

15 mm Carbon Potentiometer

- Carbon resistive element.
- IP54 protection according to IEC 60529.
- Polyester substrate.
- Also upon request:
 - Long life model for low cost control pot. applications
 - Low torque option
 - Supplied in magazines for automatic insertion.
 - Wiper positioned at initial, 50% or fully clockwise.
 - Self extinguishable plastic UL 94V-0.
 - Cut track option.
 - Special Tapers.
 - Mechanical detents.

- Mechanical rotation angle: $265^{\circ} \pm 5^{\circ}$
 $240^{\circ} \pm 5^{\circ}$ available under drawing (blue housing only)
- Electrical rotation angle: $240^{\circ} \pm 20^{\circ}$
- Torque: 0.5 to 2.5 Ncm.
(0.7 to 3.4 in-oz)
- Stop torque: > 10 Ncm. (>14 in-oz)
- Life*: Up to 100K cycles

* Others: check availability.

** Up to 85°C depending on application.

- Range of values*:
 $100\Omega \leq R_n \leq 5\text{ M}$ (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
- Tolerance*:
 $100\Omega \leq R_n \leq 1\text{M}\Omega$ $\pm 20\%$
 $1\text{M}\Omega < R_n \leq 5\text{M}$ $\pm 30\%$
- Max. Voltage: 250 VDC (lin) 125 VDC (no lin)
- Nominal Power 50°C (122°F) (see power rating curve)
0.25 W (lin) 0.12 W (no lin)
- Taper*: (Log. & Alog. only $R_n \geq 1\text{K}$) Lin ; Log; Alog.
- Residual resistance*: $\leq 0.5\%$ R_n (5 Ω min.)
- Equivalent Noise Resistance: $\leq 3\%$ R_n (3 Ω min.)
- Operating temperature**: -25°C + 70°C (-13°F + 158°F)

PT15	L	H01 - 223	A	2020							S
Series											
Rotors			Taper	Life	Detents	Flammability	Wiper position				
C F G L M N R T X W Y Z	Code H01 H05 H25 H06 H02 H10 V02 V12 V15 V17 V18 V24 V21 V22 V23	Mounting Method H2.5 H5 HC5 B H2.5P H5P V12.5 VA V15 V17.5 D VD15 V12.5P VAP V15P	A = Lin. B = Log. C = Alog.	E= Long life U= Extra Long life (See note 5)	PAI PAM PAF P1I P1F P02 ⋮ P38	I= non flammable (See note 6)	PM = 50% PF = Final				
			Value	Tolerance	Cut track	Shaft/Thum.	Shaft/rotor colour			Magazine	
			101 = 100 Ω ⋮ 223 = 22 K ⋮ 504 = 500 K ⋮ 505 = 5 M	0505 = ± 5% 0707 = ± 7% 1010 = ± 10% 2020 = ± 20% 3030 = ± 30%	PCI = Initial PCF= Final	01 – Fig. 1 ⋮ 28 – Fig. 28 (See note 10)	RO=Red NE=Black VE=Green AM=Yellow AZ=Blue MA=Brown GR=Grey NA=Orange CR=Cream (See note 7)		T (See note 9)		
(See note 1)		(See note 2)	(See note 3)	(See note 4)						Torque – = Standard L = Low torque (See note 8)	

- (1) "Z" adjustment only available on "H" versions. Standard colour for the "T" rotor: Orange.
- (2) Terminal styles: "P" are crimped terminals. V24 terminals material: brass. V=Vertical adjust; H=Horizontal Adjust
- (3) Value: Example: Code:

10	1	100 Ω	Example: +7%	Code: 07	05	
└─┬─┘		└─┬─┘		└─┬─┘		
		→ Numb of zeros.	→ -5%			→ negative tolerance
		→ First two digits of the value.				→ positive tolerance
- (4) Non standard tolerance: check availability.
- (5) Life
 - Standard: 1K cycles.
 - Long life: 10K cycles.
 - Extra long life: 100K cycles (Only for low torque versions. To be studied case by case.)
- (6) Non flammable: housing, rotor and shaft. According to UL 94V-0
- (7) Colour shaft/rotor:
 - Potentiometer without shaft: only rotor
 - Potentiometer with shaft: only shaftCream colour only available in standard plastic.
- (8) Low Torque: ≤1.5Ncm. *No detent option available for low torque models.*
- (9) Magazines (35 pcs/mag): available for VA (12.5), V (12.5), V (12.5P), V (15), V15 (P) and H models.
For more information please contact your nearest Piher supplier.
- (10) If you wish to use your own custom plastic shaft/knob/actuator please contact Piher for advice about compatible materials.

