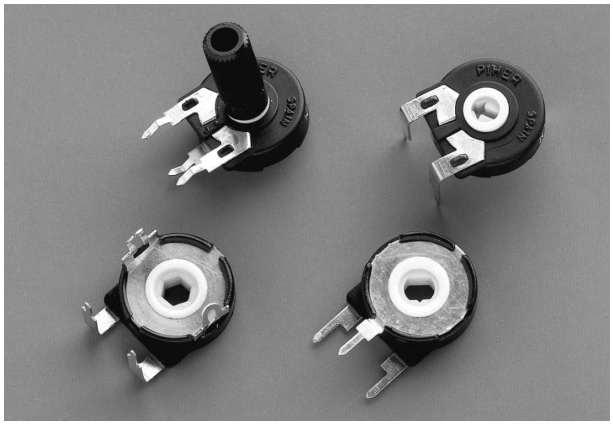
PIHER

PT-15 15 mm Carbon Potentiometer



FEATURES

- 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 SPECIFICATIONS

– Mechanical rotation angle: 265° ± 5°
240º ± 5º available under drawing (blue housing only)

– Electrical rotation angle: 240° ± 20°

– 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

ELECTRICAL SPECIFICATIONS

– Range of values*:
100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)

– Tolerance*: 100Ω ≤ Rn ≤ 1M Ω ------ ± 20%
1MΩ < Rn ≤ 5M ------ ± 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 Rn ≥1K) Lin ; Log; Alog.

– Residual resistance*: ≤ 0.5 % Rn (5 Ω min.)

– Equivalent Noise Resistance: ≤ 3% Rn (3 Ω min.)

– Operating temperature**: –25°C + 70°C (–13°F + 158°F)

* Others: check availability.
** Up to 85°C depending on application.

HOW TO ORDER

OPTIONAL EXTRAS

PT15 | L | H01 | - | 223 | A | 2020 | - | | | | | | | | | | | - | S

Series: PT15

Rotors: C F G L M N R T X W Y Z (See note 1)

Code / Mounting Method (See note 2)

Code	Mounting Method
H01	H2.5
H05	H5
H25	HC5
H06	B
H02	H2.5P
H10	H5P
V02	V12.5
V12	VA
V15	V15
V17	V17.5
V18	D
V24	VD15
V21	V12.5P
V22	VAP
V23	V15P

Value: 101 = 100 Ω; 223 = 22 K; 504 = 500 K; 505 = 5 M (See note 3)

Taper: A = Lin. B = Log. C = Alog.

Tolerance: 0505 = ± 5% 0707 = ± 7% 1010 = ± 10% 2020 = ± 20% 3030 = ± 30% (See note 4)

Life: E= Long life U= Extra Long life (See note 5)

Detents: PAI PAM PAF P1I P1F P02 : : P38

Flammability: I= non flammable (See note 6)

Wiper position: PM = 50% PF = Final

Cut track: PCI = Initial PCF= Final

Shaft/Thum.: 01 – Fig. 1 : : 28 – Fig. 28 (See note 10)

Shaft/rotor colour: RO=Red NE=Black VE=Green AM=Yellow AZ=Blue MA=Brown GR=Grey NA=Orange CR=Cream (See note 7)

Torque: – = Standard L = Low torque (See note 8)

Magazine: T (See note 9)

NOTES:

(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 (10 = First two digits of the value; 1 = Numb of zeros.)
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 shaft

Cream 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)

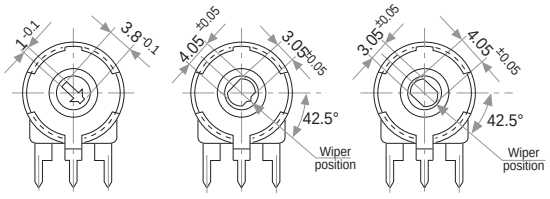
This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

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)

