FELSIC 85 M

CO 54 - CO 53

15 000 h / 85°C

10 V ... 630 V	68 µF ... 330 000 µF	Ø 36 (1,417) ... Ø 90 (3,543)	– 55°C + 85°C	Long Life Time

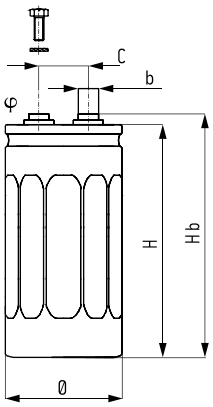
APPLICATIONS

- Power electronics: converters, current inverters
- Switch mode power supplies
- Magnetization, welding machines, flash
- Circuit with high impulse current

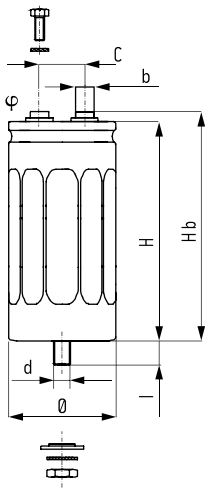
Fixing: Clip or stud fixing
Screw terminals: M5 or M6

Tolerance on capacitance at 20°C : –20 +20 %
Operating temperature: – 55°C + 85°C

BC



BD



BC
Insulated aluminum can
Hexagonal screws
Spring washers
Fixing clip must be ordered separately

BD
Aluminum can with sleeve
Hexagonal screws
Spring washers
Stud fixing delivered with capacitor
(steel hex nut, spring washer)

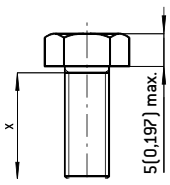
DIMENSIONS in mm (inches)

Ø ±1 (0,039)	H ±2 (0,079)	Hb ±2 (0,079)	C ±0,5 (0,020)	φ	b
36 (1,417)	52 (2,047)	58 (2,283)	12,7 (0,500)	M5	8 (0,315)
36 (1,417)	60 (2,362)	66 (2,598)	12,7 (0,500)	M5	8 (0,315)
36 (1,417)	80 (3,150)	86 (3,386)	12,7 (0,500)	M5	8 (0,315)
36 (1,417)	104 (4,094)	110 (4,331)	12,7 (0,500)	M5	8 (0,315)
51 (2,008)	81 (3,189)	87 (3,425)	22,2 (0,874)	M5	13 (0,512)
51 (2,008)	104 (4,094)	110 (4,331)	22,2 (0,874)	M5	13 (0,512)
66 (2,598)	104 (4,094)	110 (4,331)	28,5 (1,122)	M5	13 (0,512)
77 (3,031)	104 (4,094)	110 (4,331)	31,7 (1,248)	M5	13 (0,512)
77 (3,031)	144 (5,669)	150 (5,906)	31,7 (1,248)	M5	13 (0,512)
77 (3,031)	220 (8,661)	226 (8,898)	31,7 (1,248)	M5	13 (0,512)
90 (3,543)	144 (5,669)	151 (5,945)	31,7 (1,248)	M6	13 (0,512)
90 (3,543)	200 (7,874)	207 (8,150)	31,7 (1,248)	M6	13 (0,512)

Ø	d	l	Max. nut torque
36 (1,417)	M8	$12^{\pm1}$ ($0{,}472^{\pm0{,}472}$)	4 Nm
≥ 51 (2,008)	M12	$16^{\pm1{,}5}$ ($0{,}630^{\pm0{,}059}$)	10 Nm

HEXAGONAL SCREWS mm (inches)

Screwing height between screws and terminals:	3,5 (0,138) max
Max. screw torque:	M5: 3 Nm [x min 8 (0,315)]
	M6: 6 Nm [x min 10 (0,394)]



RESISTANCE TO VIBRATIONS

Hb mm (inches)	>150 (5,906)	≤150 (5,906)
ƒ (Hz)	10 –55 Hz	10 - 2000 Hz
Amplitude	0,75 (0,030)	1,5 (0,059)
Acceleration	10 g - 98 m/s²	20 g - 196 m/s²
t (h)	3 x 2 h	3 x 2 h

SPECIFICATIONS

NFC 83 110 - Long life
DIN 41 240 - Climatic category GPF – 55°C + 85°C / 56 days
CECC 30301-059 Issue 3
CECC 30 301-810
IEC 60 384.4 long life
Standard endurance test at U_R: $U_R \leq 350$ V: 5000 h / 85°C
$U_R > 350$ V: 2000 h / 85°C

WITHSTAND STRENGTH OF INSULATING SLEEVE

Insulation resistance at 20°C between terminals and mounting hardware: 100 MΩ
Test voltage at 50 Hz 1 min. between terminals and mounting hardware: 2000 V
Fire resistance: self extinguish 15 s (IEC 60 695-2-2)

FELSIC 85 M

CO 54 - CO 53

15 000 h / 85°C

Capacitance	Can				ESR 100 Hz +20°C		Z 10 kHz +20°C max.	II +20°C 5 min max.	I ~ 100 Hz		Code	
	Ø		H		Typic	max.			+40°C max.	+85°C	CO 54 (M)	CO 53 (M)
(µF)	mm (inches)		mm (inches)		(mΩ)	(mΩ)	(mΩ)	(mA)	(A)	(A)	(BC)	(BD)
Rated voltage 10 V												
33000	36	(1,417)	52	(2,047)	16	24	25	1,8	22	6,6	A 746020	A 747020
Rated voltage 16 V												
22000	36	(1,417)	52	(2,047)	16	24	25	2	22	6,6	A 746040	A 747040
47000	36	(1,417)	80	(3,150)	11	16	15	4	22	8,8	A 746041	A 747041
100000	51	(2,008)	81	(3,189)	8	12	10	5	25	13,7	A 746042	A 747042
150000	51	(2,008)	104	(4,094)	7	11	8	5	25	16,4	A 746043	A 747043
220000	66	(2,598)	104	(4,094)	5	8	6	5	50	22,3	A 746044	A 747044
Rated voltage 25 V												
15000	36	(1,417)	52	(2,047)	18	27	26	2	22	6,2	A 746060	A 747060
22000	36	(1,417)	52	(2,047)	17	25	24	3	22	6,5	A 746069	A 747069
33000	36	(1,417)	80	(3,150)	15	23	18	4	22	8,2	A 746061	A 747061
47000	36	(1,417)	104	(4,094)	12	18	15	5	25	10,3	A 746070	A 747070
47000	51	(2,008)	81	(3,189)	9	14	10	5	25	12,9	A 746062	A 747062
68000	51	(2,008)	81	(3,189)	8	14	10	5	25	13,7	A 746063	A 747063
100000	51	(2,008)	104	(4,094)	8	14	8	5	25	15,3	A 746064	A 747064
220000	77	(3,031)	104	(4,094)	4	6	7	6	55	26	A 746066	A 747066
330000	77	(3,031)	144	(5,669)	3	5	6	7	55	36	A 746067	A 747067
Rated voltage 40 V												
10000	36	(1,417)	52	(2,047)	20	30	28	2	21	5,9	A 746080	A 747080
15000	36	(1,417)	80	(3,150)	18	27	23	3	22	7,5	A 746081	A 747081
22000	36	(1,417)	104	(4,094)	15	22	19	5	22	9,2	A 746082	A 747082
33000	51	(2,008)	81	(3,189)	10	15	13	5	25	12	A 746091	A 747091
47000	51	(2,008)	81	(3,189)	9	14	9	5	25	12,9	A 746083	A 747083
68000	51	(2,008)	104	(4,094)	8	12	8	6	25	14,4	A 746092	A 747092
100000	66	(2,598)	104	(4,094)	7	11	7	6	50	18,9	A 746084	A 747084
150000	77	(3,031)	104	(4,094)	5	8	7	8	55	24,5	A 746085	A 747085
220000	77	(3,031)	144	(5,669)	4	6	6	9	55	31,5	A 746086	A 747086
Rated voltage 63 V												
4700	36	(1,417)	52	(2,047)	40	60	48	1,6	15	4,2	A 746100	A 747100
6800	36	(1,417)	52	(2,047)	35	50	39	2,5	15	4,4	A 746112	A 747112
10000	36	(1,417)	80	(3,150)	23	34	28	3	22	7	A 746101	A 747101
15000	51	(2,008)	81	(3,189)	13	20	18	5	25	10,7	A 746102	A 747102
22000	51	(2,008)	81	(3,189)	12	18	15	5	25	11,1	A 746103	A 747103
33000	51	(2,008)	104	(4,094)	10	15	14	5	25	13,7	A 746113	A 747113
33000	66	(2,598)	104	(4,094)	10	15	14	5	50	15,8	A 746104	A 747104
47000	66	(2,598)	104	(4,094)	8	12	11	6	50	17,7	A 746105	A 747105
68000	77	(3,031)	104	(4,094)	5	8	8	8	55	24,5	A 746106	A 747106
100000	77	(3,031)	144	(5,669)	3	8	8	9	55	36	A 746107	A 747107
150000	77	(3,031)	220	(8,661)	3	8	8	11	55	43	A 746109	A 747109
220000	90	(3,543)	200	(7,874)	3	5	4	15	80	46	A 746110	A 747110
Rated voltage 80 V												
10000	51	(2,008)	81	(3,189)	19	29	23	5	25	8,9	A 746363	A 747363
15000	51	(2,008)	81	(3,189)	17	25	20	5	25	9,4	A 746364	A 747364
22000	51	(2,008)	104	(4,094)	14	21	17	6	25	12	A 746365	A 747365
33000	66	(2,598)	104	(4,094)	12	18	15	6	49	14	A 746366	A 747366
Rated voltage 100 V												
2200	36	(1,417)	52	(2,047)	70	105	90	1,1	11	3,1	A 746120	A 747120
4700	36	(1,417)	80	(3,150)	45	68	54	2,5	16	4,7	A 746121	A 747121
6800	51	(2,008)	81	(3,189)	24	36	27	4	25	7,9	A 746122	A 747122
10000	51	(2,008)	81	(3,189)	20	30	21	5	25	8,7	A 746123	A 747123
15000	51	(2,008)	104	(4,094)	17	26	18	6	25	10,5	A 746124	A 747124
22000	66	(2,598)	104	(4,094)	13	19	15	6	49	13,9	A 746125	A 747125
33000	77	(3,031)	104	(4,094)	10	15	13	8	55	17,5	A 746126	A 747126
47000	77	(3,031)	144	(5,669)	7	11	10	9	55	23	A 746127	A 747127
Rated voltage 160 V												
1000	36	(1,417)	52	(2,047)	85	130	80	0,9	10	2,8	A 746140	A 747140
1500	36	(1,417)	80	(3,150)	55	85	70	1,3	15	4,3	A 746141	A 747141
2200	36	(1,417)	104	(4,094)	48	73	53	2	18	5,2	A 746142	A 747142
3300	51	(2,008)	81	(3,189)	28	42	34	3	25	7,3	A 746143	A 747143
4700	51	(2,008)	104	(4,094)	20	30	28	4	25	9,7	A 746144	A 747144
6800	66	(2,598)	104	(4,094)	17	25	21	5	43	12,3	A 746145	A 747145
10000	77	(3,031)	104	(4,094)	12	18	16	6	55	15,8	A 746146	A 747146
15000	77	(3,031)	144	(5,669)	10	14	13	8	55	20	A 746147	A 747147
22000	77	(3,031)	220	(8,661)	10	15	13	10	55	24	A 746148	A 747148
33000	90	(3,543)	200	(7,874)	8	12	11	14	80	28	A 746150	A 747150

