





CARBON - CA14

14mm carbon potentiometers with plastic housing and Ingress Protection rating type IP 54 (high level of protection against dust and also against water splashing), according to IEC 60529. Plastic materials can be self-extinguishable according to UL 94 V-0 under request.

Through-hole and SMD configurations are available. Terminals and collector are normally manufactured in tinned brass, although versions with steel terminals are also available under request. Terminals for through-hole models can be provided straight or crimped, which helps hold the component to the PCB during soldering.

Tapers can be linear, log and antilog; special tapers can also be studied.

ACP's potentiometers can be adjusted from either the front or the back, both in the horizontal and the vertical adjustment types. Thumbwheels and shafts can be ordered either separately or already inserted in the potentiometer.

Potentiometers can be manufactured in a wide range of possibilities regarding:

- Resistance value.
- Tolerance.
- Tapers / variation laws.
- Pitch.
- Positioning of the wiper (standard is at 50% rotation).
- Housing and rotor color.
- Mechanical life.
- Click effect (up to 38 detents available).
- Self-extinguishable plastic parts according to UL 94 V-0.

Applications

14mm potentiometers are mainly used in control applications in different markets:

- Electronic household appliances, heating, ventilation and air conditioning (HVAC) equipment, thermostats.
- Automotive: HVAC controls, lighting regulation (position adjustment and sensing), dimmers, seat heating controls.
- Industrial electronics: multimeters, oscilloscopes, time relays, measurement and test equipment.

CERMET - CE14

14mm cermet potentiometers with plastic housing and Ingress Protection rating type IP 54 (high level of protection against dust and also against water splashing), according to IEC 60529. Plastic materials (housing and rotor) are self-extinguishable according to UL 94 V-0. ACP's cermet potentiometers have better thermal stability, allow for higher thermal dissipation and withstand higher temperatures than carbon potentiometers.

Through-hole and SMD configurations are available. Terminals and collector are manufactured in tinned brass, although versions with steel terminals are also available under request. Terminals for through-hole models can be provided straight or crimped, which helps hold the component to the PCB during soldering.

Tapers can be linear, log and antilog; special tapers can also be studied.

ACP's potentiometers can be adjusted from either the front or the back, both in the horizontal and the vertical adjustment types. Thumbwheels and shafts can be ordered either separately or already inserted in the potentiometer.

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.
- Click effect (up to 38 detents available).

Applications

14mm cermet potentiometers are used in applications where either the operating temperature is high, or where the applications requires product with excellent ohmic value stability:

- Electronic appliances: boilers, water heaters.
- Automotive: climate controls, position sensors.
- Industrial electronics: multimeters, oscilloscopes, time relays, measurement and test equipment.

