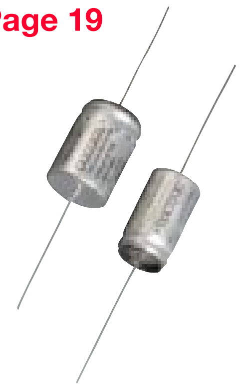
EVOX RIFA

Electrolytic Capacitors 2001-2002

Overview

PEG124

Page 19



Rated temperature 105°C
Rated voltage (VDC) 200 - 450
Diameter range (mm) 10 - 20
Temperature range (°C) -40 to +105

Applications: Electronic ballast
Industrial electronics

Rated temperature 125°C
Rated voltage (VDC) 10 - 100
Diameter range (mm) 10 - 20
Temperature range (°C) -40 to +125

Applications: Automotive electronics
Industrial electronics

PEG126

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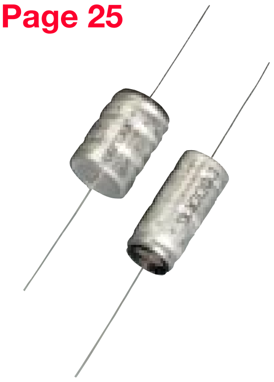

Rated temperature 150°C
Rated voltage (VDC) 40
Diameter range (mm) 16 - 20
Temperature range (°C) -40 to +150

Applications: Automotive electronics
High temperature and high ripple current applications

Can also be ordered with radial leads; PEH126

PEH124

Page 27

Rated temperature 125°C
Rated voltage (VDC) 16 - 63
Diameter range (mm) 18
Temperature range (°C) -40 to +125

Applications: SMPS

PEH430

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Rated temperature 105°C
Rated voltage (VDC) 10 - 450
Diameter range (mm) 22 - 35
Temperature range (°C) -40 to +105

Applications: Drives
UPS
Welding
SMPS

PEH169

Page 37

Rated temperature 85°C
Rated voltage (VDC) 10 - 450
Diameter range (mm) 35 - 90
Temperature range (°C) -40 to +85

Rated temperature 105°C
Rated voltage (VDC) 10 - 350
Diameter range (mm) 35 - 90
Temperature range (°C) -40 to +105

Applications: Drives
UPS
Welding

PEH200

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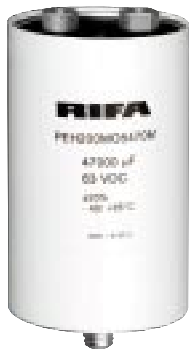
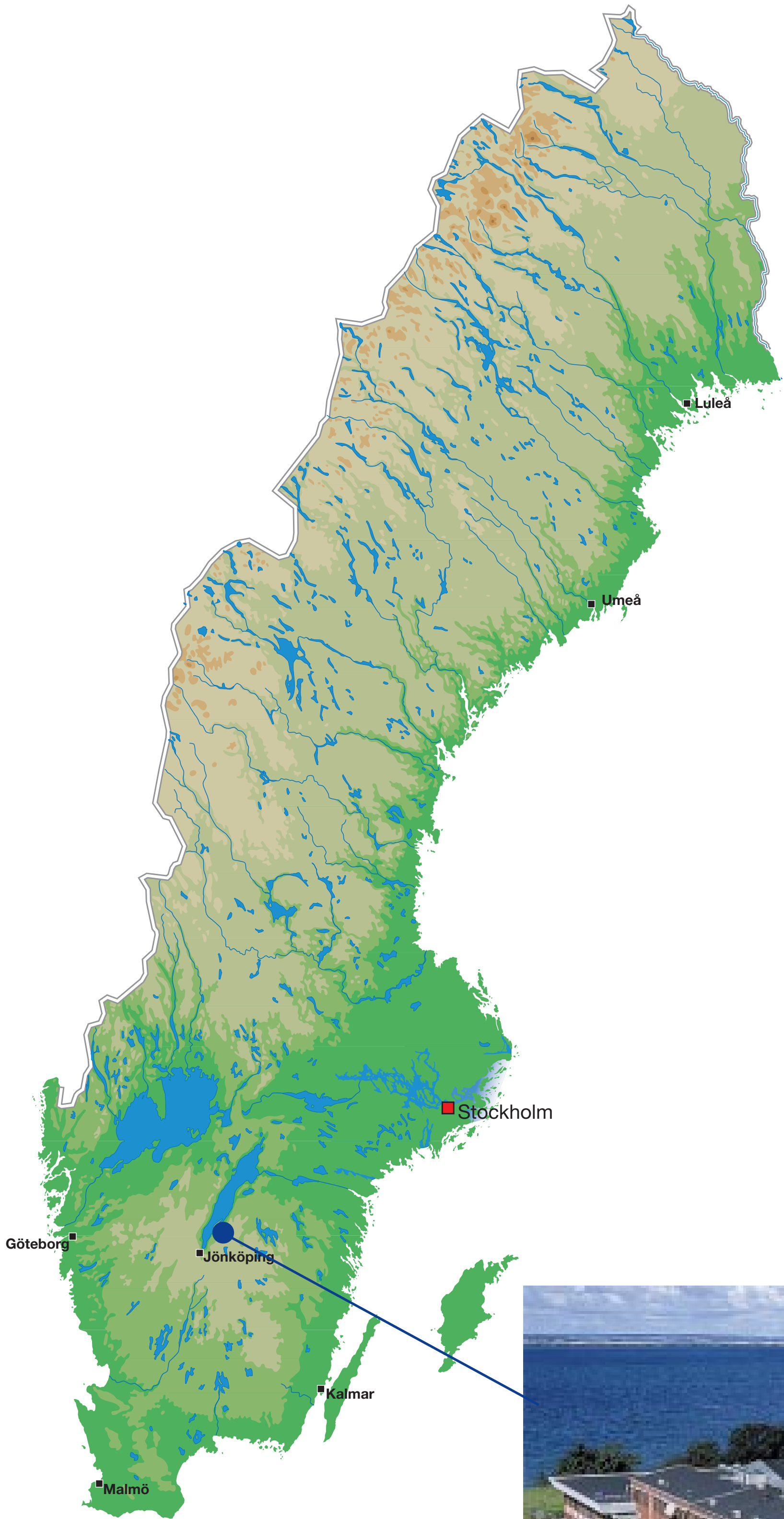


Rated temperature 85°C
Rated voltage (VDC) 25 - 550
Diameter range (mm) 35 - 90
Temperature range (°C) -40 to +85

Applications: Drives
UPS
Welding

BUSINESS UNIT GRÄNNA



Evox Rifa is one of Europe's leading manufacturers of Aluminium Electrolytic Capacitors and is operating in the world market. We develop, manufacture and distribute capacitors to users all over the world – in fact more than 85% of our volume is for export markets.

Evox Rifa electrolytic capacitors are used in modern inverter technology, automotive power electronics, electronic ballast in lighting systems and in other applications with demanding requirements.

Our high technical expertise, modern facility in Gränna and advanced quality control, enable us to provide superior quality and extensive customer support. The quality systems employed in our production plant and in our laboratory are approved in accordance with ISO9001 and EN45001. Many of our products are also CECC approved and we are working along with QS9000 requirements.

Evox Rifa is highly experienced in joint projects at both product and project levels, working in ways to help customers to achieve cost-effective solutions.

Please get in touch with us for further information on what we can do for you and your company.

Lars-Göran Stenberg
Business Unit Director

PRODUCT LITERATURE

Electrolytic Capacitors Application Guide
724 4168

Electrolytic Capacitors Theory and Application
724 4113

Components for Automotive Electronics
724 4175

Components for Electronic Ballast
724 4144

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NEWS!

PEH 430
New Snap-in range!

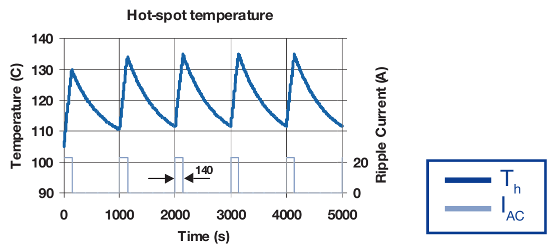
- Economically Priced
- Improved transient capability
- Voltages up to 450 VDC at 105°C
- Short lead-times on preferred parts

PEH 200

- Higher ripple current capability
- Improved transient capability
- Available up to 550 VDC
- A cost efficient solution

PEG 126

- Designed for automotive applications
- High resistance to vibrations
- 150°C, 2000h
- Intermittent ripple, up to 23A, 5kHz at T_a=105°C



Shorter lead-times

An improved lead-time for limited quantities is being available on a selected range of parts from 1st quarter 2001. These preferred parts are marked in bold in the catalogue and designed as to guide engineers where early prototypes and pre-production parts are required.

HOW TO ORDER ELECTROLYTIC CAPACITORS

When ordering, we recommend that both the full RIFA code number and the specific characteristics of the component are quoted, in order to eliminate any possibility of interpretation error. Please see the example below.

PEG 124 H V 422 O Q T1

- T1 → Describes different properties of the products, pos. 14-20
- Q → Cap. tolerance code, Pos. 13
- O → Design version code, Pos. 12
- 422 → Cap. code, Pos. 9-11
- V → Dimension code, Pos. 8
- H → Voltage code, Pos. 7
- 124 → Type code, Pos. 4-6
- PEG → Class code, Pos. 1-3

General ordering information
The RIFA article code consists of a maximum of 20 positions divided into 2 blocks.

1st block (pos 1–13)													**2nd block** (pos 14–20)						
A	**B**	**C**	**1**	**2**	**3**	**D**	**E**	**4**	**5**	**6**	**F**	**G**							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

The basic version of each article is designed with a thirteen character article code. This code is given in the article table.
As pos. 1–13 are marked on the capacitor, full traceability is at hand.

GENERAL ELECTROLYTIC CAPACITORS

1 st block

Pos. 1–3	RIFA's type class	Pos. 1:	"P" = RIFA
		Pos. 2:	"E" = Electrolytic capacitors
		Pos. 3:	"H" = Radial terminations
			"G" = Axial terminations
Pos. 4–6:	RIFA's type code	Pos. 4–6:	Type code indicate performance and type of terminations.
Pos. 7:	Rated voltage code	Pos. 7:	Rated voltage code, the code is specified in each article table.
Pos. 8:	Dimension code	Pos. 8:	Dimension code, the code is specified in each article table.
Pos. 9–11:	Capacitance code	Pos. 9:	Number of digits in capacitance value in µF.
		Pos. 10–11:	The two significant digits in the capacitance value.
			Example: 2100 is the code for 10 µF 6330 is the code for 330000 µF.
Pos. 12:		Pos. 12:	"0" for the basic version, "the catalogue product". For higher performance products, CAD-products letters, from A to Z is used.
Pos. 13:	Capacitance	Pos. 13:	Capacitance tolerance code.
			Example: Q: –10 + 30% K: ± 10% M: ± 20% J: ± 5% Y: ± 15% T: -10 + 50%

2nd block
Pos. 14–20: Describes different alternatives for the products and the use of these positions is shown in the ordering information about each article.

EVOX RIFA PRODUCT MARKING FOR TRACEABILITY

Evox Rifa Electrolytic Capacitors are marked with year and month / week of manufacturing and batch code.

Example:

PEG124, PEG126, PEH124, PEH126:	0015/01 = Year 2000, Week 15, Batch No 1.
PEH169, PEH200, PEH430:	0003/85966 = Year 2000, March, Batch No 85966.

AXIAL TAPING SPECIFICATION

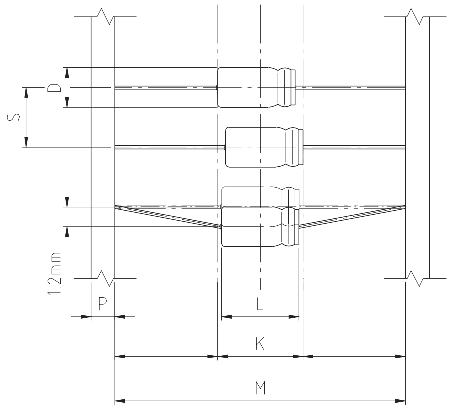
The taped capacitors are delivered in accordance with IEC 286-1, first edition 1980, EIA RS-296 D, June 1978, and with DIN 40 810, August 1971.

The components are taped so that identical poles are turned to the same side of the tape. The cathode lead tape is blue.

PEG 124

Case code	D	L	K	S	M	P	Standard Content/reel
A	10	20	21.4	15 ± 0.75	73 ± 1.5	6 ± 1	500
B	10	29	30.4	15 ± 0.75	73 ± 1.5	6 ± 1	500
C	13	20	21.4	15 ± 0.75	73 ± 1.5	6 ± 1	400
D	13	29	30.4	15 ± 0.75	73 ± 1.5	6 ± 1	400
E	13	37	38.4	15 ± 0.75	73 ± 1.5	6 ± 1	400

Dimensions in mm.

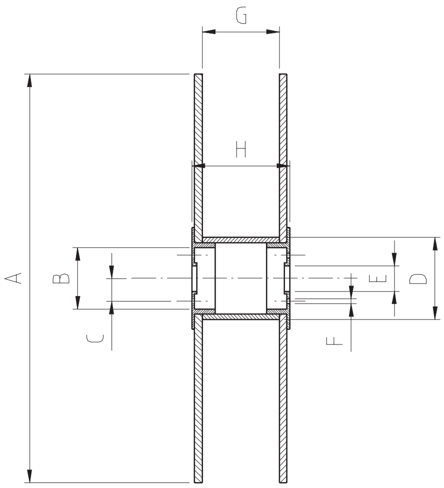


TAPING

Reel

	Standard
A Reel diameter	356 ± 2
B Inside core diameter	76.2 ± 1.5
C Feeding hole distance from reel center	27.2 ± 0.3
D Outside core diameter	82.5 ± 2
E Reel hole diameter	30.2 ± 0.4
F Feeding hole diameter	8.0 ± 0.2
G Inside reel width	90 ± 1
H Reel width	98 ± 1

Dimensions in mm.



MARKING

Standard marking for: PEG and PEH-types

	Standard
Rated capacitance	Yes
Capacitance tolerance	Yes
Rated voltage	Yes
Date of manufacture	Yes, coded
Polarity indication	Yes
Article code	Yes

TERMS AND DEFINITIONS

Term	Symbol	Unit	Definition	Notes
Rated voltage	U_R	V	Maximum operating peak voltage of a nonreversing type waveform for which the capacitor has been designed for continuous operating. Figure 1.	Figure 1.
DC voltage	U_{DC}	V	The mean value of the applied DC-voltage. Figure 1.	
Superimposed AC-voltage	U_{AC}	V	Maximum superimposed alternating voltage applied. Figure 1.	$U_{DC} + U_{AC} \leq U_R$
Rated reversed voltage	U_{RE}	V	The maximum permitted reverse voltage (not in continous operation).	$U_{RE} \leq 1.0V$
Surge voltage	U_S	V	A peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times. Figure 1.	1.15 x U_R for $U_R \leq$ 315V 1.10 x U_R for $U_R >$ 315V 1000 cycles with load period 30s and no load period 330s, R x C = 0.1s.
Transient voltage	U_T	V	Some of our capacitors can withstand pulses exceeding the surge voltage. (No general ratings, value on request)	Rise time t_R , 100 µs < t_R < 5 ms Time between transients > 5 min. Nominal voltage applied between transients. 1000 pulses randomly applied during life time.

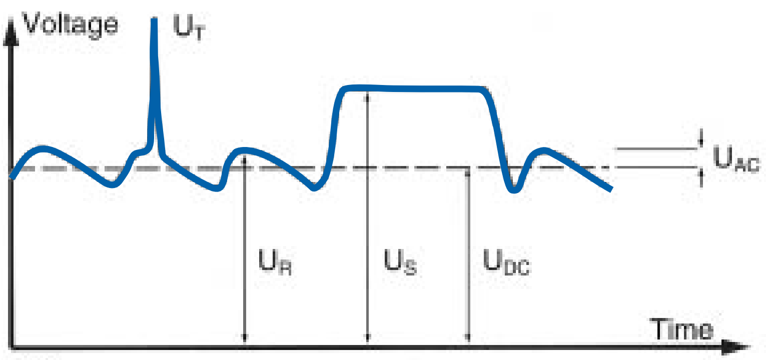


Fig 1.

Term	Symbol	Unit	Definition	Notes
Rated capacitance	C_R	F	The rated capacitance is the value which is indicated upon the capacitor.	Measured at ≤ 0.5V and 100 Hz without DC polarization, 20°C.
DC capacitance	C_{DC}	F	The capacitance determined on basis of the capacitors storage capacity when charged with DC voltage.	Measured acc. to DIN 41328.
Impedance	Z	Ohm	Impedance between capacitor terminals.	Determines output ripple voltage.
Equivalent series resistance	R_{ESR}	Ohm	An equivalent resistance in series with the ideal capacitor representing all the losses of the capacitor.	Maximum R_{ESR} is stated at 100 kHz and 100 Hz, 20°C.
Equivalent series inductance	L_{ESL}	H	An equivalent inductance in series with the ideal capacitor representing the inductance of the winding and the terminals.	Partly determines impedance at high frequencies.
Dissipation factor	$\tan\delta$		Measure for the deviation from an ideal capacitor.	Maximum $\tan\delta$ available on request.

TERMS AND DEFINITIONS

Term	Symbol	Unit	Definition	Notes
Rated ripple current	I_{RAC}	A	Maximum rms current for continuous operation at specified service conditions.	I_{RAC} is stated at 100 Hz and upper category temperature. See Article Table.
Ripple current	I_{AC}	A	Applied ripple current at operating frequency and operating temperature.	For calculation of k_{AC} and k_{PC}.
Leakage current	I_{RL}	A	The leakage current is the current after a specified time flowing through the capacitor when a direct voltage is applied across the terminals.	Rated value (at 20°C, U_R applied, 5 minutes).
Operational leakage current	I_{OL}	A	The final direct current that appears after a prolonged operating time.	Measured after approximately 30 minutes.
Temperature range		°C	The ambient temperature interval between a lower and upper temperature limit to which the capacitor may be continuously exposed in order to function with specified parameter tolerances.	See Article Table.
Storage temperature	T_S	°C	A temperature at which the capacitor can be stored without any applied voltage and without any damage to the capacitor.	Minimum storage temperature is –55°C. Storage life at 40°C without reforming 10 years.
Ambient temperature	T_a	°C	The temperature around the capacitor.	
Case temperature	T_c	°C	The hottest part of the case.	
Hot-Spot temperature	T_h	°C	The hottest part of the winding.	Determines life, reliability and max permitted ripple current.
Shelf life		h	Shelf life is specified time for which a capacitor can be stored with no applied voltage.	See article table for each group.
Operational life	L_{OP}	h	The operational life designates the period that is achieved until the electrical parameters exceed certain values. During this time the failure rate is constant.	Operational life is defined as: $10 \leq U_R \leq 160V$ Δ c/c $\leq \pm 15\%$ $U_R > 160V$ Δ c/c $\leq \pm 10\%$ $\tan\delta \leq$ 1, 3 $\tan\delta$ (specified value) $I_L \leq I_{RL}$, $R_{ESR} \leq 2R_{ESR}$ (initial value).
Failure rate	λ	h^{-1}	The failure rate is the fraction failure divided by the specified time of duty.	The failure rate is divided from our periodic tests. Therefore the failure rate is only given at the test temperature for life tests. An estimation is also given at 60°C.

APPLICATION AND OPERATION OF ELECTROLYTIC CAPACITORS

Selection of an electrolytic capacitor for reliable operation in a particular application should be based on a complete working condition specification. This chapter will give some guidelines on how to select electrolytic capacitors.

Introduction
An electrolytic capacitor used for smoothing, energy storage or filtering of a rectified AC voltage will be loaded with an AC ripple current causing a power loss and heating of the capacitor.

The temperature in the hottest part, the Hot Spot, inside the capacitor, is the major factor influencing operational life. The Hot Spot temperature is dependent upon several factors.

- Power loss caused by AC current
- Thermal resistance between the Hot Spot and the ambient
- Ambient temperature and capacitor cooling condition.

RIFA's electrolytic can types and axials are designed for operation under severe climatic conditions and for heavy ripple current load. This requires low internal losses and an efficient heat transfer between the capacitor "Hot Spot" and the ambient.

The internal thermal design and the method of mounting the capacitor are therefore of equal importance for reliability and operational life together with the capaci-tor's electrical design.

Long term high parameter stability is the key to Long Life, and the ability to withstand high temperature and high ripple current.

The power loss P in the capacitor can be calculated from:

$$P = R_{ESR} \times I_{AC}^2$$

R_{ESR} is dependent on the frequency f, and winding temperature. With complex current waveform it is therefore necessary to calculate the contribution from each harmonic frequency to the power loss.

$$P=R_{ESR}(f_1) x I_{AC}^2(f_1)+R_{ESR}(f_2) x I_{AC}^2(f_2) (W)$$

The thermal resistance R_{TH} (°C/W), of a capacitor is defined from the power loss P and the temperature difference; ΔT, between the Hot Spot temperature, T_h and the ambient temperature, T_a, in the thermal equilibrium,

$$\Delta T = P \times R_{th}$$
$$\Delta T = T_h - T_a$$

The power P is assumed to be generated in the Hot Spot.

