

### Long-life grade capacitors

#### Applications

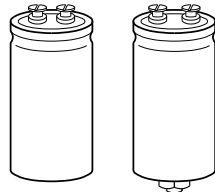
- Frequency converters
- Traction
- Highly professional power supplies

#### 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

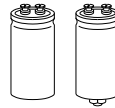
- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Poles with screw terminal connections
- Mounting with ring clips, clamps or threaded stud
- The bases of types with threaded stud and  $d \leq 76,9$  mm are not insulated, types with  $d = 91$  mm have fully insulated bases



B43560

KAL0567-B

B43580

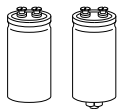
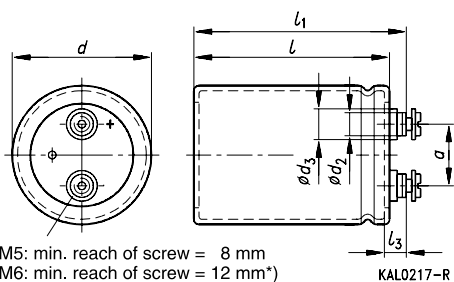
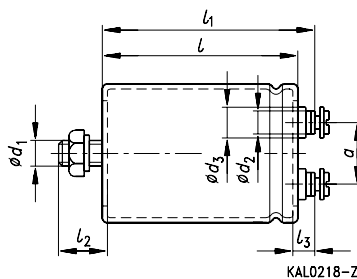

**Specifications and characteristics in brief**

Rated voltage $U_R$	350 ... 450 VDC	
Surge voltage $U_S$	$1,10 \cdot U_R$ (105 °C; $U_R \leq 400$ VDC, 85 °C; $U_R = 450$ VDC)	
Rated capacitance $C_R$	2 200 ... 15 000 $\mu\text{F}$	
Capacitance tolerance	$\pm 20 \% \triangleq \text{M}$	
Leakage current $I_L$ (5 min, 20 °C)	$I_L \leq 0,3 \mu\text{A} \cdot \left(\frac{C_R}{\mu\text{F}} \cdot \frac{U_R}{\text{V}}\right)^{0,7} + 4 \mu\text{A}$	
Self-inductance $ESL$	$d = 51,6$ mm: approx. 15 nH $d \geq 64,3$ mm: approx. 20 nH Capacitors with low-inductance design: $d \geq 64,3$ mm: approx. 13 nH	
Useful life 105 °C; $U_R$ ; $I_{\sim R}$ 85 °C; $U_R$ ; $I_{\sim R}$ 40 °C; $U_R$ ; $2,2 \cdot I_{\sim R}$	$> 6\,000$ h $> 20\,000$ h $> 250\,000$ h	Requirements: $\Delta C/C \leq \pm 30\%$ of initial value $ESR \leq 3$ times initial specified limit $I_L \leq$ initial specified limit Failure percentage: $\leq 1\%$ Failure rate: $\leq 20$ fit ( $\leq 20 \cdot 10^{-9}/\text{h}$ ) (for definiton "fit", refer to chapter "Quality", page 62)
Voltage endurance test 105 °C; $U_R$ ; $I_{\sim R}$	2 000 h	Post test requirements: $\Delta C/C \leq \pm 10\%$ of initial value $ESR \leq 1,3$ times initial specified limit $I_L \leq$ 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 $3 \times 2$ 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
$I_{\sim \text{max}}$	40 A	50 A	70 A


**Dimensional drawings**
**Type B43560**  
 Ring clip/clamp mounting

**Type B43580**  
 Threaded stud mounting


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

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.

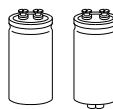
**Dimensions and weights**

Ter- minal	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.)

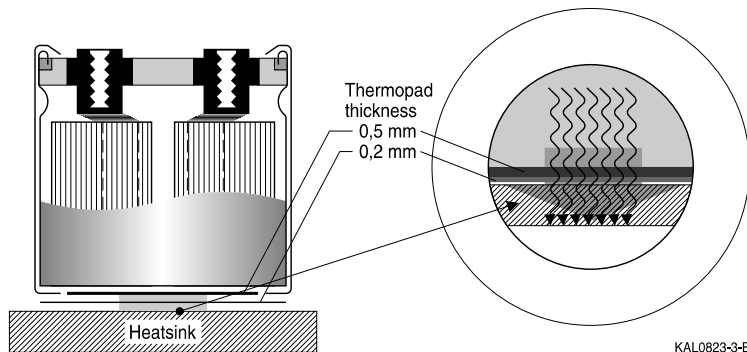
Capacitor diameter $d$	Packing units (pieces)
64,3 mm	15
76,9 mm	12
91,0 mm	8



### 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  $\geq 64,3$  mm (cf.  $I_{-R}(B)$  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

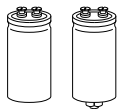
### Accessories

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)



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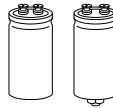
Compact – 105 °C

#### Overview of available types

$U_R$ (VDC)	350	400	450
$C_R$ ( $\mu$ F)	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.