CA14 R CE14 R HOW TO ORDER

EXAMPLE: CA14NV12,5-10KA2020 10DT SNP PI WT-14117-BA

EXAMPLE: CE14NV12,5-10KA2020 10DT SNP PI WT-14117-BA-V0

| Standard features Ex | | | | | | Extra fe | features Assembled | | | | | oled acc | essory | | | |
|--|---|---|---------------|--|----------------------------------|---|--|---|---|---|--|----------------------------|---|--------------------|---|---|
| Series Rotor Mo | odel Packg. (| Ohm value | Taper | Tol. | Life | Track | Detents | Snap in | Housing | Rotor | Wiper | Lin. | Assembly | Ref # | Color | Flam. |
| 1 2 | 3 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | | 16 | | |
| CA14/CE14 N H2 | 2,5 | - 10K | Α | 2020 | | | 10DT | SNP | | | PI | | WT | 14117 | -BA | -V0 |
| andard configuration | n: | CA14 | Throug | h-hole | | | | CA1 | 4 SMD | | | (| E14 Thro | ugh-ho | e and S | MD |
| mensions: | | | | | | | | 14 | 4mm | | | | | | | |
| rotection: | | | | | | | | | dust-proo | | | | | | | |
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| ackaging: | ' | Dide Hous | 31119 1 1 | VIIIC TOLC | ,ı | | | | Bulk | 10101 | | | Brownino | using i v | VI III C T O I C | |
| /iper position: | | | | | | | | |)% ±15° | | | | | | | |
| erminals: | | | | | | | Stı | | thout crim | ping. | | | | | | |
| larking: | | | | | | Resistive | | | n housing. | | on reques | t. | | | | |
| special specifications. - Series CA14 CE14 | Example: CA | .14PH2,5 | -10K C | ODE COO |)111. | | _ | 11 - Term SNAP IN | | | | | | | | SNP |
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| | G r | r\ IVI | IN | | - 1 | ^ | _ | · | <u>'</u> | iai, IFA | , WHELE A | ν 15 tip ii | Si igti i (dilder i | equest) | 117 | SH |
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| , | | | | | | VSMD | | 12 - Hou Color: For | | er than s | tandard: -9 | See color | chart below | r- C. | -color, ex | red: C |
| , , | V15) CFF | | - | | VOIVID | VOIVID | | | | ici tilaii 3 | taridara. C | | Oriait bolow | | 00101, 02 | ., 100. 0 |
| HSML | O (Under requ | uest, not r | eadily a | vailable) | | | | 13 - Roto | | er than s | tandard: -9 | See color | chart below | , RT. | color; ex. | hlue: F |
| - Packaging | | igh-hole | | 8 | MD mo | | | | | | | | using and | | 00.01, 07. | , 5,000, 1 |
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| If blook, bulk packaging in implied | , | | and Rool pr | advaging in a | T&R1 | | ' | f only roto | r: RT-V0 | nly the ho | using need | s to be \ | /0, then CJ- | V0. | C. | |
| | , | | and Reel pa | ackaging is o | | | inals. | f only roto 14 - Wip | r: RT-V0 er | | | | /0, then CJ- | V0. | | J-V0, R |
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| - Resistance value 0Ω 200Ω 220Ω 250Ω 47 00 200 220 250 4 The resistive values available on resistive values available on resistive values available on resistance law / tall tall tall tall tall tall tall ta | 0Ω 500Ω 1KG 70 500 1KG roper les assigned: +50 cycles. ex: LV ircuit. of track, fully | 2 2KΩ 2 2KΩ 3 2KΩ 4 2K 5030 | 500KΩ 500K | 1MΩ 2h 1M 2 A B C COODE YY ±10% 1010 S. (others on | MΩ 2M22 M 2M22 WXXX request) L | ±5% (leave blar | MΩ 1 1 1 1 1 1 1 1 1 | f only roto 14 - Wip Wiper po Initial or C Tinal or C Others: fc Wiper to Low torqu 15 - Line Not contr Independe Absolute Other feature Assemble Accessor See list of Color of s Non self-e: JL 94 (-Vo For order | r: RT-V0 er position (S CCW W collowing c rque (Sta Lue, < 1.5N earity colled ent linearity c is could be av entiometr ed from co y Referen f shafts ar shaft or th xtinguishat 0 in box 17 ring spai | controlled controlled aliable on remainal si conditions and thumbumbumbumbumbumbumbumbumbumbumbumbumbu | 50% ± 250 | 5°) 3 hours for dete | : P3H ents: <3.5) xample, 3%: essories | LN3% | (leave | J-V0, R e blank PI PF ex: P3I e blank PGB ac blank TTI XXX 14111 e, white blank) V0 |
| - Resistance value 00 2000 2200 2500 47 00 200 220 250 4 The resistive values available on resistive values available on resistive values available on resistive values available on resistance law / tain - Linear 10 - Linear 10 - Logarithmic 11 - Antilogarithmic 12 - Antilogarithmic 13 - Antilogarithmic 14 - Antilogarithmic 15 - Coperating Life (Cycerandard (1.000 cycles) 16 - Cut Track - Open cipen circuit at beginning 17 - Cut Track - Open cipen circuit at end of trace | 0Ω 500Ω 1KG 70 500 1KG roper les assigned: +50 cycles. ex: LV ircuit. of track, fully | 2 2KΩ 2 2KΩ 3 2KΩ 4 2K 5030 | 500KΩ 500K | 1MΩ 2h 1M 2 A B C COODE YY ±10% 1010 S. (others on | MΩ 2M22 MΩ 2M22 MΩ 2M22 CI | ±5% (leave blar | MΩ 1 1 1 1 1 1 1 1 1 | f only roto 14 - Wip Wiper po nitial or C Final or C Others: fc Wiper to Low torqu 15 - Line Not contr ndepende Absolute Other feature 16 - Pote Assemble Accessor See list of Color of s Non self-e Accessor Accessor | r: RT-V0 er sosition (S CCW c) | controller | 50% ± - titions; at titions; | 5°) 3 hours for dete | : P3H ents: <3.5) xample, 3%: essories | -YY dard 2.) | (leaver PXH, (leaver PXH, (leaver PXH, (leaver PXH, PXH, PXH, PXH, PXH, PXH, PXH, PXH, | PF ex: P3 e blank PGB e blank ex: LN: Ax% |
| - Resistance value 100 200 2200 2500 47 100 200 220 250 4 100 200 220 250 4 100 200 220 250 4 100 200 220 250 4 100 200 220 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 4 100 200 250 3030 100 200 250 250 4 100 200 250 4 100 200 250 250 4 100 200 250 4 100 200 250 250 4 100 200 250 4 100 200 250 250 4 100 250 250 4 100 250 250 4 100 250 250 4 100 250 250 4 100 250 250 250 4 100 250 250 250 4 100 250 250 250 250 4 100 250 250 250 250 250 250 250 250 250 2 | 0Ω 500Ω 1KG 70 500 1KG roper les assigned: +50 cycles. ex: LV- ircuit. of track, fully CW | 2 2KΩ 2 2KΩ 3 2KΩ 4 2K 5030 | 500KΩ 500K | 1MΩ 2M 1M 2 A B C COODE Y ±10% 1010 S. (others on | MΩ 2M22 MΩ 2M22 MΩ 2M22 CI | ±5% (leave blar | MΩ 1 1 1 1 1 1 1 1 1 | f only roto 14 - Wip Wiper po nitial or C Tinal or C Tinal or C Others: fc Wiper to Low torqu 15 - Line Not contr ndepende Absolute Other feature 16 - Pote Accessor See list of Color of s Non self-e: JL 94 (-VO For order Accessor Ex. 14117 | r: RT-V0 er sosition (S CCW c) | controlled | 50% ± 1 50% ± 2 50% ± 2 50% ± 2 50% ± 2 50% ± 2 50% ± 2 50% ± 2 50% ± 2 60% | 3 hours for dete | : P3H ents: <3.5) xample, 3%: essories ding to stand please, note | -YY dard 2.) | (leaver PXH, (leaver PXH, (leaver PXH, (leaver PXH, PXH, PXH, PXH, PXH, PXH, PXH, PXH, | PF ex: P3 ee blank PGB ee blank ex: LN Ax% TTI XXX e: 1411 e, white blank) V0 |

