

## FEATURES

- Carbon resistive element
- IP54 protection according to IEC 60529
- Polyester substrate
- Also upon request:
  - Wiper positioned at 50% or fully clockwise.
  - Supplied in magazines for automatic insertion.
  - Long life model for low cost control potentiometer applications
  - Self extinguishable plastic UL 94V-0
  - Cut track option
  - Special tapers
  - Mechanical detents
  - Low torque version
  - Special switch option
  - 3% Linearity and 100K cycles mechanical life

## MECHANICAL SPECIFICATIONS

- Mechanical rotation angle:  $235^\circ \pm 5^\circ$
- Electrical rotation angle:  $220^\circ \pm 20^\circ$
- Torque: 0.4 to 2 Ncm.  
(0.6 to 2.7 in-oz)
- Stop torque: > 5 Ncm. (>7 in-oz)
- Life(\*): Up to 10K cycles

\* Others check availability.

\*\* Up to 85°C depending on application.

## ELECTRICAL SPECIFICATIONS

- 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\*:  $100\Omega \leq R_n \leq 1\text{M}\Omega$  .....  $\pm 20\%$   
 $1\text{M}\Omega < R_n \leq 5\text{M}\Omega$  .....  $\pm 30\%$
- Max. Voltage: 200 VDC (lin) 100 VDC (no lin)
- Nominal Power 50°C (122°F) (see power rating curve)  
0.15 W (lin) 0.07 W (no lin)
- Taper\* (Log. & Alog. only  $R_n \geq 1\text{K}$ ) Lin ; Log; Alog.
- Residual resistance\*:  $\leq 0.5\%$   $R_n$  (5  $\Omega$  min.)
- Equivalent Noise Resistance:  $\leq 3\%$   $R_n$  (3  $\Omega$  min.)
- Operating temperature\*\*: -25°C + 70°C (-13°F + 158°F)

## HOW TO ORDER

OPTIONAL EXTRAS									
PT 10	L	H01	101	A	2020				S
<b>Series</b> PT-10	<b>Code</b> H01 H05 H02 H10 V05 V10 V11 V13	<b>Mounting Method</b> H2.5 H5 H2.5P H5P V5 V VP VJ	<b>Taper</b> A = Lin. B = Log. C = Alog.	<b>Life</b> E = Long life (See note 5)	<b>Detents</b> PAI PAM PAF P1I P1F P02 : P16	<b>Shaft/Thum.</b> 01 = Fig. 1 02 = Fig. 2 : 17 = Fig. 17 (See note 10)	<b>Shaft/rotor colour</b> RO = Red NE = Black VE = Green AM = Yellow AZ = Blue MA = Brown GR = Grey NA = Orange CR = Cream (See note 8)	<b>Torque</b> – = Standard L = Low Torque (See note 9)	
<b>Rotors</b> B G K L M R W X Y Z (See note 1)	(See note 2 / SMD version available: see product PS-10)		<b>Value</b> 101 = 100 $\Omega$ 504 = 500 K 505 = 5 M 000 = CM (See note 3)	<b>Tolerance</b> 2020 = $\pm 20\%$ 3030 = $\pm 30\%$ (See note 4)	<b>Cut track</b> PCI = Initial PCF = Final	<b>Magazine</b> T (See note 6)	<b>Flammability</b> I = Non flammable (See note 7)	<b>Wiper position</b> PM = 50% PF = Final	

### NOTES:

- (1) "Z" adjustment only available on "H" versions. Rotor "G" only available in purple (shaft/rotor colour "VI").
- (2) Terminals styles: "P" & "J" are crimped. V=Vertical adjust; H=Horizontal Adjust
- (3) Value Example: Code: 10 1 100  $\Omega$  000 = CM = Switch version (contact us)  
 Numb of zeros  
 First two digits of the value.
- (4) Non standard tolerance, check Example: +7% Code: 07 05  
 Standard = 1000 cycles • Long = 10K cycles -5%  
 Others check availability.
- (5) Magazines: not available with the H10, V05 and V13 models, nor with adjustment types X, W, Y, Z.
- (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:  $\leq 1\text{ Ncm}$   
 No detent option available for low torque models.
- (9) If you wish to use your own custom plastic shaft/knob/actuator please contact Piher for advice about compatible materials.
- (10)