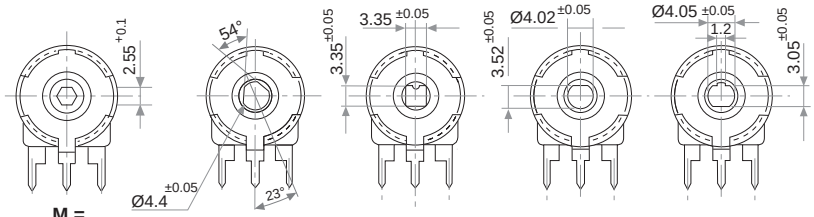


L = Screw driver thru hole

N = Removable shaft or thumbwheel

G = Removable shaft or thumbwheel

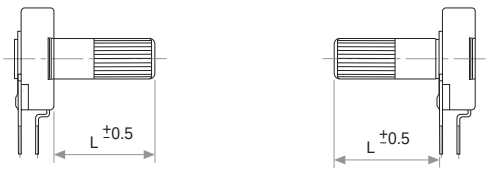
Wipers positioned at 50% (without shaft)



M = Hexagonal thru hole

Rotor C **Rotor F** **Rotor R** **Rotor T**

With shaft



X = Adjustable from collector side

W = Adjustable from terminal side

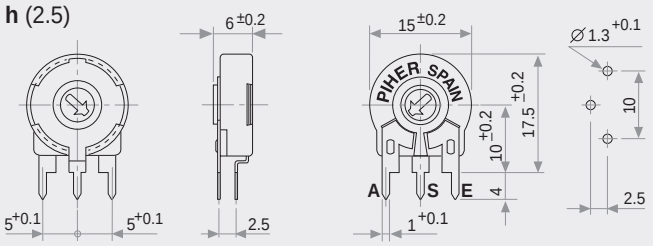
With thumbwheel

Y = Adjustable from terminal side

Z = Adjustable from collector side

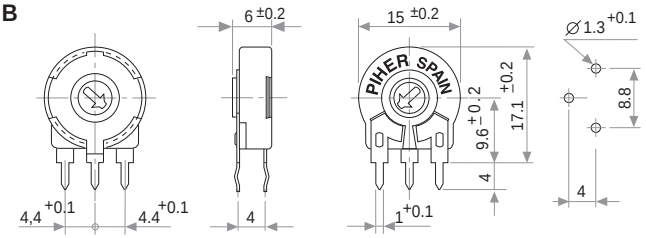
VERTICAL MOUNT - HORIZONTAL ADJUST

h (2.5)

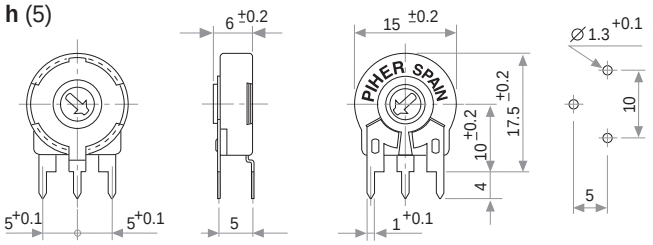


A = Initial **S** = Wiper **E** = Final

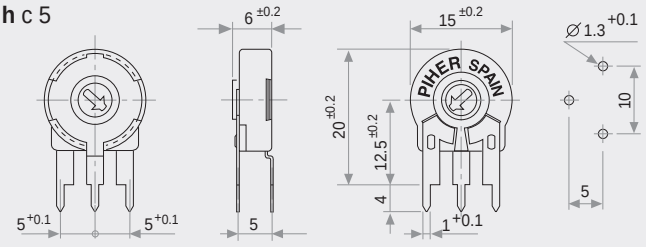
B



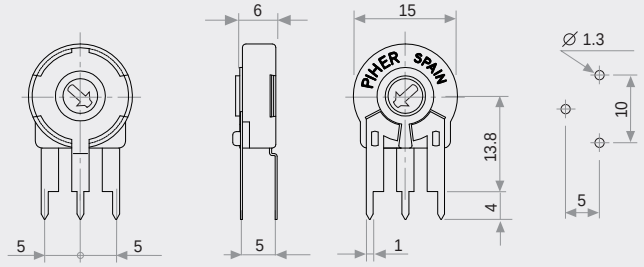
h (5)



h c 5

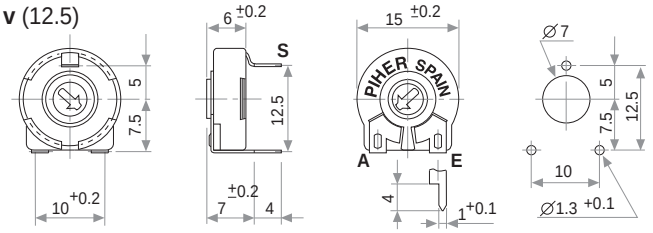


Check availability.



