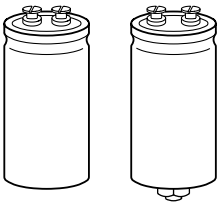
Long-life grade capacitors



KAL0567-B

B43560 B43580

Applications

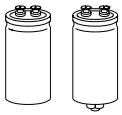
- Frequency converters
- Traction
- Highly professional power supplies

Features

- Maximum reliability
- Good thermal characteristics and high ripple current capability
- Long useful life
- Wide temperature range
- All-welded construction ensures reliable electrical contact
- Version with optimized construction for base cooling (2-pad solution) available
- Version with low-inductance design available

Construction

- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Poles with screw terminal connections
- Mounting with ring clips, clamps or threaded stud
- The bases of types with threaded stud and $d \leq 76{,}9$ mm are not insulated, types with $d = 91$ mm have fully insulated bases



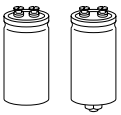
Specifications and characteristics in brief

Rated voltage U_R	350 … 450 VDC	
Surge voltage U_S	1,10 · U_R (105 °C; $U_R \leq$ 400 VDC, 85 °C; U_R = 450 VDC)	
Rated capacitance C_R	2 200 … 15 000 µF	
Capacitance tolerance	± 20 % ≙ M	
Leakage current I_L (5 min, 20 °C)	$I_L \leq 0{,}3\ \mu A \cdot \left(\frac{C_R}{\mu F} \cdot \frac{U_R}{V}\right)^{0,7} + 4\ \mu A$	
Self-inductance *ESL*	*d* = 51,6 mm: approx. 15 nH *d* ≥ 64,3 mm: approx. 20 nH Capacitors with low-inductance design: *d* ≥ 64,3 mm: approx. 13 nH	
Useful life		Requirements:
105 °C; U_R; $I_{\sim R}$	> 6 000 h	$\Delta C/C$ ≤ ± 30 % of initial value
85 °C; U_R; $I_{\sim R}$	> 20 000 h	*ESR* ≤ 3 times initial specified limit
40 °C; U_R; 2,2 · $I_{\sim R}$	> 250 000 h	I_L ≤ initial specified limit Failure percentage: ≤ 1 % Failure rate: ≤ 20 fit (≤ 20 · 10^{-9}/h) (for definiton “fit”, refer to chapter *“Quality”*, page 62)
Voltage endurance test		Post test requirements:
105 °C; U_R; $I_{\sim R}$	2 000 h	$\Delta C/C$ ≤ ± 10 % of initial value *ESR* ≤ 1,3 times initial specified limit I_L ≤ initial specified limit
Vibration resistance	To IEC 60068-2-6, test Fc: displacement amplitude 0,75 mm, frequency range 10 to 55 Hz, acceleration max. 10 *g*, duration 3 × 2 h	
IEC climatic category	To IEC 60068-1: 40/105/56 (– 40 °C/+ 105 °C/56 days damp heat test)	
Detail specifications	Similar to CECC 30301-803, CECC 30301-807	
Sectional specification	IEC 60384-4	

Ripple current capability

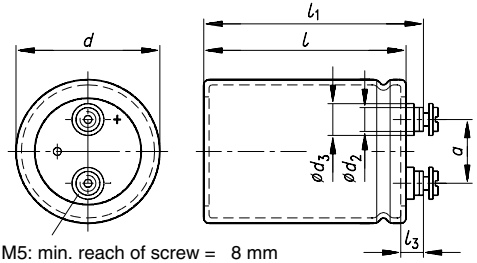
Due to the ripple current capability of the contact elements, the following current upper limits must not be exceeded:

Capacitor diameter	64,3 mm	76,9 mm	91,0 mm
$I_{\sim max}$	40 A	50 A	70 A



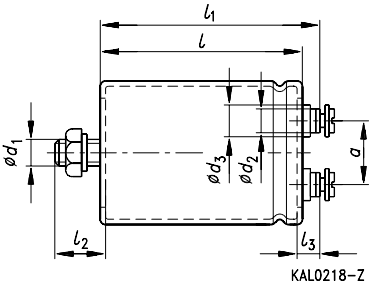
Dimensional drawings

Type B43560
Ring clip/clamp mounting



M5: min. reach of screw = 8 mm
M6: min. reach of screw = 12 mm*)
*) 8 mm for low-inductance design

Type B43580
Threaded stud mounting



Positive pole marking: +

The base of all types with threaded stud and d = 91 mm is fully insulated (the lengths l and l_1 are increased by 0,5 mm in these cases). For types with threaded stud and $d \leq 76$ mm the base is not insulated. Also refer to the notes on mounting given on page 168.