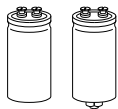
Other voltage and capacitance ratings are also available upon request.


**Technical data and ordering codes**

$U_R$	$C_R$ 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	$I_{max}$ 100 Hz 40 °C A	$I_{max}$ 100 Hz 85 °C A	$I_R$ 100 Hz 105 °C A	$I_R(B)$ 100 Hz 105 °C A	Ordering code <sup>1)2)</sup>	
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.

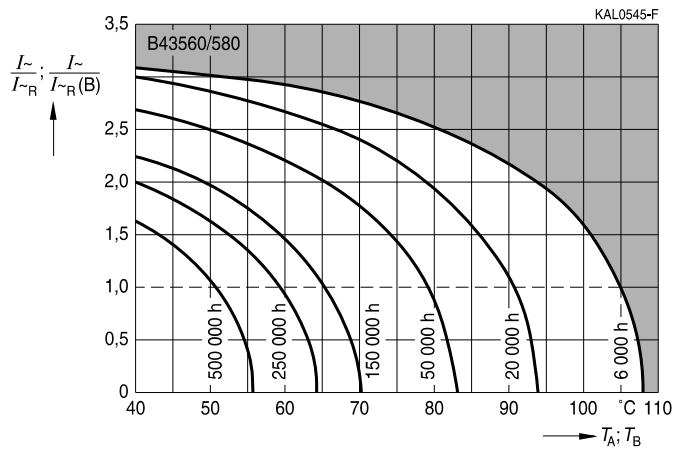


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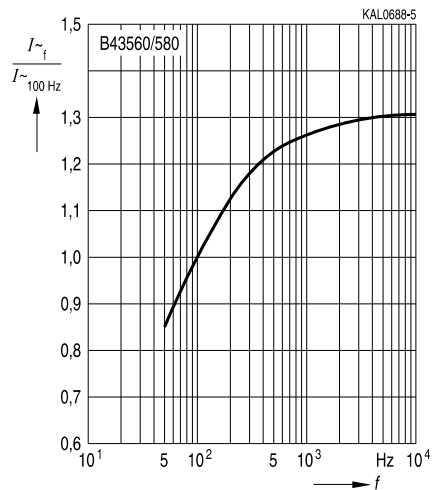
Compact – 105 °C

**Useful life**

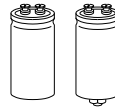
depending on ambient temperature  $T_A$  (for natural cooling) and versus temperature of case base  $T_B$  (for base cooling) under ripple current operating conditions<sup>1)</sup>



**Frequency factor of permissible ripple current  $I_{\sim}$  versus frequency  $f$**

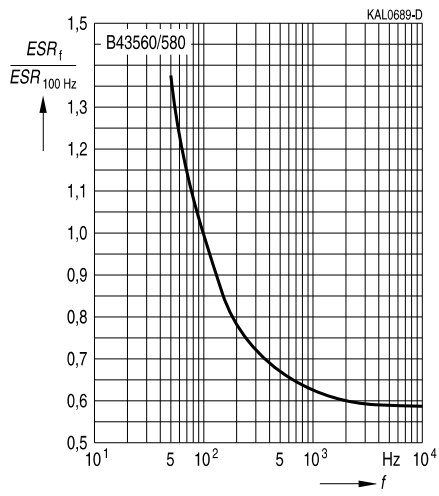


1) The ripple current refers to  $I_{\sim R}$  for natural cooling or to  $I_{\sim R(B)}$  for base cooling, respectively. Refer to page 40 for an explanation on how to interpret the useful life graphs.



**Frequency characteristics of ESR**

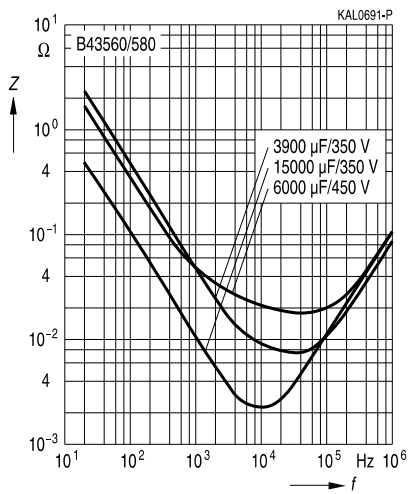
Typical behavior



**Impedance Z**

versus frequency  $f$

Typical behavior at 20 °C





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**Unternehmenskommunikation, Postfach 80 17 09, 81617 München, DEUTSCHLAND**

**☎ ++49 89 636 09, FAX (0 89) 636-2 26 89**

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**Corporate Communications, P.O. Box 80 17 09, 81617 Munich, GERMANY**

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