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Aluminum electrolytic capacitors

Capacitors with screw terminals

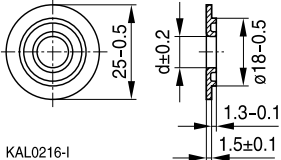
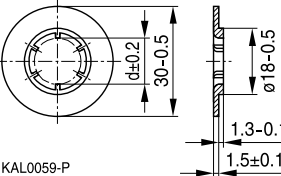
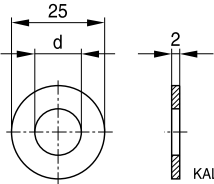
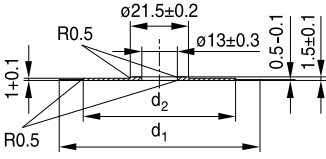
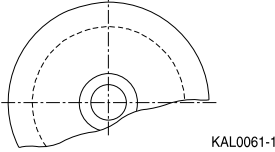
Series/Type: **B44020, B44030**

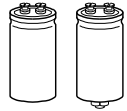
Date: November 2008

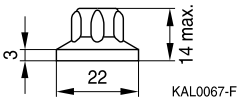
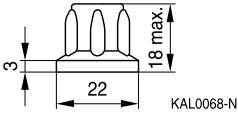
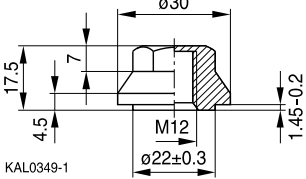
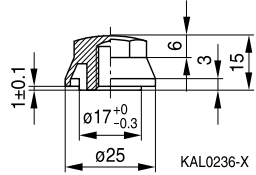
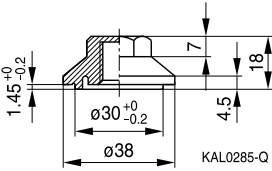
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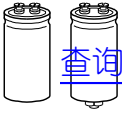


Accessories for capacitors with mounting stud on capacitor base

Capacitor diameter	Thread size	Dimensional drawing	Diameter d mm	Ordering code
Insulating plastic shoulder washer "P" similar to DIN 41331 specifications				
≤ 40 mm	M8	 <p>KAL0216-1</p>	8.4	B44020B0001B025
> 40 mm	M12	 <p>KAL0059-P</p>	12.5	B44020B0002B030
Insulating washer "N" made of laminated paper				
≤ 40 mm	M8	 <p>KAL0066-7</p>	8.4	B44020A0001B025
> 40 mm	M12		13	B44020A0002B025
Insulating washer made of Hostalen				
51.6 mm			$d_1 - 0.5 = 51$ $d_2 - 0.5 = 31$	B44020B0006B051
76.9 mm		 <p>KAL0061-1</p>	$d_1 - 0.5 = 76$ $d_2 - 0.5 = 56$	B44020B0006B076



Capacitor diameter	Thread size	Dimensional drawing	Ordering code
Plastic cap nut "V"			
≤ 40 mm	M8 width across flats 13 mm		B44020B0005B008
> 40 mm	M12 width across flats 17 mm		B44020A0005B012
Reinforced nylon cap nut			
> 40 mm	M12 width across flats 19 mm		B44020J0006B012
≤ 40 mm	M8 width across flats 17 mm		B44020J0006B008
> 40 mm	M12 width across flats 19 mm		B44020J0007B012

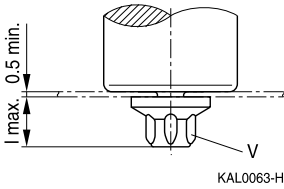


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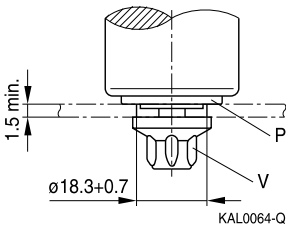
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Screw terminals – Accessories

