C2W
10	1.9	135	6.6	50	1.0	2.9	85	105	C2	0.6	E62.N10-103C2W
12	1.6	123	5.9	50	1.2	3.5	95	105	C3	0.8	E62.P10-123C3W
25	1.0	80	3.5	80	2.4	7.3	95	176	C3	1.3	E62.P17-253C3W
30	0.9	73	3.3	80	2.9	8.7	100	176	C3	1.5	E62.Q17-303C3W
40	0.8	63	2.9	80	3.9	12	116	176	C3	2.0	E62.R17-403C3W
50	1.5	58	2.2	80	2.3	7	116	176	C4	2.1	E62.R17-503C4W
60	0.7	50	2.1	100	5.8	17	116	245	C3	2.7	E62.R24-603C3W
90	0.6	41	1.8	100	8.7	20*	136	245	C3	3.7	E62.S24-903C3W
125	0.6	33	1.4	100	12.1	20*	136	320	C3	4.9	E62.S32-134C3W

U_N 3400V DC - 2000V AC **U_{rms} 1400V** **U_{BB} 5100V DC**
U_s 4200V **U_i 2400V** **U_{BG} 5800V AC**

Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
10	2.6	122	4.5	40	1.2	3.5	75	176	C2	0.8	E62.M17-103C2W
15	2.2	100	3.5	40	1.0	3.1	95	176	C3	1.3	E62.P17-153C3W
20	1.2	89	3.3	50	2.3	7.0	100	176	C3	1.5	E62.Q17-203C3W
30	1.0	73	2.9	50	3.6	11	116	176	C3	2.0	E62.R17-303C3W
40	1.2	58	1.2	80	4.6	14	116	320	C3	4.1	E62.R32-403C3W
60	1.2	48	1.6	100	6.0	18	116	320	C3	3.5	E62.R32-603C3W
90	1.1	38	1.4	100	9.7	20*	136	320	C3	4.9	E62.S32-903C3W

U_N 3600V DC - 2100V AC				U_{rms} 1500V			U_{BB} 5400V DC				
U_s 5400V				U_i 2600V			U_{BG} 6200V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
0.1	21	2050	26	9	0.10	0.3	30	58	E4	0.07	E62.C58-101E4W
0.22	10	1390	26	10	0.20	0.6	30	58	E4	0.07	E62.C58-221E4W
0.47	6.7	730	16	16	0.40	1.2	45	62	B2	0.10	E62.F62-471B2W
0.68	5.6	610	14	16	0.5	1.5	50	62	B2	0.13	E62.G62-681B2W
1	8.5	460	9.4	16	0.8	2.4	45	105	B2	0.18	E62.F10-102B2W
1.5	5.4	380	7.7	16	1.2	3.6	55	105	B2	0.26	E62.H10-152B2W
22	1.7	90	2.2	50	1.2	3.5	116	176	CR	2.0	E62.R17-223CRW
33	1.1	72	1.9	80	3.3	9.9	116	205	C3	2.4	E62.R20-333C3W
40	0.8	60	1.2	100	5.4	16	116	320	CR	3.5	E62.R32-403CRW

U_N 4000V DC - 2400V AC				U_{rms} 1700V			U_{BB} 6000V DC				
U_s 6000V				U_i 2900V			U_{BG} 6800V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
2	5.6	325	8.5	16	0.5	1.5	50	105	B2	0.24	E62.G10-202B2W
4	9	183	5.3	16	0.6	1.8	55	151	B2	0.4	E62.H15-402B2W
6.8	2.4	153	4.5	40	0.9	2.8	75	176	C2	0.8	E62.M17-682C2W
10	1.8	122	3.0	40	1.4	4.2	85	176	C2	1.0	E62.N17-103C2W
22	1.1	90	2.9	50	3.0	9.0	116	176	CR	2.0	E62.R17-223CRW

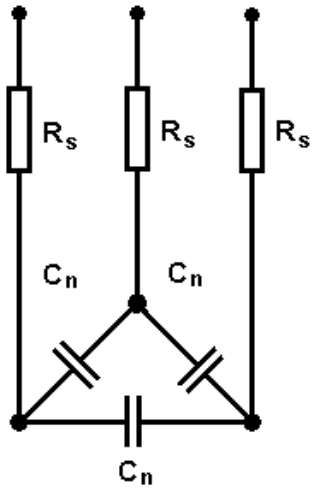
U_N 5000V DC - 4000V AC				U_{rms} 2800V			U_{BB} 7500V DC				
U_s 7500V				U_i 3600V			U_{BG} 8200V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	$\hat{I}$ kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
0.1	5.7	1590	12.2	16	0.40	1.2	45	81	B2	0.14	E62.F81-101B2W
0.47	9.1	670	9.4	16	0.37	1.1	45	105	B2	0.18	E62.F10-471B2W
0.68	7.4	560	7.7	16	0.50	1.5	55	105	B2	0.26	E62.H10-681B2W
1	3.0	410	5.0	40	0.8	2.4	75	120	C2	0.6	E62.M12-102C2W
2.2	1.6	280	3.9	40	1.7	5	95	120	CR	0.9	E62.P12-222CRW
4.7	1.0	180	2.2	40	3.7	11	95	210	CR	1.6	E62.P21-472CRW
10	2.6	120	1.4	50	6.0	18	116	280	CR	3.1	E62.R28-103CRW

9.2 E62.xxx

Three-phase AC- Filter capacitors
According to IEC 1071 / EN 61071 and IEC 831 / EN 60831

Application:

Filtering / power factor correction in three phase mains



- filled with liquid PUR resin
- very low series resistance
- low self-inductance
- very good self-healing characteristics
- high surge voltage strength
- design L/M: finger-proof terminals (IP20)

General technical data

Internal protection	overpressure mechanism
$\tan\delta_0$	2×10^{-4}
operating temperature	-40…+70ºC
storing temperature	-40…+70ºC
capacitance tolerance	± 5%
service life	100,000 h at $\Theta_{HOTSPOT} \leq 60$ºC (permitted failure rate 3%)

U_N 640V AC	U_{rms} 450V	U_{BB} 970V 50Hz AC / 2s									
U_s 1500V		U_{BG} 3600V 50Hz AC / 2s									
C_n µF	**R_s mW**	**f_{res} kHz**	**R_{th} K/W**	**I_{max} A**	**Î kA**	**is kA**	**D_1 mm**	**L_1 mm**	**drawing**	**weight kg**	**order no.**
3x 14	3x 2.0	130	5.9	3x 16	0.4	2	50	151	D3	0.3	E62.G15-143D3W
3x 17	3x 1.8	120	5.9	3x 16	0.5	2	50	151	D3	0.3	E62.G15-173D3W
3x 24	3x 1.7	100	4.9	3x 16	0.7	3	60	151	D3	0.4	E62.K15-243D3W
3x 33	3x 1.2	90	3.6	3x 43	0.9	5	75	164	L3	0.8	E62.M16-333L3W
3x 40	3x 1.2	70	3.6	3x 43	1.1	6	75	164	L3	0.8	E62.M16-403L3W
3x 46	3x 1.1	70	3.2	3x 43	1.3	6	85	164	L3	1.0	E62.N16-463L3W
3x 51	3x 1.1	60	3.2	3x 43	1.4	7	85	164	L3	1.0	E62.N16-513L3W
3x 57	3x 0.8	60	2.9	3x 43	1.6	8	95	164	L3	1.2	E62.P16-573L3W
3x 68	3x 0.8	60	2.9	3x 43	2.0	10	95	164	L3	1.2	E62.P16-683L3W
3x 100	3x 0.6	50	2.3	3x 43	3.0	15	116	164	L3	2.1	E62.R16-104L3W

U_N 1080V AC	U_{rms} 760V	U_{BB} 1635V 50Hz AC / 2s									
U_s 2300V		U_{BG} 4800V 50Hz AC / 2s									
C_n µF	**R_s mW**	**f_{res} kHz**	**R_{th} K/W**	**I_{max} A**	**Î kA**	**is kA**	**D_1 mm**	**L_1 mm**	**drawing**	**weight kg**	**order no.**
3x 4.7	3x 1.8	230	5.9	3x 16	0.5	3	50	151	D3	0.3	E62.G15-472D3W
3x 5.0	3x 1.8	230	5.4	3x 16	0.5	3	55	151	D3	0.3	E62.H15-502D3W
3x 7.3	3x 1.7	190	4.9	3x 16	0.8	4	60	151	D3	0.4	E62.K15-732D3W
3x 9.7	3x 1.2	150	3.6	3x 43	1.1	5	75	164	L3	0.8	E62.M16-972L3W
3x 11.0	3x 0.9	140	3.2	3x 43	1.2	6	85	164	L3	1.0	E62.N16-113L3W
3x 18.4	3x 0.8	110	2.9	3x 43	2.0	10	95	164	L3	1.2	E62.L95-403G1W
3x 22.0	3x 0.8	100	2.7	3x 43	2.4	12	100	164	L3	1.5	E62.P16-223L3W
3x 27.6	3x 0.6	90	2.3	3x 43	3.0	15	116	164	L3	2.1	E62.R16-283L3W

9.3 E63.xxx

DC capacitors

According to IEC 1071 / VDE 0560 part 120/121

Application

Smoothing capacitors, supporting capacitors in buffer storage circuits.