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

## HOW TO ORDER CUSTOM DRAWING

PT-10 LH 01 + DRAWING NUMBER (Max. 16 characters)

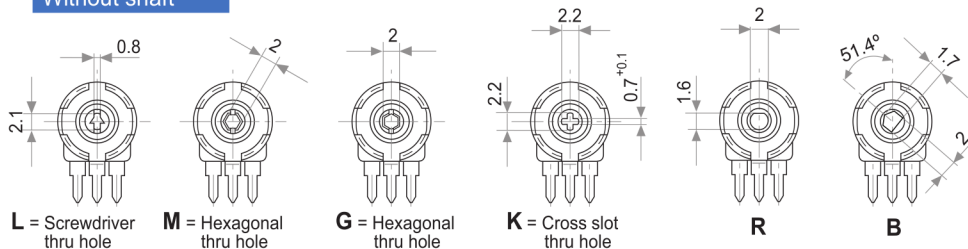
This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

## STANDARD OPTIONS

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

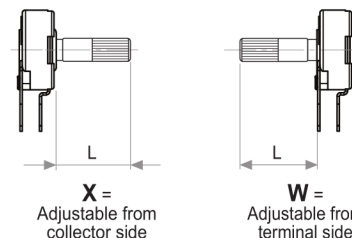
## ROTORS

### Without shaft

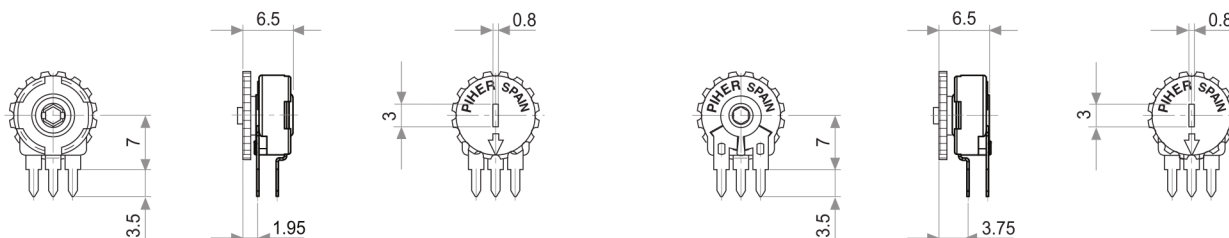


Wipers positioned at 50%

With shaft



## With thumbwheel

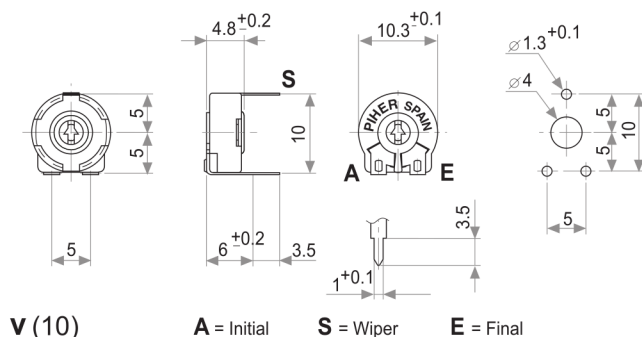
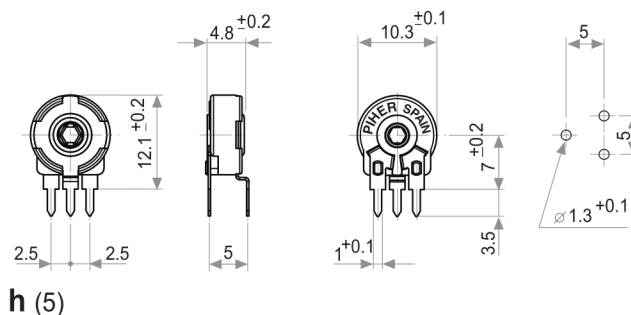
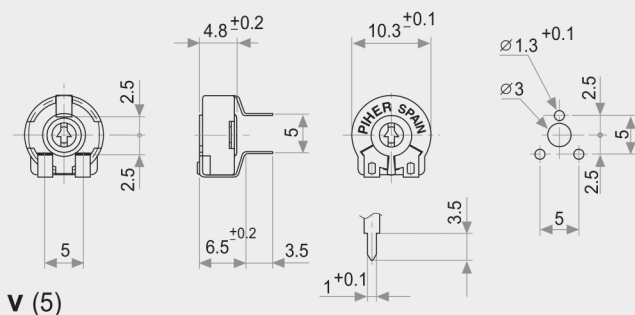
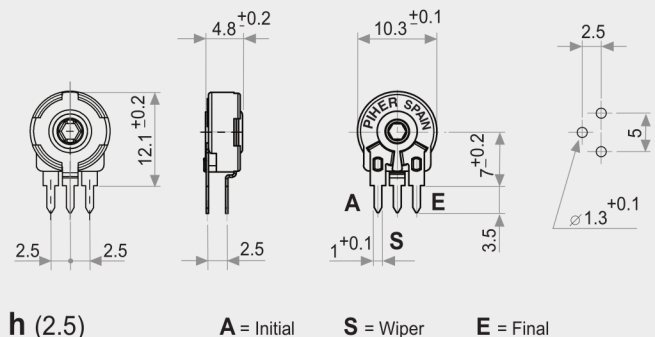