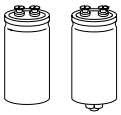
Dimensions and weights

Terminal	Dimensions (mm) with insulating sleeve									Approx. wt. (g)
	d	$l \pm 1$	$l_1 \pm 1$	$l_2\ ^{+0}_{-1}$	l_3	d_1	d_2 max	d_3 max	$a\ ^{+0,2}_{-0,4}$	
M 5	64,3+ 0/– 0,8	105,7	112,2	17	7,0+ 0,2/– 1	M 12	8,2	13,5	28,5	440
M 5	64,3+ 0/– 0,8	130,7	137,2	17	7,0+ 0,2/– 1	M 12	8,2	13,5	28,5	570
M 5	64,3+ 0/– 0,8	143,2	149,7	17	7,0+ 0,2/– 1	M 12	8,2	13,5	28,5	640
M 6	76,9+ 0/– 0,7	105,7	111,5	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	540
M 6	76,9+ 0/– 0,7	130,7	136,5	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	750
M 6	76,9+ 0/– 0,7	143,2	149,0	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	840
M 6	76,9+ 0/– 0,7	168,7	174,5	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1000
M 6	76,9+ 0/– 0,7	220,7	226,5	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1300
M 6	91,0+ 0/– 2	144,5	149,8	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1200
M 6	91,0+ 0/– 2	170,0	175,3	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1500
M 6	91,0+ 0/– 2	191,0	196,3	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1700
M 6	91,0+ 0/– 2	221,0	226,3	17	6,4+ 1,1/– 0,8	M 12	17,7	17,7	31,7	1900

Dimensions are also valid for 2-pad solution and low-inductance design.

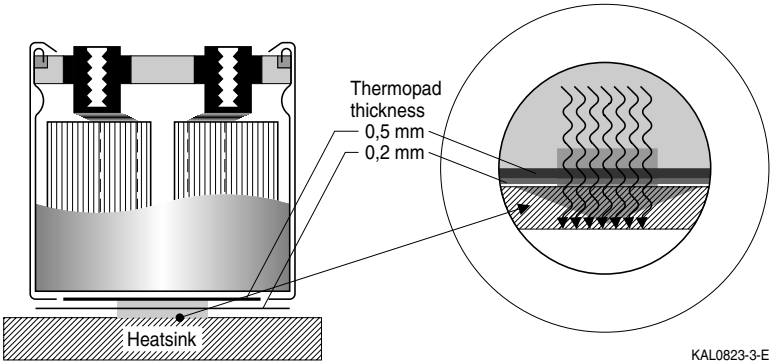
Packing (For ecological reasons the packing is pure cardboard.**)**

Capacitor diameter d	Packing units (pieces)
64,3 mm	15
76,9 mm	12
91,0 mm	8



Special designs

- Low-inductance design
- 2-pad solution
  Design for optimized connection of the capacitor to the heatsink when using base cooling. This version is available for capacitors without threaded stud and for diameters ≥64,3 mm (cf. $I_{\sim R}$(B) in table "Technical data and ordering codes" and useful life graphs).



Ordering codes:

Design	Identification in 3rd block of ordering code	Remark
Low inductance (13 nH)	M003	For capacitors with diameter $d \geq 64{,}3$ mm
2-pad solution	M006	For capacitors with diameter $d \geq 64{,}3$ mm and without threaded stud

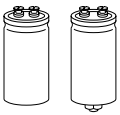
Accessories

The following items are included in the delivery package, but are not fastened to the capacitors:

	Thread	Toothed washers	Screws/Nuts	Maximum torque
For terminals	M 5	A 5,1 DIN 6797	Cylinder-head screw M 5 × 8 DIN 84-4.8	2 Nm
	M 6	A 6,4 DIN 6797	Cylinder-head screw M 6 × 12 DIN 85-4.8	2,5 Nm
For mounting	M 12	J 12,5 DIN 6797	Hex nut BM 12 DIN 439	10 Nm

The following must be ordered separately:

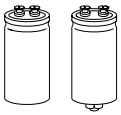
Ring clips	B 44 030 (cf. page 169)
Clamps for capacitors with $d \geq 64{,}3$ mm	B 44 030 (cf. page 173)
Insulating parts	B 44 020 (cf. page 166)



Overview of available types

U_R (VDC)	350	400	450
C_R (µF)	Case dimensions $d \times l$ (mm)		
2 200		64,3 × 105,7	64,3 × 130,7
2 700	64,3 × 105,7		
3 300		64,3 × 130,7	76,9 × 130,7
3 900	76,9 × 105,7		
4 700	64,3 × 143,2 76,9 × 105,7	76,9 × 130,7	76,9 × 168,7 91,0 × 144,5
6 000	76,9 × 130,7		76,9 × 220,7
6 800	76,9 × 143,2	91,0 × 144,5	91,0 × 191,0
8 200	91,0 × 144,5	91,0 × 170,0 76,9 × 220,7	91,0 × 221,0
10 000	76,9 × 220,7		
12 000		91,0 × 221,0	
15 000	91,0 × 221,0		

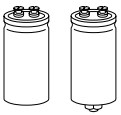
The capacitance and voltage ratings listed above are available in different cases upon request.
Other voltage and capacitance ratings are also available upon request.



Technical data and ordering codes

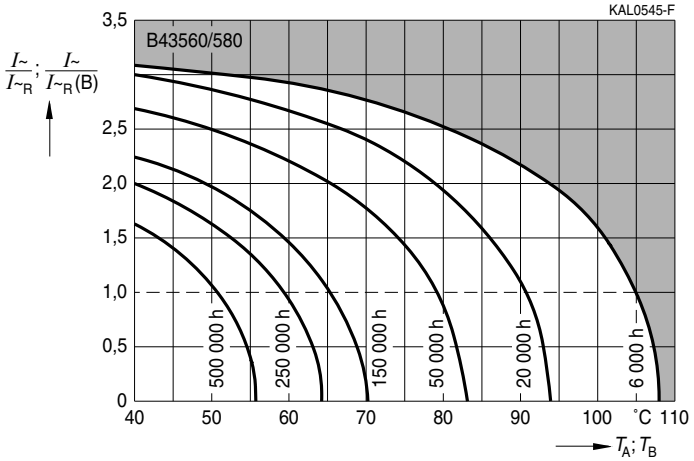
U_R VDC	C_R 100 Hz 20 °C µF	Case dimensions $d \times l$ mm	ESR_{max} 100 Hz 20 °C mΩ	Z_{max} 10 kHz 20 °C mΩ	$I_{\sim max}$ 100 Hz 40 °C A	$I_{\sim max}$ 100 Hz 85 °C A	$I_{\sim R}$ 100 Hz 105 °C A	$I_{\sim R}$(B) 100 Hz 105 °C A	Ordering code[1)2)]
350	2 700	64,3 × 105,7	69	55	27	21	8,5	15	B435*0A4278M000
	3 900	76,9 × 105,7	48	38	35	27	11	22	B435*0A4398M000
	4 700	64,3 × 143,2	40	32	40	31	13	21	B435*0A4478M000
	4 700	76,9 × 105,7	40	32	39	30	13	25	B435*0C4478M000
	6 000	76,9 × 130,7	31	25	47	36	15	27	B435*0A4608M000
	6 800	76,9 × 143,2	27	22	50	40	17	29	B435*0A4688M000
	8 200	91,0 × 144,5	23	18	61	48	20	35	B435*0A4828M000
	10 000	76,9 × 220,7	19	15	50	50	24	34	B435*0A4109M000
	15 000	91,0 × 221,0	12	10	70	70	31	48	B435*0A4159M000
400	2 200	64,3 × 105,7	84	68	24	19	7,8	14	B435*0A9228M000
	3 300	64,3 × 130,7	56	45	32	25	10	17	B435*0A9338M000
	4 700	76,9 × 130,7	40	32	41	32	13	24	B435*0A9478M000
	6 800	91,0 × 144,5	27	22	56	43	18	32	B435*0A9688M000
	8 200	91,0 × 170,0	23	18	65	50	21	35	B435*0A9828M000
	8 200	76,9 × 220,7	23	18	50	50	22	31	B435*0C9828M000
	12 000	91,0 × 221,0	15	12	70	65	27	43	B435*0A9129M000
450	2 200	64,3 × 130,7	84	68	26	20	8,4	14	B435*0A5228M000
	3 300	76,9 × 130,7	56	45	35	27	11	20	B435*0A5338M000
	4 700	76,9 × 168,7	40	32	45	35	15	24	B435*0A5478M000
	4 700	91,0 × 144,5	40	32	46	36	15	27	B435*0C5478M000
	6 000	76,9 × 220,7	31	25	50	44	18	27	B435*0A5608M000
	6 800	91,0 × 191,0	27	22	61	47	20	32	B435*0A5688M000
	8 200	91,0 × 221,0	23	18	70	54	22	35	B435*0A5828M000

