

# ALC40 Series 105°C

**RoHS**  
Compliant

- Compact Size
- Long life, 9000 hours at 105 °C ( $U_R$ ,  $I_R$  applied)
- High ripple current
- Excellent surge voltage capability
- Optimized designs available on request

## APPLICATION

## BASIC DESIGN

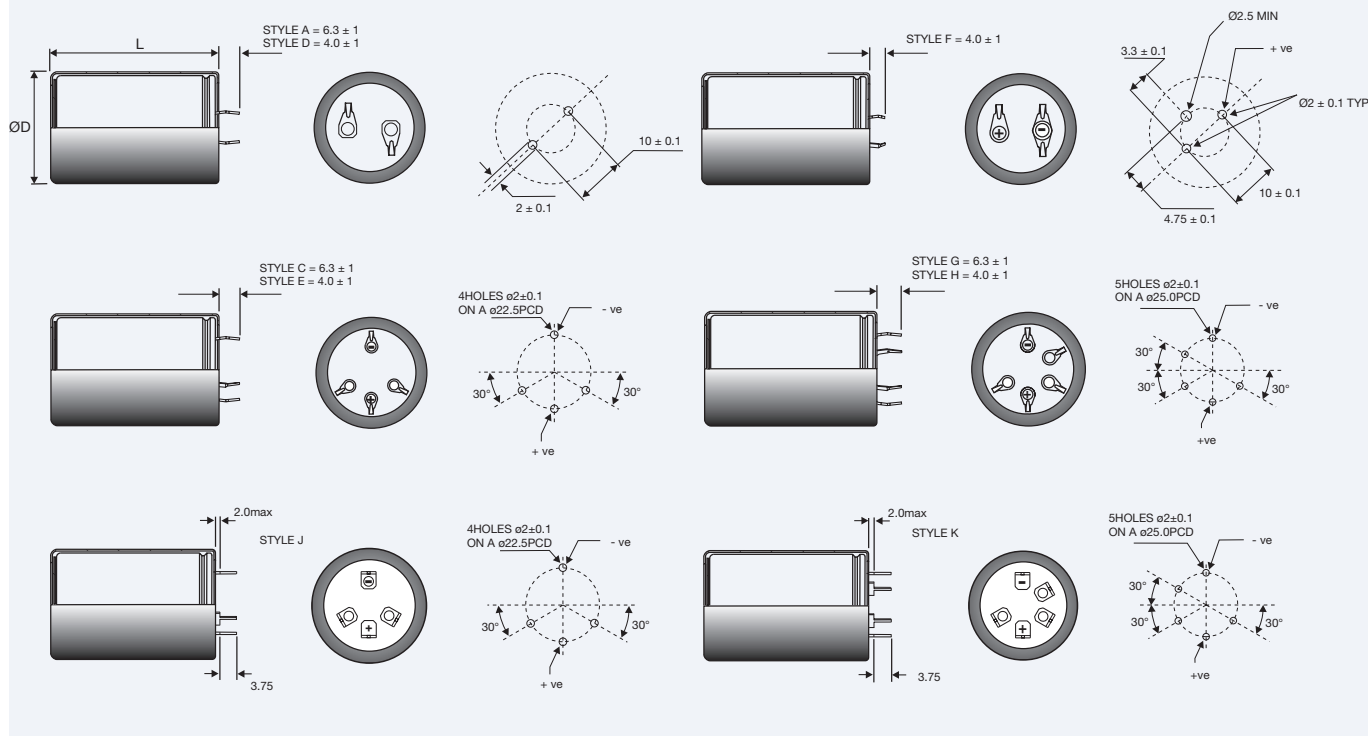
Suited for high reliability and long life applications such as frequency converters, UPS systems and switch mode power supplies, but the extended temperature range allows increased ripple currents at lower temperatures.

The ALC40 series of snap-in capacitors feature the same high ripple currents and long life characteristics as the ALC10 series but can operate at higher temperatures.