**Y** = Adjustable from terminal side

**Z** = Adjustable from collector side

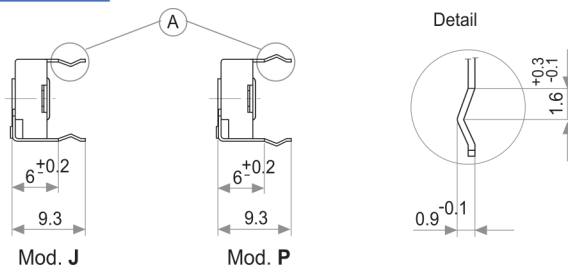
## MOUNTING METHODS

**V** = horizontal mount – vertical adjust

h = vertical mount – horizontal adjust

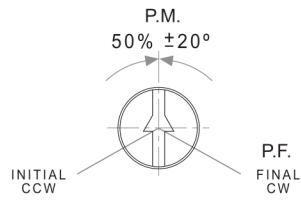
NOTE = Please note relative terminal positions when ordering non linear tapers.

## Crimped terminals



## OPTIONS

Positioning (Std. Position = CCW)



CUT TRACK  
CCW on-off (A)



A = Initial

E = Final

S = Wiper

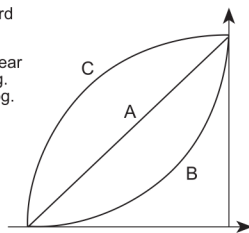
CW on-off (E)



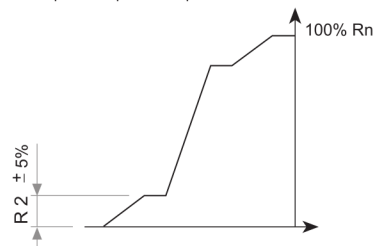
## TAPERS

Standard

A = Linear  
B = Log.  
C = Alog.



Special taper example



NOTE = Please note relative terminal positions when ordering non linear tapers.

