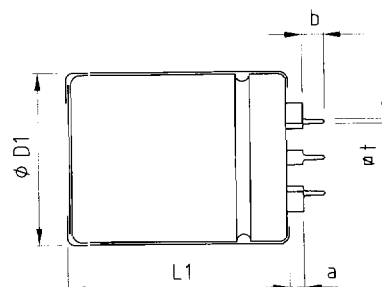
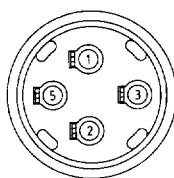


PEH 165 105°C

- Long Life
- > 10 years 50°C
- PCB Mounting
- Low ESR and low ESL
- High ripple current ratings

APPLICATION	BASIC DESIGN
Smoothing and energy storage in SMPS for data processing, office automation, industrial equipment and telecommunication.	PEH 165 is a Long Life electrolytic capacitor, high reliability version, polarized, welded design, drop-in solder pins, negative pole connected to the case, safety vent and plastic insulation.
Robust mechanical construction for professional requirements.	PEH 165 is designed to offer low impedance smoothing at high frequencies, high ripple current capability and low mounting cost. The PEH 165 winding is housed in a cylindrical aluminium can with a reinforced moulded phenolic lid. 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 gives excellent heat transfer from the winding to the ambient, which gives cooler operation. As internal thermal resistance is low, cooling by forced air or chassis mounting can be made very efficient. Low ESR is a result of a very low resistive paper/electrolyte system, and an all-welded design.

SPECIFICATION	
Standards	IEC 384-4 Long Life Grade, category 40/105/56 DIN 40040, GPF DIN 41240, type 1A, DIN 41238 GMF
RIFA Specification	Corresponding to CECC 30301-805
Capacitance range	22–68000 µF
Capacitance tolerance	–10 to +30%
Rated voltage	10–500 VDC
Temperature range	–40 to +105°C (–40 to +85°C 385–500V)
Shelf life	at 0V +85°C 5000 h, +40°C 10 years
Diameter range	25–40 mm
Pin configuration, see page 36.	



Dimensions table PEH 165 (mm)

D x L	Case code	D1 ±0.5	L1 +1/-2	a ±0.1	b ±0.5	t ±0.1	Weight approx (g)
25 x 37	A	25	37	3	4.5	0.8	25
25 x 47	B	25	47	3	4.5	0.8	34
30 x 47	C	30	47	3	4.5	0.8	46
35 x 47	D	35	47	3	4.5	0.8	65
35 x 57	E	35	57	3	4.5	0.8	76
40 x 57	F	40	57	3	4.5	0.8	95
40 x 77	G	40	77	3	4.5	0.8	135
40 x 107	H	40	107	3	4.5	0.8	175

ARTICLE TABLE PEH 165 (105°C)