NOTE: The information contained here should be used for reference purposes only.

HOW TO ORDER CUSTOM DRAWING

PT-15 LH 01 + DRAWING NUMBER (Max. 16 digits)

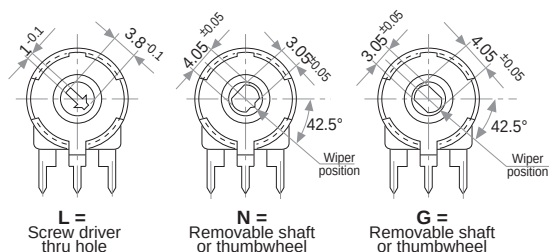
This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

STANDARD OPTIONS

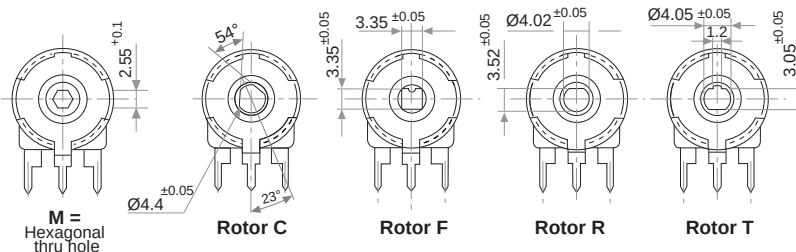
Cut track		No
Detents		None
Non flammable		No
Rotor colour		White
Shaft colour		Natural
Wiper position		Initial
Torque		Standard
Terminals material		Steel
Life		1000 cycles

ROTORS

Wipers positioned at initial (without shaft)

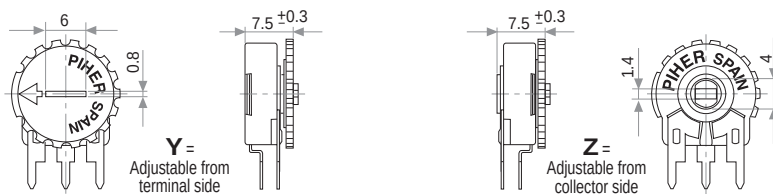
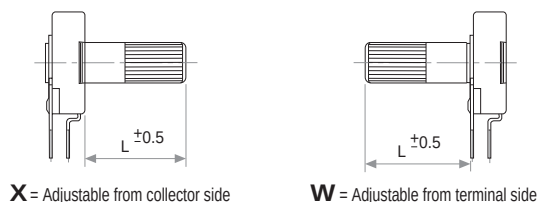


Wipers positioned at 50% (without shaft)

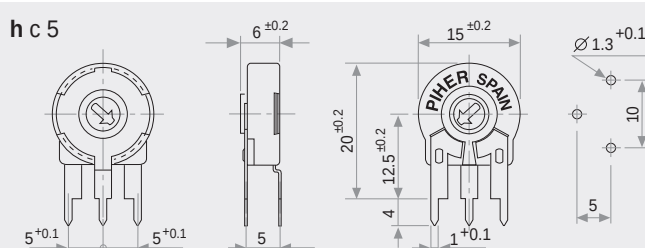
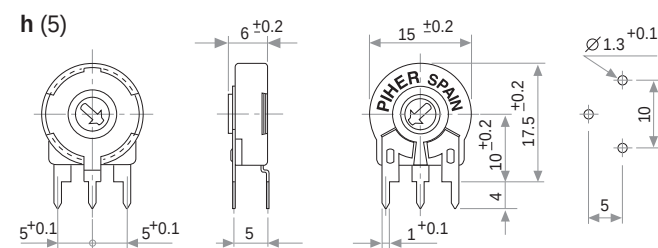
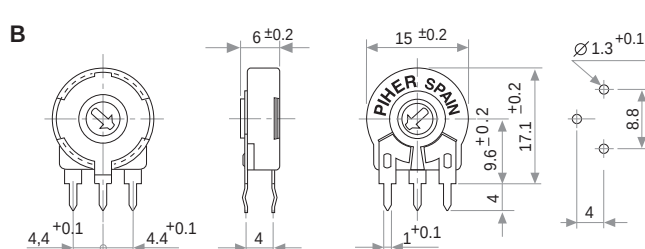
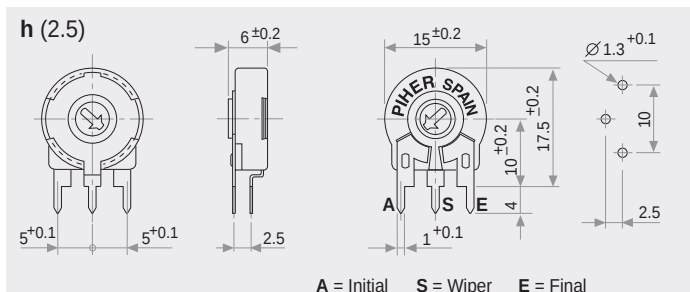


