MH Vishay ESTA Power Capacitors

Power Electronic Capacitors (PEC) Data Book

- AC Capacitors
- DC Capacitors

One of the World's Largest Manufacturers of
Power Capacitors

MH Vishay ESTA
Power Electronic Capacitors (PEC)

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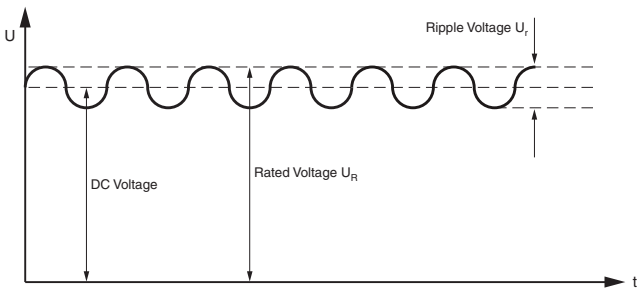
Power Electronic Capacitors

BASIC INFORMATION

Power electronic capacitors (PEC) are specially designed for DC voltage and for non-sinusodial AC waveforms of voltages and currents.

DC APPLICATION

DC capacitors are periodically charged and discharged. This capacitor type is used to reduce the AC component of a DC voltage. Supporting or DC-filter capacitors are used for energy storage.

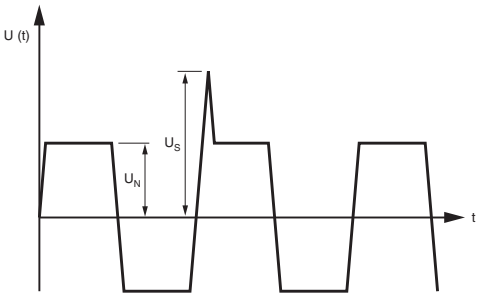


Definitions:

- **Rated voltage U_N**
  Maximum operating peak voltage of either polarity of a reversing or non reversing voltage.
- **Ripple voltage U_R**
  Peak to peak alternating component of the unidirectional voltage

AC APPLICATION

AC capacitors are periodically recharged during operation. AC capacitors serve as damping or snubber capacitors for suppression of undesirable voltage spikes.
Communication capacitors quench the conductive state of thyristors.



Definitions:

- **Rated voltage U_N**
  Maximum operating peak voltage of either polarity of a reversing or non reversing voltage.
- **Non recurrent surge voltage U_S**
  Peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and for durations shorter than the basic period.

STANDARDS

The capacitors listed in this catalog are subject to the international standards for “capacitors for power electronics”:

- IEC 61071-1 and 2; EN 61081-1 and 2
- IEC 61881; EN 61881
- IEC 6068 basic environmental testing procedures

TECHNICAL DATA

Operating mode

- Continuous operation

Impregnation

- Vegetable oil or resin (1)

Operating temperature range

- Min./max. casing temperature: - 25 °C/+ 70 °C
- Min./max. storage temperature: - 40 °C/+ 75 °C
- Hot spot temperature: ≤ + 85 °C

Self-discharge time constant

- > 10 000 s

Life expectancy with 3 % failure rate

- 100 000 h; hot spot maximum + 70 °C

Mounting position

- Vertical/horizontal
- Upside down position: upon request only

Protection

- Overpressure switch (1)

Loss factor

- $\tan \delta < 10 \times 10^{-4}$

Capacitance tolerance

- ± 10 % or ± 5 % (1)

Test voltages

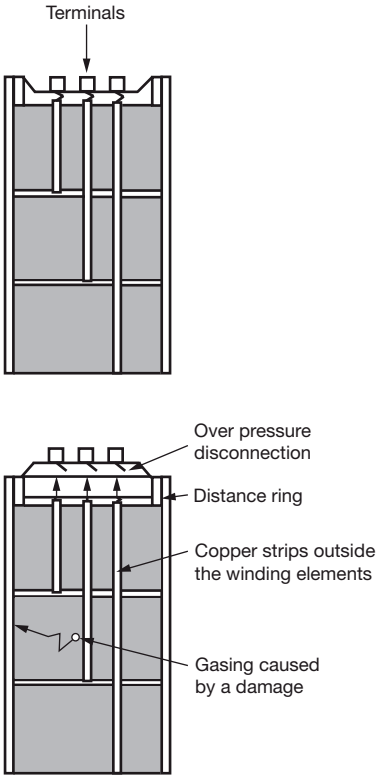
- Terminal/terminal
  AC test voltage RMS 1.5 U_N/10 s
  DC test voltage 1.5 U_{NDC}/10 s
- Terminal/casing
  2 x U_I + 1000 V or 2000 V, whichever is the highest value

Note

(1) If values differ from this data this is mentioned separately

Overpressure tear-off fuse

- On over-running or on reaching the limits of the expected capacitor lifetime, punctures can occur, causing localized bridging and the formation of gas. An over-pressure tear-off fuse disconnects the capacitors element from the line side thereby preventing bursting.



Overpressure sensor

- For capacitors in rectangular cans, pressure sensors are available which can activate a line-side switch via a signal contact.

TECHNOLOGY AND DESIGN

MKP-Dielectric

The favourite dielectric material for PEC is Polypropylene. It is a special high temperature Polypropylene film with a thin metallization on one side of the film. The metallization has a optimized structure in mixture of Aluminium/Zinc and in the ohmic profile which depends on the application and capacitor demands.

Selfhealing effect

As a result of the selfhealing effect, the capacitor is full operativ after an electrical breakdown. A breakdown generates a small electric arc which evaporates the metallization around the area of breakdown in only a view microseconds and at very low energy. The localized increase in gas pressure caused by the high temperature of the arc, blows off the gaseous metallization away from the breakdown point. By means of this process, a metal free, non-conductive isolation crescent is formed which enables continous full operation of the capacitor.

Winding element

All selfhealing capacitors comprising of one or more individual cylindric winding elements. For contacting the elements in parallel or in series a solderable lead-free metal base layer is sprayed onto the front sides of the winding elements. The process of metal spraying is called “schooping”. The connection of the windings in parallel or in series is accomplished by means of highly flexible copper material. In this way the capacitors are able to fullfill the most highest demands of current load, low inductive characteristics, low ohmic drop and shock and vibration fail proof.

Filling material

After mounting the stack of winding elements into the cases, the capacitors are dried under vacuum and gas impregnated with N2 (Nitrogen) before filling.

- **Dry casting**
  Most of the selfhealing capacitors in rectangular cases and a number of capacitors in cylindrical cans are filled with a soft resin mainly based on vegetable castor oil. The casting compound R25 developed by Vishay remains elastic throughout the entire life of the capacitor.
  This elastic casting compound offers outstanding shock and vibration protection for the internal structure and long-lasting protection against the penetration of moisture into the electrical components of the capacitor.
  A very good thermal conductivity of the casting compound enables maximum capacitor loads under high temperature stress conditions.
  The casting compound can be treated as ordinary waste.
- **Vegetable oil**
  For capacitors with tear-off protection, preference is given to impregnation using a specially produced and stabilized vegetable oil.

DEFINITIONS

Rated capacitance (C_N)

of a capacitor is the capacitance by which it is designated. The term is related to 20 °C capacitor temperature, 50 Hz and rated voltage.

Tolerance on capacitance

is the capacitance range within which the actual capacitance may differ from rated capacitance (CN).

Rated voltage (U_N)

is the maximum of mixed voltages or the peak of AC voltages for which the dielectric of capacitors is designed, adhering to the characteristics and other rated values specified. Rated voltage is not the rms value but the maximum or peak capacitor voltage.

Rated voltage (U_N) DC-capacitors

is the maximum operating peak voltage of either polarity but of a non-reversing type waveform, for which the capacitors have been designed, for continuous operation.

Periodic peak voltage (U_S)

is the periodically permissible peak voltage. The characteristic and permissible duration of exposure are given.

Peak voltage ($U_{Smax.}$)

is the maximum voltage which may be allowed to occur across the capacitor sporadically and for a brief period, e.g. in the event of a fault. The characteristic and permissible load duration are given in most cases.

Ratio of voltage reversal (D)

is the ratio between the second voltage peak and the first voltage peak for dampened dying-out surge discharge, expressed as a percentage.

Rated insulation voltage (U_I)

is the rms AC voltage for which the insulation of the capacitor is designed and designed with terminal connected to case.

Rated current (I_N)

is the current by which the capacitor is designated and in particular for which its current paths are designed. Rated current is the maximum rms level of steady-state current.

Peak surge current (I_S)

is the maximum level of current which may be allowed to occur across the capacitor sporadically for a short period e.g. in the event of a fault. The characteristic and permissible duration are given.

Dielectric loss factor (tan δ_0)

is the loss factor of the dielectric which is assumed to be constant for the normal dielectrics and their operating frequency range.

Minimum temperature

The lowest temperature at the surface of the capacitor case (ready for operation) at which the capacitor may be switched on. Lower temperatures are usually permissible for transport and and storage.

Maximum temperature

The highest temperature which the hottest point of the capacitor case may reach during operation, including selfheating.

Reliability

The operating reliability of the capacitor is determined by the number of failures within an adequately large batch expected to occur after a specified time (life expectancy).
DIN 40040 has replaced the previous term “operating reliability” by the new term “reference reliability”.

Reference reliability

Reference reliability is expressed in terms of failure quota and respective load duration (not including storage times).
Reference reliability is the reliability for defined load (reference load). The reference exposure figure quoted relates to operation under nominal conditions and the application class given in the data lists.

Failure ratio

The failure ratio is the relationship between the number of failed capacitors and the total number of capacitors used.
It applies to a particular capacitor only and the load duration cited (life expectancy). The figure quoted in the data lists is an average which is generally not exceeded if examining an adequately large number of capacitors.

FIT

FIT = failures in time

The failure rate in FIT indicates the maximum failed components within 1 x 10^9 component operation hours.

Capacitors for Power Electronics - Cylindrical

Contents

Capacitors for Power Electronics (PEC) - Cylindrical

FEATURES

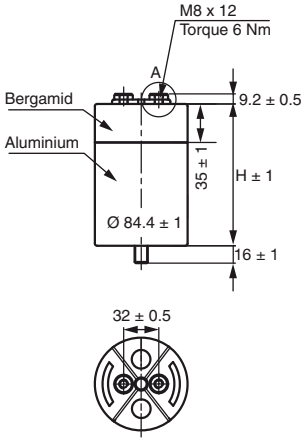
- High RMS current rating: up to 150 A
- High impulse current rating: up to 25 kA
- Low self-inductance of 70 nH
- High reliability and life expectancy
- Withstands heavy-duty shock and vibration
- Non-polar dielectric

APPLICATIONS

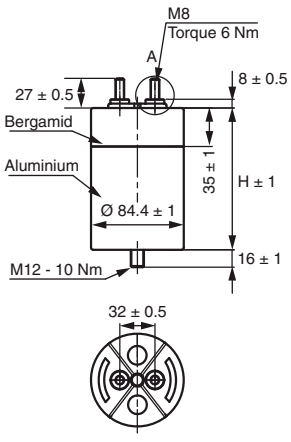
- DC linking and DC filtering in industry and traction converters
- DC linking in low-power drives
- DC linking in wind turbine converters
- Impulse discharge capacitors for magnetizing and welding
- Replacement of aluminium electrolytic capacitors (lower capacitance, higher currents)
- AC filter in UPS

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	900 V
Rated DC voltage max.	2700 V
Capacitance min.	40 µF
Capacitance max.	2235 µF
Technology	Metallized polypropylene film
Dissipation factor (tan δ_0)	< 2 x 10^{-4}/1 kHz
Capacitance tolerance	± 5 %
Operating temperature (hot spot)	$\theta_{min.}$ - 40 °C $\theta_{max.}$ + 80 °C
Inductance	70 nH
Lifetime expectancy	100 000 h at U_R and < 70 °C hotspot
Reliability	100 FIT
Test voltage	Terminal/terminal = 1.5 x U_{RDC}, 10 s terminal/case = 2 x U_{RDC} + 1000 V_{AC}, 60 s
Casing material	Aluminum/Bergamid 3700 UF
Filling	Resin dry, UL 94 V-0
Standards	IEC 61071-1, IEC 61881 and EN 61071-1

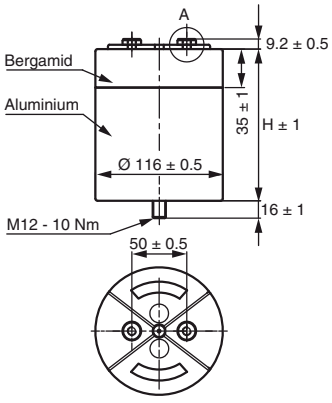
DIMENSIONS in millimeters



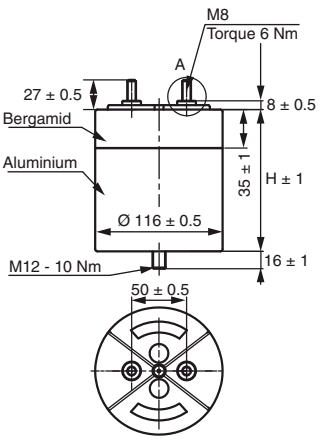
Drawing 1
i.e.: HDMKP...-...I



Drawing 2
i.e.: HDMKP...-...B



Drawing 3
i.e.: HDMKP...-...I



Drawing 4
i.e.: HDMKP...-...B

TYPE DESCRIPTION

TYPE HDMKP.../ ...B/I	C_N [µF]	VOLTAGE V_{DC}	R_S [mΩ]	R_{th} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
HDMKP 900, U_{NDC} = 900 V, U_N = 220 V_{RMS}												
900-360-MH	360	900	2.4	6.0	32.0	1.30	3.92	105	84.4	0.7	4	1 and 2
900-460-MH	460	900	3.2	5.4	29.0	1.25	3.77	135	84.4	0.9	4	1 and 2
900-720-MH	720	900	1.3	3.2	59.0	1.32	3.98	185	84.4	1.2	4	1 and 2
900-950-MH	950	900	1.7	2.7	56.0	1.30	3.89	235	84.4	1.6	4	1 and 2
900-1080-MH	1080	900	0.9	2.2	85.0	1.31	3.94	260	84.4	1.7	4	1 and 2
900-2050-MH	2050	900	1.3	1.7	75.0	5.61	16.8	235	116	3.0	4	3 and 4
900-2235-MH	2235	900	0.6	1.6	120.0	8.38	25.1	260	116	3.3	4	3 and 4
HDMKP 1.1, U_{NDC} = 1100 V, U_N = 275 V_{RMS}												
1.1-240-MH	240	1100	2.9	4.1	28.0	1.12	3.37	105	84.4	0.7	4	1 and 2
1.1-325-MH	325	1100	3.8	4.8	27.0	1.11	3.33	135	84.4	0.9	4	1 and 2
1.1-480-MH	480	1100	1.6	2.5	50.0	2.25	6.75	185	84.4	1.2	4	1 and 2
1.1-650-MH	650	1100	0.8	2.7	50.0	2.22	6.66	235	84.4	1.6	4	1 and 2
1.1-720-MH	720	1100	0.5	2.2	75.0	3.37	10.1	260	84.4	1.7	4	1 and 2
1.1-1310-MH	1310	1100	1.5	1.8	72.0	4.48	13.4	235	116	3.0	4	3 and 4
1.1-1425-MH	1425	1100	0.6	1.7	114.0	6.68	20.0	260	116	3.3	4	3 and 4
HDMKP 1.35, U_{NDC} = 1350 V, U_N = 325 V_{RMS}												
1.35-160-MH	160	1350	3.2	6.7	26.0	0.90	2.69	105	84.4	0.7	4	1 and 2
1.35-200-MH	200	1350	1.2	4.6	51.0	0.89	2.68	135	84.4	0.9	4	1 and 2
1.35-320-MH	320	1350	1.7	3.5	50.0	0.90	2.69	185	84.4	1.2	4	1 and 2
1.35-400-MH	400	1350	2.4	3.1	45.0	0.82	2.46	235	84.4	1.6	4	1 and 2
1.35-480-MH	480	1350	1.2	2.4	72.0	0.90	2.69	260	84.4	1.7	4	1 and 2
1.35-910-MH	910	1350	1.6	1.9	70.0	3.73	11.2	235	116	3.0	4	3 and 4
1.35-990-MH	990	1350	0.7	1.8	108.0	5.56	16.6	260	116	3.3	4	3 and 4
HDMKP 2.0, U_{NDC} = 2000 V, U_N = 500 V_{RMS}												
2.0-70-MH	70	2000	4.4	7.2	21.0	0.59	1.77	105	84.4	0.7	4	1 and 2
2.0-90-MH	90	2000	5.8	5.9	20.0	0.58	1.75	135	84.4	0.9	4	1 and 2
2.0-140-MH	140	2000	2.3	3.8	41.0	0.59	1.77	185	84.4	1.3	4	1 and 2
2.0-180-MH	180	2000	3.0	3.1	39.0	0.58	1.75	235	84.4	1.6	4	1 and 2
2.0-210-MH	210	2000	1.6	2.7	60.0	0.59	1.78	260	84.4	1.7	4	1 and 2
2.0-390-MH	390	2000	2.0	2.1	60.0	2.45	7.36	235	116	3.0	4	3 and 4
2.0-420-MH	420	2000	0.9	1.9	90.0	3.65	10.9	260	116	3.3	4	3 and 4
HDMKP 2.25, U_{NDC} = 2250 V, U_N = 550 V_{RMS}												
2.25-55-MH	55	2250	4.8	7.4	20.0	0.53	1.59	105	84.4	0.7	4	1 and 2
2.25-75-MH	75	2250	6.4	6.0	19.0	0.52	1.56	135	84.4	0.9	4	1 and 2
2.25-110-MH	110	2250	2.5	3.9	39.0	0.53	1.59	185	84.4	1.2	4	1 and 2
2.25-150-MH	150	2250	3.3	3.2	37.0	0.52	1.56	235	84.4	1.6	4	1 and 2
2.25-165-MH	165	2250	1.7	2.7	56.0	0.53	1.59	260	84.4	1.7	4	1 and 2
2.25-320-MH	320	2250	2.4	2.4	56.0	2.23	6.70	235	116	3.0	4	3 and 4
2.25-345-MH	345	2250	1.1	2.0	90.0	3.33	9.99	260	116	3.3	4	3 and 4
HDMKP 2.7, U_{NDC} = 2700 V, U_N = 660 V_{RMS}												
2.7-40-MH	40	2700	5.1	8.4	18.0	0.46	1.39	105	84.4	0.7	4	1 and 2
2.7-50-MH	50	2700	7.4	6.5	17.0	0.41	1.25	135	84.4	0.9	4	1 and 2
2.7-80-MH	80	2700	5.1	6.8	20.0	0.46	1.39	185	84.4	1.2	4	1 and 2
2.7-100-MH	100	2700	7.4	5.3	19.0	0.41	1.25	235	84.4	1.6	4	1 and 2
2.7-120-MH	120	2700	5.2	6.2	21.0	0.45	1.34	260	84.4	1.7	4	1 and 2
2.7-220-MH	220	2700	2.4	2.4	52.0	0.92	2.77	235	116	3.0	4	3 and 4
2.7-240-MH	240	2700	1.1	2.0	84.0	0.92	2.78	260	116	3.3	4	3 and 4