C_R	D x L	Case code	I_{RAC}^* 105°C 100 Hz 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
μF	mm							
10 VDC (U_R)								
4700	25 x 37	A	3.4	10.3	49	36	21	PEH 165EA4470Q
6800	25 x 47	B	4.4	13.3	33	24	21	PEH 165EB4680Q
10000	30 x 47	C	5.1	14.4	26	20	24	PEH 165EC5100Q
15000	35 x 47	D	5.2	13.7	25	21	25	PEH 165ED5150Q
22000	35 x 57	E	6.2	16.2	19	16	25	PEH 165EE5220Q
33000	40 x 57	F	6.0	14.9	22	20	32	PEH 165EF5330Q
47000	40 x 77	G	7.5	18.8	15	14	32	PEH 165EG5470Q
68000	40 x 107	H	8.9	22.3	11	10	32	PEH 165EH5680Q
16 VDC (U_R)								
3300	25 x 37	A	3.2	10.3	54	37	21	PEH 165GA4330Q
4700	25 x 47	B	4.0	13.3	37	25	21	PEH 165GB4470Q
6800	30 x 47	C	4.7	14.1	29	21	24	PEH 165GC4680Q
10000	35 x 47	D	5.0	13.7	27	21	25	PEH 165GD5100Q
15000	35 x 57	E	6.0	16.1	20	16	25	PEH 165GE5150Q
22000	40 x 57	F	5.9	15.1	22	20	32	PEH 165GF5220Q
33000	40 x 77	G	7.4	18.8	15	14	32	PEH 165GG5330Q
47000	40 x 107	H	8.6	22.1	11	10	32	PEH 165GH5470Q
25 VDC (U_R)								
2200	25 x 37	A	2.8	10.3	62	37	21	PEH 165HA4220Q
3300	25 x 47	B	3.6	13.4	41	24	21	PEH 165HB4330Q
4700	30 x 47	C	4.3	13.9	32	21	24	PEH 165HC4470Q
6800	35 x 47	D	4.7	13.4	30	22	25	PEH 165HD4680Q
10000	35 x 57	E	5.6	15.9	22	16	25	PEH 165HE5100Q
15000	40 x 57	F	5.8	15.2	23	19	32	PEH 165HF5150Q
22000	40 x 77	G	7.2	18.8	16	14	32	PEH 165HG5220Q
33000	40 x 107	H	8.4	21.9	12	10	32	PEH 165HH5330Q
40 VDC (U_R)								
1500	25 x 37	A	2.4	9.2	74	38	21	PEH 165KA4150Q
2200	25 x 47	B	3.1	12.2	49	25	21	PEH 165KB4220Q
3300	30 x 47	C	3.6	11.9	40	24	24	PEH 165KC4330Q
4700	35 x 47	D	3.9	11.3	40	28	25	PEH 165KD4470Q
6800	35 x 57	E	4.7	13.5	29	21	25	PEH 165KE4680Q
10000	40 x 57	F	4.8	12.7	32	26	32	PEH 165KF5100Q
15000	40 x 77	G	6.1	16.1	21	18	32	PEH 165KG5150Q
22000	40 x 107	H	7.2	19.2	15	13	32	PEH 165KH5220Q
63 VDC (U_R)								
1000	25 x 37	A	2.2	10.2	86	37	21	PEH 165MA4100Q
1500	25 x 47	B	2.9	13.5	56	23	21	PEH 165MB4150Q
2200	30 x 47	C	3.3	11.8	47	25	24	PEH 165MC4220Q
3300	35 x 47	D	3.9	12.3	40	25	25	PEH 165MD4330Q
4700	35 x 57	E	4.7	14.3	33	22	25	PEH 165ME4470Q
6800	40 x 57	F	4.9	13.5	34	27	32	PEH 165MF4680Q
10000	40 x 77	G	6.0	16.7	24	19	32	PEH 165MG5100Q
15000	40 x 107	H	6.9	18.9	17	13	32	PEH 165MH5150Q
100 VDC (U_R)								
470	25 x 37	A	1.6	6.2	230	140	21	PEH 165PA3470Q
680	25 x 47	B	2.0	8.1	160	93	21	PEH 165PB3680Q
1000	30 x 47	C	2.5	9.5	110	70	24	PEH 165PC4100Q
1500	35 x 47	D	3.0	9.8	86	57	25	PEH 165PD4150Q
2200	35 x 57	E	3.7	11.8	60	41	25	PEH 165PE4220Q
3300	40 x 57	F	4.1	12.0	53	40	32	PEH 165PF4330Q
4700	40 x 77	G	5.2	15.3	36	27	32	PEH 165PG4470Q
6800	40 x 107	H	6.1	17.8	25	19	32	PEH 165PH4680Q

* Maximum values

ARTICLE TABLE PEH 165 (105°C)