- filled with liquid resin
- integrated overpressure protection (break-action mechanism)
- very good ratio between capacitance and volume
- very good self-healing characteristics and high overvoltage proofness
- suitable for high rms currents

General technical data

Internal protection	overpressure mechanism
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+70ºC
storing temperature	-40…+85ºC
capacitance tolerance	± 10%
service life	100,000 h at $\Theta_{HOTSPOT} \leq 65$ºC (permitted failure rate 3%)

U_N 800V DC				U_{ripple} 200V			U_{BB} 1200V DC				
U_s 1200V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
100	3.3	50	13.5	28	0.9	2.8	50	85	G1	0.18	E63.G85-104G1W
175	2.3	38	9.8	30	1.6	4.8	65	95	G1	0.31	E63.L95-184G1W
250	2.1	28	6.4	43	2.3	6.9	85	105	L1	0.63	E63.N10-254L1W
680	1.9	17	3.4	43	6.2	19	95	176	L1	1.3	E63.P17-684L1W
800	1.8	16	3.3	43	7.3	20	100	176	L1	1.5	E63.Q17-804L1W

U_N 1000V DC				U_{ripple} 200V			U_{BB} 1500V DC				
U_s 1500V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
60	3.6	65	13.5	25	0.7	2.1	50	85	G1	0.18	E63.G85-603G1W
80	4.6	63	12.3	20	0.9	2.8	55	85	D2	0.21	E63.H85-803D2W
100	4.2	50	9.8	28	1.1	3.4	65	95	G1	0.31	E63.L95-104G1W
150	2.3	36	7.3	43	1.7	5.2	75	105	L1	0.5	E63.M10-154L1W
250	2.1	28	5.7	43	2.9	8.6	95	105	L1	0.8	E63.P10-254L1W
470	2.0	20	3.4	43	5.4	16.1	95	176	L1	1.3	E63.P17-474L1W
700	1.0	17	2.8	80	8.0	20	116	176	M1	2.0	E63.R17-704M1W
1000	0.75	12	2.0	80	11	20 *	116	245	C3	2.7	E63.R24-105C3W
1200	0.65	9	2.0	80	9	16	116	245	C3	2.7	E63.R24-125C3W
1500	0.6	10	1.7	80	15*	20 *	136	245	C3	3.7	E63.S24-155C3W
1800	0.6	8.6	1.3	100	15*	20 *	136	320	C3	4.9	E63.S32-185C3W

U_N 1200V DC				U_{ripple} 280V			U_{BB} 1800V DC				
U_s 1800V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
40	5	80	13.5	22	0.6	1.7	50	85	G1	0.18	E63.G85-403G1W
50	6.3	68	12.3	16	0.7	2.1	55	85	B1	0.21	E63.H85-503B1W
75	3.5	58	9.8	32	1.0	3.1	65	95	G1	0.3	E63.L95-753G1W
100	1.5	43	6.4	43	1.4	4.1	85	105	L1	0.6	E63.N10-104L1W
160	1.3	34	5.7	43	2.2	6.6	95	105	L1	0.8	E63.P10-164L1W
300	0.9	23	3.4	43	4.1	12.4	95	176	L1	1.3	E63.P17-304L1W
500	0.7	18	2.8	80	6.9	20 *	116	176	M1	2.0	E63.R17-504M1W
750	0.7	14	2.0	80	10.3	20 *	116	245	C3	2.7	E63.R24-754C3W
1000	0.65	12	1.7	100	13.7	20 *	136	245	C3	3.7	E63.S24-105C3W

CAPACITORS FOR POWER ELECTRONICS

U_N 1400V DC				U_{ripple} 350V			U_{BB} 2100V DC				
U_s 2100V				U_i 1000V			U_{BG} 3000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
30	6	92	13.5	20	0.5	1.4	50	85	G1	0.18	E63.G85-303G1W
40	6.6	76	12.3	16	0.6	1.9	55	85	B1	0.21	E63.H85-403B1W
50	4.1	71	9.8	28	0.8	2.4	65	95	G1	0.31	E63.L95-503G1W
80	1.9	48	6.4	43	1.3	3.8	85	105	L1	0.6	E63.N10-803L1W
110	1.5	41	5.7	43	1.8	5.3	95	105	L1	0.8	E63.P10-114L1W
220	1	27	3.4	43	3.5	10.6	95	176	L1	1.3	E63.P17-224L1W
250	0.95	25	3.3	43	4.0	12.0	100	176	L1	1.5	E63.Q17-254L1W
350	0.8	21	2.8	80	5.6	16.8	116	176	M1	2.0	E63.R17-354M1W
500	0.75	17	2.0	80	8.0	20 *	116	245	M1	2.7	E63.R24-504M1W
800	0.65	14	1.7	100	12.8	20 *	136	245	C3	3.7	E63.S24-804C3W
1000	0.7	12	1.4	100	15.0	20 *	136	320	C3	3.9	E63.S32-954C3W

U_N 1600V DC				U_{ripple} 400V			U_{BB} 2400V DC				
U_s 2400V				U_i 1200V			U_{BG} 3400V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
25	6	101	13.5	20	0.5	1.4	50	85	G1	0.18	E63.G85-253G1W
40	4.5	80	9.8	28	0.7	2.2	65	95	G1	0.31	E63.L95-403G1W
47	2.7	62	7.3	40	0.9	2.6	75	105	C2	0.5	E63.M10-473C2W
68	2	52	6.4	40	1.3	3.8	85	105	C2	0.6	E63.N10-683C2W
110	1.4	38	3.8	80	2.0	6.0	85	176	C2	1.0	E63.N17-114C2W
200	1	28	3.3	80	3.7	11.0	100	176	C3	1.5	E63.Q17-204C3W
280	0.8	24	2.8	80	5.1	15.4	116	176	C3	2.0	E63.R17-284C3W
400	0.75	19	2.0	100	7.3	20 *	116	245	C3	2.7	E63.R24-404C3W

U_N 1800V DC				U_{ripple} 400V			U_{BB} 2700V DC				
U_s 2700V				U_i 1300V			U_{BG} 3600V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
20	6.5	113	13.5	20	0.4	1.2	50	85	G1	0.18	E63.G85-203G1W
33	4.5	88	9.8	28	0.7	2.0	65	95	G1	0.31	E63.L95-333G1W
47	2.4	62	6.4	45	1.0	2.9	85	105	C2	0.6	E63.N10-473C2W
220	0.85	27	2.8	80	4.5	13.6	116	176	C3	2.0	E63.R17-224C3W
330	0.8	21	2.0	100	6.8	20 *	116	245	C3	2.7	E63.R24-334C3W
500	0.7	17	1.7	100	10.3	20 *	136	245	C3	3.7	E63.S24-504C3W

U_N 2000V DC				U_{ripple} 400V			U_{BB} 3000V DC				
U_s 3000V				U_i 1500V			U_{BG} 4000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
15	7.5	130	13.5	18	0.3	1.0	50	85	G1	0.18	E63.G85-153G1W
25	6.3	101	9.8	23	0.6	1.7	65	95	G1	0.31	E63.L95-253G1W
30	3	78	7.3	35	0.7	2.1	75	105	C2	0.5	E63.M10-303C2W
32	6.8	99	6.3	25	0.6	1.8	65	109	G1	0.45	E63.L10-323G1W
40	2.2	67	6.4	45	0.9	2.8	85	105	C2	0.6	E63.N10-403C2W
55	6	68	5.1	25	1.0	3.0	65	135	G1	0.6	E63.L13-553G1W
110	1.2	38	3.4	80	2.5	7.6	95	176	C3	1.3	E63.P17-114C3W
180	0.9	30	2.8	80	4.1	12.4	116	176	C3	2.0	E63.R17-184C3W
250	0.85	24	2.0	100	5.7	17.2	116	245	C3	2.7	E63.R24-254C3W
500	0.72	17	1.4	100	6.2	18.5	136	320	C3	5.5	E63.S32-504C3W

U_N 2400V DC				U_{ripple} 550V			U_{BB} 3600V DC				
U_s 3600V				U_i 1750V			U_{BG} 4500V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
4.7	8	212	13.0	16	0.5	1.4	45	98	B2	0.2	E63.F98-472B2W
22	1.5	91	5.6	40	2.2	6.6	85	120	C2	0.9	E63.N12-223C2W
100	0.76	38	1.8	100	10	20 *	116	280	CR	3.1	E63.R28-104CRW
180	0.65	28	1.5	100	15*	20 *	136	280	CR	4.2	E63.S28-184CRW
330	1.1	18	1.0	80	9	20 *	136	320	C3	5.5	E63.S32-334C3W

