

## Long-life grade capacitors

### Applications

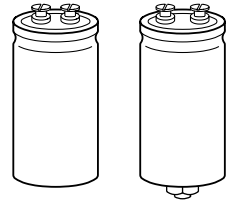
- Frequency converters
- Professional power supplies
- Uninterruptible power supplies

### Features

- Extremely compact, i. e. high CU product
- High reliability and ripple current capability
- 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

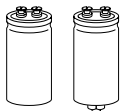
- Charge-discharge proof, polar
- Aluminum case with insulating sleeve
- Poles with screw terminal connections
- Mounting with ring clips, clamps or threaded stud
- The bases of types with threaded stud and  $d \leq 76,9$  mm are not insulated, types with  $d = 91$  mm have fully insulated bases



B43456

KAL0567-B

B43458

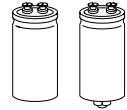

**Specifications and characteristics in brief**

Rated voltage $U_R$	350 ... 450 VDC	
Surge voltage $U_S$	$1,10 \cdot U_R$	
Rated capacitance $C_R$	1 000 ... 18 000 $\mu$ F	
Capacitance tolerance	$\pm 20 \% \triangleq M$	
Leakage current $I_L$ (5 min, 20 °C)	$I_L \leq 0,3 \mu\text{A} \cdot \left( \frac{C_R}{\mu\text{F}} \cdot \frac{U_R}{V} \right)^{0,7} + 4 \mu\text{A}$	
Self-inductance $ESL$	Approx. 20 nH Capacitors with low inductance design: $d \geq 64,3$ mm: approx. 13 nH	
Useful life 85 °C; $U_R$ ; $I_{\sim R}$ 40 °C; $U_R$ ; $1,5 \cdot I_{\sim R}$	> 12 000 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: $\leq 40$ fit ( $\leq 40 \cdot 10^{-9}/\text{h}$ ) (for definition "fit", refer to chapter "Quality", page 62)
Voltage endurance test 85 °C; $U_R$	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: $U_R \leq 400$ VDC: 40/085/56 (– 40 °C/+ 85 °C/56 days damp heat test) $U_R = 450$ VDC: 25/085/56 (– 25 °C/+ 85 °C/56 days damp heat test)	
Detail specifications	Similar to CECC 30301-803, CECC 30301-807	
Sectional specification	IEC 60384-4	

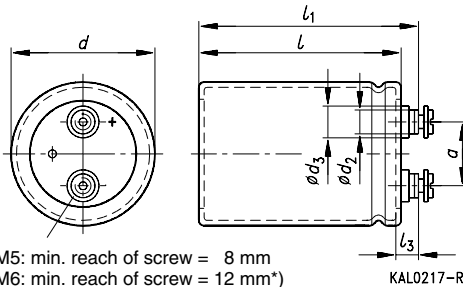
**Ripple current capability**

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

Capacitor diameter	51,6 mm	64,3 mm	76,9 mm	91,0 mm
$I_{\sim \text{max}}$	30 A	40 A	50 A	70 A


**Dimensional drawings**
**Type B43456**

Ring clip/clamp mounting

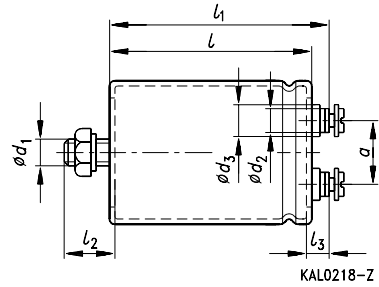


M5: min. reach of screw = 8 mm  
 M6: min. reach of screw = 12 mm\*)  
 \*) 8 mm for low-inductance design

KAL0217-R

**Type B43458**

Threaded stud mounting



KAL0218-Z

Positive pole marking: +

The base of 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.

Screw terminals with UNF threads are available upon request.

**Dimensions and weights**

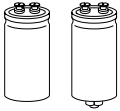
Ter- minal	Dimensions (mm) with insulating sleeve										Approx. wt. (g)
	$d$	$l \pm 1$	$l_1 \pm 1$	$l_2 \begin{smallmatrix} +0 \\ -1 \end{smallmatrix}$	$l_3$	$d_1$	$d_2$ max	$d_3$ max	$a \begin{smallmatrix} +0,2 \\ -0,4 \end{smallmatrix}$		
M 5	51,6 +0/-0,8	80,7	87,2	17	7,0 +0,2/-1	M 12	8,2	13,5	22,2	220	
M 5	51,6 +0/-0,8	105,7	112,2	17	7,0 +0,2/-1	M 12	8,2	13,5	22,2	280	
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 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	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	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	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)	Capacitor diameter $d$	Packing units (pieces)
51,6 mm	22	76,9 mm	12
64,3 mm	15	91,0 mm	8



