



Potentiometers Potentiometers

Cermet

CA

CE





9mm carbon potentiometers with plastic housing and protection type IP 5 (dust-proof).

Standard tapers available include linear, log and antilog. ACP can also study special requests.

Terminals are manufactured in tinned brass to guarantee better soldering and higher resistance to corrosion. They can be provided straight or crimped (with "snap in"), recommended to hold the potentiometer to the board prior to the soldering operation. SMD configuration can be available on request.

Thumbwheels and shafts can be provided either separately or already inserted in the potentiometer.

ACP's potentiometers can be adjusted from either side, both in the horizontal and the vertical adjustment types. There is a guide on the housing to simplify the manual adjusting operations.

Our potentiometers can be manufactured in a wide range of possibilities regarding:

- Resistance value.
- Tolerance.
- Tapers / variation laws.
- Pitch.
- Positioning of the wiper (the standard is at 50%).
- Housing and rotor color.
- Mechanical life.
- Pause effect (up to 20 detents available).
- Self-extinguishable plastic parts according to UL 94 V-0.

Applications

- Electronic appliances: white goods, brown goods, small household appliances.
- Heating and air conditioning equipment and thermostats.
- Automotive: dimmers, climate controls, lighting regulation (position adjustment and sensing).
- Measurement and test equipment. Timers and relays.
- Multimedia.



9mm Cermet potentiometers with plastic housing and protection type IP 5 (dust-proof). Self-extinguishable according to UL 94 V-0.

Standard taper is linear. Log, Antilog and other tapers are available on request. Laser trimming equipment in-house, allowing for very low tolerances.

Terminals are manufactured in tinned brass to guarantee better soldering and higher resistance to corrosion. They can be provided straight or crimped (with "snap in"), recommended to hold the potentiometer to the board prior to the soldering operation. SMD configuration can be available on request.

Thumbwheels and shafts can be provided either separately or already inserted in the potentiometer.

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- Pitch.
- Positioning of the wiper (the standard is at 50%).
- Housing and rotor color.
- Mechanical life.
- Pause effect (up to 20 detents available).

Applications

- Electronic appliances: white goods, brown goods, small household appliances, boilers, water heaters, etc.
- Heating and air conditioning equipment and thermostats.
- Automotive: dimmers, climate controls, lighting sensors.
- Industrial electronics: multimeters, oscilloscopes, test equipment, time relay.



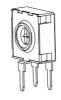
Models

All models shown here have the standard rotor for the 9mm series, the arrow (P). Models can be manufactured with any of the rotors listed on the rotor menu. The color of the housing or rotor can also be modified. SMD configuration can be available on request.



















CA9 H2,5 CE9 H2,5

CA9 H3,8 CE9 H3,8

CA9 HS3,8 CE9 HS3,8

CA9 H5 CE9 H5

CA9 V7,5 CE9 V7,5

CA9 V10 CE9 V10

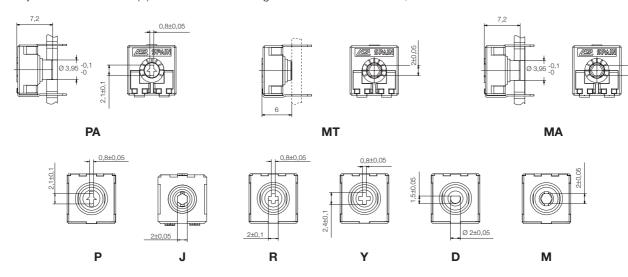
CA9 VR10 CE9 VR10

CA9 MAV10 CE9 MAV10

IAV10 CA9 MTV10 IAV10 CE9 MTV10

Rotors

The rotor by default is the arrow (P). Accessories are designed for the M and J rotors, unless otherwise stated.