U_N 3200V DC				U_{ripple} 600V			U_{BB} 4800V DC				
U_s 4800V				U_i 2300V			U_{BG} 5600V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
0.5	9	650	16	10	0.18	0.54	45	62	B2	0.1	E63.F62-501B2W
3.3	9	253	13.0	16	0.4	1.2	45	98	B2	0.2	E63.F98-332B2W
4.7	5.3	200	9.1	16	0.5	1.5	50	98	B2	0.2	E63.G98-472B2W
16	1.7	106	5.0	40	1.9	5.8	95	120	CR	1.0	E63.P12-163CRW
60	0.9	48	2.0	80	7.2	20	100	280	CR	2.6	E63.Q28-603CRW
85	0.75	41	1.8	100	10	20 *	116	280	CR	3.1	E63.R28-8503CRW
120	0.7	34	1.5	100	14	20 *	136	280	CR	4.3	E63.S28-124CRW
200	1.0	23	1.0	100	7	16	136	320	CR	5.5	E63.S32-204CRW

U_N 3600V DC				U_{ripple} 630V			U_{BB} 5400V DC				
U_s 5400V				U_i 2600V			U_{BG} 6200V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
2.5	11.5	291	13.0	15	0.4	1.1	45	98	B2	0.2	E63.F98-252B2W
6.3	2.1	169	5.5	40	0.9	2.6	75	120	C2	0.8	E63.M12-632C2W
10	2.1	135	5.6	40	1.4	4.2	85	120	C2	0.9	E63.N12-103C2W
60	0.85	48	1.8	100	8.4	20 *	116	280	CR	3.1	E63.R28-603CRW
90	0.75	40	1.5	100	12.6	20 *	136	280	CR	4.3	E63.S28-903CRW
132	1.4	28	1.0	100	6	14	136	320	CR	5.5	E63.S32-134CRW

U_N 4000V DC				U_{ripple} 630V			U_{BB} 6000V DC				
U_s 6000V				U_i 2900V			U_{BG} 6800V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
2	12	325	13.0	15	0.3	1.0	45	98	B2	0.2	E63.F98-202B2W
6.8	2.7	163	5.6	40	1.1	3.3	85	120	C2	0.9	E63.N12-682C2W
50	0.85	53	1.8	100	8.0	20 *	116	280	CR	3.1	E63.R28-503CRW
70	0.75	45	1.5	100	11.2	20 *	136	280	CR	4.3	E63.S28-703CRW

U_N 6300V DC				U_{ripple} 700V			U_{BB} 9450V DC				
U_s 10000V				U_i 4500V			U_{BG} 10000V AC				
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	weight kg	order no.
22	4.6	82	2.3	40	1.5	4.5	100	245	CR	2.4	E63.Q24-223CRW
30	3.5	70	2.0	60	2.1	6.2	116	245	CR	2.7	E63.R24-303CRW
45	2.5	58	1.7	80	3.1	9.3	136	245	CR	3.7	E63.S24-453CRW

* higher values available on request

9.4 E52.xxx

Low-inductance AC/DC capacitors in axial design for GTO-damping and for universal use in power electronics

According to IEC 1071 / VDE 0560 part 120/121

Application

Damping of GTO thyristors
High-current applications with higher frequencies

- filled with solidified PUR resin
- very low loss power thanks to low series resistance
- high rms and pulse currents even with low capacitance values
- very low self-inductance, suitable for use with high operating frequencies

General technical data

Internal protection	none
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+85ºC
storing temperature	-40…+85ºC
hotspot temperature	+ 85ºC
capacitance tolerance	± 10%
service life	100,000 h at $\Theta_{HOTSPOT} \leq 70$ºC (permitted failure rate 3%)
self inductance L_e	approx. 10 nH

C_R (µF)	dimensions $D_1 \times L_1$ (mm)	K/L (mm)	order code	drawing
UN 900V DC 560 AC		**Urms 400V**	**US 1350V**	**UBB 1350V**
3.3	55 x 49	90	E52.H49-332T1W	T1
4	60 x 49	95	E52.K49-402T1W	T1
6.8	75 x 49	104	E52.M49-682T2W	T2
10	85 x 49	114	E52.N49-103T2W	T2
12	95 x 49	124	E52.P49-123T2W	T2
15	105 x 49	134	E52.Q49-153T2W	T2
UN 1200V DC 680 AC		**Urms 480V**	**US 1400V**	**UBB 1800V**
2	55 x 49	90	E52.H49-202T1W	T1
3	60 x 49	95	E52.K49-302T1W	T1
4	75 x 49	104	E52.M49-402T2W	T2
6	85 x 49	114	E52.N49-602T2W	T2
18	105 x 75	160	E52.Q75-183T2W	T2
UN 1500V DC 700V AC		**Urms 500V**	**US 1500V**	**UBB 2250V**
1.5	55 x 49	90	E52.H49-152T1W	T1
2	60 x 49	95	E52.K49-202T1W	T1
3	75 x 49	104	E52.M49-302T2W	T2
4	85 x 49	114	E52.N49-402T2W	T2
5	95 x 49	124	E52.P49-502T2W	T2
12	105 x 75	160	E52.Q75-123T2W	T2
UN 1800V DC 850V AC		**Urms 600V**	**US 1800V**	**UBB 2700V**
1	55 x 49	90	E52.H49-102T1W	T1
2	75 x 49	104	E52.M49-202T2W	T2
3	85 x 49	114	E52.N49-302T2W	T2
4	95 x 49	124	E52.P49-402T2W	T2
8	105 x 75		E52.Q75-802T2W	T2
UN 2400V DC 1000V AC		**Urms 700V**	**US 2500V**	**UBB 3600V**
0.5	55 x 49	90	E52.H49-501T1W	T1
1	75 x 49	104	E52.M49-102T2W	T2
2	95 x 49	124	E52.P49-202T2W	T2
3	105 x 49	134	E52.Q49-302T2W	T2
6	105 x 75	160	E52.Q75-602T2W	T2

9.5 E53.xxx

Low-inductance AC / DC capacitors in axial design for general use in power electronics
According to IEC 1071 / VDE 0560 part 120 / 121

Application

Damping of GTO thyristors
High-current applications with medium frequencies
Low-inductance buffer circuits with high rms currents

- filled with solidified PUR resin
- low series resistance and high rms currents
- high pulse strength
- very low self-inductance, suitable for use with high operating frequencies
- good ratio between capacitance and volume
- very good self-healing characteristics without loss of capacitance

General technical data

Internal protection	none
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+85ºC
storing temperature	-40…+85ºC
hotspot temperature	≤ 85ºC
capacitance tolerance	± 10%
service life	100,000 h at $\Theta_{HOTSPOT}$ ≤ 70ºC (permitted failure rate 3%)

U_N 550V DC 280V AC				U_{rms} 200V		U_{BB} 825V DC			U_s 800V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
50	0.8	225	9.7	60	0,83	2,5	55	49	T1	90	E53.H49-503T1W
68	0.6	193	8.9	60	1,1	3,4	60	49	T1	95	E53.K49-683T1W
100	0.4	159	7.1	80	1,7	5,0	75	49	T2	104	E53.M49-104T2W
150	0.25	130	6.3	80	2,5	7,4	85	49	T2	114	E53.N49-154T2W
200	0.2	113	5.6	80	3,3	9,9	95	49	T2	124	E53.P49-204T2W

U_N 700V DC 400V AC				U_{rms} 280V		U_{BB} 1050V DC			U_s 1000V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
33	0.95	277	9.7	55	0,68	2,1	55	49	T1	90	E53.H49-333T1W
45	0.7	237	8.9	60	0,93	2,8	60	49	T1	95	E53.K49-453T1W
68	0.5	193	7.1	80	1,4	4,2	75	49	T2	104	E53.M49-683T2W
100	0.35	159	6.3	80	2,1	6,2	85	49	T2	114	E53.N49-104T2W
120	0.3	145	5.6	80	2,5	7,4	95	49	T2	124	E53.P49-124T2W
150	0.25	130	5.1	100	3,1	9,3	105	49	T2	134	E53.Q49-154T2W
300	0.35	75	3.3	100	3,4	10	105	75	T2	160	E53.Q75-304T2W

U_N 900V DC 450V AC				U_{rms} 320V		U_{BB} 1350V DC			U_s 1400V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
30	0.85	291	9.7	60	0,68	2,1	55	49	T1	90	E53.H49-303T1W
36	0.8	265	8.9	60	0,82	2,5	60	49	T1	95	E53.K49-363T1W
60	0.5	205	7.1	80	1,4	4,1	75	49	T2	104	E53.M49-603T2W
80	0.4	178	6.3	80	1,8	5,5	85	49	T2	114	E53.N49-803T2W
100	0.35	159	5.6	80	2,3	6,8	95	49	T2	124	E53.P49-104T2W
130	0.25	140	5.1	100	3,0	8,9	105	49	T2	134	E53.Q49-134T2W

CAPACITORS FOR POWER ELECTRONICS

U_N 1100V DC 680V AC				U_{rms} 480V		U_{BB} 1650V DC			U_s 1650V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
12	1.7	459	9.7	40	0,40	1,2	55	49	T1	90	E53.H49-123T1W
16	1.3	398	8.9	50	0,53	1,6	60	49	T1	95	E53.K49-163T1W
25	0.8	318	7.1	70	0,83	2,5	75	49	T2	104	E53.M49-253T2W
35	0.6	269	6.3	80	1,2	3,5	85	49	T2	114	E53.N49-353T2W
50	0.4	225	5.6	80	1,7	5,0	95	49	T2	124	E53.P49-503T2W
60	0.35	205	5.1	100	2,0	6,0	105	49	T2	134	E53.Q49-603T2W
100	0.6	130	3.3	100	1,8	5,5	105	75	T2	160	E53.Q75-104T2W