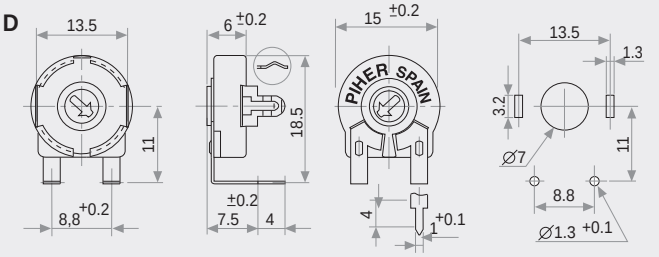
HORIZONTAL MOUNT - VERTICAL ADJUST

v (12.5)

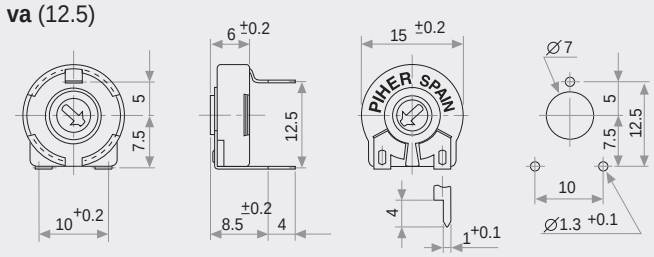


A = Initial **S** = Wiper **E** = Final

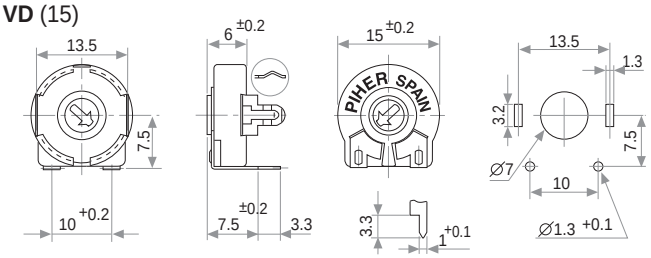
D



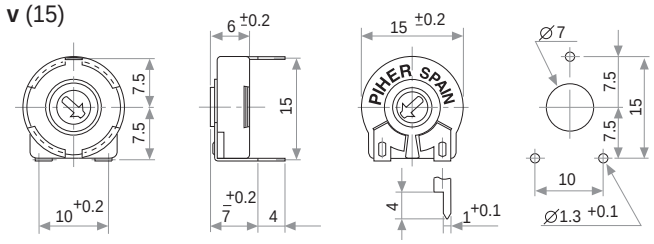
va (12.5)



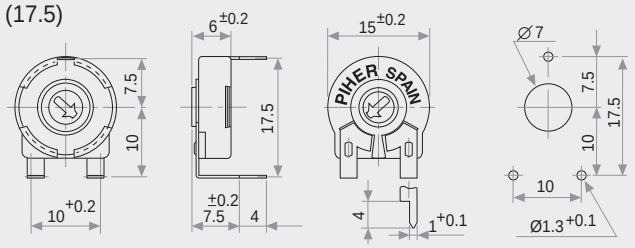
VD (15)



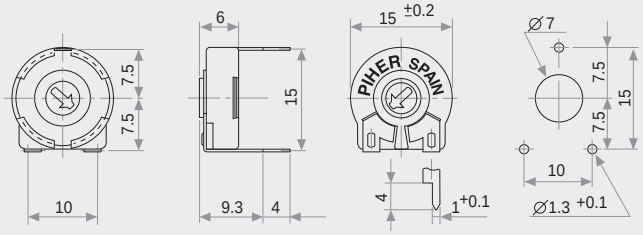
v (15)



v (17.5)

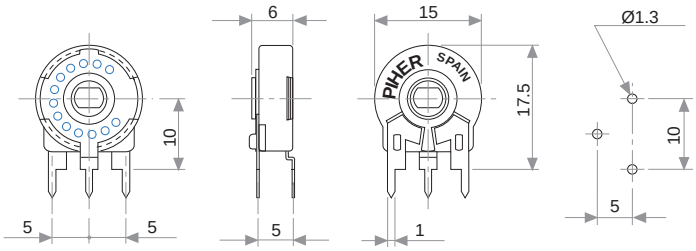


Check availability.