R_{th} (total thermal resistance) can be divided in two parts. R_{thhc} is the inner thermal resistance between the Hot Spot and the case. R_{thca} is the outer thermal resistance between the case and the ambient.

$$\Delta T = P \times (R_{thhc} + R_{thca})$$

R_{thhc} is dependent on the capacitor design, R_{thca} is dependent on cooling conditions.

In electrolytic capacitors, heat generated in the winding is easily transfered in the axial direction. With this design a very low R_{thhc} is achieved and thus a very low temperature difference between the Hot Spot and the case.

The operational life of Long Life electrolytic capacitors is dependent upon the evaporation of electrolyte through the seal.

At voltages up to rated voltage and at high temperatures there are practically no other factors that influence the life of the capacitors. Sealing materials are selected for a minimum of diffusion losses.

Even if the Hot Spot temperature, T_h determines service life, the case temperature,T_c is better suited as a refe-rence temperature for the calculation of service life. T_c is the temperature of a well defined surface area (the bottom of the case beneath the insulation). It is easily measured when e.g. effect of forced cooling is determined. For a certain power loss P the temperature difference between T_h and T_c is a constant.

$$T_h = T_c + P \times R_{thhc}$$

APPLICATION AND OPERATION OF ELECTROLYTIC CAPACITORS

Rated Voltage

The continuous operating voltage U_{cont}, is the sum of DC voltage (U_{DC}) and the superimposed AC voltage U_{AC}.

$$U_{cont} = U_{DC} + U_{AC}$$

The RIFA electrolytic capacitors will work continuously up to rated voltage $U_{cont} \leq U_R$, without any effect on life, reliability, ripple current or temperature.

During transient operation, the capacitor operating voltage U_{max}, may be higher than rated voltage U_R, for short periods, but during this periods leakage current I_L, will increase with voltage causing formation of hydrogen gas at the negative aluminium foil. This condition can lead to a catastrophic failure, due to high gas pressure inside the capacitor. At high gasing working conditions RIFA electrolytic capacitor design concept with free volume between winding and case will give a higher safety margin before catastrophic failure may occur.

In reverse voltage U_{RE}, operation the capacitor permits $U_{RE} \leq 1.0V$. At higher reverse voltage an increasing leakage current will occur, causing formation of oxygen gas at the cathode aluminium foil in the winding.

Leakage current

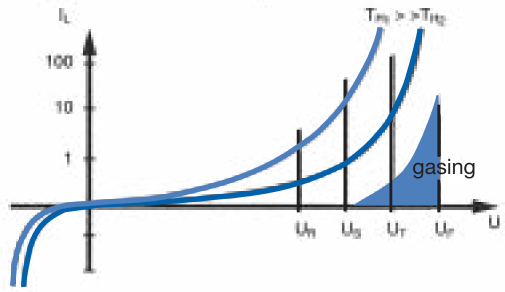
In all wet electrolytic capacitors there is an ongoing leakage current process when voltage is applied. The leakage current level I_L, depends on several factors such as:

- Purity of materials used inside the capacitor.
- Type of electrolyte, its non-aggressiveness under stand-by, no voltage conditions.
- Temperature and applied voltage in relation to rated voltage.
- Temperature and electrification time before measurement.

The RIFA electrolytic capacitor design concept with highest purity materials and tightly controlled production processes, excellent sealing systems and long term stable organic electrolyte ensure the lowest possible leakage current in any working conditions.

The leakage current plays an important part in the wet electrolytic capacitor self-healing process. The quality of the aluminiumoxide Al_2O_3, layer is maintained by a process where water in the electrolyte is divided into oxygen and hydrogen, and Al_2O_3 is continuously built up by reaction with aluminium ions. The leakage current is a measure of this oxidizing activity. For stable performance it is important to evacuate the hydrogen gas from the capacitor winding. Here the RIFA concept of free volume between the winding and the case, and the breathing vent for radials is an outstanding design.

Leakage current versus voltage



The forming voltage U_F, is used in the production of the dielectric, Al_2O_3, layer, and the thickness of the layer corresponds to this voltage level. The high forming voltage U_F, in relation to the rated voltage U_R, together with the burn-in-process, are important factors which ensures the lowest possible leakage current under any working conditions.

Rated leakage current I_{RL}, measured with applied rated voltage U_R, and after 5 minutes at 20°C is specified for each capacitor range. I_{RL} is the maximum current level the capacitor will have after 10 years in storage at 20°C without reforming. Statistics from our 100% final prodution test measurements give, on average, about 4 times lower leakage current level after 1 minute with applied rated voltage at 20°C.

Operational leakage current I_{OL}, after a minimum of 30 minutes with applied voltage is in the order of 15% of I_{RL}. Temperature dependance of the leakage current is shown in the following table.

T_C (°C)	I_L (factor)
40	1.0
85	5
105	20
125	100

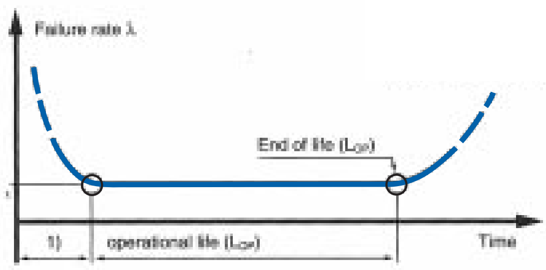
In storage the dielectric aluminium oxide layer is attacked mainly by the water content in the electrolyte. Hereby the effective thickness of the dielectric layer decreases, a process continuing with time and temperature. The more this process develops the higher the leakage current will occur to restore the dielectric layer when voltage is applied. The RIFA electrolytic capacitor design concept with organic electrolyte offers exceptional storage stability with maximum leakage current (I_{RL}) as specified after 10 years in storage at 40°C and without reforming.

Reliability

The failure rate is derived from our periodic test results. The failure rate, λ_R, is therefore only given at test temperature for life tests. An estimation is also given at 60°C. The expected failure rate is specified for each capacitor range and is based on our periodic test results for capacitors with structural similarity.

The specified failure rate includes catastrophic and parametric failures.

Definition of operational life, L_{OP}



$10 \leq U_R \leq 160$ VDC $\Delta C/C \leq \pm 15\%$
$U_R > 160$ VDC $\Delta C/C \leq \pm 10\%$
$\tan\delta < 1.3 \times \tan\delta$ specified value
$I_L - I_{RL}$
ESR ≤ 2 x ESR initial value

1) Time for burn-in
2) Rated failure rate λ_R

RIFA's unique burn-in process minimize the number of possible early failures and gives the capacitors a stabilized and low failure rate in operation. To achieve this low failure rate it is important that the capacitor working conditions are within specified limits. For life and realibility calculations for a product containing electrolytic capacitors it is important to take into account the spread in the capacitor parameters between capacitance value to maintain correct circuit operation, or spread in ESR-value when working with high ripple current loads.

TREATMENT

Cleaning of electrolytic capacitors
Aluminium electrolytic capacitors are susceptible to damage by certain types of cleaning solvents. Cleaning solvents that contain halogenated hydrocarbons especially chlorinated hydrocarbons are generally not recommended. The solvents can diffuse through the seal into the capacitor, and are then converted electro-chemically to free chlorides, which can cause corrosion. This can result in a pressure build-up that can destroy the capacitor.

Cleaning solvents that can be used without precautions

1) Cleaning solvents such as alcohols (e.g. isopropanol, methyl-, ethyl-, propyl-, or buthyl alcohol), glycol ethers (e.g. methylglycol) or ethylacetate are recommended.

2) If the other components on the circuit board are washable with water, water with a mild detergent is recommended as the mildest cleaning solvent. However, this procedure should be followed by immediate drying in hot air +85°C for 5–10 min. to avoid hydroxide precipi-tation on the surface of the can.

3) Washing with halogenated carbons, but only on the non-component side of the circuit board.

Precautions for applications of haloge-nated hydrocarbons

1) The only useful solvents in this case are freons mixed with alcohols or glycol ethers, because of their low boiling points.

2) Only vapour or spray methods should be used, taking care not to expose the seal to direct fluid.

Immersion techniques including ultra-sonic washing can be recommended only when the temperature of the liquid is kept higher than the temperature of the components being immersed, thus avoiding a negative pressure within the capacitor which can assist transport of cleaning fluids through the seal.

3) The exposure time to cleaning solvents containing halogenated hydrocar-bons should not exceed five (5) minutes.

4) Immediately after the cleaning procedure the components should be heated 5–10 minutes to a temperature 10–20°C above the boiling point of the solvent but not higher than the maximum upper category temperature of the capacitor. In that way the solvent absorbed in the surface of the capacitor sealing is revaporized and prevented from leaking into the capacitor.

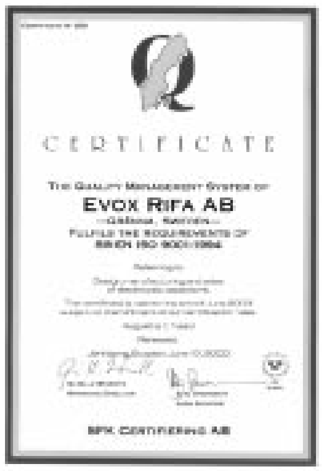
QUALITY ASSURANCE SYSTEM

Since 1979 we have **CECC-approval** as manufacturer for the factory in Gränna.

From April 1993 we have manufacturer approval according to **EN ISO 9001**. This means that our organization, facilities and inspection procedures have been found to comply with the requirements of document **CECC 00 100,** CECC 00 114 PART 1 and EN ISO **9001**.

From 1995 we also fulfill the requirements according to EN ISO 9001:1994.
We have a total quality documentation in our **Quality Manual**, **Quality Handbook** and **Instructions**.

The factory is under supervision of the inspectorate **SFK Certifiering AB.**

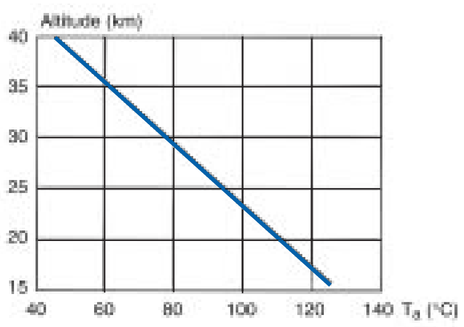


OPERATIONAL LIMITS FOR PEH AND PEG TYPES

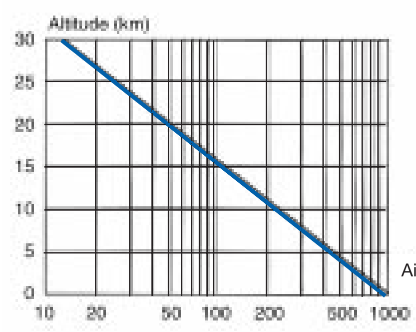
The low pressure that may occur in aviation applications will normally not cause any capacitor problems when using RIFA electrolytic capacitors.

The limitation is the vapour pressure for the electrolyte and it's temperature dependence, according to well-known physical laws.

Maximum altitude as a function of the ambient temperature (T_a)



Air pressure as a function of the altitude



FLAMMABILITY

The RIFA electrolytic capacitors withstand the fire hazard test according to IEC 695-2-2 with a 30 s flame exposure and the requirement to be self retardent within 10 s.

The capacitors also withstand the fire hazard test with the requirement that any flame is self retardent within 1 s, and that no burning particles will leave the capacitor during the flame exposure.

The electrolyte liquid itself is not classified as flammable according to ASTM (American Society for Testing and Materials).

Fire classification of materials

		Oxygen index	Corresponding UL standard
PEH 169 – PEH 200	Cover (phenolic plastic)	35	UL 94 V-0
	Insulating case (polypropylene)	17	UL 94 HB
	Cap nut (polyamid)	26	UL 94 V-2
PEH 430	Sleeve (PVC)	60	UL 94 V-0
PEG-types	Tape (polyester)	20	UL 94 HB

ELECTROLYTIC CAPACITORS

This is a summary of IEC-publications test procedures and requirements met or exceeded by RIFA electrolytic capacitors.

Test	IEC-Publ.	Procedure	Requirements
Mechanical test Robustness of terminations: Test Ua: Tensile Test Ub: Bending Test Uc: Torsion, severity 2. Test Ud: Torque, severity 1.	68-2-21	Loading force 10N Loading force 5N Two bends Two successive rotations of 180° During 10–15 s, Nm	No leakage of electrolyte or other visible damage. Deviations in capacitance, and tanδ from initial measurements must not exceed: $\Delta C/C < 5\%$. $\Delta \tan\delta \leq 1.2$ x initial value.
Resistance to soldering heat	68-2-20A	Method 1 B. Solder bath 350°C 3.5 s	
Solderability	68-2-20	For lead wire terminations Solder globule Solder bath 235 ± 2°C For solder pin terminations Immersion time 5.0 ± 0.5 s 235 ± 2%	Wetting time ≤ 1 s Good tinning
Rapid change of temperature Test Na	68-2-14	Duration of exposure: 3 h Recovery period: 16 h	No leakage of electrolyte or other visible damage. Deviations in capacitance and tanδ from initial measurements must not exceed: $\Delta C/C < 5\%$.
Vibration Test Fc	68-2-6	Procedure B4 **PEH 169 and PEH 200:** Frequency range: 10–500 Hz Amplitude 0.75 mm or acceleration 10 g. Time 3 x 2 h Big cans Ø 65, 75 and 90 mm. Frequency range 10–55 Hz Amplitude 0.75 mm or acceleration 10 g. Time 3 x 2 h **PEG124 and PEH 124:** Frequency range: 10-500 Hz Amplitude 0.75 mm or acceleration 10 g. Time 3 x 2 h. Ø16–20 mm to be clamped by their body **PEG126:** Clamped body Frequency range: 10-2000Hz Amplitude 1.5 mm or acceleration 20 g. Time 3x2 h **PEH 430:** Clamped body Frequency range: 10-500 Hz Amplitude 0.75 mm or acceleration 10 g. Time 3 x 2 h.	No leakage of electrolyte or other visible damage. Deviations in capacitance and tanδ from initial measurements must not exceed: $\Delta C/C < 5\%$.

ELECTROLYTIC CAPACITORS

Test	IEC-Publ.	Procedure	Requirements
Shock test Ea	68-2-27	Degree of severity Acceleration: 490 m/s ^{2} Duration of pulse: 11 ms Capacitors shall be mounted using clamps supplied by RIFA or shall be mounted by their stud, reinforced with clamps supplied by RIFA	No leakage of electrolyte or other visible damage. Deviations in capacitance from initial measurements must not exceed: ΔC/C < 5%.
Climatic test Climatic sequency Dry heat Test Ba	68-2-2	Temperature = upper category temperature. Duration 16 h	
Damp heat, cyclic Test Db	68-2-30	Upper temperature 55°C 1 cycle of 24 h at 55 ± 2°C RH 95 to 100%, no voltage applied.	
Cold Test Aa	68-2-1	Temperature = lower category temperature. Duration 16 h	
Low air pressure Test M	68-2-13	Pressure 44 mbar (4.4 kPa) Temperature 15–35°C Duration 5 min. During the last minute the rated voltage (U_R) to be applied.	
Damp heat, cyclic (remaining cycles)	68-2-30	The components to be subjected to 5 cycles. Upper temperature +55°c	No leakage of electrolyte or other damage.The marking to be legible. The difference in capacitance from the initial measurement must not exceed 10%.
Damp heat steady state Test Ca	68-2-3	Duration: 56 days	No leakage of electrolyte or other visible damage. The marking to be legible. No breakdown or flashover.
		After the test a voltage test is performed between terminations connected to case and a metal foil wrapped around the insulation, V-block as an alt. 1000 VDC, 60 s.Insulation resistance measurement. 100 VDC, 60 s.	Insulation resistance ≥ 100 MΩ.
Life test Endurance Long Life types	384-4	For following: PEG 124 125°C PEG126 150°c PEH 169 105°C PEH 200 85°C PEH 430 105°C	No leakage of electrolyte or other visible damage. The marking to be legible.
		2000 h at upper category temp. The ripple current given in the article list to be superimposed.	ΔC/C + 15/-30% $U_R \leq 6.3$ VDC ΔC/C ± 15% $6.3 \leq U_R \leq 160$ VDC ΔC/C ± 10% for $U_R > 160$ VDC
		For following: PEH 169 85°C PEG 124 105°C 5000 h at upper category temp. The ripple current given in the article list to be superimposed.	Leakage current - the limit in the article list. ESR - 2 x initial value. PEH 430: ESR - 3 x initial specified limit No flashover or breakdowns in voltage proof at 1000 VDC.

ELECTROLYTIC CAPACITORS

Test	IEC-Publ.	Procedure	Requirements
Surge voltage	384-4	The capacitor to be subjected to 1000 cycles of charge to voltage 0.5 min load period followed by a no load period of 5 min. 30 s. Temperature = upper category temp. Applied voltage: 1.15 x rated voltage for $U_R \leq 315$ V. 1.10 x rated voltage for $U_R > 315$ V. Time constant for charge 0.1 ± 0.05 s. Duration: 30 s Recovery: 1–2 h	No leakage of electrolyte or other visible damage. ΔC/C ≤ 15% Leakage current and tangent of the loss angle not to exceed the values given in the article list.
Pressure relief	384-4	A DC voltage is applied in the reverse direction to give a current of 1 to 10A	The pressure relief is to open in such away that any danger of explosion or fire is eliminated.
Storage at upper category temperature Test Ba	68-2-2	96 ± 4 at upper category temperature. Recovery: Minimum 16 h.	No leakage of electrolyte or other visible damage. Leakage current ≤ 2 x the maxvalue in the article list. ΔC/C – 10%
Storage at low temperature	68-2-1	72 h lower category temperature acc. to table below. Category Temperature °C 25/-/- –40 40/-/- –55 55/-/- –65 Recovery: Minimum 16 h	No leakage of electrolyte or other visible damage. The marking to be legible. ΔC/C ≤ 10%. The leakage current and tangent loss angle to be lower or equal to the values given in the article list.
Characteristics at high and low temperature	68-2	Test Aa followed by test Ba of IEC 68-2 Temp: lower respectively upper category temperature. The impedance to be measured at lower category temp. Leakage current, tanδ and capacitance to be measured at upper category temp.	The ratio of the impedance measured at lower category temperature and initially must not exceed the values in the table below. Rated voltage VDC — Ratio of impedance $U_R \leq 6.3$ — 5 $6.3 < U_R < 16$ — 4 $16 < U_R \leq 160$ — 3 $U_R < 160$ — 6
Charge and discharge	384-4	Number of cycles: 10^6 Temp: 20°C Charge Applied voltage: U_R Duration: 0.5 s Time constant 0.1 s Discharge The discharge resistor to give a time constant = 0.1 s	No leakage of electrolyte or other visible damage. ΔC/C ≤ 10%
Fire Hazard Testing	695-2-2	Needle-flame test. Duration of test flame: 30 s	Max burning time after removal of test-flame: 30 s

PEG 124 125°C and 105°C

- **125°C and 105°C**
- **Long Life > 30 years at 50°C**
- **Low ESR**
- **Low ESL**

APPLICATION

Smoothing, coupling/decoupling and energy storage in telecommunication, power supply system, data processing, process control and measuring where Long Life and high reliability are of paramount importance.

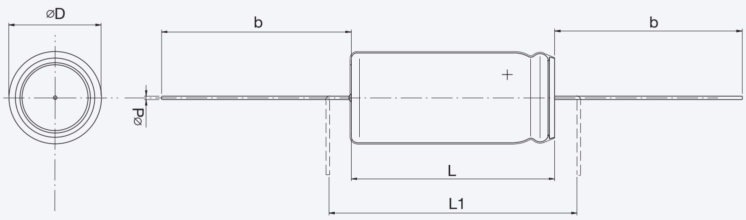
BASIC DESIGN

PEG 124 is an electrolytic capacitor with very Long Life and outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case, plastic insulation. Long Life and very high reliability are achieved by the dimensioning of the capacitor, the careful selection of materials/ methods and discipline in quality control allowing operation up to +125°C/105°C.

The PEG 124 winding is housed in a cylindrical aluminium can with a high purity aluminium lid and a high quality rubber gasket. The sealing system is designed for electrolyte leakage free operation and a very low gasdiffusion rate of electrolyte. Low ESR is a result of a low resistive electrolyte/paper system and an all-welded design. Thanks to its mechanical robustness the PEG 124 is also suitable for use in mobile and in aircraft installations.

SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/125/56, DIN 41240, type 1A and 1B, DIN 40040 GKF, IEC 384-4 Long Life Grade 40/105/56, DIN 41240, type 1A and 1B, DIN 40040 GMF,
CECC	CECC 30301-053 (10–450 VDC)
Capacitance range	1–4700µF
Capacitance tolerance	–10 to +30%
Rated voltage	10–450 VDC
Temperature range	–40 to +125°C
Operational life time	27500 h at 105°C (case ⌀ = 20 mm)
Shelf life	5000 h at 0V +105°C or 10 years at 0V +40°C +40°C 10 years
Diameter range	10 – 20 mm



Dimensions table PEG 124 (mm)

D x L	Case code	D ±0.5	d ±0.03	L ±1	L_1 min	b + 3/–2 Box	b + 3/–2 Taped	Weight approx (g)
10 x 20	A	10	0.8	20.0	26.0	–	31	3
10 x 29	B	10	0.8	29.0	35.0	–	27	4
13 x 20	C	13	0.8	20.0	26.0	–	31	4
13 x 29	D	13	0.8	29.0	35.0	–	27	6
13 x 37	E	13	0.8	37.0	43.0	42	24	7
16 x 29	F	16	0.8	29.0	35.0	42	–	8
16 x 37	G	16	0.8	37.0	43.0	42	–	11
20 x 29	H	20	0.8	29.0	35.0	42	–	13
20 x 37	J	20	0.8	37.0	43.0	42	–	20
20 x 46	L	20	0.8	46.0	52.0	42	–	24

ARTICLE TABLE PEG 124 (125°C)

C_R µF	D x L mm	Case code	I_{RAC} * 125°C 100 Hz mA	I_{RAC} 40°C 20kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L_{ESL} Approx. nH	Article code 1st block
				10 VDC (U_R)				
1000	16 x 29	F	1035	4.6	0.20	0.14	10	PEG124EF4100Q
1500	16 x 37	G	1276	5.6	0.14	0.10	12	PEG124EG4150Q
2200	20 x 37	J	1804	8.0	0.09	0.06	15	PEG124EJ4220Q
3300	20 x 46	L	2088	8.8	0.07	0.05	17	PEG124EL4330Q
				16 VDC (U_R)				
68	10 x 20	A	130	0.95	2.40	1.60	5	PEG124GA2680Q
100	10 x 20	A	191	1.2	1.70	1.10	5	PEG124GA3100Q
150	10 x 29	B	287	1.5	1.10	0.71	6	PEG124GB3150Q
220	10 x 29	B	315	1.5	0.80	0.54	6	PEG124GB3220Q
220	13 x 20	C	422	3.9	0.39	0.14	6	PEG124GC322AQ
330	13 x 29	D	515	2.6	0.50	0.33	8	PEG124GD3330Q
470	13 x 20	C	645	3.9	0.25	0.12	6	PEG124GC347AQ
470	13 x 29	D	632	3.1	0.37	0.25	8	PEG124GD3470Q
680	13 x 37	E	851	4.6	0.20	0.12	10	PEG124GE3680Q
680	16 x 29	F	850	4.0	0.26	0.18	10	PEG124GF3680Q
680	16 x 29	F	1005	7.6	0.13	0.05	10	PEG124GF368AQ
1000	16 x 29	F	1166	7.6	0.11	0.05	10	PEG124GF410AQ
1000	16 x 37	G	1031	4.8	0.19	0.13	12	PEG124GG4100Q
1500	16 x 37	G	1490	9.3	0.07	0.04	12	PEG124GG415AQ
1500	20 x 37	J	1372	6.0	0.14	0.10	´15	PEG124GJ4150Q
2200	16 x 37	G	1720	9.3	0.06	0.04	12	PEG124GG422AQ
2200	20 x 46	L	1782	8.0	0.09	0.06	17	PEG124GL4220Q
3300	20 x 37	J	2251	11.8	0.04	0.02	15	PEG124GJ433AQ
4700	20 x 37	J	2685	12.7	0.04	0.02	15	PEG124GJ447AQ
				25 VDC (U_R)				
47	**10 x 20**	**A**	**141**	**1.1**	**2.40**	**1.30**	**5**	**PEG124HA2470Q**
100	**10 x 29**	**B**	**255**	**1.5**	**1.20**	**0.67**	**6**	**PEG124HB3100Q**
220	13 x 20	C	452	3.1	0.46	0.20	6	PEG124HC322AQ
220	13 x 29	D	448	2.6	0.59	0.32	8	PEG124HD3220Q
330	13 x 20	C	525	3.1	0.37	0.20	6	PEG124HC333AQ
330	13 x 37	E	570	3.4	0.36	0.20	10	PEG124HE3330Q
470	**16 x 29**	**F**	**806**	**4.7**	**0.25**	**0.14**	**10**	**PEG124HF3470Q**
470	16 x 29	F	827	6.1	0.20	0.08	10	PEG124HF347AQ
680	16 x 29	F	946	6.0	0.17	0.08	10	PEG124HF368AQ
680	16 x 37	G	960	5.3	0.19	0.11	12	PEG124HG3680Q
1000	**16 x 37**	**G**	**1248**	**7.8**	**0.11**	**0.05**	**12**	**PEG124HG410AQ**
1000	20 x 37	J	1323	7.4	0.12	0.07	15	PEG124HJ4100Q
1500	16 x 37	G	1437	7.8	0.09	0.06	12	PEG124HG415AQ
1500	20 x 46	L	1659	8.9	0.09	0.05	17	PEG124HL4150Q
2200	**20 x 37**	**J**	**1803**	**9.5**	**0.06**	**0.04**	**15**	**PEG124HJ422BQ**
3300	**20 x 37**	**J**	**2067**	**9.5**	**0.06**	**0.04**	**15**	**PEG124HJ433BQ**
4000	20 x 46	L	2454	12.3	0.04	0.02	17	PEG124HL440BM
				40 VDC (U_R)				
33	10 x 20	A	153	1.1	2.90	1.30	5	PEG124KA2330Q
68	10 x 29	B	221	1.5	1.40	0.65	6	PEG124KB2680Q
150	13 x 20	C	381	3.1	0.58	0.20	6	PEG124KC315AQ
150	13 x 29	D	416	2.8	0.62	0.29	8	PEG124KD3150Q
220	13 x 20	C	452	3.1	0.44	0.20	6	PEG124KC322AQ
220	13 x 37	E	487	3.5	0.44	0.19	10	PEG124KE3220Q
220	16 x 29	F	575	3.9	0.41	0.19	10	PEG124KF3220Q
330	16 x 29	F	739	6.1	0.24	0.08	10	PEG124KF333AQ
330	16 x 37	G	692	4.8	0.29	0.13	12	PEG124KG3330Q
470	16 x 29	F	827	6.1	0.20	0.08	10	PEG124KF347CQ
470	20 x 37	J	898	6.0	0.22	0.10	15	PEG124KJ3470Q
680	16 x 37	G	1048	7.7	0.13	0.05	12	PEG124KG368AQ
680	20 x 37	J	1132	7.3	0.15	0.07	15	PEG124KJ3680Q

* Maximum values
Items marked in **bold**, are available on short lead-times

ARTICLE TABLE PEG 124 (125°C)

C_R µF	D x L mm	Case code	I_{RAC} * 125°C 100 Hz mA	I_{RAC} 40°C 20kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L_{ESL} Approx. nH	Article code 1st block
40 VDC (U_R)								
1000	16 x 37	G	1242	7.8	0.11	0.05	12	PEG124KG410AQ
1000	20 x 46	L	1414	8.8	0.10	0.05	17	PEG124KL4100Q
1500	20 x 37	J	1598	9.5	0.07	0.04	15	PEG124KJ415AQ
2200	20 x 37	J	1900	9.6	0.06	0.04	15	PEG124KJ422AQ
63 VDC (U_R)								
10	10 x 20	A	76	0.9	5.90	1.60	5	PEG124MA2100Q
15	10 x 20	A	113	1.0	4.30	1.40	5	PEG124MA2150Q
22	**10 x 20**	**A**	**134**	**1.1**	**3.40**	**1.20**	**5**	**PEG124MA2220Q**
33	10 x 29	B	158	1.4	2.20	0.78	6	PEG124MB2330Q
47	**10 x 29**	**B**	**190**	**1.6**	**1.60**	**0.55**	**6**	**PEG124MB2470Q**
68	13 x 29	D	274	2.3	1.10	0.40	8	PEG124MD2680Q
100	**13 x 29**	**D**	**355**	**3.0**	**0.74**	**0.26**	**8**	**PEG124MD3100Q**
100	13 x 20	C	328	3.1	0.73	0.22	6	PEG124MC310AQ
150	16 x 29	F	491	4.0	0.50	0.18	10	PEG124MF3150Q
150	13 x 29	D	455	3.6	0.46	0.15	8	PEG124MD315AQ
220	16 x 29	F	647	6.1	0.29	0.08	10	PEG124MF322AQ
220	**16 x 37**	**G**	**610**	**5.0**	**0.34**	**0.12**	**12**	**PEG124MG3220Q**
330	16 x 29	F	737	6.1	0.24	0.08	10	PEG124MF333AQ
330	20 x 37	J	845	6.8	0.22	0.08	15	PEG124MJ3330Q
470	16 x 37	G	927	7.5	0.17	0.06	12	PEG124MG347AQ
470	20 x 46	L	1018	7.9	0.16	0.06	17	PEG124ML3470Q
680	**16 x 37**	**G**	**1090**	**7.5**	**0.14**	**0.06**	**12**	**PEG124MG368AQ**
1000	**20 x 37**	**J**	**1399**	**9.2**	**0.09**	**0.04**	**15**	**PEG124MJ410AQ**
1500	20 x 46	L	1715	10.2	0.07	0.04	17	PEG124ML415AQ
100 VDC (U_R)								
4.7	10 x 20	A	54	0.8	16.00	2.80	5	PEG124PA1470Q
10	**10 x 29**	**B**	**79**	**1.1**	**7.70**	**1.40**	**6**	**PEG124PB2100Q**
22	**13 x 29**	**D**	**132**	**1.4**	**3.90**	**1.00**	**8**	**PEG124PD2220Q**
33	13 x 29	D	199	1.7	2.10	0.80	8	PEG124PD2330Q
47	**13 x 37**	**E**	**222**	**1.5**	**1.80**	**0.92**	**10**	**PEG124PE2470Q**
68	16 x 29	F	336	2.7	1.10	0.43	10	PEG124PF2680Q
100	**16 x 37**	**G**	**412**	**3.3**	**0.74**	**0.29**	**12**	**PEG124PG3100Q**
150	20 x 37	J	573	4.0	0.55	0.26	15	PEG124PJ3150Q
220	**16 x 37**	**G**	**582**	**3.3**	**0.51**	**0.30**	**12**	**PEG124PG322AQ**
220	20 x 46	L	710	4.9	0.40	0.19	17	PEG124PL3220Q

ARTICLE TABLE PEG 124 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz mA	I_{RAC} 40°C 20kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L_{ESL} Approx. nH	Article code 1st block
200 VDC (U_R)								
5.6	**10 x 20**	**A**	**49**	**0.38**	**20.00**	**10.0**	**5**	**PEG 124RA156BM**
10	**10 x 29**	**B**	**65**	**0.47**	**10.00**	**4.20**	**6**	**PEG 124RB2100Q**
15	13 x 29	D	96	0.74	6.30	2.40	8	PEG 124RD2150Q
22	**13 x 29**	**D**	**120**	**0.86**	**4.60**	**1.90**	**8**	**PEG 124RD2220Q**
33	16 x 29	F	167	1.20	3.10	1.30	10	PEG 124RF2330Q
47	**16 x 29**	**F**	**210**	**1.50**	**2.20**	**0.92**	**10**	**PEG 124RF2470Q**
68	20 x 29	H	294	2.00	1.50	0.66	12	PEG 124RH2680Q
100	**20 x 37**	**J**	**353**	**2.40**	**1.00**	**0.44**	**15**	**PEG 124RJ3100Q**
150	**20 x 46**	**L**	**446**	**3.10**	**0.69**	**0.30**	**17**	**PEG 124RL3150Q**

*Maximum values
Items marked in **bold**, are available on short lead-times

ARTICLE TABLE PEG 124 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz mA	I_{RAC} 40°C 20kHz A	ESR* 20°C 100 Hz Ω	ESR* 20°C 100 kHz Ω	L_{ESL} Approx. nH	Article code 1st block
350 VDC (U_R)								
4.7	10 x 29	B	55	0.37	17.00	7.50	6	PEG124UB1470Q
6.8	13 x 29	D	92	0.59	9.00	4.20	8	PEG124UD1680Q
10	13 x 29	D	102	0.65	7.60	3.60	8	PEG124UD2100Q
22	16 x 29	F	184	1.20	3.30	1.50	10	PEG124UF2220Q
33	20 x 29	H	248	1.60	2.30	1.10	12	PEG124UH2330Q
47	20 x 37	J	328	2.10	1.50	0.66	15	PEG124UJ2470Q
68	20 x 46	L	389	2.50	1.10	0.50	17	PEG124UL2680Q
400 VDC (U_R)								
2.2	10 x 29	B	42	0.27	25.00	12.00	6	PEG124VB1220Q
4.7	**13 x 29**	**D**	**78**	**0.52**	**11.00**	**5.10**	**8**	**PEG124VD1470Q**
10	**13 x 37**	**E**	**116**	**0.70**	**5.90**	**3.00**	**10**	**PEG124VE2100Q**
22	**16 x 37**	**G**	**209**	**1.40**	**2.70**	**1.20**	**12**	**PEG124VG2220Q**
33	20 x 37	J	304	1.90	1.60	0.76	15	PEG124VJ2330Q
47	**20 x 46**	**L**	**377**	**2.40**	**1.20**	**0.53**	**17**	**PEG124VL2470Q**
450 VDC (U_R)								
1.0	10 x 20	A	30	0.21	49.00	20.00	5	PEG124YA1100Q
2.2	**10 x 29**	**B**	**43**	**0.29**	**24.00**	**11.00**	**6**	**PEG124YB1220Q**
3.3	10 x 29	B	55	0.38	17.00	7.30	6	PEG124YB1330Q
4.7	**13 x 29**	**D**	**79**	**0.54**	**11.00**	**4.80**	**8**	**PEG124YD1470Q**
6.8	**13 x 29**	**D**	**97**	**0.61**	**8.30**	**4.00**	**8**	**PEG124YD1680Q**
10	**16 x 29**	**F**	**133**	**0.82**	**5.70**	**2.80**	**10**	**PEG124YF2100Q**
10	16 x 37	F	141	1.40	4.60	1.70	10	PEG124YF210AT
15	**16 x 37**	**G**	**171**	**1.10**	**3.60**	**1.70**	**12**	**PEG124YG2150Q**
15	20 x 29	H	185	1.60	3.30	1.40	12	PEG124YH215AQ
22	**20 x 29**	**H**	**240**	**1.60**	**2.40**	**1.10**	**12**	**PEG124YH2220Q**
22	20 x 37	J	242	2.30	2.10	0.80	15	PEG124YJ222AT
33	**20 x 37**	**J**	**306**	**2.00**	**1.60**	**0.74**	**15**	**PEG124YJ2330Q**
47	20 x 46	L	377	2.40	1.20	0.53	17	PEG124YL2470Q

* Maximum values
Items marked in **bold**, are available on short lead-times

OPERATIONAL DATA

Please see operational lifetime section, page 57.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

For U_R = 10 - 125V

T_a	Failure rate per hour
125°C	5 x 10^{-7}
105°C	1 x 10^{-7}
60°C	5 x 10^{-9}

For U_R > 125V

T_a	Failure rate per hour
105°C	1 x 10^{-6}
60°C	5 x 10^{-8}

Failure rate per hour for catastrophic plus parametric failures.

TECHNICAL DATA

Leakage current
Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)

For $U_R \leq 160$ V and $C_R \times U_R \leq 1000$
$I_{RL} = 0.01 \times C_R \times U_R$
For $U_R \leq 160$ V and $C_R \times U_R > 1000$
$I_{RL} = 0.003 \times C_R \times U_R + 4$
For $U_R > 160$ V
$I_{RL} = 0.006 \times C_R \times U_R + 4$

ORDERING INFORMATION

1st block (pos 1–13) | **2nd block** (pos 14–20)

P	E	G	1	2	4	K	D	3	1	5	0	Q	T	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q: –10 to +30%

T1: Taped delivery on reels
L1: Packed in boxes

Quantities and weights

CASE CODE	A	B	C	D	E	F	G	H	J	L
Weight approx (g)	3	4	4	6	7	8	11	13	20	24
Standard content per reel	500	500	400	400	400[1]					
Standard box quantity	250[1]	200[1]	200[1]	200[1]	100	100	100	100	100	100

[1] On request.

NOTES

PEG 126 150°C

- **150°C**
- **Resistance to vibrations**
- **Low ESR**
- **High ripple capability**

APPLICATION

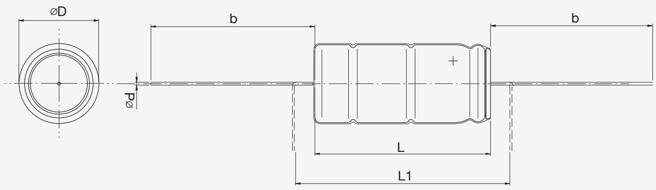
PEG 126 is a high performance axial electrolytic capacitor. It is designed for automotive applications with high demands on resistance to vibrations and high ambient temperature.

BASIC DESIGN

PEG 126 is an electrolytic capacitor with outstanding electrical performance. Polarized, all-welded design, tinned copper wire leads, negative pole connected to the case, plastic insulation. The PEG 126 winding is housed in a cylindrical aluminium can with a high purity aluminium lid and a high quality rubber gasket. Low ESR is a result of a low resistive electrolyte / paper system and an all-welded design. Thanks to its mechanical robustness the PEG 126 is suitable for use in mobile and aircraft installations, operation up to 150°C.

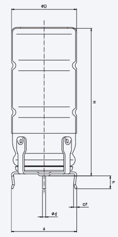
SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/125/56
Capacitance range	470-2700µF
Capacitance tolerance	–10 to +30%
Rated voltage	40 VDC
Temperature range	–40 to +150°C
Operational life time	8500 h at 125°C (Case ⌀ = 20 mm) 6500 h at 125°C (Case ⌀ = 16 mm)
Shelf life at	5000 h at 0V+105°C, or 10 years at 0V +40°C
Diameter range	16 – 20 mm
Resistance to vibrations	10-2000 Hz, 1.5 mm displacement amplitude or max 20 g 3x12 hours The capacitors shall be clamped by their body.
Life test	2000 h, 150°C (Case ⌀ = 20 mm) 1500 h, 150°C (Case ⌀ = 16 mm)



On request
Can also be ordered with radial leads; PEH126.

Dimensions: See PEH124 on page 27



Dimensions table PEG 126 (mm)

D x L	Case code	D ±0.5	d ± 0.03	L ±1	L_1 min	b+3/-2 Box	Weight approx (g)
16 x 29	F	16	1.0	29.0	35.0	42	8
16 x 37	G	16	1.0	37.0	43.0	42	11
20 x 29	H	20	1.0	29.0	35.0	42	13
20 x 37	J	20	1.0	37.0	43.0	42	20
20 x 46	L	20	1.0	46.0	52.0	42	24

ARTICLE TABLE PEG 126 (150°C)

C_R µF	D x L mm	I_{RAC}* 125°C 100 Hz A	I_{RAC}* 105°C 5 kHz A	I_{RAC}* 125°C 5kHz A	I_{RAC}* 150°C 5kHz A	ESR* 20°C 100Hz mΩ	ESR* 20°C 100kHz mΩ	L_{ESL} Approx nH	Article code 1st block
40 VDC (U_R)									
470	16 x 29	1.1	6.3	3.5	1.0	150	45	10	PEG126KF347EQ
600	16 x 37	1.4	8.4	4.7	1.4	116	35	12	PEG126KG360EQ
1200	20 x 29	1.9	9.8	5.4	1.5	69	26	12	PEG126KH412EQ
2200	20 x 37	2.5	11.2	5.9	1.9	42	18	15	PEG126KJ422EQ
2700	20 x 46	3.0	12.0	7.0	2.1	36	17	17	PEG126KL427EQ

* Maximum specified values.

INTERMITTENT RIPPLE CURRENT

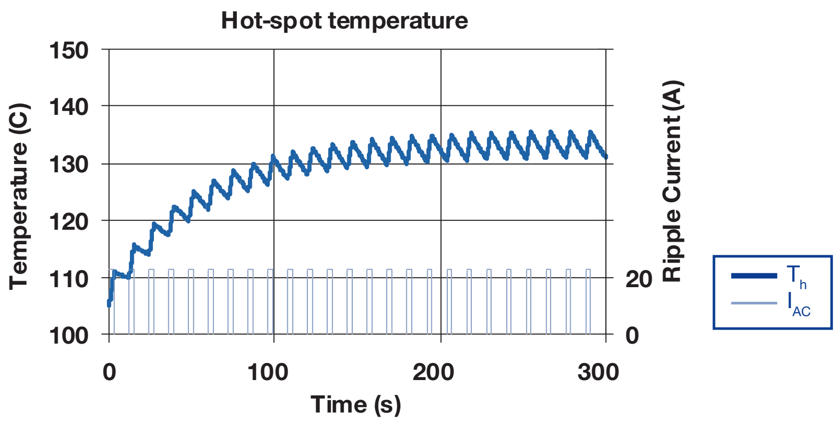
During intermittent operation, the PEG 126-capacitors allows a significant increase of ripple current compared with specified values (I_{RAC} at continoues operation). Increased ripple current, with up to x1.95, is allowed at max 25% intermittence.

Example 1
Article: PEG126KL427
23A, 5kHz during 30 s, period time 120 s
(90 s without ripple)
Ambient temperature: 105°C

⇒ Hot-spot temperature during operation:
Max 135°C (see diagram)
L_{OP} = 4700h

Example 2
Article: PEG126KL427
23A, 5kHz during 140 s, period time 17 minutes
(14.7 minutes without ripple, per cycle)
Ambient temperature: 105°C

⇒ Hot-spot temperature during operation:
Max 135°C
L_{OP} = 4700h



Operational life can be calculated for arbitrary intermittence. Please contact Customer Support.