U_N 1400V DC 750V AC				U_{rms} 530V		U_{BB} 2100V DC			U_s 2100V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
8	2	563	9.7	38	0,33	0,99	55	49	T1	90	E53.H49-802T1W
10	1.6	503	8.9	45	0,41	1,2	60	49	T1	95	E53.K49-103T1W
16	1	398	7.1	60	0,66	2,0	75	49	T2	104	E53.M49-163T2W
22	0.75	339	6.3	75	0,91	2,7	85	49	T2	114	E53.N49-223T2W
30	0.55	291	5.6	80	1,2	3,7	95	49	T2	124	E53.P49-303T2W
40	0.4	252	5.1	100	1,7	5,0	105	49	T2	134	E53.Q49-403T2W
75	0.65	150	3.3	100	1,7	5,2	105	75	T2	160	E53.Q75-753T2W

U_N 1700V DC 1060V AC				U_{rms} 750V		U_{BB} 2550V DC			U_s 2600V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
4.7	1.3	734	9.7	45	0.5	1.6	55	49	T1	90	E53.H49-472T1W
6	1	650	8.9	55	0.7	2.1	60	49	T1	95	E53.K49-602T1W
10	0.6	503	7.1	80	1.1	3.5	75	49	T2	104	E53.M49-103T2W
15	0.4	411	6.3	80	1.7	5.0	85	49	T2	114	E53.N49-153T2W
16	0.37	398	5.6	80	1.8	5.5	95	49	T2	124	E53.P49-163T2W
22	0.27	339	5.1	100	2.5	7.5	105	49	T2	134	E53.Q49-223T2W
40	0.38	252	3.3	100	2.4	7.2	105	75	T2	160	E53.Q75-403T2W

U_N 2000V DC 1200V AC				U_{rms} 850V		U_{BB} 3000V DC			U_s 3000V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
3.3	1.6	876	9.7	40	0.42	1.2	55	49	T1	90	E53.H49-332T1W
4.2	1.2	777	8.9	50	0.54	1.6	60	49	T1	95	E53.K49-422T1W
8	0.65	563	7.1	80	1	3	75	49	T2	104	E53.M49-802T2W
10	0.55	503	6.3	80	1.3	3.9	85	49	T2	114	E53.N49-103T2W
14	0.35	425	5.6	80	1.8	5.5	95	49	T2	124	E53.P49-143T2W
18	0.3	375	5.1	100	2.3	7	105	49	T2	134	E53.Q49-183T2W
33	0.4	277	3.3	100	2.2	6.6	105	75	T2	160	E53.Q75-333T2W

U_N 2250V DC 1350V AC				U_{rms} 950V		U_{BB} 3000V DC			U_s 3000V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
2.5	1.8	1007	9.7	40	0.37	1.1	55	49	T1	90	E53.H49-252T1W
3.3	1.4	876	8.9	48	0.48	1.4	60	49	T1	95	E53.K49-332T1W
6	0.75	650	7.1	70	0.88	2.6	75	49	T2	104	E53.M49-602T2W
8	0.6	563	6.3	80	1.2	3.6	85	49	T2	114	E53.N49-802T2W
10	0.45	503	5.6	80	1.5	4.5	95	49	T2	124	E53.P49-103T2W
14	0.35	425	5.1	100	2	6	105	49	T2	134	E53.Q49-143T2W
25	0.5	318	3.3	100	1.9	5.7	105	75	T2	160	E53.Q75-253T2W

U_N 2800V DC 1700V AC				U_{rms} 1200V		U_{BB} 4200V DC			U_s 4200V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
1.5	2.4	1299	9.7	32	0.27	1.4	55	49	T1	90	E53.H49-152T1W
2.2	1.7	1073	8.9	40	0.4	2.0	60	49	T1	95	E53.K49-222T1W
3.3	1.1	876	7.1	60	0.6	3.0	75	49	T2	104	E53.M49-332T2W
5	0.73	712	6.3	75	0.9	4.5	85	49	T2	114	E53.N49-502T2W
6.8	0.55	610	5.6	80	1.2	6.0	95	49	T2	124	E53.P49-682T2W
8	0.45	563	5.1	100	1.5	7.5	105	49	T2	134	E53.Q49-802T2W
15	0.65	411	3.3	100	1.4	7.0	105	75	T2	160	E53.Q75-153T2W

U_N 3200V DC 2000V AC				U_{rms} 1400V		U_{BB} 4800V DC			U_s 5000V		
Cn µF	Rs mW	fres kHz	Rth K/W	Imax A	Î kA	is kA	D1 mm	L1 mm	drawing	K/L mm	order no.
1	1.6	1592	9.7	40	0.35	1.8	55	49	T1	90	E53.H49-102T1W
1.5	1.1	1299	8.9	50	0.55	2.8	60	49	T1	95	E53.K49-152T1W
2.5	0.65	1007	7.1	75	0.9	4.5	75	49	T2	104	E53.M49-252T2W
3.3	0.5	876	6.3	80	1.2	6.0	85	49	T2	114	E53.N49-332T2W
4	0.4	796	5.6	80	1.5	7.5	95	49	T2	124	E53.P49-402T2W
5	0.32	712	5.1	100	1.8	9.0	105	49	T2	134	E53.Q49-502T2W

9.6 E53.xxx

Low inductance AC / DC capacitors in radial design, for universal use in power electronics
According to IEC 1071 / VDE 0560 part 120 / 121

Application
Damping of GTO thyristors
High-current applications with medium frequencies
Low-inductance buffer circuits with high rms currents

- filled with solidified PUR resin
- universal AC / DC capacitors with low series resistance and high rms currents
- high pulse strength
- very low self-inductance, suitable for use with high operating frequencies
- good ratio between capacitance and volume
- very good self-healing characteristics without loss of capacitance

General technical data

Internal protection	none
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+85ºC
storing temperature	-40…+85ºC
hotspot temperature	≤ 85ºC
capacitance tolerance	± 10%
service life	100,000 h at $\Theta_{HOTSPOT} \leq 70$ºC (permitted failure rate 3%)

U_N DC V	U_N AC V	U_{rms} V	U_{BB} V	U_s V	C_N µF	I_{max} A	Î kA	I_s kA	W_N Ws	R_s mW	Le nH	R_{th} k/W	L_1 mm	weight kg	order no.
700	420	300	1050	1050	100	100	2.1	6	25	0.50	30	6	51	0.35	E53.N51-104H1W
700	420	300	1050	1050	175	95	2.2	7	43	0.65	35	5	76	0.53	E53.N76-184H1W
840	500	360	1180	1200	70	100	1.7	5	25	0.50	30	6	51	0.35	E53.N51-703H1W
840	500	360	1180	1200	120	90	1.8	5	42	0.75	35	5	76	0.53	E53.N76-124H1W
1000	640	450	1500	1500	50	90	1.5	5	25	0.55	30	6	51	0.35	E53.N51-503H1W
1000	640	450	1500	1500	90	80	1.6	5	45	0.70	35	5	76	0.53	E53.N76-903H1W
1120	680	480	1680	1700	40	90	1.3	4	25	0.60	30	6	51	0.35	E53.N51-403H1W
1120	680	480	1680	1700	68	80	1.3	4	43	0.85	35	5	76	0.53	E53.N76-683H1W
1260	750	530	1890	1900	32	90	1.2	4	25	0.65	30	6	51	0.35	E53.N51-323H1W
1260	750	530	1890	1900	50	80	1.1	3.3	40	1.0	35	5	76	0.53	E53.N76-503H1W
1400	850	600	2100	2200	25	80	1.1	3.2	25	0.70	30	6	51	0.35	E53.N51-253H1W
1400	850	600	2100	2200	40	70	1.0	3.0	39	1.1	35	5	76	0.53	E53.N76-403H1W
1700	1000	710	2550	2600	15	90	1.7	5.1	22	0.60	30	6	51	0.35	E53.N51-153H1W
1700	1000	710	2550	2600	25	80	1.6	4.8	36	0.85	35	5	76	0.53	E53.N76-253H1W
2000	1200	850	3000	3000	12	85	1.5	4.5	24	0.65	30	6	51	0.35	E53.N51-123H1W
2000	1200	850	3000	3000	22	80	1.5	4.5	44	0.85	35	5	76	0.53	E53.N76-223H1W
2250	1350	960	3375	3400	10	85	1.4	4.2	25	0.65	30	6	51	0.35	E53.N51-103H1W
2250	1350	960	3375	3400	16	75	1.3	4.0	41	0.95	35	5	76	0.53	E53.N76-163H1W
2800	1700	1200	4200	4200	6	75	1.1	3.3	24	0.80	30	6	51	0.35	E53.N51-602H1W
2800	1700	1200	4200	4200	10	70	1.0	3.1	39	1.15	35	5	76	0.53	E53.N76-103H1W
3200	2000	1400	4800	4800	3.3	75	1.2	3.6	17	0.85	30	6	51	0.35	E53.N51-332H1W

9.7 E61.xxx

DC-capacitors for direct PCB-mounting
According to IEC 1071 / VDE 0560 part 120 / 121