X number of detents

Special detents are available on request: If you need to assign a voltage value to each detent, please inquire.

XDT: 10DT

NE

ВА

(1) black is not an option for housings.

IN

RO

VΕ

AM

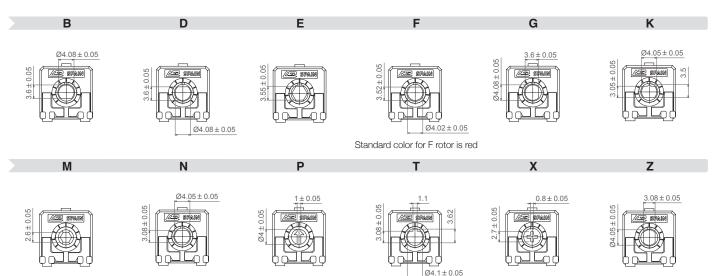
ΑZ

GS

MR

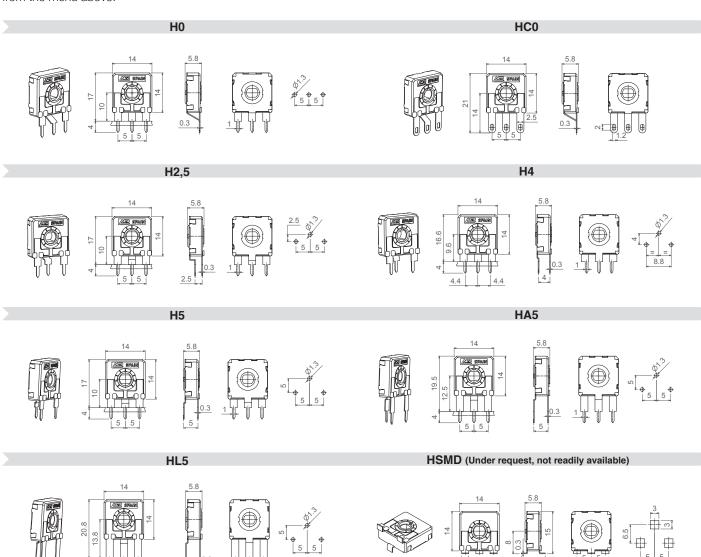
TA

Rotors are drawn in their standard positioning, 50% of rotation. Alternative delivery positioning can be requested. Accessories in this catalogue are designed for N, Z and T rotors, unless otherwise stated.

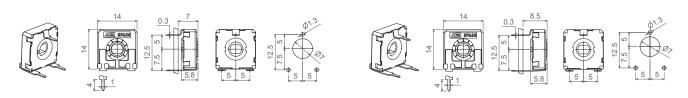


Models

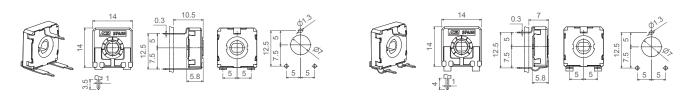
All models shown here have the most common rotor for 14mm potentiometers: the N rotor. Different rotors are available from the menu above.



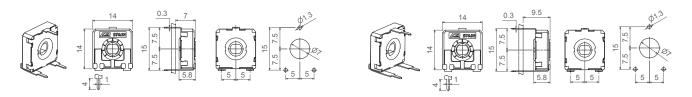
V12,5 VA12,5



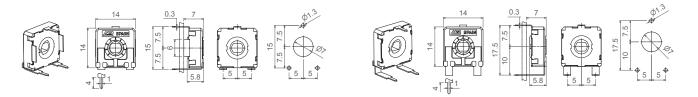
VR12,5 VL12,5



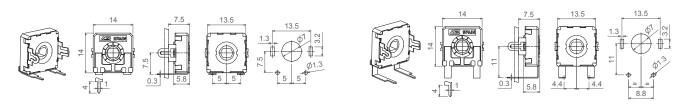
VJ15 V15



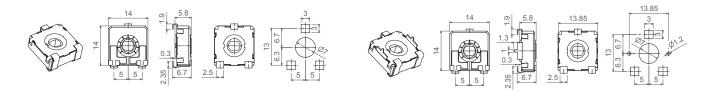
V17,5 V15...CFF



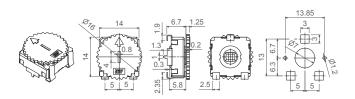
VD7,5 VD11



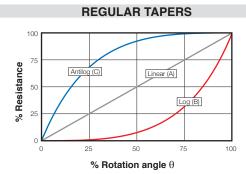
VSMD VSMD...CY

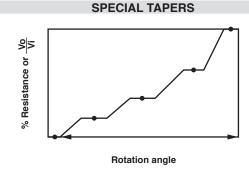


VSMD...CY WT-14003



The standard taper is linear (A). Log (B) and Antilog (C) tapers are also available, as well as special tapers according to customer's specifications. For example, a special taper can be matched with a potentiometer with detents (click effect), to guarantee a value in a specific position – see "detents" section.-





Potentiometers with cut track

The cut track is an area with very high resistive value, resulting in an open circuit. It is widely used in lighting applications.

Mechanical life with cut track needs to be confirmed.

PCI = Cut at initial position, when the potentiometer is turned fully counter clockwise.

PCF = Cut at final position, when the potentiometer is turned fully clockwise.

Other positions are available on request.

PCI PCF







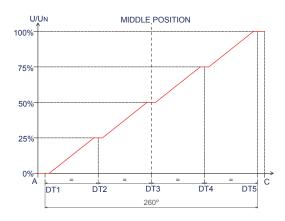


Potentiometers with detents

ACP's patented detent (DT) feature is especially suitable for control applications where the end user will turn a knob inserted in the potentiometer. Detents can be used to add a click feeling to the turning of the potentiometer or to control the position in which the wiper is placed, assuring a particular output value with a narrow tolerance.