## SPECIFICATION

<b>Standards</b>	IEC 60384-4 Long Life Grade 40/105/56,																	
<b>Capacitance range</b>	47 – 120000 $\mu$ F																	
<b>Capacitance tolerance</b>	–20 to +20%																	
<b>Rated voltage <math>U_R</math></b>	25 – 450 VDC																	
<b>Surge voltage <math>U_s</math></b>	1.15 x $U_R$ (for $U_R \leq 250$ VDC) 1.10 x $U_R$ (for $U_R \geq 350$ VDC)	Test Condition: $\leq 30$ s surge, 1000 cycles @ 105°C																
<b>Surge voltage <math>U_{ss}</math> (Short duration)</b>	<table border="1"> <tr> <td><math>U_R</math></td> <td><math>U_{ss}</math></td> </tr> <tr> <td>200</td> <td>350</td> </tr> <tr> <td>250</td> <td>400</td> </tr> <tr> <td>350</td> <td>500</td> </tr> <tr> <td>400</td> <td>520</td> </tr> <tr> <td>415</td> <td>530</td> </tr> <tr> <td>450</td> <td>550</td> </tr> <tr> <td>500</td> <td>600</td> </tr> </table>	$U_R$	$U_{ss}$	200	350	250	400	350	500	400	520	415	530	450	550	500	600	Test Condition: $\leq 500$ ms surge, 100 cycles @ 20°C
$U_R$	$U_{ss}$																	
200	350																	
250	400																	
350	500																	
400	520																	
415	530																	
450	550																	
500	600																	
<b>Leakage current <math>I_L</math></b>	= 0.003 x $C_R$ x $U_R$ ( $\mu$ A) or 6mA whichever is the smaller. Note, $C_R$ is in $\mu$ F.	Test Condition: $U_R$ , 5mins., 20°C																
<b>Operational life time +105°C, <math>U_R</math>, <math>I_R</math></b>	<table border="1"> <tr> <td>Can Diameter</td> <td></td> </tr> <tr> <td>25</td> <td>6000 hrs</td> </tr> <tr> <td>30</td> <td>7000 hrs</td> </tr> <tr> <td>35</td> <td>8000 hrs</td> </tr> <tr> <td>40, 45, 50</td> <td>9000 hrs</td> </tr> </table>	Can Diameter		25	6000 hrs	30	7000 hrs	35	8000 hrs	40, 45, 50	9000 hrs	End of Life requirement: $\Delta C/C \leq \pm 10\%$ ESR $\leq 2$ x initial ESR value $I_L \leq$ initial specified limit						
Can Diameter																		
25	6000 hrs																	
30	7000 hrs																	
35	8000 hrs																	
40, 45, 50	9000 hrs																	
<b>+105°C, <math>U_R</math></b>	<table border="1"> <tr> <td>Can Diameter</td> <td></td> </tr> <tr> <td>25</td> <td>10000 hrs</td> </tr> <tr> <td>30</td> <td>11000 hrs</td> </tr> <tr> <td>35</td> <td>13000 hrs</td> </tr> <tr> <td>40, 45, 50</td> <td>14000 hrs</td> </tr> </table>	Can Diameter		25	10000 hrs	30	11000 hrs	35	13000 hrs	40, 45, 50	14000 hrs							
Can Diameter																		
25	10000 hrs																	
30	11000 hrs																	
35	13000 hrs																	
40, 45, 50	14000 hrs																	
<b>Shelf Life</b>	2000 hrs at 0V +85°C, or 30000 hrs at 0V +40°C																	
<b>Temperature range</b>	–40 to +105°C (Operating) –55°C to +105°C (Storage)																	

SPECIFICATION



Mounting

These capacitors are designed to be mounted by their terminations alone, and may be used in any position. Dummy pins must be isolated on 4 and 5 pin styles.

Terminal Style

Description	2 pin	2 pin	3 pin	4 pin	4 pin	5 pin	5 pin	4 pin	5 pin
Pin length	6.3±1	4.0±1	4.0±1	6.3±1	4.0±1	6.3±1	4.0±1	5.75	5.75
Code	A	D	F	C	E	G	H	J	K
DIA. mm -0+1									
25	•	•	•						
30	•	•	•						
35	•	•	•	•	•			•	
40	•	•	•	•	•	•	•		•
45				•	•	•	•		
50				•	•	•	•		•

CASE CODE (COMPONENT WEIGHT grams - nominal )