Mounting instructions



Non-insulated mounting with cap nut

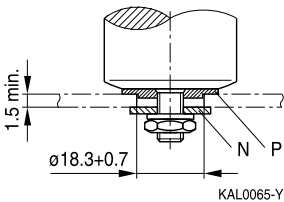


Insulated mounting with cap nut

Mounting hole diameter

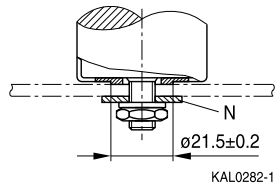
Insulated mounting with DIN 439 hex nut

$d \leq 76.9 \text{ mm}$

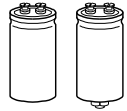


Mounting hole diameter

$d = 91 \text{ mm}$

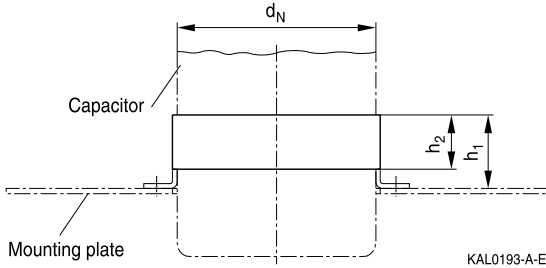


Mounting hole diameter

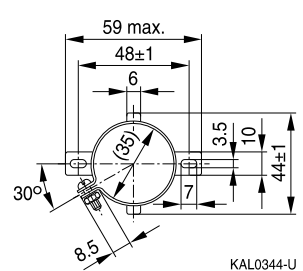
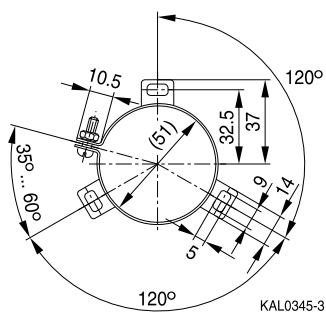


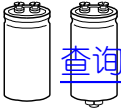
Ring clip mounting

Ring clips are primarily used for upright mounting of screw-terminal and photoflash capacitors. The ring clips are corrosion protected and are RoHS-compatible.



It is recommended to insert an additional insulating strip between capacitor and ring clip to avoid any risk of damage due to edges from the clip. The strip is included in delivery. For ordering code, see the following table. Attention must be paid to any relevant regulations (e.g. VDE, BSA or UL).

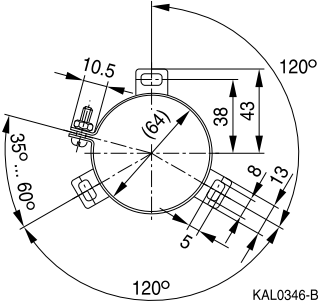
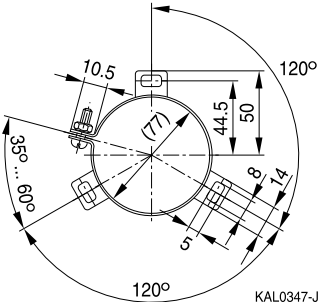
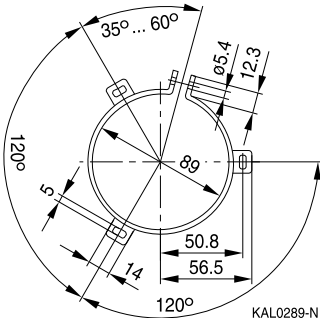
d_N	h_1 mm	h_2	Ring clip version	Ordering code with insulating strip
35	15	10	 <p>KAL0344-U</p>	B44030J0036B000 (insulating strip length: 230 mm)
50	22	15	 <p>KAL0345-3</p>	B44030J0051B000 (insulating strip length: 325 mm)

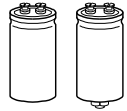


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Screw terminals – Accessories

d_N	h_1 mm	h_2	Ring clip version	Ordering code with insulating strip
65	29	19	 <p style="text-align: right;">KAL0346-B</p>	<p>B44030J0064B000</p> <p>(insulating strip length: 420 mm)</p>
75	29	19	 <p style="text-align: right;">KAL0347-J</p>	<p>B44030J0075B000</p> <p>(insulating strip length: 495 mm)</p>
90	29	19	 <p style="text-align: right;">KAL0289-N</p>	<p>B44030J0090B000</p> <p>(insulating strip length: 585 mm)</p>