FELSIC 85 M

CO 54 - CO 53

15 000 h / 85°C

Capacitance	Can				ESR 100 Hz +20°C		Z 10 kHz +20°C max.	II +20°C 5 min max.	I ~ 100 Hz		Code	
	Ø		H		Typic	max.			+40°C max.	+85°C	CO 54 (M)	CO 53 (M)
(µF)	mm (inches)		mm (inches)		(mΩ)	(mΩ)	(mΩ)	(mA)	(A)	(A)	(BC)	(BD)
Rated voltage 250 V												
470	36	(1,417)	52	(2,047)	110	170	100	0,7	9	2,5	A 746160	A 747160
1000	36	(1,417)	80	(3,150)	70	105	70	1,5	13	3,8	A 746161	A 747161
1500	51	(2,008)	81	(3,189)	50	75	50	2	19	5,5	A 746162	A 747162
2200	51	(2,008)	81	(3,189)	48	72	48	3	20	5,6	A 746163	A 747163
3300	51	(2,008)	104	(4,094)	35	50	35	4	25	7,6	A 746164	A 747164
4700	66	(2,598)	104	(4,094)	21	32	20	6	38	10,9	A 746165	A 747165
6800	77	(3,031)	104	(4,094)	16	24	15	8	46	13	A 746166	A 747166
10000	77	(3,031)	144	(5,669)	14	21	13	9	55	16,8	A 746167	A 747167
22000	90	(3,543)	200	(7,874)	10	15	12	14	80	25	A 746170	A 747170
Rated voltage 350 V												
330	36	(1,417)	52	(2,047)	240	360	190	0,7	5,9	1,7	A 746180	A 747180
470	36	(1,417)	80	(3,150)	150	230	140	0,9	9	2,6	A 746181	A 747181
680	36	(1,417)	104	(4,094)	100	150	100	1,4	13	3,6	A 746182	A 747182
1000	51	(2,008)	81	(3,189)	75	110	65	2	16	4,5	A 746183	A 747183
1500	51	(2,008)	104	(4,094)	55	75	55	3	20	5,8	A 746184	A 747184
2200	66	(2,598)	104	(4,094)	30	45	32	4	32	9,1	A 746185	A 747185
3300	77	(3,031)	104	(4,094)	25	38	27	6	38	10,9	A 746186	A 747186
4700	77	(3,031)	104	(4,094)	20	30	18	7	43	12,2	A 746191	A 747191
6800	77	(3,031)	144	(5,669)	17	25	15	7	53	15,2	A 746187	A 747187
Rated voltage 385 V												
220	36	(1,417)	52	(2,047)	380	570	360	0,5	4,6	1,3	A 746200	A 747200
1000	51	(2,008)	81	(3,189)	90	135	100	2,3	14	4,1	A 746202	A 747202
1500	51	(2,008)	104	(4,094)	70	110	80	3,4	18	5	A 746203	A 747203
2200	66	(2,598)	104	(4,094)	50	75	50	5	25	7,1	A 746204	A 747204
3300	77	(3,031)	104	(4,094)	29	45	30	6	35	10,1	A 746205	A 747205
4700	77	(3,031)	144	(5,669)	22	35	25	7	47	13,4	A 746206	A 747206
6800	77	(3,031)	220	(8,661)	17	25	15	8	55	18,4	A 746207	A 747207
Rated voltage 400 V												
220	36	(1,417)	52	(2,047)	400	600	500	1,7	4,6	1,3	A 746220	A 747220
330	36	(1,417)	80	(3,150)	280	420	300	2,0	6,6	1,9	A 746221	A 747221
470	36	(1,417)	104	(4,094)	200	300	200	2,5	9	2,5	A 746222	A 747222
1000	51	(2,008)	81	(3,189)	90	135	100	3,5	14	4,1	A 746223	A 747223
1500	66	(2,598)	104	(4,094)	60	90	60	4,0	22	6,4	A 746224	A 747224
2200	66	(2,598)	104	(4,094)	40	70	50	5,0	28	7,9	A 746225	A 747225
3300	77	(3,031)	104	(4,094)	29	50	35	6,0	35	10,1	A 746226	A 747226
4700	77	(3,031)	144	(5,669)	22	35	25	7,0	47	13,4	A 746227	A 747227
6800	90	(3,543)	144	(5,669)	16	25	15	9,0	64	18,4	A 746229	A 747229
10000	90	(3,543)	200	(7,874)	11	18	15	12,0	80	24,0	A 746230	A 747230
Rated voltage 450 V												
150	36	(1,417)	52	(2,047)	590	890	700	1,5	3,9	1,1	A 746240	A 747240
330	36	(1,417)	80	(3,150)	260	400	370	2,3	7	2,0	A 746242	A 747242
470	36	(1,417)	104	(4,094)	170	260	240	2,7	9,5	2,7	A 746243	A 747243
680	51	(2,008)	81	(3,189)	130	190	130	3,3	12	3,3	A 746244	A 747244
1000	51	(2,008)	104	(4,094)	85	130	90	4,0	16	4,7	A 746245	A 747245
1500	66	(2,598)	104	(4,094)	65	100	85	5,0	22	6,2	A 746246	A 747246
2200	66	(2,598)	104	(4,094)	50	85	70	6,0	25	7,0	A 746250	A 747250
2200	77	(3,031)	104	(4,094)	38	70	60	6,0	31	8,8	A 746247	A 747247
3300	77	(3,031)	144	(5,669)	25	50	40	7,3	44	12,6	A 746248	A 747248
4700	77	(3,031)	144	(5,669)	22	40	35	8,7	47	13,4	A 746252	A 747252
5600	77	(3,031)	220	(8,661)	20	40	30	9,5	55	17,0	A 746249	A 747249
6000	90	(3,543)	144	(5,669)	20	40	30	9,9	60	17,0	A 746253	A 747253
6800	90	(3,543)	200	(7,874)	15	30	20	10,0	72	20,0	A 746251	A 747251
8000	90	(3,543)	200	(7,874)	12	20	18	11,0	80	23,0	A 746255	A 747255
10000	90	(3,543)	200	(7,874)	11	18	16	13,0	80	24,0	A 746256	A 747256
Rated voltage 500 V												
68	36	(1,417)	52	(2,047)	700	1050	750	1,1	3,5	1,0	A 746280	A 747280
100	36	(1,417)	52	(2,047)	520	800	550	1,3	4	1,2	A 746381	A 747381
150	36	(1,417)	60	(2,362)	400	700	500	1,6	4,9	1,4	A 746382	A 747382
220	36	(1,417)	80	(3,150)	280	420	300	2,0	6,6	1,9	A 746383	A 747383
330	36	(1,417)	104	(4,094)	240	360	260	2,4	8	2,3	A 746384	A 747384
470	51	(2,008)	81	(3,189)	170	260	180	2,9	10	3,0	A 746385	A 747385
680	51	(2,008)	104	(4,094)	120	180	130	3,5	14	3,9	A 746386	A 747386
1000	66	(2,598)	104	(4,094)	80	120	80	4,2	20	5,6	A 746387	A 747387
1500	77	(3,031)	104	(4,094)	70	105	70	5,2	23	6,5	A 746388	A 747388
3300	77	(3,031)	220	(8,661)	30	45	35	7,7	49	14,0	A 746390	A 747390