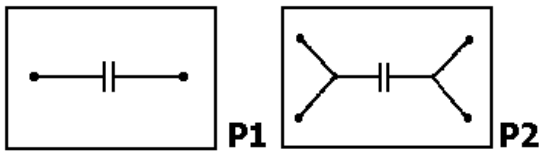
Application

Universal use in power electronics, e.g. as commutation, supporting, smoothing, surge discharge capacitors

- filled with liquid resin
- integrated overpressure protection (break-action mechanism)
- high specific ratio between capacitance and volume
- very good self-healing characteristics
- high AC-voltage handling capacity
- suitable for high rms and surge currents

General technical data

Internal Protection:	None
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+70ºC
storing temperature	-40…+85ºC
capacitance tolerance	± 10%
service life	100,000 h
	(permitted failure rate 3%)



Rated Voltage U_N	**500V DC**	surge voltage u_s test voltages	750V 750V DC between terminals							
C_N µF	**R_s** mW	**Rth** **k/W**	**I_{max}** A	**$\hat{I}$** kA	**I_s** kA	**W_N** Ws	**Le** **nH**	**weight** g	**drawing**	**order no.**
13	4.8	18	16	0.65	1.3	1.6	30	65	P1	E61.A45-133P1W
13	4.8	18	16	0.65	1.3	1.6	30	65	P2	E61.A45-133P2W
22	3.8	18	16	1.1	2.2	2.8	30	65	P1	E61.A45-223P1W
22	3.8	18	16	1.1	2.2	2.8	30	65	P2	E61.A45-223P2W

Rated Voltage U_N	**900V DC**	surge voltage u_s test voltages	1350V 1350V DC between terminals							
C_N µF	**R_s** mW	**Rth** **k/W**	**I_{max}** A	**$\hat{I}$** kA	**I_s** kA	**W_N** Ws	**Le** **nH**	**weight** g	**drawing**	**order no.**
6	6.5	18	16	0.45	0.9	2.4	30	65	P1	E61.A45-602P1W
6	6.5	18	16	0.45	0.9	2.4	30	65	P2	E61.A45-602P2W
10	5.4	18	16	0.6	1.2	4.1	30	65	P1	E61.A45-103P1W
10	5.4	18	16	0.6	1.2	4.1	30	65	P2	E61.A45-103P2W

Rated Voltage U_N	**1000V DC**	surge voltage u_s test voltages	1500V 1500V DC between terminals							
C_N µF	**R_s** mW	**Rth** **k/W**	**I_{max}** A	**$\hat{I}$** kA	**I_s** kA	**W_N** Ws	**Le** **nH**	**weight** g	**drawing**	**order no.**
7	6.2	18	16	0.5	1.0	2.8	30	65	P1	E61.A45-702P1W
7	6.2	18	16	0.5	1.0	2.8	30	65	P2	E61.A45-702P2W

9.8 E50.xxx

Low-inductance DC Capacitors (MKP)
According to IEC 1071, EN 61071, VDE 0560 part 120 / 121

The PK16 capacitor can be universally used for the assembly of low-inductance DC buffer circuits and DC filters; with its energy density it can replace banks of series-connected electrolytic capacitors as well as large film capacitors in rectangular cases.

Thanks to its compact cylindrical aluminium can design this capacitor is ideal for both the electrical and mechanical requirements of high-speed IGBT converters. Its robust terminals and fixing stud allow for very simple and reliable mounting that unites lowest inductance and highest current strength.

The extraordinarily large clearance and creepage distances make this design suitable for a wide range of operating voltages. As a result, existing standard converter concepts can easily be adapted to new applications without having to change the principal construction and to re-approve the entire system.

General technical data

Internal protection	none
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+70ºC
storing temperature	-40…+70ºC
hotspot temperature	≤ 75ºC
capacitance tolerance	± 10%
service life	100,000 h at $\Theta_{HOTSPOT}$ ≤ 75ºC (permitted failure rate 3%)
insulation strength C x R_{is}	5000 s

Rated Voltage U_N 900V DC — surge voltage U_s 1350V; test voltages U_{BG} 3000V AC, U_{BB} 1350V DC

C_N µF	R_s mW	Rth k/W	I_{max} A	Î kA	I_s kA	W_N Ws	Le nH	weight kg	dimensions D_1xL_1(mm)	drawing	order no.
580	1.4	4.3	35	3	10	235	55	0.8	85 x 136	N5	E50.N13-584N5W
1100	0.47	2.3	80	10	30	446	40	1.8	116 x 165	N1	E50.R16-115N1W
1160	1.1	2.1	60	5	25	470	60	1.6	85 x 252	N5	E50.N25-125N5W
1700	0.63	1.7	100	15	45	689	50	2.5	116 x 230	N1	E50.R23-175N1W
2000	0.5	1.3	100	15	45	810	70	3.2	116 x 295	N1	E50.R29-205N1W

Rated Voltage U_N 1100V DC — surge voltage U_s 1650V DC; test voltages U_{BG} 3000V AC, U_{BB} 1650V DC

C_N µF	R_s mW	Rth k/W	I_{max} A	Î kA	I_s kA	W_N Ws	Le nH	weight kg	dimensions D_1xL_1(mm)	drawing	order no.
370	1.7	4.3	35	2.3	7	224	55	0.8	85x 136	N5	E50.N13-374N5W
750	1.7	2.1	60	3.7	23	454	60	1.6	85x 252	N5	E50.N25-754N5W
750	0.55	2.3	80	8	24	454	40	1.8	116x 165	N1	E50.R16-754N1W
1100	0.4	1.7	100	12	35	666	50	2.5	116x 230	N1	E50.R23-115N1W
1670	0.75	1.1	100	10	30	676	70	3.5	116x 345	N1	E50.R34-175N1W

Rated Voltage U_N 1300V DC — surge voltage U_s 1950V DC; test voltages U_{BG} 3000V AC, U_{BB} 1950V DC

C_N µF	R_s mW	Rth k/W	I_{max} A	Î kA	I_s kA	W_N Ws	Le nH	weight kg	dimensions D_1xL_1(mm)	drawing	order no.
500	0.6	2.3	80	6.8	20	423	40	1.8	116 x 165	N1	E50.R16-504N1W
750	0.45	1.7	100	10	30	634	50	2.5	116 x 230	N1	E50.R23-754N1W
1000	0.5	1.4	120	12	36	845	60	3.2	116 x 295	N1	E50.R29-105N1W

9.9 E56.xxx

DC link capacitors in rectangular case with pressure switch for monitoring of internal pressure.

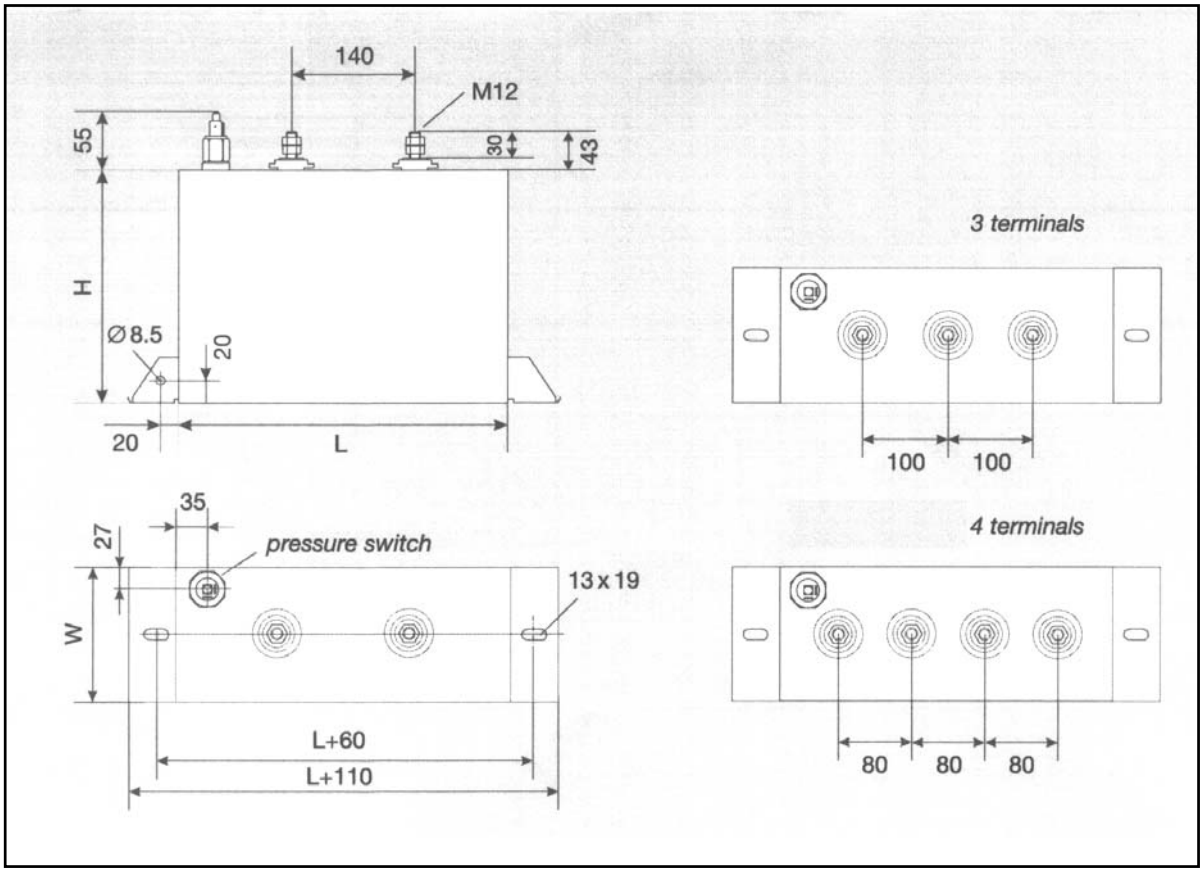
According to IEC 1071, EN 61071, VDE 0560 part 120/121.
Flat terminals M12 x 30mm

Application
Buffer storage circuits of converters, filter circuits.