OPERATIONAL DATA

Please see operational lifetime section, page 57

CUSTOMER DESIGN

On request PEG126 can be designed in other capacitance values and case sizes.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
125°C	5×10^{-7}
105°C	1×10^{-7}
60°C	5×10^{-9}

TECHNICAL DATA

Leakage current
Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)
$I_{RL} = 0.003 \times C_R \times U_R + 4$

ORDERING INFORMATION

1st block (pos 1–13) | **2nd block** (pos 14–20)

P	E	G	1	2	6	K	F	3	4	7	E	Q	E	1					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q: –10 to +30%

E1: Packed in boxes

Quantities and weights

CASE CODE	F	G	H	J	L
Weight approx (g)	8	11	13	20	24
Standard box quantity	100	100	100	100	100

PEH 124 125°C

- Snap-in terminals
- High performance, 125°C
- Long Life > 30 years at 50°C
- Low ESR and ESL

APPLICATION

The PEH 124 is a radial capacitor for PCB mounting with a 3-pin snap-in termination. It is mainly intended for SMPS or other applications with high ripple currents and high temperatures. Due to its very high load capability, specially at high frequencies, a single PEH 124 will in many cases replace parallel connections of two or several capacitors, with a very costeffective solution as a result.

With its mechanical robustness the PEH 124 is also very suitable for use in mobile and aviation applications.

BASIC DESIGN

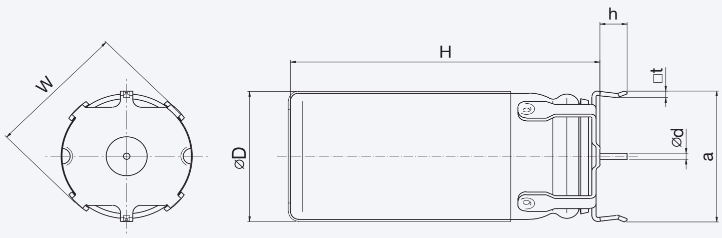
The PEH 124 electrolytic capacitor range is built on the well known PEG 124 concept with its extremely Long Life and high reliability.

The winding is housed in a cylindrical aluminium can with an aluminium lid and a high quality rubber gasket. The sealing system is designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte.

The all-welded internal connections contributes to the low ESR-value. The negative pole is connected to the case which is covered with a plastic insulation.

SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/125/56
Capacitance range	220–2200 µF
Capacitance tolerance	–10 to +30%
Rated voltage	16–63 VDC
Temperature range	–40 to +125°C
Operational life time	5000 h at +125°C
Shelf life	5000 h at 0V +105°C or 10 years at 0V +40°C
Diameter range	18 mm



Dimensions table PEH 124 (mm)

D x L	Case code	D ±0.5	H ±1	W ±0.5	d ±0.03	t ±0.1	h +0/-0.2	a ±0.1	Weight approx (g)
18 x 31	F	16.5	31	17.5	0.8	0.8	3.3	15.24	8
18 x 39	G	16.5	39	17.5	0.8	0.8	3.3	15.24	11

ARTICLE TABLE PEH 124 (125°C)

C_R µF	D x L mm	Case code	I_{RAC}* 125°C 100 Hz A	I_{RAC}* 40°C 20kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
16 VDC (U_R)								
680	18 x 31	F	1.10	8.2	130	46	10	PEH124GF368BQ
1000	18 x 31	F	1.30	8.3	100	46	10	PEH124GF410BQ
1500	18 x 39	G	1.50	10.0	72	33	12	PEH124GG415BQ
2200	18 x 39	G	1.80	10.0	60	33	12	PEH124GG422BQ
25 VDC (U_R)								
470	18 x 31	F	0.84	6.2	190	78	10	PEH124HF347BQ
680	18 x 31	F	0.98	6.2	160	78	10	PEH124HF368BQ
1000	18 x 39	G	1.20	7.5	110	55	12	PEH124HG410BQ
1500	18 x 39	G	1.40	7.6	94	55	12	PEH124HG415BQ
40 VDC (U_R)								
330	18 x 31	F	0.71	6.1	250	78	10	PEH124KF333BQ
470	18 x 31	F	0.87	6.2	190	78	10	PEH124KF347DQ
680	18 x 39	G	1.00	7.5	130	55	12	PEH124KG368BQ
1000	18 x 39	G	1.20	7.6	110	55	12	PEH124KG410BQ
63 VDC (U_R)								
220	18 x 31	F	0.64	5.9	320	90	10	PEH124MF322BQ
330	18 x 31	F	0.77	6.0	250	90	10	PEH124MF333BQ
470	18 x 39	G	0.96	7.5	170	62	12	PEH124MG347BQ
680	18 x 39	G	1.10	7.5	140	62	12	PEH124MG368BQ

* Maximum values.

OPERATIONAL DATA

Please see operational lifetime section, page 57.

RELIABILITY

The Failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
125°C	5×10^{-7}
105°C	1×10^{-7}
60°C	5×10^{-9}

Failure rate per hour for catastrophic plus parametric failures.

TECHNICAL DATA

Leakage current
Rated leakage current, I_{RL} (μA)
Rated voltage, U_R (V)
Rated capacitance, C_R (μF)

For $U_R \leq 160$ V and $C_R \times U_R \leq 1000$
$I_{RL} = 0.01 \times C_R \times U_R$

For $U_R \leq 160$ V and $C_R \times U_R > 1000$
$I_{RL} = 0.003 \times C_R \times U_R + 4$

For $U_R > 160$ V
$I_{RL} = 0.006 \times C_R \times U_R + 4$

ORDERING INFORMATION

1st block (pos 1–13)

P	E	H	1	2	4	K	D	3	1	5	0	Q
1	2	3	4	5	6	7	8	9	10	11	12	13

2nd block (pos 14–20)

L	1					
14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q: –10 to +30%

L1: Packed in boxes

Quantities and weights

CASE CODE	F	G
Weight approx (g)	8	11
Standard box quantity	100	100

PEH 430 105°C

- Snap-In
- Long Life Grade
- PCB Mounting
- Low ESR and ESL
- High ripple current

APPLICATION

Typical applications for PEH 430 would be SMPS, drives, welding equipment, UPS and other power electronic applications where high current ratings and compact size are important.

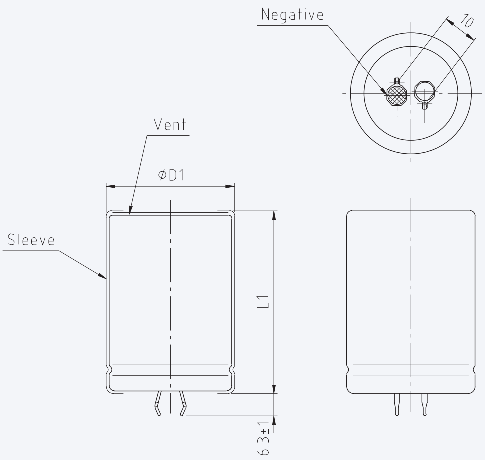
BASIC DESIGN

PEH 430 is a Long Life electrolytic capacitor designed to offer high ripple current capability and low mounting cost. The low ESR is a result of very low resistive paper/ electrolyte system.

The low ESR together with the TDC thermal concept gives the PEH 430 a high ripple current capability.

SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/105/56, in accordance with CECC 30 301-809
Capacitance range	150–22000 µF
Capacitance tolerance	–20 to +20%
Rated voltage	35–450 VDC
Temperature range	–40 to +105°C
Leakage current, I_{RL} (µA)	0.01 (µA) x C_R (µF) x U_R (V)
Operational life time	4000 hours at +105°C
Shelf life	4 years at 0 Volt and +40°C
Diameter range	25–35 mm



Dimensions table PEH 430 (mm)

D x L	Case code	D1 ±0.5	L1 ±1.0	Weight approx (g)
25 x 30	H	25.5	31	21
25 x 35	J	25.5	36	24
25 x 40	K	25.5	41	27
25 x 45	L	25.5	46	30
25 x 50	M	25.5	51	33
30 x 25	N	30.5	26	24
30 x 30	P	30.5	31	29
30 x 35	Q	30.5	36	34
30 x 40	R	30.5	41	39
30 x 45	S	30.5	46	45
30 x 50	T	30.5	51	51
35 x 25	U	35.5	26	32
35 x 30	V	35.5	31	40
35 x 35	W	35.5	36	48
35 x 40	X	35.5	41	56
35 x 45	Y	35.5	46	64
35 x 50	Z	35.5	51	72

ARTICLE TABLE PEH 430 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz A	I_{RAC} * 40°C 20kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code 1st block
35 VDC (U_R)							
5600	25 x 30	H	2.1	8.4	42	32	PEH430JH4560M2
6800	25 x 35	J	2.3	10.0	34	26	PEH430JJ4680M2
6800	30 x 25	N	2.3	10.0	34	26	PEH430JN4680M2
8200	25 x 40	K	2.8	11.3	28	22	PEH430JK4820M2
8200	30 x 30	P	2.8	11.3	28	22	PEH430JP4820M2
8200	35 x 25	U	2.8	11.3	28	22	PEH430JU4820M2
10000	25 x 45	L	3.1	12.6	24	19	PEH430JL5100M2
10000	30 x 35	Q	3.1	12.6	24	19	PEH430JQ5100M2
15000	30 x 45	S	4.6	15.4	17	13	PEH430JS5150M2
15000	35 x 35	W	4.6	15.4	17	13	PEH430JW5150M2
22000	35 x 50	Z	6.5	21.0	12	10	PEH430JZ5220M2
63 VDC (U_R)							
2200	25 x 30	H	1.7	7.5	80	56	PEH430MH4220M2
3300	25 x 40	K	2.3	9.6	51	36	PEH430MK4330M2
3300	30 x 30	P	2.3	9.6	51	36	PEH430MP4330M2
4700	30 x 40	R	2.8	12.1	37	26	PEH430MR4470M2
4700	35 x 30	V	2.8	12.1	37	26	PEH430MV4470M2
5600	30 x 45	S	3.9	14.3	30	22	PEH430MS4560M2
5600	35 x 35	W	3.9	14.3	30	22	PEH430MW4560M2
6800	30 x 50	T	4.4	15.1	26	19	PEH430MT4680M2
6800	35 x 40	X	4.4	15.1	26	19	PEH430MX4680M2
8200	35 x 45	Y	4.9	17.3	21	15	PEH430MY4820M2
10000	35 x 50	Z	5.3	18.9	18	13	PEH430MZ5100M2
100 VDC (U_R)							
1500	25 x 40	K	2.0	8.1	100	74	PEH430PK4150M2
1500	30 x 30	P	2.0	8.1	100	74	PEH430PP4150M2
2200	30 x 40	R	2.7	11.8	71	51	PEH430PR4220M2
2200	35 x 30	V	2.7	11.8	71	51	PEH430PV4220M2
3300	30 x 50	T	3.5	13.5	47	34	PEH430PT4330M2
3300	35 x 40	X	3.5	13.5	47	34	PEH430PX4330M2
3900	35 x 45	Y	3.9	15.0	40	29	PEH430PY4390M2
4700	35 x 50	Z	4.4	16.5	34	25	PEH430PZ4470M2
200 VDC (U_R)							
470	25 x 35	J	1.4	5.9	240	115	PEH430RJ3470M2
560	25 x 40	K	1.5	6.6	200	102	PEH430RK3560M2
560	30 x 30	P	1.5	6.6	200	102	PEH430RP3560M2
680	25 x 45	L	1.7	7.3	170	84	PEH430RL3680M2
680	30 x 35	Q	1.7	7.3	170	84	PEH430RQ3680M2
680	35 x 30	V	1.7	7.3	170	84	PEH430RV3680M2
820	30 x 40	R	1.9	8.5	130	71	PEH430RR3820M2
820	35 x 30	V	1.9	8.5	130	71	PEH430RV3820M2
1000	30 x 50	T	2.1	10.0	110	58	PEH430RT4100M2
1000	35 x 35	W	2.1	10.0	110	58	PEH430RW4100M2
1500	35 x 45	Y	2.6	12.5	74	37	PEH430RY4150M2
250 VDC (U_R)							
390	25 x 40	K	1.4	6.3	330	190	PEH430SK3390M2
390	30 x 30	P	1.4	6.3	330	190	PEH430SP3390M2
470	25 x 45	L	1.5	6.5	270	150	PEH430SL3470M2
470	30 x 35	Q	1.5	6.5	270	150	PEH430SQ3470M2
470	35 x 30	V	1.5	6.5	270	150	PEH430SV3470M2
560	25 x 50	M	1.7	7.4	220	130	PEH430SM3560M2

* Maximum values

ARTICLE TABLE PEH 430 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz A	I_{RAC} * 40°C 20kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	Article code 1st block
250 VDC (U_R)							
560	30 x 40	R	1.7	7.4	220	130	PEH430SR3560M2
680	30 x 45	S	1.8	8.7	190	110	PEH430SS3680M2
680	35 x 35	W	1.8	8.7	190	110	PEH430SW3680M2
820	30 x 50	T	2.1	9.2	150	88	PEH430ST3820M2
820	35 x 40	X	2.1	9.2	150	88	PEH430SX3820M2
1000	35 x 45	Y	2.3	10.6	130	72	PEH430SY4100M2
350 VDC (U_R)							
220	25 x 40	K	1.0	4.4	410	195	PEH430UK3220M2
220	30 x 30	P	1.0	4.4	410	195	PEH430UP3220M2
220	35 x 25	U	1.0	4.4	410	195	PEH430UU3220M2
330	30 x 40	R	1.3	5.6	270	135	PEH430UR3330M2
330	35 x 30	V	1.3	5.6	270	135	PEH430UV3330M2
390	30 x 45	S	1.5	6.7	235	115	PEH430US3390M2
390	35 x 35	W	1.5	6.7	235	115	PEH430UW3390M2
470	35 x 40	X	1.7	7.1	200	94	PEH430UX3470M2
560	35 x 45	Y	1.9	8.0	180	79	PEH430UY3560M2
400 VDC (U_R)							
150	25 x 35	J	0.83	3.6	700	360	PEH430VJ3150M2
150	30 x 25	N	0.83	3.6	700	360	PEH430VN3150M2
220	25 x 45	L	1.1	4.6	470	250	PEH430VL3220M2
220	30 x 35	Q	1.1	4.6	470	250	PEH430VQ3220M2
220	**35 x 30**	**V**	**1.1**	**4.6**	**470**	**250**	**PEH430VV3220M2**
330	30 x 45	S	1.4	5.8	320	165	PEH430VS3330M2
330	**35 x 35**	**W**	**1.4**	**5.8**	**320**	**165**	**PEH430VW3330M2**
390	30 x 50	T	1.5	6.4	270	138	PEH430VT3390M2
390	**35 x 40**	**X**	**1.5**	**6.4**	**270**	**138**	**PEH430VX3390M2**
470	**35 x 45**	**Y**	**1.7**	**7.3**	**220**	**115**	**PEH430VY3470M2**
560	**35 x 50**	**Z**	**1.8**	**7.9**	**185**	**96**	**PEH430VZ3560M2**
450 VDC (U_R)							
150	**25 x 40**	**K**	**0.80**	**3.5**	**680**	**375**	**PEH430YK3150M2**
150	30 x 30	P	0.80	3.5	680	375	PEH430YP3150M2
150	35 x 25	U	0.80	3.5	680	375	PEH430YU3150M2
220	**30 x 40**	**R**	**1.1**	**4.6**	**470**	**255**	**PEH430YR3220M2**
220	35 x 30	V	1.1	4.6	470	255	PEH430YV3220M2
330	30 x 50	T	1.4	5.8	310	170	PEH430YT3330M2
330	**35 x 40**	**X**	**1.4**	**5.8**	**310**	**170**	**PEH430YX3330M2**
390	**35 x 45**	**Y**	**1.6**	**6.5**	**260**	**134**	**PEH430YY3390M2**
470	**35 x 50**	**Z**	**1.7**	**7.2**	**220**	**120**	**PEH430YZ3470M2**

* Maximum values
Standard range items are marked in **bold** and are available from stock.
Minimum annual usage for the non-standard range items is 10 000 pcs.

OPERATIONAL DATA

Please see operational life section, page 57.

MECHANICAL DATA

The capacitor may be mounted in any position. The PEH 430 is supplied with PVC insulation sleeve, thickness 0.3 mm. Voltage proof of the insulation sleeve = 2.5 kVDC (1 min). The minus pole is marked on the case surface.

ORDERING INFORMATION

1st block (pos 1–13)													**2nd block** (pos 14–20)
P	**E**	**H**	**4**	**3**	**0**	**J**	**H**	**4**	**5**	**6**	**0**	**M**	**2**
1	2	3	4	5	6	7	8	9	10	11	12	13	14

Pos. 13: Capacitance tolerance M = –20 to +20%

Quantities and weights

CASE CODE	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X	Y	Z
Weight approx (g)	21	24	27	30	33	24	29	34	39	45	51	32	40	48	56	64	72
Standard box quantity	100	100	100	100	100	100	100	100	100	100	100	400	400	400	400	400	400

TYPICAL DATA PEH 430

Fig. 1
C_T = C (f=100 Hz,T_h) / C (f=100 Hz,T_h = 20°C) vs T_h

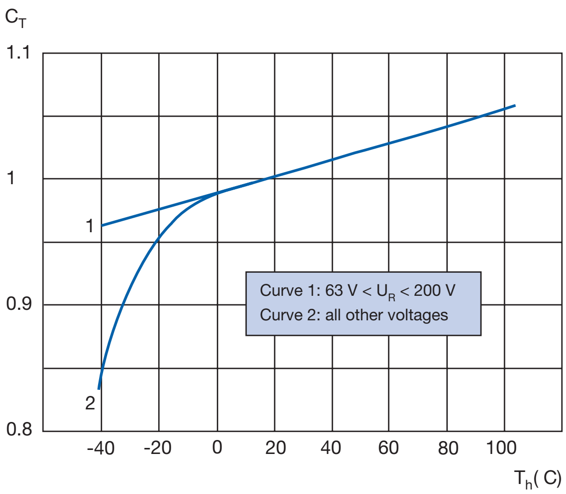


Fig. 4
k_f = ESR (f, T_h = 20°C) / ESR (f = 100 Hz, T_h = 20°C) vs f

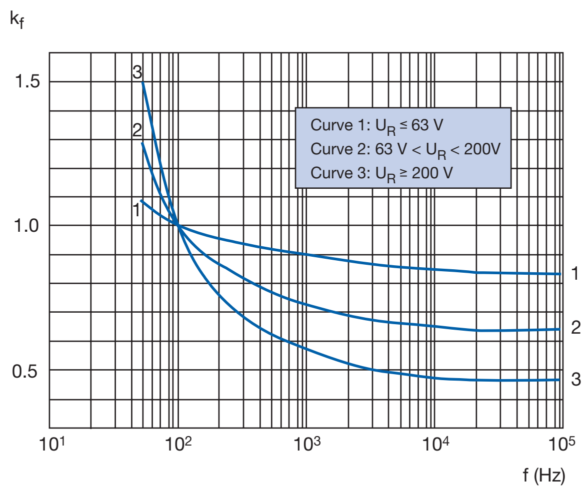


Fig. 2
k_T = ESR (f, T_h) / ESR (f, T_h = 20°C) vs T_h, U_R < 200 V

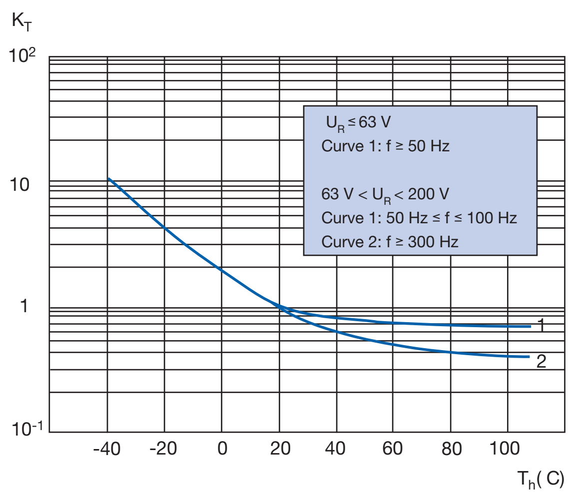
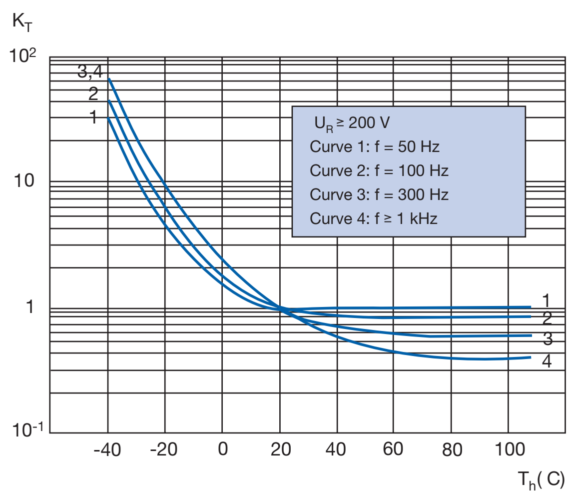


Fig. 5
k_T = ESR (f, T_h) / ESR (f, T_h = 20°C) vs T_h, U_R • 200 V



THERMAL RESISTANCE

Thermal resistance for different case sizes, as a function of case air speed v.