FELSIC 85 M

CO 54 - CO 53

15 000 h / 85°C

Capacitance	Can				ESR 100 Hz +20°C		Z 10 kHz +20°C max.	II +20°C 5 min max.	I ~ 100 Hz		Code	
	Ø		H		Typic	max.			+40°C max.	+85°C	CO 54 (M)	CO 53 (M)
(µF)	mm (inches)		mm (inches)		(mΩ)	(mΩ)	(mΩ)	(mA)	(A)	(A)	(BC)	(BD)
Rated voltage 550 V												
68	36	(1,417)	52	(2,047)	850	1300	900	1,5	3,2	0,9	A 746302	A 747302
100	36	(1,417)	52	(2,047)	600	1000	700	1,9	3,8	1,1	A 746303	A 747303
150	36	(1,417)	80	(3,150)	500	800	600	2,3	5	1,4	A 746304	A 747304
220	36	(1,417)	104	(4,094)	400	600	450	2,8	6,3	1,8	A 746305	A 747305
330	51	(2,008)	81	(3,189)	300	450	330	3,4	7,8	2,2	A 746306	A 747306
470	51	(2,008)	104	(4,094)	200	300	230	4,1	11	3,1	A 746307	A 747307
680	66	(2,598)	104	(4,094)	130	200	150	4,9	15	4,4	A 746308	A 747308
1000	77	(3,031)	104	(4,094)	100	150	110	5,9	19	5,5	A 746309	A 747309
1500	77	(3,031)	144	(5,669)	80	120	80	7,3	25	7,0	A 746310	A 747310
2200	90	(3,543)	144	(5,669)	40	70	55	8,8	38	11,0	A 746311	A 747311
3300	90	(3,543)	200	(7,874)	25	45	35	11,0	56	16,0	A 746301	A 747301
4700	90	(3,543)	200	(7,874)	20	35	30	13,0	62	18,0	A 746313	A 747313
Rated voltage 630 V												
68	36	(1,417)	52	(2,047)	2400	3600	3000	2,0	1,9	0,5	A 746400	A 747400
100	36	(1,417)	52	(2,047)	2000	3000	2800	2,5	2,1	0,6	A 746411	A 747411
150	36	(1,417)	80	(3,150)	1100	1650	1200	3,1	3,3	1,0	A 746401	A 747401
220	36	(1,417)	104	(4,094)	750	1150	850	3,7	4,6	1,3	A 746402	A 747402
330	51	(2,008)	81	(3,189)	500	750	550	4,6	6	1,7	A 746403	A 747403
470	51	(2,008)	104	(4,094)	350	520	400	5,4	8	2,3	A 746404	A 747404
680	66	(2,598)	104	(4,094)	230	350	270	6,5	12	3,3	A 746405	A 747405
1000	77	(3,031)	104	(4,094)	200	300	250	7,9	14	3,9	A 746406	A 747406
1500	77	(3,031)	144	(5,669)	180	270	200	9,7	16	4,7	A 746407	A 747407
2200	90	(3,543)	144	(5,669)	120	180	120	12,0	22	6,3	A 746408	A 747408
3300	90	(3,543)	200	(7,874)	80	120	80	15,0	31	8,9	A 746409	A 747409

FELSIC 85 M

CO 54 - CO 53

15 000 h / 85°C

PERMISSIBLE REPETITIVE PEAK CURRENT Ip:

If given corresponding max r.m.s. currents are not exceeded, peak current values are as follows:

DIMENSIONS in mm (inches)				Ip (A)		I~ max.
Ø		H		40°C	85°C	(A)
36	(1,417)	52	(2,047)	400	200	22
36	(1,417)	60	(2,362)	450	220	22
36	(1,417)	80	(3,150)	600	300	22
36	(1,417)	104	(4,094)	700	400	22
51	(2,008)	81	(3,189)	800	400	25
51	(2,008)	104	(4,094)	1100	500	25
66	(2,598)	104	(4,094)	1900	800	50
77	(3,031)	104	(4,094)	3100	1200	55
77	(3,031)	144	(5,669)	4200	1800	55
77	(3,031)	220	(8,661)	5700	2400	55
90	(3,543)	144	(5,669)	5700	2400	80
90	(3,543)	200	(7,874)	7700	3200	80

CONNECTIONS IN SERIES:

Operating voltages exceeding 500 V up to 20000 V will be reached by connecting capacitors with rated voltages higher or equal to 350 V in series.

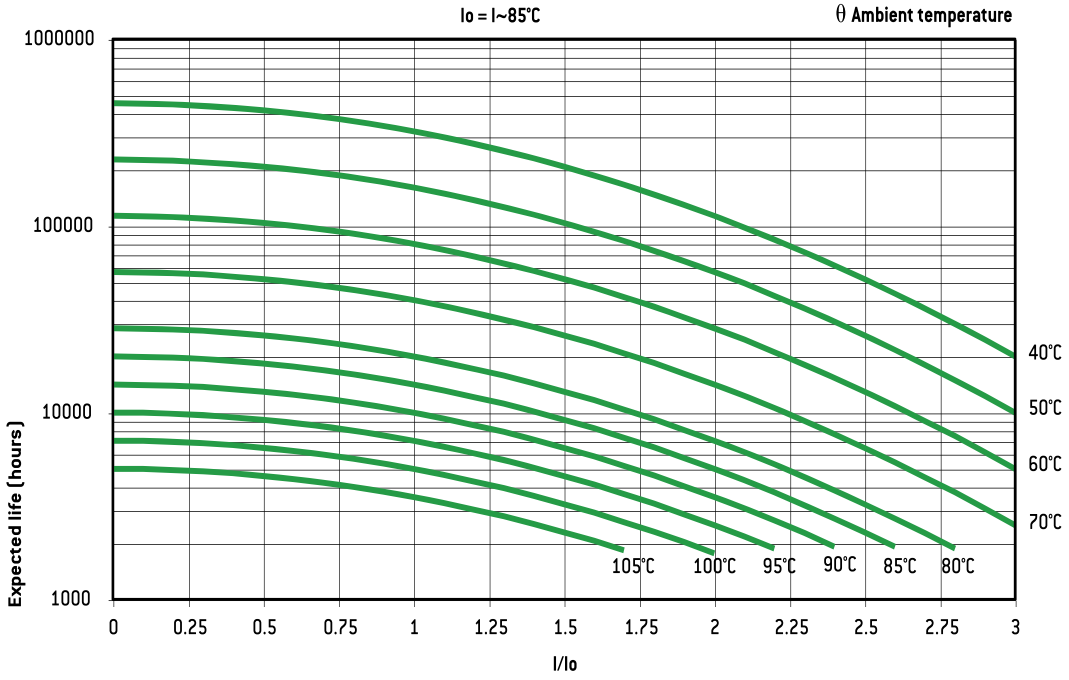
PERMISSIBLE RIPPLE CURRENT I (R.M.S. VALUE)

versus frequency ƒ:
I ~: permissible r.m.s. current at 100 Hz

ƒ (Hz)	50	100	300	600	1 000	10 000	50 000
I	0,8 x I~	I~	1,2 x I~	1,3 x I~	1,35 x I~	1,5 x I~	1,6 x I~

EXPECTED LIFE

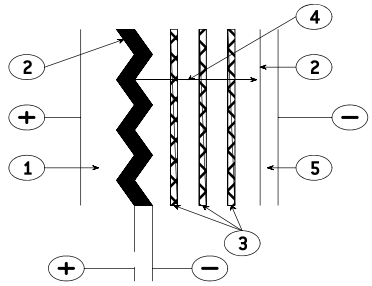
As a function of temperature and ripple current



General technical data

1. BASIC CONSTRUCTION

Structure of an electrolytic aluminum capacitor is shown hereunder:



1. Anode: aluminum foil
2. Dielectric: aluminum oxide
3. Papers spacers impregnated with electrolyte
4. Ionic conduction assumed by electrolyte
5. Cathode: aluminum foil

The positive plate is an etched aluminum foil covered with alumina which is the dielectric of the capacitor.