Detents can be light or strong, or even a combination of different feelings. They 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, open circuit zone, different slopes, etc. One common example is a potentiometer with detents and matching non-overlapping voltage values in specific angular positions used to feed in a voltage value to a microprocessor:

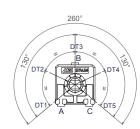
Example of 5DT with control of value in each DT.





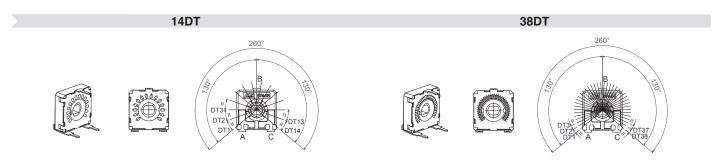








Examples of some potentiometers with detents:



| Number of standard detents (evenly distributed) already available. Other configurations are available under request. | 1 (Initial, final or central), 3, 4, 5, 6, 7, 8, 9, 10, 13, 14, 17, 22, 27, 38. |
|---|---|
| Maximum number of detents for feeling only | 38 |
| Maximum number of detents when the voltage value in each detent is controlled and non-overlapping. | 14 |

Our patented design with two wipers has improved the performance of these potentiometers, giving them more stable electrical parameters, improved reliability and Contact Resistance Variation (CRV) and narrower tolerances for detent positioning.

For potentiometers with detents, mechanical life is also 1.000 cycles, if no additional cycles are mentioned. Up to 10.000 cycles are available. Please, indicate the number of cycles needed with LV (number of cycles), for example: LV10, for 10.000 cycles.

Terminals

By default, terminals are always straight, as shown on the "models" section. ACP can provide crimped terminals (with snap in, "SNP" or "SNR") to better hold the component to the PCB during the soldering operation.

SNP SNR



R1.5

Also, there is an option of having shorter terminal tips:

| Standard Terminal | Shorter terminal, for V12,5 | Shorter terminal, TPXX (under request) |
|-------------------|-----------------------------|--|
| | , | |
| | | |
| | | |
| | | |
| \$ <u></u> | SINTY | \$EVTV |

Possibilities for insertion

Accessories can be mounted on potentiometers through either the front side (WT) or the collector side (WTI). For the specific angular position of shafts with planes, a drawing with the exact position is requested.

| WT Front side | WTI Collector side | WT Front side | WTI Collector side |
|---------------|--------------------|---------------|--------------------|
| _ | _ | | |
| | | | |
| | | 7 | 7] |

Shafts are available in different colors (color chart in "how to order" section) and with self-extinguishable property, according to UL 94 V-0, under request. ACP can study special shaft designs.

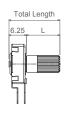
Shafts can be sold separately or delivered already mounted on the potentiometer at ACP.

When a shaft is mounted, the distance from the top of the potentiometer to the top of the shaft is marked with "L" in the table below, as shown in the drawings:

H potentiometer + shaft

V potentiometer + shaft

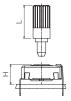










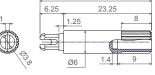


| Shaft | 14042 | 14065 (For E rotor) | 14117 | 14056 | 14081 | 14187 | 14251 | 14067 | 14008 | 14015 | 14066 | 14084 | 14250 | 14072 | 14073 |
|-------------|-------|------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| L Dimension | 7.05 | 11.50 | 11.70 | 12.25 | 18.25 | 18.75 | 18.75 | 27.75 | 23.25 | 23.25 | 23.50 | 23.50 | 25.00 | 31.75 | 38.50 |

14008 14015



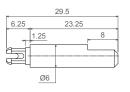














14042

14056

















14065 (Designed for E rotor)

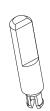
14066



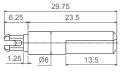












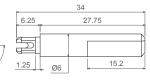


14067

14072



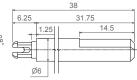














14073

14081

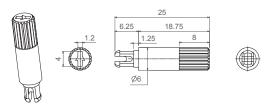
14084

14117

14187

14250

14251



Thumbwheel

6.25

1.25

18.75

Thumbwheels are available in different colors (color chart in "how to order" section) and with self-extinguishable property according to UL 94 V-0, under request.

