

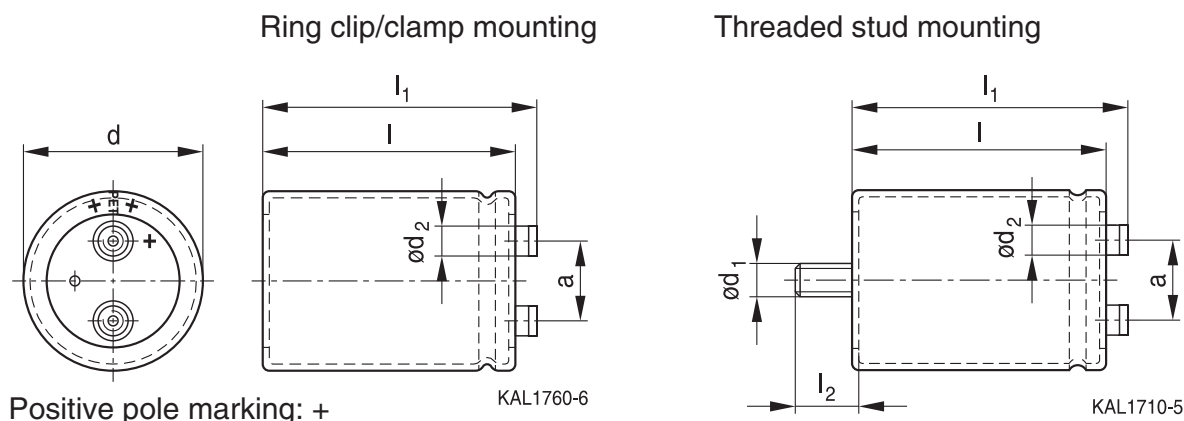
# **Aluminum Electrolytic Capacitors**

## Capacitors with screw terminals – General information

Date: December 2019

## Capacitors with screw terminals – general information

### 1 Dimensional drawings



For standard types with threaded stud the base is not insulated. Also refer to the mounting instructions in chapter "Capacitors with screw terminals – accessories".

Screw terminals with UNF threads are available upon request.

### 2 Dimensions and weights (Standard capacitors, without heat sink, M600)

#### 2.1 Capacitors with screw terminals series B43701, B43721

Ter- minal	Dimensions (mm) with insulating sleeve							Approx. weight (g)
	d	$l \pm 1$	$l_1 \pm 1$	$l_2 +0/-1$	$d_1$	$d_2 \text{ max.}$	$a +0.2/-0.4$	
M5	51.6 +0.5/-1	80.7	87.2	17	M12	10.2	22.2	220
M5	51.6 +0.5/-1	96.7	103.2	17	M12	10.2	22.2	250
M5	51.6 +0.5/-1	105.7	112.2	17	M12	10.2	22.2	280
M5	51.6 +0.5/-1	118.2	124.7	17	M12	10.2	22.2	320
M5	51.6 +0.5/-1	130.7	137.2	17	M12	10.2	22.2	350
M5	64.3 +0.5/-1	80.7	87.2	17	M12	13.2	28.5	370
M5	64.3 +0.5/-1	96.7	103.2	17	M12	13.2	28.5	400
M5	64.3 +0.5/-1	105.7	112.2	17	M12	13.2	28.5	440
M5	64.3 +0.5/-1	118.2	124.7	17	M12	13.2	28.5	510
M5	64.3 +0.5/-1	130.7	137.2	17	M12	13.2	28.5	600
M5	64.3 +0.5/-1	143.2	149.7	17	M12	13.2	28.5	630
M5	76.9 +0.5/-1	96.7	103.2	17	M12	13.2	31.7	570
M5	76.9 +0.5/-1	105.7	112.2	17	M12	13.2	31.7	620
M5	76.9 +0.5/-1	130.7	137.2	17	M12	13.2	31.7	800
M5	76.9 +0.5/-1	156.2	162.7	17	M12	13.2	31.7	920
M5	76.9 +0.5/-1	168.7	175.2	17	M12	13.2	31.7	1000
M5	76.9 +0.5/-1	190.7	197.2	17	M12	13.2	31.7	1150

Min. reach of screw = 9.5 mm

Tolerances of terminal thread respectively stud thread:

– Terminal thread M5: 6H

– Stud thread M12: 6g

## Capacitors with screw terminals – general information

### 2.2 Capacitors with screw terminals series

Ter- minal	Dimensions (mm) with insulating sleeve							Approx. weight (g)
	d	l ±1	l <sub>1</sub> ±1	l <sub>2</sub> +0/-1	d <sub>1</sub>	d <sub>2</sub> max.	a +0.2/-0.4	
M5	51.6 +0.5/-1	80.7	87.2	17	M12	10.2	22.2	220
M5	51.6 +0.5/-1	96.7	103.2	17	M12	10.2	22.2	250
M5	51.6 +0.5/-1	105.7	112.2	17	M12	10.2	22.2	280
M5	51.6 +0.5/-1	118.2	124.7	17	M12	10.2	22.2	320
M5	51.6 +0.5/-1	130.7	137.2	17	M12	10.2	22.2	350
M5	64.3 +0.5/-1	80.7	87.2	17	M12	13.2	28.5	370
M5	64.3 +0.5/-1	96.7	103.2	17	M12	13.2	28.5	400
M5	64.3 +0.5/-1	105.7	112.2	17	M12	13.2	28.5	440
M5	64.3 +0.5/-1	118.2	124.7	17	M12	13.2	28.5	510
M5	64.3 +0.5/-1	130.7	137.2	17	M12	13.2	28.5	600
M5	64.3 +0.5/-1	143.2	149.7	17	M12	13.2	28.5	630
M6	76.9 +0.5/-1	96.7	102.5	17	M12	17.7	31.7	570
M6	76.9 +0.5/-1	105.7	111.5	17	M12	17.7	31.7	620
M6	76.9 +0.5/-1	118.2	124.0	17	M12	17.7	31.7	700
M6	76.9 +0.5/-1	130.7	136.5	17	M12	17.7	31.7	800
M6	76.9 +0.5/-1	143.2	149.0	17	M12	17.7	31.7	840
M6	76.9 +0.5/-1	156.2	162.0	17	M12	17.7	31.7	920
M6	76.9 +0.5/-1	168.7	174.5	17	M12	17.7	31.7	1000
M6	76.9 +0.5/-1	190.7	196.5	17	M12	17.7	31.7	1150
M6	76.9 +0.5/-1	220.7	226.5	17	M12	17.7	31.7	1300
M6	90.0 +0.5/-1.5	97.0	102.3	17	M12	17.7	31.7	770
M6	90.0 +0.5/-1.5	120.0	125.3	17	M12	17.7	31.7	1000
M6	90.0 +0.5/-1.5	144.5	149.8	17	M12	17.7	31.7	1200
M6	90.0 +0.5/-1.5	170.0	175.3	17	M12	17.7	31.7	1400
M6	90.0 +0.5/-1.5	191.0	196.3	17	M12	17.7	31.7	1650
M6	90.0 +0.5/-1.5	197.0	202.3	17	M12	17.7	31.7	1700
M6	90.0 +0.5/-1.5	221.0	226.3	17	M12	17.7	31.7	1900

For low-inductance design the following deviation applies:

d = 64.3 mm: l<sub>1</sub> -0.7 mm

d = 90.0 mm: l<sub>1</sub> -1.7 mm

M5: Min. reach of screw = 9.5 mm

9 mm for low inductance design

M6: Min. reach of screw = 12 mm

9.5 mm for low inductance design

Tolerances of terminal thread respectively stud thread:

– Terminal thread M5 and M6: 6H

– Stud thread M12: 6g

## Capacitors with screw terminals – general information

### 3 Accessories

All accessories for connecting (screws M5 and M6) as well as for mounting the capacitors must be ordered separately. For details refer to chapter "Capacitors with screw terminals – accessories".

Item	Type
Screws M5 and M6	B44020
Ring clips	B44030
Clamps for capacitors with $d \geq 64.3$ mm	B44030
Insulating parts	B44020

### 4 Packing

Capacitor diameter d (mm)	Length l (mm)	Packing units (pcs.)
51.6	all	36
64.3	all	25
76.9	$\leq 168.7$	16
	$> 168.7$	12
90.0	all	9



For ecological reasons the packing is pure cardboard.