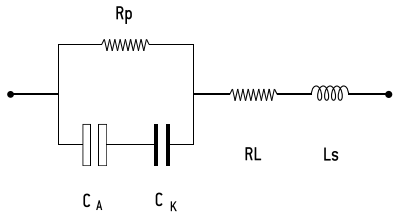
The negative plate is constituted by a second aluminum foil which serves as a current supply, and by electrolyte-impregnated papers layers.

The metal used for anode is a ≥ 99,98 % grade aluminum.

The dielectric has a thickness of 13 Å / V.

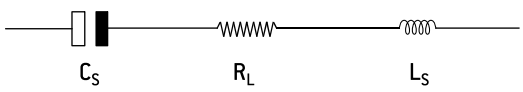
The aluminum used for the cathode is a ≥ 98 % grade aluminum covered with a dielectric layer with a thickness of about 40 Å.

2. DIAGRAM OF THE EQUIVALENT CIRCUIT



CA = Capacitance of the anode
CK = Capacitance of the cathode
Rp = Parallel resistance due to the aluminum oxide f llms.
RL = Series resistance of connections, plates and impregnated spacer.
Ls = Inductance of winding and connections.

A standard simplified diagram is.



Cs is the series capacitance of both anode and cathode capacitances. Electrolytic aluminum capacitors are naturally polarized because of the insulating f llm on the anode. Given the very thin aluminum oxide layer, a reversed voltage should not exceed 1.5 V when there is energy supply.

Short duration reverse voltages can be absorbed by special construction, second anode replacing the former cathode.

3. CAPACITORS MARKING

3.1. ARTICLE CODE (ON EACH PACKAGING)

A followed by 6 figures number. First 3 positions are specific of the range. (Ex. A 745xxx for a FELSIC 85 BD)

140 FELSIC in bank
701 PRORELSIC 125
703 PRORELSIC 125
704 SNAPSIC
705 SNAPSIC 105
706 FELSIC HP BC – BD
708 PRORELSIC 145
710 CUBISIC
711 PROMISIC 031
712 CUBISIC LP
713 SNAPSIC 105 LP
714 SNAPSIC 4P
715 SNAPSIC 105 4P
716 SNAPSIC HV
717 SNAPSIC HC
718 SNAPSIC 125
721 RELSIC 033
722 CI FRS
723 CI FRS
728 FELSIC 039 (ex 727)
FELSIC DI
738 FELSIC 037 (ex 737)
740 FELSIC 125 FRS BC
(ex 731)
741 FELSIC 125 FRS BD
(ex 731)
742 PRORELSIC 105 TFRS
743 PRORELSIC 105 TFRS
744 FELSIC 85 BC
FELSIC 85 LP
745 FELSIC 85 BD
746 FELSIC 85 M BC
747 FELSIC 85 M BD
748 SICAL CO 42 - SICAL
749 SICAL CO 42 - SICAL
750 CUBISIC 125
756 FELSIC 105 BC
FELSIC 105 LP
757 FELSIC 105 BD
760 FELSIC HC BC
761 FELSIC HC BD
762 FELSIC 105 TFRS BC
763 FELSIC 105 TFRS BD
764 FELSIC HV BC
765 FELSIC HV BD
775 VACSIC
774 VACSIC 150
776 ALSIC 20G
ALSIC 145 20G

In FELSIC ranges, article code without first letter A, is printed on each capacitor.
a Figure 9 in fourth position shows a special product.

3.2. BATCH (ON EACH CAPACITOR).

3 figures or 6 figures

3.3. DATE (ON EACH CAPACITOR IF APPLICABLE)

4 figures (year-week)

4. ELECTRICAL CHARACTERISTICS

4.1. RATED CAPACITANCE C_R

The rated capacitance is defined at 100 Hz and at ambient temperature.

4.2. RATED VOLTAGE U_R

U_R is the maximum DC voltage which may be applied in continuous operation.
When applying a superimposed alternating voltage, the peak value of the resulting waveform should not exceed the rated voltage.

4.3. PEAK VOLTAGE U_P

Up is the maximum repetitive voltage which can be applied within short periods.
Defined in CECC 30 300 and IEC 60 384-4:

1000 cycles of 30 s charge followed by a no load period of 5 min. 30 s with upper category temperature.

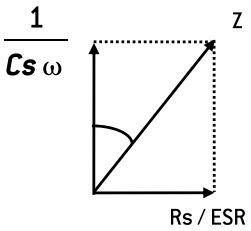
$Up \leq 1{,}15\ U_R$ ($U_R \leq 315$ V)
$Up \leq 1{,}10\ U_R$ ($U_R > 315$ V)

General technical data

4.4. DISSIPATION FACTOR TANδ

The dissipation or loss factor is defined by its tangent Tanδ

$$Tg\delta = Rs \; Cs\,\omega \quad (\omega = 2\pi F)$$



ESR Capacitor Equivalent Series Resistance
Cs Capacitor capacitance
F Frequency (100 Hz)
Z Capacitor impedance

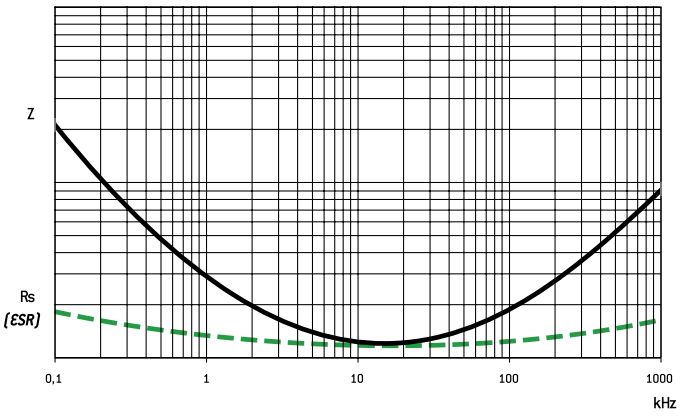
4.5. EQUIVALENT SERIES RESISTANCE ESR

The relation between ESR and dissipation factor Tanδ is given in § 4.4.

4.6. IMPEDANCE Z - INDUCTANCE L

The impedance is given by:

$$Z = \sqrt{R^2 + \left(L\omega - \frac{1}{C\omega}\right)^2}$$



L inductance. Generally L = 5 to 20 nH
Z and ESR as function of frequency typically follows the chart:

4.7. PERMISSIBLE RIPPLE CURRENT (I r.m.s.) I~

The current is defined at the maximum climatic category and at 100 Hz. It is the root mean square value r.m.s. The value I_0 is the rated value for calculations of expected life up to3 I_0.

4.8. LEAKAGE CURRENT II

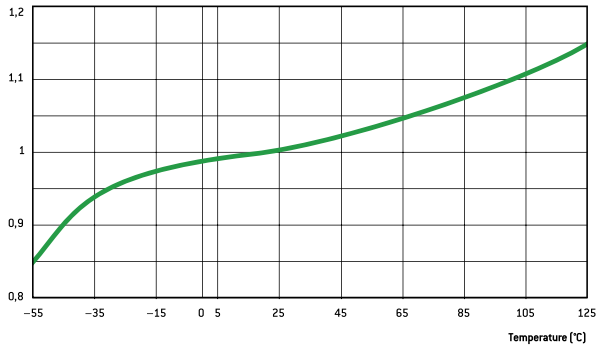
II is measured at 20°C after a 5 min. polarization under rated voltage.

For C_R in µF and U_R in V:
$II \leq 0{,}01\ C_R\ U_R$ or 1 µA*
when $C_R\ U_R \leq 1000$ µC
$II \leq 0{,}006\ C_R\ U_R + 4$ µA
when $C_R\ U_R > 1000$ µC
For $U_R > 350\ V_{DC}$ it can be specified:
with K = 4, 6 or 8
or
$II \leq 0{,}3\ (C_R\ U_R)^{0,7} + 4$ µA (CECC 30 300)
* Whichever is the greater

4.9. CHARACTERISTICS

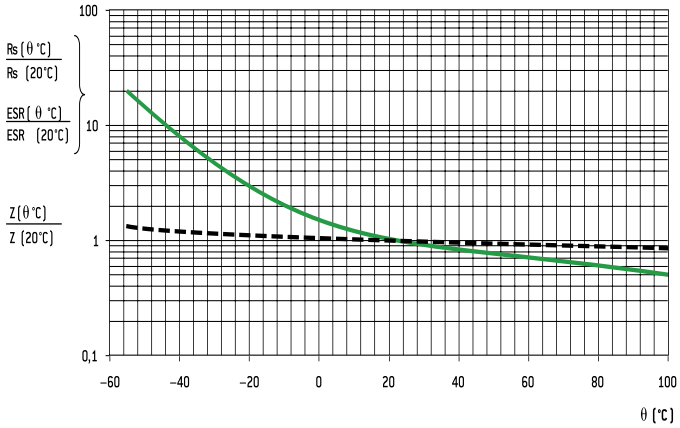
Versus temperature (typical values).