1) * "6" = for capacitors with ring clip/clamp mounting
"8" = for capacitors with threaded stud
2) For 2-pad solution (types without threaded stud) and for low-inductance design, see page 153.



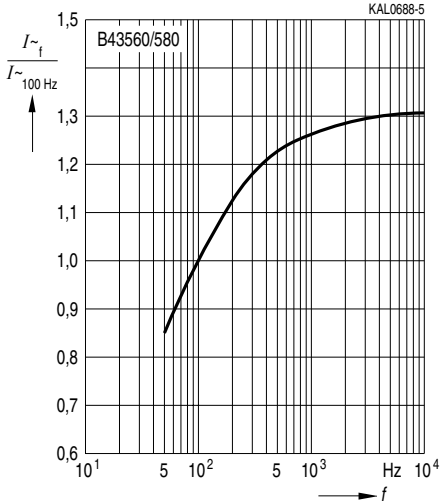
Useful life

depending on ambient temperature T_A (for natural cooling) and versus temperature of case base T_B (for base cooling) under ripple current operating conditions[1)]

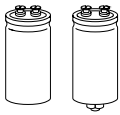


Frequency factor of permissible ripple current *I*~

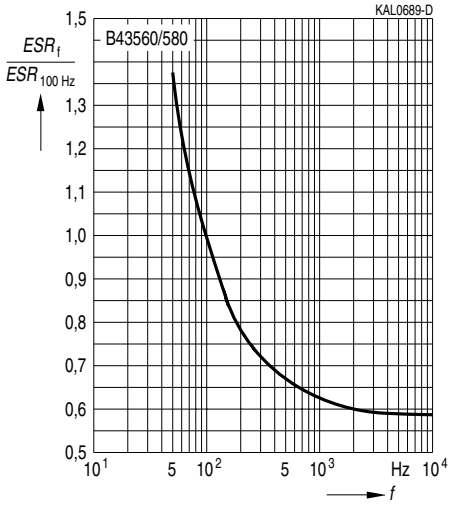
versus frequency *f*



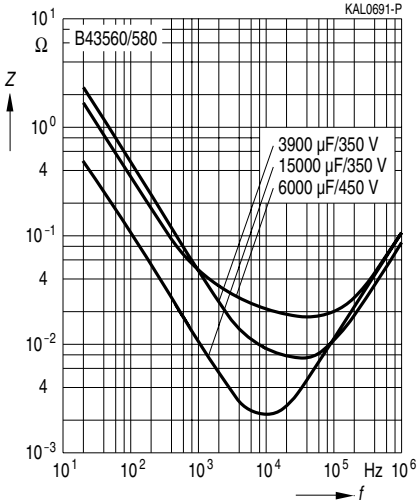
1) The ripple current refers to $I\sim_R$ for natural cooling or to $I\sim_R(B)$ for base cooling, respectively. Refer to page 40 for an explanation on how to interpret the useful life graphs.



Frequency characteristics of *ESR*
Typical behavior



Impedance *Z*
versus frequency *f*
Typical behavior at 20 °C



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