With shaft

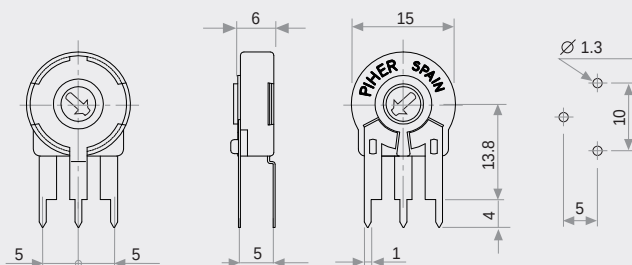
With thumbwheel



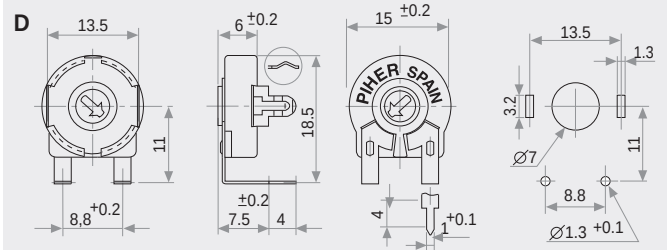
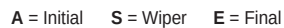
VERTICAL MOUNT - HORIZONTAL ADJUST



Check availability.



v (12.5)



Technical drawings of the PHER SPM sensor showing front, side, and top views with dimensions:

- Front View:** Shows a circular sensor with a central mounting hole. Dimensions include a total diameter of $10^{+0.2}$ mm, a mounting hole diameter of 7.5 mm, and a central hole diameter of 5 mm.
- Side View:** Shows the profile of the sensor. Dimensions include a total height of 12.5 mm, a base width of $8.5^{+0.2}$ mm, and a mounting flange width of 4 mm.
- Top View:** Shows the sensor from above. Dimensions include a total diameter of $10^{+0.2}$ mm, a mounting hole diameter of 7.5 mm, a central hole diameter of 5 mm, and a mounting flange width of 4 mm. The sensor is labeled "PHER SPM".
- Bottom View:** Shows the sensor from below. Dimensions include a total diameter of $10^{+0.2}$ mm, a mounting hole diameter of 7.5 mm, a central hole diameter of 5 mm, and a mounting flange width of 4 mm. The sensor is labeled "PHER SPM".
- Detail View:** Shows a close-up of the mounting flange. Dimensions include a total diameter of $10^{+0.2}$ mm, a mounting hole diameter of 7.5 mm, a central hole diameter of 5 mm, and a mounting flange width of 4 mm. The sensor is labeled "PHER SPM".

[illegible]

(15)

Technical drawing of a PHIER SPAN 15mm diameter, 15mm height. The drawing includes four views: front, side, top, and bottom. Dimensions are given in mm with tolerances. The front view shows a diameter of 15 ± 0.2 and a height of 15. The side view shows a diameter of 10 ± 0.2 and a height of 15. The top view shows a diameter of 15 ± 0.2 and a height of 15. The bottom view shows a diameter of 10 ± 0.2 and a height of 15. The drawing also shows a cross-section of the PHIER SPAN with a diameter of 7 and a height of 15. The PHIER SPAN is labeled on the top view.