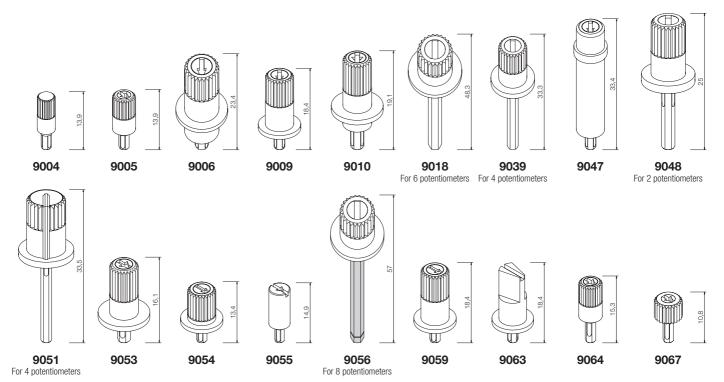
Shafts

• CA9. Shafts are available in different colors. On request, they can also be provided in accordance with UL 94 V-0.

Potentiometers can be supplied with shafts already inserted in. ACP can also study special shafts.

• **CE9.** Shafts in accordance with UL 94 V-0 are available in different colors.

Potentiometers can be supplied with shafts already inserted in. ACP can also study special shafts.



Thumbwheels

• CA9. Thumbwheels are available in different colors. On request, they can also be provided in accordance with UL 94 V-0.

Potentiometers can be supplied with thumbwheels already inserted in. ACP can also study special requests for thumbwheels.

• CE9. Thumbwheels in accordance with UL 94 V-0 are available in different colors.

Potentiometers can be supplied with thumbwheels already inserted in. ACP can also study special requests for thumbwheels.



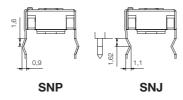






Terminals

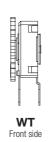
By default, terminals are always straight for the 9mm size, as shown on the "models" menu. ACP can provide crimped terminals (with "snap in"), to better hold the component to the board prior to soldering.

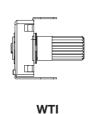


Adjustment possibilities

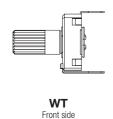
ACP's potentiometers can be adjusted through either the front side (WT) or the collector side (WTI):







Collector side

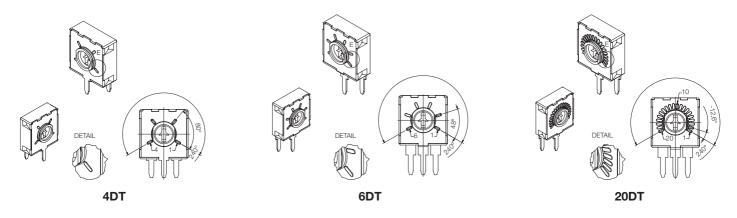


Potentiometers with detents

ACP's "detent" feature (DT) is specially suitable for control applications. Our patented design has improved the features of these potentiometers:

- Longer mechanical life: up to 10.000 cycles.
- More stable electrical parameters.
- Improved reliability and Contact Resistance Variation (CRV).
- Narrower tolerances for detent positioning.

Detents can be lighter or stronger, or even a combination of both feelings. Detents can be evenly distributed along the angle (standard), or tailored to match customers' request. They can also be combined with special tapers: constant value areas, different slopes, etc. Examples: 4, 6 and 20 detents -evenly distributed -.



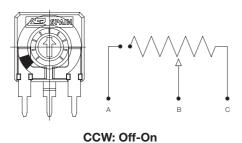


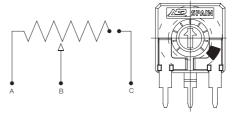
Potentiometers with cut track

The resistive element in this potentiometer has an area with very high resistive values, resulting in an open circuit. Recommended for lighting regulation.

With cut at the beginning of the track CCW: Off-On.

With cut at the end of track CW: On-Off. Other positions available on request.

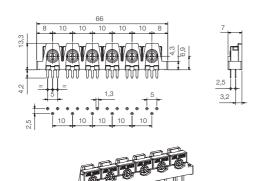




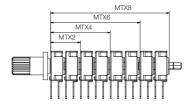
CW: On-Off

Assemblies of several potentiometers

STACKING: Set of 6 potentiometers in a plastic cover. It is used to speed up assembly and soldering process.