R_{th} Thermal resistance between hot-spot and ambient
R_{thca} Thermal resistance between case and amibient

At ambient temperature T_a = 40°C

Case	Air speed v											
	v=0.5 m/s		v=1.0 m/s		v=2.0 m/s		v=3.0 m/s		v=4.0 m/s		v=5.0 m/s	
	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}	R_{thca}	R_{th}
	˚C/W		˚C/W		˚C/W		˚C/W		˚C/W		˚C/W	
25x30	19,3	20,2	15,3	16,1	12,0	12,8	10,5	11,3	9,2	10,0	8,2	9,1
25x45	14,7	16,2	11,8	13,3	9,4	10,9	8,4	9,9	7,4	8,9	6,8	8,3
30x25	18,9	19,5	14,9	15,5	11,7	12,3	10,0	10,6	8,7	9,3	7,8	8,4
30x50	11,9	12,9	9,7	10,7	7,8	8,8	6,8	7,8	6,1	7,1	5,5	6,6
35x25	16,5	17,0	13,1	13,6	10,5	11,0	8,6	9,1	7,5	8,0	6,7	7,2
35x50	10,5	11,3	8,5	9,3	7,0	7,8	5,9	6,7	5,3	6,0	4,8	5,6

PEH 169 85°C

- **High CV-value**
- **Long Life, > 10 years at 50°C**
- **Low ESR and ESL**
- **High stability, 10 years shelf life**

APPLICATION

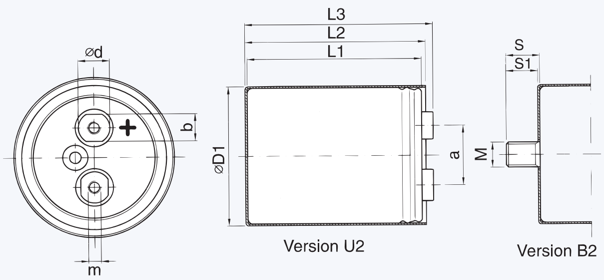
Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

BASIC DESIGN

PEH 169 is a Long Life electrolytic capacitor with outstanding reliability and electrical performance. Polarized, all-welded design, heavy duty screw terminals, negative pole connected to the case, safety vent and plastic insulation. The PEH 169 winding is housed in a cylindrical aluminium can with a rein-forced moulded lid incorporating a safety vent. The sealing system is designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and the case allows excellent heat transfer from the winding to the ambient, which means cooler operation. Low ESR is a result of a low resistive paper/electrolyte system, at least two tabs per foil and all-welded design.

SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/85/56, DIN 41240, type 1A CECC 30300 DIN 40040 GPF, DIN 41248
CECC	CECC 30301-058, Corresponding to CECC 30301-803
British Telecom	BT No. 4513A
Capacitance range	68–470000 µF
Capacitance tolerance	–20 to +20%
Rated voltage	10–450 VDC
Temperature range	–40 to +85°C
Operational life time	78000 h at +85°C (case ⌀ = 90 mm)
Shelf life	5000 h at 0V +85°C, or 10 years at 0V +40°C
Diameter range	35–90 mm



Dimensions table PEH 169 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 169 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C *** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
10 VDC (U_R)									
10000	35 x 51	A	8.6	26.0	16.8	34	28	12	PEH169EA510VM
15000	35 x 51	A	10.0	28.3	18.9	24	20	12	PEH169EA515VM
22000	35 x 60	B	11.9	32.3	22.1	18	15	12	PEH169EB522VM
33000	35 x 75	C	14.6	37.6	27.2	12	10	12	PEH169EC533VM
47000	35 x 95	D	16.1	38.9	29.0	10	9	12	PEH169ED547VM
68000	50 x 75	H	17.4	42.3	29.8	9	8	16	PEH169EH568VM
100000	50 x 95	J	20.1	47.1	34.3	7	6	16	PEH169EJ610VM
150000	50 x 105	K	20.7	47.4	34.7	7	7	16	PEH169EK615VM
220000	65 x 105	O	21.9	48.2	36.0	8	8	16	PEH169EO622VM
330000	75 x 115	U	31.4	68.1	51.9	5	4	17	PEH169EU633VM
470000	75 x 145	V	33.6	71.0	55.5	4	4	17	PEH169EV647VM
16 VDC (U_R)									
10000	35 x 51	A	9.1	27.4	18.3	28	22	12	PEH169GA510VM
15000	35 x 51	A	10.5	30.8	20.5	19	15	12	PEH169GA515VM
22000	35 x 75	C	13.2	36.2	25.7	14	11	12	PEH169GC522VM
33000	35 x 95	D	15.4	39.7	29.4	10	8	12	PEH169GD533VM
47000	50 x 75	H	17.8	42.6	30.6	10	8	16	PEH169GH547VM
68000	50 x 95	J	20.2	47.0	34.6	7	7	16	PEH169GJ568VM
100000	65 x 105	O	23.3	52.2	39.6	8	7	16	PEH169GO610VM
150000	75 x 105	T	31.2	68.5	53.0	5	5	17	PEH169GT615VM
220000	75 x 115	U	31.6	69.2	52.9	5	4	17	PEH169GU622VM
330000	75 x 145	V	33.5	69.5	55.8	4	4	17	PEH169GV633VM
25 VDC (U_R)									
6800	35 x 51	A	8.3	27.4	18.3	30	22	12	PEH169HA468VM
10000	35 x 51	A	9.6	30.7	20.1	24	18	12	PEH169HA510VM
15000	35 x 75	C	12.3	36.2	25.7	15	11	12	PEH169HC515VM
22000	35 x 95	D	14.3	39.5	29.3	11	8	12	PEH169HD522VM
33000	50 x 75	H	16.3	42.4	29.8	10	8	16	PEH169HH533VM
47000	50 x 95	J	19.0	47.0	34.4	8	7	16	PEH169HJ547VM
68000	65 x 105	O	21.6	49.6	37.3	8	7	16	PEH169HO568VM
100000	75 x 105	T	30.1	61.2	52.2	5	5	17	PEH169HT610VM
150000	75 x 115	U	31.1	69.8	53.1	5	4	17	PEH169HU615VM
220000	75 x 145	V	33.1	71.0	55.9	4	4	17	PEH169HV622VM
40 VDC (U_R)									
4700	35 x 51	A	7.7	28.3	18.9	32	20	12	PEH169KA447VM
6800	35 x 60	B	9.0	30.4	21.1	23	15	12	PEH169KB468VM
10000	35 x 75	C	10.9	33.7	24.5	18	13	12	PEH169KC510VM
15000	35 x 95	D	13.0	37.5	28.6	11	8	12	PEH169KD515VM
22000	50 x 75	H	16.3	45.3	32.0	11	8	16	PEH169KH522VM
33000	50 x 95	J	17.8	46.3	32.9	9	8	16	PEH169KJ533VM
47000	65 x 105	O	21.7	50.7	38.7	8	7	16	PEH169KO547VM
68000	75 x 105	T	28.8	63.6	51.3	5	5	17	PEH169KT568VM
100000	75 x 115	U	29.7	68.1	51.6	5	4	17	PEH169KU610VM
150000	75 x 145	V	32.0	69.5	55.1	4	4	17	PEH169KV615VM
63 VDC (U_R)									
2200	35 x 51	A	5.9	25.1	17.1	46	24	12	PEH169MA422VM
3300	35 x 51	A	7.1	31.1	19.4	30	15	12	PEH169MA433VM
4700	35 x 75	C	8.8	33.2	23.9	23	12	12	PEH169MC447VM
6800	35 x 95	D	10.1	34.9	27.0	17	9	12	PEH169MD468VM
10000	50 x 75	H	13.3	40.2	29.3	14	9	16	PEH169MH510VM

* Maximum values.
** Capacitance tolerance: −10 to +30%.
*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C_R	D x L	Case code	I_{RAC} * 85°C	I_{RAC} * 50°C ***	I_{RAC} * 40°C	ESR* 20°C	ESR* 20°C	L_{ESL} Approx.	Article code 1st block
			100 Hz	10 kHz	10 kHz	100 Hz	100 kHz		
µF	mm		A	A	A	mΩ	mΩ	nH	
63 VDC (U_R)									
15000	50 x 95	J	15.7	44.0	33.5	11	7	16	PEH169MJ515VM
22000	50 x 105	K	17.9	48.2	35.8	9	7	16	PEH169MK522VM
33000	75 x 105	T	27.5	71.3	54.4	6	5	17	PEH169MT533VM
47000	75 x 115	U	29.6	73.0	55.9	5	4	17	PEH169MU547VM
68000	75 x 145	V	30.0	68.8	54.2	5	4	17	PEH169MV568VM
68000**	75 x 145	V	29.4	65.0	52.6	6	5	17	PEH169MV568AQ
82000**	75 x 145	V	28.2	66.7	49.7	5	4	17	PEH169MV582BQ
100 VDC (U_R)									
1000	35 x 51	A	4.1	16.4	11.1	120	75	12	PEH169PA410VM
1500	35 x 51	A	5.0	19.5	13.1	80	51	12	PEH169PA415VM
2200	35 x 75	C	6.1	21.5	15.5	61	41	12	PEH169PC422VM
3300	35 x 95	D	7.4	24.3	18.3	42	29	12	PEH169PD433VM
4700	50 x 75	H	10.5	34.4	24.3	31	22	16	PEH169PH447VM
6800	50 x 95	J	12.6	39.2	28.7	22	15	16	PEH169PJ468VM
10000	50 x 105	K	13.9	38.6	29.1	17	13	16	PEH169PK510VM
15000	65 x 105	O	18.4	48.5	36.3	13	10	16	PEH169PO515VM
22000	75 x 115	U	25.4	67.3	51.3	8	6	17	PEH169PU522VM
33000	75 x 145	V	28.5	71.0	55.2	6	5	17	PEH169PV533VM
33000**	75 x 145	V	27.3	67.3	51.5	7	6	17	PEH169PV533AQ
160 VDC (U_R)									
470	35 x 51	A	2.5	13.6	9.0	240	110	12	PEH169QA347VM
680	35 x 51	A	3.0	14.3	9.7	190	98	12	PEH169QA368VM
1000	35 x 75	C	3.9	17.2	12.2	130	66	12	PEH169QC410VM
1500	35 x 95	D	4.7	19.4	14.7	87	45	12	PEH169QD415VM
2200	50 x 75	H	6.7	26.5	18.1	59	31	16	PEH169QH422VM
3300	50 x 95	J	8.2	30.6	22.9	44	24	16	PEH169QJ433VM
4700	65 x 105	O	10.9	35.8	26.8	31	17	16	PEH169QO447VM
6800	75 x 105	T	14.6	50.2	37.2	21	12	17	PEH169QT468VM
10000	75 x 115	U	17.0	53.6	41.7	16	10	17	PEH169QU510VM
15000	75 x 145	V	19.6	58.2	43.4	12	7	17	PEH169QV515VM
200 VDC (U_R)									
470	35 x 51	A	2.6	13.4	9.2	240	110	12	PEH169RA347VM
680	35 x 60	B	3.3	15.2	11.1	170	79	12	PEH169RB368VM
1000	35 x 95	D	4.0	18.9	13.9	110	53	12	PEH169RD410VM
1500	50 x 75	H	5.8	24.0	18.1	79	40	16	PEH169RH415VM
2200	50 x 95	J	7.0	28.3	21.5	55	28	16	PEH169RJ422VM
3300	50 x 105	K	8.5	32.1	24.3	39	21	16	PEH169RK433VM
4700	65 x 105	O	11.0	35.5	27.1	35	22	16	PEH169RO447VM
6800	75 x 105	T	14.6	48.1	36.2	23	15	17	PEH169RT468VM
10000	75 x 145	V	17.3	52.0	41.3	17	11	17	PEH169RV510VM
250 VDC (U_R)									
220	35 x 51	A	1.8	8.4	6.0	500	260	12	PEH169SA322VM
330	35 x 51	A	2.2	10.6	7.3	340	170	12	PEH169SA333VM
470	35 x 60	B	2.7	11.9	8.7	240	130	12	PEH169SB347VM
680	35 x 75	C	3.3	14.8	10.7	170	88	12	PEH169SC368VM
1000	50 x 75	H	4.9	20.5	14.9	110	61	16	PEH169SH410VM
1500	50 x 75	H	6.0	24.2	16.7	81	45	16	PEH169SH415VM
2200	50 x 105	K	7.3	27.3	21.0	55	31	16	PEH169SK422VM
3300	65 x 105	O	10.0	34.5	26.8	40	23	16	PEH169SO433VM
4700	75 x 105	T	13.3	45.6	34.8	27	16	17	PEH169ST447VM

* Maximum values.
** Capacitance tolerance: –10 to +30%.
*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C *** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
250 VDC (U_R)									
6800	75 x 145	V	15.8	50.6	40.3	19	11	17	PEH169SV468VM
6800**	75 x 145	V	16.1	53.2	41.9	17	9	17	PEH169SV468AQ
8800	75 x 145	V	17.3	60.6	45.9	15	9	17	PEH169SV488AM
10000	75 x 220	X	17.3	50.7	43.2	14	9	17	PEH169SX510VM
10000	90 x 145	Y	20.5	58.2	47.6	15	10	16	PEH169SY510VM
350 VDC (U_R)									
150	35 x 51	A	1.6	7.6	5.0	630	340	12	PEH169UA315VM
220	35 x 51	A	2.0	9.3	6.3	440	240	12	PEH169UA322VM
330	35 x 75	C	2.5	10.8	7.8	290	160	12	PEH169UC333VM
470	35 x 95	D	3.0	12.6	9.2	200	110	12	PEH169UD347VM
680	50 x 75	H	4.4	18.2	13.4	140	80	16	PEH169UH368VM
1000	50 x 95	J	5.3	20.8	16.1	99	55	16	PEH169UJ410VM
1500	50 x 105	K	6.7	25.5	19.2	68	39	16	PEH169UK415VM
2200	65 x 105	O	9.2	32.2	24.7	49	29	16	PEH169UO422VM
3300	75 x 105	T	12.4	42.8	32.8	33	20	17	PEH169UT433VM
4700	75 x 145	V	14.5	48.0	38.0	23	14	17	PEH169UV447VM
4700 **	75 x 145	V	15.1	51.8	40.7	20	11	17	PEH169UV447CQ
6800	75 x 220	X	15.9	47.1	39.2	18	11	17	PEH169UX468VM
6800	90 x 145	Y	18.9	53.7	43.7	19	13	16	PEH169UY468VM
400 VDC (U_R)									
68 **	35 x 51	A	1.3	5.8	4.1	1100	500	12	PEH169VA2680Q
100 **	35 x 51	A	1.5	7.2	4.9	740	360	12	PEH169VA3100Q
100	35 x 51	A	1.5	7.8	5.3	700	320	12	PEH169VA310VM
150 **	35 x 60	B	1.8	8.7	6.3	500	240	12	PEH169VB3150Q
150	35 x 51	A	1.8	9.4	6.3	470	220	12	PEH169VA315VM
220 **	35 x 75	C	2.2	10.1	7.5	350	170	12	PEH169VC3220Q
220	35 x 60	B	2.2	9.8	6.8	370	200	12	PEH169VB322VM
330 **	50 x 75	H	3.3	15.1	11.3	230	110	16	PEH169VH3330Q
330	35 x 75	C	2.8	12.2	8.9	250	130	12	PEH169VC333VM
470 **	50 x 75	H	4.0	18.9	13.5	160	78	16	PEH169VH3470Q
470	50 x 75	H	4.1	18.7	14.0	150	73	16	PEH169VH347VM
680 **	50 x 105	K	4.9	20.3	15.4	120	59	16	PEH169VK3680Q
680	50 x 75	H	4.7	19.5	14.5	120	68	16	PEH169VH368VM
1000	50 x 105	K	5.8	23.0	17.6	85	47	16	PEH169VK410VM
1000**	65 x 105	O	6.8	26.9	21.2	79	41	16	PEH169VO4100Q
1500 **	75 x 105	T	9.2	36.7	28.6	53	27	17	PEH169VT4150Q
1500	65 x 105	O	8.2	30.8	23.8	58	32	16	PEH169VO415VM
2200	75 x 98	P	11.2	48.4	36.2	35	17	17	PEH169VP422AM
2200 **	75 x 145	V	11.0	41.8	34.0	36	18	17	PEH169VV4220Q
2200	75 x 105	T	10.9	40.1	31.0	40	23	17	PEH169VT422VM
3300 **	75 x 145	V	13.9	50.4	40.7	22	11	17	PEH169VV433GQ
3300	75 x 145	V	13.3	46.0	37.3	27	15	17	PEH169VV433VM
4400	90 x 98	N	15.5	52.1	33.7	30	22	16	PEH169VN444AM
4700	75 x 220	X	13.8	38.5	33.8	24	16	17	PEH169VX447VM
4700	90 x 145	Y	16.8	48.1	39.3	25	17	16	PEH169VY447VM
420 VDC (U_R)									
68	35 x 51	A	1.0	4.5	3.2	1000	500	12	PEH169OA2680M
100	35 x 60	B	1.2	5.5	4.0	700	340	12	PEH169OB3100M
150	35 x 75	C	1.5	6.6	5.0	470	230	12	PEH169OC3150M
220	35 x 95	D	1.8	7.5	5.9	320	160	12	PEH169OD3220M
330	50 x 75	H	2.8	12.7	9.3	210	110	16	PEH169OH3330M
470	50 x 95	J	3.4	14.4	11.0	150	75	16	PEH169OJ3470M

* Maximum values.

** Capacitance tolerance: –10 to +30%.

*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C *** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
420 VDC (U_R)									
680	50 x 105	K	4.1	17.5	13.3	110	53	16	PEH169OK3680M
1000	65 x 105	O	5.8	23.3	17.9	73	38	16	PEH169OO4100M
1500	75 x 105	T	7.9	31.6	24.1	49	25	17	PEH169OT4150M
2200	75 x 145	V	9.3	35.2	28.1	34	18	17	PEH169OV4220M
3300	75 x 220	X	10.0	32.9	28.3	23	12	17	PEH169OX4330M
3300	90 x 145	Y	12.9	44.1	36.0	24	13	16	PEH169OY4330M
450 VDC (U_R)									
68	35 x 51	A	1.0	3.7	2.9	1140	690	12	PEH169YA2680M
100	35 x 60	B	1.3	4.4	3.6	800	490	12	PEH169YB3100M
150	35 x 75	C	1.5	5.5	3.9	630	420	12	PEH169YC3150M
220	35 x 95	D	1.8	5.1	4.6	440	300	12	PEH169YD3220M
330	50 x 75	H	3.0	9.9	8.5	230	140	16	PEH169YH3330M
470	50 x 95	J	3.8	11.8	10.1	170	100	16	PEH169YJ3470M
680	50 x 105	K	4.2	12.2	10.5	140	96	16	PEH169YK3680M
1000	65 x 105	O	6.4	18.5	16.0	82	52	16	PEH169YO4100M
1500	75 x 105	T	7.8	21.7	18.7	67	47	17	PEH169YT4150M
2200	75 x 145	V	9.4	25.4	22.7	45	31	17	PEH169YV4220M
3300	75 x 220	X	10.2	25.0	23.8	34	24	17	PEH169YX4330M
3300	90 x 145	Y	12.6	30.9	28.3	35	25	16	PEH169YY4330M

* Maximum values.
** Capacitance tolerance: –10 to +30%.
*** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

TECHNICAL DATA

Please see page 47 for technical data.

NOTES

PEH 169 105°C

- High performance
- Long Life, > 10 years at 50°C
- Low ESR and ESL
- High stability, 10 years shelf life

APPLICATION

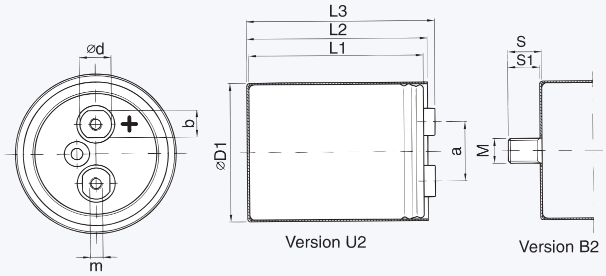
Smoothing, energy storage, or pulse operation in telecommunication demanding power supplies, process control, AC-motor control, traction, welding and measuring.

BASIC DESIGN

PEH 169 is a Long Life electrolytic capacitor with outstanding reliability and electrical performance. Polarized, all-welded design, heavy duty screw terminals, negative pole connected to the case, safety vent and plastic insulation. The PEH 169 winding is housed in a cylindrical aluminium can with a reinforced moulded lid incorporating a safety vent. The sealing system is designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte. Mechanical contact between the winding and the case allows excellent heat transfer from the winding to the ambient, which means cooler operation. Low ESR is a result of a low resistive paper/electrolyte system, at least two tabs per foil and all-welded design.