(17.5)

Technical drawing of a PIHER SPAIN pressure washer nozzle, showing four views: front, side, top, and bottom. Dimensions are in mm.

Front view dimensions: Total width $10^{+0.2}$, total height 17.5 , top flange height 7.5 , bottom flange height 10 .

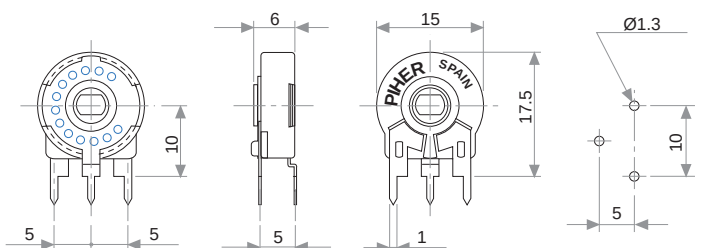
Side view dimensions: Total width $6^{+0.2}$, total height 17.5 , bottom flange height 4 , bottom flange width 7.5 , bottom flange thickness ± 0.2 .

Top view dimensions: Total width $15^{+0.2}$, total height 17.5 , bottom flange height 10 , bottom flange width 4 , bottom flange thickness $1^{+0.1}$.

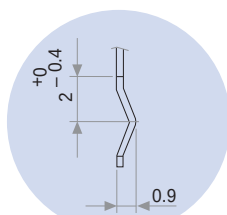
Bottom view dimensions: Total width 10 , total height 17.5 , bottom flange height 7.5 , bottom flange width 10 , bottom flange thickness ± 0.1 .

The technical drawings show the following dimensions:

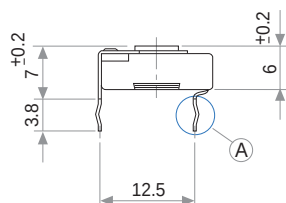
- Front View:** A square-shaped component with rounded corners. The width is 10 mm. The height from the base to the center of the circular opening is 7.5 mm. The total height is 15 mm.
- Side View:** Shows the profile of the component. The width is 6 mm. The height from the base to the center of the circular opening is 15 mm. The base has a width of 9.3 mm and a thickness of 4 mm.
- Top View:** Shows the circular opening with a diameter of $\varnothing 7$. The distance between the centers of the two circular openings is 15 ± 0.2 mm. The text "PIHER SPAN" is visible on the top surface.
- Bottom View:** Shows the underside of the component. The distance between the centers of the two circular openings is 10 mm. The diameter of the circular openings is $\varnothing 1.3 \pm 0.1$ mm. The total height from the base to the center of the circular opening is 15 mm. The base has a width of 4 mm and a thickness of 1 ± 0.1 mm.

13 detents
example

Technical drawing of a mechanical part. The drawing shows a side view of a component with a total width of 6 ± 0.2 and a base width of 5. A callout 'A' points to a specific feature on the right side of the part.



Detail A



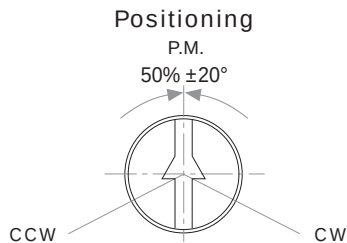
A = Linear
B = Log.
C = Alog.

Special taper example

$R_2 \pm 5\%$

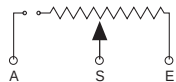
% Rn

OPTIONS



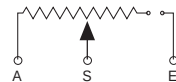
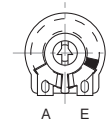
Cut Track
(open circuit
zone)

CCW on-off (A)



A = Initial
S = Wiper
E = Final

CW on-off (E)



TESTS

VARIATIONS

ELECTRICAL LIFE	1.000 h. @ 50°C; 0.25 W	±5 %
MECHANICAL LIFE (CYCLES)	1000 @ 10 CPM ...15 CPM	±3 % (Rn < 1 MΩ)
TEMPERATURE COEFFICIENT	-25°C; +70°C	±300 ppm (Rn < 100 K)
THERMAL CYCLING	16 h. @ 85°C; 2h. @ - 25°C	±2.5 %
DAMP HEAT	500 h. @ 40°C @ 95% HR	±5 %
VIBRATION (for each plane X,Y,Z)	2 h. @ 10 Hz. ... 55 Hz.	±2 %

NOTE : Out of range values may not comply these results.