Note

- Other voltage, current and capacitance values are available on request

Capacitors for Power Electronics (PEC) - Cylindrical

FEATURES

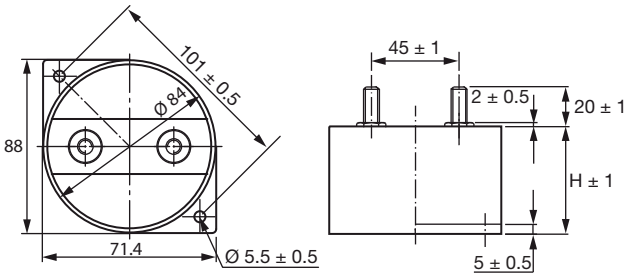
- Very low stray inductance < 40 nH
- Extremely low losses also at high frequencies
- Low ESR: < 4 mΩ
- Highest RMS current rating: up to 80 A
- High impulse discharge current capability
- Resistance to heavy duty shock vibration
- High reliability and life expectancy
- Integrated flanges enable easy mounting
- Casing material: UL 94 V-0

APPLICATION

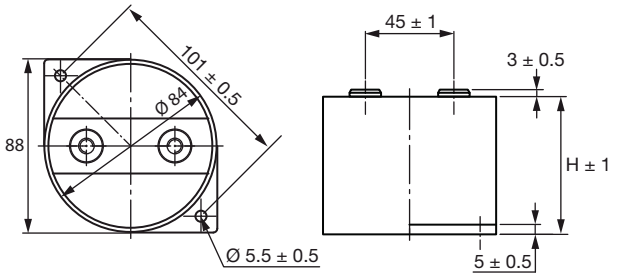
- Damping GTO thyristors
- Protection of GTO capacitors
- Low inductance buffer circuits
- High current DC filtering
- Medium frequency tuning
- Pulsed laser

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	700 V
Rated DC voltage max.	2150 V
Capacitance min.	15 µF
Capacitance max.	230 µF
Technology	Metalized polypropylene
Dissipation factor (tan δ_0)	< 2 x 10^{-4}/2 kHz
Capacitance tolerance	± 5 %
Operating temperature (hotspot)	$\theta_{min.}$ - 40 °C $\theta_{max.}$ - 80 °C
Inductance	< 30 nH
Lifetime expectancy	100 000 h at U_{NDC} and < 60 °C hotspot
Reliability	300 FIT
Test voltage	Terminal/terminal = 1.5 x U_{NDC}, 10 s; Terminal/case = 2 x U_{NDC} + 1000 V_{AC}, 60 s
Casing material	Polyester, UL 94 V-0
Filling	Resin polyurethane, UL 94 V-0
Standards	IEC 61071-1, IEC 61881, and EN 61071-1

DIMENSIONS in millimeters



Drawing 1
GLI...-...B



Drawing 2
GLI...-...I

TYPE DESCRIPTION												
TYPE GLI...-... B/I	C_N [µF]	VOLTAGE V_{DC}	R_S [mΩ]	R_{TH} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
GLI 700, U_{NDC} = 700 V, U_N = 495 V												
700-35-MH	35	700	0.4	6.4	80.0	0.98	2.94	38	84	0.2	4	1 and 2
700-160-MH	160	700	0.6	6.0	60.0	1.28	3.84	56	84	0.3	4	1 and 2
700-230-MH	230	700	0.8	5.6	50.0	1.33	4.01	68	84	0.4	4	1 and 2
GLI 900, U_{NDC} = 900 V, U_N = 635 V												
900-25-MH	25	900	0.4	6.5	80.0	0.82	2.46	38	84	0.2	4	1 and 2
900-100-MH	100	900	0.7	6.1	55.0	1.00	3.00	56	84	0.3	4	1 and 2
900-150-MH	150	900	0.9	5.7	50.0	1.09	3.27	68	84	0.4	4	1 and 2
GLI 1100, U_{NDC} = 1100 V, U_N = 775 V												
1100-15-MH	15	1100	0.5	6.7	60.0	0.63	1.89	38	84	0.2	4	1 and 2
1100-75-MH	75	1100	0.8	6.2	55.0	0.90	2.70	56	84	0.3	4	1 and 2
1100-100-MH	100	1100	1.0	5.8	50.0	0.87	2.61	68	84	0.6	4	1 and 2
GLI 1250, U_{NDC} = 1250 V, U_N = 1250 V												
1250-50-MH	50	1250	1.0	6.3	50.0	0.70	2.10	56	84	0.3	4	1 and 2
1250-75-MH	75	1250	1.2	5.9	47.0	0.76	2.28	68	84	0.4	4	1 and 2
GLI 1450, U_{NDC} = 1450 V, U_N = 1025 V												
1450-40-MH	40	1450	1.0	6.4	48.0	0.64	1.92	56	84	0.3	4	1 and 2
1450-60-MH	60	1450	1.2	5.9	45.0	0.70	2.10	68	84	0.4	4	1 and 2
GLI 1800, U_{NDC} = 1800 V, U_N = 1270 V												
1800-25-MH	25	1800	1.2	6.5	43.0	0.50	1.50	56	84	0.3	4	1 and 2
1800-35-MH	35	1800	1.6	6.1	38.0	0.50	1.52	68	84	0.4	4	1 and 2
GLI 2150, U_{NDC} = 2150 V, U_N = 1520 V												
2150-18-MH	18	2150	1.4	6.6	40.0	0.43	1.29	56	84	0.3	4	1 and 2
2150-25-MH	25	2150	1.8	6.1	35.0	0.43	1.30	68	84	0.4	4	1 and 2

Note

- Other voltage, current and capacitance values are available on request

Capacitors for Power Electronics (PEC) - Cylindrical

FEATURES

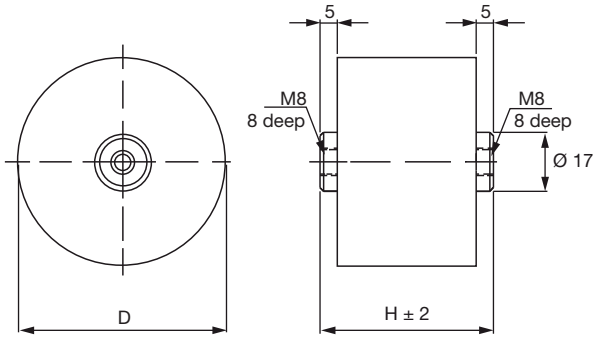
- Very low stray inductance: < 10 nH
- Extremely low losses at high frequencies < 4 x 10^{-4} at 2 kHz
- Low ESR: < 4 mΩ
- Highest RMS current rating: up to 100 A
- High impulse discharge current capability
- Resistance to heavy duty shock vibration
- High reliability and life expectancy
- Casing material: UL 94 V-0

APPLICATIONS

- Voltage converters
- Frequency converters
- RFI filters
- Traction drives
- Industrial drives
- UPS
- Medical equipment

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	700 V
Rated DC voltage max.	2150 V
Capacitance min.	7.5 µF
Capacitance max.	230 µF
Technology	Metalized polypropylene film
Dissipation factor (tan δ_0)	< 2 x 10^{-4}/2 kHz
Capacitance tolerance	± 5 %
Operating temperature (hotspot)	$\theta_{min.}$ - 40 °C $\theta_{max.}$ - 80 °C
Inductance	< 30 nH
Lifetime expectancy	100 000 h at U_{NDC} and < 60 °C hotspot
Reliability	300 FIT
Test voltage	Terminal/terminal = 1.5 x U_{NDC}, 10 s; Terminal/case = 2 x U_{NDC} + 1000 V_{AC}, 60 s
Casing material	Polyester, UL 94 V-0
Filling	Resin polyurethane, UL 94 V-0
Standards	IEC 61071-1, IEC 61881, and EN 61071-1

DIMENSIONS in millimeters



Drawing 1
GLI...-...A

TYPE DESCRIPTION												
TYPE GLI...-... A	C_N [µF]	VOLTAGE V_{DC}	R_S [mΩ]	R_{th} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
GLI 700, U_{NDC} = 700 V, U_N = 495 V												
700-35-MH	35	700	0.5	8.0	60.0	0.98	2.94	44	87	0.4	12	1
700-230-MH	230	700	0.8	6.4	50.0	1.33	4.01	74	87	0.5	12	1
GLI 900, U_{NDC} = 900 V, U_N = 635 V												
900-25-MH	25	900	0.3	7.7	80.0	0.82	2.46	44	87	0.3	12	1
900-100-MH	100	900	0.7	7.1	50.0	1.00	3.00	64	87	0.4	12	1
900-150-MH	150	900	0.9	6.3	52.0	1.09	3.27	74	87	0.4	12	1
GLI 1100, U_{NDC} = 1100 V, U_N = 775 V												
1100-15-MH	15	1100	0.4	7.7	75.0	0.63	1.89	44	87	0.3	12	1
1100-75-MH	75	1100	0.7	7.3	55.0	0.90	2.70	64	87	0.4	12	1
1100-100-MH	100	1100	1.0	6.5	45.0	0.87	2.62	74	87	0.4	12	1
GLI 1250, U_{NDC} = 1250 V, U_N = 1250 V												
1250-50-MH	50	1250	0.9	6.9	50.0	0.70	2.10	64	87	0.4	12	1
1250-75-MH	75	1250	1.1	6.5	45.0	0.76	2.28	74	87	0.5	12	1
GLI 1450, U_{NDC} = 1450 V, U_N = 1025 V												
1450-11-MH	11	1450	0.7	6.5	50.0	0.33	1.10	74	87	0.5	12	1
1450-60-MH	60	1450	1.2	6.3	45.0	0.70	2.10	74	87	0.3	12	1
GLI 1800, U_{NDC} = 1800 V, U_N = 1270 V												
1800-25-MH	25	1800	1.2	7.1	42.0	0.50	1.50	64	87	0.4	12	1
1800-35-MH	35	1800	1.7	6.4	38.0	0.50	1.52	74	87	0.4	12	1
GLI 2150, U_{NDC} = 2150 V, U_N = 1520 V												
2150-7,5-MH	75	2150	3.0	11.8	20.0	0.18	0.54	64	87	0.4	12	1
2150-25-MH	25	2150	2.1	6.0	32.0	0.43	1.30	74	87	0.4	12	1

Note

- Other voltage, current and capacitance values are available on request

Capacitors for Power Electronics (PEC) - Cylindrical

FEATURES

- High impulse current rating up to 10 kA
- Low self-inductance of < 100 nH
- High reliability and life expectancy
- Withstands heavy duty shock and vibration
- Non-polar dielectric
- Dry, resin filled

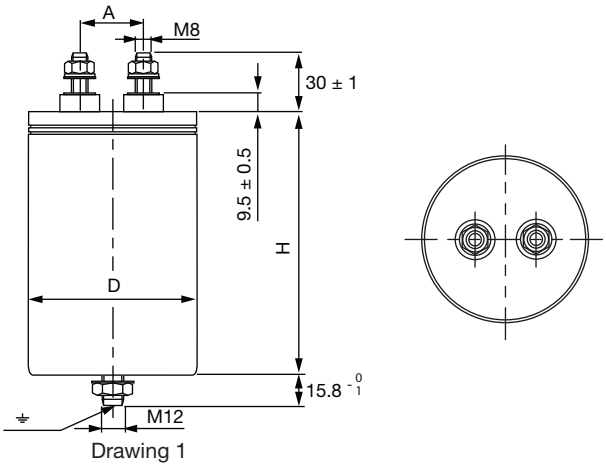
APPLICATIONS

- DC linking and DC filtering in industry and traction converters
- DC linking in low-power drives
- Impulse discharge capacitors for magnetizing and welding
- Replacement of aluminum electrolytic capacitors (lower capacitance, higher currents)

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	880 V
Rated DC voltage max.	1000 V
Capacitance min.	30 µF
Capacitance max.	2235 µF
Technology	Metallized polypropylene
Dissipation factor (tan δ_0)	$< 2 \times 10^{-4}$
Capacitance tolerance	± 5 %
Operating temperature (hot spot)	$\theta_{min.}$ - 40 °C $\theta_{max.}$ + 80 °C
Inductance	< 100 nH
Lifetime expectancy	200 000 h at U_{NDC} and < 60 °C hotspot
Reliability	200 FIT
Test voltage	Terminal/terminal = 1.5 x U_{NDC}, 10 s Terminal/case = 2 x U_{NDC} + 1000 V_{AC}, 60 s
Casing material	Aluminum
Filling	Resin polyurethane, UL 94 V-0
Standards	IEC 61071-1, IEC 61881 and EN 61071-1

DIMENSIONS in millimeters

D ≤ 84.4 mm	A = 32 mm
D = 116 mm	A = 50 mm



Drawing 1

TYPE DESCRIPTION												
TYPE DCMKP ...-...IBR	C_N [µF]	VOLTAGE V_{DC}	R_S [mΩ]	R_{th} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
DCMKP 880, U_{NDC} = 880 V, V_{AC} = 220 V_{RMS}												
880-200-MH	200	880	3.4	15.0	34.0	0.75	2.25	105	64	0.4	9	1
880-270-MH	270	880	4.4	11.7	35.0	0.73	2.21	130	64	0.4	9	1
880-370-MH	370	880	2.2	12.8	46.0	1.38	4.15	105	84	0.6	4	1
880-510-MH	510	880	2.8	9.8	48.0	1.39	4.18	130	84	0.7	4	1
DCMKP 1.1, U_{NDC} = 1100 V, V_{AC} = 275 V_{RMS}												
1.1-130-MH	130	1100	3.9	14.9	32.0	0.60	1.82	105	64	0.3	9	1
1.1-175-MH	175	1100	5.2	11.6	32.0	0.60	1.80	130	64	0.4	9	1
1.1-240-MH	240	1100	2.5	12.7	43.0	1.12	3.37	105	84	0.6	4	1
1.1-280-MH	280	1100	7.7	7.7	31.0	0.60	1.80	185	64	0.5	9	1
1.1-330-MH	330	1100	3.2	9.8	44.0	1.12	3.37	130	84	0.7	4	1
1.1-525-MH	525	1100	4.5	6.5	46.0	1.68	5.05	185	84	1.3	4	1
1.1-1000-MH	1000	1100	2.9	5.4	62.0	2.14	6.42	185	116	1.9	4	1
DCMKP 1.3, U_{NDC} = 1300 V, V_{AC} = 325 V_{RMS}												
1.3-90-MH	90	1300	4.6	15.0	29.0	0.50	1.50	105	64	0.3	9	1
1.3-120-MH	120	1300	6.0	11.7	29.0	0.94	2.82	130	64	0.7	9	1
1.3-165-MH	165	1300	2.9	12.8	40.0	1.91	5.75	105	84	2.1	4	1
1.3-195-MH	195	1300	9.0	7.7	30.0	0.50	1.50	185	64	0.6	9	1
1.3-230-MH	230	1300	3.6	9.8	41.0	0.93	2.80	130	84	0.7	4	1
1.3-365-MH	365	1300	5.1	6.5	42.0	2.05	6.16	185	84	1.3	4	1
1.3-710-MH	710	1300	3.2	5.4	59.0	3.83	11.5	185	116	1.9	4	1
DCMKP 1.55, U_{NDC} = 1550 V, V_{AC} = 385 V_{RMS}												
1.55-65-MH	65	1550	5.2	15.1	28.0	0.43	1.29	105	64	0.4	9	1
1.55-90-MH	90	1550	6.8	11.6	28.0	0.43	1.29	130	64	0.6	9	1
1.55-120-MH	120	1550	3.2	12.9	38.0	0.78	2.34	105	84	0.6	4	1
1.55-145-MH	145	1550	10.3	7.7	28.0	0.43	1.29	185	64	0.6	9	1
1.55-165-MH	165	1550	4.1	9.9	39.0	0.79	2.37	130	84	0.7	4	1
1.55-265-MH	265	1550	5.9	6.6	39.0	0.79	2.38	185	84	1.0	4	1
1.55-520-MH	520	1550	3.6	5.4	56.0	1.70	5.12	185	116	1.2	4	1
DCMKP 1.75, U_{NDC} = 1750 V, V_{AC} = 440 V_{RMS}												
1.75-50-MH	50	1750	5.7	15.0	26.0	0.37	0.13	105	64	0.3	9	1
1.75-65-MH	65	1750	7.6	11.6	26.0	0.36	1.09	130	64	0.4	9	1
1.75-90-MH	90	1750	3.5	12.9	36.0	0.69	2.09	105	84	0.6	4	1
1.75-110-MH	110	1750	11.5	7.7	26.0	0.37	1.13	185	64	0.5	9	1
1.75-125-MH	125	1750	4.5	9.9	37.0	0.70	2.10	130	84	0.8	4	1
1.75-200-MH	200	1750	6.6	6.6	37.0	0.69	2.08	185	84	1.0	4	1
1.75-390-MH	390	1750	3.9	5.5	53.0	1.46	4.40	185	116	2.1	4	1
DCMKP 2.0, U_{NDC} = 2000 V, V_{AC} = 500 V_{RMS}												
2.0-35-MH	35	2000	6.4	15.2	25.0	0.30	0.90	105	64	0.4	9	1
2.0-50-MH	50	2000	8.4	11.6	25.0	0.31	0.94	130	64	0.4	9	1
2.0-70-MH	70	2000	3.8	12.8	35.0	0.60	1.82	105	84	0.6	4	1
2.0-85-MH	85	2000	12.9	7.8	25.0	0.33	0.99	185	64	0.5	9	1
2.0-110-MH	110	2000	5.0	9.9	35.0	0.62	1.87	130	84	0.8	4	1
2.0-160-MH	160	2000	7.2	6.6	36.0	0.62	1.87	185	84	1.0	4	1
2.0-310-MH	310	2000	4.3	5.5	51.0	1.18	3.56	185	116	1.9	4	1
DCMKP 2.2, U_{NDC}= 2200 V, V_{AC} = 550 V_{RMS}												
2.2-30-MH	30	2200	7.0	15.1	24.0	0.29	0.87	105	64	0.3	9	1
2.2-40-MH	40	2200	9.2	11.6	24.0	0.27	0.83	130	64	0.4	9	1
2.2-55-MH	55	2200	4.1	12.9	33.0	0.53	1.59	105	84	0.6	4	1
2.2-70-MH	70	2200	14.2	7.8	24.0	0.30	0.91	185	64	0.5	9	1
2.2-80-MH	80	2200	5.4	9.9	34.0	0.56	1.68	130	84	0.8	4	1
2.2-130-MH	130	2200	8.0	6.6	34.0	0.56	1.69	185	84	0.9	4	1
2.2-250-MH	250	2200	4.7	5.5	49.0	1.08	3.25	185	116	2.1	4	1