Thumbwheels can be mounted on the potentiometers at ACP or sold separately. ACP can study special thumbwheel designs.

14003

6.25

1.25

Ø6

Bulk packaging:

| Potentiometer model | With shaft or thumbwheel inserted? | Pieces per small box (150 x 100 x 70) | Pieces per bigger box (250 x 150 x 70, CG on description) | | |
|--|---|---------------------------------------|--|--|--|
| H2.5 - H4 - H5- HA5- HL5- H0 | None, only potentiometers. | 200 150 for models with* | 700 600 for VJ15 - V17,5 - VD7,5 500 for VD11 | | |
| HC0 - V12,5 - V15 - VA12,5 VL12,5 - VJ15 - V17,5* | 14003, 14117, 14042, 14056, 14065 | 100 | 400 350 for models with* | | |
| VD11* - VD7,5* - VR12,5 | 14008, 14015, 14066, 14067, 14072, 14073, 14081, 14084, 14187, 14250. | 75 | To be determined. | | |

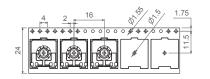
For models with * and an inserted accessory, please, inquire about the quantity per box in that case. Optional box 140x140x70 is available on request.

Tape & Reel packaging:

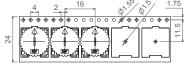
| | With thumbwheel inserted? | 13" Reel (Standard), with 24mm width tape | 15" Reel, with 24mm width tape |
|-----------|----------------------------|---|---|
| VSMD | None, only potentiometers. | 500 pcs per reel, 16mm step between cavities. | 800 pcs per reel, 16mm step between cavities. |
| VSIVID | 14003 | 450 pcs per reel, 16mm step between cavities. | To be determined. |
| VSMD CY | None, only potentiometers. | 350 pcs per reel, 20mm step between cavities. | 500 pcs per reel, 20mm step between cavities. |
| VSIVID OT | 14003 | 350 pcs per reel, 20mm step between cavities. | To be determined. |
| HSMD | | To be determined | To be determined. |

The 13" reel is the standard. For the 15" reel, T&R15 is added to the description.

VSMD-T&R VSMD-T&R...WT-14003





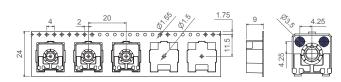


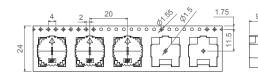




VSMD-T&R ... CY

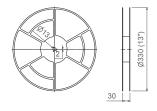
VSMD-T&R...CY WT-14003

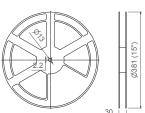






13" Reel 15" Reel







These are standard features; other specifications and out of range values can be studied on request.

| | CA14 Through-hole | CA14 SMD | CE14 Through-hole and SMD | | |
|--|---|---|--|--|----------------------|
| Range of resistance values* Lin (A) Log (B) Antilog (C) | 100Ω ≤ Rn ≤ 5MΩ 1 KΩ ≤ Rn ≤ 2M2Ω | 100Ω ≤ Rn ≤ 1MΩ 1 KΩ ≤ Rn ≤ 1 MΩ | 100Ω ≤ Rn ≤ 5MΩ 1 KΩ ≤ Rn ≤ 2M2Ω | | |
| Tolerance* $ \begin{array}{l} \text{Rn} < 100\Omega \text{:} \\ 100\Omega \leq \text{Rn} \leq 100\text{K}\Omega \\ 100\text{K} < \text{Rn} \leq 1\text{M}\Omega \text{:} \\ 1\text{M}\Omega < \text{Rn} \leq 5\text{M}\Omega \text{:} \\ \text{Rn} > 5\text{M}\Omega \text{:} \\ \end{array} $ | 1MΩ: ±20% ±40% | | ±20% ±20% ±30% | | |
| Variation laws | Lin (A), | Log (B), Antilog (C). Other tapers available or | n request | | |
| Residual resistance | Rn ≤ 400Ω ≤ 2Ω; Rr | n > 400Ω 5*10-3* Rn | ≤2Ω | | |
| CRV - Contact Resistance Variation (dynamic) | | Lin (A) Electrical Angle 245°±20° ≤ 3%Rn. Other tapers, please inquire | | | |
| CRV - Contact Resistance Variation (static) | | Lin (A) Electrical Angle 245°±20° ≤ 5%Rn. Other tapers, please inquire | | | |
| Maximum power dissipation** Lin (A) Log (B), Antilog (C) | at 5 0.2 0.1 | at 70° C. 0.7W 0.30W | | | |
| Maximum voltage Lin (A) Log (B), Antilog (C) | | | | | |
| Operating temperature | -25°C +70°C (up | -40°C +90°C (+125°C on request) | | | |
| Temperature coefficient $100\Omega \leq Rn \leq 10K\Omega$ $10K\Omega < Rn \leq 5M\Omega$ | $100\Omega \le \text{Rn} \le 10\text{K}\Omega$ +200/ -300 ppm | | $Rn \le 10K\Omega$ +200/ -300 ppm +200/ -500 ppm | | ±100 ppm ±100 ppm |