GANGED: Set of potentiometers in a row that allows for simultaneous adjustment of all of them through one shaft. Recommended potentiometer model is H2,5. MTX2 (2 potentiometers), MTX4 (4), MTX6 (6), MTX8 (8).



Packaging

Bulk packaging: Potentiometers are first bagged and then introduced in boxes:

Potentiometer model	+ Shaft or thumbwheel inserted	Pieces per box (130 x 60 x 90)	
	- (only potentiometers)	500 (models with * : 450)	
H2,5 - H3,8 - H5 - HS3,8 - V7,5 - V10 - VR10 MAV10* - MTV10*	9002	250	
	9004, 9005, 9006, 9009, 9010, 9018, 9039, 9041, 9047, 9048, 9051, 9056, 9059, 9053, 9054, 9055, 9060, 9061,9063, 9064, 9067	200	
MTX2	9048	150	
MTX4	9039, 9051	75	
MTX6	9018	50	
MTX8	9056	40	
STACKING	-	50	

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CA9. Electric Specifications

These are standard features; other specifications can always be studied on request.

Range of resistance values

 $\begin{array}{c} 100\Omega \leq Rn \leq 5M\Omega \\ 1~K\Omega~\dots~2,2~M\Omega \end{array}$ Log (B) Antilog (C)

100Ω ... 1MΩ ±20% >1MΩ ... 5MΩ ±30% Tolerance Special tolerances available on request Out of range: Rn> $5M\Omega$: +50%, -30%

Lin (A), Log (B), Antilog (C) Variation laws Other tapers available on request

Lin (A), Log (B), Antilog (C) $\leq 5^*10^{\cdot 3^*} Rn$ Minimum value 2Ω Residual resistance CRV - Contact Resistance Variation (dynamic) ≤3%Rn CRV - Contact Resistance Variation (static) ≤5%Rn

Lin (A) 0.15W Non Lin (B, C) 0,10W

Maximum power dissipation at 40° C.

Maximum voltage at 40°C 200VDC Non Lin (B, C) 150VDC

-25°C ... +70°C Operating temperature

100 Ω - 10K Ω → +200/ -300 ppm. >10K Ω - 5M Ω → +200/ -500 ppm Temperature coefficient



CA9. Mechanical Specifications

Resistive element	Carbon technology
Angle of rotation (mechanical)	240° ± 5°
Wiper position	Middle position: 50% ± 15°
Angle of rotation (electrical)	220° ± 20°
Max. stop torque	5 Ncm
Max. push/pull on rotor	40 N
Wiper torque	< 2 Ncm (0,4 3,5Ncm for pots. with detents)
Mechanical life	1000 cycles (more available on request) (up to 10.000 cycles for pots. with detents)



CA9. Test

Test // Conditions // Typical variation of Nominal Resistance

Damp heat // 500 h. at 40°C and 95% RH // +5%; -2%

Thermal cycles // 16h at 85°C, plus 2h at -25°C // $\pm 2,5$ %

Load life // 1.000 h. at 40°C // +0%; -5%

Mechanical life // 1000 cycles at 10 c.p.m. and at 23°C \pm 2°C // \pm 3%

Soldering effect // 2 seconds at 350°C // ±1%

Storage (3 years) // at 23°C ± 2°C // ±3%

For further information on tests, go to TESTS AND RELIABILITY on pages 10-11.



CE9. Electric Specifications

These are standard features; other specifications can always be studied on request.

Range of resistance values

 $\begin{array}{c} 100\Omega \leq \text{Rn} \leq 5\text{M}\Omega \\ 1 \text{ K}\Omega \ ... \ 2,2 \text{ M}\Omega \end{array}$ Log (B) Antilog (C)

Tolerance Special tolerances available on request

 $\begin{array}{cccc} 100\Omega \dots 1M\Omega & \pm 20\% \\ > 1M\Omega \dots 5M\Omega & \pm 30\% \end{array}$ Out of range: Rn> $5M\Omega$: +50%, -30%

Lin (A) Log (B), Antilog (C) and other tapers available on request Variation laws

Lin (A), Log (B), Antilog (C) $\leq 5^*10^{\cdot 3^*} Rn$ Minimum value 2Ω Residual resistance CRV - Contact Resistance Variation (dynamic) ≤3%Rn CRV - Contact Resistance Variation (static) ≤5%Rn Maximum power dissipation at 40° C. Lin (A) 0.5W Non Lin (B, C) See note 1 Maximum voltage at 40°C

200VDC Non Lin (B, C) See note 1

-40°C ... +125°C Operating temperature

Temperature coefficient ±100ppm.