Note

- Other voltage, current and capacitance values are available on request

Capacitors for Power Electronic (PEC) - Cylindrical

FEATURES

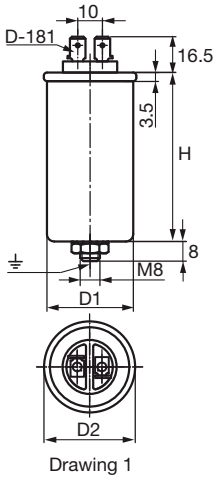
- Extremely low losses at high frequencies
- Low ESR 0.7 mΩ up to 10 mΩ
- Highest RMS current rating up to 80 A
- High impulse discharge current capability
- High reliability and life expectancy > 100 000 h/100 FIT
- Internal tear-off fuse

APPLICATIONS

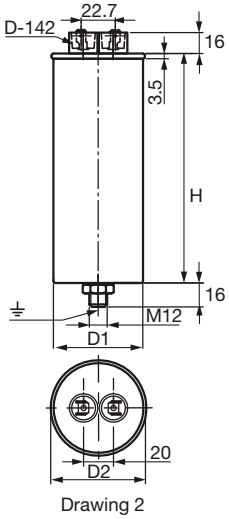
- AC input and AC output filters
- Damping and snubber
- Surge suppression
- Commutation
- DC linking and DC filtering

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	400 V
Rated DC voltage max.	2400 V
Capacitance min.	0.1 µF
Capacitance max.	470 µF
Technology	Metallized polypropylene film
Dissipation factor (tan δ_0)	< 1.5 x 10^{-4}
Capacitance tolerance	± 10 %
Operating temperature (hot spot)	$\theta_{min.}$ - 25 °C $\theta_{max.}$ + 80 °C
Inductance	< 100 nH
Lifetime expectancy	100 000 h at U_{NDC} and < 70 °C hotspot
Reliability	100 FIT
Test voltage	Terminal/terminal = 1.5 x U_{NDC}, 10 s Terminal/case = 2 x U_{NDC} + 1000 V_{AC}, 60 s
Casing material	Aluminum
Filling	Resin polyurethane, R25 or vegetable oil
Standards	IEC 61071-1, IEC 61881 and EN 61071-1

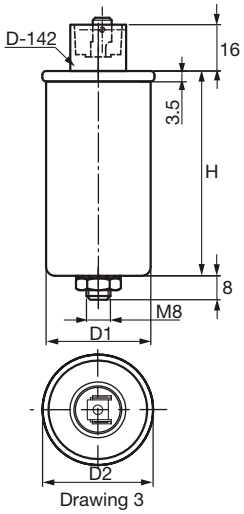
DIMENSIONS in millimeters



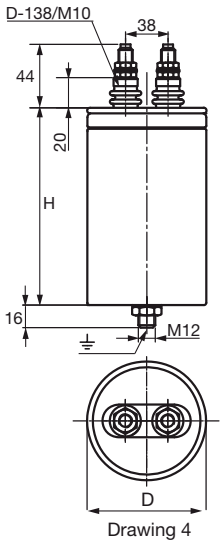
Drawing 1



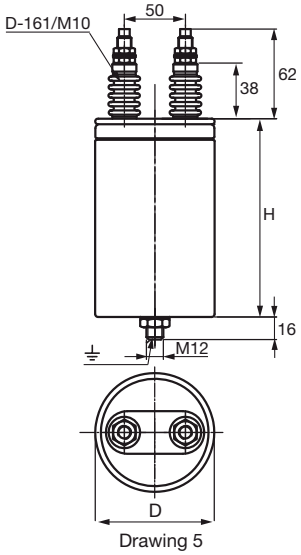
Drawing 2



Drawing 3



Drawing 4



Drawing 5

TYPE DESCRIPTION

TYPE EMKP ...-...	C_N [µF]	VOLTAGE V_{AC}	R_S [mΩ]	R_{th} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
EMKP 400; U_N = 400 V; U_{RMS} = 280 V; U_{NDC} = 750 V; U_S = 1125 V												
400-15-MH	15	400	2.6	24.9	15	0.20	0.6	52	40	0.1	50	1
400-22-MH	22	400	3.0	19.4	16	0.22	0.7	72	40	0.1	50	1
400-33-MH	33	400	2.3	18.5	19	0.33	1.0	72	50	0.2	25	1
400-47-MH	47	400	1.6	12.8	27	0.47	1.4	72	64	0.3	9	4
400-68-MH	68	400	1.9	11.5	26	0.49	1.5	72	64	0.3	9	4
400-100-MH	100	400	2.8	9.5	24	0.46	1.4	109	64	0.4	9	4
400-150-MH	150	400	1.2	6.4	44	1.09	3.3	72	84	0.5	4	4
400-220-MH	220	400	1.7	5.8	39	1.02	3.1	109	84	0.8	4	4
400-330-MH	330	400	0.7	3.1	82	2.33	7.0	140	84	1.0	4	4
400-470-MH	470	400	0.9	2.9	74	2.17	6.5	190	84	1.3	4	4
EMKP 650; U_N = 650 V; U_{RMS} = 460 V; U_{NDC} = 1200 V; U_S = 1800 V												
650-4.7-MH	4.7	650	4.1	27.9	11	0.10	0.3	52	35	0.1	50	1
650-6.8-MH	6.8	650	3.1	24.4	14	0.15	0.5	52	40	0.1	50	1
650-10-MH	10	650	2.4	23.1	16	0.22	0.7	52	50	0.1	25	1
650-15-MH	15	650	4.4	18.4	14	0.17	0.5	72	50	0.2	9	4
650-22-MH	22	650	1.9	12.6	25	0.35	1.1	72	64	0.3	9	4
650-33-MH	33	650	2.2	10.9	25	0.38	1.1	72	64	0.3	9	4
650-47-MH	47	650	3.4	9.2	22	0.35	1.1	109	64	0.4	4	4
650-68-MH	68	650	1.2	5.6	48	0.79	2.4	140	64	0.6	4	4
650-100-MH	100	650	0.9	4.7	58	1.16	3.5	140	84	1.0	4	4
650-150-MH	150	650	1.3	4.0	53	1.11	3.3	190	84	1.3	4	4
EMKP 950; U_N = 950 V; U_{RMS} = 670 V; U_{NDC} = 1800 V; U_S = 2700 V												
950-0.10-MH	0.10	950	7.8	37.0	7	0.04	0.1	52	30	0.05	100	1
950-0.22-MH	0.22	950	5.5	34.2	9	0.06	0.2	52	30	0.05	100	1
950-0.33-MH	0.33	950	8.0	39.2	7	0.04	0.1	52	30	0.05	100	1
950-0.47-MH	0.47	950	10.3	45.8	6	0.04	0.1	52	30	0.05	100	1
950-0.68-MH	0.68	950	7.5	39.6	7	0.06	0.2	52	30	0.05	100	1
950-1.0-MH	1.0	950	5.5	32.8	9	0.08	0.2	52	30	0.05	100	1
950-1.5-MH	1.5	950	4.0	31.3	11	0.13	0.4	52	40	0.08	50	1
950-2.2-MH	2.2	950	3.1	24.9	14	0.19	0.6	52	40	0.1	50	1
950-3.3-MH	3.3	950	2.4	23.2	17	0.28	0.8	52	50	0.1	25	2
950-4.7-MH	4.7	950	3.1	19.5	16	0.27	0.8	72	50	0.2	25	2
950-6.8-MH	6.8	950	3.0	16.2	18	0.27	0.8	72	50	0.2	25	2
950-10-MH	10	950	2.0	11.9	25	0.40	1.2	72	64	0.3	9	4
950-15-MH	15	950	3.1	10.2	22	0.36	1.1	109	64	0.4	9	4
950-22-MH	22	950	2.4	7.5	29	0.53	1.6	109	64	0.4	9	4
950-33-MH	33	950	1.9	6.4	36	0.80	2.4	109	84	0.8	4	4
950-47-MH	47	950	0.7	3.3	80	1.88	5.6	140	84	1.0	4	4
950-68-MH	68	950	1.0	3.3	67	1.64	4.9	190	84	1.3	4	4
EMKP 1200; U_N = 1200 V; U_{RMS} = 850 V; U_{NDC} = 2250 V; U_S = 3375 V												
1200-0.68-MH	0.68	1200	3.1	30.1	13	0.14	0.4	52	40	0.08	50	3
1200-1.0-MH	1.0	1200	2.4	24.0	16	0.21	0.6	52	40	0.08	50	3
1200-1.5-MH	1.5	1200	3.4	21.0	14	0.20	0.6	72	40	0.1	50	3
1200-2.2-MH	2.2	1200	2.7	20.1	17	0.29	0.9	72	50	0.2	25	2
1200-3.3-MH	3.3	1200	3.7	17.9	15	0.28	0.8	72	50	0.2	25	2
1200-4.7-MH	4.7	1200	1.2	11.3	34	0.62	1.9	120	50	0.3	25	4
1200-6.8-MH	6.8	1200	1.0	7.3	46	0.90	2.7	120	64	0.5	9	4
1200-10-MH	10	1200	0.8	5.1	62	1.32	4.0	120	64	0.5	9	4
1200-15-MH	15	1200	1.0	5.2	53	1.28	3.8	140	64	0.6	9	4
1200-22-MH	22	1200	0.8	4.3	65	1.87	5.6	140	84	1.0	4	4
1200-33-MH	33	1200	1.3	4.6	50	1.61	4.8	140	84	1.0	4	4
1200-47-MH	47	1200	1.1	3.1	67	2.29	6.9	190	84	1.3	4	4

TYPE DESCRIPTION

TYPE EMKP ...-...	C_N [µF]	VOLTAGE V_{AC}	R_S [mΩ]	R_{th} [K/W]	$I_{MAX.}$ [A]	I_P [kA]	Î [kA]	HEIGHT [mm]	D [mm]	WEIGHT [kg]	PACKAGING UNIT	DRAWING NO.
EMKP 1450; U_N = 1450 V; U_{RMS} = 1030 V; U_{NDC} = 2700 V; U_S = 4050 V												
1450-0.68-MH	0.68	1450	2.7	25.0	15	0.17	0.5	52	40	0.08	50	3
1450-1.0-MH	1.0	1450	2.2	23.7	17	0.25	0.8	52	50	0.1	25	2
1450-1.5-MH	1.5	1450	3.0	20.8	15	0.24	0.7	72	50	0.2	25	2
1450-2.2-MH	2.2	1450	3.0	15.0	18	0.24	0.7	72	64	0.3	9	2
1450-3.3-MH	3.3	1450	1.6	10.5	30	0.52	1.6	72	64	0.3	9	4
1450-4.7-MH	4.7	1450	2.3	11.4	24	0.48	1.4	72	64	0.3	9	4
1450-6.8-MH	6.8	1450	0.9	5.9	55	1.08	3.2	109	64	0.4	4	4
1450-10-MH	10	1450	0.7	4.6	68	1.59	4.8	120	84	0.9	4	4
1450-15-MH	15	1450	0.9	4.6	59	1.53	4.6	140	84	1.0	4	4
1450-22-MH	22	1450	1.5	4.6	47	1.29	3.9	190	84	1.3	4	4
1450-33-MH	33	1450	1.2	3.2	63	1.93	5.8	190	84	1.3	4	4
EMKP 1650; U_N = 1650 V; U_{RMS} = 1170 V; U_{NDC} = 3150 V; U_S = 4725 V												
1650-0.22-MH	0.22	1650	5.5	34.2	9	0.06	0.2	52	30	0.05	100	3
1650-0.33-MH	0.33	1650	4.0	30.0	11	0.10	0.3	52	35	0.1	100	3
1650-0.47-MH	0.47	1650	3.1	26.6	13	0.14	0.4	52	40	0.1	50	3
1650-0.68-MH	0.68	1650	2.5	25.3	15	0.20	0.6	52	50	0.1	50	2
1650-1.0-MH	1.0	1650	3.6	22.3	14	0.19	0.6	72	50	0.2	50	2
1650-1.5-MH	1.5	1650	2.7	17.7	18	0.28	0.8	72	50	0.2	25	2
1650-2.2-MH	2.2	1650	0.9	8.4	45	0.65	2.0	109	64	0.4	9	4
1650-3.3-MH	3.3	1650	1.2	8.3	38	0.61	1.8	120	64	0.5	9	4
1650-4.7-MH	4.7	1650	1.0	6.2	50	0.87	2.6	120	64	0.5	9	4
1650-6.8-MH	6.8	1650	0.8	5.3	60	1.26	3.8	120	84	0.9	4	4
1650-10-MH	10	1650	1.1	5.4	51	1.19	3.6	140	84	1.0	4	4
1650-15-MH	15	1650	1.7	5.0	41	1.02	3.1	190	84	1.3	4	4
1650-22-MH	22	1650	1.4	3.7	55	1.50	4.5	190	84	1.3	4	4
EMKP 2250; U_N = 2250 V; U_{RMS} = 1590 V; U_{NDC} = 4050 V; U_S = 6075 V												
2250-0.22-MH	0.22	2250	4.5	29.4	11	0.08	0.2	52	35	0.06	100	3
2250-0.33-MH	0.33	2250	3.3	25.2	13	0.13	0.4	52	40	0.1	50	3
2250-0.47-MH	0.47	2250	2.6	24.2	15	0.18	0.5	52	50	0.1	25	2
2250-0.68-MH	0.68	2250	3.9	21.4	13	0.16	0.5	72	50	0.2	25	2
2250-1.0-MH	1.0	2250	1.2	13.0	31	0.38	1.1	109	50	0.3	25	2
2250-1.5-MH	1.5	2250	1.7	11.6	28	0.36	1.1	120	50	0.3	25	2
2250-2.2-MH	2.2	2250	1.4	8.3	36	0.52	1.6	120	64	0.5	9	5
2250-3.3-MH	3.3	2250	1.9	7.8	32	0.51	1.5	140	64	0.6	9	5
2250-4.7-MH	4.7	2250	1.4	6.0	42	0.72	2.2	140	64	0.6	9	5
2250-6.8-MH	6.8	2250	1.1	5.2	50	1.04	3.1	140	84	1.0	4	5
2250-10-MH	10	2250	0.9	3.5	68	1.53	4.6	140	84	1.0	4	5
2250-15-MH	15	2250	1.5	3.6	53	1.28	3.8	190	84	1.3	4	5
EMKP 2400; U_N = 2400 V; U_{RMS} = 1700 V; U_{NDC} = 4500 V; U_S = 6750 V												
2400-0.22-MH	0.22	2400	4.1	28.8	11	0.09	0.3	52	40	0.08	100	3
2400-0.33-MH	0.33	2400	3.1	26.7	13	0.14	0.4	52	50	0.1	25	2
2400-0.47-MH	0.47	2400	4.7	23.7	12	0.12	0.4	72	50	0.2	25	2
2400-0.68-MH	0.68	2400	3.6	19.1	15	0.18	0.5	72	50	0.2	25	2
2400-1.0-MH	1.0	2400	5.3	17.2	13	0.17	0.5	72	50	0.2	25	2
2400-1.5-MH	1.5	2400	0.9	7.0	50	0.63	1.9	109	64	0.4	9	2
2400-2.2-MH	2.2	2400	1.2	7.3	41	0.58	1.7	120	64	0.5	9	2
2400-3.3-MH	3.3	2400	0.9	6.1	51	0.87	2.6	120	84	0.9	9	5
2400-4.7-MH	4.7	2400	1.3	6.2	42	0.80	2.4	140	84	1.0	9	5
2400-6.8-MH	6.8	2400	1.1	4.4	57	1.16	3.5	140	84	1.0	4	5
2400-10-MH	10	2400	1.8	4.3	44	0.97	2.9	190	84	1.3	4	5

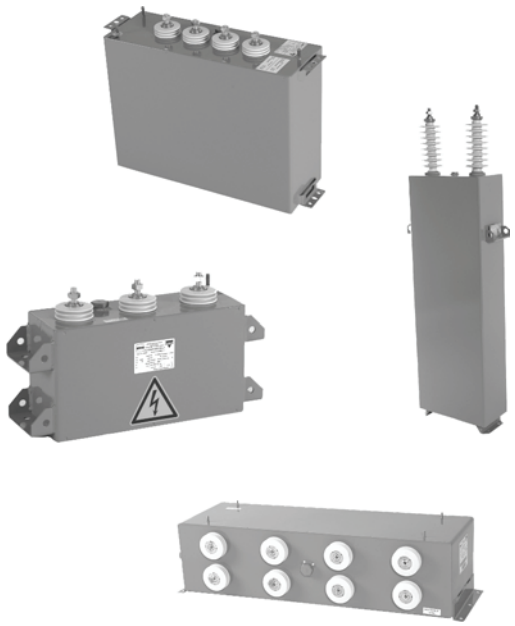
Note

- Other voltage, current, and capacitance values are available on request

Capacitors for Power Electronics - Rectangular

Contents

Capacitors for Power Electronics (PEC) - Rectangular



FEATURES

- High impulse current rating up to 600 A
- Low self inductance of < 30 nH
- High reliability and life expectancy
- Withstands heavy duty shock and vibration
- Non-polar dielectric
- Dry, resin filled

APPLICATION

- DC linking in industrial and traction drives
- DC filtering in industrial and traction drives
- DC-power storage for testing equipment
- Impulse discharge capacitors for magnetizing and welding

QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Rated DC voltage min.	750 V
Rated DC voltage max.	10.0 kV
Capacitance min.	50 µF
Capacitance max.	20 000 µF
Technology	Metallized polypropylene film
Dissipation factor (tan δ_0)	$< 2 \times 10^{-4}$
Capacitance tolerance	± 5 %
Operating temperature (hotspot)	$\theta_{min.}$ - 25 °C $\theta_{max.}$ + 80 °C
Inductance	< 100 nH
Lifetime expectancy	250 000 h at U_{NDC} and < 70 °C hotspot
Reliability	100 FIT
Test voltage	Terminal/terminal = 1.5 x U_{NDC}, 10 s; Terminal/case = 2 x U_{NDC} + 1000 V_{AC}, 60 s
Casing material	Aluminum or stanless steel, antimagnetic
Filling	Resin polyurethane R40
Standards	IEC 61071-1, IEC 61881, and EN 61071-1

TYPE DESCRIPTION												
TYPE	C_N [µF]	VOLTAGE V_{DC}	R_S [mΩ]	R_{th} [K/W]	$I_{max.}$ [A]	I_P [kA]	Î [kA]	LENGTH [mm]	WIDTH [mm]	HEIGHT [mm]	WEIGHT [kg]	DRAWING NO.
DCMKP 0.9/625 µF-MH												
DCMKP 0.9/625 µF-**MH**	625	900	0.1	0.5	500.0	75	225	340	175	510	40	07-B-1091
DCMKP 0.9/20 mF-MH												
DCMKP 0.9/20 mF-**MH**	20 000	900	0.1	0.5	500.0	75	225	340	175	510	40	07-B-1091
DCMKP 1.1/9.0 mF-MH												
DCMKP 1.1/9.0 mF-**MH**	9000	1100	0.8	0.2	100.0	19	58	280	175	480	31	07-B-1132
DCMKP 1.9/2.7 mF-MH												
DCMKP 1.9/2.7 mF-**MH**	2700	1900	0.7	0.4	190.0	10.5	31.7	340	175	330	26	07-B-1285
DCMKP 1.9/4.0 mF/A-MH												
DCMKP 1.9/4.0 mF/A-**MH**	4000	1900	0.5	0.2	300.0	15.9	47.6	340	175	505	39	07-B-1170
DCMKP 2.0/4.0 mF-MH												
DCMKP 2.0/4.0 mF-**MH**	4000	2000	0.4	0.5	230.0	16.1	48.3	455	175	368	38	07-B-1270
DCMKP 0.9/20 mF-MH												
DCMKP 0.9/20 mF-**MH**	7250	2000	0.5	0.1	240.0	29.0	87.2	340	175	820	63	07-B-1255
DCMKP 2.05/3.0 mF/B-MH												
DCMKP 2.05/3.0 mF/B-**MH**	3000	2050	0.6	0.3	320	12.5	37.4	650	175	245	36	07-B-841
DCMKP 2.2/1.4 mF-MH												
DCMKP 2.2/1.4 mF-**MH**	1400	2200	0.4	0.5	200.0	13.2	39.7	340	175	250	20	07-B-1230
DCMKP 2.8/4.0 mF/2-MH												
DCMKP 2.8/4.0 mF/2-**MH**	4000	2800	0.3	0.2	560.0	45.5	136.6	1060	175	385	93	07-B-940
DCMKP 3.6/710 µF-MH												
DCMKP 3.6/710 µF-**MH**	710	3600	0.6	0.5	240.0	11.7	35.0	455	340	175	35	07-B-1150
DCMKP 3.63/1.5 mF/2-MH												
DCMKP 3.63/1.5 mF/2-**MH**	1500	3630	0.5	0.3	420.0	20.0	28.5	800	170	315	56	07-B-1134
DCMKP 3.75/1.25 mF/T-MH												
DCMKP 3.75/1.25 mF/T-**MH**	1250	3750	0.5	0.3	250.0	20.7	62.2	680	175	345	54	07-B-1265
DCMKP 4.0/625 µF-MH												
DCMKP 4.0/625 µF-**MH**	625	4000	0.8	0.7	150.0	10.1	30.2	250	175	450	26	07-B-1311
DCMKP 4.25/2.57 mF/2-MH												
DCMKP 4.25/2.57 mF/2-**MH**	2570	4250	0.4	0.3	600.0	36.8	11.0	420	175	1140	109	07-B-1222
DCMKP 4.25/2.57 mF/4-MH												
DCMKP 4.25/2.57 mF/4-**MH**	2570	4250	0.4	0.3	600.0	36.8	11.0	420	175	1140	109	07-B-1222

Notes

- Every voltage, current, capacitance value, casing and terminal design is available on request
- All above listed types are for reference only!