- rectangular steel or aluminium case
- filled with liquid resin
- pressure switch for external monitoring of the internal pressure
- self-inductance app. 100nH
- flat-low-inductance terminals M12 x 30
- very good self-healing characteristics without loss of capacitance
- stable capacitance even at high operating temperatures
- high surge current sustaining capability
- rms currents up to 400A

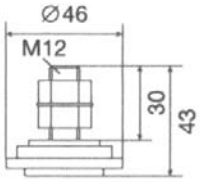
General technical data

Protection:	Pressure switch for monitoring internal pressure
$\tan\delta_0$	2×10^{-4}
operating temperature	-25…+70ºC
storing temperature	-40…+70ºC
capacitance tolerance	± 10%
service life	100,000 h (permitted failure rate 3%)

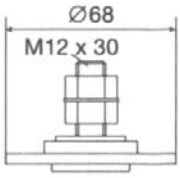


Terminal Options:

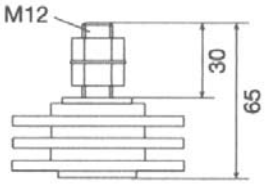
F1 – M12x30
K: 26mm
L: 17mm



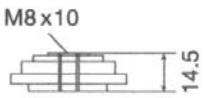
F2-M12x30
K: 48mm
L: 26mm



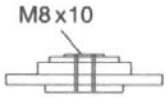
F3-M12x30
K: 120mm
L: 45mm



F1-M8ix10
K: 26mm
L: 17mm



F2-M8ix10
K: 48mm
L: 26mm



Case Options:

Type 1
Standard Aluminium case
for vertical installation

Aluminium 2mm blank

Standard H_1 : 0mm

Type 2
Standard Steel case
for vertical installation

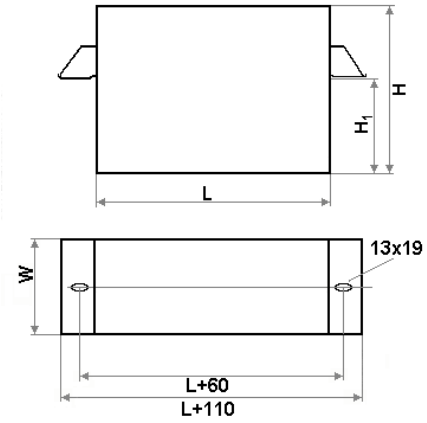
Stainless Steel 1.5mm

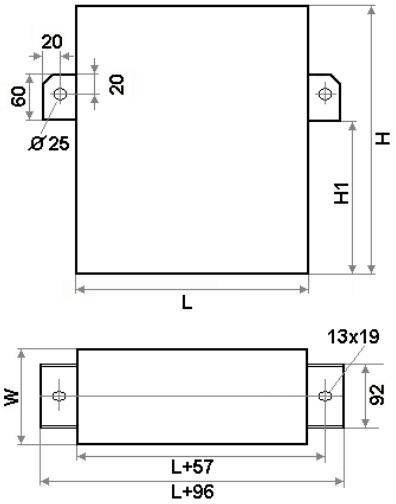
Standard H_1 : 0mm

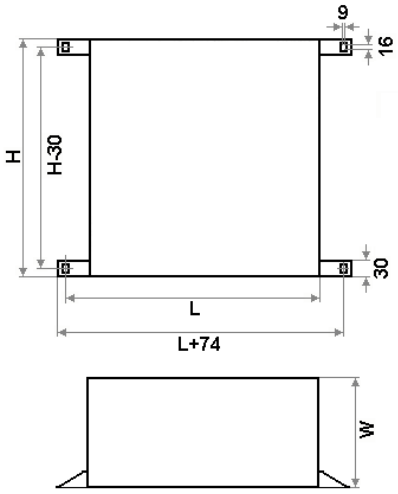
Type 3
Standard Steel or Aluminium case
for horizontal installation

Stainless Steel 1.5mm
Aluminium 2mm blank

Standard H_1 : 0mm







Available on request (according to specification)

- low-inductance design (up to 30nH) with internal thread M8 x 10

- capacitors for higher rms currents and with multiple terminals

- versions with sub-divided capacitances

- designs made with segmented SMKP-film (additional current fuses in the film coating), without pressure switch

- capacitors in rectangular cases for AC applications

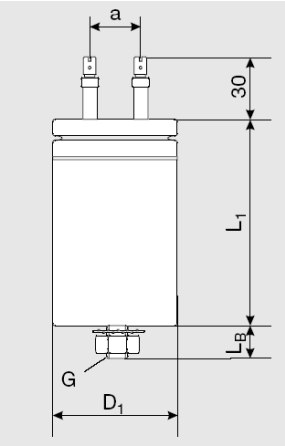
Base Area 125 x 340mm								
				case height H (mm)				
U_N	200	280	360	440	520	600	680	760 mm
800 V	4200	6300	8400	10500	12600	14700	16800	19000 µF
1000 V	2700	4000	5400	6700	8100	9400	10800	12000 µF
1200 V	1900	2800	3700	4600	5600	6500	7500	8400 µF
1400 V	1400	2060	2750	3400	4100	4800	5500	6200 µF
1600 V	1050	1600	2100	2600	3150	3700	4200	4700 µF
1800 V	830	1250	1660	2100	2500	2900	3300	3700 µF
2000 V	670	1000	1350	1700	2000	2350	2700	3000 µF
2400 V	450	680	900	1100	1400	1600	1800	2000 µF
2800 V	330	500	660	830	1000	1150	1300	1500 µF
3200 V	250	380	510	640	760	890	1020	1140µF
3600 V	200	300	400	500	600	700	800	900 µF
4000 V	160	240	330	410	490	570	650	730 µF

Base Area 140 x 340mm								
				Case height H (mm)				
U_N	200	280	360	440	520	600	680	760 mm
800 V	5400	8000	10600	13300	16000	18700	21000	24000 µF
1000 V	3500	5100	6800	8500	10000	12000	13700	15400 µF
1200 V	2400	3600	4700	6000	7100	8300	9500	10600 µF
1400 V	1750	2600	3500	4350	5200	6100	7000	7800 µF
1600 V	1300	2000	2650	3300	4000	4700	5300	6000 µF
1800 V	1050	1580	2100	2600	3200	3700	4200	4700 µF
2000 V	850	1280	1710	2130	2560	2980	3410	3800 µF
2400 V	580	870	1150	1400	1700	2000	2300	2600 µF
2800 V	420	640	850	1060	1300	1500	1700	1900 µF
3200 V	320	490	650	810	970	1140	1300	1460 µF
3600 V	260	380	510	640	770	900	1000	1150 µF
4000 V	210	310	420	520	620	730	830	930 µF

Base Area 175 x 340mm								
				Case height H (mm)				
U_N	200	280	360	440	520	600	680	760 mm
800 V	n/a	10000	13400	16500	20000	23400	27000	30000 µF
1000 V	n/a	6400	8600	10700	13000	15000	17000	19200 µF
1200 V	n/a	4450	6000	7400	8900	10400	12000	13400 µF
1400 V	n/a	3300	4400	5500	6500	7600	8700	10000 µF
1600 V	n/a	2500	3300	4200	5000	5800	6700	7500 µF
1800 V	n/a	2000	2600	3300	4000	4600	5300	5950 µF
2000 V	n/a	1600	2140	2700	3200	3700	4300	4800 µF
2400 V	n/a	1090	1450	1800	2200	2540	2900	3300 µF
2800 V	n/a	800	1070	1340	1600	1870	2140	2400 µF
3200 V	n/a	610	820	1020	1230	1430	1640	1840 µF
3600 V	n/a	480	650	810	970	1130	1290	1450 µF
4000 V	n/a	390	520	650	790	920	1050	1180 µF

10. Outline Drawings

10.1 Design B1



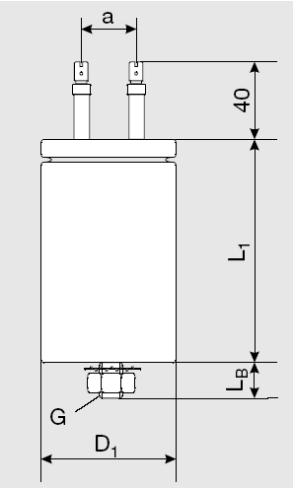
Capacitors with rated diameter 45 - 60 mm.
Case: pressed aluminium with base mounting stud flanged brass lid with rubber sealing (folded edge), soldered ceramic bushings.

