

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

** 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

└─┬─┘

→ Numb of zeros.
→ First two digits of the value.

Example: +7% -5%

Code: 07 05

└─┬─┘

→ negative tolerance
→ 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.

www.piher.net

HOW TO ORDER CUSTOM DRAWING

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

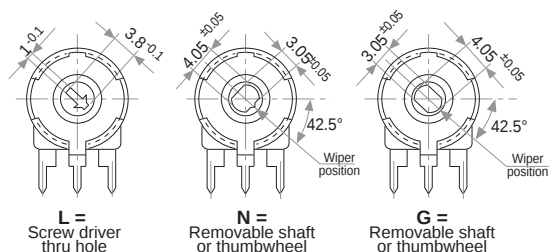
This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

STANDARD OPTIONS

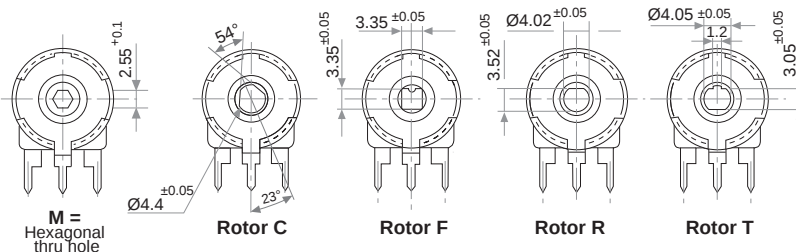
Cut track		No
Detents		None
Non flammable		No
Rotor colour		White
Shaft colour		Natural
Wiper position		Initial
Torque		Standard
Terminals material		Steel
Life		1000 cycles

ROTORS

Wipers positioned at initial (without shaft)

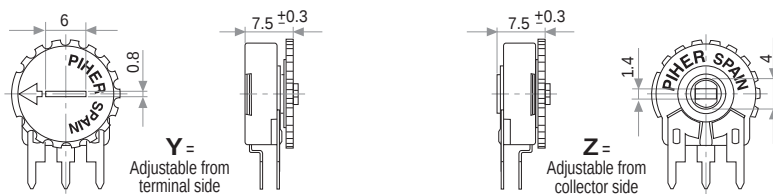
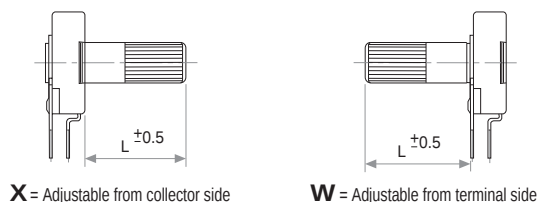


Wipers positioned at 50% (without shaft)

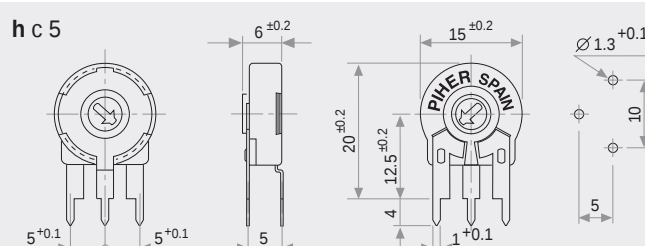
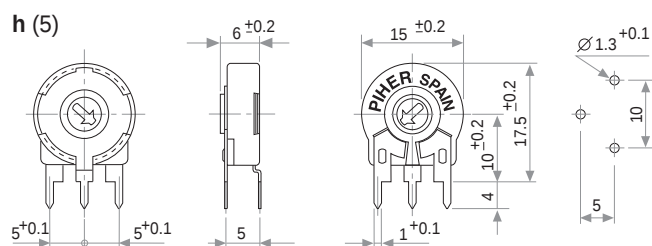
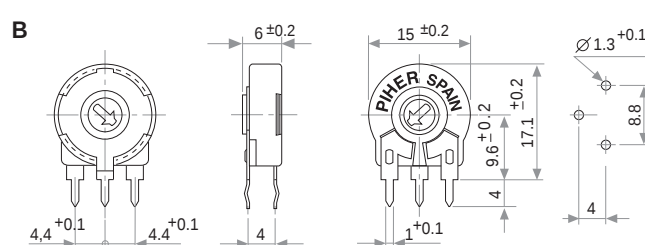
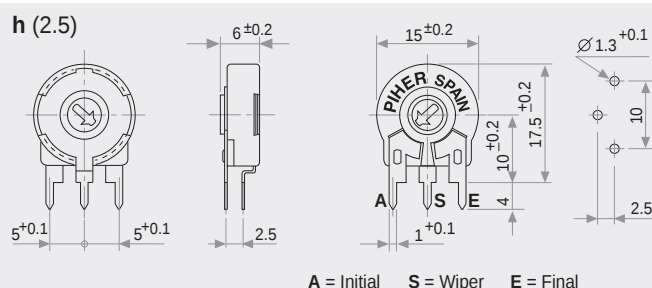