4.9.1. Capacitance drift



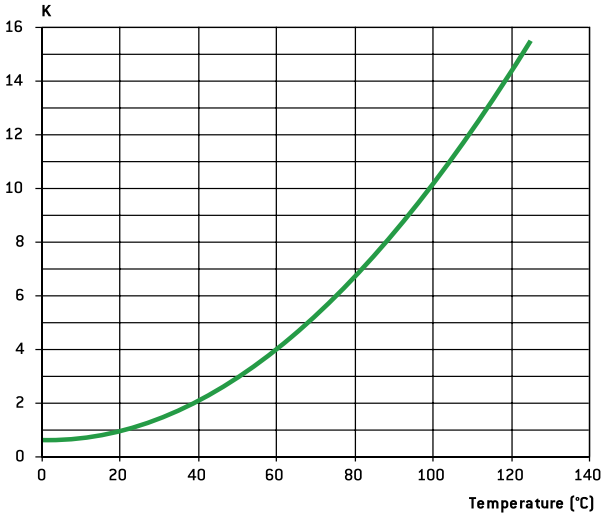
Versus temperature

4.9.2. ESR and Z drifts at 100 Hz



Versus temperature

4.9.3 Leakage current drift



Versus temperature

General technical data

5. SPECIFICATION TO APPLY

Electrolytic aluminum capacitors are defined in:

- NF and UTE French national standard
- CECC European specifications
- IEC international specifications

Quality insurance procedures are described in these specifications.

	French	European	International
Generic specification Fixed capacitors	NF C 83 100	CECC 30 000 EN 130 000	IEC 60 384 -1 QC 300 000
Sectional specification Electrolytic aluminum capacitors	NF C 83 110	CECC 30 300	IEC 60 384 - 4 C 300 300
Blank deta II specification - Electrolytic aluminum capacitors with non solid electrolyte.	UTE 83 110	CECC 30 301	IEC 60 384 - 4 -1 QC 300 301
Blank deta II specifications	CECC 30 301- 017 to CECC 30 301- 062 CO 31 to CO 55	CECC 30 301- 017 to CECC 30 301- 062 CECC 30 301- 802 to CECC 30 301- 811	

6. ENDURANCE TESTS / LIFE TIME

6.1. STANDARD ENDURANCE TEST

at max category temperature:

Standard endurance tests do not exceed 2000 hours at 125°C. However,

Temperature	Endurance test			
	Grade I - Long life			Grade II - General purpose
	10 000 h	5 000 h	2 000 h	1 000 h
125°C			•	
105°C		•	•	•
85°C	•	•	•	•

present EXXELIA technologies concerning liquid electrolytes have led to endurance tests up to 5000 hours at 125°C (PRORELSIC 125 - FELSIC 125 RS) and even 20000 hours at 125°C (PRORELSIC 145 - ALSIC 145)

6.2. PERFORMANCE REQUIREMENTS ON STANDARD ENDURANCE TESTS.

Permissible capacitance drift ΔC/C (%)

Permissible increase factors on Tanδ, ESR, Z and II initial values

(1) Tanδ or ESR: for initial value, take standard value.

U_R	Endurance test			
	Grade I			Grade II
	10 000 h	5 000 h	2 000 h	1 000 h
6,3 V			+15 –30	+25 –40
10 V - 35 V	+15 –20	±15	±15	±30
40 V - 160 V	±15	±15	±15	±30
> 160 V	±15	±10	±10	±15

	Endurance test			
	Grade I			Grade II
	10 000 h	5 000 h	2 000 h	1 000 h
Tanδ or ESR (1)	1,5	1,3	1,3	1,5
Z (2)	3	2	2	3
II	Standard values			

(2) Z: for initial value, take specified value (see data sheet).

Specific requirements can be taken into consideration with regards to initial values of dissipation factor or equivalent series resistance and impedance.

6.3. FAILURE CRITERIA FOR ELECTROLYTIC CAPACITORS.

Failure criteria are defined in CECC 30 301

- Non measurable defaults leading to complete failure.
- Measurable defaults leading to adjustment losses of the load circuit (failure due to variations).

6.3.1. Non measurable defaults.

They might be summed up as:

- Open circuit
- Short circuit
- Operation of pressure relief device
- Severely damaged insulation
- Unusable terminations

6.3.2. Measurable defaults.

Variations exceeding the values given below characterize a default.

- Capacitance drift ΔC/C (%): 3 times the limit for standard endurance testing or 50 % (whichever is the smallest).
- Tanδ or ESR: 3 times standard max initial values.
- Z: 3 times standard max initial values.
- II: initial limit (under load conditions).

Specific requirements can be taken into consideration with regards to lower drifts.

6.4. INFLUENCE OF MAIN PARAMETER ON OPERATIONAL LIFE.

6.4.1. Temperature.

The capacitors operational life is highly dependent upon its internal temperature Θi and therefore upon the ambient temperature and the ripple current.

Knowing ESR and dissipated power values (§ 6.4.3.) one can figure out, the internal temperature rise and then determine the capacitors expected life.

With present high boiling point electrolytes (§ 8.6)

Θi max = 125 to 185°C depending on styles.

6.4.2. Ripple current.

The ripple current flowing through the capacitor increase the internal temperature through power dissipation.

Standards define the permissible current at 100 Hz and generally consider a temperature rise of 5 to 10°C of max category temperature.

Current waveforms and frequencies make it difficult to clearly determine the capacitors internal temperature rise, which defines the operationally life.

Experiments confirm following relationship:

$$\Theta i = \Theta a + (\Theta c - \Theta a)\, K$$

Where:

- Θi = Internal hot spot temperature
- Θa = Ambient temperature
- Θc = Case temperature
- K = Parameter depending upon case diameter and cooling
  - Ø ≥ 51 k = $2^{\pm 0,5}$
  - Ø < 51 k = $1,5^{\pm 0,5}$ (air cooling - 0,2 m/s)

General technical data

r.m.s. value according to current waveform.

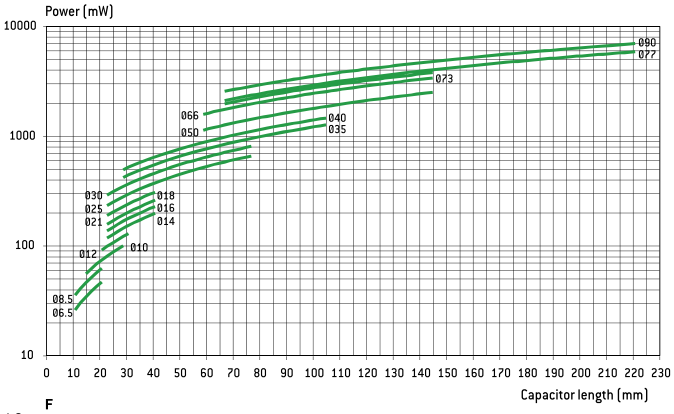
Function	Mean value	R.m.s. value
	A (t0/T)	A $\sqrt{t_0/T}$
	A (t1/T)	A $\sqrt{2t_1/3T}$
	A/2 (t0/T)	A $\sqrt{t_0/3T}$

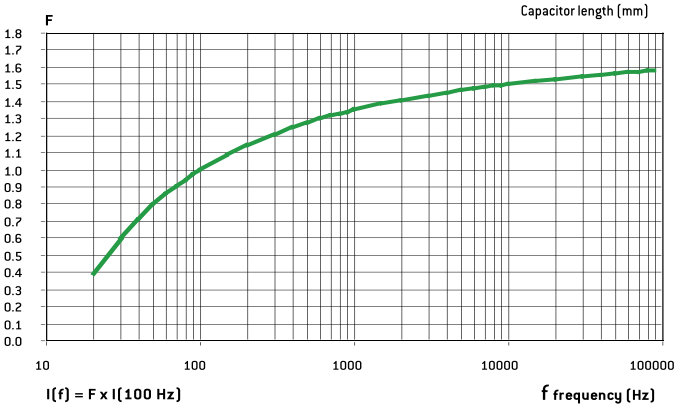
Function	Mean value	R.m.s. value
	A /2	A $\sqrt{3}$
	2A/π (t0/T)	A $\sqrt{t_0/2T}$
	A/2 (t0/T)	A $\sqrt{t_0/3T}$

Function	Mean value	R.m.s. value
	2A/π	A / $\sqrt{2}$
	A /2	A / $\sqrt{3}$
	0	A

6.4.3. Dissipated power versus case dimension

For calculations of ripple currents, considering an internal temperature rise of 10°C





$P = ESR.I^2$

P = Dissipated power (mW)

(Θi - Θa = 10°C)

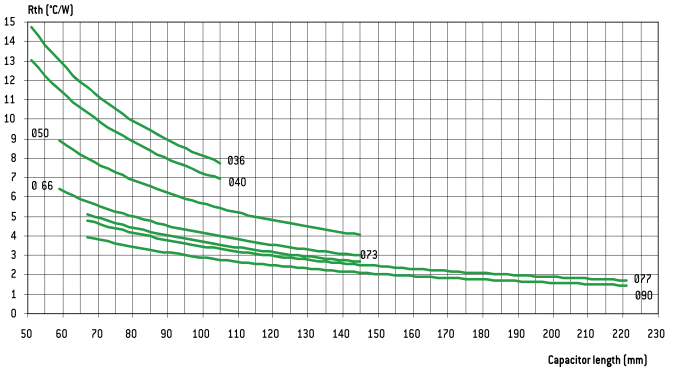
ESR: Equivalent series resistance (100 Hz 20°C)

I: Ripple current (r.m.s. value at 100 Hz)

For different frequencies from 100 Hz, I must be multiplied by the factor F, according to above chart.:

6.4.4. Thermal resistance Rth and air cooling

Rth is static thermal resistance (without cooling) between capacitor central hot spot and ambient temperature measured at a distance of one capacitor diameter



Forced or not cooling air can lead to a significant decrease of these values.