Terminals: tab connectors 6.3 x 0.8 mm

Humidity class F

D_1	a	g	L_B	K	L
45	19	M8	10	10	9
50	26	M12	16	10	10
55	26	M12	16	10	10
60	34	M12	16	10	10

10.2 Design B2



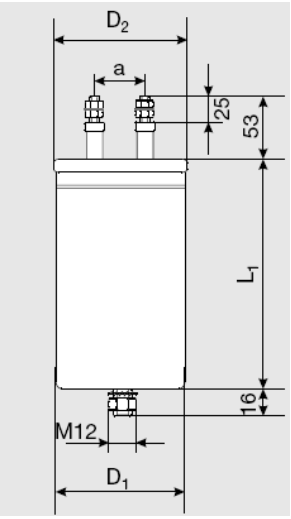
Capacitors with rated diameter 45 - 60 mm.
Case: pressed aluminium with base mounting stud flanged brass lid with rubber sealing (folded edge), soldered ceramic bushings.

Terminals: tab connectors 6.3 x 0.8 mm

Humidity class F

D_1	a	g	L_B	K	L
45	19	M8	10	20	9
50	26	M12	16	20	16
55	26	M12	16	20	16
60	34	M12	16	20	20

10.3 Design C2



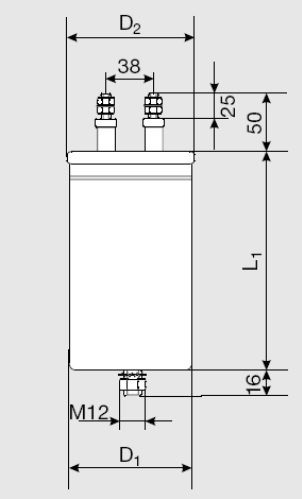
Capacitors with rated diameter 60 - 85 mm.
Case: pressed aluminium with base mounting stud flanged copper lid with soldered ceramic bushings.

Terminals: threaded stud M10

Humidity class C

D_1	D_2	a	K	L
60	64	30	20	17
75	79	38	20	17
85	89	38	20	17

10.4 Design C3



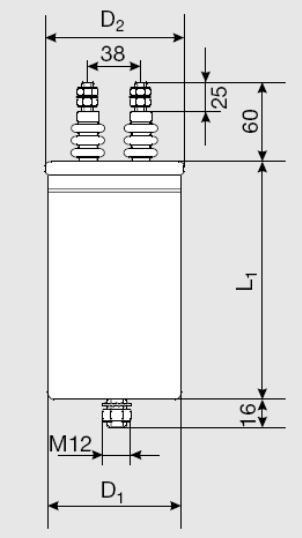
Capacitors with rated diameter 95 - 136 mm.
Case: pressed aluminium with base mounting stud flanged copper lid with soldered ceramic bushings

Terminals: threaded stud M10

Humidity class C

D_1	D_2	K	L
95	100	15	15
100	105	15	15
116	122	15	15
136	141	15	15

10.5 Design CR



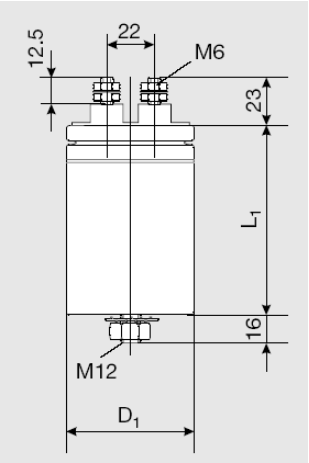
Capacitors with rated diameter 95 - 136 mm.
Case: pressed aluminium with base mounting stud flanged copper lid with soldered ceramic bushings

Terminals: threaded stud M10

Humidity class C

D_1	D_2	K	L
95	100	43	16
100	105	43	16
116	122	43	16
136	141	43	16

10.6 Design G1



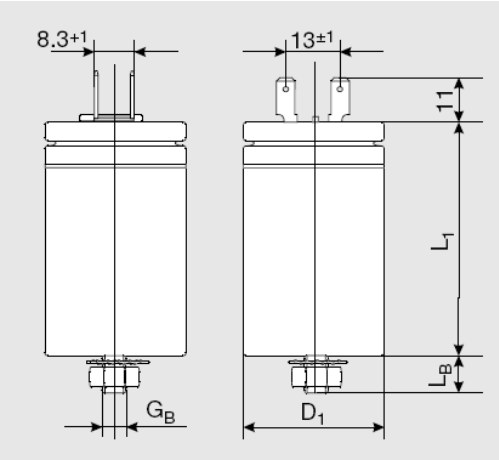
Capacitors with rated diameter 50/65 mm. Case: pressed aluminium with base mounting stud flanged plastic lid (folded edge), with rubber sealing

Terminals: threaded stud M6

Humidity class F

K: 15mm
L: 10mm

10.7 Design D1



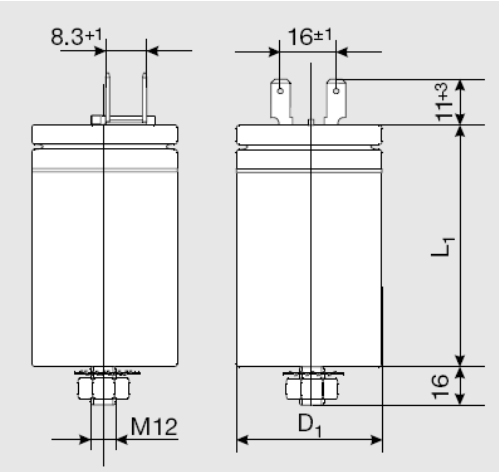
Capacitors with rated diameter 35 - 60 mm.
Case: pressed aluminium with base mounting stud flanged plastic lid (folded edge), with rubber sealing.

Terminals: riveted dual tab connectors 6.3 x 0.8 mm (brass)

Humidity class F

D_1	GB	LB	K	L
35	M8	10	6.5	6.5
40	M8	10	9	6.5
45	M8	10	10	6.5
50	M12	16	10	6.5
55	M12	16	10	6.5
60	M12	16	10	6.5

10.8 Design D2



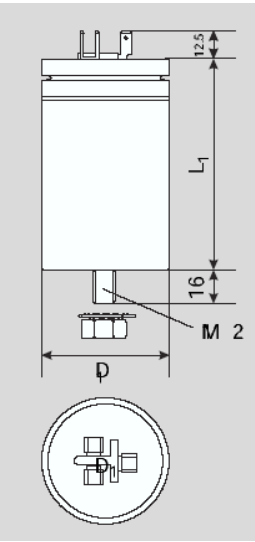
Capacitors with rated diameter 65 - 75 mm.
Case: pressed aluminium with base mounting stud flanged plastic lid (folded edge), with rubber sealing

Terminals: riveted dual tab connectors 6.3 x 0.8 mm (brass)

Humidity class F

K: 10 mm
L: 8 mm

10.9 Design D3



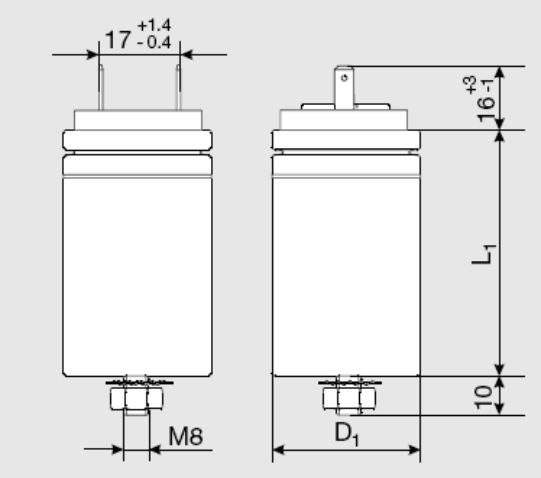
Three phase capacitors with a diameter of 50 - 75 mm.
Case: pressed aluminium with base mounting stud.
Lid: plastic lid, casing sealed with rubber gasket.
Terminals: dual tab connectors (standard) 6.3 x 0.8 mm.
Protection: IP 00

Humidity class F

K: 10 mm
L: 8 mm

D_1	K	L
30...45	M8	10
50...75	M12	16

10.10 Design E1



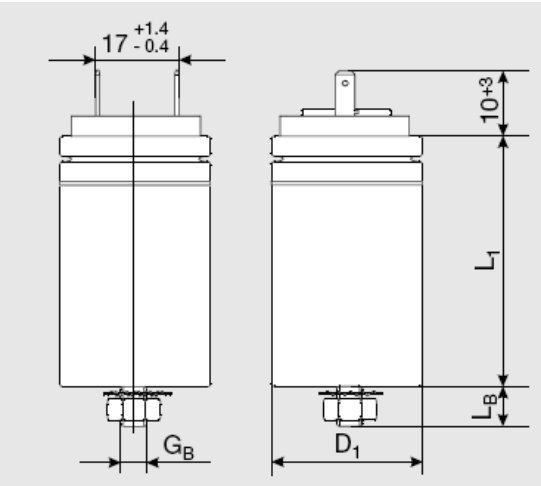
Capacitors with rated diameter 25 - 30 mm.
Case: pressed aluminium with base mounting stud flanged plastic lid (folded edge), with rubber sealing