ESTAdry DC Capacitors - Range

Contents

ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	9000 µF	± 10 %
Rated DC voltage	U_{NDC}	1100 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	1210 V (30 % of the working time)
1.15 x U_N	U_2	1265 V (30 min/day)
1.2 x U_N	U_3	1320 V (5 min/day)
1.3 x U_N	U_4	1430 V (1 min/day)
1.5 x U_N	U_6	1650 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	100 A_{RMS} (1)
Maximum peak current	$\hat{I}$	19 kA
Maximum surge current	$\hat{I}_S$	58 kA; 100 x per LT
Series resistance	R_S	< 0.8 mΩ
Thermal resistance	R_{th}	0.2 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	60 nH

ROUTINE TEST

Terminal/terminal	UT/T	1650 V_{DC}, 10 s
Terminal/casing	UT/C	4000 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 30 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-197

Amount	2
Flash over distance T/C	47 mm
Creepage distance	90 mm
Terminal	M12
Maximal torque	15.5 Nm
Height	77 mm

MECHANICAL DATA

Dimensions	280 mm x 175 mm x 480 mm
Drawing	07-B-1132
Weight	31 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1

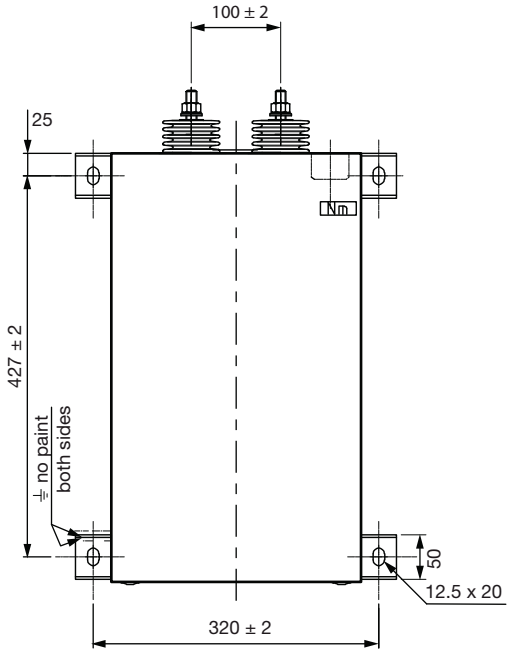
SPECIFICATION

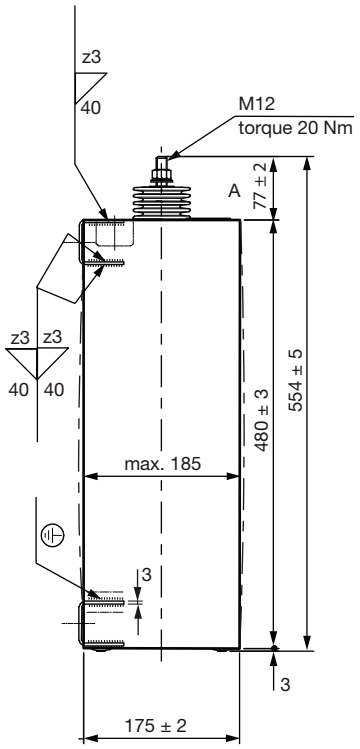
-

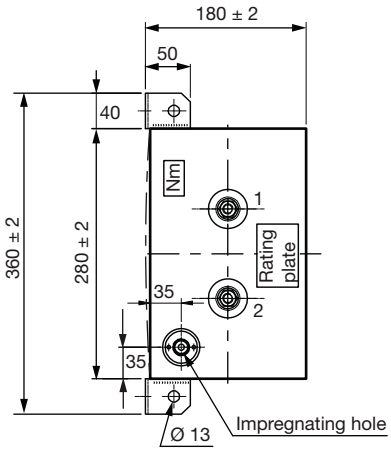
REFERENCE

5192-31708-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	4000 µF	± 5 %
Rated DC voltage	U_{NDC}	1900 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2090 V (30 % of the working time)
1.15 x U_N	U_2	2185 V (30 min/day)
1.2 x U_N	U_3	2280 V (5 min/day)
1.3 x U_N	U_4	2470 V (1 min/day)
1.5 x U_N	U_6	2850 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	300 A_{RMS} (1)
Maximum peak current	$\hat{I}$	15.9 kA
Maximum surge current	$\hat{I}_S$	47.6 kA; 100 x per LT
Series resistance	R_S	< 0.5 mΩ
Thermal resistance	R_{th}	0.2 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	60 nH

ROUTINE TEST

Terminal/terminal	UT/T	2850 V_{DC}, 10 s
Terminal/casing	UT/C	6000 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-216

Amount	4
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M12
Maximal torque	25 Nm
Height	52 mm

MECHANICAL DATA

Dimensions	340 mm x 175 mm x 505 mm
Drawing	07-B-1170
Weight	39 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 200 000 h

FAILURE RATE

< 300 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

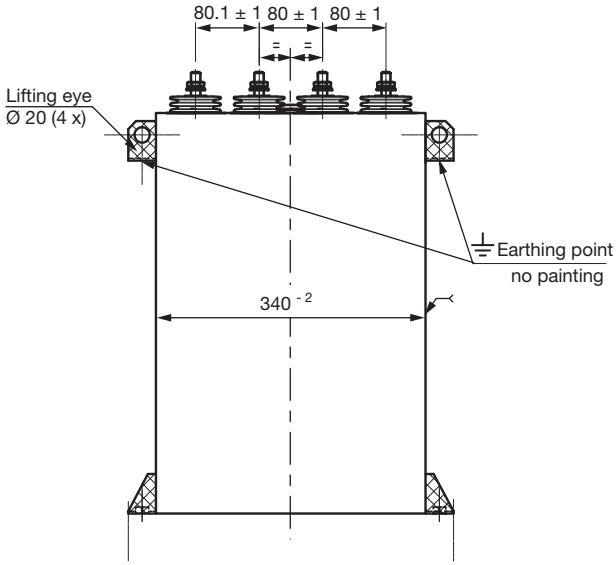
SPECIFICATION

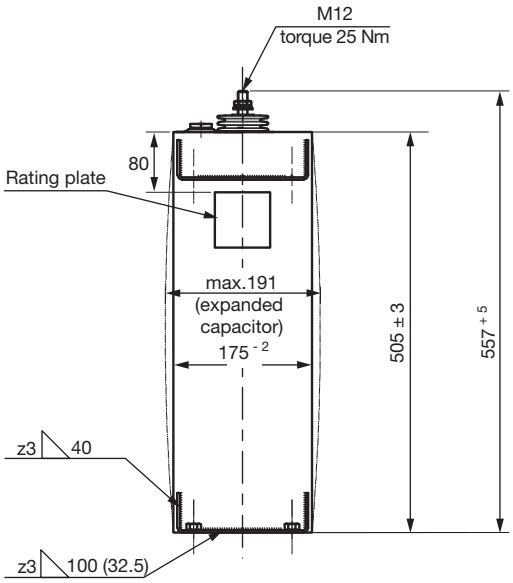
-

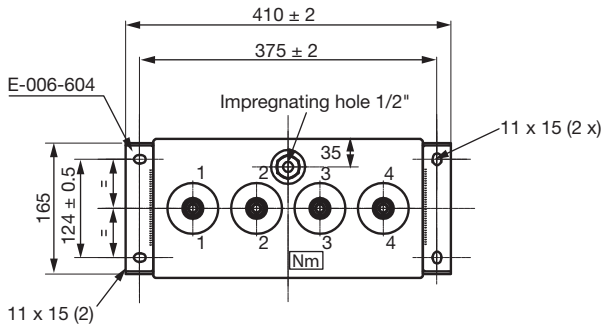
REFERENCE

5192-31952-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	7250 µF	0 %/+ 10 %
Rated DC voltage	U_{NDC}	2000 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2200 V (30 % of the working time)
1.15 x U_N	U_2	2300 V (30 min/day)
1.2 x U_N	U_3	2400 V (5 min/day)
1.3 x U_N	U_4	2600 V (1 min/day)
1.5 x U_N	U_6	3000 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	240 A_{RMS} (1)
Maximum peak current	$\hat{I}$	29.0 kA
Maximum surge current	$\hat{I}_S$	87.2 kA; 100 x per LT
Series resistance	R_S	< 0.5 mΩ
Thermal resistance	R_{th}	0.1 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 200 nH

ROUTINE TEST

Terminal/terminal	UT/T	3000 V_{DC}, 10 s
Terminal/casing	UT/C	6000 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-236

Amount	2
Flash over distance T/C	35 mm
Creepage distance	50 mm
Terminal	M12
Maximal torque	25 Nm
Height	52 mm

MECHANICAL DATA

Dimensions	340 mm x 175 mm x 820 mm
Drawing	07-B-1255
Weight	63 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 200 000 h

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

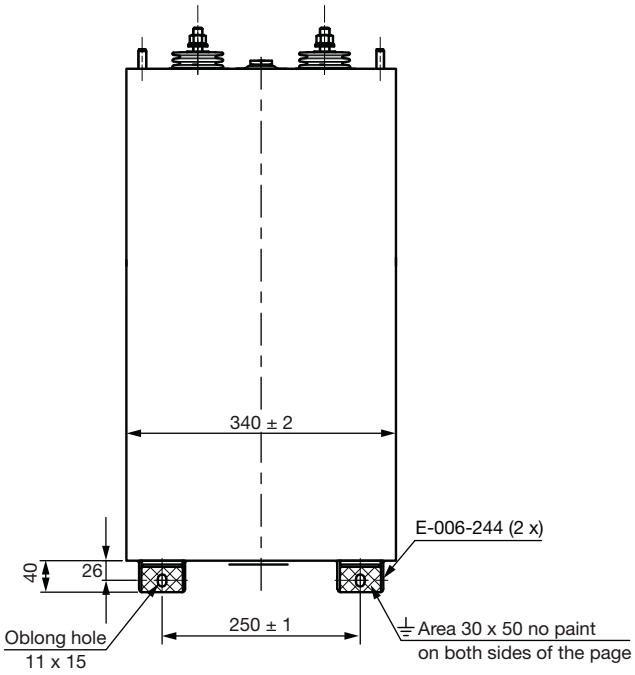
SPECIFICATION

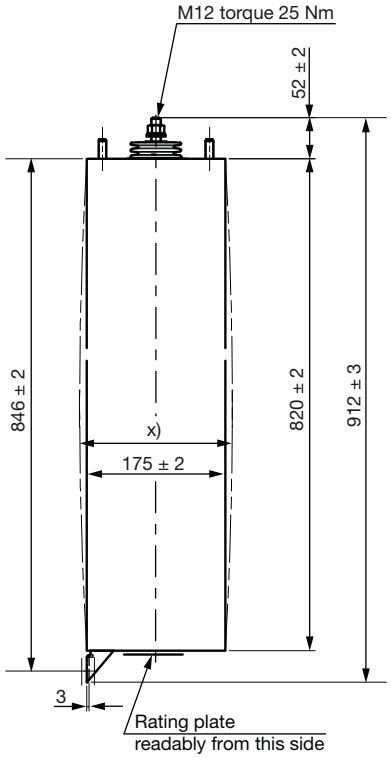
-

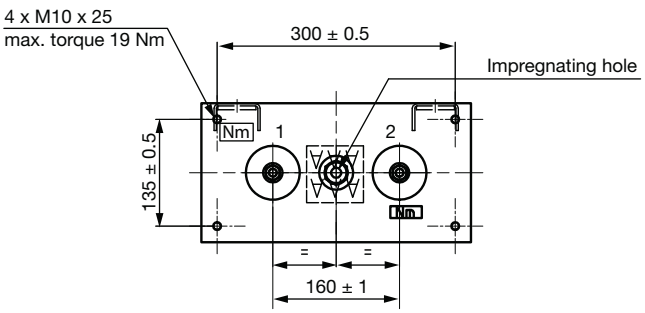
REFERENCE

5192-32814-xx-0

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	2700 µF	± 5 %
Rated DC voltage	U_{NDC}	1900 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2090 V (30 % of the working time)
1.15 x U_N	U_2	2185 V (30 min/day)
1.2 x U_N	U_3	2280 V (5 min/day)
1.3 x U_N	U_4	2470 V (1 min/day)
1.5 x U_N	U_6	2850 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	190 A_{RMS} (1)
Maximum peak current	$\hat{I}$	10.5 kA
Maximum surge current	$\hat{I}_S$	31.7 kA; 100 x per LT
Series resistance	R_S	< 0.7 mΩ
Thermal resistance	R_{th}	0.4 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	60 nH

ROUTINE TEST

Terminal/terminal	UT/T	2850 V_{DC}, 10 s
Terminal/casing	UT/C	6700 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 25 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-216

Amount	4
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M12
Maximal torque	25 Nm
Height	52 mm

MECHANICAL DATA

Dimensions	340 mm x 175 mm x 330 mm
Drawing	07-B-1285
Weight	26 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h

FAILURE RATE

100 FIT at 65 °C

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

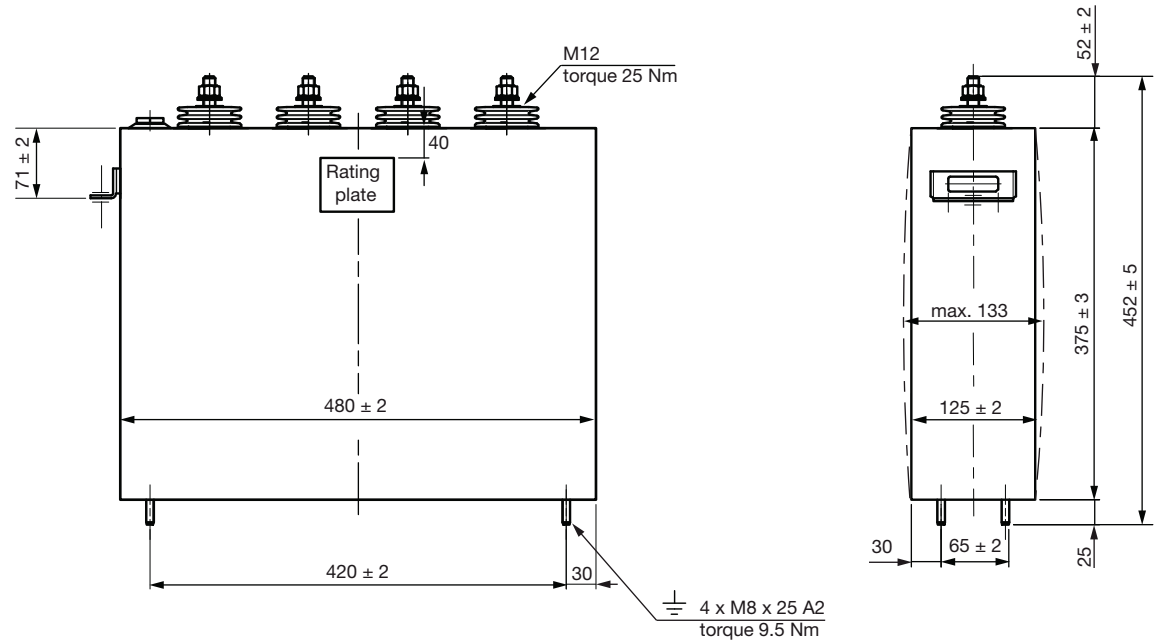
SPECIFICATION

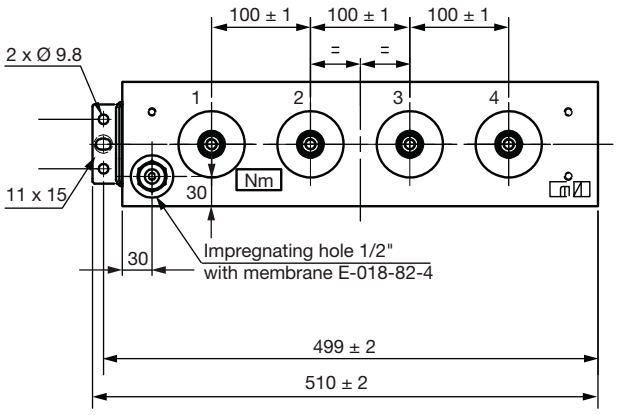
-

REFERENCE

5192-32759-xx

DIMENSIONS in millimeters





ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	4000 µF	0 %/+ 10 %
Rated DC voltage	U_{NDC}	2000 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2200 V (30 % of the working time)
1.15 x U_N	U_2	2300 V (30 min/day)
1.2 x U_N	U_3	2400 V (5 min/day)
1.3 x U_N	U_4	2600 V (1 min/day)
1.5 x U_N	U_6	3000 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	230 A_{RMS} (1)
Maximum peak current	$\hat{I}$	16.1 kA
Maximum surge current	$\hat{I}_S$	48.3 kA; 100 x per LT
Series resistance	R_S	< 0.4 mΩ
Thermal resistance	R_{th}	0.5 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 40 nH