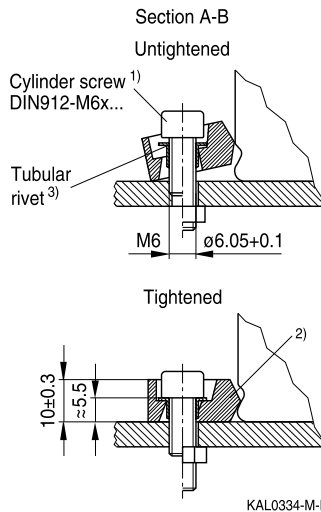
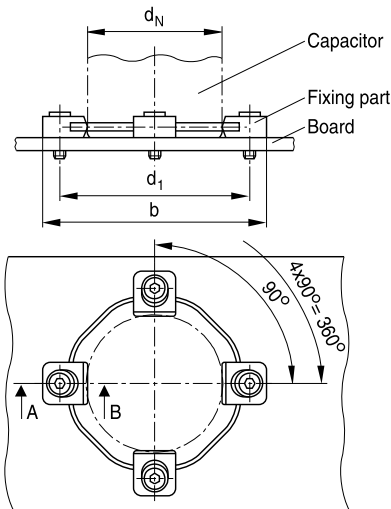


Clamp mounting

Screw-terminal capacitors without threaded stud and with a diameter ≥ 64.3 mm can also be mounted with ring clamps. Clamp mounting offers the following advantages:

- Optimum heat transfer between capacitor base and board due to pressure contact
- High vibration resistance
- Electrically insulated material

Dimensional drawing

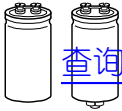


- 1) Length depends on application.
- 2) The screws have to be tightened uniformly and crosswise until the fixing part rests flatly on the board.
- 3) Tubular rivets included in delivery package.

Dimensions and ordering codes

Capacitor diameter d_N	$d_1 \pm 0.2$ mm	b mm	Ordering code
65 mm	87	104	B44030A0165B000
75 mm	99	116	B44030A0175B000
90 mm	112	130	B44030A0190B000

Screws are not included in the delivery package.



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Screw terminals – Accessories

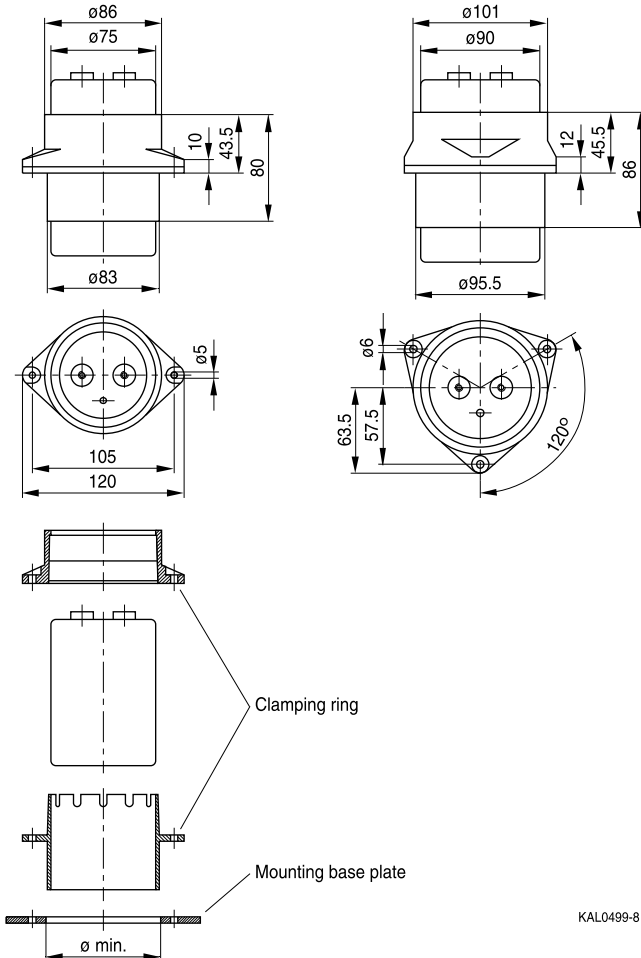
Mounting set (ring clamps)

- Protects the capacitor against tilt and the terminals from mechanical stress
- Fits for different capacitor length
- Electrically insulated clamping material

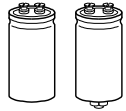
Dimensions and ordering codes

Capacitor diameter d_N	\varnothing_{\min}	Ordering code
75 mm	84 mm	B44030A0375B000
90 mm	96.5 mm	B44030A0390B000

Dimensional drawing



KAL0499-8



Cautions and warnings

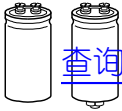
Personal safety

The electrolytes used by EPCOS have not only been optimized with a view to the intended application, but also with regard to health and environmental compatibility. They do not contain any solvents that are detrimental to health, e.g. dimethyl formamide (DMF) or dimethyl acetamide (DMAC).