## Capacitors with screw terminals – general information

### 5 Special designs

#### 5.1 Design options

Design options	Identification in third block of ordering code	Remark
Standard	M600	Standard version without threaded stud: fully insulated with PET Standard version with threaded stud: insulated with PET sleeve, base not insulated
Low inductance (13 nH)	M603	For capacitors with diameter $d \geq 64.3$ mm
Heat sink mounting	M607	For capacitors with diameter $d \geq 64.3$ mm and without threaded stud
Insulated base	M608	For capacitors with threaded stud, fully insulated with PET sleeve and PP disk
PAPR terminal style	M650	Not for low inductance
PAPR with heat sink mounting	M657	For capacitors with diameter $d \geq 64.3$ mm and without threaded stud, not for low inductance
PAPR with insulated base	M658	For capacitors with threaded stud, fully insulated with PET sleeve and PP disk, not for low inductance

Version with low inductance (13 nH) in combination with insulated base (threaded stud) available upon request.

Please note that there are design options which might not be available for each series. For further information refer to series data sheets.

#### 5.2 Low-inductance design (M603)

Low-inductance aluminum electrolytic capacitors offer numerous advantages for frequency converter design:

- Voltage peaks caused by steep-edged pulses are significantly reduced.
- Power semiconductors of a lower voltage class can be used.
- Capacitor banks require fewer capacitors, which reduces the cost, weight and space requirements of frequency converters accordingly.

The low inductance of the aluminum electrolytic capacitor with screw terminals is the result of various design improvements.

Many of the data book types with diameter  $\geq 64.3$  mm can be ordered in low-inductance design with inductance approx.  $L = 13$  nH.

## Capacitors with screw terminals – general information

For low-inductance design the following deviation regarding case dimensions applies:

$d = 64.3 \text{ mm}$ :  $l_1 - 0.7 \text{ mm}$

$d = 90.0 \text{ mm}$ :  $l_1 - 1.7 \text{ mm}$

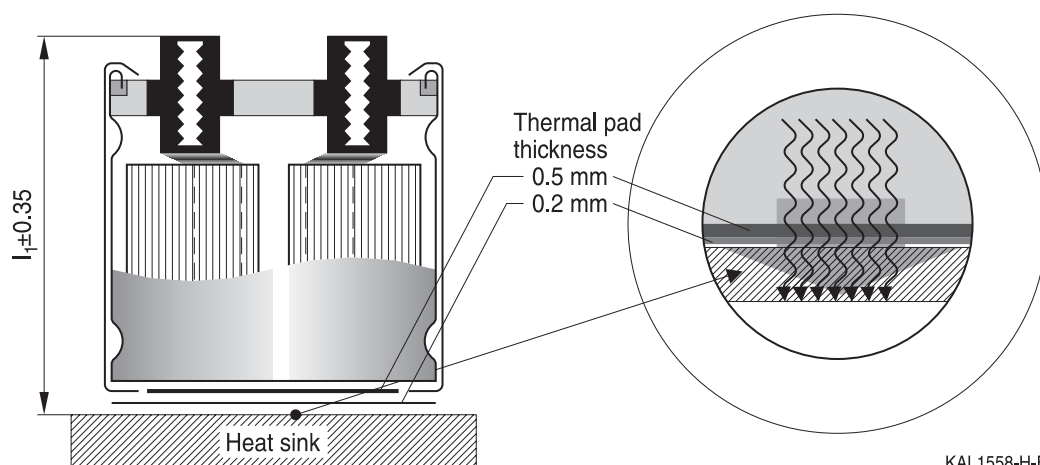
M5: Min. reach of screw = 9 mm

M6: Min. reach of screw = 9.5 mm

### 5.3 Capacitors with heat sink mounting (M607, M657)

As a large amount of heat is dissipated through the base of the case, the use of a heat sink connected to the capacitor base is the most efficient cooling method. For heat-sink mounting we offer a special optimized version of high-voltage capacitors with screw terminals in order to ensure an optimal heat transfer between the base of the case and the heat sink. The special design comprises:

- Two thermal pads at the base. The first one (thickness 0.5 mm) closes the air gap at the base in the area which is not covered by the insulating sleeve and the second one (thickness 0.2 mm) ensures the electrical insulation of the case.
- Minimized tolerance ( $\pm 0.35 \text{ mm}$ ) of the overall length  $l_1$  of the capacitor to avoid unwanted mechanical forces on the terminals particularly when several capacitors are mounted between heat sink and bus bar.
- Case with extra groove near the base for ring clamp mounting (recommended accessory B44030A0165-A0190B). The clamp ensures an optimal pressing of the case to the heat sink.
- Most of the high-voltage data book types without threaded stud and for diameters  $\geq 64.3 \text{ mm}$  can be ordered in heat-sink mounting design.