SHAFTS (for N, G and T rotor types, top view)

Hollow model shafts

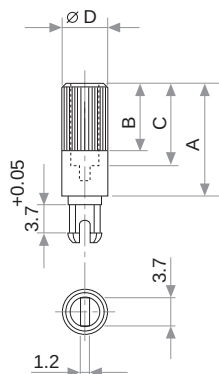


FIG.	A	B	C	D	Ref.
1	12	9	8	6	5272
2	19	9	15	6	5214
5	9.5	6.5	5.5	6	5208
9	35	9	31	6	5216
10	37.8	9	33.8	6	5218
11	35	25	15	6	5209
13	7.8	4.8	3.8	6	5265

A = Length (FRS)
B = Knurling length
C = Hollow depth
D = Shaft diameter
FRS = From rotor surface

Solid model shafts

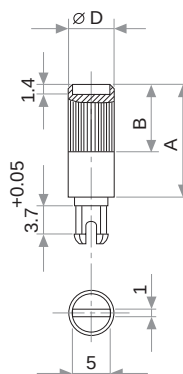
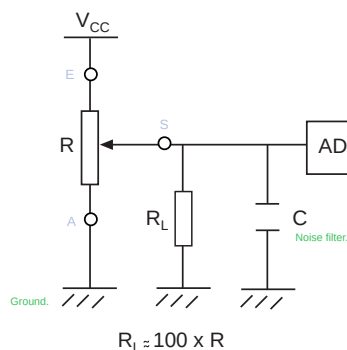


FIG.	A	B	D	Ref.
6	15	9	6	5219
7	16.8	9	6	5220
8	25.3	9	6	5207
12	46	5	6	5227

Slot (1 x 1.4) perpendicular to wiper position. Fig. 12 slot is on line with wiper position.

RECOMMENDED CONNECTIONS

Piher potentiometer's recommended connection circuit for a position sensor or control application. (voltage divider circuit electronic design).



SHAFTS (for N, G and T rotor types, top view)

By default shafts, knobs & thumbwheels are delivered unassembled.

Mounted shafts, knobs & thumbwheels are delivered at random position. Positioning available check availability..

If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.