With shaft

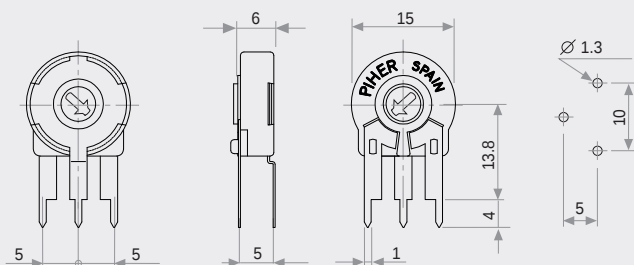
With thumbwheel



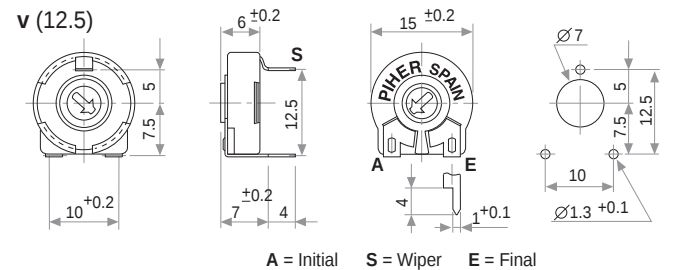
VERTICAL MOUNT - HORIZONTAL ADJUST



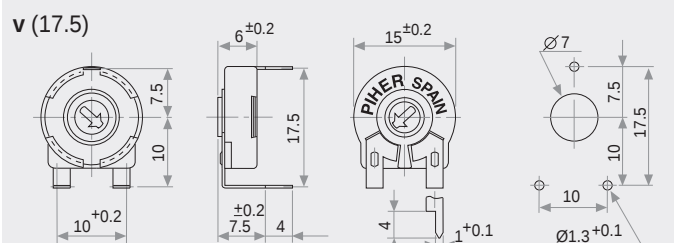
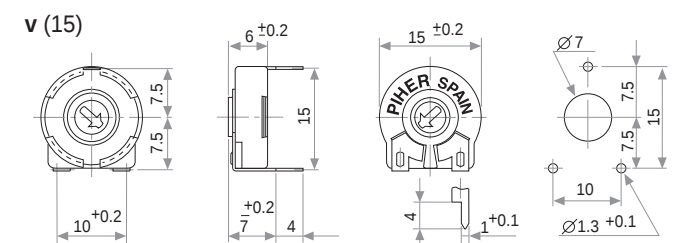
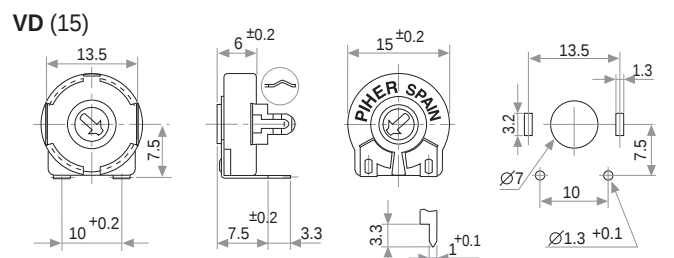
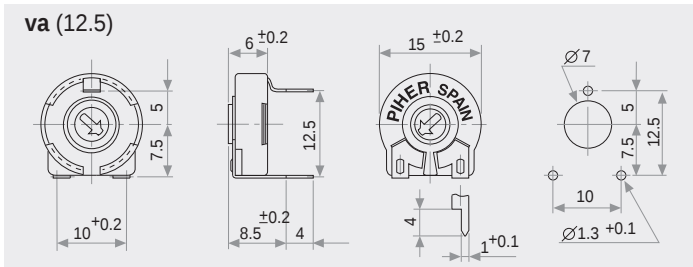
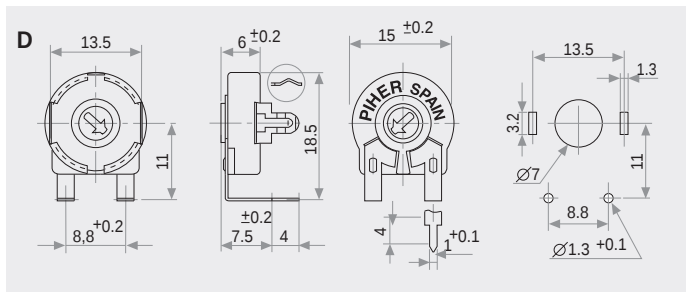
Check availability.