## TESTS

## TYPICAL VARIATIONS

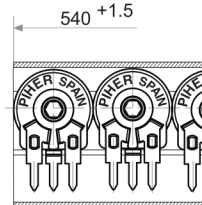
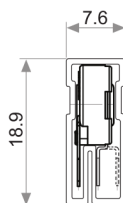
ELECTRICAL LIFE	1.000 h. @ 50°C; 0.15 W	±5 %
MECHANICAL LIFE (CYCLES)	1000 @ 10 CPM ... 15 CPM	±3 % (Rn < 1 MΩ)
TEMPERATURE COEFFICIENT	-25°C; +70°C	±300 ppm (Rn < 100 K)
THERMAL CYCLING	16 h. @ 85°C; 2h. @ -25°C	±2.5 %
DAMP HEAT	500 h. @ 40°C @ 95% HR	±5 %
VIBRATION (for each plane X,Y,Z)	2 h. @ 10 Hz. ... 55 Hz.	±2 %

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

## PACKAGING

### BOXES

Model	Units
Without shaft	1000 (80 x 85 x 185 mm.)
With thumbwheel	800 (80 x 85 x 185 mm.)
With shaft	400 (80 x 85 x 185 mm.)

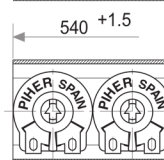
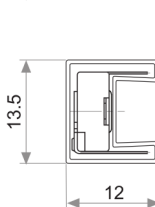


Magazines for PT-10 h 2.5; h 5

Also crimped term. h 2.5 P

### AUTOMATIC INSERTION

Magazines	Units per magazine
PT-10H & PT-10V	50 Pieces

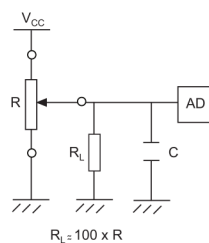


Magazines for PT-10 V

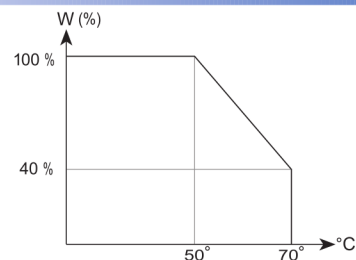
Also crimped term. VP

## RECOMMENDED CONNECTION

Recommended  
connection scheme  
for Piher's position  
sensors  
(voltage divider)