Please refer to chapter "General technical information, 5.2.2 Base cooling with heat sink". Regarding ripple current and useful life, please refer to chapter "General technical information, 5 Useful life".

## Capacitors with screw terminals – general information

Dimensions and weights for heat sink mounting:

Terminal	Dimensions (mm) with insulating sleeve					Approx. weight g
	d	$l \pm 1$	$l_1 \pm 0.35$	$d_2 \text{ max.}$	$a +0.2/-0.4$	
M5	64.3 +0.5/-1	80.7	86.3	13.2	28.5	370
M5	64.3 +0.5/-1	96.7	102.3	13.2	28.5	400
M5	64.3 +0.5/-1	105.7	111.3	13.2	28.5	440
M6	76.9 +0.5/-1	96.7	101.6	17.7	31.7	570
M6	76.9 +0.5/-1	105.7	110.6	17.7	31.7	620
M6	76.9 +0.5/-1	118.2	123.1	17.7	31.7	700
M6	90.0 +0.5/-1.5	97.0	101.4	17.7	31.7	770
M6	90.0 +0.5/-1.5	120.0	124.4	17.7	31.7	1000
M6	90.0 +0.5/-1.5	144.5	148.9	17.7	31.7	1200

M5: Min. reach of screw = 7.5 mm

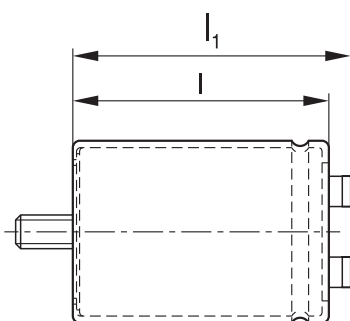
M6: Min. reach of screw = 10 mm

Tolerances of terminal thread M5 and M6: 6H

Dimensions for other sizes are available upon request.

### 5.4 Insulated base (M608, M658)

Length  $l$  and  $l_1$  increase by +0.5 mm for types with threaded stud and insulated base. All other dimensions of the capacitor are identical with those of standard capacitors. Please refer to the table "Dimensions and weights".



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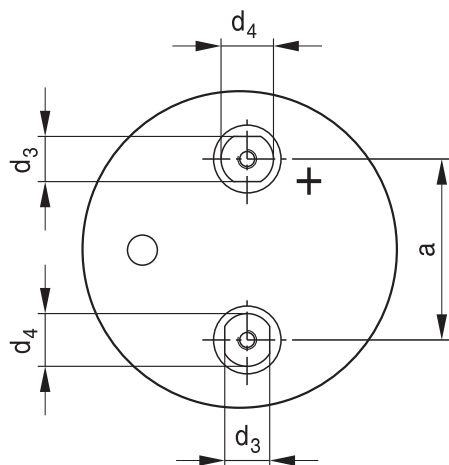
### 5.5 PAPER terminal style (M650, M657, M658)

An aluminum electrolytic capacitor is a polar component that needs strictly to be mounted under correct polarity. With our PAPER terminal style (**P**rotection **A**gainst **P**olarity **R**eversal) we offer an optional mechanical feature in addition to the visual polarity marking on the cover disk and the sleeve, which prevents from mounting in reverse polarity.

The non-circular shape of the terminals and their arrangement perpendicular to each other enables the user to definitely prevent wrong mounting with respect to polarity (Poka Yoke).

## Capacitors with screw terminals – general information

Dimensional drawing of PAPR terminal configuration:



KAL1317-3

Dimensions for PAPR terminal style (mm):

Capacitor diameter d	Terminal	$d_3 \pm 0.1$	$d_4 \pm 0.1$	$a + 0.2 / - 0.4$
51.6	M5	10	13	22.2
64.3	M5	13	15	28.5
76.9	M6	13	15	31.7
90.0	M6	13	15	31.7

M5: Min. reach of screw = 9.5 mm

M6: Min. reach of screw = 12 mm

Tolerances of terminal thread M5 and M6: 6H

All other dimensions of the capacitor such as diameter d, case length l and overall length  $l_1$  are identical with those of standard capacitors of this series. Please refer to the tables "Dimensions and weights" (standard types) on page 3 and "Dimensions and weights for heat sink mounting" (special designs) on page 7.