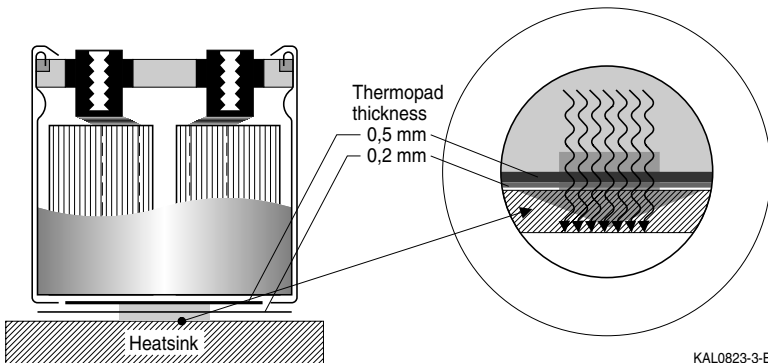
**B43456 / B43458**

**Compact – 85 °C**

### 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).



KAL0823-3-E

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 $\times$ 8 DIN 84-4.8	2 Nm
	M 6	A 6,4 DIN 6797	Cylinder-head screw M 6 $\times$ 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

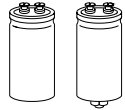
B 44 030 (cf. page 169)

Clamps for capacitors with  $d \geq 64,3$  mm

B 44 030 (cf. page 173)

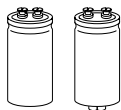
Insulating parts

B 44 020 (cf. page 166)


**Overview of available types**

$U_R$ (VDC)	350	400	450
$C_R$ ( $\mu$ F)	Case dimensions $d \times l$ (mm)		
1 000		51,6 × 80,7	51,6 × 80,7
1 500	51,6 × 80,7	51,6 × 80,7	51,6 × 105,7
2 200	51,6 × 105,7	51,6 × 105,7	64,3 × 105,7
3 300		64,3 × 105,7	76,9 × 105,7
3 900	64,3 × 105,7		
4 700		76,9 × 105,7	
5 600	76,9 × 105,7		76,9 × 143,2
6 800		76,9 × 143,2	91,0 × 144,5
8 200	76,9 × 143,2		76,9 × 220,7
10 000		91,0 × 144,5	
12 000	91,0 × 144,5	76,9 × 220,7	91,0 × 221,0
15 000	76,9 × 220,7	91,0 × 221,0	
18 000	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.


**B43456 / B43458**
**Compact – 85 °C**
**Technical data and ordering codes**

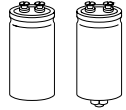
$U_R$	$C_R$ 100 Hz 20 °C μF	Case dimensions $d \times l$ mm	$ESR_{max}$ 100 Hz 20 °C mΩ	$Z_{max}$ 10 kHz 20 °C mΩ	$I_{~max}$ 100 Hz 40 °C A	$I_{~R}$ 100 Hz 85 °C A	$I_{~R(B)}$ 100 Hz 85 °C A	Ordering code <sup>1)</sup>
350	1 500	51,6 × 80,7	110	93	16	5,7	11	B4345*A4158M000
	2 200	51,6 × 105,7	73	63	21	7,6	14	B4345*A4228M000
	3 900	64,3 × 105,7	41	38	32	12	21	B4345*A4398M000 <sup>2)</sup>
	5 600	76,9 × 105,7	29	28	43	15	30	B4345*A4568M000 <sup>2)</sup>
	8 200	76,9 × 143,2	20	20	50	20	36	B4345*A4828M000 <sup>2)</sup>
	12 000	91,0 × 144,5	14	14	70	28	52	B4345*A4129M000 <sup>2)</sup>
	15 000	76,9 × 220,7	11	11	50	34	50	B4345*A4159M000 <sup>2)</sup>
	18 000	91,0 × 221,0	9	9	70	38	58	B4345*A4189M000 <sup>2)</sup>
400	1 000	51,6 × 80,7	160	133	13	4,6	8,2	B4345*A9108M000
	1 500	51,6 × 80,7	110	93	17	6,0	13	B4345*A9158M000
	2 200	51,6 × 105,7	73	63	22	8,0	15	B4345*A9228M000
	3 300	64,3 × 105,7	49	44	30	11	20	B4345*A9338M000 <sup>2)</sup>
	4 700	76,9 × 105,7	34	32	40	14	29	B4345*A9478M000 <sup>2)</sup>
	6 800	76,9 × 143,2	24	24	50	19	33	B4345*A9688M000 <sup>2)</sup>
	10 000	91,0 × 144,5	16	16	70	25	48	B4345*A9109M000 <sup>2)</sup>
	12 000	76,9 × 220,7	14	14	50	31	46	B4345*A9129M000 <sup>2)</sup>
	15 000	91,0 × 221,0	11	11	70	35	54	B4345*A9159M000 <sup>2)</sup>
450	1 000	51,6 × 80,7	220	190	13	4,8	9,6	B4345*A5108M000
	1 500	51,6 × 105,7	150	130	18	6,5	12	B4345*A5158M000
	2 200	64,3 × 105,7	100	85	24	8,4	15	B4345*A5228M000 <sup>2)</sup>
	3 300	76,9 × 105,7	65	57	32	12	23	B4345*A5338M000 <sup>2)</sup>
	5 600	76,9 × 143,2	38	35	49	17	31	B4345*A5568M000 <sup>2)</sup>
	6 800	91,0 × 144,5	32	31	57	20	37	B4345*A5688M000 <sup>2)</sup>
	8 200	76,9 × 220,7	26	26	50	24	36	B4345*A5828M000 <sup>2)</sup>
	12 000	91,0 × 221,0	18	18	70	32	51	B4345*A5129M000 <sup>2)</sup>