Note 1: Value depends on taper, please, inquire



CE9. Mechanical Specifications

Resistive element	Cermet technology
Angle of rotation (mechanical)	240° ± 5°
Wiper position	Middle position: 50% ± 15°
Angle of rotation (electrical)	220° ± 20°
Max. stop torque	5 Ncm
Max. push/pull on rotor	40 N
Wiper torque	< 2 Ncm (0,4 3,5Ncm for pots. with detents)
Mechanical life	1000 cycles (more available on request) (up to 10.000 cycles for pots. with detents)



CE9. Test

Test // Conditions // Typical variation of Nominal Resistance

Damp heat // 500 h. at 40°C and 95% RH // ±2%

Thermal cycles // 16h at 90°C, plus 2h at -40°C // $\pm 2\%$

Load life // 1.000 h. at 70°C // $\pm 2\%$

Mechanical life // 1000 cycles at 10 c.p.m. and at 23°C \pm 2°C // \pm 2%

Soldering effect // 2 seconds at 350°C // ±1%

Storage (3 years) // at 23° C $\pm 2^{\circ}$ C // $\pm 3^{\circ}$

For further information on tests, go to TESTS AND RELIABILITY on pages 10-11.

- EXAMPLE: CA9MH2.5-10KA2020 SNP PI WT9005-BA-V0
- EXAMPLE: CE9MH2,5-10KA2020 SNP PI WT9005-BA-V0

Standard features							
Series	Rotor	Model	Packg	Ohm value	Taper	Tol	Life
1	2	3	4	5	6	7	8
CA9/CE9	М	H2,5		-10K	Α	2020	

	extra 10	eatures					
	Track	Detents	Snap in	Housing	Rotor	Wiper	Lin
	9	10	11	12	13	14	15
•			SNP			PI	

Assembled accessory				
Assembly	Ref#	Color	Flam.	
	16		17	
WT	9005	-BA	-VO	

Standard configuration

Dimensions: 9mm

• CA9: IP 5 (dust-proof)

• CE9: IP-5 (dust-proof) Self-extinguishable, to meet UL 94 V-0

Substrate: • CA9: Carbon technology

• CE9: Cermet

Color:

Protection:

• CA9: Blue housing with white rotor

• CE9: Brown housing with white rotor

Packaging: Bulk Wiper position: at 50% ±15°

Straight, without SNAP IN Terminals:

Marking: Resistive value marked on housing. Others on request

Customized products

A drawing is requested to order a customized product. The code assigned will include all special specifications.

Series, rotor, model and total resistive value are given before the special code: CA9PH2,5 10K CODE C00111.

1 - Series

• CA9	• CE9			

3 - Model and pitch

H2,5	H3,8	H5	HS3,8	V7,5			
V10	VR10	MAV10	MTV10				
HSMD and VSMD models can be available on request.							

2 - Rotors

P (standard) PA R Y D M MA MT J	P (standard)	PA	R	Υ	D	M	MA	MT	J
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4 - Packaging

	Through-hole	SMD models
Bulk	(blank) (1)	On request
T&R (Tape and reel)	(N.A.) (2)	On request

(1) If blank, bulk packaging is implied.

(2) N.A. - Not Available: Tape and Reel packaging is only available for SMD terminals.

5 - Resistance value

Taper:	Lin (A)	Log (B), Antilog (C)
Value Rn	100 Ω / 100 / 5 MΩ / 5M	1KΩ / 1K / 2,2 MΩ / 2M2
0.1	Little and a second	

Other resistive values available on request.