C _R	D x L	Case code	I _{RAC} * 105°C 100 Hz 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
μF	mm							
250 VDC (U _R)								
100	25 x 37	A	0.69	3.5	1000	490	21	PEH 165SA3100Q
150	25 x 47	B	0.87	4.5	690	320	21	PEH 165SB3150Q
220	30 x 47	C	1.20	5.5	480	230	24	PEH 165SC3220Q
330	35 x 47	D	1.50	6.9	330	160	25	PEH 165SD3330Q
470	35 x 57	E	1.80	8.5	230	120	25	PEH 165SE3470Q
680	40 x 57	F	2.30	9.8	170	91	32	PEH 165SF3680Q
1000	40 x 77	G	2.90	12.2	120	62	32	PEH 165SG4100Q
1500	40 x 107	H	3.50	14.5	79	42	32	PEH 165SH4150Q
350 VDC (U _R)								
47	25 x 37	A	0.54	2.5	1900	980	21	PEH 165UA2470Q
68	25 x 47	B	0.67	3.0	1300	710	21	PEH 165UB2680Q
100	30 x 47	C	0.89	3.9	920	490	24	PEH 165UC3100Q
150	35 x 47	D	1.20	5.1	620	330	25	PEH 165UD3150Q
220	35 x 57	E	1.50	6.3	430	230	25	PEH 165UE3220Q
330	40 x 57	F	1.90	7.6	300	160	32	PEH 165UF3330Q
470	40 x 77	G	2.30	9.4	210	110	32	PEH 165UG3470Q
680	40 x 107	H	2.80	11.2	140	79	32	PEH 165UH3680Q

* Maximum values

ARTICLE TABLE PEH 165 (85°C)

C _R	D x L	Case code	I _{RAC} * 85°C 100 Hz 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
μF	mm							
385 VDC (U _R)								
47	25 x 37	A	0.79	2.6	1800	900	21	PEH 165XA2470Q
68	25 x 47	B	0.99	3.2	1200	620	21	PEH 165XB2680Q
100	30 x 47	C	1.30	4.2	830	430	24	PEH 165XC3100Q
150	35 x 47	D	1.70	5.3	560	300	25	PEH 165XD3150Q
220	35 x 57	E	2.20	6.6	390	200	25	PEH 165XE3220Q
330	40 x 57	F	2.80	7.9	270	150	32	PEH 165XF3330Q
470	40 x 77	G	3.40	10.0	190	100	32	PEH 165XG3470Q
680	40 x 107	H	4.10	11.7	130	72	32	PEH 165XH3680Q
400 VDC (U _R)								
33	25 x 37	A	0.68	2.2	2300	1200	21	PEH 165VA2330Q
47	25 x 47	B	0.83	2.7	1600	830	21	PEH 165VB2470Q
68	30 x 47	C	1.10	3.6	1100	580	24	PEH 165VC2680Q
100	35 x 47	D	1.40	4.6	780	400	25	PEH 165VD3100Q
150	35 x 57	E	1.80	5.8	530	270	25	PEH 165VE3150Q
220	40 x 57	F	2.30	7.1	370	190	32	PEH 165VF3220Q
330	40 x 77	G	2.90	8.9	240	130	32	PEH 165VG3330Q
470	40 x 107	H	3.50	10.5	170	91	32	PEH 165VH3470Q
450 VDC (U _R)								
22	25 x 37	A	0.51	1.6	2800	1600	21	PEH165YA2220Q
33	25 x 47	B	0.64	2.0	1900	1000	21	PEH165YB2330Q
47	30 x 47	C	0.85	2.6	1300	740	24	PEH165YC2470Q
68	35 x 47	D	1.10	3.4	920	510	25	PEH165YD2680Q
100	35 x 57	E	1.40	4.2	620	350	25	PEH165YE3100Q
150	40 x 57	F	1.90	5.6	420	230	32	PEH165YF3150Q
220	40 x 77	G	2.30	6.9	290	160	32	PEH165YG3220Q
330	40 x 107	H	2.80	8.3	190	110	32	PEH165YH3330Q