ROUTINE TEST

Terminal/terminal	UT/T	3000 V_{DC}, 10 s
Terminal/casing	UT/C	5000 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 75 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-281

Amount	6
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M8 x 17 mm (female)
Maximal torque	15.5 Nm
Height	22 mm

MECHANICAL DATA

Dimensions	455 mm x 175 mm x 368 mm
Drawing	07-B-1270
Weight	38 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

SPECIFICATION

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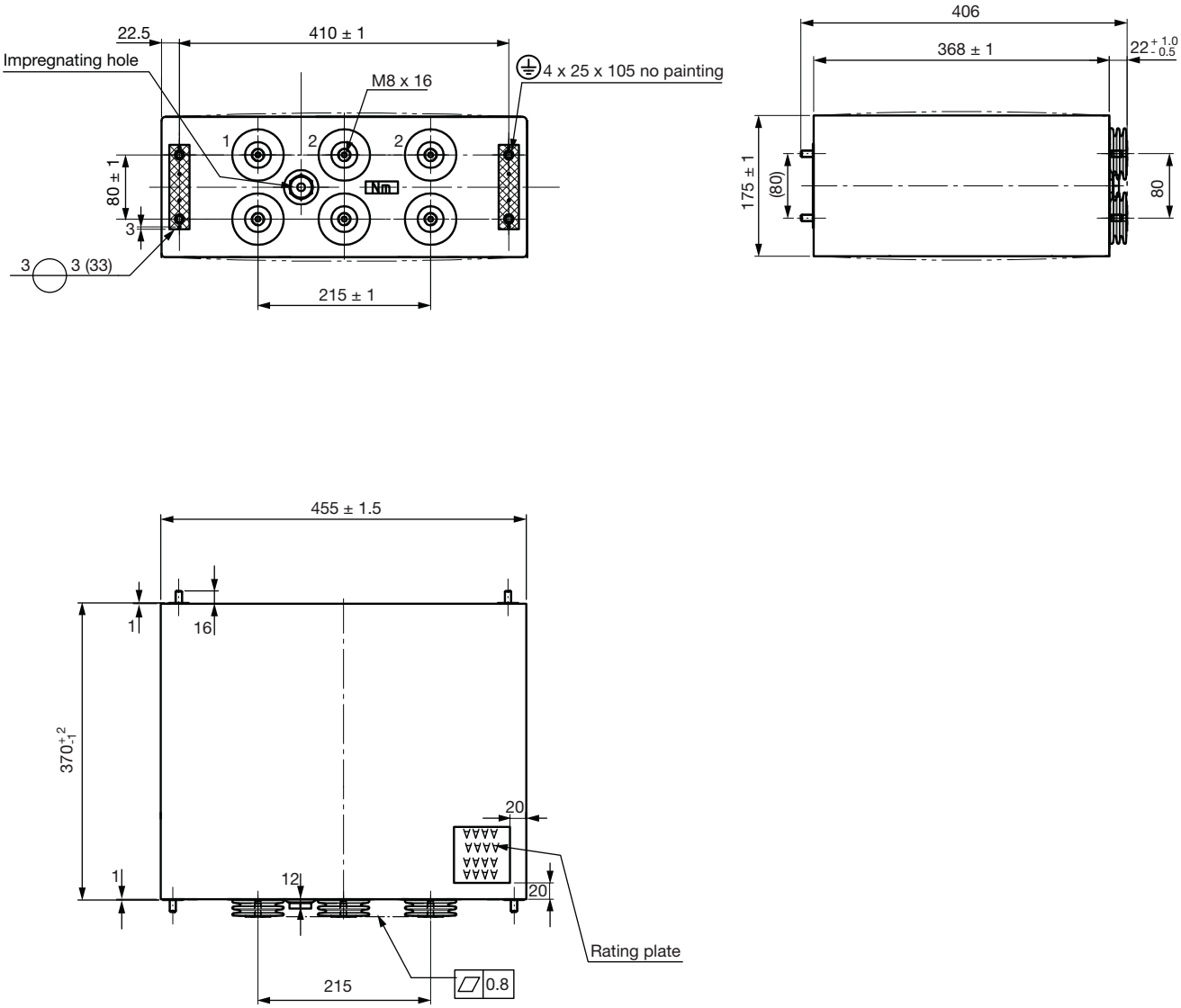
REFERENCE

5192-32512-xx

DIMENSIONS in millimeters



ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	1400 µF	0 %/+ 10 %
Rated DC voltage	U_{NDC}	2200 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2420 V (30 % of the working time)
1.15 x U_N	U_2	2530 V (30 min/day)
1.2 x U_N	U_3	2640 V (5 min/day)
1.3 x U_N	U_4	2860 V (1 min/day)
1.5 x U_N	U_6	3300 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	200 A_{RMS} (1)
Maximum peak current	$\hat{I}$	13.2 kA
Maximum surge current	$\hat{I}_S$	39.7 kA; 100 x per LT
Series resistance	R_S	< 0.4 mΩ
Thermal resistance	R_{th}	0.5 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 75 nH

ROUTINE TEST

Terminal/terminal	UT/T	3300 V_{DC}, 10 s
Terminal/casing	UT/C	7000 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 20 °C
Maximum temperature	$\theta_{max.}$	+ 75 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-208

Amount	2
Flash over distance T/C	35 mm
Creepage distance	50 mm
Terminal	M12
Maximal torque	15.5 Nm
Height	45 mm

MECHANICAL DATA

Dimensions	340 mm x 175 mm x 250 mm
Drawing	07-B-1230
Weight	20 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 176 000 h

FAILURE RATE

< 200 FIT

STANDARD

IEC 61071-2007-1

IEC 61881-2007-1

SPECIFICATION

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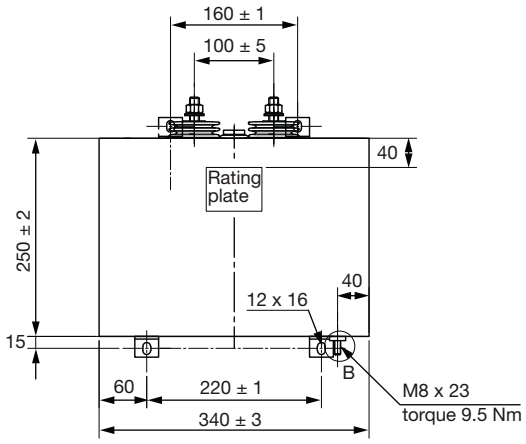
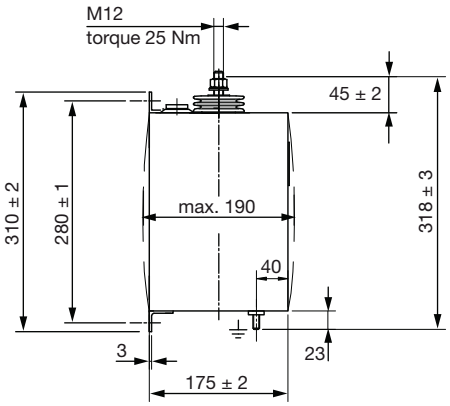
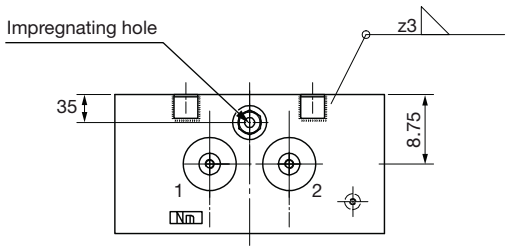
REFERENCE

5192-32488-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	3000 µF	0 %/+10 %
Rated DC voltage	U_{NDC}	2050 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	2255 V (30 % of the working time)
1.15 x U_N	U_2	2358 V (30 min/day)
1.2 x U_N	U_3	2460 V (5 min/day)
1.3 x U_N	U_4	2665 V (1 min/day)
1.5 x U_N	U_6	3075 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	320 A_{RMS} (1)
Maximum peak current	$\hat{I}$	12.5 kA
Maximum surge current	$\hat{I}_S$	37.4 kA; 100 x per LT
Series resistance	R_S	< 0.6 mΩ
Thermal resistance	R_{th}	0.3 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 40 nH

ROUTINE TEST

Terminal/terminal	UT/T	3075 V_{DC}, 10 s
Terminal/casing	UT/C	6150 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-242

Amount	8
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M8 x 17 mm (female)
Maximal torque	10 Nm
Height	22 mm

MECHANICAL DATA

Dimensions	650 mm x 175 mm x 245 mm
Drawing	07-B-841
Weight	36 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h at 65 °C

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

SPECIFICATION

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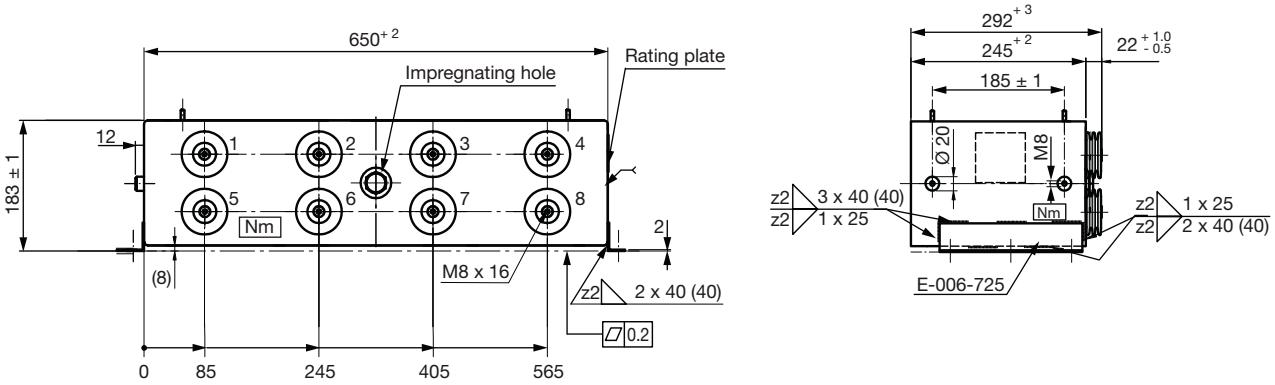
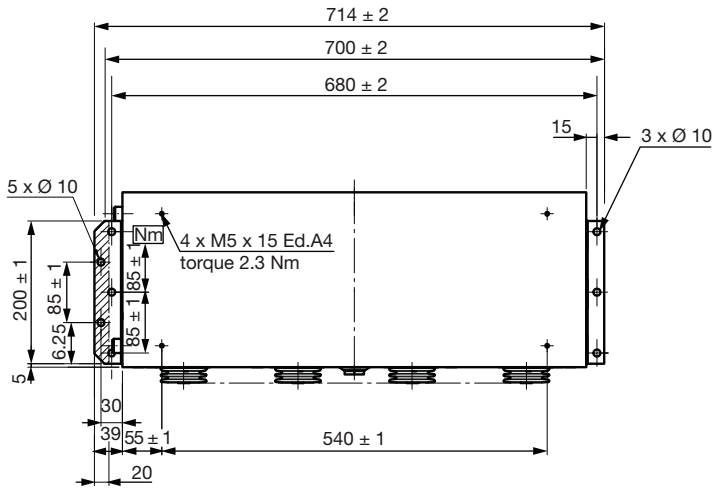
REFERENCE

5192-28538-xx

DIMENSIONS in millimeters





ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	4000 µF ± 5 % 2 x 2000 µF ± 5 %
Rated DC voltage	U_{NDC}	2800 V

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	3080 V (30 % of the working time)
1.15 x U_N	U_2	3220 V (30 min/day)
1.2 x U_N	U_3	3360 V (5 min/day)
1.3 x U_N	U_4	3640 V (1 min/day)
1.5 x U_N	U_6	4200 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	560 A_{RMS} (1)
Maximum peak current	$\hat{I}$	45.5 kA
Maximum surge current	$\hat{I}_S$	136.6 kA; 100 x per LT
Series resistance	R_S	< 0.3 mΩ
Thermal resistance	R_{th}	0.3 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 50 nH

ROUTINE TEST

Terminal/terminal	UT/T	4200 V_{DC}, 10 s
Terminal/casing	UT/C	9800 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 25 °C
Maximum temperature	$\theta_{max.}$	+ 50 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-242

Amount	6
Flash over distance T/C	47 mm
Creepage distance	90 mm
Terminal	M12
Maximal torque	15.5 Nm
Height	96 mm

MECHANICAL DATA

Dimensions	1060 mm x 175 mm x 385 mm
Drawing	07-B-940
Weight	36 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 100 000 h at 55 °C

FAILURE RATE

< 200 FIT

STANDARD

IEC 61071-2007-1

IEC 61881-2007-1

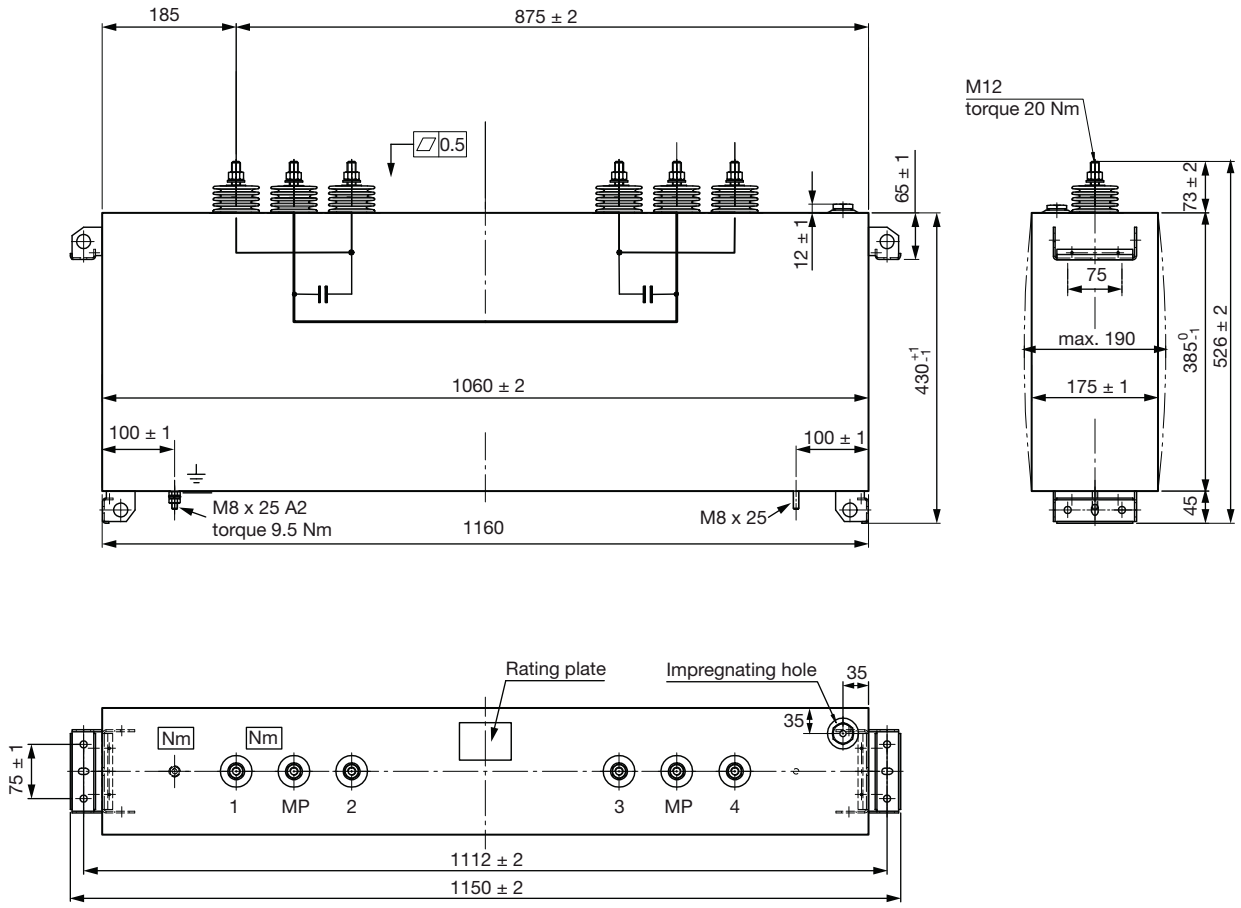
SPECIFICATION

-

REFERENCE

5192-31716-xx

DIMENSIONS in millimeters



ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	710 µF	0 %/+ 5 %
Rated DC voltage	U_{NDC}	3600 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	3960 V (30 % of the working time)
1.15 x U_N	U_2	4140 V (30 min/day)
1.2 x U_N	U_3	4320 V (5 min/day)
1.3 x U_N	U_4	4680 V (1 min/day)
1.5 x U_N	U_6	5400 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	240 A_{RMS} (1)
Maximum peak current	$\hat{I}$	11.7 kA
Maximum surge current	$\hat{I}_S$	35.0 kA; 100 x per LT
Series resistance	R_S	< 0.6 mΩ
Thermal resistance	R_{th}	0.5 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 57 nH

ROUTINE TEST

Terminal/terminal	UT/T	5400 V_{DC}, 10 s
Terminal/casing	UT/C	10 000 V_{AC}, 10 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-283

Amount	4
Flash over distance T/C	35 mm
Creepage distance	50 mm
Terminal	M12
Maximal torque	15.5 Nm
Height	45 mm

MECHANICAL DATA

Dimensions	455 mm x 340 mm x 175 mm
Drawing	07-B-1150
Weight	35 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h at 65 °C