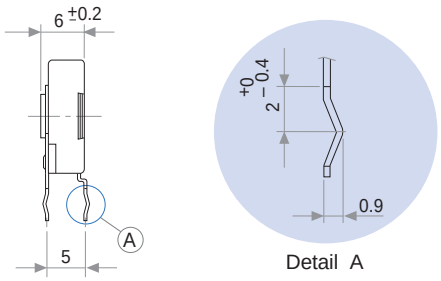


DETENT DETAILS

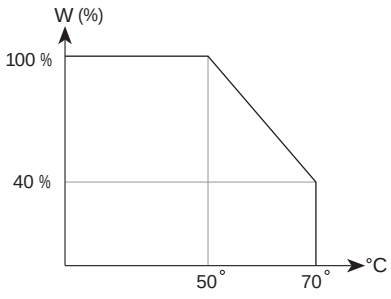
13 detents example



CRIMPED TERMINALS (DETAIL)

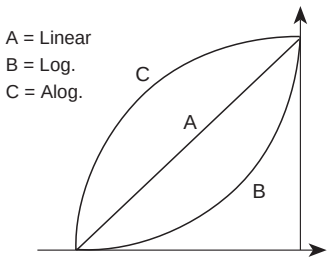


POWER RATING CURVE

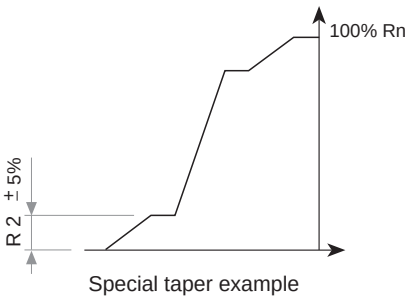


TAPERS

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



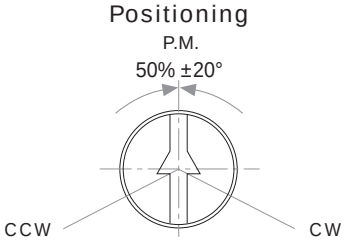
Standard



Special taper example

OPTIONS

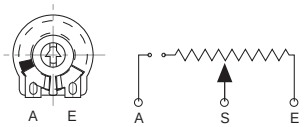
Positioning



Std. Position = CCW

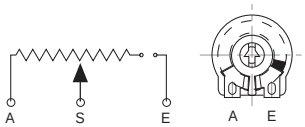
Cut Track (open cirtuit zone)

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

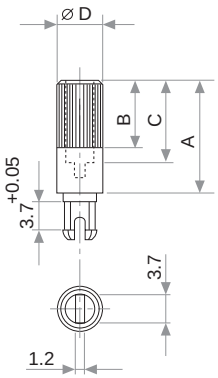


FIG.	A	B	C	D	Ref.
1	12	9	8	6	5272
2	19	9	15	6	5214
5	9.5	6.5	5.5	6	5208
9	35	9	31	6	5216
10	37.8	9	33.8	6	5218
11	35	25	15	6	5209
13	7.8	4.8	3.8	6	5265

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

Solid model shafts

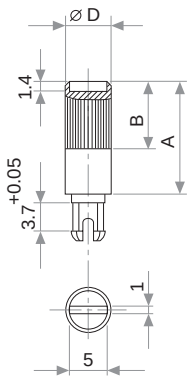
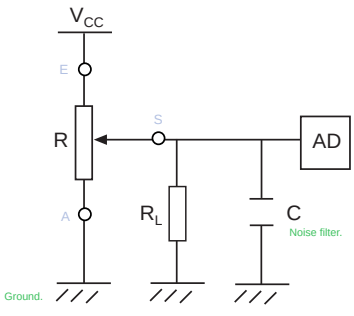


FIG.	A	B	D	Ref.
6	15	9	6	5219
7	16.8	9	6	5220
8	25.3	9	6	5207
12	46	5	6	5227

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).