* Maximum values

ARTICLE TABLE PEH 165 (85 °C)								
C _R	D x L	Case code	I _{RAC} * 85°C 100 Hz 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
μF	mm							
500 VDC (U _R)								
22	25 x 37	A	0.37	1.4	5300	1800	21	PEH165ZA2220Q
33	25 x 47	B	0.47	1.8	3500	1200	21	PEH165ZB2330Q
47	30 x 47	C	0.62	2.3	2500	850	24	PEH165ZC2470Q
68	35 x 47	D	0.81	3.0	1800	590	25	PEH165ZD2680Q
100	35 x 57	E	1.00	3.7	1200	400	25	PEH165ZE3100Q
150	40 x 57	F	1.40	5.0	780	270	32	PEH165ZF3150Q
220	40 x 77	G	1.70	6.3	540	180	32	PEH165ZG3220Q
330	40 x 107	H	2.00	7.5	360	130	32	PEH165ZH3330Q

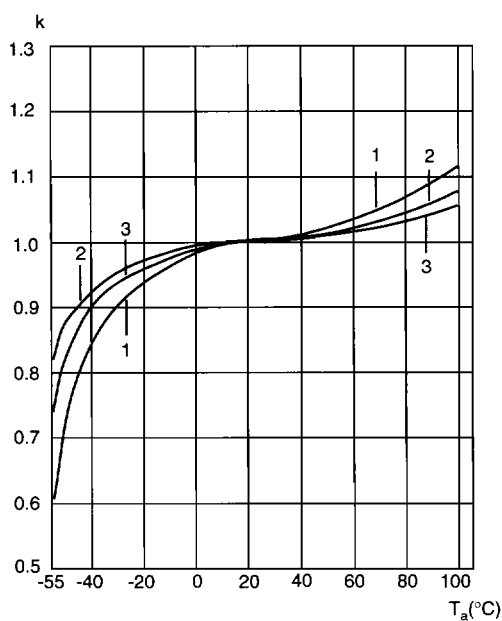
* Maximum values

OPERATIONAL DATA	RELIABILITY
Please see operational lifetime section, page 62.	
The failure rate is derived from our periodic test results. The failure rate (λ_p) 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 x 10 ⁻⁶
60°C	1 x 10 ⁻⁷
Failure rate per hour for catastrophic plus parametric failures.	

TECHNICAL DATA

The capacitance value vs ambient temperature

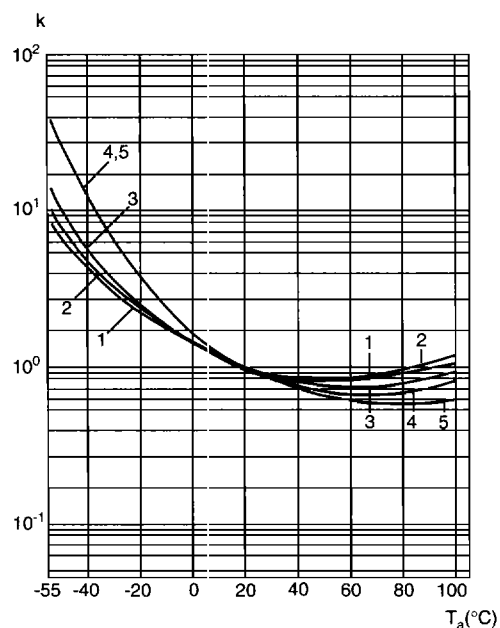
(T_a) at $f = 100$ Hz
 $k = C(T_a) / C(20^\circ\text{C})$