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

SPECIFICATION

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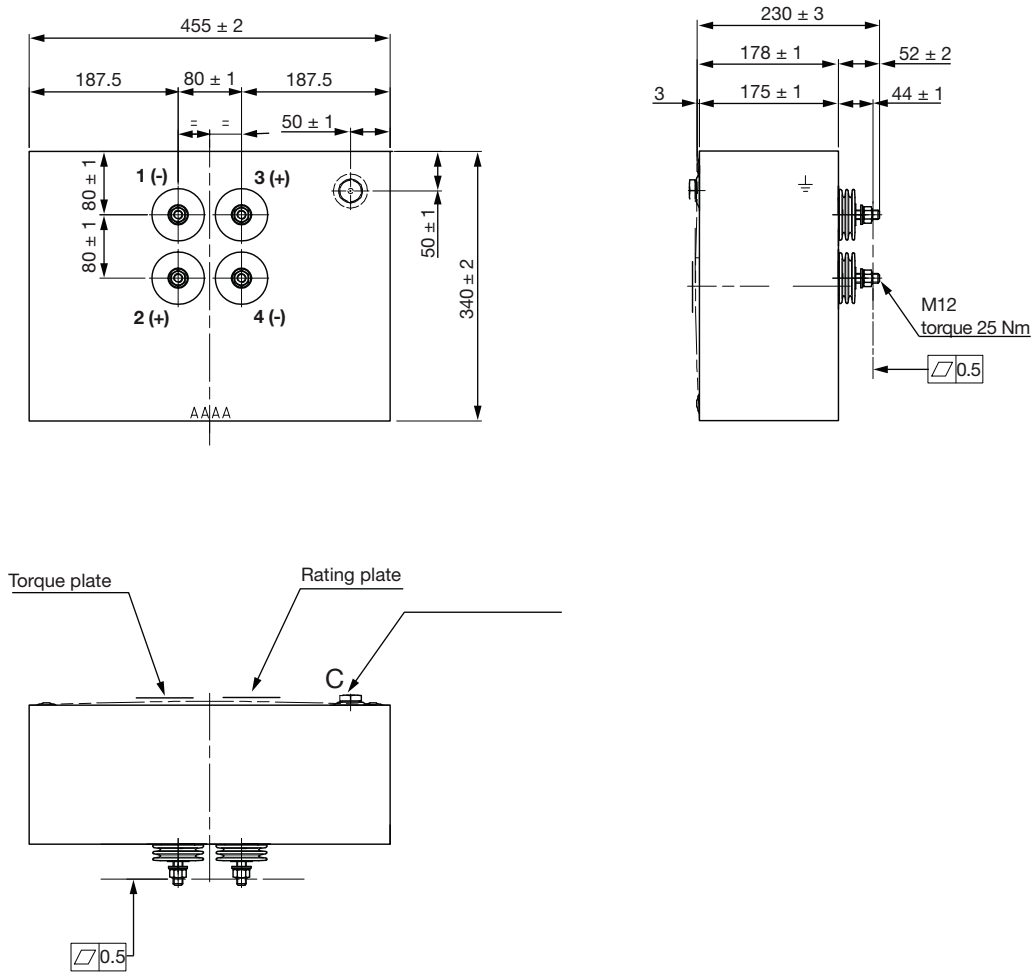
REFERENCE

5192-31856-xx

DIMENSIONS in millimeters



ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	1500 µF	± 3 %
Rated DC voltage	U_{NDC}	3630 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	3993 V (30 % of the working time)
1.15 x U_N	U_2	4175 V (30 min/day)
1.2 x U_N	U_3	4356 V (5 min/day)
1.3 x U_N	U_4	4719 V (1 min/day)
1.5 x U_N	U_6	5445 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	420 A_{RMS} (1)
Maximum peak current	$\hat{I}$	20 kA
Maximum surge current	$\hat{I}_S$	285 kA; 100 x per LT
Series resistance	R_S	< 0.5 mΩ
Thermal resistance	R_{th}	0.3 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 30 nH

ROUTINE TEST

Terminal/terminal	UT/T	5455 V_{DC}, 10 s
Terminal/casing	UT/C	14 500 V_{AC}, 10 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	0 °C
Maximum temperature	$\theta_{max.}$	+ 65 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-283

Amount	8
Flash over distance T/C	51 mm
Creepage distance	96 mm
Terminal	M16
Maximal torque	25 Nm
Height	83 mm

MECHANICAL DATA

Dimensions	800 mm x 170 mm x 315 mm
Drawing	07-B-1134
Weight	56 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 200 000 h at 65 °C

FAILURE RATE

< 200 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

SPECIFICATION

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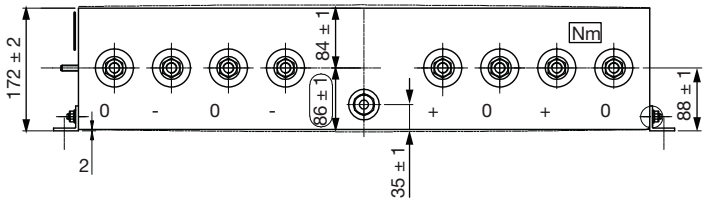
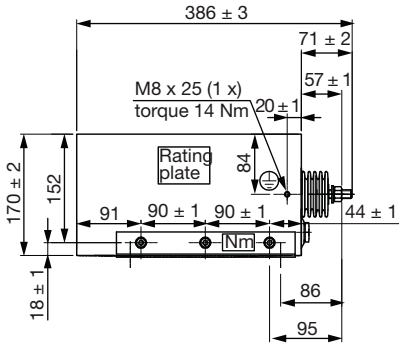
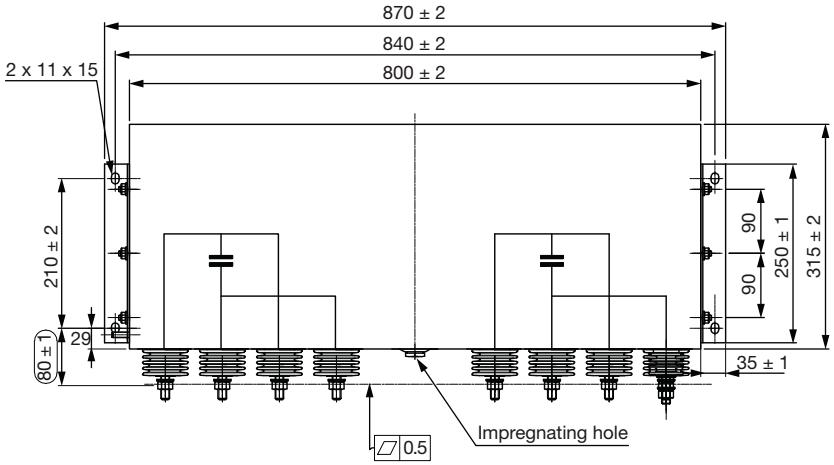
REFERENCE

5192-31664-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	1250 µF	0 %/+ 10 %
Rated DC voltage	U_{NDC}	3750 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	4125 V (30 % of the working time)
1.15 x U_N	U_2	4313 V (30 min/day)
1.2 x U_N	U_3	4500 V (5 min/day)
1.3 x U_N	U_4	4875 V (1 min/day)
1.5 x U_N	U_6	5625 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	250 A_{RMS} (1)
Maximum peak current	$\hat{I}$	20.7 kA
Maximum surge current	$\hat{I}_S$	62.2 kA; 100 x per LT
Series resistance	R_S	< 0.5 mΩ
Thermal resistance	R_{th}	0.3 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 30 nH

ROUTINE TEST

Terminal/terminal	UT/T	5600 V_{DC}, 10 s
Terminal/casing	UT/C	8400 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 30 °C
Maximum temperature	$\theta_{max.}$	+ 75 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature:**

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-321

Amount	8
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M8 x 17 mm (female)
Maximal torque	16 Nm
Height	32 mm

MECHANICAL DATA

Dimensions	680 mm x 175 mm x 345 mm
Drawing	07-B-1265
Weight	54 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h at 65 °C

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

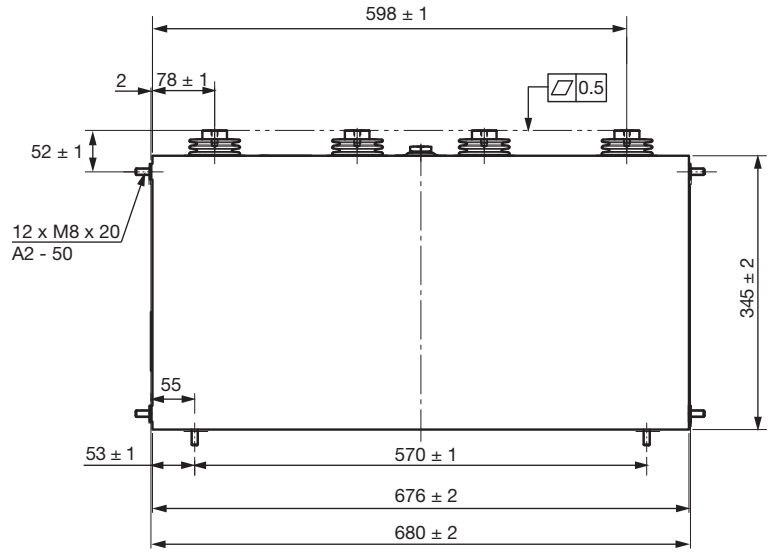
SPECIFICATION

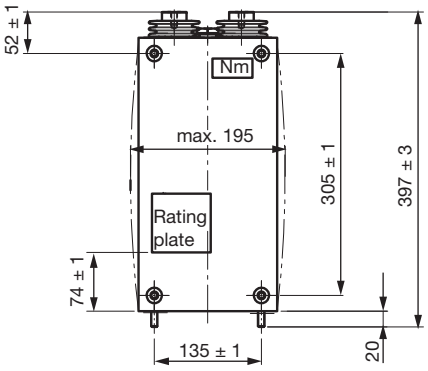
-

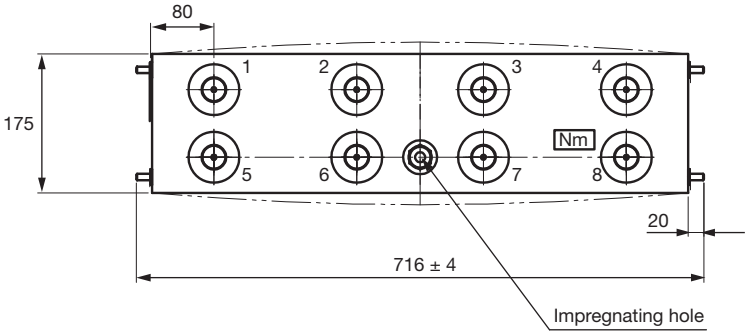
REFERENCE

5192-32715-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	625 µF	± 5 %
Rated DC voltage	U_{NDC}	4000 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	4400 V (30 % of the working time)
1.15 x U_N	U_2	4600 V (30 min/day)
1.2 x U_N	U_3	4800 V (5 min/day)
1.3 x U_N	U_4	5200 V (1 min/day)
1.5 x U_N	U_6	6000 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	150 A_{RMS} (1)
Maximum peak current	$\hat{I}$	10.1 kA
Maximum surge current	$\hat{I}_S$	30.2 kA; 100 x per LT
Series resistance	R_S	< 0.8 mΩ
Thermal resistance	R_{th}	0.7 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 60 nH

ROUTINE TEST

Terminal/terminal	UT/T	6000 V_{DC}, 10 s
Terminal/casing	UT/C	9500 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-283

Amount	2
Flash over distance T/C	37 mm
Creepage distance	56 mm
Terminal	M12
Maximal torque	15 Nm
Height	62 mm

MECHANICAL DATA

Dimensions	250 mm x 175 mm x 450 mm
Drawing	07-B-1311
Weight	26 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 150 000 h at 55 °C

FAILURE RATE

< 100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

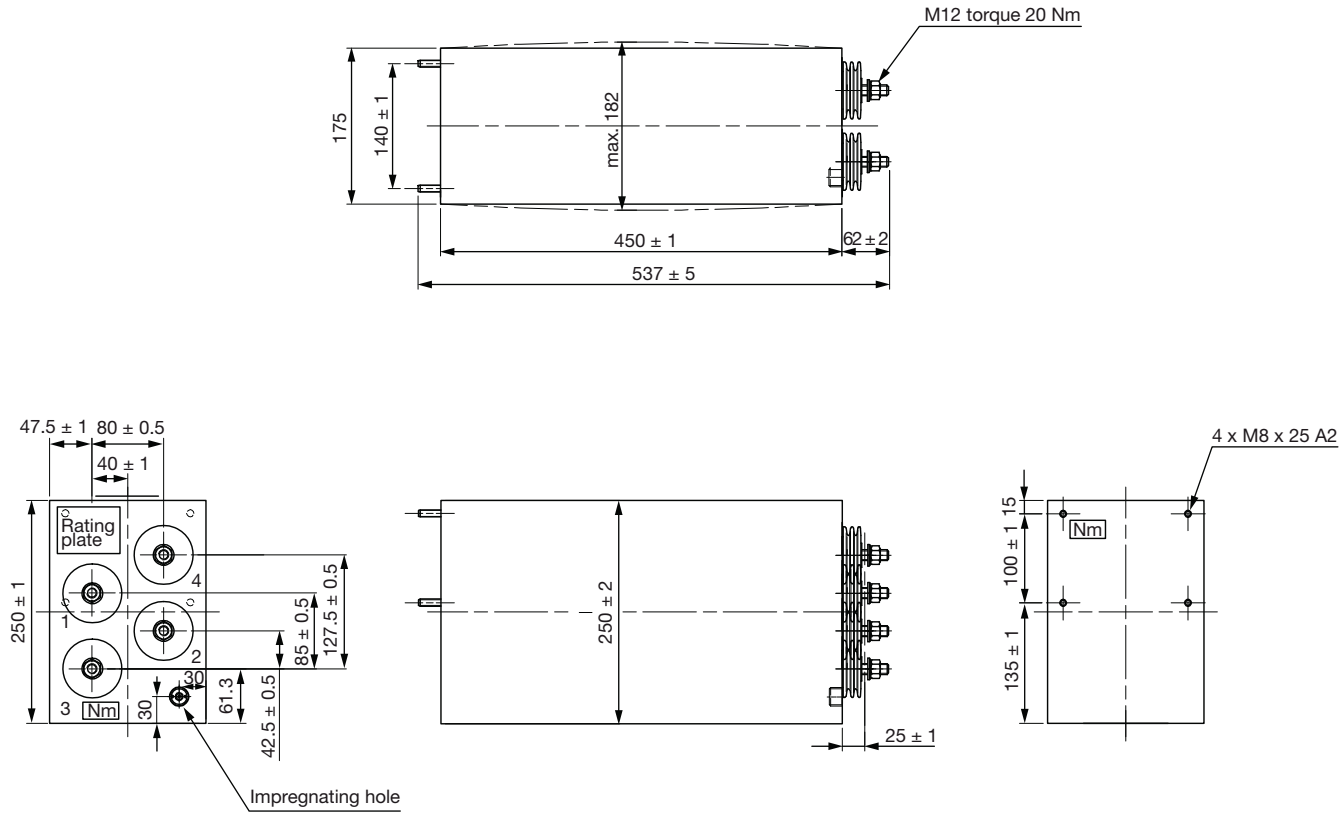
SPECIFICATION

-

REFERENCE

5192-33524-xx

DIMENSIONS in millimeters



ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	2567 µF	- 2 %/+ 5 %
Rated DC voltage	U_{NDC}	4250 V	

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	4675 V (30 % of the working time)
1.15 x U_N	U_2	4888 V (30 min/day)
1.2 x U_N	U_3	5100 V (5 min/day)
1.3 x U_N	U_4	5525 V (1 min/day)
1.5 x U_N	U_6	6375 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	600 A_{RMS} (1)
Maximum peak current	$\hat{I}$	36.8 kA
Maximum surge current	$\hat{I}_S$	110.3 kA; 100 x per LT
Series resistance	R_S	< 0.4 mΩ
Thermal resistance	R_{th}	0.3 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 200 nH

ROUTINE TEST

Terminal/terminal	UT/T	6380 V_{DC}, 10 s
Terminal/casing	UT/C	11 900 V_{AC}, 10 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 75 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-197

Amount	8
Flash over distance T/C	47 mm
Creepage distance	90 mm
Terminal	M12
Maximal torque	15.5 Nm
Height	77 mm

MECHANICAL DATA

Dimensions	420 mm x 175 mm x 1140 mm
Drawing	07-B-1222
Weight	109 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 180 000 h

FAILURE RATE

100 FIT

STANDARD

IEC 61071-2007-1
IEC 61881-2007-1

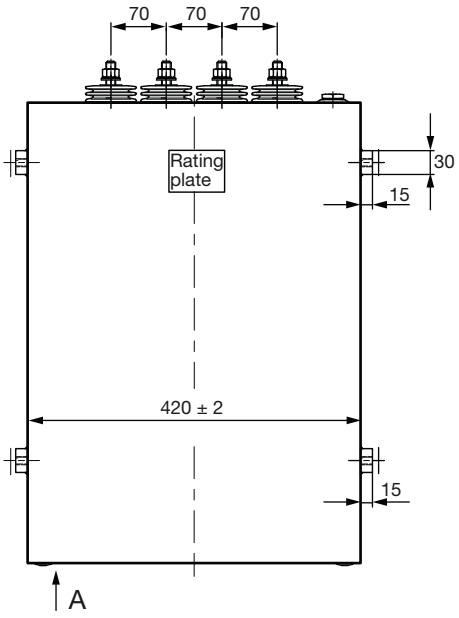
SPECIFICATION

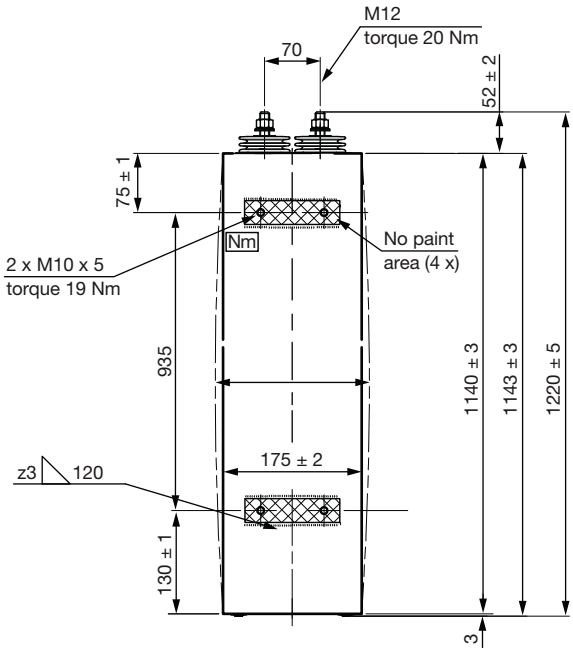
-

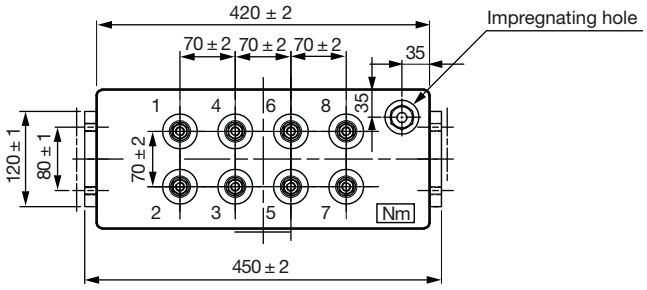
REFERENCE

5192-32519-xx

DIMENSIONS in millimeters







ESTAdry DC Capacitor

NOMINAL RATINGS

Capacitance/tolerance	C_N	20 000 µF ± 5 %
Rated DC voltage	U_{NDC}	900 V

OVER VOLTAGES ACCORDING TO STANDARD

1.1 x U_N	U_1	990 V (30 % of the working time)
1.15 x U_N	U_2	1035 V (30 min/day)
1.2 x U_N	U_3	1080 V (5 min/day)
1.3 x U_N	U_4	1170 V (1 min/day)
1.5 x U_N	U_6	1350 V (30 ms; max. 1000 x per LT)