Furthermore, part of the high-voltage electrolytes used by EPCOS are self-extinguishing. They contain flame-retarding substances which will quickly extinguish any flame that may have been ignited.

As far as possible, EPCOS does not use any dangerous chemicals or compounds to produce operating electrolytes. However, in exceptional cases, such materials must be used in order to achieve specific physical and electrical properties because no safe substitute materials are currently known. However, the amount of dangerous materials used in our products has been limited to an absolute minimum. Nevertheless, the following rules should be observed when handling Al electrolytic capacitors:

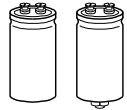
- Any escaping electrolyte should not come into contact with eyes or skin.
- If electrolyte does come into contact with the skin, wash the affected parts immediately with running water. If the eyes are affected, rinse them for 10 minutes with plenty of water. If symptoms persist, seek medical treatment.
- Avoid breathing in electrolyte vapor or mists. Workplaces and other affected areas should be well ventilated. Clothing that has been contaminated by electrolyte must be changed and rinsed in water.



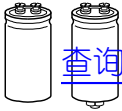
Product safety

The table below summarize the safety instructions that must be observed without fail. A detailed description can be found in the relevant sections of chapter "General technical information".

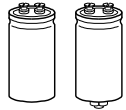
Topic	Safety information	Reference Chapter "General technical information"
Polarity	Make sure that polar capacitors are connected with the right polarity.	1 "Basic construction of aluminum electrolytic capacitors"
Reverse voltage	Voltages polarity classes should be prevented by connecting a diode.	3.1.6 "Reverse voltage"
Upper category temperature	Do not exceed the upper category temperatur.	7.2 "Maximum permissible operating temperature"
Maintenance	Make periodic inspections of the capacitors. Before the inspection, make sure that the power supply is turned off and carefully discharge the electricity of the capacitors. Do not apply any mechanical stress to the capacitor terminals.	10 "Maintenance"
Mounting position of screw terminal capacitors	Do not mount the capacitor with the terminals (safety vent) upside down.	11.1 "Mounting positions of capacitors with screw terminals"
Mounting of single-ended capacitors	The internal structure of single-ended capacitors might be damaged if excessive force is applied to the lead wires. Avoid any compressive, tensile or flexural stress. Do not move the capacitor after soldering to PC board. Do not pick up the PC board by the soldered capacitor. Do not insert the capacitor on the PC board with a hole space different to the lead space specified.	11.4 "Mounting considerations for single-ended capacitors"
Robustness of terminals	The following maximum tightening torques must not be exceeded when connecting screw terminals: M5: 2 Nm M6: 2.5 Nm	11.3 "Mounting torques"
Soldering	Do not exceed the specified time or temperature limits during soldering.	11.5 "Soldering"



Topic	Safety information	Reference Chapter "General technical information"
Soldering, cleaning agents	Do not allow halogenated hydrocarbons to come into contact with aluminum electrolytic capacitors.	11.6 "Cleaning agents"
Passive flammability	Avoid external energy, such as fire or electricity.	8.1 "Passive flammability"
Active flammability	Avoid overload of the capacitors.	8.2 "Active flammability"
		Reference Chapter "Capacitors with screw terminals"
Breakdown strength of insulating sleeves	Do not damage the insulating sleeve, especially when ring clips are used for mounting.	"Screw terminals - accessories"


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Screw terminals – Accessories
Symbols and terms