$R_L \approx 100 \times R$

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

By default shafts, knobs & & thumweels are delivered unassembled.
Mounted shafts, knobs & thumbweels 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.

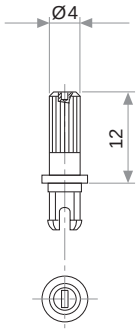


Fig. 3 / Ref. 5372

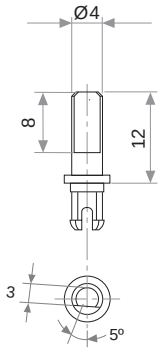


Fig. 15 / Ref. 5217

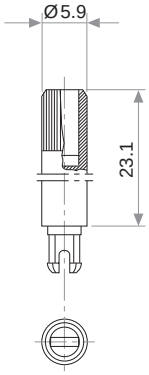


Fig. 17 / Ref. 5210

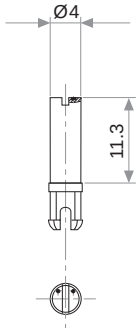


Fig. 18 / Ref. 5271

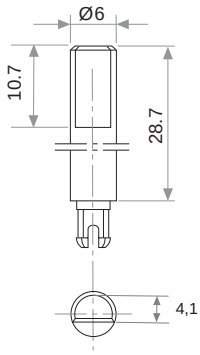


Fig. 19 / Ref. 6032*

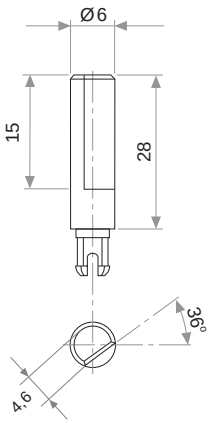


Fig. 20 / Ref. 5369*

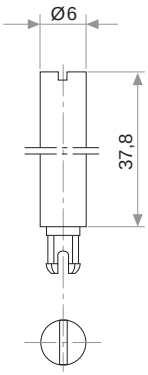


Fig. 21 / Ref. 6031*

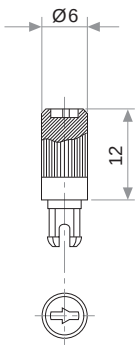


Fig. 22 / Ref. 6029

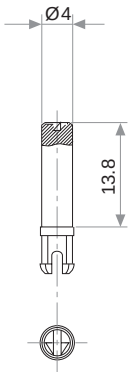


Fig. 23 / Ref. 6022

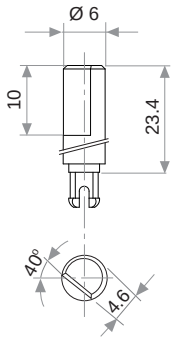


Fig. 29 / Ref.6162

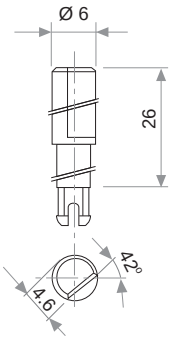


Fig. 25 / Ref. 6059

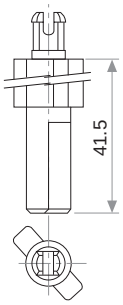


Fig. 27 / Ref. 5268*

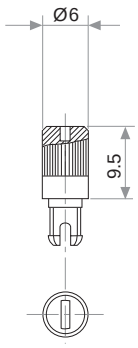


Fig. 28 / Ref. 6055

* Not available in self extinguishable plastic

THUMBWHEEL

By default shafts, knobs & & thumweels are delivered unassembled.
Mounted shafts, knobs & thumbweels 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.