Consequently, r.m.s. ripple current can be increased as a function of air cooling speed:

Ø mm (inches)	≤ 0,5 m/s	1 m/s	2 m/s	3 m/s	≥ 4 m/s
66 - 90	I~	1,1 I~	1,2 I~	1,25 I~	1,3 I~
36 - 51	I~	1,2 I~	1,4 I~	1,45 I~	1,5 I~

This parameter shall be applied to one capacitor alone.

For capacitors in bank, ambient temperature must be strictly equal around all capacitors.

6.4.5. Quality guaranty

We guarantee products manufactured during 2 years from the data of shipment against defaults of material and assembly.

This guaranty can be involved by the buyer only if our products are used within normal conditions, always according to the state of the art and taking in account storage conditions.

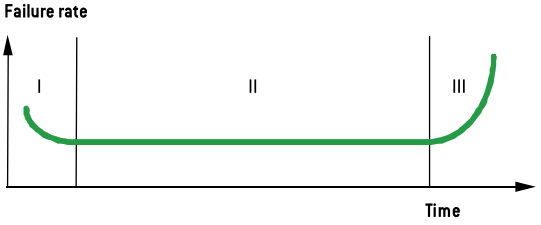
The equipment design should take into consideration possible failures of our capacitors and related effects in order to avoid them.

Guaranty is not applicable for damages occurred by surge voltage, irregular use, polarity inversion or maintenance default.

Guaranty is exclusively limited to the replacement of individual defective capacitors within the terms of delivery. This rule applied to all cases and particularly to any further consequence of failures.

6.4.6. Reliability

Failure rate:



$$FR = \frac{\text{Number of components tested x test duration}}{\text{Number of failures}}$$

Failure rate is measured in FIT (failure in time = 10^{-9} / hour).

The failure rate is set up during the life time of the capacitor (phase II)

I. Early failure phase (generally excluded during ageing process).

II. Operational life time of the capacitors

III. End of life

General technical data

Mean time between failures MTBF = 1/FR mesured in years

Range	Failure rate for a failure percentage not exceeding 1% with a confidence level of 60 %
FELSIC 85 >350 V FELSIC HC > 350 V SNAPSIC - SNAPSIC HC > 350 V SNAPSIC 4P > 350 V PROMISIC 031 Ø = 6,5 SICAL CO 42 - SICAL > 350 V	50 FIT - (MTBF = 2280)
FELSIC 037 - 039 FELSIC 85 ≤ 350 V FELSIC HC ≤ 350 V CUBISIC CI FRS SNAPSIC 105 - SNAPSIC 105 4P SNAPSIC 105 LP - SNAPSIC HV SNAPSIC - SNAPSIC 4P ≤ 350 V SNAPSIC HC ≤ 350 V ALSIC IR - ALSIC 145 - ALSIC HV - VACSIC 150 - VACSIC SICAL CO 42 - SICAL ≤ 350 V PRORELSIC 125 Ø = 6,5 RELSIC 033 PROMISIC 031 Ø > 6,5	25 FIT - (MTBF = 4560)
FELSIC 125 FRS - SNAPSIC 125 FELSIC HV - FELSIC 105	10 FIT - (MTBF = 11410)
PRORELSIC 125 Ø > 6,5 PRORELSIC 145	5 FIT - (MTBF = 22820)

Multiplying factor of FR with voltage and temperature

	Temperature (°C)							
	≤ 40	50	60	70	85	105 (1)	125 (1)	145 (1)
Factor	1	1,5	2,3	3,4	6,3	14	32	72

(1) Only for permitted capacitors

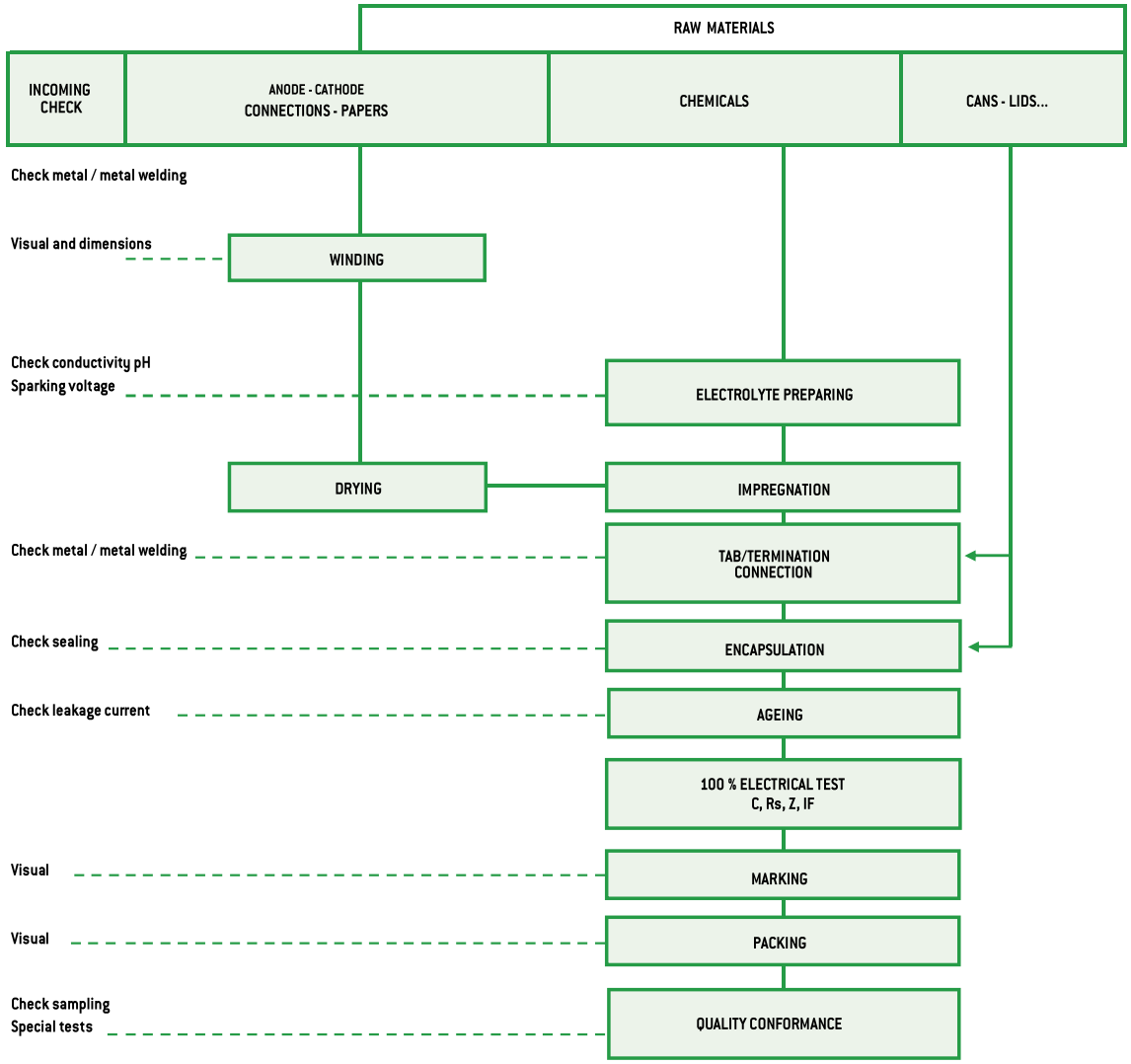
	Percentage of rated voltage (2)		
	100 %	80 %	50 %
Factor	1	0,8	0,5

(2) This voltage has to be constant

Environment	Without vibration		Ground with vibrations or mob lle			
	Ground, fix Controlled air	Ground, fix	PRORELSIC SNAPSIC 20 g FELSIC 20 g	FELSIC 10 g PROMISIC SICAL Ø ≤14	CI FRS - SNAPSIC RELSIC SICAL Ø >14	ALSIC
Factor	1	2	2	4	6	12

7. MANUFACTURING FLOW CHART

Process controls



General technical data

8. INFORMATION ON APPLICATION

8.1. CLEANING SOLVENTS

Use aliphatic alcohols, such as denatured ethyl alcohol, isopropanol, or butylacetate, or else alkaline diluted solutions. Avoid incompatible solvents (halogenous for example).