SPECIFICATION

Standards	Standards IEC 384-4 Long Life Grade 40/105/56, DIN 41240, type 1A CECC 30300 DIN 40040 GPF, DIN 41248
CECC	CECC 30301-030, Corresponding to CECC 30301-803
Capacitance range	100–330000 µF
Capacitance tolerance	–10 to +30%
Rated voltage	10–350 VDC
Temperature range	–40 to +105°C
Operational life time	25000 h at 105°C Case ⌀ = 90 mm
Shelf life	5000h at 0V +105°C, or 10 years at 0V +40°C
Diameter range	35–90 mm



Dimensions table PEH 169 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 169 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
10 VDC (U_R)									
6800	35 x 51	A	5.2	21.8	15.4	46	37	12	PEH169EA4680Q
10000	35 x 51	A	6.2	26.3	17.5	33	27	12	PEH169EA5100Q
15000	35 x 60	B	7.4	28.9	20.5	23	19	12	PEH169EB5150Q
22000	35 x 75	C	8.8	34.8	24.3	17	14	12	PEH169EC5220Q
33000	35 x 95	D	10.4	38.3	28.0	12	10	12	PEH169ED5330Q
47000	50 x 75	H	11.0	42.9	30.0	12	10	16	PEH169EH5470Q
68000	50 x 95	J	13.5	51.8	34.1	9	8	16	PEH169EJ5680Q
100000	50 x 105	K	14.0	48.5	35.0	8	7	16	PEH169EK6100Q
150000	65 x 105	O	14.7	47.6	35.5	9	8	16	PEH169EO6150Q
220000	75 x 105	T	19.4	62.8	46.7	6	5	17	PEH169ET6220Q
330000	75 x 145	V	22.5	70.7	54.6	4	4	17	PEH169EV6330Q
16 VDC (U_R)									
6800	35 x 51	A	5.5	25.5	16.7	36	28	12	PEH169GA4680Q
10000	35 x 51	A	6.4	28.0	18.9	27	21	12	PEH169GA5100Q
15000	35 x 75	C	8.3	34.3	24.6	18	14	12	PEH169GC5150Q
22000	35 x 95	D	9.7	38.6	28.5	13	10	12	PEH169GD5220Q
33000	50 x 75	H	11.7	43.0	31.0	12	10	16	PEH169GH5330Q
47000	50 x 95	J	13.2	46.2	34.5	9	8	16	PEH169GJ5470Q
68000	65 x 105	O	14.4	47.7	36.2	9	8	16	PEH169GO5680Q
100000	75 x 105	T	21.6	70.9	54.7	6	5	17	PEH169GT6100Q
150000	75 x 115	U	19.8	67.3	50.0	5	5	17	PEH169GU6150Q
220000	75 x 145	V	23.6	74.7	58.0	4	4	17	PEH169GV6220Q
25 VDC (U_R)									
4700	35 x 51	A	4.9	24.1	16.5	41	29	12	PEH169HA4470Q
6800	35 x 51	A	5.8	27.7	18.5	30	22	12	PEH169HA4680Q
10000	35 x 75	C	7.1	31.2	22.8	20	15	12	PEH169HC5100Q
15000	35 x 95	D	8.7	36.8	27.2	15	11	12	PEH169HD5150Q
22000	50 x 75	H	11.0	42.9	30.9	13	10	16	PEH169HH5220Q
33000	50 x 95	J	12.6	46.5	34.6	10	8	16	PEH169HJ5330Q
47000	65 x 105	O	15.8	53.7	42.1	8	7	16	PEH169HO5470Q
68000	75 x 105	T	20.2	68.1	51.9	6	6	17	PEH169HT5680Q
100000	75 x 115	U	21.9	70.3	55.4	5	5	17	PEH169HU6100Q
150000	75 x 145	V	22.1	71.4	55.3	4	4	17	PEH169HV6150Q
40 VDC (U_R)									
3300	35 x 51	A	4.6	26.3	17.6	41	25	12	PEH169KA4330Q
4700	35 x 60	B	5.6	29.6	20.5	30	19	12	PEH169KB4470Q
6800	35 x 75	C	6.7	32.6	23.6	22	14	12	PEH169KC4680Q
10000	35 x 95	D	7.8	34.8	26.8	16	11	12	PEH169KD5100Q
15000	50 x 75	H	10.2	42.9	30.5	14	10	16	PEH169KH5150Q
22000	50 x 95	J	11.9	46.5	34.8	10	8	16	PEH169KJ5220Q
33000	65 x 105	O	15.0	53.8	41.4	8	7	16	PEH169KO5330Q
47000	75 x 105	T	19.9	69.5	55.0	6	5	17	PEH169KT5470Q
68000	75 x 115	U	20.6	70.7	53.9	6	5	17	PEH169KU5680Q
100000	75 x 145	V	23.0	71.0	59.0	4	4	17	PEH169KV6100Q
63 VDC (U_R)									
1500	35 x 51	A	3.5	23.1	15.9	63	31	12	PEH169MA4150Q
2200	35 x 51	A	4.1	27.0	18.1	46	23	12	PEH169MA4220Q
3300	35 x 75	C	5.3	31.6	22.9	30	15	12	PEH169MC4330Q
4700	35 x 95	D	6.2	34.2	25.9	22	11	12	PEH169MD4470Q
6800	50 x 75	H	8.5	42.6	30.8	18	10	16	PEH169MH4680Q
10000	50 x 95	J	9.9	45.3	34.2	13	8	16	PEH169MJ5100Q

* Maximum values
** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

ARTICLE TABLE PEH 169 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
63 VDC (U_R)									
15000	65 x 105	O	13.1	53.0	41.1	10	6	16	PEH169MO5150Q
22000	75 x 105	T	17.7	73.0	55.8	6	4	17	PEH169MT5220Q
33000	75 x 115	U	18.9	71.0	54.3	6	5	17	PEH169MU5330Q
47000	75 x 145	V	20.9	73.0	58.0	5	4	17	PEH169MV5470Q
100 VDC (U_R)									
680	35 x 51	A	2.4	14.4	9.9	160	95	12	PEH169PA3680Q
1000	35 x 51	A	2.9	17.4	11.7	110	67	12	PEH169PA4100Q
1500	35 x 75	C	3.6	20.5	14.9	73	44	12	PEH169PC4150Q
2200	35 x 95	D	4.3	23.2	17.6	50	31	12	PEH169PD4220Q
3300	50 x 75	H	6.4	33.8	23.8	30	23	16	PEH169PH4330Q
4700	50 x 95	J	7.7	37.1	27.6	26	17	16	PEH169PJ4470Q
6800	65 x 105	O	10.4	46.4	35.5	18	12	16	PEH169PO4680Q
10000	65 x 105	O	11.7	49.1	36.6	14	10	16	PEH169PO5100Q
15000	75 x 115	U	16.0	67.5	51.1	9	6	17	PEH169PU5150Q
22000	75 x 145	V	18.2	70.6	55.3	7	5	17	PEH169PV5220Q
160 VDC (U_R)									
330	35 x 51	A	1.4	9.6	6.6	400	210	12	PEH169QA3330Q
470	35 x 51	A	1.7	11.2	7.6	290	160	12	PEH169QA3470Q
680	35 x 75	C	2.1	13.8	10.3	190	100	12	PEH169QC3680Q
1000	35 x 95	D	2.6	15.7	12.3	130	70	12	PEH169QD4100Q
1500	50 x 75	H	3.8	22.1	16.2	93	51	16	PEH169QH4150Q
2200	50 x 95	J	4.7	25.4	19.6	64	36	16	PEH169QJ4220Q
3300	65 x 105	O	6.5	32.0	25.0	45	26	16	PEH169QO4330Q
4700	75 x 105	T	8.7	48.1	36.9	26	13	17	PEH169QT4470Q
6800	75 x 115	U	10.2	50.9	39.6	19	10	17	PEH169QU4680Q
10000	75 x 145	V	11.9	55.7	43.2	14	8	17	PEH169QV5100Q
200 VDC (U_R)									
330	35 x 51	A	1.5	8.1	5.6	480	300	12	PEH169RA3330Q
470	35 x 60	B	1.8	9.7	6.9	340	210	12	PEH169RB3470Q
680	35 x 95	D	2.2	10.0	7.9	250	160	12	PEH169RD3680Q
1000	50 x 75	H	3.3	15.5	11.4	170	110	16	PEH169RH4100Q
1500	50 x 95	J	4.0	18.0	14.0	120	76	16	PEH169RJ4150Q
2200	50 x 105	K	4.9	23.1	17.2	76	49	16	PEH169RK4220Q
3300	65 x 105	O	6.7	28.8	22.0	55	37	16	PEH169RO4330Q
4700	75 x 105	T	8.6	41.6	31.1	33	20	17	PEH169RT4470Q
6800	75 x 145	V	10.1	45.2	35.2	24	16	17	PEH169RV4680Q
250 VDC (U_R)									
150	35 x 51	A	1.0	7.0	4.9	730	370	12	PEH169SA3150Q
220	35 x 51	A	1.3	8.9	6.0	500	250	12	PEH169SA3220Q
330	35 x 60	B	1.6	11.0	7.7	320	160	12	PEH169SB3330Q
470	35 x 75	C	2.0	11.7	8.9	240	130	12	PEH169SC3470Q
680	50 x 75	H	2.9	17.2	12.6	170	90	16	PEH169SH3680Q
1000	50 x 75	H	3.5	21.0	15.5	110	58	16	PEH169SH4100Q
1500	50 x 105	K	4.2	24.1	17.9	79	43	16	PEH169SK4150Q
2200	65 x 105	O	5.8	25.8	23.6	56	32	16	PEH169SO4220Q
3300	75 x 105	T	7.9	41.5	31.5	36	20	17	PEH169ST4330Q
4700	75 x 145	V	9.2	46.6	37.8	26	14	17	PEH169SV4470Q
6800	75 x 220	X	9.4	42.6	36.8	19	12	17	PEH169SX4680Q
6800	90 x 145	Y	11.9	53.5	43.5	20	12	16	PEH169SY4680Q

* Maximum values.
** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

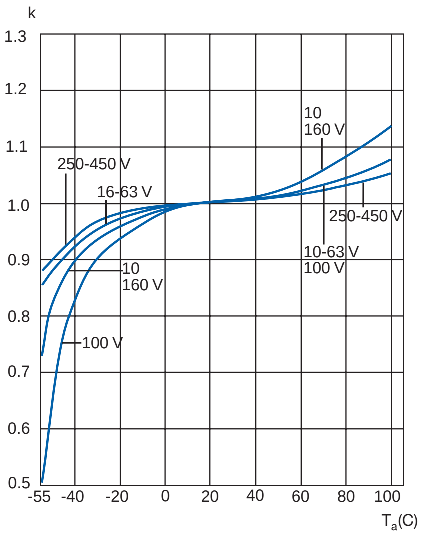
ARTICLE TABLE PEH 169 (105°C)

C_R µF	D x L mm	Case code	I_{RAC} * 105°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
350 VDC (U_R)									
100	35 x 51	A	1.0	6.7	4.6	810	410	12	PEH169UA3100Q
150	35 x 51	A	1.3	8.8	6.1	520	250	12	PEH169UA3150Q
220	35 x 75	C	1.5	10.1	7.3	360	180	12	PEH169UC3220Q
330	35 x 95	D	1.9	11.8	9.1	250	120	12	PEH169UD3330Q
470	50 x 75	H	2.7	17.1	12.3	180	91	16	PEH169UH3470Q
680	50 x 95	J	3.3	19.9	14.8	120	64	16	PEH169UJ3680Q
1000	50 x 105	K	4.1	24.3	18.0	82	42	16	PEH169UK4100Q
1500	65 x 105	O	5.5	30.6	23.5	60	33	16	PEH169UO4150Q
2200	75 x 105	T	7.5	42.6	32.6	39	20	17	PEH169UT4220Q
3300	75 x 145	V	9.0	44.1	38.0	26	14	17	PEH169UV4330Q
4700	75 x 220	X	9.4	41.4	35.9	22	13	17	PEH169UX4470Q
4700	90 x 145	Y	11.6	50.8	41.7	23	14	16	PEH169UY4470Q

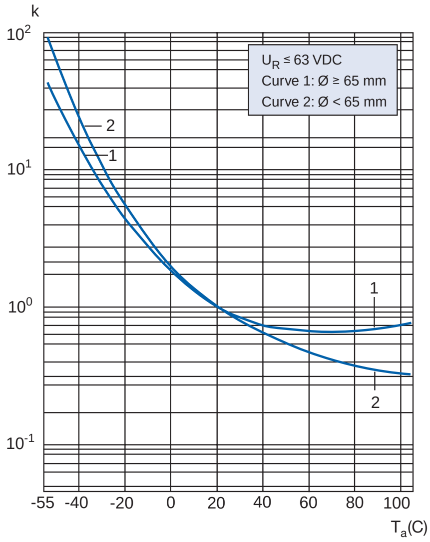
* Maximum values
** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

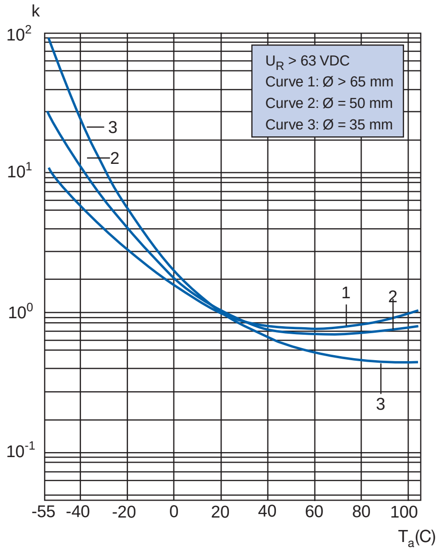
TECHNICAL DATA PEH 169 (85°C AND 105°C)

The capacitance vs ambient temperature
(T_a) at f = 100 Hz



ESR as a function of ambient temperature
(T_a) at f = 100 kHz. k = R_{ESR} (T_a)/R_{ESR} (20°C)





LEAKAGE CURRENT

Rated leakage current, I_{RL} (µA).
Rated voltage, U_R (V).
Rated capacitance, C_R (µF). $I_{RL} = 0.003 \times C_R \times U_R + 4$

R_{th} – short form table versus chassis area and air speed

D x L	Case code	STUD MOUNTED R_{thhs} = 3°C/W (0.5 m/s)	STUD MOUNTED R_{thhs} = 2°C/W (0.5 m/s)	STUD MOUNTED R_{thhs} = 3°C/W (2.0 m/s)	STUD MOUNTED R_{thhs} = 2°C/W (2.0 m/s)	CLIP MOUNTED (0.5 m/s)	CLIP MOUNTED (2.0 m/s)
35 x 51	A	5.6	5.3	4.5	4.4	10.6	7.4
35 x 60	B	5.4	5.1	4.4	4.3	9.8	7.0
35 x 75	C	5.3	5.1	4.4	4.3	9.2	6.7
35 x 95	D	5.3	5.1	4.4	4.3	8.9	6.7
50 x 75	H	3.6	3.3	2.8	2.7	6.3	4.4
50 x 95	J	3.4	3.2	2.7	2.6	5.8	4.2
50 x 105	K	3.4	3.2	2.7	2.6	5.8	4.2
50 x 115	I	3.4	3.2	2.7	2.6	5.8	4.2
65 x 105	O	2.6	2.4	2.1	2.0	4.2	3.1
65 x 115	Q	2.6	2.4	2.1	2.0	4.2	3.1
65 x 130	S	2.6	2.4	2.1	2.0	4.2	3.1
75 x 78	L	2.3	2.0	1.8	1.7	4.1	2.7
75 x 98	P	2.3	2.0	1.8	1.7	4.0	2.7
75 x 105	T	2.3	2.1	1.7	1.6	3.7	2.6
75 x 115	U	2.2	2.0	1.6	1.5	3.5	2.5
75 x 145	V	2.2	2.0	1.6	1.5	3.4	2.5
75 x 220	X	2.3	2.1	2.0	1.9	3.4	2.6
90 x 78	M	1.9	1.7	1.6	1.4	3.4	2.2
90 x 98	N	1.9	1.7	1.5	1.4	3.1	2.1
90 x 145	Y	1.8	1.6	1.5	1.4	2.7	1.9

OPERATIONAL DATA

Please see operational lifetime section, page 57.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C.

The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
85°C	1×10^{-6}
60°C	1×10^{-7}

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position
The capacitor can be mounted upright or inclined to a horizontal position.

Clamp fixing
Clips must be ordered seperately. See “Accessories”.

Stud fixing
Nylon cap nut must be ordered separately.
For the stud fixing insulated version the outer insulation serves as lock washer. See “Accessories”. Max tightening torque: M8: 3 Nm M12: 8 Nm. Max chassis thickness 5 mm. Mounting hole: See “Accessories”.

Screw terminals
M5 x 10 according to DIN 41.248. Max tightening torque: 2.5 Nm. Must be ordered separately: See “Accessories”.
Recommended max connector thickness with delivered screw: 4 mm. M6 thread on request.

Insulation can
PEH169 is supplied with a polypropylene insulation can, thickness 0.8 mm. Voltage proof of the insulation sleeve:
≥ 4000 VDC.

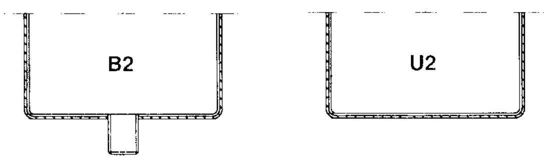
PVC shrink sleeve only on request.

ORDERING INFORMATION

1st block (pos 1–13)													**2nd block** (pos 14–20)						
P	**E**	**H**	**1**	**6**	**9**	**K**	**U**	**5**	**6**	**8**	**0**	**Q**	**B**	**2**					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: Q= –10 to +30%
M: -20 to +20%

Pos. 14-15: B2 = with bottom stud
U2 = without bottom stud



Quantities and weights

CASE CODE	A	B	C	D	H	I	J	K	L	M	N	O	P	Q	S	T	U	V	X	Y
Weight approx (g)	70	85	105	130	180	300	240	265	430	750	950	415	530	460	520	585	640	800	1400	1400
Standard box quantity	42	42	42	42	20	20	20	20	9	6	6	12	9	12	12	9	9	9	9	6

PEH 200 85°C

- High CV-value
- Long Life
- Low ESR and ESL
- Compact size

APPLICATION

Typical applications for the new PEH 200 would be found in Uninterruptable Power Supplies (UPS), Ground Power Units (GPU), Welding Equipments and Drives where high current ratings and compact size are important.

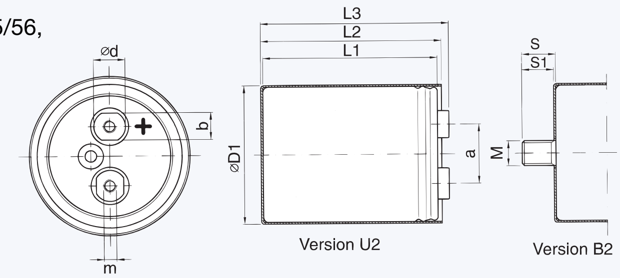
BASIC DESIGN

Dubbed the Elyt Long Life, the compact PEH 200 series has a polarized, all-welded design, heavy duty screw terminals, negative pole connected to the case, safety vent and plastic insulation. The sealing systems designed for electrolyte leakage free operation and a very low gas-diffusion rate of electrolyte.

Mechanical contact between the winding and the aluminium case allows excellent heat transfer from the winding hot spot to the ambient, which means cooler operation and very high current ratings.