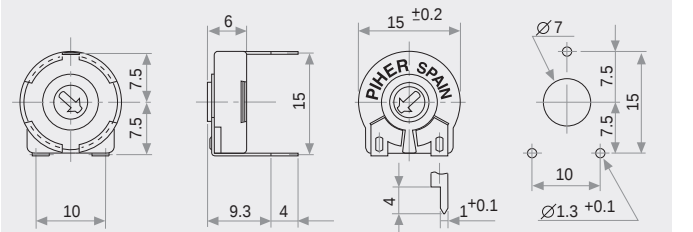
HORIZONTAL MOUNT - VERTICAL ADJUST



A = Initial **S** = Wiper **E** = Final

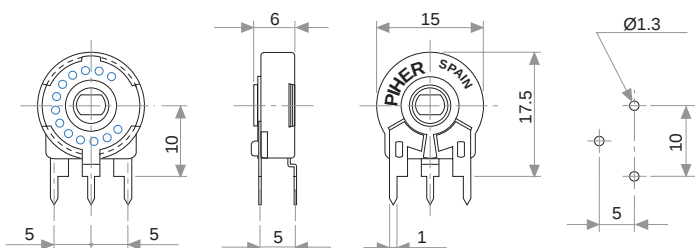


Check availability.

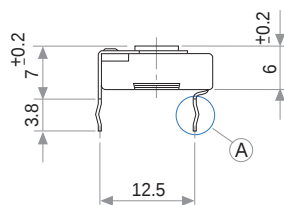
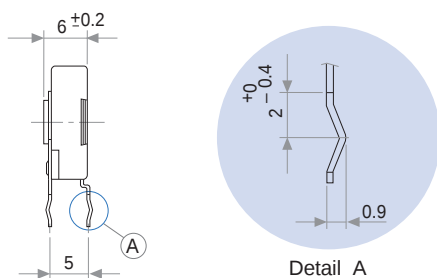


DETENT DETAILS

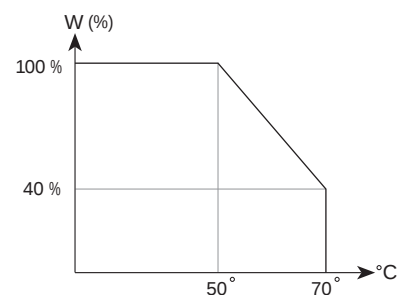
13 detents example



CRIMPED TERMINALS (DETAIL)



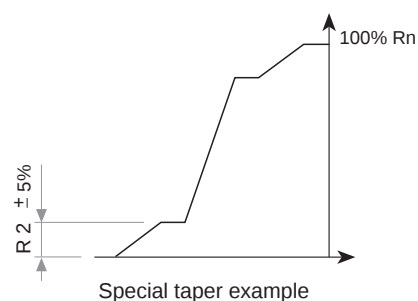
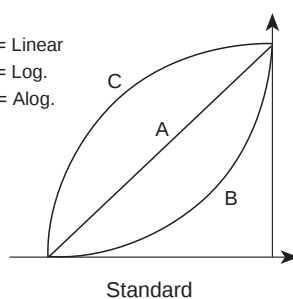
POWER RATING CURVE



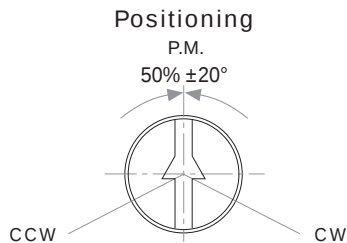
TAPERS

A = Linear
B = Log.
C = Alog.

NOTE: Please note terminals disposition when ordering non linear curves.