Symbol	English	German
C	Capacitance	Kapazität
C_R	Rated capacitance	Nennkapazität
C_S	Series capacitance	Serienkapazität
$C_{S,T}$	Series capacitance at temperature T	Serienkapazität bei Temperatur T
C_f	Capacitance at frequency f	Kapazität bei Frequenz f
d	Case diameter, nominal dimension	Gehäusedurchmesser, Nennmaß
d_{max}	Maximum case diameter	Maximaler Gehäusedurchmesser
ESL	Self-inductance	Eigeninduktivität
ESR	Equivalent series resistance	Ersatzserienwiderstand
ESR_f	Equivalent series resistance at frequency f	Ersatzserienwiderstand bei Frequenz f
ESR_T	Equivalent series resistance at temperature T	Ersatzserienwiderstand bei Temperatur T
f	Frequency	Frequenz
I	Current	Strom
I_{AC}	Alternating current (ripple current)	Wechselstrom
$I_{AC,rms}$	Root-mean-square value of alternating current	Wechselstrom, Effektivwert
$I_{AC,f}$	Ripple current at frequency f	Wechselstrom bei Frequenz f
$I_{AC,max}$	Maximum permissible ripple current	Maximal zulässiger Wechselstrom
$I_{AC,R}$	Rated ripple current	Nennwechselstrom
$I_{AC,R} (B)$	Rated ripple current for base cooling	Nennwechselstromstrom für Bodenkühlung
I_{leak}	Leakage current	Ableitstrom
$I_{leak,op}$	Operating leakage current	Ableitstrom bei Betrieb
l	Case length, nominal dimension	Gehäuselänge, Nennmaß
l_{max}	Maximum case length (without terminals and mounting stud)	Maximale Gehäuselänge (ohne Anschlüsse und Gewindebolzen)
R	Resistance	Widerstand
R_{ins}	Insulation resistance	Isolationswiderstand
R_{symm}	Balancing resistance	Symmetrierwiderstand
T	Temperature	Temperatur
ΔT	Temperature difference	Temperaturdifferenz
T_A	Ambient temperature	Umgebungstemperatur
T_C	Case temperature	Gehäusetemperatur
T_B	Capacitor base temperature	Temperatur des Becherbodens
t	Time	Zeit
Δt	Period	Zeitraum
t_b	Service life (operating hours)	Brauchbarkeitsdauer (Betriebszeit)



Symbol	English	German
V	Voltage	Spannung
V _F	Forming voltage	Formierspannung
V _{op}	Operating voltage	Betriebsspannung
V _R	Rated voltage, DC voltage	Nennspannung, Gleichspannung
V _S	Surge voltage	Spitzenspannung
X _C	Capacitive reactance	Kapazitiver Blindwiderstand
X _L	Inductive reactance	Induktiver Blindwiderstand
Z	Impedance	Scheinwiderstand
Z _T	Impedance at temperature T	Scheinwiderstand bei Temperatur T
tan δ	Dissipation factor	Verlustfaktor
λ	Failure rate	Ausfallrate
ε ₀	Absolute permittivity	Elektrische Feldkonstante
ε _r	Relative permittivity	Dielektrizitätszahl
ω	Angular velocity; 2 · π · f	Kreisfrequenz; 2 · π · f

Notes

All dimensions are given in mm.

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1. Some parts of this publication contain **statements about the suitability of our products for certain areas of application**. These statements are based on our knowledge of typical requirements that are often placed on our products in the areas of application concerned. We nevertheless expressly point out **that such statements cannot be regarded as binding statements about the suitability of our products for a particular customer application**. As a rule, EPCOS is either unfamiliar with individual customer applications or less familiar with them than the customers themselves. For these reasons, it is always ultimately incumbent on the customer to check and decide whether an EPCOS product with the properties described in the product specification is suitable for use in a particular customer application.
2. We also point out that **in individual cases, a malfunction of electronic components or failure before the end of their usual service life cannot be completely ruled out in the current state of the art, even if they are operated as specified**. In customer applications requiring a very high level of operational safety and especially in customer applications in which the malfunction or failure of an electronic component could endanger human life or health (e.g. in accident prevention or lifesaving systems), it must therefore be ensured by means of suitable design of the customer application or other action taken by the customer (e.g. installation of protective circuitry or redundancy) that no injury or damage is sustained by third parties in the event of malfunction or failure of an electronic component.
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