SPECIFICATION

Standards	IEC 384-4 Long Life Grade 40/85/56, DIN 41240
Capacitance range	100–330000 µF
Capacitance tolerance	–20 to +20%
Rated voltage	25–550 VDC
Temperature range	–40 to +85°C
Shelf life	2000 h at 0V +85°C, or 4 years at 0V +40°C
Operational life time	60000 h at +85°C (Case ⌀ = 90 mm)
Diameter range	35–90 mm



Dimensions table PEH 200 (mm)

D x L	Case code	D1 ±1.0	L1 ±1.0	L2 ±1.0	L3 ±1.0	S	S1	M	a ±0.5	b	d	m*	Weight approx (g)
35 x 47	E	36.6	47.5	50.5	55.0	12	11.0	M8	13.0	—	8	M5	60
35 x 51	A	36.6	51.5	54.5	58.9	12	11.0	M8	13.0	—	8	M5	70
35 x 60	B	36.6	59.5	62.5	66.9	12	11.0	M8	13.0	—	8	M5	85
35 x 75	C	36.6	73.5	76.5	80.9	12	11.0	M8	13.0	—	8	M5	105
35 x 95	D	36.6	94.5	97.5	101.9	12	11.0	M8	13.0	—	8	M5	130
50 x 49	G	51.6	48.5	51.5	56.4	16	15.0	M12	22.0	13	15	M5	150
50 x 75	H	51.6	74.5	77.5	82.4	16	15.0	M12	22.0	13	15	M5	180
50 x 95	J	51.6	95.5	98.5	103.4	16	15.0	M12	22.0	13	15	M5	240
50 x 105	K	51.6	103.5	106.5	111.4	16	15.0	M12	22.0	13	15	M5	265
50 x 115	I**	51.6	115.5	118.5	123.4	16	15.0	M12	22.0	13	15	M5	300
65 x 105	O	66.6	106.0	109.2	113.0	16	14.8	M12	28.5	13	15	M5	415
65 x 115	Q**	66.6	118.0	121.2	125.0	16	14.8	M12	28.5	13	15	M5	460
65 x 130	S**	66.6	129.0	132.2	136.0	16	14.8	M12	28.5	13	15	M5	520
65 x 140	R**	66.6	141.0	144.2	148.0	16	14.8	M12	28.5	13	15	M5	650
75 x 78	L	76.6	77.0	80.2	84.0	16	14.8	M12	32.0	13	15	M5	430
75 x 98	P**	76.6	98.0	101.2	105.0	16	14.8	M12	32.0	13	15	M5	530
75 x 105	T	76.6	106.0	109.2	113.0	16	14.8	M12	32.0	13	15	M5	585
75 x 115	U	76.6	118.0	121.2	125.0	16	14.8	M12	32.0	13	15	M5	640
75 x 145	V	76.6	146.0	149.2	153.0	16	14.8	M12	32.0	13	15	M5	800
75 x 220	X	76.6	221.0	224.2	228.0	16	14.8	M12	32.0	13	15	M5	1400
90 x 78	M	91.6	76.5	79.7	83.4	16	14.8	M12	32.0	13	15	M5	750
90 x 98	N	91.6	97.5	100.7	104.4	16	14.8	M12	32.0	13	15	M5	950
90 x 145	Y	91.6	145.5	148.7	152.4	16	14.8	M12	32.0	13	15	M5	1400
90 x 220	Z	91.6	220.0	223.2	226.9	16	14.8	M12	32.0	13	15	M5	1500

* M6 and other threads on request. **on request

ARTICLE TABLE PEH 200 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
25 VDC (U_R)									
15000	35 x 51	A	11.9	28.7	19.0	25	21	12	PEH200HA5150M
22000	35 x 75	C	15.2	34.3	24.4	17	14	12	PEH200HC5220M
33000	35 x 95	D	17.8	38.0	28.1	12	10	12	PEH200HD5330M
47000	50 x 75	H	20.2	43.3	30.1	11	10	16	PEH200HH5470M
68000	50 x 95	J	23.4	47.4	34.6	8	7	16	PEH200HJ5680M
100000	50 x 105	K	23.9	46.1	34.7	7	7	16	PEH200HK6100M
150000	65 x 105	O	26.3	50.0	37.2	7	7	16	PEH200HO6150M
220000	75 x 105	T	35.0	63.6	49.5	5	5	17	PEH200HT6220M
330000	75 x 145	V	40.0	73.1	56.9	4	4	17	PEH200HV6330M
40 VDC (U_R)									
6800	**35 x 51**	**A**	**9.9**	**27.2**	**18.1**	**33**	**25**	**12**	**PEH200KA4680M**
10000	35 x 60	B	12.0	31.5	21.4	23	18	12	PEH200KB5100M
15000	**35 x 75**	**C**	**14.6**	**36.1**	**25.5**	**16**	**12**	**12**	**PEH200KC5150M**
22000	35 x 95	D	17.1	39.8	29.2	12	9	12	PEH200KD5220M
33000	50 x 75	H	18.9	41.1	28.8	11	9	16	PEH200KH5330M
47000	**50 x 95**	**J**	**22.1**	**46.3**	**33.6**	**8**	**7**	**16**	**PEH200KJ5470M**
68000	65 x 105	O	25.2	49.9	35.6	7	7	16	PEH200KO5680M
100000	**65 x 105**	**O**	**24.9**	**46.3**	**36.9**	**8**	**8**	**16**	**PEH200KO6100M**
150000	75 x 115	U	35.7	67.7	51.2	5	4	17	PEH200KU6150M
220000	**75 x 145**	**V**	**34.4**	**62.3**	**48.9**	**5**	**5**	**17**	**PEH200KV6220M**
63 VDC (U_R)									
4700	**35 x 51**	**A**	**9.0**	**26.8**	**18.0**	**32**	**21**	**12**	**PEH200MA4470M**
6800	35 x 75	C	11.5	32.7	23.5	21	14	12	PEH200MC4680M
10000	**35 x 95**	**D**	**13.6**	**36.0**	**27.0**	**15**	**10**	**12**	**PEH200MD5100M**
15000	50 x 75	H	16.1	37.3	26.5	14	11	16	PEH200MH5150M
22000	**50 x 95**	**J**	**19.0**	**42.0**	**30.9**	**10**	**8**	**16**	**PEH200MJ5220M**
33000	65 x 105	O	22.8	45.9	34.8	10	8	16	PEH200MO5330M
47000	**65 x 105**	**O**	**21.8**	**42.7**	**32.0**	**10**	**9**	**16**	**PEH200MO5470M**
68000	75 x 115	U	31.5	61.3	46.8	6	5	17	PEH200MU5680M
100000	**75 x 145**	**V**	**34.3**	**62.2**	**50.3**	**5**	**5**	**17**	**PEH200MV6100M**
100 VDC (U_R)									
1500	35 x 51	A	5.7	18.0	12.1	92	63	12	PEH200PA4150M
2200	**35 x 60**	**B**	**7.0**	**21.3**	**14.7**	**63**	**44**	**12**	**PEH200PB4220M**
3300	35 x 75	C	8.7	25.0	17.8	43	30	12	PEH200PC4330M
4700	**35 x 95**	**D**	**10.3**	**28.9**	**21.1**	**31**	**21**	**12**	**PEH200PD4470M**
6800	50 x 75	H	12.7	30.4	21.5	33	27	16	PEH200PH4680M
10000	**50 x 95**	**J**	**15.3**	**34.7**	**25.6**	**23**	**19**	**16**	**PEH200PJ5100M**
15000	50 x 105	K	17.3	37.6	27.9	17	14	16	PEH200PK5150M
22000	**65 x 105**	**O**	**19.3**	**38.7**	**30.1**	**15**	**13**	**16**	**PEH200PO5220M**
33000	75 x 105	T	26.3	53.0	39.8	10	8	17	PEH200PT5330M
47000	**75 x 145**	**V**	**30.8**	**60.5**	**47.3**	**7**	**6**	**17**	**PEH200PV5470M**
250 VDC (U_R)									
330	35 x 51	A	2.2	13.5	8.7	330	170	12	PEH200SA3330M
470	**35 x 60**	**B**	**2.7**	**15.9**	**10.6**	**240**	**120**	**12**	**PEH200SB3470M**
680	35 x 75	C	3.4	18.7	13.0	160	84	12	PEH200SC3680M
1000	35 x 95	D	4.1	21.2	15.6	110	58	12	PEH200SD4100M
1000	**50 x 49**	**G**	**4.3**	**20.7**	**12.6**	**120**	**69**	**16**	**PEH200SG4100M**
1500	50 x 75	H	5.9	28.7	19.5	78	42	16	PEH200SH4150M
2200	**50 x 95**	**J**	**7.3**	**32.5**	**23.2**	**54**	**29**	**16**	**PEH200SJ4220M**
3300	65 x 105	O	10.0	39.8	29.4	38	22	16	PEH200SO4330M
3300	75 x 78	L	10.5	43.8	29.6	38	22	17	PEH200SL4330M
4700	**65 x 105**	**O**	**11.3**	**38.2**	**27.2**	**29**	**18**	**16**	**PEH200SO4470M**

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.
Items marked in **bold**, are available on short lead-times

ARTICLE TABLE PEH 200 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
				250 VDC (U_R)					
4700	90 x 78	M	12.7	44.2	30.4	30	18	16	PEH200SM4470M
6800	75 x 105	T	14.7	51.5	36.5	20	12	17	PEH200ST4680M
6800	90 x 98	N	15.8	52.1	37.3	21	13	16	PEH200SN4680M
10000	**75 x 145**	**V**	**18.0**	**59.0**	**44.0**	**14**	**9**	**17**	**PEH200SV5100M**
12000	75 x 145	V	18.8	58.6	43.6	14	9	17	PEH200SV512AM
15000	**75 x 220**	**X**	**20.6**	**61.6**	**49.2**	**10**	**6**	**17**	**PEH200SX5150M**
15000	90 x 145	Y	21.8	60.1	45.5	12	8	16	PEH200SY5150M
				350 VDC (U_R)					
220	35 x 51	A	2.0	13.7	8.8	360	170	12	PEH200UA3220M
330	35 x 60	B	2.6	16.6	11.0	240	110	12	PEH200UB3330M
470	35 x 75	C	3.2	19.3	13.4	170	79	12	PEH200UC3470M
680	35 x 95	D	3.8	21.9	16.0	120	55	12	PEH200UD3680M
680	50 x 49	G	4.0	20.7	12.6	130	66	16	PEH200UG3680M
1000	50 x 75	H	5.5	28.8	19.5	85	41	16	PEH200UH4100M
1500	**50 x 95**	**J**	**6.8**	**32.9**	**23.4**	**57**	**28**	**16**	**PEH200UJ4150M**
2200	**65 x 105**	**O**	**9.4**	**39.8**	**29.2**	**41**	**21**	**16**	**PEH200UO4220M**
2200	75 x 78	L	9.8	43.5	29.4	41	21	17	PEH200UL4220M
3300	**65 x 105**	**O**	**10.9**	**38.6**	**27.5**	**31**	**17**	**16**	**PEH200UO4330M**
3300	90 x 78	M	13.1	54.0	37.0	28	15	16	PEH200UM4330M
4700	75 x 115	U	14.5	54.7	39.5	20	11	17	PEH200UU4470M
4700	90 x 98	N	15.0	51.3	36.7	22	13	16	PEH200UN4470M
6800	**75 x 145**	**V**	**16.8**	**57.0**	**42.3**	**15**	**8**	**17**	**PEH200UV4680M**
10000	75 x 220	X	19.4	60.8	48.5	11	7	17	PEH200UX5100M
10000	**90 x 145**	**Y**	**23.3**	**75.2**	**56.9**	**11**	**6**	**16**	**PEH200UY5100M**
15000	90 x 220	Z	27.3	79.8	64.4	8	5	16	PEH200UZ515AM
				385 VDC (U_R)					
220	35 x 51	A	2.1	14.6	9.3	330	150	12	PEH200XA3220M
330	35 x 75	C	2.7	17.0	12.0	220	97	12	PEH200XC3330M
470	35 x 95	D	3.3	19.1	14.2	150	69	12	PEH200XD3470M
470	50 x 49	G	3.6	20.9	12.8	160	78	16	PEH200XG3470M
680	50 x 75	H	4.7	26.8	18.4	110	51	16	PEH200XH3680M
1000	50 x 95	J	5.9	31.7	22.8	76	35	16	PEH200XJ4100M
1500	50 x 105	K	7.1	34.1	24.7	52	25	16	PEH200XK4150M
2200	65 x 105	O	9.6	36.7	26.1	38	20	16	PEH200XO4220M
2200	75 x 78	L	10.0	42.7	28.8	38	20	17	PEH200XL4220M
3300	75 x 105	T	12.8	52.5	37.4	25	13	17	PEH200XT4330M
3300	90 x 78	M	13.3	52.6	36.0	26	14	16	PEH200XM4330M
4700	75 x 145	V	15.2	57.6	43.9	19	11	17	PEH200XV4470M
4700	90 x 98	N	16.6	62.4	44.4	19	10	16	PEH200XN4470M
6800	90 x 145	Y	20.9	74.8	57.2	14	8	16	PEH200XY4680M
6800	75 x 220	X	17.4	58.9	47.0	14	8	17	PEH200XX4680M
				400 VDC (U_R)					
220	35 x 51	A	2.2	11.4	9.6	310	130	12	PEH200VA3220M
330	35 x 75	C	2.8	14.3	12.6	210	90	12	PEH200VC3330M
470	35 x 95	D	3.4	16.5	14.8	140	63	12	PEH200VD3470M
470	50 x 49	G	3.7	15.0	12.7	150	73	16	PEH200VG3470M
680	50 x 75	H	4.9	21.2	18.3	110	55	16	PEH200VH3680M
1000	50 x 95	J	5.9	24.2	21.3	76	38	16	PEH200VJ4100M
1500	65 x 105	O	9.1	49.1	35.1	53	27	16	PEH200VO415AQ
1500	75 x 78	L	8.8	34.0	29.0	52	27	17	PEH200VL4150M
2200	65 x 105	O	9.6	29.1	25.6	39	21	16	PEH200VO4220M
2200	90 x 78	M	11.8	44.1	37.1	36	19	16	PEH200VM4220M
3300	65 x 105	O	11.0	30.5	26.7	29	16	16	PEH200VO433AM
3300	75 x 115	U	13.8	52.0	45.7	22	10	17	PEH200VU433AQ
3300	90 x 98	N	14.9	52.8	45.2	25	13	16	PEH200VN4330M

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis. Items marked in **bold**, are available on short lead-times

ARTICLE TABLE PEH 200 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
400 VDC (U_R)									
3300	75 x 105	T	13.0	41.5	36.3	26	14	17	PEH200VT4330M
4700	75 x 145	V	15.6	57.0	42.5	18	10	17	PEH200VV447AM
6800	75 x 220	X	17.6	51.2	47.7	13	8	17	PEH200VX4680M
6800	90 x 145	Y	21.4	64.1	56.8	13	7	16	PEH200VY4680M
10000	90 x 220	Z	24.7	69.2	64.0	9	5	16	PEH200VZ5100M
420 VDC (U_R)									
150	35 x 51	A	1.8	12.1	7.8	400	170	12	PEH200OA3150M
220	35 x 75	C	2.3	14.3	10.3	270	110	12	PEH200OC3220M
330	35 x 95	D	2.9	16.3	12.3	180	76	12	PEH200OD3330M
330	50 x 49	G	3.2	20.4	12.6	190	80	16	PEH200OG3330M
470	50 x 75	H	4.2	24.8	17.0	140	62	16	PEH200OH3470M
680	50 x 95	J	5.1	28.1	20.4	96	44	16	PEH200OJ3680M
1000	50 x 105	K	6.3	32.0	23.2	67	31	16	PEH200OK4100M
1500	65 x 105	O	8.8	38.9	28.4	47	23	16	PEH200OO4150M
1500	75 x 78	L	9.1	42.3	28.5	47	23	17	PEH200OL4150M
2200	75 x 105	T	11.5	51.6	37.0	32	16	17	PEH200OT4220M
2200	90 x 78	M	12.2	52.7	36.0	33	17	16	PEH200OM4220M
2700	65 x 105	O	12.4	57.3	40.1	24	10	16	PEH200OO427AM
3300	75 x 145	V	14.0	57.5	43.7	22	11	17	PEH200OV4330M
3300	90 x 98	N	15.4	61.9	44.0	22	12	16	PEH200ON4330M
4700	75 x 220	X	15.7	57.6	46.8	16	8	17	PEH200OX4470M
4700	90 x 145	Y	18.2	62.2	47.5	17	9	16	PEH200OY4470M
8200	90 x220	Z	23.8	77.3	63.1	10	5	16	PEH200OZ4820M
450 VDC (U_R)									
150	35 x 51	A	2.0	14.6	9.3	350	150	12	PEH200YA3150M
220	35 x 75	C	2.5	16.8	11.9	240	99	12	PEH200YC3220M
330	35 x 95	D	3.1	19.4	14.5	160	66	12	PEH200YD3330M
330	50 x 49	G	3.5	20.8	12.7	170	75	16	PEH200YG3330M
470	**50 x 75**	**H**	**4.5**	**25.5**	**17.5**	**120**	**58**	**16**	**PEH200YH3470M**
680	50 x 95	J	5.5	28.8	20.8	86	41	16	PEH200YJ3680M
1000	**50 x 105**	**K**	**6.7**	**32.7**	**23.6**	**60**	**29**	**16**	**PEH200YK4100M**
1500	65 x 105	O	9.3	39.2	28.2	43	22	16	PEH200YO4150M
1500	75 x 78	L	9.6	42.3	28.5	43	22	17	PEH200YL4150M
1800	65 x 105	O	10.6	47.8	34.0	43	22	17	PEH200YO418AM
2200	**75 x 105**	**T**	**12.1**	**50.1**	**35.6**	**29**	**15**	**17**	**PEH200YT4220M**
2200	90 x 78	M	12.7	52.4	35.8	30	16	16	PEH200YM4220M
3300	75 x 115	U	14.2	52.5	37.7	30	16	17	PEH200YU433CM
3300	75 x 145	V	14.7	57.3	43.7	20	10	17	PEH200YV4330M
3300	90 x 98	N	16.1	61.9	43.9	21	11	16	PEH200YN4330M
4700	75 x 145	V	17.9	68.3	50.4	14	7	17	PEH200YV447BM
4700	75 x 220	X	16.8	59.3	47.6	14	8	17	PEH200YX4470M
4700	90 x 145	Y	18.9	61.4	46.9	16	9	16	PEH200YY4470M
6000	75 x 220	X	18.5	60.5	47.8	12	7	17	PEH200YX460BQ
8200	90 x 220	Z	24.9	77.7	63.4	10	5	16	PEH200YZ4820M
500 VDC (U_R)									
100	35 x 51	A	1.5	6.1	3.9	1000	590	12	PEH200ZA3100M
150	35 x 60	B	1.9	7.5	4.9	670	390	12	PEH200ZB3150M
220	35 x 75	C	2.3	8.4	5.8	505	310	12	PEH200ZC3220M
220	50 x 49	G	2.5	10.1	6.1	520	320	12	PEH200ZG3220M
330	35 x 95	D	2.9	10.7	7.7	300	180	12	PEH200ZD3330M
470	50 x 75	H	4.2	15.8	10.5	220	130	16	PEH200ZH3470M
680	50 x 95	J	5.1	18.4	12.8	150	90	16	PEH200ZJ3680M
1000	65 x 105	O	6.8	21.4	15.5	130	79	16	PEH200ZO4100M
1500	75 x 105	T	9.2	29.8	21.0	82	52	17	PEH200ZT4150M
1800	65 x 105	O	10.6	40.9	28.2	94	29	16	PEH200ZO418HM
2200	75 x 145	V	11.1	33.7	25.1	58	38	17	PEH200ZV4220M
3300	75 x 220	X	12.8	36.5	29.0	38	25	17	PEH200ZX4330M

* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis. Items marked in **bold**, are available on short lead-times

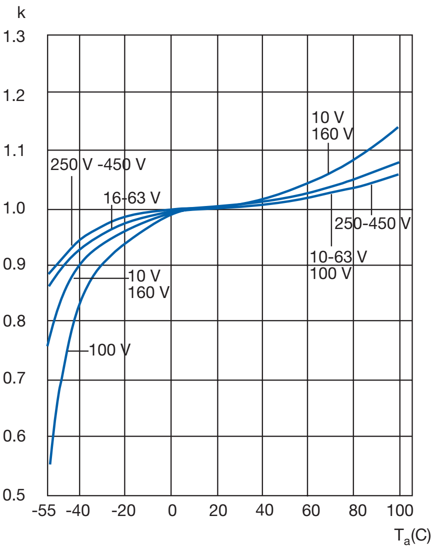
ARTICLE TABLE PEH 200 (85°C)

C_R µF	D x L mm	Case code	I_{RAC} * 85°C 100 Hz A	I_{RAC} * 50°C ** 10 kHz A	I_{RAC} * 40°C 10 kHz A	ESR* 20°C 100 Hz mΩ	ESR* 20°C 100 kHz mΩ	L_{ESL} Approx. nH	Article code 1st block
500 VDC (U_R)									
3300	90 x 145	Y	15.7	46.9	35.4	38	24	16	PEH200ZY4330M
5600	90 X 220	Z	19.6	53.4	42.6	25	17	16	PEH200ZZ4560M
550 VDC (U_R)									
680	65 x 105	O	6.6	21.1	15.4	160	110	16	PEH200TO3680M
1000	65 x 105	O	8.0	25.2	17.9	120	76	16	PEH200TO4100M
1200	90 x 78	M	10.2	33.7	22.6	97	63	16	PEH200TM412AM
1200	75 x 105	T	9.5	30.5	21.6	96	62	17	PEH200TT4120M
1500	75 x 145	V	10.6	32.3	24.4	77	49	17	PEH200TV4150M
1800	75 x 145	V	11.6	35.3	26.3	66	42	17	PEH200TV4180M
2200	75 x 220	X	11.1	29.4	24.1	65	45	17	PEH200TX4220M
2700	75 x 220	X	13.4	37.8	30.1	45	29	17	PEH200TX4270M
2700	90 x 145	Y	15.7	44.4	33.7	47	30	16	PEH200TY4270M

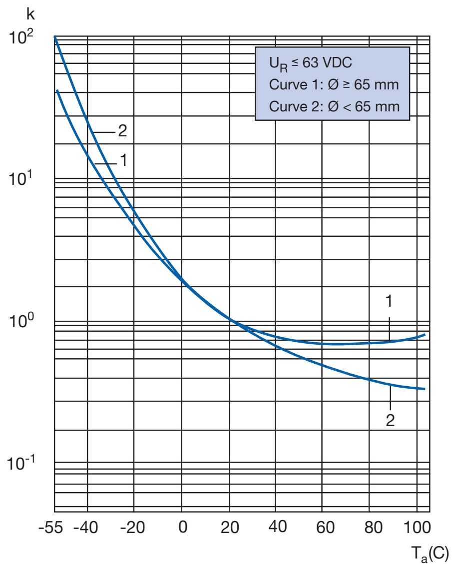
* Maximum values. ** 2 m/s forced air, studmounted on 3°C/W aluminium chassis.

