

# HCGW3 · Screw-Terminal · 5000 h/70 °C

## Highest capacitance · Most Compact

Optional design for permanent and deep charge-discharge application with high voltage hub and pulsed operation mode upon request.

Spezielles Design für häufige und tiefe Lade-, Entladeanwendungen mit hohem Spannungshub und Impulsbetrieb auf Anfrage erhältlich.

### > Specifications · Spezifikationen

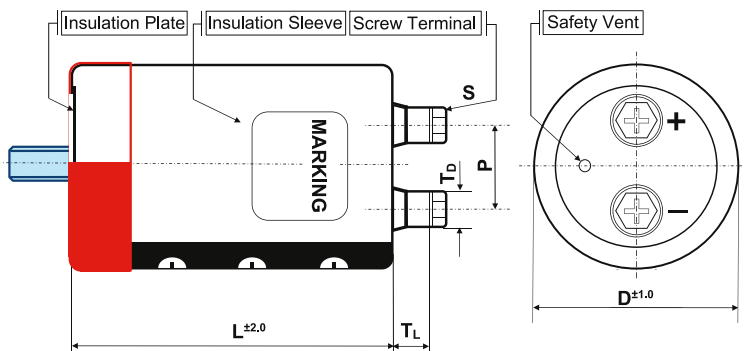
Items	Characteristics
Temperature range	-10°C ~ + 70°C
Capacitance tolerance (at 20°C)	Standard +/- 20%, -10/+30% on request
Surge voltage	Repetitive max. 30 sec per 6 Minutes
Leakage current max. I <sub>L</sub> (20°C, 5 min)	0.01 · C · V, [μA] or 7 mA, which is smaller.
Useful life	5000 hours at 70°C
Field failure rate	0.5 FIT = 0.5 · 10 <sup>-9</sup> Failures/hour
Reference standards	IEC 60384-4, JIS C 5101-4
Vibration	0.75mm, 10...55Hz, 10g, 3x2h
Outer materials	UL94-V0/UL224-VW1 certified (cap/sleeve)
Sleeve withstanding voltage	4000 Vac/1min between terminals bundled and plate*
Product Compliance	RoHS, REACH, Conflict Minerals a.o. – refer to p. 12–13

\* Typical value



### > Shape designation · Formbezeichnung

- additional information on p. 10–11 · Zusatzinformationen auf S. 10–11
- mounting accessories from p. 189 · Montagezubehör ab S. 189



Shape code Features	B Bolt	I/Y double sleeve for 2/3 points metal Bracket	N standard
outer insulation sleeve	•	•	•
insulation plate	•	•	•
stud bolt	•		
bottom double sleeve		•	

diameter code	ØD	available shape	P	S	T <sub>L</sub>	T <sub>D</sub>	Cap material
E	77	B, N, I, Y	31.5	M6x12	9.0	12	PH
				M5x10	8.0	11	PH
F	90	B, N, I, Y	31.5	M6x12	8.0	12	PH
				M5x10	7.0	11	PH

Size in mm. First listed terminal is standard.

## > Product Code · Bestellbezeichnung

**Example:** Series HCGW3 · 36000 µF · 400 V · D=90 mm · L=230mm with Y-Bracket

**HCGW3 2G 363 Y F 230**

Series name	Capacitance code		Shape code	Diameter code	Capacitance tolerance	Specific features
Rated voltage code						
Code	Voltage	Code	Voltage			
2V	350	2W	450			
2G	400	2H	500			

∅ : ± 20 %  
Q : -10 % ~ +30 %

Case length code – length in mm (3 digits)

Rated Voltage Code (Surge Voltage) $V_r$ [V DC]	Capacitance $C_r$ [µF]	Ripple Current at 70°C/120Hz $I_r$ [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	ESL (typ) [nH]	Dissipation Factor at 20°C/120Hz Tan δ	DxL [mm]	Product Code # = variable value, see fixing code in the product code
350 VDC Code: 2V  Surge Voltage 400 VDC	19 000	15.8	36.3	18	19	20	0.70	77x148	HCGW32V193#E148
	21 000	17.3	39.8	16	17	20	0.70	77x165	HCGW32V213#E165
	25 000	19.4	44.6	14	15	20	0.70	77x188	HCGW32V253#E188
	28 000	20.4	46.9	12	13	20	0.70	90x150	HCGW32V283#F150
	30 000	22.0	50.6	12	13	20	0.70	90x167	HCGW32V303#F167
	31 000	23.4	53.8	11	12	20	0.70	77x228	HCGW32V313#E228
	35 000	24.3	55.9	10	11	20	0.70	90x190	HCGW32V353#F190
	44 000	29.5	67.9	8	9	20	0.70	90x230	HCGW32V443#F230
51 000	34.2	78.7	7	8	20	0.70	90x268	HCGW32V513#F268	
400 VDC Code: 2G  Surge Voltage 450 VDC	16 000	14.5	33.4	21	22	20	0.70	77x148	HCGW32G163#E148
	17 000	15.6	35.9	20	21	20	0.70	77x165	HCGW32G173#E165
	20 000	17.4	40.0	17	18	20	0.70	77x188	HCGW32G203#E188
	22 000	18.2	41.9	16	17	20	0.70	90x150	HCGW32G223#F150
	24 000	19.7	45.3	14	15	20	0.70	90x167	HCGW32G243#F167
	25 000	21.0	48.3	14	15	20	0.70	77x228	HCGW32G253#E228
	29 000	22.1	50.8	12	13	20	0.70	90x190	HCGW32G293#F190
	36 000	26.8	61.6	10	11	20	0.70	90x230	HCGW32G363#F230
42 000	31.0	71.3	8	9	20	0.70	90x268	HCGW32G423#F268	
450 VDC Code: 2W  Surge Voltage 500 VDC	8 600	9.3	21.4	47	43	20	0.70	77x108	HCGW32W862#E108
	13 000	12.5	28.8	31	32	20	0.70	77x148	HCGW32W133#E148
		13.0	29.9	31	32	20	0.70	90x126	HCGW32W133#F126
	14 000	13.4	30.8	29	29	20	0.70	90x126	HCGW32W143#F126
	15 000	14.0	32.2	27	28	20	0.70	77x165	HCGW32W153#E165
	16 000	14.8	34.0	25	26	20	0.70	90x150	HCGW32W163#F150
	17 000	15.3	35.2	23	25	20	0.70	77x188	HCGW32W173#E188
	18 000	15.7	36.1	22	23	20	0.70	90x150	HCGW32W183#F150
	21 000	17.6	40.5	19	20	20	0.70	90x167	HCGW32W213#F167
	22 000	18.8	43.2	18	19	20	0.70	77x228	HCGW32W223#E228
	25 000	19.6	45.1	16	17	20	0.70	90x190	HCGW32W253#F190
	32 000	24.1	55.4	12	13	20	0.70	90x230	HCGW32W323#F230
35 000	26.8	61.7	11	12	20	0.70	90x268	HCGW32W353#F268	

Additional designs on request · Weitere Designs auf Anfrage

# HCGW3 · Screw-Terminal · 5000 h/70 °C

Rated VoltageCode (Surge Voltage) $V_r$ [V DC]	Capacitance $C_r$ [μF]	Ripple Current at 70°C/120Hz $I_r$ [A RMS]	Ripple Current at 40°C/120Hz [A RMS]	ESR (typ) at 20°C/100Hz [mΩ]	Zmax at 20°C/10kHz [mΩ]	ESL (typ) [nH]	Dissipation Factor at 20°C/120Hz Tan δ	DxL [mm]	Product Code  # = variable value, see fixing code in the product code
<b>500 VDC</b> Code: 2H  Surge Voltage 550 VDC	10 000	11.0	25.3	36	37	20	0.70	77x148	HCGW32H103#E148
	12 000	12.5	28.8	30	31	20	0.70	77x165	HCGW32H123#E165
	14 000	13.9	32.0	26	27	20	0.70	77x188	HCGW32H143#E188
	15 000	14.3	32.9	24	25	20	0.70	90x150	HCGW32H153#F150
	17 000	16.5	38.0	21	22	20	0.70	77x228	HCGW32H173#E228
		15.9	36.6	21	22	20	0.70	90x167	HCGW32H173#F167
	20 000	17.6	40.5	18	19	20	0.70	90x190	HCGW32H203#F190
	25 000	21.4	49.2	15	15	20	0.70	90x230	HCGW32H253#F230
28 000	24.1	55.4	13	13	20	0.70	90x268	HCGW32H283#F268	

Additional designs on request · Weitere Designs auf Anfrage

## > Ripple Current Multiplier · Wechselstrommultiplikator

Frequency [Hz]	50/60	120	300	1k	≥ 10k	Forced cooling – Wind speed [m/sec]	v < 1.0	v ≥ 1.0
Multiplier	0.70	1.00	1.05	1.10	1.35	Multiplier	1.00	1.10

Ta (°C)	40	45	50	55	60	65	70
Multiplier	2.3	2.2	2.1	1.9	1.7	1.4	1.0

## > Life Time Table · Brauchbarkeitsdauer – Tabelle

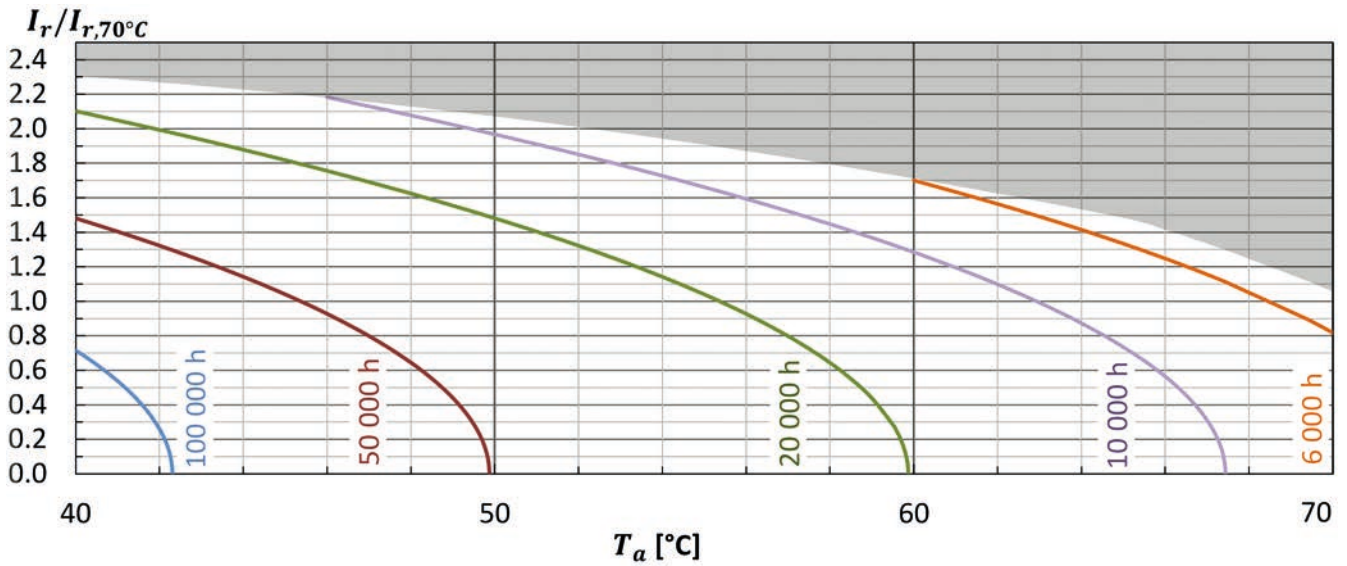
HCGW3	Useful life as function of ambient temperature and ripple current										
$I_r$ at 70°C	0.0	0.5	1.0	1.2	1.4	1.7	1.9	2.0	2.1	2.2	2.3
T <sub>a</sub> = 40°C	123	111	81	68	55	37	27	23	20	16	13
T <sub>a</sub> = 45°C	78	70	51	43	34	23	17	15	12	10	
T <sub>a</sub> = 50°C	49	44	32	27	22	15	11	9	8		
T <sub>a</sub> = 55°C	31	28	20	17	13	9	7				
T <sub>a</sub> = 60°C	19	17	13	10	8	6					
T <sub>a</sub> = 65°C	12	11	8	6	5						
T <sub>a</sub> = 70°C	7	7	5								

khrs

## > Life Time Graph · Brauchbarkeitsdauer – Diagramm

Useful life depending on ambient temperature T<sub>a</sub> and ripple current operating conditions I<sub>r</sub> versus rated ripple current at the upper category temperature I<sub>r, 70°C, 120Hz</sub>

Brauchbarkeitsdauer in Abhängigkeit von Umgebungstemperatur T<sub>a</sub> und Wechselstrombelastung I<sub>r</sub> im Verhältnis zur max. Wechselstrombelastung bei oberer Kategorie-temperatur I<sub>r, 70°C, 120Hz</sub>



> Life Time Tests and Requirements · Anforderungen Brauchbarkeitsdauer

Life time test	Reference	Test procedure	Life time criteria
Endurance test	JIS-C-5101-4 JIS-C-5102 IEC 60384-4	$T_a = 70^\circ C$ ; $V_r$ , $I_r$ applied 4000 hours	$\Delta C/C \leq 10\%$ (of initial value) $\tan\delta \leq 175\%$ (of specified value) $I_L \leq$ specified value
Useful life	JIS-C-5104-4 IEC 60384-4	$T_a = 70^\circ C$ ; $V_r$ , $I_r$ applied 5000 hours	$\Delta C/C \leq 15\%$ (of initial value) $\tan\delta < 200\%$ (of specified value) $I_L \leq$ specified value

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