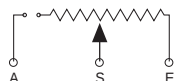
OPTIONS



Std. Position = CCW

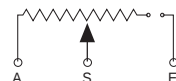
Cut Track
(open circuit zone)

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

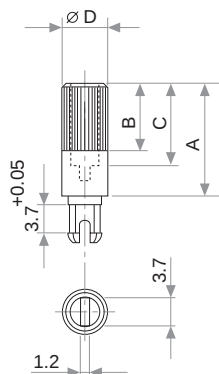


FIG.	A	B	C	D	Ref.
1	12	9	8	6	5272
2	19	9	15	6	5214
5	9.5	6.5	5.5	6	5208
9	35	9	31	6	5216
10	37.8	9	33.8	6	5218
11	35	25	15	6	5209
13	7.8	4.8	3.8	6	5265

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

Solid model shafts

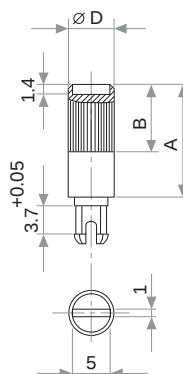
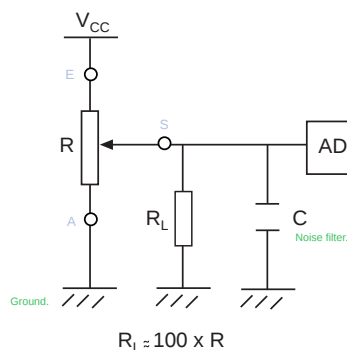


FIG.	A	B	D	Ref.
6	15	9	6	5219
7	16.8	9	6	5220
8	25.3	9	6	5207
12	46	5	6	5227

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.

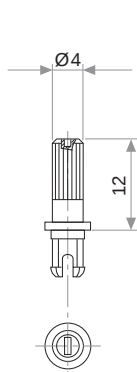


Fig. 3 / Ref. 5372

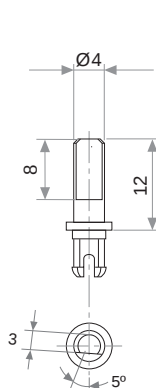


Fig. 15 / Ref. 5217

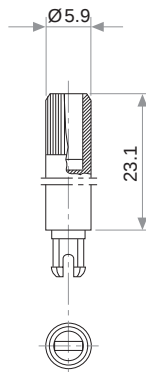


Fig. 17 / Ref. 5210

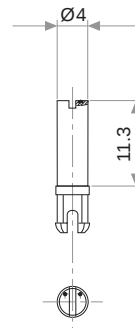


Fig. 18 / Ref. 5271

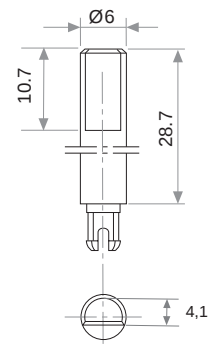


Fig. 19 / Ref. 6032*

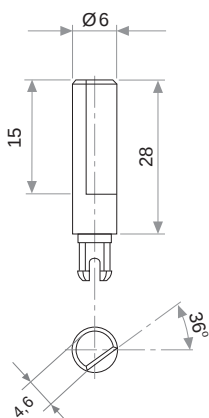


Fig. 20 / Ref. 5369*

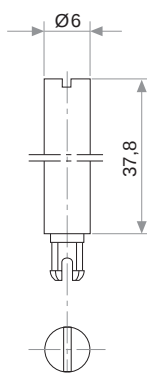


Fig. 21 / Ref. 6031*

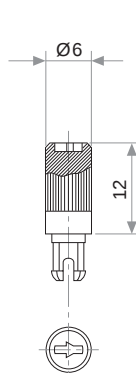


Fig. 22 / Ref. 6029

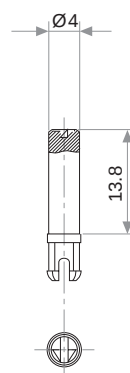


Fig. 23 / Ref. 6022

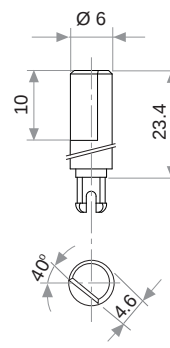


Fig. 29 / Ref. 6162

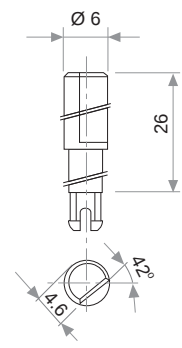


Fig. 25 / Ref. 6059

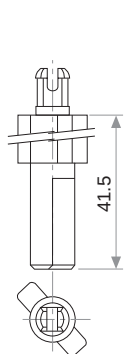


Fig. 27 / Ref. 5268*

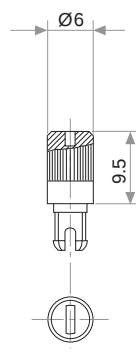


Fig. 28 / Ref. 6055

* 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.