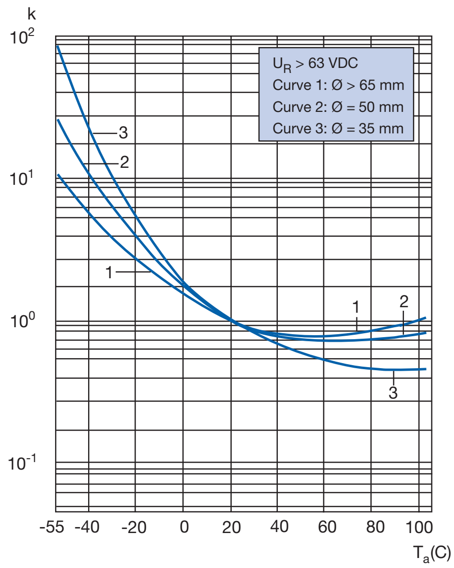
TECHNICAL DATA PEH 200 (85°C)

The capacitance vs ambient temperature
(T_a) at f = 100 Hz



ESR as a function of ambient temperature
(T_a) at f = 100 kHz. $k = R_{ESR}(T_a)/R_{ESR}(20°C)$

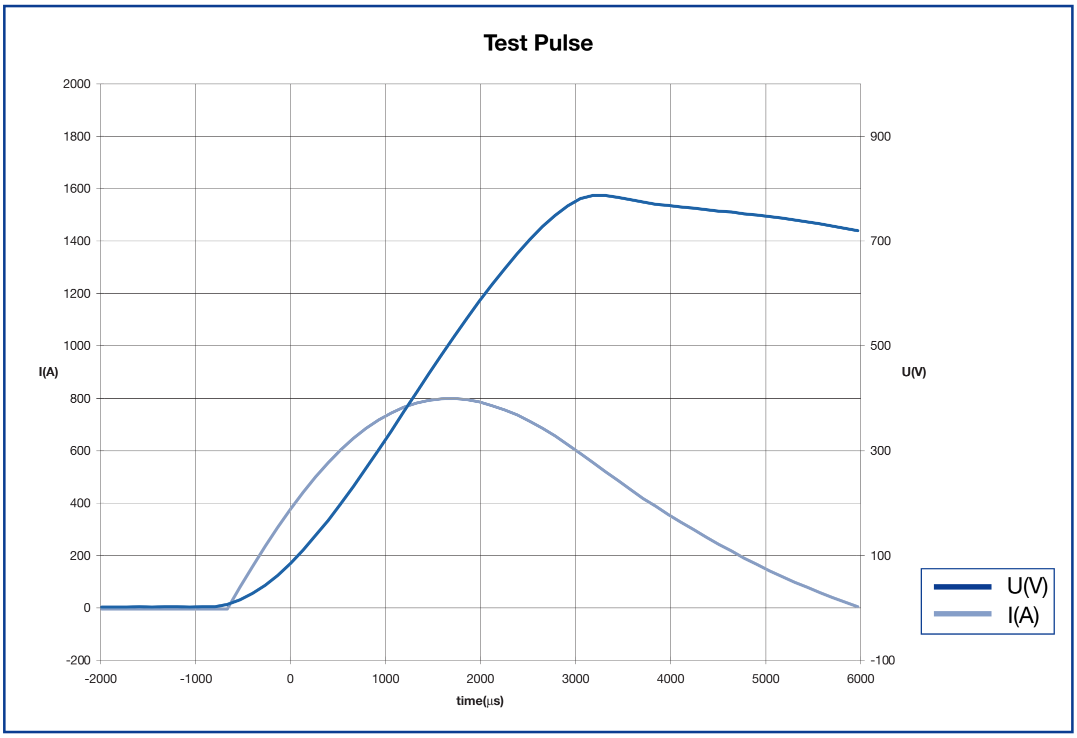




Increased over-voltage capability
Most power electronics applications of today will be exposed to over-voltages, like transients on the mains. Even when using a mains filter, the electrolytic capacitors could be exposed to current pulses that can over-charge the capacitors. The over-charging causes over-voltages and heat dissipation in the capacitors. This is why Evox Rifa has introduced a new method to define the capacitors capability to withstand a sequence of over-charging pulses.

Test Method
The capacitors are tested according to the multi-pulse test procedure. Each test pulse, every 90 seconds, consists of twice the charge of the capacitor, $Q = 2xC_RxU_R$. See example below for the PEH200, 550 VDC capacitors.

Example:
Article: PEH200TY4270M
U_R: 550 Volt
C_R: 2700µF
Case: 90 x 145 mm



EVOX RIFA

LEAKAGE CURRENT

Rated leakage current, I_{RL} (µA).
Rated voltage, U_R (V).
Rated capacitance, C_R (µF) $I_{RL} = 0.003 \times C_R \times U_R + 4$

THERMAL RESISTANCE

R_{th} – short form table versus chassis area and air speed

D x L	Case code	STUDMOUNTED R_{thhs} = 3°C/W (0.5 m/s)	STUDMOUNTED R_{thhs} = 2°C/W (0.5 m/s)	STUDMOUNTED R_{thhs} = 3°C/W (2.0 m/s)	STUDMOUNTED R_{thhs} = 2°C/W (2.0 m/s)	CLIPMOUNTED (0.5 m/s)	CLIPMOUNTED (2.0 m/s)
35 x 47	E	5.6	5.3	4.5	4.4	11.9	8.3
35 x 51	A	5.6	5.3	4.5	4.4	10.6	7.4
35 x 60	B	5.4	5.1	4.4	4.3	9.8	7.0
35 x 75	C	5.3	5.1	4.4	4.3	9.2	6.7
35 x 95	D	5.3	5.1	4.4	4.3	8.9	6.7
50 x 49	G	3.3	2.9	2.8	2.5	6.7	4.5
50 x 75	H	3.6	3.3	2.8	2.7	6.3	4.4
50 x 95	J	3.4	3.2	2.7	2.6	5.8	4.2
50 x 105	K	3.4	3.2	2.7	2.6	5.8	4.2
50 x 115	I	3.4	3.2	2.7	2.6	5.8	4.2
65 x 105	O	2.6	2.4	2.1	2.0	4.2	3.1
65 x 115	Q	2.6	2.4	2.1	2.0	4.2	3.1
65 x 130	S	2.6	2.4	2.1	2.0	4.2	3.1
65 x 140	R	2.6	2.4	2.1	2.0	4.2	3.1
75 x 78	L	2.3	2.0	1.8	1.7	4.1	2.7
75 x 98	P	2.3	2.0	1.8	1.7	4.0	2.7
75 x 105	T	2.3	2.1	1.7	1.6	3.7	2.6
75 x 115	U	2.2	2.0	1.6	1.5	3.5	2.5
75 x 145	V	2.2	2.0	1.6	1.5	3.4	2.5
75 x 220	X	2.3	2.1	2.0	1.9	3.4	2.6
90 x 78	M	1.9	1.7	1.6	1.4	3.4	2.2
90 x 98	N	1.9	1.7	1.5	1.4	3.1	2.1
90 x 145	Y	1.8	1.6	1.5	1.4	2.7	1.9
90 x 220	Z	1.9	1.7	1.6	1.5	2.7	2.0

OPERATIONAL DATA

Please see operational lifetime section, page 57.

RELIABILITY

The failure rate is derived from our periodic test results. The failure rate (λ_R) is therefore only given at test temperature for life tests. An estimation is also given at 60°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity.

T_a	Failure rate per hour
85°C	1×10^{-6}
60°C	1×10^{-7}

Failure rate per hour for catastrophic plus parametric failures.

MECHANICAL DATA

Mounting position
The capacitor can be mounted upright or inclined to a horizontal position.

Clamp fixing
Clips must be ordered seperately. See "Accessories".

Stud fixing
Nylon cap nut must be ordered separately. For the stud fixing insulated version the outer insulation serves as lock washer. See "Accessories". Max tightening torque: M8: 3 Nm M12: 8 Nm. Max chassis thickness 5 mm. Mounting hole: See "Accessories".

Screw terminals
M5 x 10 according to DIN 41.248. Max tightening torque: 2.5 Nm. Must be ordered separately: See "Accessories". Recommended max connector thickness with delivered screw: 4 mm. M6 thread on request.

Insulation can
PEH200 is supplied with a polypropylene insulation can, thickness 0.8 mm. Voltage proof of the insulation sleeve:
≥ 4000 VDC.

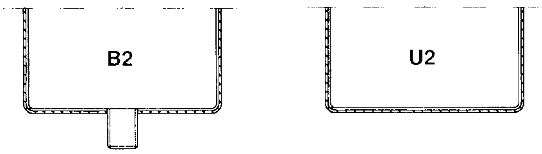
PVC shrink sleeve only on request.

ORDERING INFORMATION

1st block (pos 1–13)													**2nd block** (pos 14–20)						
P	**E**	**H**	**2**	**0**	**0**	**K**	**U**	**6**	**1**	**5**	**0**	**M**	**B**	**2**					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Capacitance tolerances:
Pos. 13: M: -20 to +20%

Pos. 14-15: B2 = with bottom stud
U2 = without bottom stud



Quantities and weights

CASE CODE	A	B	C	D	E	G	H	I	J	K	L	M	N	O	P	R	Q	S	T	U	V	X	Y	Z
Weight approx (g)	70	85	105	130	60	150	180	300	240	265	430	750	950	415	530	650	460	520	585	640	800	1400	1400	1500
Standard box quantity	42	42	42	42	42	20	20	20	20	20	9	6	6	12	9	12	12	12	9	9	9	9	6	6

Operational life time section

LIFE TIME CALCULATION OF EVOX RIFA ELECTROLYTIC CAPACITORS

P_{LOSS} = I_{RMS}^2 x ESR
P_{LOSS} = Power losses in the capacitor
I_{RMS} = Ripple current
ESR = Equivalent serie resistance

T_h = T_a + P_{LOSS} x R_{th}
T_h = Hot spot temperature
T_a = Ambient temperature
R_{th} = Thermal resistance

$$L_{OP} = \text{Expected life time} = A \times 2^{\frac{85-T_h}{C}} \text{ hours}$$

Capacitor	Diameter	A	C
PEG124	10	36000	11
	13	43000	11
	16	65000	11
	20	97000	11
PEG 126	16	64000	12
	20	85000	12
PEH 124	18	65000	11
PEH 430	25-35	13000	12
PEH 169	35	29000	12
	50	35000	12
	65	44000	12
	75	58000	12
	90	78000	12
PEH 200	35	20000	12
	50	24000	12
	65	30000	12
	75	40000	12
	90	60000	12

Capacitor		Max T_a	Max T_h at Max T_a
PEG 124	125°C	125°C	129°C
	105°C	105°C	108°C
PEG 126	150°C	150°C	151°C
PEH 124	125°C	125°C	129°C
PEH 430	105°C	105°C	110°C
PEH 169	85°C	85°C10	0°C ($U_R \leq$ 420 VCD)
	85°C	85°C	95°C (U_R = 450 VDC)
	105°C	105°C	112°C
PEH 200	85°C	85°C	100°C

CALCULATION EXAMPLE

Article No: PEH200OO427AMB2

Input:
Ambient temperature = 70°C
Ripple current = 30A (10kHz)
$U_{applied}$ = 350V
ESR (85°C, 10 kHz) = 4.6 mΩ
Thermal resistance R_{th} = 4.3°C/W

Calculation:
$P_{LOSS} = I_{RMS}^2 \times ESR = 30^2 \times 4.6 \times 10^{-3} = 4.1$ W
Hot spot temp. $T_h = T_a + R_{th} \times P_{LOSS} = 70 + 4.3 \times 4.1 = 88$°C
The assumption of hot-spot temp 85°C when we get ESR was OK!

Output:
Expected Life time $L_{OP} = 30000 \times 2^{\frac{85-88}{12}} = 25$k hours

Remark! ESR (T_h, f) and R_{th} values, of a given article number, is available upon request. Please contact Customer Support.

PYR 5008 and 7511 resistors

- **For voltage balancing and/or discharge of electrolytic capacitors**
- **Fits capacitor diameters 50–90 mm**
- **Easy to mount**

APPLICATION

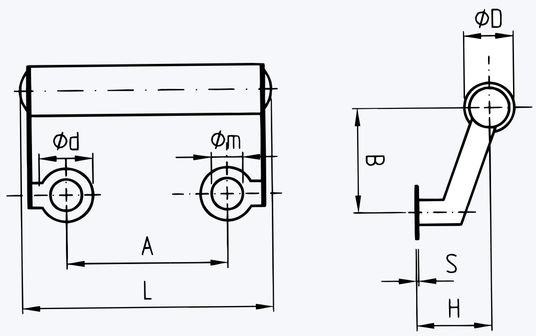
Voltage balancing of series connected electrolytic can type capacitors and/or discharge purposes.

BASIC DESIGN

The PYR resistors are wire wound on a ceramic core and coated with high temperature silicone. The mounting brackets are made of stainless steel and connected by two point spot welding.

SPECIFICATION

Standards	CECC 40201, MIL -R26E
Resistance range	10–47 kΩ
Resistance tolerance	+/– 5%
Rated voltage	700 VDC acc. to CECC 40201-003
Temperature range	–55 to +105°C



Dimensions table PYR (mm)

Type	A	L ±1	d ±2	m	B	H ±1	S ±1	D max	Weight approx (g)
PYR 5008	22.0*	40	10.6	6.3	21	15	0.4	10	9
PYR 7511	32.0	50	10.6	6.3	21	15	0.4	10	11

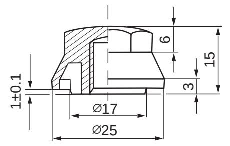
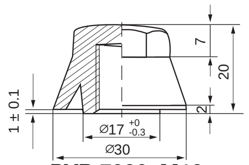
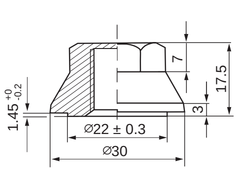
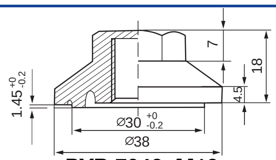
* Brackets are adjustable up to A = 28.5

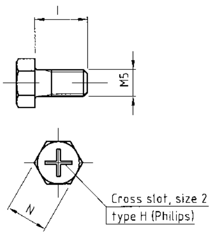
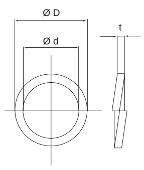
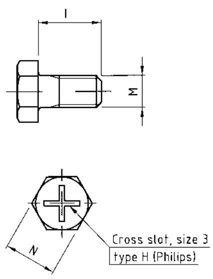
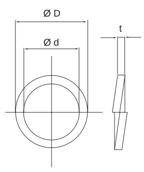
Article table PYR

Article code	R (ký)*	P_{max} (W) 40°C	P_{max} (W) 85°C	P_{max} (W) 105°C	Fits cap. diameter
PYR 5008 / 47	47	10	8	7	50–65
PYR 7511 / 10	10	13	11	10	75–90
PYR 7511 / 18	18	13	11	10	75–90
PYR 7511 / 27	27	13	11	10	75–90
PYR 7511 / 47	47	13	11	10	75–90

* Other R values on request

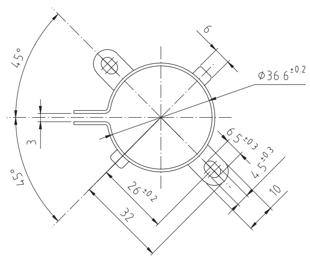
MOUNTING DATA FOR THE ACCESSORIES

NYLON CAP NUTS	Mounting hole mm (min)	Max chassis thickness (mm)	Width of jaws (mm)	Creepage distance (mm)	Test voltage 50–60 Hz 1 min (KVAC)	Max tightening torque (NM)	Capacitor diameter (mm)
 PYB 7033, M8	⌀ 17.5	5	17	4.5	2.5	3	⌀ = 35
 PYB 7026, M12	⌀ 17.5	5	19	2.5	2,5	8	⌀ > 35
 PYB 7041, M12	⌀ 22.5	5	19	5	2.5	8	⌀ > 35
 PYB 7042, M12	⌀ 30.5	5	19	9	4	8	⌀ > 35

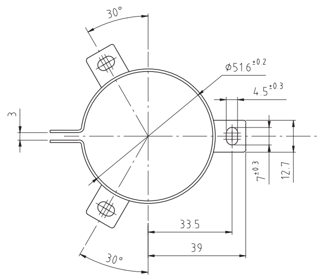
SCREWS STAINLESS STEEL	WASHERS STAINLESS STEEL	M	l	D	d	t	S	Max tightening torque (NM)
 PYC 6750, M5	 PYC 7150, M5	M5	10	8.7	5.1	1.2	10	2.5
 PYC 6751, M6*	 PYC 6756, M6*	M6	12	11.1	6.1	1.6	12	5 *

* M6 x 12 (min connector thickness 3 mm incl. washer)

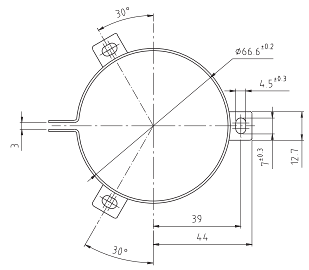
CLIPS



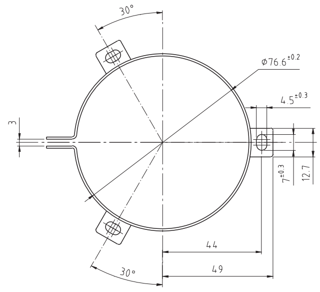
PYC 6041, Ø 35 mm



PYC 6042, Ø 50 mm

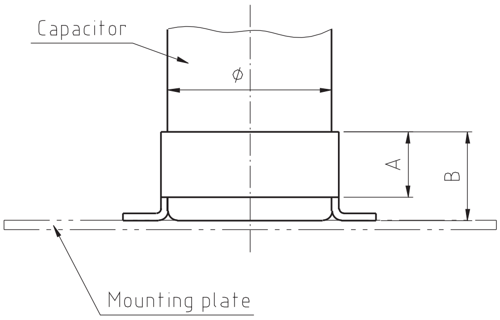


PYC 6043, Ø 65 mm



PYC 6044, Ø 75 mm

Delivered without bolts and nuts for mounting



Ø	A	B
35	14 mm	20 mm
50	19 mm	30 mm
65/75	25 mm	36 mm

LIMITED WARRANTY ELECTROLYTIC CAPACITORS

Evox Rifa AB warrants that the goods manufactured by Evox Rifa AB are free from defects in design, materials and workmanship.

Evox Rifa AB liability under this warranty shall be limited to replacement or repair free of charge, at Evox Rifa AB factory, provided that notification of such failure or defect is given to Evox Rifa AB immediately upon the same becoming apparent and that on Evox Rifa AB's request the goods are promptly returned to Evox Rifa AB carriage paid. In case goods thus returned as defective, prove to be without fault or defect, Evox Rifa AB is entitled to charge buyer 10% of the value of returned goods.

If the goods supplied or part there of are not manufactured by or branded RIFA, Evox Rifa AB will only extend to buyer the benefit of the warranty granted by the manufacturer of the goods. Evox Rifa AB liability is further limited to a period of 12 months from the date of shipment to the buyer.

Evox Rifa AB shall not be liable for any defect which is due to accident, fair wear and tear, negligent use, tampering, improper handling, improper use, improper operation or improper storage or any other default on the part of any other person other than Evox Rifa AB.

Evox Rifa AB shall have no other liabilities in case of defective goods than those stated above and shall under no circumstances be liable for any consequential loss or damage arising from the use of goods sold by Evox Rifa AB. Liability under paragraph 823 BGB is expressly excluded.
The above limitations of Evox Rifa AB liability for defective goods shall apply also with regards to product liability, and Evox Rifa AB shall have no responsibility for injury to persons or for damage to goods or property of any kind.

In case of product liability claims from third parties against Evox Rifa AB, not falling within Evox Rifa AB liability in accordance to the above, buyer shall hold Evox Rifa AB harmless.

SAFETY PRECAUTIONS

Personnel and property safety
Electrolytic capacitors have a very high Watt-Second capability.

For personnel and property safety it is very important that suitable precautions are observed in handling, testing and application of these capacitors.

To prevent electrical shocks and sparks always discharge electrolytic capacitors directly before touching or connecting/ disconnecting the terminals.

Exposure to electrolyte liquids
Eye or mouth exposure to electrolytes in electrolytic capacitors must be treated immediately:

1. Flush thoroughly with large amounts of running water

2. Seek immediate medical attention

   Skin or clothing contact must be treated as soon as possible after contact with electrolyte:

1. Flush thoroughly with large amounts of running water and then wash with soap and hot water.

WARNING!

Misapplication of electrolytic capacitors
Do not misapply Aluminium Electrolytic Capacitors.

Misapplication of electrolytic capacitors may be hazardous. Personal injury or property damage may result from explosion of a capacitor or from expulsion of electrolyte liquid due to mechanical disruption of a capacitor.

The most common forms of misapplication:
1. Exposure to voltage and temperatures above specified limit.
2. Exposure to reverse voltage in excess of specified limit.
3. Application of excessive ripple current or voltage.
4. Exposure to transient or surge voltages beyond specified limits.
5. Excessive torque or soldering heat.

The electrolyte liquid
The electrolyte liquid used in RIFA electrolytic capacitors is a biodegradable liquid based on organic solvent with a high boiling point, mixed with an organic salt. It is chemically neutral, and contains no PCB or other chlorinated compounds. It has low acute toxicity, but prolonged inhalation of vapours should be avoided. Repeated contact with skin may cause slight irri-tation, so protective gloves should be used when handling electrolyte liquid.

Smoke from burning electrolyte is irritating, but does not contain dioxines or similar highly toxic substances.

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