U_R	Curve
10 and 100	1
16-63	2
250-450	3

TAN δ as a function of ambient temperature

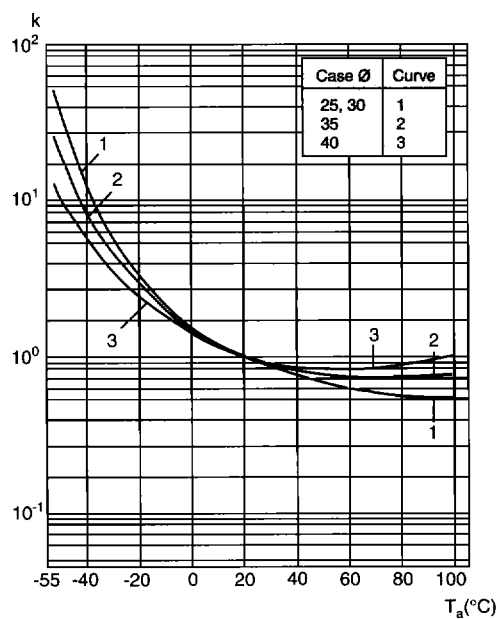
(T_a) at $f = 100$ Hz
 $k = \text{TAN}\delta(T_a) / \text{TAN}\delta(20^\circ\text{C})$



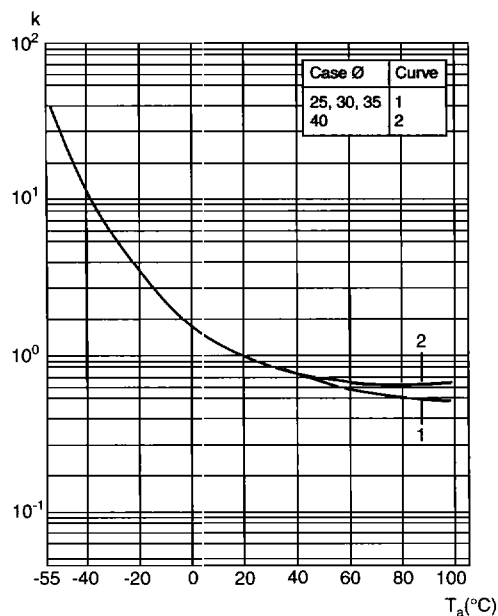
U_R	Case Code	Curve
$10 \leq U_R \leq 25$	A-C	4
$10 \leq U_R \leq 25$	D-F	3
$10 \leq U_R \leq 63$	A-H	2
$40 \leq U_R \leq 63$	F-H	1
$100 \leq U_R \leq 450$	A-H	5

ESR as a function of ambient temperature

(T_a) at $f = 100$ Hz
 $10 \leq U_R \leq 63$
 $k = \text{ESR}(T_a) / \text{ESR}(20^\circ\text{C})$



$100 \leq U_R \leq 450$
 $k = \text{ESR}(T_a) / \text{ESR}(20^\circ\text{C})$



MECHANICAL DATA

The capacitor may be mounted in any position.