## POWER RATING CURVE



## SHAFTS (for G and M rotor types, top view)

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

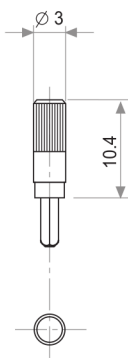


Fig. 1 / Ref. 5016

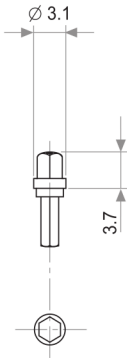


Fig. 2 / Ref. 5053

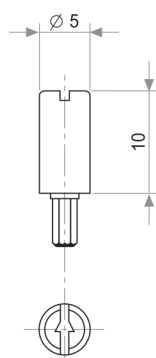


Fig. 3 / Ref. 5012

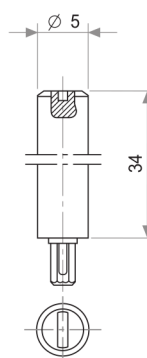


Fig. 4 / Ref. 6053

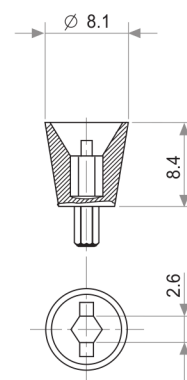


Fig. 6 / Ref. 5035

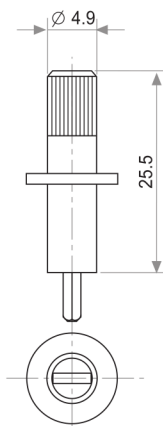


Fig. 7 / Ref. 5115

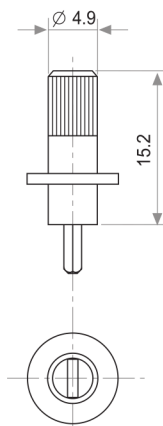


Fig. 8 / Ref. 5116

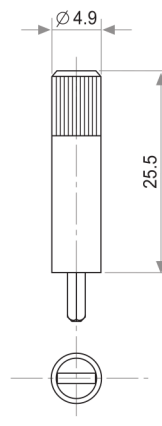


Fig. 9 / Ref. 5119

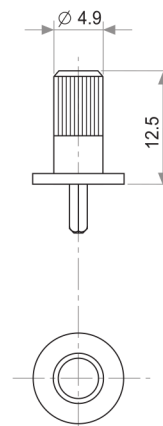


Fig. 10 / Ref. 5120

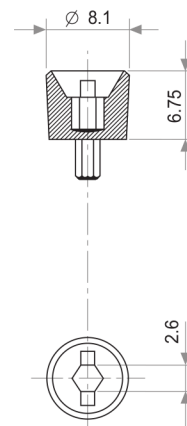


Fig. 11 / Ref. 5027

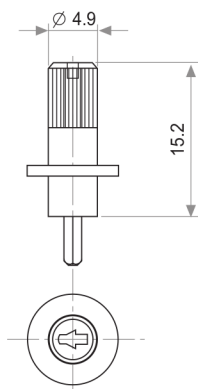


Fig. 12 / Ref. 6052

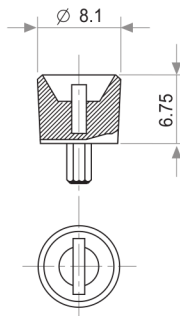


Fig. 13 / Ref. 5121

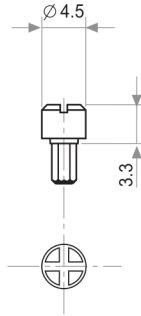
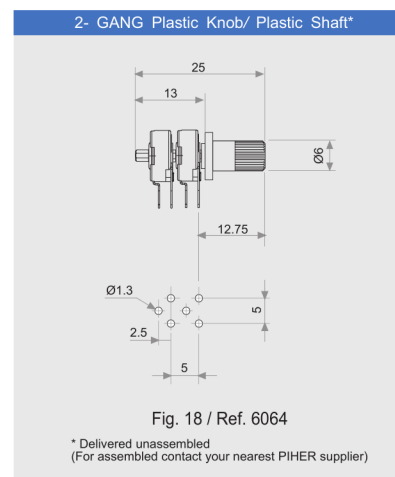


Fig. 14 / Ref. 5055



## THUMBWHEELS (for G and M rotor types, top view)

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

## THUMBWHEEL

For R rotor type only

Marking: configurable number of positions.

Example of four positions marking:

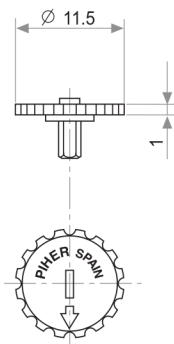


Fig. 5 / Ref. 5034

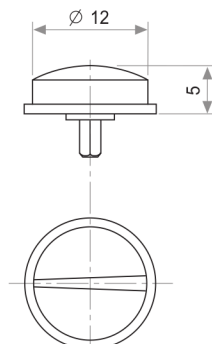


Fig. 15 / Ref. 6008

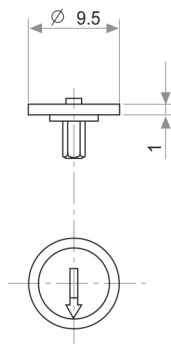


Fig. 16 / Ref. 5039

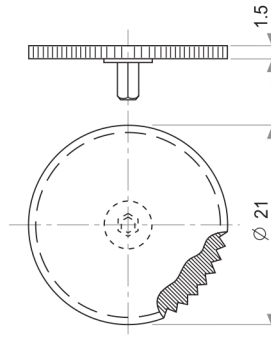
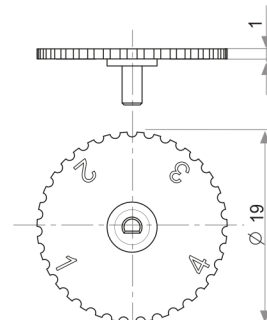