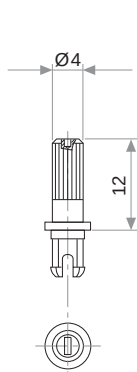


Fig. 3 / Ref. 5372

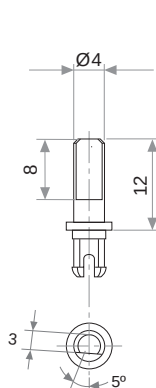


Fig. 15 / Ref. 5217

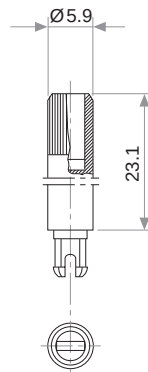


Fig. 17 / Ref. 5210

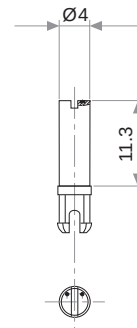


Fig. 18 / Ref. 5271

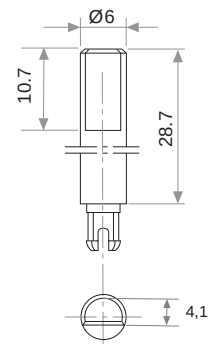


Fig. 19 / Ref. 6032*

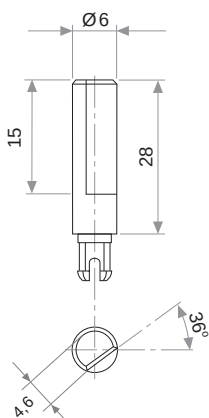


Fig. 20 / Ref. 5369*

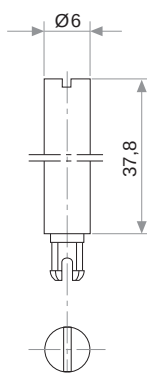


Fig. 21 / Ref. 6031*

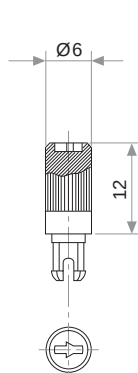


Fig. 22 / Ref. 6029

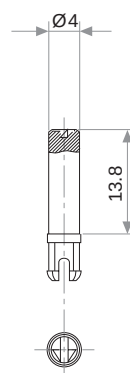


Fig. 23 / Ref. 6022

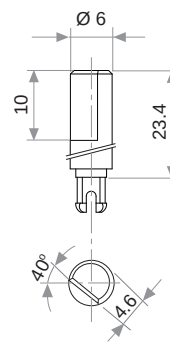


Fig. 29 / Ref. 6162

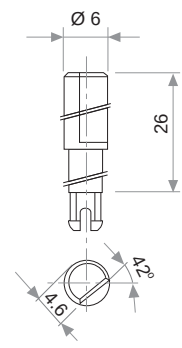


Fig. 25 / Ref. 6059

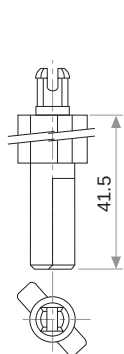


Fig. 27 / Ref. 5268*

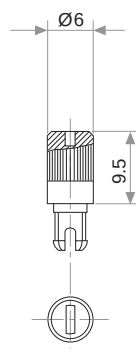


Fig. 28 / Ref. 6055

* Not available in self extinguishable plastic

THUMBWHEEL

By default shafts, knobs & thumbwheels are delivered unassembled.

Mounted shafts, knobs & thumbwheels are delivered at random position. Positioning available check availability..

If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.

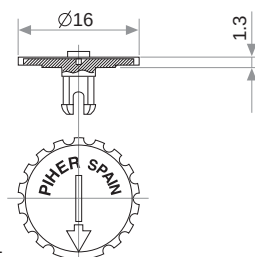


Fig. 4 / Ref. 5371

DETENT CONFIGURATIONS EXAMPLES

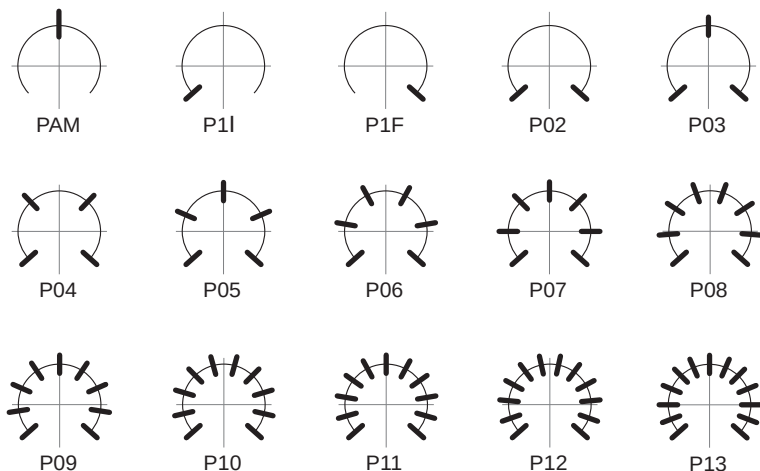
This innovative PT's with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the potentiometer thus allowing a high range of configurations: special tapers, torque, tolerances, linearity, cut track, etc.

This detent design not only adds a "click" sensation of position, but also offers enormous savings in both cost and space for any given application.

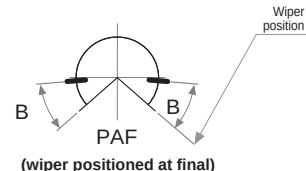
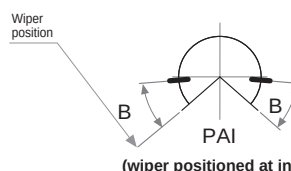
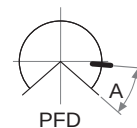
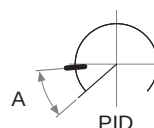
Strong and weak detents can be mixed as per customer's request.