CHARACTERISTICS

Maximum current	$I_{max.}$	500 A_{RMS} (1)
Maximum peak current	$\hat{I}$	75 kA
Maximum surge current	$\hat{I}_S$	224 kA; 100 x per LT
Series resistance	R_S	< 0.1 mΩ
Thermal resistance	R_{th}	0.5 K/W (hotspot-ambient)
Tangent of the loss angle	tan δ_0	2 x 10^{-4}
Self inductance	L_S	< 30 nH (f = 1 MHz)

ROUTINE TEST

Terminal/terminal	UT/T	1350 V_{DC}, 10 s
Terminal/casing	UT/C	3800 V_{AC}, 60 s

OPERATING TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 40 °C
Maximum temperature	$\theta_{max.}$	+ 70 °C
Maximum hotspot temp.	θ_{hs}	+ 85 °C (1)

STORAGE TEMPERATURE

Minimum temperature	$\theta_{min.}$	- 45 °C
Maximum temperature	$\theta_{max.}$	+ 85 °C

Note

(1) **Calculation of hospot temperature**:

$P_D = U_{RMS}^2 \times 2\pi f \times C_N \times \tan \delta_0 + I^2 \times R_S$

$\theta_{hs} = \theta_{amb} + R_{th} \times P_D$

TECHNOLOGY

Dielectric	Polypropylene; metallized selfhealing
Filling material	N_2; resin; dry

BUSHINGS D-283

Amount	4
Flash over distance T/C	38 mm
Creepage distance	61 mm
Terminal	M16
Maximal torque	25 Nm
Height	52 mm

MECHANICAL DATA

Dimensions	340 mm x 175 mm x 510 mm
Drawing	07-B-1091
Weight	40 kg
Casing material	Stainless steel, antimagnetic
Painting	RAL 7033
Mounting position	Every position

LIFE EXPECTANCY

> 176 000 h

FAILURE RATE

< 200 FIT

STANDARD

IEC 61071-2007-1

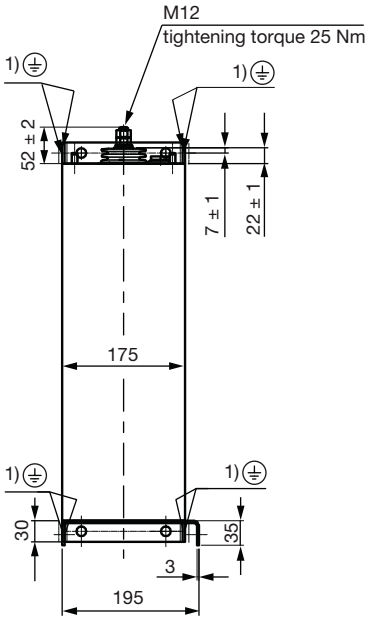
SPECIFICATION

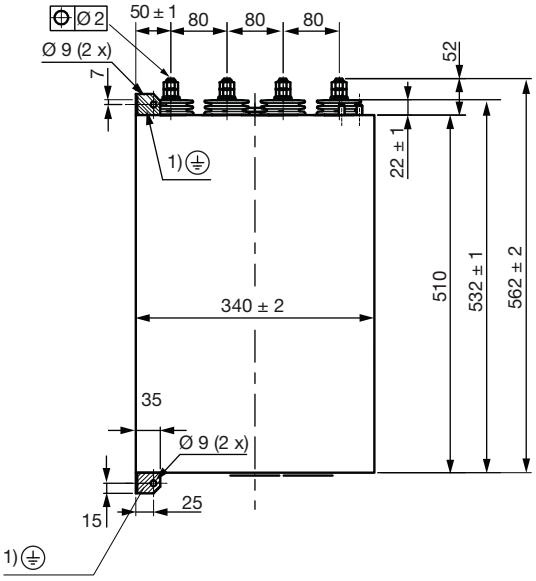
-

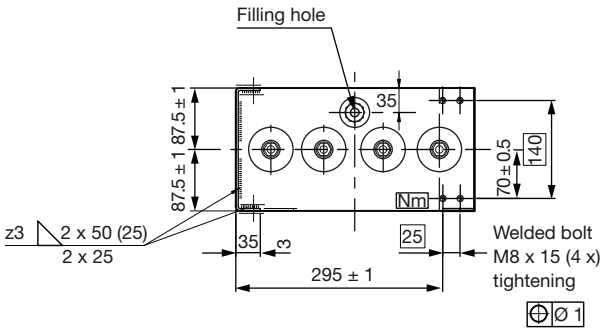
REFERENCE

5192-33576-xx

DIMENSIONS in millimeters



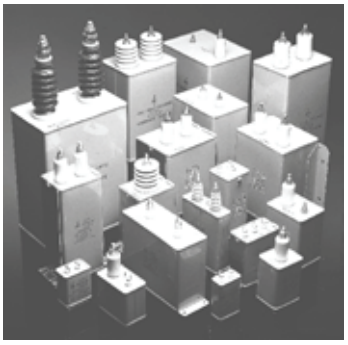




DC Filter Capacitors

Contents

DC Filter Capacitors



TYPE ER

Capacitors offer unusually good electrical characteristics, coupled with very small size. The ER range of capacitors are manufactured using a mixed dielectric material that consists of polyester/polypropylene. The container is a rolled seamed tinplate case that is hermetically sealed. The construction is designed to prevent internal movement when subjected to shock and vibration.

Note

- The impregnant used is a non toxic highly refined, purified and inhibited mineral oil.

APPLICATIONS

The ER range of capacitors are specifically designed for DC applications.

- Audio coupling
- Pulse forming networks
- Oscillator circuits
- Arc and spark suppression
- RF by-pass
- Tuned filters
- Energy storage
- Integrating circuits
- Low and high pass filters
- High voltage smoothing

Capacitors required for AC applications and high discharge rates can also be designed from the ER range.

Consult Vishay Electronic GmbH, Division Roederstein ESTA and Hybrids for your specific requirements.

TEMPERATURE RANGE

Temperature range is - 55 °C to + 85 °C. The nominal voltage rating is applicable from - 55 °C to + 85 °C.

Derating is required for higher operating temperatures.

TEMPERATURE COEFFICIENT

Capacitance will increase by 2 % per 100 °C temperature change.

RIPPLE

The sum of the peak ripple voltage and the DC voltage should not exceed the rated voltage. Refer to graph fig. 1 for permissible peak-to-peak ripple voltage as a percentage of rated voltage for various frequencies.

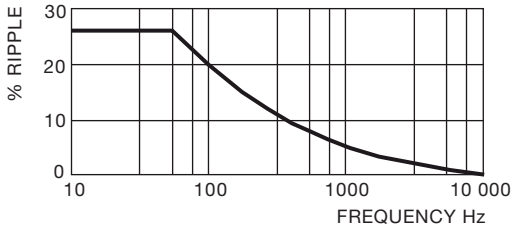


Fig. 1

POWER FACTOR

The power factor is variable, and a function of temperature and frequency. See fig 2. Nominal value < 0.5 % at 20 °C.

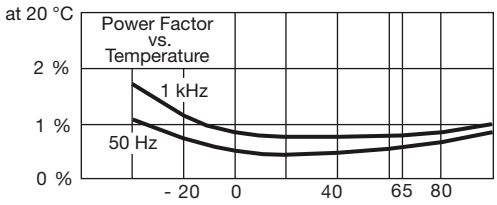


Fig. 2

DIELECTRIC RESISTANCE

(Parallel resistance) is indicated by the graph of insulance (MΩ x µF) vs temperature fig 3. The insulance (MΩ x µF) is nominally 10 000 s at + 20 °C. (Measurements taken after 1 minute with an applied voltage of 500 V).

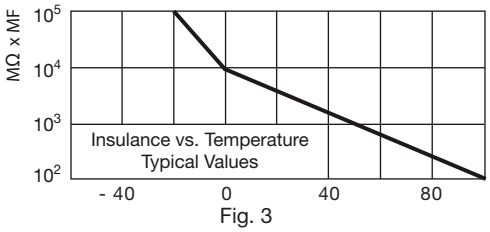


Fig. 3

LIFE EXPECTANCY

ER type capacitors are designed for a life exceptancy of 50 000 h at 65 °C. To achieve the same life expectancy at 85 °C derate to 60 % of rated voltage fig 4.

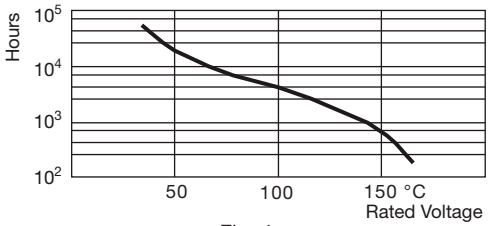


Fig. 4

CAPACITANCE RANGE

0.01 µF to 100 µF. The tolerance is ± 10 %. Other tolerances are available on request. Nominal values measured at 1 kHz.

VOLTAGE RANGE

1000 V_{DC} to 40 000 V_{DC} other values on request.

TEST VOLTAGE

Terminal/terminal (Vt/t)

For DC rating < 20 kV

Vt/t = 2.0 x rated voltage 60 s

For DC rating > 20 kV

Vt/t = 1.5 x rated voltage 60 s

WEIGHT

The approximate weight in kg of capacitors in the ER range can be estimated by multiplying the volume of the capacitor container by 1.45 (1) x 10^{-6}.

TERMINATIONS

Add suffix W to part No. To indicate wire terminations.

CAPACITANCE

Capacitance tolerance of 20 % is standard with those marked (1).

FLASHOVER

Up to 5000 V rating, the capacitor terminals will withstand 125 % of the rated voltage without flashover at a pressure of 85 mm Hg., equivalent to 50 000 feet altitude. Above 5000 V rating, the capacitor terminals will withstand 125 % of the rated voltage at a pressure of 500 mg Hg, equivalent to 10 000 feet altitude.

LIFE TESTS

Conducted at 85 °C for 500 h. The voltage applied will be 140 % of the rated voltage.

DIMENSIONS in millimeters

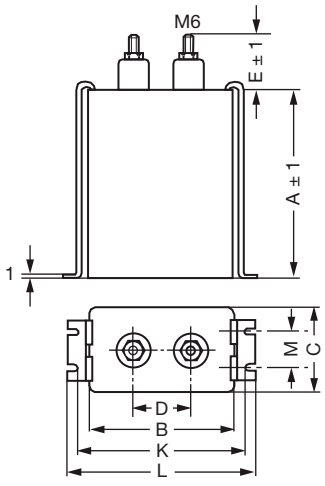


Fig. 5

TYPE DESCRIPTION						
PART NUMBER	CAP. [µF]	A	B	C	D	E
1000 V_{DC} WKG						
ER10-104-MH	0.1	50	48	28	20	20
ER10-504-MH	0.5	50	48	28	20	20
ER10-105-MH	1.0	75	48	28	20	20
ER10-405-MH	4.0	75	60	54	25	35
ER10-605-MH	6.0	95	60	54	25	35
ER10-106-MH	10.0	115	80	48	40	35
ER10-256-MH	25.0	155	85	67	40	35
ER10-506-MH	50.0	155	130	100	50	35
1500 V_{DC} WKG						
ER15-104-MH	0.1	60	48	28	20	20
ER15-504-MH	0.5	60	48	28	20	20
ER15-205-MH	2.0	75	54	48	22	35
ER15-405-MH	4.0	115	54	48	22	35
ER15-805-MH	8.0	95	85	67	40	35
ER15-106-MH	10.0	115	85	67	40	35
ER15-126-MH	12.0	135	85	67	40	35
ER15-256-MH	25.0	115	130	100	50	35
ER15-506-MH	50.0	180	130	100	50	35
2000 V_{DC} WKG						
ER20-104-MH	0.1	60	48	28	20	20
ER20-254-MH	0.25	60	48	28	20	20
ER20-504-MH	0.5	60	48	28	20	20
ER20-105-MH	1.0	95	48	28	20	20
ER20-205-MH	2.0	75	54	48	22	35
ER20-405-MH	4.0	115	54	48	22	35
ER20-605-MH	6.0	135	60	54	25	35
ER20-106-MH	10.0	115	85	67	40	35
ER20-126-MH	12.0	135	85	67	40	35
ER20-206-MH	20.0	115	130	100	50	35
3000 V_{DC} WKG						
ER30-104-MH	0.1	60	48	28	20	20
ER30-504-MH	0.5	75	48	28	20	20
ER30-105-MH	1.0	115	48	28	20	20
ER30-105X-MH	1.0	75	54	48	22	35
ER30-205-MH	2.0	115	54	48	22	35
ER30-405-MH	4.0	155	60	54	25	35
ER30-605-MH	6.0	180	80	48	40	35
ER30-805-MH	8.0	155	85	67	40	35
ER30-106-MH	10.0	95	130	100	50	35
ER30-206-MH	20.0	155	130	100	50	35
ER30-256-MH	25.0	180	130	100	50	35
ER30-104-MH	0.1	60	48	28	20	20
4000 V_{DC} WKG						
ER40-104-MH	0.1	60	48	28	20	20
ER40-254-MH	0.25	75	48	28	20	20
ER40-504-MH	0.5	95	48	28	20	20
ER40-105-MH	1.0	95	54	48	22	35
ER40-205-MH	2.0	135	54	48	22	35
ER40-405-MH	4.0	115	85	67	40	35
ER40-805-MH	8.0	115	130	100	50	35
ER40-106-MH	10.0	135	130	100	50	35
ER40-206-MH	20.0	230	130	100	50	35
ER40-306-MH	30.0	320	130	100	50	35

TYPE DESCRIPTION						
PART NUMBER	CAP. [µF]	A	B	C	D	E
5000 V_{DC} WKG						
ER50-104-MH	0.1	60	48	28	20	20
ER50-254-MH	0.25	75	48	28	20	20
ER50-105-MH	1.0	115	54	48	22	35
ER50-405-MH	4.0	155	85	67	40	35
ER50-805-MH	8.0	135	130	100	50	35
ER50-106-MH	10.0	155	130	100	50	35
ER50-206-MH	20.0	290	130	100	50	35
ER50-506-MH	50.0	295	180	180	75	35
6000 V_{DC} WKG						
ER60-104-MH	0.1	65	54	48	(1)	35
ER60-254-MH	0.25	80	54	48	(1)	35
ER60-504-MH	0.5	100	80	48	40	35
ER60-105-MH	1.0	100	85	67	40	35
ER60-205-MH	2.0	100	130	100	50	35
ER60-405-MH	4.0	135	130	100	50	35
ER60-605-MH	6.0	180	130	100	50	35
ER60-805-MH	8.0	250	130	100	50	35
ER60-106-MH	10.0	290	130	100	50	35
ER60-126-MH	12.0	345	130	100	50	35
ER60-206-MH	20.0	180	220	164	125	60
8000 V_{DC} WKG						
ER80-503-MH	0.05	58	60	54	(1)	60
ER80-104-MH	0.1	65	60	54	(1)	60
ER80-254-MH	0.25	85	60	54	(1)	60
ER80-504-MH	0.5	140	60	54	(1)	60
ER80-105-MH	1.0	120	85	67	40	60
ER80-205-MH	2.0	120	130	100	50	60
ER80-405-MH	4.0	200	130	100	50	60
ER80-605-MH	6.0	270	130	100	50	60
ER80-805-MH	8.0	345	130	100	50	60
ER80-156-MH	15.0	280	180	180	75	60
10 000 V_{DC} WKG						
ER100-503-MH	0.05	58	80	48	40	60
ER100-104-MH	0.1	65	80	48	54	60
ER100-504-MH	0.5	140	80	48	40	60
ER100-105-MH	1.0	160	85	67	40	60
ER100-205-MH	2.0	140	130	100	50	60
ER100-405-MH	4.0	260	130	100	50	60
ER100-605-MH	6.0	350	130	100	50	60
ER100-805-MH	8.0	300	190	120	75	60
ER100-156-MH	15.0	350	180	180	75	60

TYPE DESCRIPTION						
PART NUMBER	CAP. [µF]	A	B	C	D	E
12 000 V_{DC} WKG						
ER120-503-MH	0.05	75	85	67	40	60
ER120-104-MH	0.10	100	85	67	40	60
ER120-254-MH	0.25	105	85	67	40	60
ER120-105-MH	1.0	145	130	100	75	60
ER120-205-MH	2.0	240	130	100	75	60
ER120-405-MH	4.0	280	190	120	75	60
15 000 V_{DC} WKG						
ER150-103-MH	0.01	60	60	54	(1)	60
ER150-203-MH	0.02	60	60	54	(1)	60
ER150-503-MH	0.05	85	60	54	(1)	60
ER150-104-MH	0.10	105	80	48	(1)	60
ER150-254-MH	0.25	125	85	67	40	60
ER150-504-MH	0.50	190	85	67	40	60
ER150-504X-MH	0.50	105	130	100	75	60
ER150-105-MH	1.0	160	130	100	75	60
ER150-205-MH	2.0	190	159	120	75	60
20 000 V_{DC} WKG						
ER200-103-MH	0.01	70	80	48	(1)	60
ER200-503X-MH	0.05	85	85	67	40	60
ER200-104-MH	0.1	105	85	67	40	60
ER200-254-MH	0.25	190	85	67	40	60
ER200-504-MH	0.5	160	130	100	75	60
ER200-105-MH	1.0	300	130	100	75	60
ER200-205-MH	2.0	250	180	180	90	100
ER200-405-MH	4.0	305	240	180	100	100
25 000 V_{DC} WKG						
ER250-503-MH	0.05	110	85	67	(1)	70
ER250-104X-MH	0.1	95	130	100	65	70
ER250-254-MH	0.25	130	130	100	65	70
ER250-504-MH	0.5	250	130	100	65	70
30 000 V_{DC} WKG						
ER300-303-MH	0.03	120	85	67	(1)	70
ER300-104-MH	0.1	200	85	67	(1)	70
ER300-104X-MH	0.1	120	130	100	65	70
ER300-504-MH	0.5	315	130	100	65	70
ER300-105-MH	1.0	295	180	180	75	100
40 000 V_{DC} WKG						
ER400-303-MH	0.03	160	85	67	(1)	70
ER400-503-MH	0.05	210	85	67	(1)	70
ER400-503X-MH	0.05	125	130	100	65	70

Note

(1) These capacitors are fitted with one high voltage terminal and case terminal. An additional terminal for connection to case is available as an optional extra. Add suffix M to part number.

DC Filter Capacitors

TYPE ET

These capacitors are manufactured using a mixed dielectric material that consists of polyester/polypropylene film and capacitor tissue. They are impregnated and filled with a mineral oil. The container is a Synthetic Resin Bonded Paper tube sealed at both ends with resin assuring hermetic sealing. The capacitors are terminated with M5 *12 mm studs or tinned copper wire.

Note

- The impregnant used is a non toxic highly refined, purified and inhibited mineral oil.

APPLICATIONS

The ET range is specifically designed for high voltage filters and can be successfully used in the following

applications:

- By-pass
- Coupling
- Filter applications
- X-ray power supplies
- Electrostatic air deaners

TEMPERATURE RANGE

Temperature range is - 55 °C to + 85 °C. Derating is required for operation at higher temperatures.