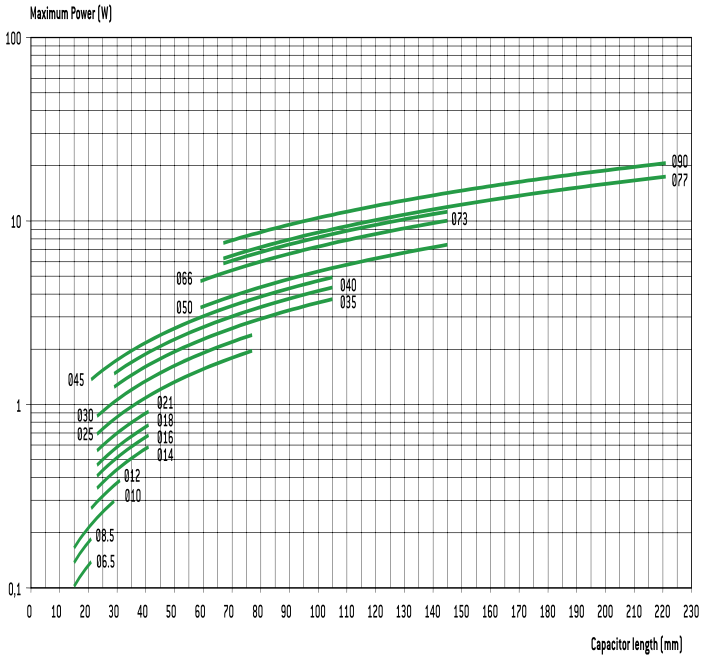
8.2. SHELF LIFE

There is no electrical characteristics variation for long periods of storage except leakage current which can increase.

It is caused by chemical reactions between the dielectric alumina and the electrolyte. These reactions are reversible when switched on. Capacitors can generally be stored at temperature between –5° and +50°C without reforming for the following periods of time:

- For $U_R \leq 100$ V, storage time: ..... 5 years (up to 10 years under specific conditions)
- For 100 V < $U_R \leq 360$ V storage time: ..... 3 years
- For 360 V < U_R < 500 V storage time: ..... 1 year
- For $U_R \leq 500$ V, storage time: ..... 6 months

Generally when these periods are overstepped, one hour at rated voltage causes the decrease of leakage current under the specified limits. An other way to avoid this leakage current increase problem is to always limit available power through capacitor during first seconds or minutes after storage or transport, according to the following chart:



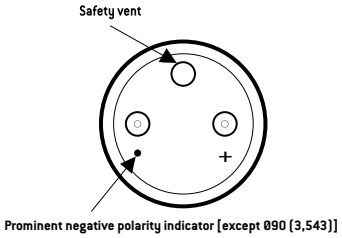
8.3. LOW PRESSURE RESISTANCE

EXXELIA capacitors can be used with ambient low pressure decreasing up to 10 mbar (altitude 28000 m – 92000 feet).

8.4. MOUNTING SCREW TERMINALS CAPACITORS (FELSIC)

Capacitors may be used vertically (terminals on top) or horizontally. When used horizontally, the following position in relation to the safety vent, is recommended:

Mounting capacitors in series may be used for operating voltage exceeding U_R. See FELSIC in bank.



8.5. MOUNTING SOLDER TYPE CAPACITORS.

They may be used in any position. During mounting, avoid applying excessive force to capacitor pins or wires. There is a risk of damaging internal connections.
After soldering and for the same reasons, do not try to move the capacitor's body.

8.6. ELECTROLYTES: SAFETY RULES.

Electrolytes used in EXXELIA capacitors are manufactured by EXXELIA. Main solvents are generally γ butyrolactone and ethylene glycol, very stable high boiling point solvents. Ionic conductive salts in electrolyte induce a very weak acidity (pH 5 to 7).

8.7. ENVIRONMENT.

In aluminium capacitors with liquid electrolyte there is no component showing a pollution risk, in small amounts, of air or water. EXXELIA is always involved in this security field particularly in using chemicals for electrolyte, without well-known risks.

- Dimethylformamide (DMF) dangerous solvent forbidden in several uses is completely excluded by EXXELIA,since 1990.
- There is no halogen compound such as chlorofluorocarbon (CFC or FCKW in german) or polychlorobiphenyl (PCBPyralene) or pentabromodiphenylether or octabromodiphenylether.

There is neither benzene, toluene or phenyl compound nor explosive such as picric acid, nor asbestos in plastic covers. All the capacitors made by EXXELIA since 1991, can be scrapped or used in raw materials recycling processes without special care in compliance with Community rules.

EXXELIA aluminium capacitors with non-solid electrolyte are particularly suitable for different kinds of environment taking in account severity increasing laws.

European directives 2003/11/EC, 2002/96/EC (WEEE) and 2002/95/EC (RoHS) applies to all EXXELIA capacitors including every solder type, manufactured with pure tin coated pins or wires, since at least January 2006.

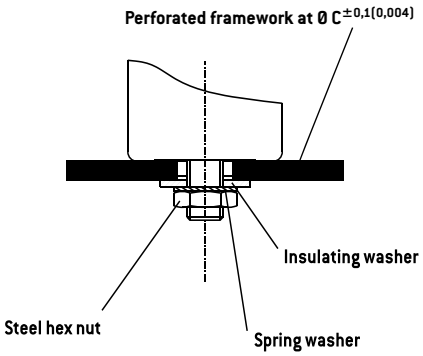
Mounting and insulating parts

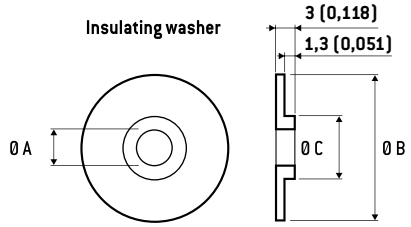
STUD FIXING: FELSIC BD

Steel nut, spring washer and insulating washer are delivered loosely with the capacitor.

STANDARD MOUNTING WITH:

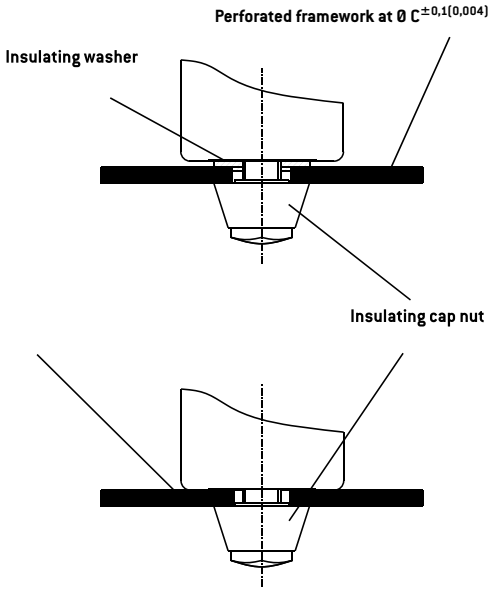
Insulating washer and steel nut

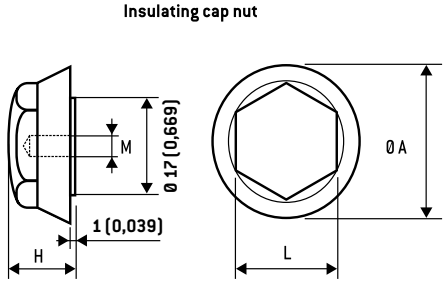




Ø Capacitor	DIMENSIONS in mm (inches)				
	M	Ø A	Ø B	Ø C	Code
36	8	8,4	25	18,5	A 691060
51 - 77	12	12,5	30	21,5	A 691061
90	12	12,5	35	21,5	A 691062

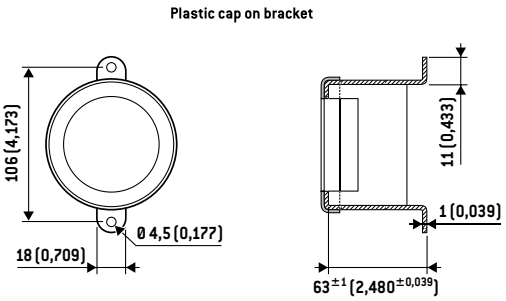
Insulating plastic nut with or without insulating washer





DIMENSIONS in mm (inches)												
M		Ø A		H		L		Max. torque	Code
8	(0,315)	25	(0,984)	15	(0,591)	17	(0,669)	3 Nm	A 691070
12	(0,472)	30	(1,181)	20	(0,787)	19	(0,748)	7 Nm	A 691071

Ring - clip mounting: FELSIC LP
Ring clips shall be ordered separately.
Tightening screws and nuts are supplied loosely.