Fig. 17 / Ref. 5062



check availability


## DETENT CONFIGURATIONS EXAMPLES

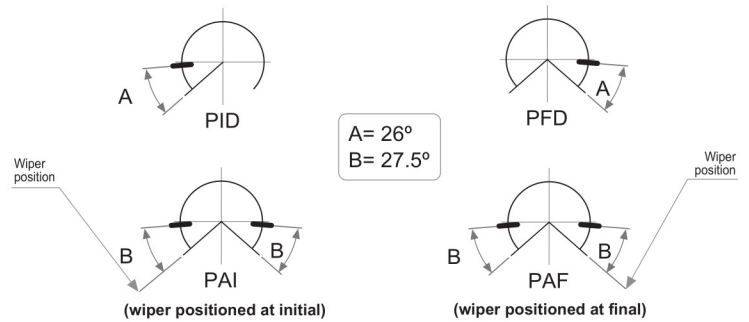
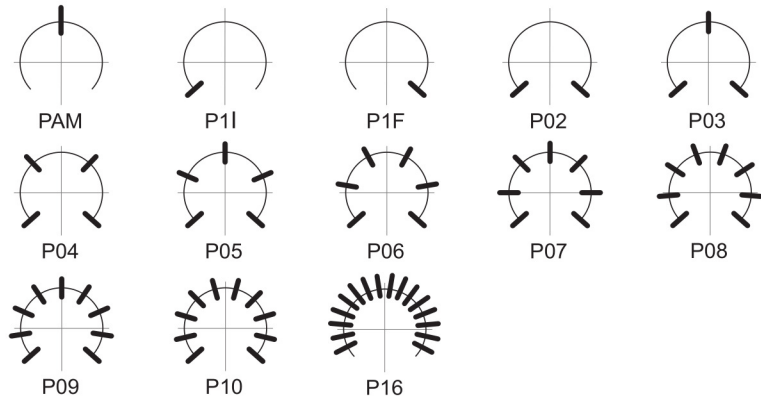
This innovative PT's with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the majority of the 10 & 15 mm. PS/PT/PTC potentiometer series thus allowing a high range of configurations: special tapers, torque, 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.

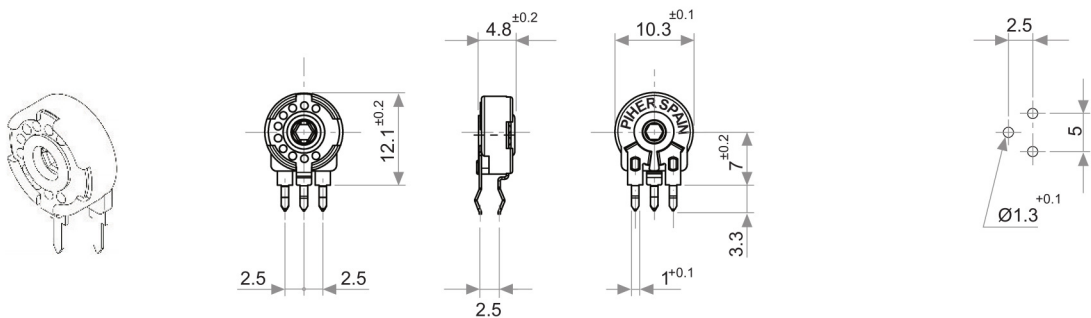
 Relative detent positions along the total mechanical travel. Unless otherwise specified the detents are evenly spaced (using the end points as reference)