Length mm ±2	30	35	40	45	50	55	60	80	105
Dia. mm -0+1									
25	BB (28)	BC (30)	BD (35)						
30	CB (35)	CC (40)	CD (45)	CE (50)	CF (55)				
35	DB (42)	DC (50)	DD (55)	DE (65)	DF (70)	DG (75)	DH (80)	DL (105)	
40	EB (49)	EC (57)	ED (65)	EE (80)	EF (82)	EG (95)	EH (98)	EL (131)	EP (170)
45	FB (62)	FC (72)	FD (82)	FE (92)	FF (103)	FG (113)	FH (123)	FL (164)	FP (215)
50	KB (75)	KC (88)	KD (100)	KE (113)	KF (126)	KG (138)	KH (151)	KL (201)	KP (264)

Other sizes available upon request

## ARTICLE TABLE ALC40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR ( $m\Omega$ ) at 20°C 100Hz (max)	Impedance ( $m\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>25 VDC (<math>U_R</math>)</b>						
8200	25x30	183	157	1.97	2.11	ALC40A822BB025
10000	25x35	148	126	2.33	2.50	ALC40A103BC025
12000	25x40	123	105	2.74	2.93	ALC40A123BD025
12000	30x30	157	138	2.18	2.33	ALC40A123CB025
15000	30x35	125	109	2.65	2.83	ALC40A153CC025
18000	30x40	103	91	3.04	3.24	ALC40A183CD025
22000	35x35	116	104	2.91	3.10	ALC40A223DC025
27000	30x50	73	64	3.94	4.21	ALC40A273CF025
27000	35x40	96	86	3.34	3.56	ALC40A273DD025
27000	40x30	75	69	4.03	4.09	ALC40A273EB025
33000	35x50	70	63	4.32	4.61	ALC40A333DF025
33000	40x35	66	62	4.83	4.90	ALC40A333EC025
39000	35x50	69	62	4.32	4.61	ALC40A393DF025
39000	40x40	53	49	5.57	5.65	ALC40A393ED025
47000	40x50	41	37	7.30	7.40	ALC40A473EF025
56000	40x55	38	35	7.51	7.61	ALC40A563EG025
82000	40x80	22	20	11.06	11.24	ALC40A823EL025
120000	40x105	18	17	13.41	14.05	ALC40A124EP025
<b>40 VDC (<math>U_R</math>)</b>						
3900	25x30	202	166	1.87	2.09	ALC40A392BB040
5600	25x35	149	124	2.23	2.49	ALC40A562BC040
5600	30x30	171	144	2.08	2.31	ALC40A562CB040
6800	25x40	123	102	2.61	2.92	ALC40A682BD040
6800	30x35	145	120	2.55	2.84	ALC40A682CC040
8200	30x35	129	110	2.53	2.81	ALC40A822CC040
10000	30x40	107	91	2.90	3.22	ALC40A103CD040
12000	30x50	80	68	3.75	4.18	ALC40A123CF040
12000	35x35	121	106	2.77	3.08	ALC40A123DC040
12000	40x30	88	79	4.13	4.22	ALC40A123EB040
15000	35x40	100	87	3.18	3.53	ALC40A153DD040
15000	40x40	63	56	5.66	5.78	ALC40A153ED040
18000	35x50	73	64	4.12	4.58	ALC40A183DF040
18000	40x45	53	47	6.46	6.60	ALC40A183EE040
22000	40x50	43	39	7.34	7.50	ALC40A223EF040
27000	40x55	39	35	7.50	7.63	ALC40A273EG040
47000	40x80	23	21	10.42	10.59	ALC40A473EL040
68000	40x105	17	16	12.71	13.47	ALC40A683EP040
<b>63 VDC (<math>U_R</math>)</b>						
2200	25x30	227	180	1.69	1.98	ALC40A222BB063
3300	25x35	165	133	2.01	2.35	ALC40A332BC063
3900	25x40	138	111	2.36	2.75	ALC40A392BD063
3900	30x30	185	154	1.88	2.18	ALC40A392CB063
4700	30x35	148	123	2.28	2.65	ALC40A472CC063
5600	30x40	122	102	2.61	3.03	ALC40A562CD063
5600	40x30	102	90	3.82	3.91	ALC40A562EB063
6800	30x50	92	75	3.39	3.93	ALC40A682CF063
6800	35x35	141	119	2.50	2.90	ALC40A682DC063
6800	40x35	91	81	4.18	4.26	ALC40A682EC063
8200	30x50	48	35	3.33	3.98	ALC40A822CF063
8200	35x40	116	99	2.87	3.33	ALC40A822DD063
8200	40x40	72	64	5.01	5.12	ALC40A822ED063
10000	35x50	85	72	3.71	4.31	ALC40A103DF063
10000	40x45	60	53	5.69	5.81	ALC40A103EE063
12000	40x50	50	44	6.50	6.64	ALC40A123EF063
15000	40x60	39	34	7.81	7.99	ALC40A153EH063
22000	40x80	27	24	9.70	9.92	ALC40A223EL063
33000	40x105	18	17	12.01	13.01	ALC40A333EP063