TEMPERATURE COEFFICIENT

Capacitance will increase by 2 % per 100 °C temperature rise.

CAPACITANCE RANGE

0.0005 µF to 2 µF. The tolerance is ± 10 %. Other tolerances are available on request. Nominal values measured at 1 kHz.

VOLTAGE RANGE

1000 V_{DC} to 70 000 V_{DC}

RIPPLE

The sum of the peak ripple voltage and the DC voltage should not exceed the rated voltage. Refer to graph fig.1 for permissible peak-to-peak ripple voltage as a percentage of rated voltage for various frequencies.

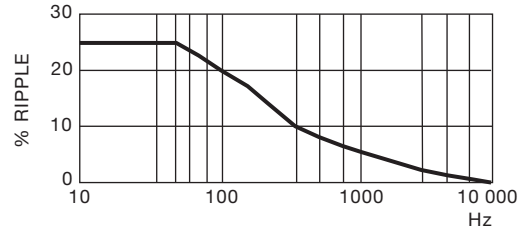


Fig. 1

POWER FACTOR

The power factor is variable, and is a function of temperature and frequency see fig. 2. Nominal value < 0.5 % at 20 °C

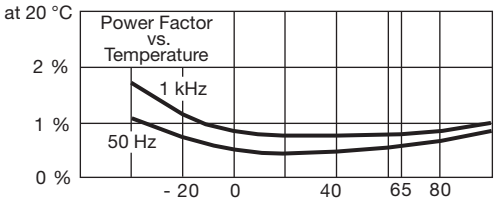


Fig. 2

DIELECTRIC RESISTANCE

(Parallel resistance) is indicated by the graph of insulance (MΩ x µF) vs temperature fig. 3. The insulance (MΩ [1] x µF) is nominally 10 000 s at + 20 °C. (Measurements taken after 1 minute with an applied voltage of 500 V)

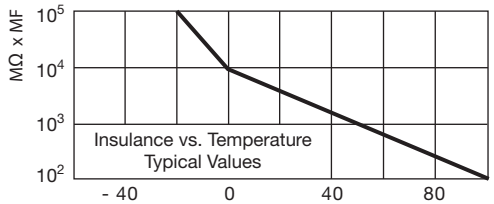


Fig. 3

LIFE EXPECTANCY

ET type capacitors are designed for a life exceptancy of 5000 h at 65 °C. To achieve the same life expectancy at 85 °C derate to 60 % of rated voltage fig. 4.

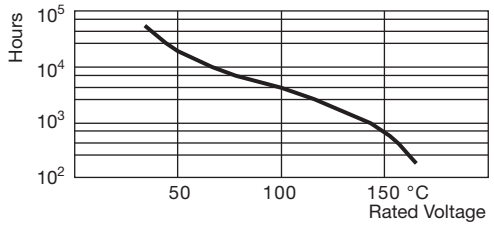


Fig. 4

TEST VOLTAGE

Terminal/terminal (Vt/t)

For DC rating < 20 kV

Vt/t = 2.0 x rated voltage 60 s

For DC rating > 20 kV

Vt/t = 1.5 x rated voltage 60 s

WEIGHT

The approximate weight in grams may be calculated by multiplying the volume of the capacitor container by 1.2×10^{-3}.

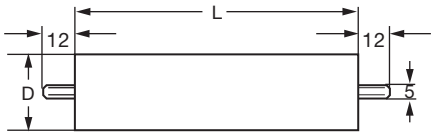
TERMINATIONS

Add suffix W to part No. to indicate wire terminations.

CAPACITANCE

Capacitance tolerance of 20 % is standard with those marked.

DIMENSIONS in millimeters



TYPE DESCRIPTION			
PART NUMBER	CAP. [µF]	L [mm]	D [mm]
1000 V_{DC} WKG			
ET10-103-MH	0.01 (1)	42	17
ET10-203-MH	0.02 (1)	42	17
ET10-503-MH	0.05	48	17
ET10-254-MH	0.25	60	22
ET10-504-MH	0.5	70	30
ET10-205-MH	2.0	110	35
1500 V_{DC} WKG			
ET15-103-MH	0.01 (1)	42	17
ET15-203-MH	0.02 (1)	42	20
ET15-254-MH	0.25	60	30
ET15-504-MH	0.5	110	25
ET15-105-MH	1.0	110	35
ET15-205-MH	2.0	110	42
2000 V_{DC} WKG			
ET20-103-MH	0.01 (1)	48	17
ET20-503-MH	0.05	60	17
ET20-104-MH	0.1	60	22
ET20-254-MH	0.25	60	30
ET20-504-MH	0.5	75	35
3000 V_{DC} WKG			
ET30-502-MH	0.005 (1)	42	17
ET30-103-MH	0.01 (1)	42	20
ET30-203-MH	0.02	48	20
ET30-503-MH	0.05	55	25
ET30-104-MH	0.1	55	30
ET30-254-MH	0.25	60	35
ET30-504-MH	0.5	75	42
ET30-105-MH	1.0	110	42
4000 V_{DC} WKG			
ET40-102-MH	0.001 (1)	42	17
ET40-502-MH	0.005 (1)	42	17
ET40-503-MH	0.05	60	22
ET40-103-MH	0.01	42	20
ET40-104-MH	0.1	60	30
ET40-504-MH	0.5	95	42
5000 V_{DC} WKG			
ET50-102-MH	0.001 (1)	42	17
ET50-202-MH	0.002 (1)	42	17
ET50-502-MH	0.005 (1)	42	20
ET50-103-MH	0.01	48	20
ET50-203-MH	0.02	48	22
ET50-503-MH	0.05	60	25
ET50-104-MH	0.1	75	30
ET50-254-MH	0.25	95	35
ET50-504-MH	0.5	110	42

Notes

- Non standard size containers can be supplied on request

(1) Capacitance tolerance of 20 % is standard

TYPE DESCRIPTION			
PART NUMBER	CAP. [µF]	L [mm]	D [mm]
6000 V_{DC} WKG			
ET60-102-MH	0.001 (1)	55	17
ET60-202-MH	0.002 (1)	55	17
ET60-502-MH	0.005 (1)	65	17
ET60-103-MH	0.01	65	20
ET60-203-MH	0.02	80	20
ET60-503-MH	0.05	100	25
ET60-104-MH	0.10	100	35
ET60-254-MH	0.25	135	42
8000 V_{DC} WKG			
ET80-502-MH	0.005 (1)	65	20
ET80-103-MH	0.01	80	20
ET80-503-MH	0.05	105	35
ET80-104-MH	0.10	105	42
ET80-254-MH	0.25	170	42
10 000 V_{DC} WKG			
ET100-102-MH	0.001 (1)	65	17
ET100-502-MH	0.005 (1)	65	22
ET100-103-MH	0.01	80	22
ET100-203-MH	0.02	80	30
ET100-503-MH	0.05	105	35
ET100-104-MH	0.10	170	35
ET100-254-MH	0.25	205	42
12 000 V_{DC} WKG			
ET120-202-MH	0.002 (1)	95	20
ET120-502-MH	0.005 (1)	95	30
ET120-103-MH	0.01	115	30
ET120-203-MH	0.02	115	35
ET120-503-MH	0.05	180	35
ET120-104-MH	0.10	180	42
15 000 V_{DC} WKG			
ET150-102-MH	0.001 (1)	95	17
ET150-202-MH	0.002 (1)	95	20
ET150-502-MH	0.005 (1)	110	20
ET150-103-MH	0.01	110	30
ET150-203-MH	0.02	110	35
ET150-503-MH	0.05	150	42
ET150-104-MH	0.10	245	42
20 000 V_{DC} WKG			
ET200-102-MH	0.001 (1)	115	22
ET200-502-MH	0.005 (1)	145	25
ET200-103-MH	0.01	145	30
ET200-203-MH	0.02	195	30
ET200-503-MH	0.05	245	42
ET200-104-MH	0.10	320	42

TYPE DESCRIPTION			
PART NUMBER	CAP. [µF]	L [mm]	D [mm]
25 000 V_{DC} WKG			
ET250-501-MH	0.0005 (1)	145	17
ET250-102-MH	0.001 (1)	145	20
ET250-502-MH	0.005	175	30
ET250-103-MH	0.010	175	35
ET250-503-MH	0.05	300	42
30 000 V_{DC} WKG			
ET300-501-MH	0.0005 (1)	170	17
ET300-102-MH	0.001 (1)	170	20
ET300-202-MH	0.002	170	25
ET300-502-MH	0.005	205	30
ET300-103-MH	0.010	205	35
ET300-203-MH	0.02	280	35
ET300-303-MH	0.03	280	42
40 000 V_{DC} WKG			
ET400-102-MH	0.001 (1)	210	20
ET400-202-MH	0.002	275	20
ET400-103-MH	0.010	275	42
50 000 V_{DC} WKG			
ET500-501-MH	0.0005 (1)	275	22
ET500-102-MH	0.001 (1)	275	22
ET500-202-MH	0.002	340	22
ET500-502-MH	0.005	340	35
ET500-103-MH	0.010	340	42
60 000 V_{DC} WKG			
ET600-102-MH	0.001 (1)	330	25
ET600-152-MH	0.0015	330	30

Notes

- Non standard size containers can be supplied on request

(1) Capacitance tolerance of 20 % is standard

High Voltage DC Filter Capacitors

TYPE EC

The EC range of capacitors are similar in design to the ET range but are housed in a more robust container. They are manufactured using a mixed dielectric material that consists of polyester/polypropylene film and capacitor tissue. They are impregnated and filled with a mineral oil. The container is a Synthetic Resin Bonded Paper (SRBP) tube sealed at both ends with resin assuring a hermetic seal. The capacitors may be used in air, oil or SF6. They are terminated with M6 studs x 15 mm long or tinned copper wire.

Note

- The impregnant used is a non toxic highly purified and inhibited mineral oil

APPLICATIONS

The EC range of capacitors are specifically designed for high voltage filters and can be sucessfully used in the following applications:

- High voltage smoothing
- Induction heating
- RT transmitter power supplies
- X-ray power supplies

TEMPERATURE RANGE

Temperature range is - 40 °C to + 85 °C. Derating is required for operation at higher temperatures.

TEMPERATURE COEFFICIENT

Capacitance will increase by 2 % per 100 °C temperature rise.

CAPACITANCE RANGE

0.001 µF to 2 µF. The tolerance is ± 10 %. Other tolerance are available on request. Normal values measured at 1 kHz.

VOLTAGE RANGE

1000 V_{DC} to 100 000 V_{DC}

TEST VOLTAGE

Terminal/terminal (Vt/t)

For DC rating < 20 kV

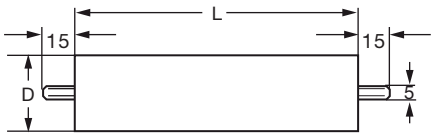
Vt/t = 2.0 x rated voltage 60 s

For DC rating > 20 kV

Vt/t = 1.5 x rated voltage 60 s

TYPE DESCRIPTION			
PART NUMBER	CAP. [µF]	L [mm]	D [mm]
10 kV			
EC100-104-MH	0.1	115	65
EC100-254-MH	0.25	140	75
EC100-504-MH	0.5	205	95
20 kV			
EC200-503-MH	0.05	180	65
EC200-104-MH	0.1	230	65
EC200-254-MH	0.25	280	75
EC200-504-MH	0.5	360	95
30 kV			
EC300-253-MH	0.025	245	65
EC300-503-MH	0.05	320	65
EC300-104-MH	0.1	395	65
EC300-254-MH	0.25	510	75
40 kV			
EC400-253-MH	0.025	305	65
EC400-503-MH	0.05	410	65
EC400-104-MH	0.01	345	95
EC400-124-MH	0.12	440	95
50 kV			
EC500-103-MH	0.01	270	65
EC500-253-MH	0.025	335	65
EC500-503-MH	0.05	430	75
EC500-104-MH	0.1	430	95
60 kV			
EC600-502-MH	0.005	310	65
EC600-103-MH	0.01	310	75
EC600-253-MH	0.025	390	75
EC600-503-MH	0.05	500	75
EC600-104-MH	0.1	615	95
80 kV			
EC800-502-MH	0.005	400	65
EC800-103-MH	0.01	400	75
EC800-253-MH	0.025	500	95
EC800-503-MH	0.05	650	95
100 kV			
EC1000-502-MH	0.005	485	65
EC1000-103-MH	0.01	485	75
EC1000-253-MH	0.025	610	95
120 kV			
EC1200-502-MH	0.005	425	75

DIMENSIONS in millimeters



High Voltage DC Capacitors

TYPE EPR

The EPR range of capacitors are manufactured using a mixed dielectric material that consists of polyester/ polypropylene film and capacitor tissue. They are impregnated and filled with a mineral oil. The container is a robust rectangular polypropylene case. The internal construction is designed to prevent movement when the capacitor is subjected to mechanical shock or vibration. An inert welding process ensures hermetic sealing. Standard terminations are M10 threaded inserts which eliminates the necessity for large voltage terminals. The case has an extremely low affinity for moisture and is resistant to virtually all electrical environments. Brackets can be welded on as required.

Note

- The impregnant used is a non toxic highly purified and inhibited mineral oil.

APPLICATIONS

The EPR range is designed specifically for DC applications such as filters:

- By-pass
- Coupling
- Rapid discharge
- Pulse forming networks
- Radar
- Laser
- X-ray equipment

TEMPERATURE RANGE

Temperature range is - 40 °C to + 85 °C. Derating is required for operation at higher temperatures.

TEMPERATURE COEFFICIENT

Capacitance will increase by 2 % per 100 °C temperature rise.

CAPACITANCE RANGE

0.002 µF to 2 µF. The tolerance is ± 10 %. Other tolerance are available on request. Normal values measured at 1 kHz.

RIPPLE

The sum of the peak ripple voltage and the DC voltage should not exceed the rated voltage. Refer to graph fig. 1 for permissible peak-to-peak ripple voltage as a percentage of rated voltage for various frequencies.

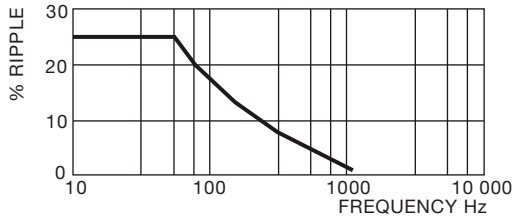


Fig. 1

POWER FACTOR

The power factor is variable, and is a function of temperature and frequency see fig. 2. Nominal value < 0.5 % at 20 °C

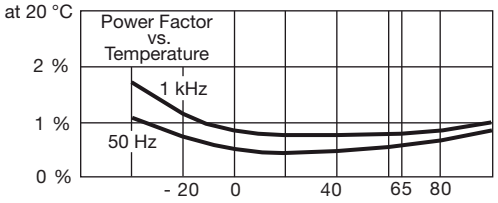


Fig. 2

DIELECTRIC RESISTANCE

(Parallel resistance) is indicated by the graph of insulance (MΩ x µF) vs temperature fig. 3. The insulance (MΩ x µF) is nominally 10 000 s at + 20 °C. (Measurements taken after 1 minute with an applied voltage of 500 V)

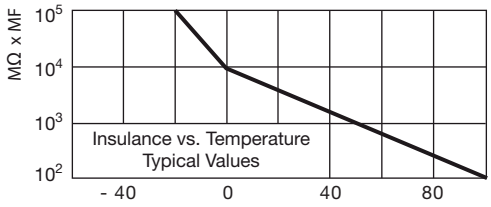


Fig. 3

LIFE EXPECTANCY

EPR type capacitors are designed for a life exceptancy of 50 000 h at 65 °C. To achieve the same life expectancy at 85 °C derate to 60 % of rated voltage fig. 4.

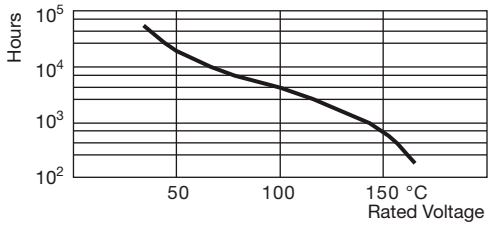


Fig. 4

VOLTAGE RANGE

1000 V_{DC} to 300 000 V_{DC}

TEST VOLTAGE

Terminal/terminal (Vt/t)

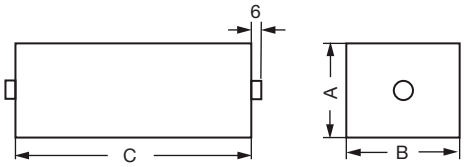
For DC rating < 20 kV

Vt/t = 2.0 x rated voltage 60 s

For DC rating > 20 kV

Vt/t = 1.5 x rated voltage 60 s

DIMENSIONS in millimeters



TYPE DESCRIPTION				
PART NUMBER	CAP. [µF]	A	B	C
15 kV_{DC}				
EPR150-104-MH	0.1	75	75	142
30 kV_{DC}				
EPR300-504-MH	0.5	130	220	185
50 kV_{DC}				
EPR500-103-MH	0.01	70	90	245
EPR500-504-MH	0.5	175	235	280
75 kV_{DC}				
EPR750-503-MH	0.05	80	110	365
EPR750-104-MH	0.1	115	130	365
EPR750-254-MH	0.25	175	190	365
100 kV_{DC}				
EPR1000-253-MH	0.025	80	90	420
PR1000-403-MH	0.04	120	200	285
EPR1000-104-MH	0.1	125	175	445
200 kV_{DC}				
EPR2000-502-MH	0.005	90	90	385
300 kV_{DC}				
EPR3000-252-MH	0.0025	70	95	555

REQUEST FOR POWER ELECTRONIC CAPACITORS

		VALUE		REMARKS
Capacitance	C	.....	µ F	.....
- Tolerance		.....	%	.....
Voltage				
- Rated AC voltage	U_N	.....	V	.....
- Rated DC voltage	U_{NDC}	.....	V	.....
- Ripple voltage	U_r	.....	V	.....
- Pulse frequency	f_p	.....	Hz	.....
- Non-recurrent surge voltage	U_S	.....	V	.....
- Voltage rate of rise (repetitive)	dU/dt	.....	V/µ s	.....
Current				
- Maximum peak current	$\in$	.....	A	.....
- Maximum RMS current	$I_{max.}$	.....	A	.....
- Maximum surge current	$\in_S$	.....	A	.....
Expected Life Time		.....	h	
Climatic Conditions				
- Operating temperature range		$\theta_{min.}$ ..... °C	$\theta_{max.}$ ..... °C	
- Ambient temperature/on.load-duration		Temperature 50 % to 60 %		..... °C
		Temperature 60 % to 70 %		..... °C
- Cooling	Forced cooling	☐	Natural cooling	☐
Installation	Indoor	☐	Outdoor	☐
Maximum Dimensions	L x W x H	.....		.....
Further Requirements				
- Quantity		.....	pieces	.....
- Request lead time		.....	weeks	.....
- Additional requirements				
- Application	.....			

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