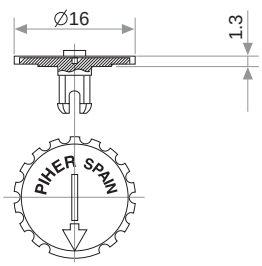


Fig. 4 / Ref. 5371

DETENT CONFIGURATIONS EXAMPLES

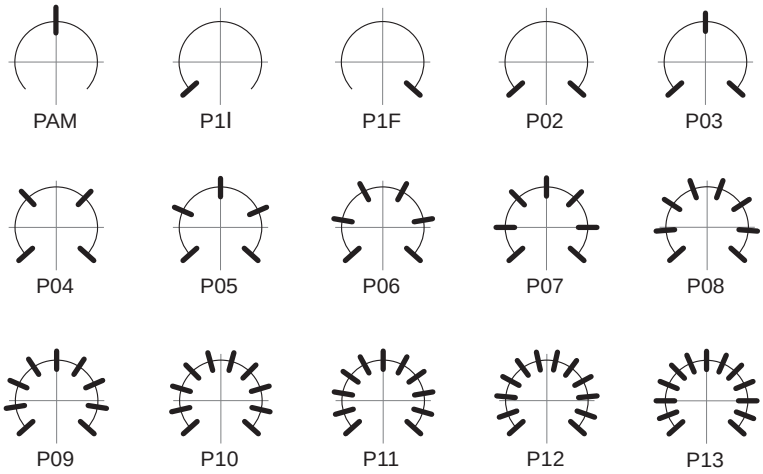
This innovative PT´s with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the potentiometer thus allowing a high range of configurations: special tapers, torque, tolerances, linearity, cut track, etc.

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.

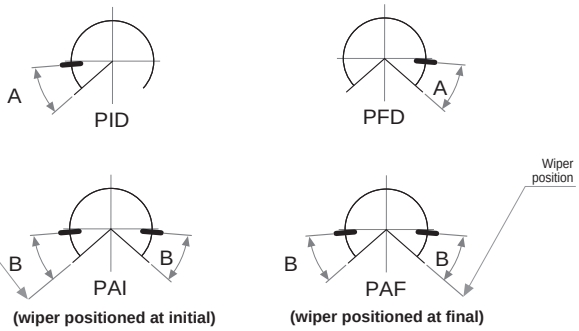
Strong and weak detents can be mixed as per customer´s request.

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= 32.625º
B= 34.5º



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 Tª:
- 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.

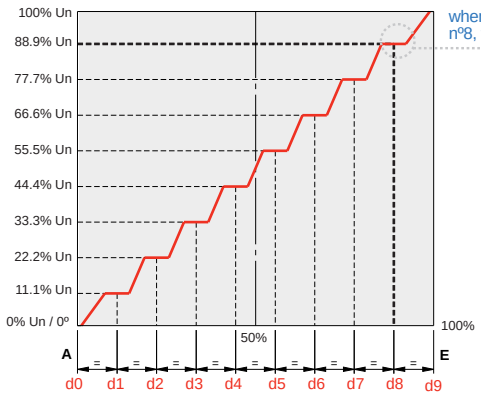
These constant voltage zones can be combined with PIHER's mechanical detents to provide exact alignment between the electrical output (flat areas) and the mechanical detent's positions. The result is a higher level of precision in controlling lighting, temperature, motor or other electronic control systems.

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.

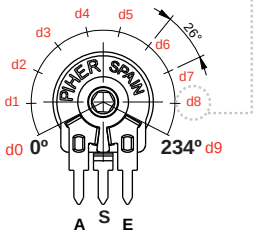
With its exacting control capabilities, our 10mm and 15mm potentiometers series are well suited for many consumer applications such as ovens, ranges, dishwashers, lighting (dimmers), power hand tools, washing machines and HVAC systems.

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

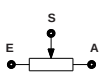
10 stepped outputs version example:



when the potentiometer´s wiper position is located at detent nº8, the output votage will be exactly 88.9% Un

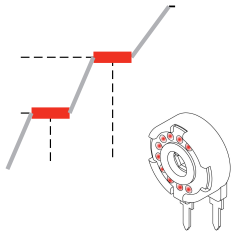


Wiper position



DETENTS WITH CONSTANT VALUE ZONES

upon request



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

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Note: All Piher products can be adapted to meet customer´s requirements.
Due to continuous process improvement, specifications are subject to change without notice