Termination Style A,C,D,E,F,G,H,J or K 

## ARTICLE TABLE ALC40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR ( $m\Omega$ ) at 20°C 100Hz (max)	Impedance ( $m\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>100 VDC (<math>U_R</math>)</b>						
820	25x30	294	220	1.39	1.82	ALC40A821BB100
1000	25x35	238	177	1.65	2.16	ALC40A102BC100
1200	25x40	198	147	1.93	2.53	ALC40A122BD100
1200	30x30	245	191	1.57	2.01	ALC40A122CB100
1500	30x35	195	151	1.90	2.44	ALC40A152CC100
1800	30x40	162	125	2.18	2.80	ALC40A182CD100
2200	30x50	123	94	2.82	3.63	ALC40A222CF100
2200	35x35	177	142	2.10	2.67	ALC40A222DC100
2200	40x30	128	110	3.58	3.80	ALC40A222EB100
2700	35x40	146	118	2.41	3.07	ALC40A272DD100
2700	40x40	95	80	4.92	5.24	ALC40A272ED100
3300	35x50	108	86	3.12	3.97	ALC40A332DF100
3300	40x45	78	66	5.59	5.95	ALC40A332EE100
3900	40x50	65	55	6.41	6.83	ALC40A392EF100
4700	40x55	58	50	6.67	7.04	ALC40A472EG100
5600	40x60	49	42	7.46	7.87	ALC40A562EH100
8200	40x80	34	29	9.28	9.78	ALC40A822EL100
10000	40x105	24	21	11.33	13.12	ALC40A103EP100
<b>200 VDC (<math>U_R</math>)</b>						
270	25x30	542	377	1.01	1.56	ALC40A271BB200
390	25x35	386	271	1.24	1.86	ALC40A391BC200
470	25x40	320	224	1.45	2.19	ALC40A471BD200
470	30x30	369	270	1.24	1.76	ALC40A471CB200
560	30x35	301	219	1.50	2.13	ALC40A561CC200
680	30x40	249	181	1.72	2.44	ALC40A681CD200
680	40x30	202	158	2.97	3.67	ALC40A681EB200
820	30x50	196	140	2.18	3.16	ALC40A821CF200
820	35x35	252	191	1.70	2.34	ALC40A821DC200
820	40x35	173	137	3.35	4.06	ALC40A821EC200
1000	35x40	208	158	1.95	2.69	ALC40A102DD200
1000	40x40	140	110	3.92	4.80	ALC40A102ED200
1200	35x50	159	119	2.50	3.48	ALC40A122DF200
1200	40x45	116	91	4.50	5.50	ALC40A122EE200
1500	40x50	94	74	5.13	6.23	ALC40A152EF200
1800	40x60	76	60	6.10	7.53	ALC40A182EH200
2700	40x80	52	41	7.62	9.32	ALC40A272EL200
3900	40x105	49	34	7.90	12.31	ALC40A392EP200
5600	45x105	40	28	8.68	12.54	ALC40G562FP200
6800	50x105	36	26	9.08	12.29	ALC40G682KP200
<b>250 VDC (<math>U_R</math>)</b>						
220	25x30	592	405	0.93	1.50	ALC40A221BB250
270	25x35	480	327	1.10	1.77	ALC40A271BC250
330	25x40	393	268	1.29	2.08	ALC40A331BD250
330	30x30	441	312	1.13	1.69	ALC40A331CB250
390	30x35	364	256	1.36	2.04	ALC40A391CC250
470	30x40	302	212	1.56	2.34	ALC40A471CD250
470	40x30	258	193	2.59	3.49	ALC40A471EB250
560	30x50	243	168	1.96	3.02	ALC40A561CF250
560	35x35	297	217	1.57	2.25	ALC40A561DC250
560	40x35	221	166	3.05	4.16	ALC40A561EC250
680	35x40	245	179	1.80	2.59	ALC40A681DD250
680	40x40	180	134	3.49	4.76	ALC40A681ED250
820	35x50	190	137	3.12	4.66	ALC40A821DF250
820	40x45	149	111	4.01	5.46	ALC40A821EE250
1000	35x60	164	125	3.61	5.78	ALC40A102DH250
1000	40x50	123	92	4.58	6.22	ALC40A102EF250
1200	40x55	106	80	4.93	6.51	ALC40A122EG250