6 - Resistance law / taper

Lin - Linear	А
Log - Logarithmic	B (on request for CE)
Antilog - Antilogarithmic	C (on request for CE)
- Special tapers have codes assigned:	CODE YXXXXX

Please, indicate terminal position when ordering a special taper

7 - Tolerance

100 $\Omega \le Rn \le 1M\Omega$: ±20%	2020
1 MΩ ≤ Rn ≤ 5MΩ: ±30%	3030
For out of range values: Rn > 5M Ω , tol : +50% - 30%	5030
Special tolerances available: <5% 10%, etc.	

9 - Cut track

At beginning of track, CCW: Off - On	PCI
At end of track, CW: On - Off	PCF

11 - Crimped terminals (SNAP IN)

SNAP IN P	SNP
SNAP IN J	SNJ

8 - Operating life (cycles)

Standard (1000cycles)	(leave blank)
Long life: LV + the number of cycles. ex: LV10 for 10000 cycles ⁽¹⁾	LVXX: ex: LV10
(1) Others on request.	

10 - Detents (DT)

One detent at the beginning: CCW	DTI
One detent at the end: CW	DTF
X number of detents. Ex., 10	XDT: 10DT

Detents readily available: 3, 4, 6, 7, 9, 10, up to 20 –evenly distributed along $240^{\circ}\pm5^{\circ}$. Others on request.

12 - Housing color

,	CA9.	standard	is	blue
٠.	Uno.	stariuaru	10	DIUC

With other colors -see color chart below-, for example, red CJ-color, ex: CJ-RO

13 - Rotor color

Standard is white	
With other colors -see color chart below- for example red	RT-color: ex: RT-RO

14 - Wiper

Wiper position (Standard is at $50\% \pm 15^{\circ}$)	(leave blank)
Initial or CCW	PI
Final or CW	PF
Others: following clock positions; at 3hours: P3H	PXH, ex: P3H
Wiper torque (Standard: <2 Ncm)	(leave blank)
Low torque (< 1.5Ncm)	PGB
-	

15 - Linearity

Independent linearity controlled & below x%, for example, 3%: LN3%	LNx%; ex: LN3%
Absolute linearity controlled & below x%	LAx%

16 - Potentiometers with assembled accessories

Assembled from front side	WT
Assembled from collector side	WTI
Accessory Reference See list of shafts and thumbwheels available	XXXX Example: 9005
Color of shaft or thumbwheel	-YY Example, white: BA

17 - Flammability (according to UL 94 V-0)

CA9: Not self-extinguishable	(leave blank)
Self-extinguishable according to standard UL 94 (including all plastic parts of the potentiometer: rotor, housing and accessory. If only one part needs to be V0, please, inform)	-V0
CE9: All accessories assembled with cermet potentiometers will have the self-extinguishable property according to standard UL 94	-V0

For ordering spare accessories

Accessory reference - color- flammability. Ex. 9005-AZ-V0 is a blue self-extinguishable 9005 thumbwheel

XXXX-YY-__

For ordering special sets of potentiometers

STACKING	STK + (POTENTIOMETER CODE)	Example: STK+CA9MH2,5-10KA2020 (1)
GANGED	MTX + (number of potentiometers: 2, 4, 6, 8) + (POT. CODE + ASSEMBLED SHAFT CODE)	Example: MTX4+CA9PH2,5-10KA2020 WT9051-BA (1)

(1) Note: If not all potentiometers in the set are identical, please, order potentiometers separately and indicate assembly order.

Color chart for rotor, housing and accessories

Black (1)	NE	
White	BA	
Neutral	IN	
Transparent	TA	
Red	RO	
Green	VE	
Yellow	AM	
Blue	AZ	
Grey	GS	
Brown	MR	

(1) Black is not an option for housings.