Detent number and positions can be made or fitted to the customer needs or preferences.

-  Relative detent positions along the total mechanical travel. Unless otherwise specified the detents are evenly spaced (using the end points as reference)



A = 32.625°
B = 34.5°



NOTES FOR DETENTED VERSIONS:

- (1) For the following mounting methods, the detents configurations will be studied individually case by case:
 - V02 & V21
 - V12 & V22
 - V18
 - V24
- (2) For more than 13 detents versions please contact your nearest PIHER authorised distributor.
- (3) Standard mechanical life is 500 cycles.
- (4) Long life versions are available under request and have the following characteristics at T^a:
 - Potentiometers with 1 to 3 detents: up to 10K cycles
 - Potentiometers with 4 and more detents: up to 5K cycles
- (5) Detent torque can vary from 1.2 to 2.5 times the standard potentiometer torque.

For all detents versions of more than 13 detents the detent torque will be 0.5 to 3.5 Ncm.
- (6) Please consult your nearest Piher supplier if unique non-overlapping values at each detent position or LOG/ALOG tapers are required.
- (7) Different output voltage values can be matched at each detent position (under request).

DETENTS WITH CONSTANT VALUE ZONES

application notes

PIHER's potentiometers may feature special stepped outputs or 'constant voltage zones' for the 10mm and 15mm product families.

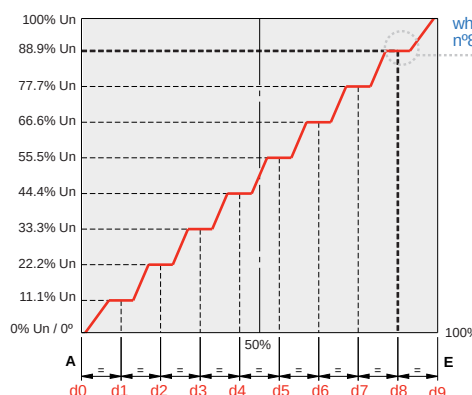
These constant voltage zones can be combined with PIHER's mechanical detents to provide exact alignment between the electrical output (flat areas) and the mechanical detent's positions. The result is a higher level of precision in controlling lighting, temperature, motor or other electronic control systems.

In addition to established catalogue detent configurations, we will design and manufacture any other configuration on our tried-and-tested carbon/cermet & THM/SMD potentiometer technology and processes.

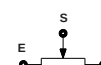
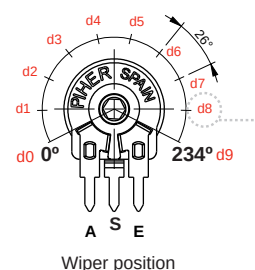
With its exacting control capabilities, our 10mm and 15mm potentiometers series are well suited for many consumer applications such as ovens, ranges, dishwashers, lighting (dimmers), power hand tools, washing machines and HVAC systems.

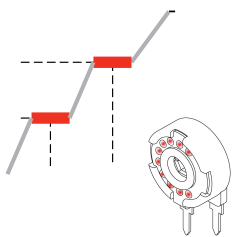
Constant value zones can be combined with strategically located stops matching the flat areas of the output.

10 stepped outputs version example:



when the potentiometer's wiper position is located at detent n°8, the output voltage will be exactly 88.9% Un



**Improved repeatability**

By combining the constant value zones with the detents, engineers can align the same voltage values with each of the detent stops when rotating the control both forward and backward.

This provides clear mechanical positions that are not only repeatable, but perfectly aligned electrical outputs at each of the (detent) angles.

Piher's detents also prevent output values from changing due to vibration or accidental rotor movements, furthering reliable control consistency.

Design tip. Cost-effectiveness

Absolute encoders can easily be replaced connecting the potentiometer to the microprocessor's analogue input.

**Main advantages**

- ✓ Unique, non-overlapping values at each stop (detent position)
- ✓ Prevents output value change due to light vibration or accidental rotor micro-movements
- ✓ Fully customisable according to customer's needs
- ✓ Cost effective replacement for absolute encoders

Disclaimer

The product information in this catalogue is for reference purposes. Please consult for the most up to date and accurate design information.

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