Termination Style A,C,D,E,F,G,H,J or K 

## ARTICLE TABLE ALC40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR ( $m\Omega$ ) at 20°C 100Hz (max)	Impedance ( $m\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>250 VDC (<math>U_R</math>)</b>						
1500	35x80	112	90	4.43	6.88	ALC40A152DL250
1800	40x80	67	50	6.77	9.27	ALC40A182EL250
2700	40x105	62	42	7.05	12.03	ALC40A272EP250
3900	45x105	50	33	7.90	12.43	ALC40G392FP250
4700	50x105	44	30	8.36	12.30	ALC40G472KP250
<b>350 VDC (<math>U_R</math>)</b>						
120	25x30	868	562	0.88	2.07	ALC40A121BB350
150	25x35	694	449	1.04	2.46	ALC40A151BC350
180	25x40	578	374	1.20	2.81	ALC40A181BD350
180	30x30	618	410	1.17	2.46	ALC40A181CB350
220	30x35	502	332	1.36	2.88	ALC40A221CC350
270	30x40	410	272	1.59	3.33	ALC40A271CD350
270	40x30	448	291	1.97	4.36	ALC40A271EB350
330	35x35	378	260	1.79	3.24	ALC40A331DC350
390	30x50	287	191	2.02	4.02	ALC40A391CF350
390	35x40	317	218	2.02	3.67	ALC40A391DD350
390	40x40	312	203	2.64	5.73	ALC40A391ED350
470	35x50	251	170	2.72	4.90	ALC40A471DF350
470	40x45	258	168	3.00	6.46	ALC40A471EE350
560	35x50	224	155	2.57	4.44	ALC40A561DF350
560	35x60	224	155	3.11	5.70	ALC40A561DH350
560	40x50	216	141	3.41	7.27	ALC40A561EF350
680	40x60	177	114	3.99	8.39	ALC40A681EH350
820	35x80	150	102	3.82	6.72	ALC40A821DL350
1000	40x80	120	78	5.00	9.98	ALC40A102EL350
1500	40x105	99	68	6.00	11.47	ALC40A152EP350
2200	45x105	77	53	6.79	12.06	ALC40G222FP350
2700	50x105	66	45	7.34	12.08	ALC40G272KP350
<b>400 VDC (<math>U_R</math>)</b>						
100	25x30	1193	788	0.85	2.09	ALC40A101BB400
120	25x35	991	653	1.00	2.45	ALC40A121BC400
150	25x40	794	524	1.17	2.83	ALC40A151BD400
150	30x30	835	562	1.14	2.46	ALC40A151CB400
180	30x35	690	463	1.31	2.88	ALC40A181CC400
220	30x40	565	379	1.54	3.33	ALC40A221CD400
220	40x30	521	320	1.88	4.36	ALC40A221EB400
270	35x35	470	322	1.73	3.23	ALC40A271DC400
270	40x35	430	266	2.21	4.95	ALC40A271EC400
330	30x50	383	258	1.98	4.02	ALC40A331CF400
330	35x40	386	266	1.98	3.64	ALC40A331DD400
330	40x40	350	216	2.56	5.76	ALC40A331ED400
390	35x50	323	221	2.64	4.66	ALC40A391DF400
390	40x45	295	182	2.88	6.48	ALC40A391EE400
470	35x50	277	192	2.51	4.40	ALC40A471DF400
470	35x60	270	185	3.04	5.78	ALC40A471DH400
470	40x50	245	151	3.28	7.30	ALC40A471EF400
560	40x55	209	130	3.62	7.78	ALC40A561EG400
680	35x80	200	131	3.72	6.69	ALC40A681DL400
680	40x60	173	107	4.08	8.58	ALC40A681EH400
1000	40x80	118	73	4.85	10.16	ALC40A102EL400
1200	40x105	103	70	5.76	11.46	ALC40A122EP400
1800	45x105	82	55	6.48	12.04	ALC40G182FP400
2200	50x105	70	47	7.02	12.08	ALC40G222KP400