Preferred types

1) \* "6" = for capacitors with ring clip/clamp mounting

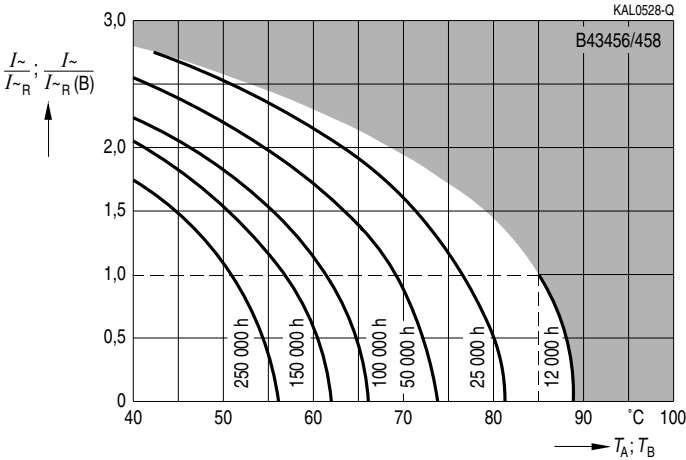
"8" = for capacitors with threaded stud

2) For 2-pad solution (types without threaded stud) and for low-inductance design, see page 128.

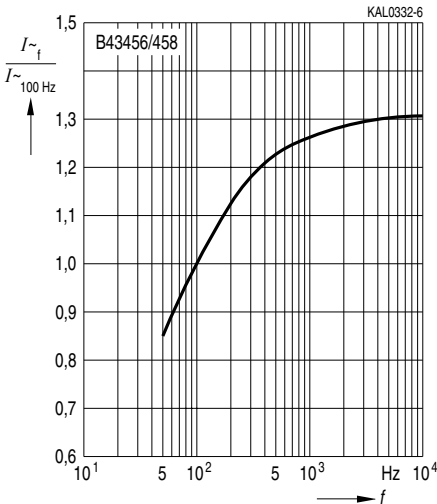


**Useful life**

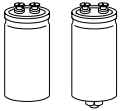
depending on ambient temperature  $T_A$  (for natural cooling) and versus temperature of case base  $T_B$  (for base cooling) under ripple current operating conditions<sup>1)</sup>



**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.

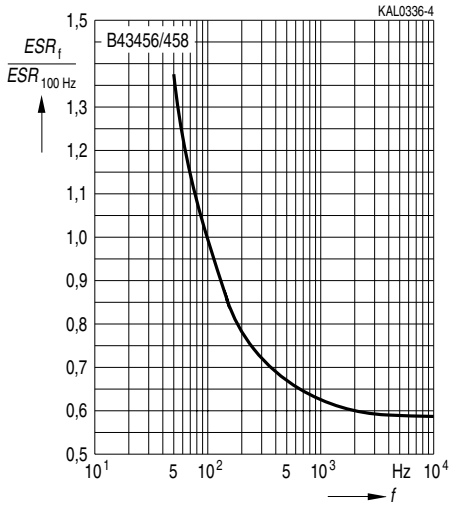


**B43456 / B43458**

**Compact – 85 °C**

### Frequency characteristics of ESR

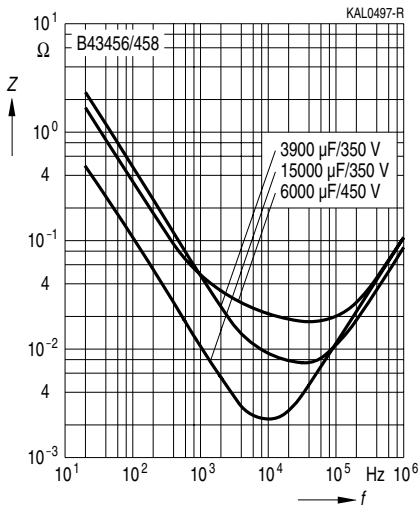
Typical behavior



### Impedance $Z$

versus frequency  $f$

Typical behavior at 20 °C





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