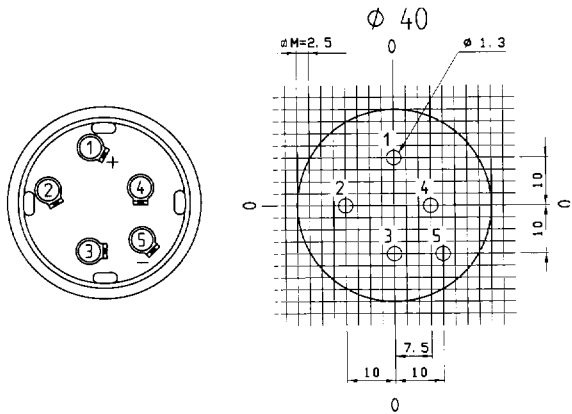
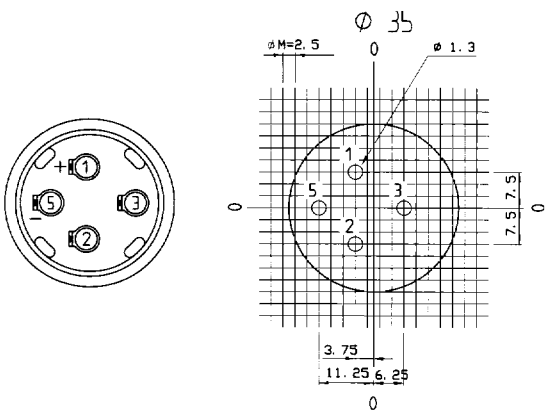
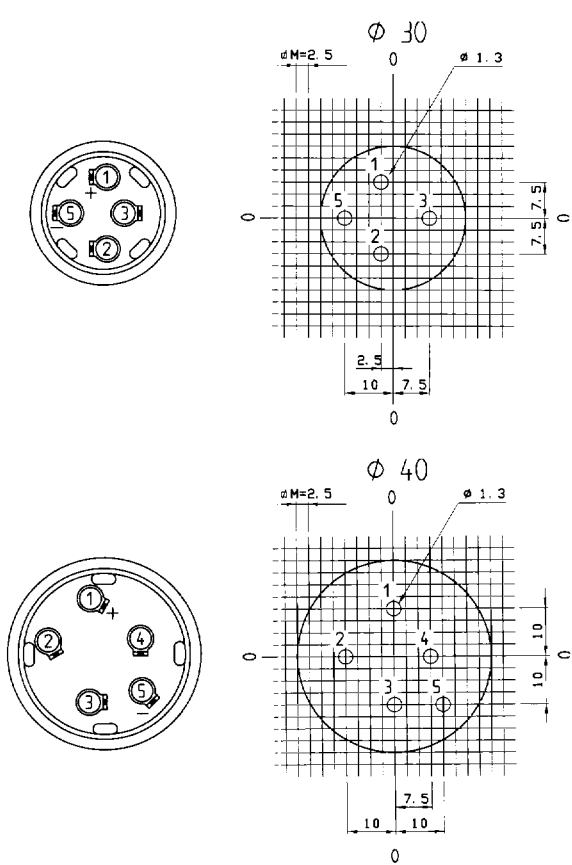
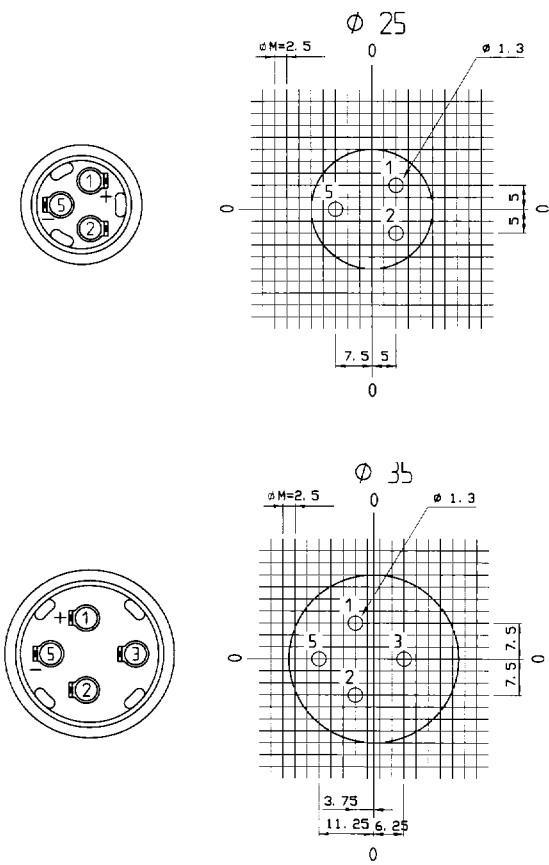
Pin no. 1 shall be connected to positive polarity. Pin no. 5 shall be connected to negative polarity. The other pins must be

soldered to isolated pads or pads with the same potential as the negative pole.

Note: All piercing diagram viewed from soldering side.

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	H	1	6	5	S	G	4	1	0	0	Q							
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%

Quantities and weights

CASE CODE	A	B	C	D	E	F	G	H
Weight approx (g)	25	34	46	65	76	95	135	175
Standard box quantity	72	72	56	42	42	30	30	30