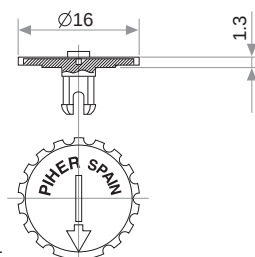


Fig. 4 / Ref. 5371

DETENT CONFIGURATIONS EXAMPLES

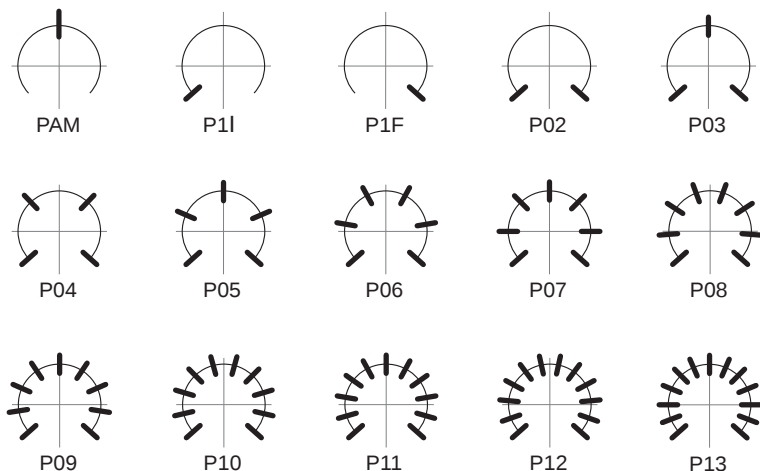
This innovative PT's with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the potentiometer thus allowing a high range of configurations: special tapers, torque, tolerances, linearity, cut track, etc.

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.

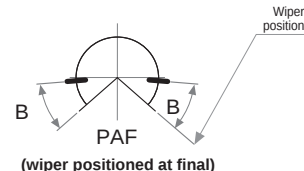
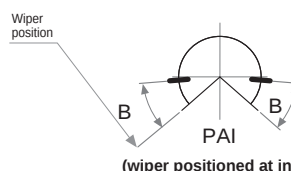
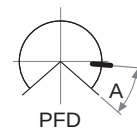
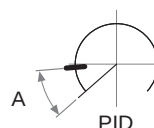
Strong and weak detents can be mixed as per customer's request.

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.

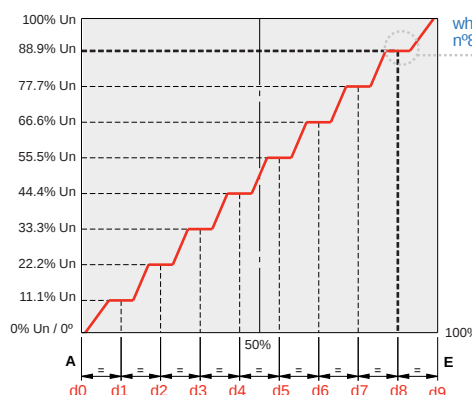
These constant voltage zones can be combined with PIHER's mechanical detents to provide exact alignment between the electrical output (flat areas) and the mechanical detent's positions. The result is a higher level of precision in controlling lighting, temperature, motor or other electronic control systems.

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.

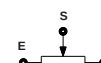
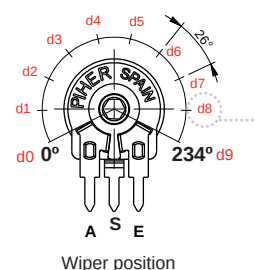
With its exacting control capabilities, our 10mm and 15mm potentiometers series are well suited for many consumer applications such as ovens, ranges, dishwashers, lighting (dimmers), power hand tools, washing machines and HVAC systems.

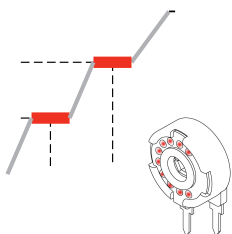
Constant value zones can be combined with strategically located stops matching the flat areas of the output.

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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