Termination Style A,C,D,E,F,G,H,J or K 

## ARTICLE TABLE ALC40 (105°C)

Cap ( $\mu$ F)	Case Size (mm)	ESR ( $m\Omega$ ) at 20°C 100Hz (max)	Impedance ( $m\Omega$ ) at 20°C 10 KHz (max)	Ripple current(A) at 105°C		Type number
				100 Hz	10 KHz	
<b>450 VDC (<math>U_R</math>)</b>						
47	25x30	2011	1392	0.66	1.74	ALC40A470BB450
56	25x35	1687	1168	0.76	2.03	ALC40A560BC450
68	25x40	1391	963	0.88	2.34	ALC40A680BD450
68	30x30	1403	974	0.87	2.19	ALC40A680CB450
82	30x35	1163	807	1.01	2.54	ALC40A820CC450
100	30x40	955	663	1.18	2.95	ALC40A101CD450
120	35x35	810	565	1.36	3.11	ALC40A121DC450
150	30x50	642	446	1.54	3.67	ALC40A151CF450
150	35x40	651	454	1.57	3.53	ALC40A151DD450
150	40x30	642	447	1.73	4.14	ALC40A151EB450
180	35x50	541	377	1.88	4.27	ALC40A181DF450
180	40x35	538	374	2.01	4.70	ALC40A181EC450
220	35x50	449	315	2.28	4.71	ALC40A221DF450
220	40x40	440	306	2.34	5.47	ALC40A221ED450
270	40x50	356	248	2.80	6.74	ALC40A271EF450
330	35x60	285	198	2.91	5.53	ALC40A331DH450
330	40x55	293	204	3.14	7.29	ALC40A331EG450
390	40x60	249	174	3.50	8.04	ALC40A391EH450
470	35x80	203	138	3.51	6.68	ALC40A471DL450
560	40x80	175	122	4.32	9.57	ALC40A561EL450
820	40x105	121	85	5.34	11.05	ALC40A821EP450
1200	45x105	105	71	5.84	11.64	ALC40G122FP450
1500	50x105	86	59	6.44	11.85	ALC40G152KP450

Termination Style A,C,D,E,F,G,H,J or K 

## OPERATIONAL DATA

**Operational Lifetime**

Please see separate BHC application notes TD003 for calculating operational life expectancy under customer specific conditions.

## RELIABILITY

The failure rate is derived from our periodic test results. The failure rate ( $\lambda_R$ ) is therefore only given at test temperature for life tests. An estimation is also given at 40°C. The expected failure rate for this capacitor range is based on our periodic test results for capacitors with structural similarity. Failure rate is frequently quoted in FIT (Failures In Time) where 1 FIT =  $1 \times 10^{-9}$  failures per hour.

$T_a$  Failure rate per hour

85°C 220 FIT

40°C 10 FIT

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.

**Vibration**

10Hz to 500Hz at 0.75mm or 10g for 3x2hrs duration. 10Hz to 55Hz at 0.35mm or 5g for 3x0.5hrs duration (45/50mm diameter cans).

**Insulating resistance**

$\geq 100$  Mohms at 100V d.c., across insulating sleeve.

**Voltage Proof**

$\geq 2500$ V d.c., across insulating sleeve.

**Safety vent**

A safety vent for over pressure is featured on either the base (opposing end to the terminals) or on the the side of the can. This is in the form of a grooved section on the surface of the can which is a weakened area and is designed to relieve build up of internal pressure due to over stress or catastrophic failure.