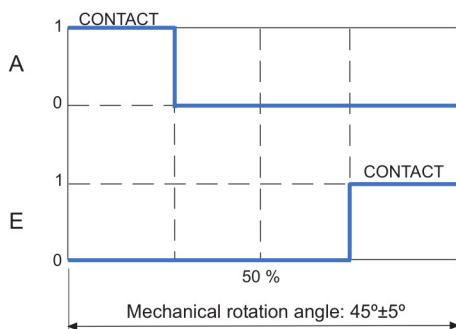
### NOTES FOR DETENTED VERSIONS:

- (1) Detents not available for V05 mounting. These cases are studied individually.
- (2) For more than 10 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<sup>a</sup>:
  - 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.
- (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).

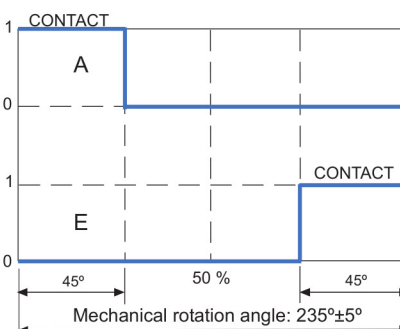
## DETENT DETAILS



## STANDARD SWITCH VERSIONS



D48 Switch code (Housing colour: green)



A80 Switch code

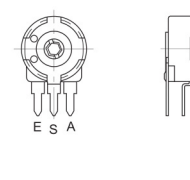
**SW Standard specs.**

Power Rating:  
24V / 15mA

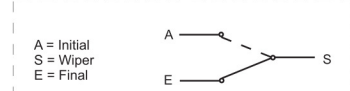
ON position resistance:  
≤ 5 Ω

Insulation Resistance:  
≥ 30 MΩ

Please contact Piher for ordering information.



(Rotor at Final Position)



A = Initial  
S = Wiper  
E = Final

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

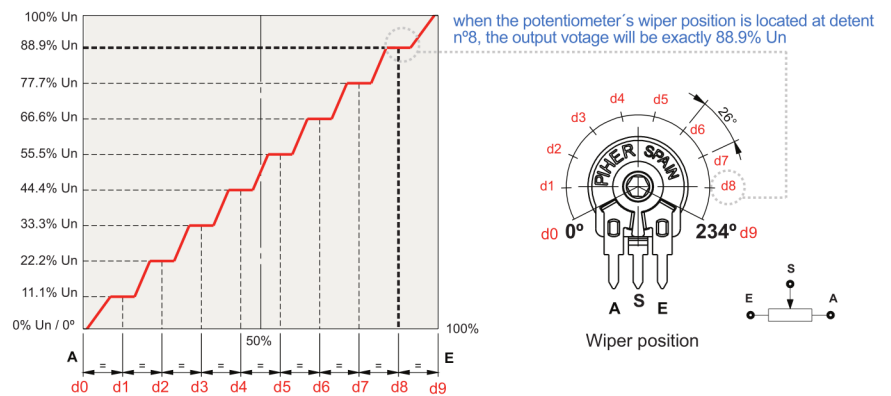
These constant voltage zones can be combined with PIHER's mechanical detents to provide exact alignment between the electrical output (flat areas) and the mechanical detent's positions. The result is a higher level of precision in controlling lighting, temperature, motor or other electronic control systems.

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:**



## 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.

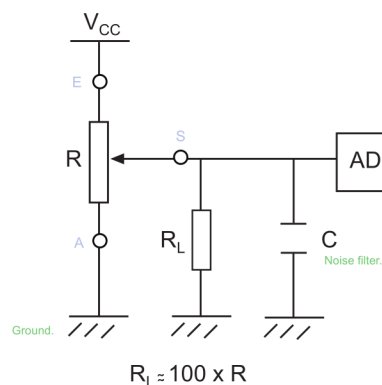


## Main advantages

- ✓ 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

## RECOMMENDED CONNECTIONS

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



## 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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