DRAWINGS CA9 // CE9

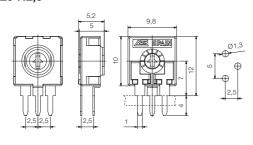
Tolerances 9 mm (in mm.):

<1	±0,1	
1<5	±0,3	
5	±0,5	

Model types. CA9 // CE9

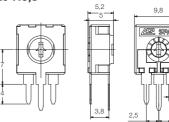
CA9 H2,5 // CE9 H2,5





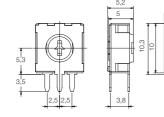
CA9 H3,8 // CE9 H3,8



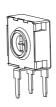


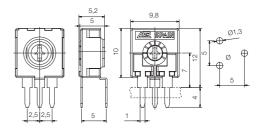
CA9 HS3,8 // CE9 HS3,8





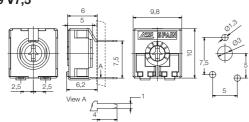
CA9 H5 // CE9 H5





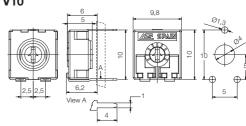
CA9 V7,5 // CE9 V7,5





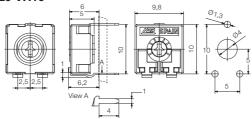
CA9 V10 // CE9 V10





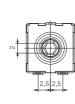
CA9 VR10 // CE9 VR10

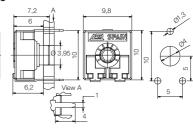




CA9 MAV10 // CE9 MAV10

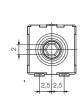


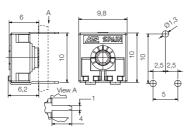




CA9 MTV10 // CE9 MTV10







Specifications on this catalogue are for reference only; they are subject to change without notice.

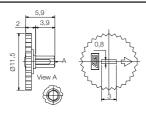
DRAWINGS CA9 // CE9

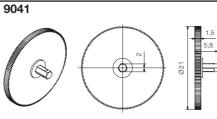
Tolerances 9 mm (in mm.):

<1	±0,1
1<5	±0,3
5	±0,5

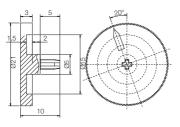
Thumbwheels. CA9 // CE9

9002

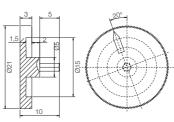








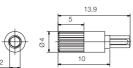




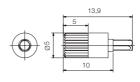
Shafts. CA9 // CE9

9004



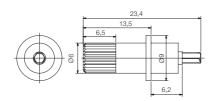




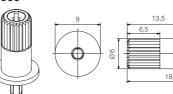


9006





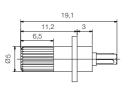
9009



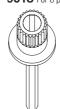
9010

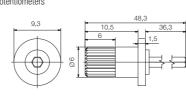




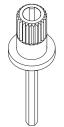


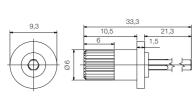
9018 For 6 potentiometers



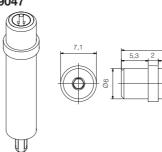


9039 For 4 potentiometers





9047



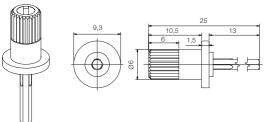
DRAWINGS CA9 // CE9

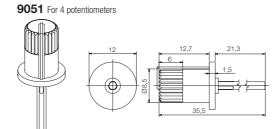
Tolerances 9 mm (in mm.):

<1	±0,1
1<5	±0,3
5	±0,5

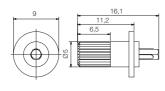
Shafts. CA9 // CE9

9048 For 2 potentiometers

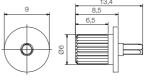




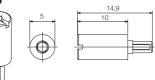




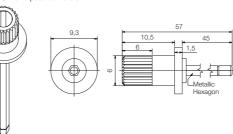


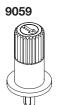


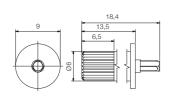
9055



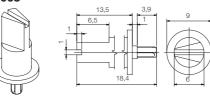
9056 For 8 potentiometers



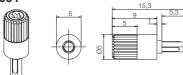








9064



9067