Terminals: riveted tab connectors 6.3 x 0.8 mm (brass)

Humidity class F

D_1	K	L
25	7.5	7.5
30	9	7.5

10.11 Design E2

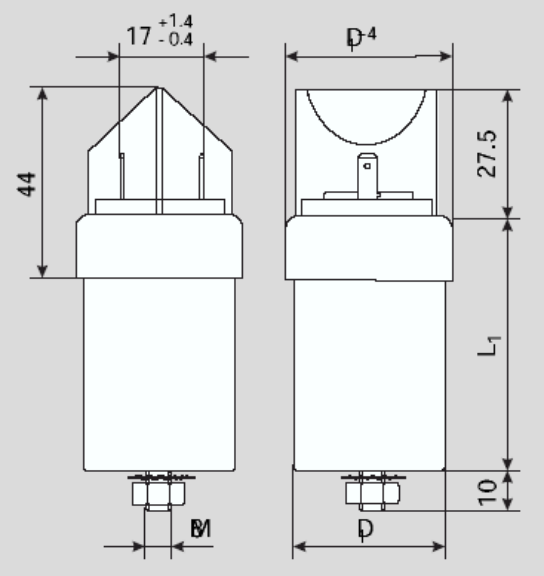


Capacitors with rated diameter 35 - 65 mm.
Case: pressed aluminium with base mounting stud flanged plastic lid (folded edge), with rubber sealing.
Terminals: riveted dual tab connectors 6.3 x 0.8 mm (brass)

Humidity class F

D_1	G_B	L_B	K	L
≤ 45	M8	10	9	7.5
≥ 50	M12	16	9	7.5

10.12 Design E4



Capacitors with rated diameter 30 mm.
Case: pressed aluminium with base mounting stud M8 flanged plastic lid (folded edge), with rubber sealing.
Terminals: riveted tab connectors 6.3 x 0.8 mm (brass)

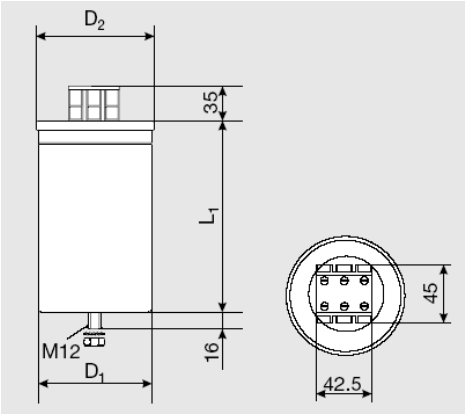
Humidity class F

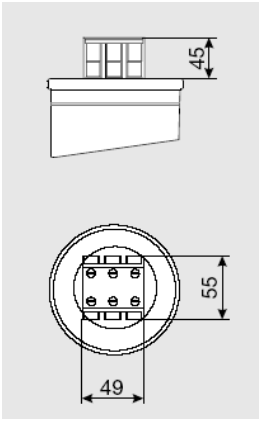
Extended clearance and creepage distances by special insulating top (plastic, fixed)(1)

K: 40 mm
L: 30 mm

(1) Patent pending

10.13 Design L1/L3 M1/M3





Capacitors with a diameter of 75 -136 mm.
Case: pressed aluminium with base mounting stud.
Lid: aluminium lid, crimped case.
Terminal block: L: 2 x 25 mm^2 per contact (with ferrule)
M: 2 x 35 mm^2 per contact (with ferrule)
2 x 50 mm^2 per contact (without ferrule)

(for design L1 and M1 the central screw has no contact)

Protection IP20
Humidity class C

K: 16 mm
L: 16 mm

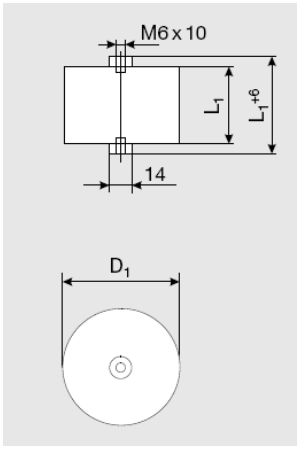
Diameter (mm)

D_1 -0.5...+1	D_2 -0.5...+1
75	79
85	89
95	100
100	105
116	122
136	142

Size of terminal block (mm)

	Design	
	L	M
h	35	45
b	42	49
t	45	55

10.14 Design T1

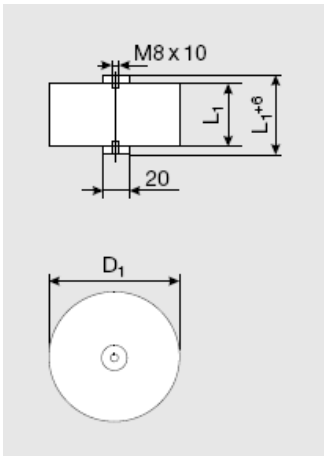


Capacitors with rated diameter 55 - 60 mm.
Plastic can, filled with PUR resin.
Terminals: axial thread M8 x 10 mm

Humidity class F

K/L: See data charts for E53.xxx range.

10.15 Design T2

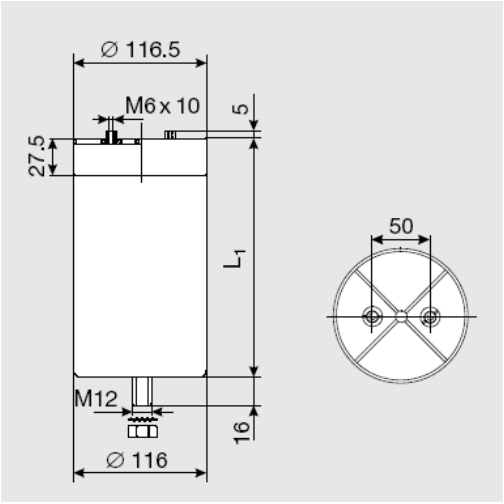


Capacitors with rated diameter 75 - 105 mm.
Plastic can, filled with PUR resin.
Terminals: axial thread M8 x 10 mm

Humidity class F

K/L: see data charts

10.16 Design N1/N5



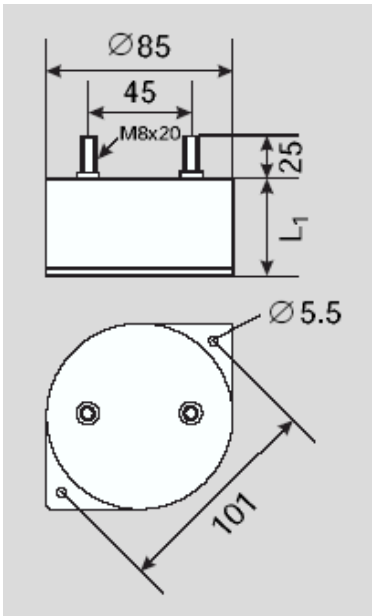
Case: pressed aluminium with base mounting stud.
Lid: plastic lid

Humidity class C

K: 45 mm
L: 35 mm

	D_1	a	d	L_2	K	L
N1	116	50	14	5	45	35
N5	85	32	12	6	36	20

10.17 Design H1

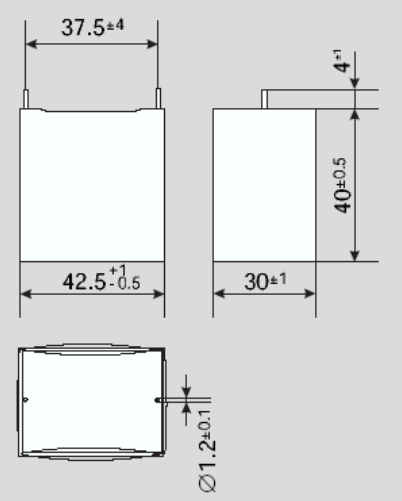


Capacitors with rated diameter 85 mm.
Casing: plastic, filled with PUR resin.
Terminals: threaded stud M8 x 20 mm.

Humidity class F

K: 40 mm
L: 37 mm

10.18 Design P1



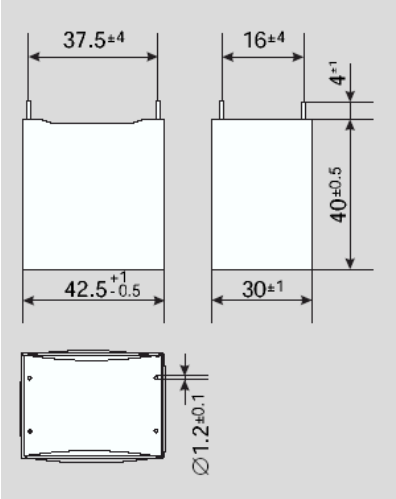
Flame-proof plastic housing, filled with PUR resin.
Connecting wires: copper

Humidity class F

K: 37 mm
L: 37 mm

Note: Case may be dented inside or outside within specified tolerances.

10.19 Design P2



Flame-proof plastic housing, filled with PUR resin.
Connecting wires: copper

Humidity class F

K: 37 mm
L: 37 mm

Note: Case may be dented inside or outside within specified tolerances.