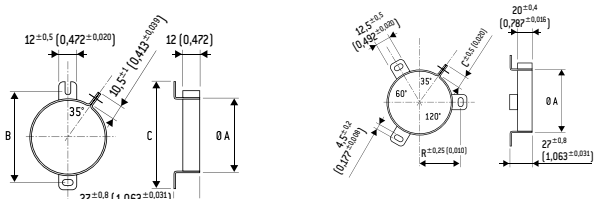


FELSIC 85 LP FELSIC 105 LP	Code
Metal bracket	A691055
Plastic cap	A691065

General technical data

Ring - clip mounting: FELSIC BC
Ring clips shall be ordered separately.
Tightening screws and nuts are supplied loosely.

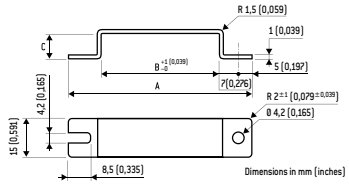
FELSIC BC - Metal ring-clips



Ø A Cap.	B	C	Code	Ø A Cap.	B	C	Code
36	54	63	A 691901	51	33,5	11,8	A 691905
				66	39	10,5	A 691913
				73	44	10,5	A 691914
				77	44,5	10,5	A 691907
				90	53,3	11,8	A 691915

Stirrup mounting: CUBISIC LP
Stirrups shall be ordered separately.
Tightening screws and nuts are supplied loosely
Salt mist endurance of screws and mounting accessories:
minimum 96 h (IEC 600 68-2-11)

CUBISIC /CUBISIC LP - Metal bracket



Ø A Cap.	A		B		C		Code
45x12 (1,772x 0,472)	69	(2,717)	45	(1,772)	10	(0,394)	A 691057
35x16 (1,378x 0,630)	59	(2,323)	35	(1,378)	14	(0,551)	A 691059

PACKAGING

1. PACKAGING AND WEIGHT UNITS.

1.1. Capacitor with screw terminals

Can DIMENSIONS in mm (inches)				Unit weight *
Ø	H			(g)
36 (1,417)	47 (1,850)	52 (2,047)	53 (2,087)	70
36 (1,417)	60 (2,362)			79
36 (1,417)	80 (3,150)	81 (3,189)		100
36 (1,417)	104 (4,094)	105 (4,134)		120
51 (2,008)	47 (1,850)			80
51 (2,008)	62 (2,441)	63 (2,480)		105
51 (2,008)	81 (3,189)	82 (3,228)		190
51 (2,008)	104 (4,094)	105 (4,134)		260
51 (2,008)	112 (4,409)			270
51 (2,008)	144 (5,669)			370
66 (2,598)	104 (4,094)	105 (4,134)		430
66 (2,598)	112 (4,409)			460
73 (2,874)	104 (4,094)	112 (4,409)		600
73 (2,874)	144 (5,669)			680
77 (3,031)	104 (4,094)	105 (4,134)		620
77 (3,031)	144 (5,669)	145 (5,709)		860
77 (3,031)	200 (7,874)			1300
77 (3,031)	220 (7,874)	221 (8,701)		1400
90 (3,543)	67 (2,638)			600
90 (3,543)	144 (5,669)	145 (5,709)		1400
90 (3,543)	200 (7,874)			1800

* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

1.2. Radial solder types

Can dimensions mm (inches)		ALSIC	SNAP-SIC
Ø	H	Weight* (g)	
10 (0,394)	16 (0,630)	1,8	-
12,5 (0,492)	21 (0,827)	4,5	-
12,5 (0,492)	24 (0,945)	5	
16 (0,630)	25 (0,984)	8,2	-
22 (0,866)	25 (0,984)	-	15
22 (0,866)	30 (1,181)	-	17
22 (0,866)	40 (1,575)	-	18
25 (0,984)	25 (0,984)	-	17
25 (0,984)	30 (1,181)	-	20
25 (0,984)	35 (1,378)	-	22
25 (0,984)	40 (1,575)	-	25
25 (0,984)	45 (1,772)	-	28
25 (0,984)	50 (1,969)	-	30
30 (1,181)	25 (0,984)	-	28
30 (1,181)	30 (1,181)	-	30
30 (1,181)	35 (1,378)	-	30
30 (1,181)	40 (1,575)	-	40
30 (1,181)	45 (1,772)	-	45
30 (1,181)	50 (1,969)	-	50

Can dimensions		AL-SIC	SNAP-SIC
Ø	H	Weight* (g)	
35 (1,378)	30 (1,181)	-	50
35 (1,378)	40 (1,575)	-	50
35 (1,378)	45 (1,772)	-	52
35 (1,378)	50 (1,969)	-	60
35 (1,378)	75 (2,953)	-	95
35 (1,378)	100 (3,937)	-	125
40 (1,575)	40 (1,575)	-	65
40 (1,575)	50 (1,969)	-	100
40 (1,575)	75 (2,953)	-	130
40 (1,575)	100 (3,937)	-	170
45 (1,772)	21 (0,827)	-	50
45 (1,772)	(0,984)	-	60
45 (1,772)	30 (1,181)	-	73
45 (1,772)	35 (1,378)	-	85
45 (1,772)	45 (1,772)	-	110
45 (1,772)	75 (2,953)	-	180
45 (1,772)	100 (3,937)	-	240

Can DIMENSIONS in mm (inches)			CUBISIC
I	L	H	weight (g)
35 (1,378)	35 (1,378)	16 (0,630)	30
35 (1,378)	50 (1,969)	16 (0,630)	40
45 (1,772)	35 (1,378)	12 (0,472)	30
45 (1,772)	50 (1,969)	12 (0,472)	45
45 (1,772)	75 (2,953)	12 (0,472)	60

* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

1.3. Axial types

Can DIMENSIONS in mm (inches)		PRORELSIC RELSIC	PRORELSIC PROMISIC	SICAL CO 42 SICAL
Ø	H	Unit weight * (g)	Unit weight * (g)	Unit weight * (g)
6,5 (0,256)	15 (0,591)	-	1,6	-
6,5 (0,256)	19 (0,748)	-	1,8	1,8
8,5 (0,335)	19 (0,748)	-	2,3	2,3
10 (0,394)	19 (0,748)	-	2,8	2,8
10 (0,394)	25 (0,984)	-	3,5	3,5
10 (0,394)	28 (1,102)	-	3,8	-
12 (0,472)	25 (0,984)	-	5	-
12 (0,472)	30 (1,181)	-	5,4	5,4
14 (0,551)	30 (1,181)	-	6,9	6,9
14 (0,551)	41 (1,614)	-	9,5	-
(0,630)	30 (1,181)	7,7	-	7,7
18 (0,709)	35 (1,378)	13,6	-	-
18 (0,709)	40 (1,575)	15,3	-	15,3
21 (0,827)	40 (1,575)	19,5	-	19,5
25 (0,984)	40 (1,575)	28	-	28
25 (0,984)	50 (1,969)	35	-	35
25 (0,984)	75 (2,953)	56	-	56

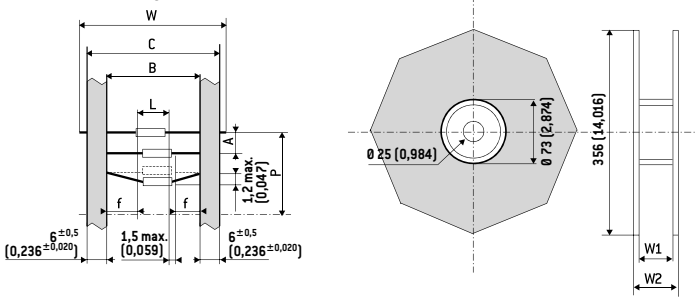
* Unit weight = typical values
Possible variations of = ± 25 % according to different voltage and capacitance.

General technical data

2. PACKAGING ON TAPE

2.1. Axial types

Dimensions and tolerance in accordance with IEC 60 286-
(1) On tape only on request



DIMENSIONS in mm (inches)									
D	L max.	B	A	P	C max.	W_1	W_2 max.	W	n (2)
6,5 (0,256) 8,5 (0,335) (1)	20 (0,787)	$73^{\pm 1,5}$ ($2,874^{\pm 0,059}$)	$10^{\pm 1,5}$ ($0,394^{\pm 0,059}$)	± 2 (0,079)	87,5 (3,445)	93 (3,661)	106 (3,661)	$85^{\pm 1,5}$ ($3,346^{\pm 0,059}$)	1000 (39,370) 750 (29,528)
10 (0,394) (1) 12 (0,472) (1) 14 (0,551) (1)	32 (1,260)	$73^{\pm 1,5}$ ($2,874^{\pm 0,059}$)	$15^{\pm 1,5}$ ($0,591^{\pm 0,059}$)	± 3 (0,118)	87,5 (3,445)	93 (3,661)	106 (3,661)	$85^{\pm 1,5}$ ($3,346^{\pm 0,059}$)	400 (15,748) 400 (15,748) 200 (7,874)

(2) n = number of capacitors per reel.

White positive tape ƒ: > 20 mm (0,787 inches)
P: 10 space