^{*} Out of range ohm values and tolerances are available on request, please, inquire.

Mechanical Specifications

| | CA14 Through-hole | CA14 SMD | CE14 Through-hole and SMD | | | | | | | |
|----------------------------------|--|-------------------|---------------------------|--|--|--|--|--|--|--|
| Resistive element | Carbon technology | Carbon technology | Cermet | | | | | | | |
| Angle of rotation (mechanical) | | 265° ± 5° | - | | | | | | | |
| Angle of rotation (electrical) | | 245° ± 20° | | | | | | | | |
| Wiper standard delivery position | 50% ± 15° | | | | | | | | | |
| Max. stop torque | 10 Ncm | | | | | | | | | |
| Max. push/pull on rotor | 50 N | | | | | | | | | |
| Wiper torque* | <2.5 Ncm Potentiometers with detents: <3.5 Ncm | | | | | | | | | |
| Mechanical life | 1.000 cycles (many more available on request, please, inquire) | | | | | | | | | |

^{*} Stronger or softer torque feeling is available on request.



The following typical test results (with 95% confidence) are given at 23°C ±2°C and 50% ±25% RH.

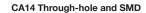
CA14 Through-hole and SMD

CE14 Through-hole and SMD

| | Test conditions | Typical variation of Rn | Test conditions | Typical variation of Rn |
|-------------------|--|-------------------------|--|-------------------------|
| Damp heat | 500 h. at 40°C and 95% RH | +5%, -2% | 500 h. at 40°C and 95% RH | ±2% |
| Thermal cycles | 16 h at 85°C, plus 2 h at -25°C | ±2.5% | 16 h at 90°C, plus 2 h at -40°C | ±2% |
| Load life | 1.000 h. at 50°C | +0%; -5% | 1.000 h. at 70°C | ±2% |
| Mechanical life | 1.000 cycles at 10 c.p.m. and at 23°C ± 2°C | ±3% | 1.000 cycles at 10 c.p.m. and at 23°C ± 2°C | ±2% |
| Storage (3 years) | 3 years at 23°C ± 2°C | ±3% | 3 years at 23°C ± 2°C | ±1% |

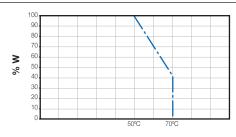
^{**} Dissipation of special tapers will vary, please, inquire.

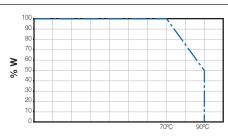




CE14 Through-hole and SMD

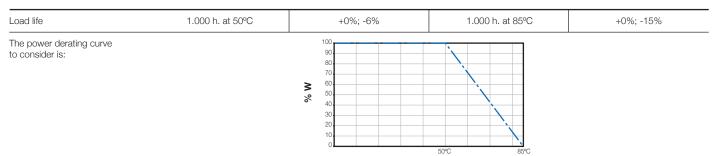
Power derating curve:





For temperatures out of range

The normal operation temperature for a carbon ACP potentiometer is -25°C to +70°C. When the temperature goes up to 85°C, the following variations should be observed:



Representation of the typical variation of nominal resistance (with 95% confidence) throughout the ohm value range:

