

# HCGF5 · Screw-Terminal · 6000 h/85 °C

## Standard Performances · Small Diameter Design

Special charge-discharge proof design available upon request.

Auf Anfrage spezielles Design für Lade-, Entladeanwendungen erhältlich.

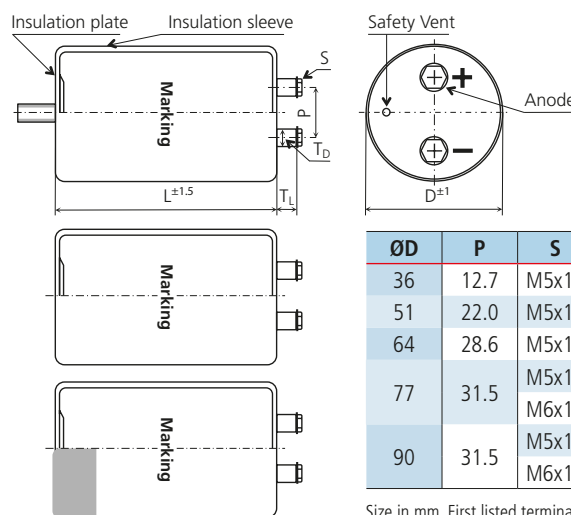
### > Specifications · Spezifikationen

Items	Characteristics
Temperature range	-25°C ~ + 85°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10/+30% on request
Surge voltage	Repetitive max. 30 sec per 6 Minutes
Leakage current max. I <sub>l</sub> (20°C, 5 min)	0.01 • C • V <sub>r</sub> [μA] or 3 mA, which is smaller.
Useful life	6 000 hours at 85°C
Field failure rate	0.5 FIT = 0.5 • 10 <sup>-9</sup> Failures/hour
RoHS conform	Directive 2011/65/EU & (EU)2015/863
Specification /Vibration	JIS C 5101-4 / 0.75mm, 10...55Hz, 10g, 3x2h



### > Outline Drawings · Bauformen

- Shape: B (ØD = 51-101)  
(for Bolt – Mounting, M12x16, stud bolt is not isolated)
- Form: B (ØD = 51-101)  
(für Bolzenbefestigung, M12x16, Bolzen nicht isoliert)
- Shape: N (for PBT-Holder ØD = 77-101 and Press Ring ØD = 64-101)
- Form: N (für PBT-Halter ØD = 77-101 und Einpressring ØD = 64-101)
- Shape: I (ØD = 36)
- Shape: Y (ØD = 51-101)  
(double sleeve, Y- bracket free of charge)
- Form: I (ØD = 36)
- Form: Y (ØD = 51-101)  
(doppelte Isolierung, Y- Schelle wird kostenlos mitgeliefert)



Size in mm. First listed terminal is standard.

### > Product Code · Bestellbezeichnung

**Example:** Series HCGF5 · 4700 μF +/- 20 % · 200 V · D = 51 mm · L = 96 mm with Y-Bracket

HCGF5 2D		472		Y		C		096 (PHM6)																															
Type of series		Capacitance code		Fixing symbol code		Case code diameter		Customers' specification																															
<table border="1"> <thead> <tr> <th colspan="2">Rated Voltage Code</th> </tr> <tr> <th>Code</th> <th>Voltage</th> </tr> </thead> <tbody> <tr> <td>2C</td> <td>160</td> </tr> <tr> <td>2D</td> <td>200</td> </tr> <tr> <td>2E</td> <td>250</td> </tr> </tbody> </table>		Rated Voltage Code		Code	Voltage	2C	160	2D	200	2E	250	The first two digits are significant. The last digit indicates the number of following zeros in μF.		B : Bolt ØD = 51 – 101  N : No double sleeve (PBT-Safety-holder or press ring)  Y : 3 Stoppers Bracket ØD = 51 - 101  I : 2 Stoppers Bracket ØD = 36		<table border="1"> <thead> <tr> <th>ØD</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>36</td> <td>A</td> </tr> <tr> <td>51</td> <td>C</td> </tr> <tr> <td>64</td> <td>D</td> </tr> <tr> <td>77</td> <td>E</td> </tr> <tr> <td>90</td> <td>F</td> </tr> <tr> <td>101</td> <td>G</td> </tr> </tbody> </table>		ØD	Code	36	A	51	C	64	D	77	E	90	F	101	G	<table border="1"> <thead> <tr> <th colspan="2">Case Code length</th> </tr> <tr> <th>Length in mm</th> <th>(3 digits)</th> </tr> </thead> <tbody> <tr> <td>096</td> <td></td> </tr> </tbody> </table>		Case Code length		Length in mm	(3 digits)	096	
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# HCGF5 · Screw-Terminal · 6000 h/85 °C

Rated VoltageCode (Surge Voltage) $V_r$ [V DC]	Capacitance $C_r$ [ $\mu$ F]	Ripple Current at 85°C/120Hz $I_r$ [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [m $\Omega$ ]	Zmax at 20°C/10kHz [m $\Omega$ ]	ESL (typ) [nH]	Dissipation Factor at 20°C/120Hz Tan $\delta$	DxL [mm]	Product Code  # = variable value, see fixing code in the product code
<b>160 VDC</b> Code: 2C  Surge Voltage 200 VD	3 300	6.0	16.2	40	35	15	0.2	36x121	HCGF52C332#A121PH
	3 900	6.1	16.5	37	28	17	0.2	51x75	HCGF52C392#C075PH
	4 700	6.7	18.1	30	25	17	0.2	51x75	HCGF52C472#C075PH
	5 600	8.0	21.6	26	23	17	0.2	51x96	HCGF52C562#C096PH
	6 800	9.0	24.3	22	22	17	0.2	51x96	HCGF52C682#C096PH
	8 200	10.5	28.4	18	19	17	0.2	51x115	HCGF52C822#C115PH
	10 000	12.0	32.4	14	17	18	0.2	64x96	HCGF52C103#D096PH
		12.2	32.9	15	16	17	0.2	51x130	HCGF52C103#C130PH
	12 000	13.0	35.1	12	15	18	0.2	64x96	HCGF52C123#D096PH
	15 000	16.4	44.3	11	12	18	0.2	64x130	HCGF52C153#D130PH
	18 000	17.9	48.3	9	11	18	0.2	64x130	HCGF52C183#D130PH
	22 000	21.0	56.7	8	8	20	0.2	77x130	HCGF52C223#E130PH
	27 000	23.2	62.6	7	8	20	0.2	77x130	HCGF52C273#E130PH
	33 000	27.4	74.0	6	7	20	0.2	90x131	HCGF52C333#F131PH
	39 000	32.1	86.7	5	7	20	0.2	90x157	HCGF52C393#F157PH
	47 000	37.1	100.2*	5	7	20	0.2	77x195	HCGF52C473#E195PH
		40.0	108.0*	5	6	20	0.2	77x220	HCGF52C523#E220PH
	52 000	40.3	108.8*	5	6	20	0.2	90x196	HCGF52C523#F196PH
68 000		42.6	115.0*	4	6	20	0.2	90x203	HCGF52C683#F203PH
100 000	55.7	150.4*	4	6	29	0.2	101x250	HCGF52C104#G250	
<b>200 VDC</b> Code: 2D  Surge Voltage 250 VD	2 200	4.5	12.2	68	60	15	0.2	36x100	HCGF52D222#A100PH
	2 700	5.4	14.6	48	39	15	0.2	36x121	HCGF52D272#A121PH
	3 300	5.6	15.1	43	35	17	0.2	51x75	HCGF52D332#C075PH
	3 900	6.1	16.5	37	30	17	0.2	51x75	HCGF52D392#C075PH
	4 700	7.4	20.0	30	27	17	0.2	51x96	HCGF52D472#C096PH
	5 600	8.6	23.2	26	25	17	0.2	51x115	HCGF52D562#C115PH
	6 800	10.1	27.3	21	20	17	0.2	51x130	HCGF52D682#C130PH
	8 200	10.8	29.2	17	18	18	0.2	64x96	HCGF52D822#D096PH
	10 000	12.0	32.4	14	14	18	0.2	64x96	HCGF52D103#D096PH
	12 000	13.9	37.5	12	14	20	0.2	77x96	HCGF52D123#E096PH
	15 000	16.6	44.8	10	13	20	0.2	77x96	HCGF52D153#E096PH
	18 000	19.0	51.3	8	12	20	0.2	77x130	HCGF52D183#E130PH
	20 000	21.0	56.7	8	8	20	0.2	77x145	HCGF52D203#E145PH
	22 000	22.5	60.8	7	7	20	0.2	77x155	HCGF52D223#E155PH
	27 000	24.8	67.0	6	7	20	0.2	90x131	HCGF52D273#F131PH
		28.9	78.0	6	7	20	0.2	77x220	HCGF52D273#E220PH
	33 000	29.3	79.1	5	7	20	0.2	90x157	HCGF52D333#F157PH
	39 000	34.7	93.7	5	7	20	0.2	77x220	HCGF52D393#E220PH
40 000	32.3	87.2	5	7	20	0.2	90x157	HCGF52D403#F157PH	
52 000	40.3	108.8*	5	7	20	0.2	90x196	HCGF52D523#F196PH	
<b>250 VDC</b> Code: 2E  Surge Voltage 300 VD	1 500	3.7	10.0	56	50	15	0.2	36x100	HCGF52E152#A100PH
	1 800	4.0	10.8	52	44	15	0.2	36x100	HCGF52E182#A100PH
	2 200	4.6	12.4	50	40	17	0.2	51x75	HCGF52E222#C075PH
	2 700	5.1	13.8	41	36	17	0.2	51x75	HCGF52E272#C075PH

Additional designs on request · Weitere Designs auf Anfrage

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<b>250 VDC</b> Code: 2E  Surge Voltage 300 VD	3 300	6.2	16.7	36	35	17	0.2	51x96	HCGF52E332#C096PH
	3 900	7.2	19.4	31	30	17	0.2	51x115	HCGF52E392#C115PH
	4 700	8.2	22.1	25	23	18	0.2	64x96	HCGF52E472#D096PH
	5 600	9.0	24.3	21	21	18	0.2	64x96	HCGF52E562#D096PH
	6 800	10.5	28.4	18	18	18	0.2	64x115	HCGF52E682#D115PH
	8 200	11.5	31.0	15	16	18	0.2	64x115	HCGF52E822#D115PH
	10 000	13.5	36.4	12	14	18	0.2	64x130	HCGF52E103#D130PH
	12 000	14.8	40.0	10	11	20	0.2	77x115	HCGF52E123#E115PH
	15 000	17.4	47.0	8	11	20	0.2	77x130	HCGF52E153#E130PH
	18 000	20.4	55.1	7	10	20	0.2	77x155	HCGF52E183#E155PH
	22 000	24.0	64.8	6	8	20	0.2	90x157	HCGF52E223#F157PH
	26 000	26.8	72.4	6	7	20	0.2	77x220	HCGF52E263#E220PH

\* Please contact us if load condition exceeds 100A RMS

## > Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k	Forced cooling [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	0.80	1.00	1.18	1.34	1.45	Multiplier	1.0	1.1

Temperature (°C)	40	45	50	55	60	65	70	75	80	85
Multiplier	2.7	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0

## > Life Time Table · Brauchbarkeitsdauer – Tabelle

HCGF5	Useful life as function of ambient temperature and ripple current													
	$I_r$ at 85°C	x 1.0	x 1.2	x 1.4	x 1.6	x 1.8	x 2.0	x 2.1	x 2.2	x 2.3	x 2.4	x 2.5	x 2.6	x 2.7
$T_a = 40°C$	250	250	250	199	149	108	91	76	63	51	42	33	27	
$T_a = 45°C$	243	201	162	125	94	68	57	48	39	32	26	21		
$T_a = 50°C$	153	127	102	79	59	43	36	30	25	20				
$T_a = 55°C$	97	80	64	50	37	27	23	19						
$T_a = 60°C$	61	51	41	31	23	17								
$T_a = 65°C$	38	32	25	20	15									
$T_a = 70°C$	24	20	16	12										
$T_a = 75°C$	15	12	10											
$T_a = 80°C$	9	8												
$T_a = 85°C$	6													

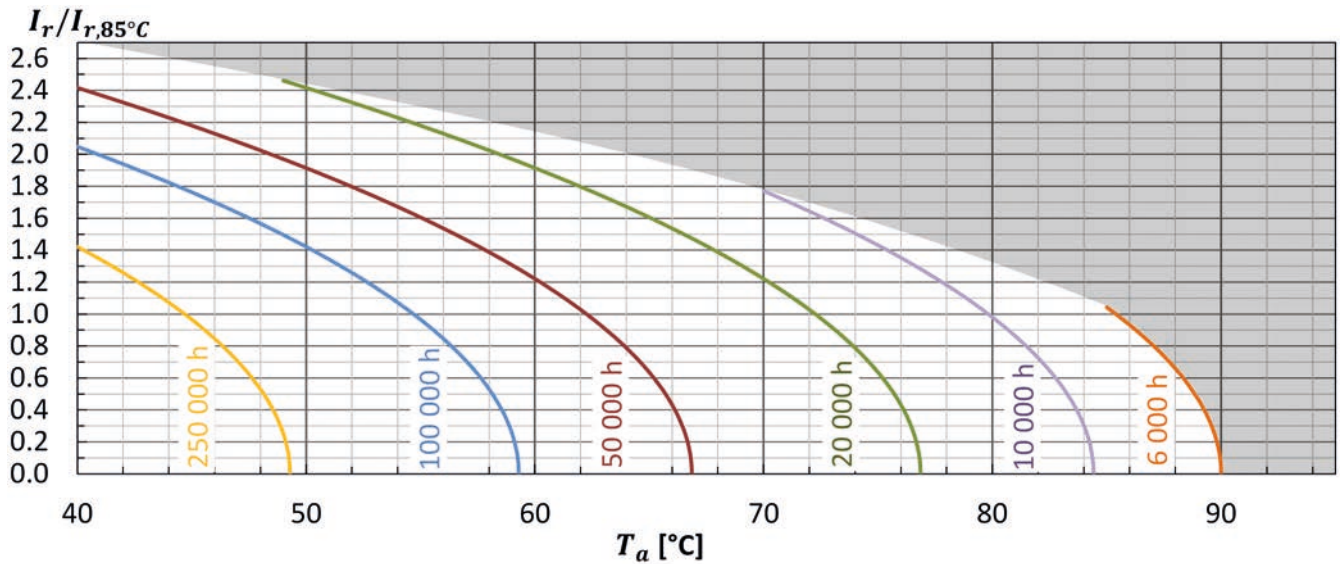
Max. value limited to 250 000 hours.

Additional designs on request · Weitere Designs auf Anfrage

## > Life Time Graph · Brauchbarkeitsdauer – Diagramm

Useful life depending on ambient temperature  $T_a$  and ripple current operating conditions  $I_r$ , versus rated ripple current at the upper category temperature  $I_{r, 85^\circ\text{C}, 120\text{Hz}}$

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur  $T_a$  und Wechselstrombelastung  $I_r$ , im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorie-temperatur  $I_{r, 85^\circ\text{C}, 120\text{Hz}}$



## > Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Test procedure	Life time criteria
Endurance test	$T_a = 85^\circ\text{C}$ ; $V_r, I_r$ applied 4000 hours	$\Delta C/C \leq 15\%$ (of initial value) $\text{Tan}\delta \leq 175\%$ (of specified value) $I_L \leq$ specified value
Useful life	$T_a = 85^\circ\text{C}$ ; $V_r, I_r$ applied 6000 hours	$\Delta C/C \leq 20\%$ (of initial value) $\text{Tan}\delta < 200\%$ (of specified value) $I_L \leq$ specified value

Reference Specification: JIS C 5101-4, JIS C 5102, IEC 60384-4