

# PT-15 / PTC-15

## 15-mm carbon / cermet through-hole potentiometer

The PT-15 and PTC-15 potentiometers offer control where frequent adjustment is required. The shaftless design allows for employment of different engagement mechanisms, such as a customized shaft, a motor control or a human interface adjustment. This potentiometer can also control variable outputs including frequency, change in motor speed or volume.



### KEY FEATURES

- ▶ Excellent performance (up to 3% linearity)
- ▶ Carbon or cermet resistive element
- ▶ Up to 38 mechanical detents for tactile feedback
- ▶ Up to 100.000 life cycles
- ▶ IP54 protection
- ▶ Magazine packaging for automatic insertion available
- ▶ Polyester / Alumina substrate
- ▶ Wiper positioned at initial, 50% or fully clockwise
- ▶ Loose and assembled shaft and knobs
- ▶ Linear, logarithmic and antilogarithmic tapers
- ▶ Self extinguishable plastic (UL 94V-0) available
- ▶ SPDT switch and low torque version available

### ELECTRICAL SPECIFICATIONS

|                                  | PT-15   | PTC-15  |
|----------------------------------|---|---|
| Taper <sup>1</sup>               | Lin, Log, Alog                                    |   |
| Range of values <sup>1</sup>     | (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)        |   |
| Lin                              | 100Ω ≤ R <sub>n</sub> ≤ 5MΩ                       |   |
| Log, Alog                        | 1KΩ ≤ R <sub>n</sub> ≤ 5MΩ                        |   |
| Tolerance <sup>1</sup>           |   |   |
| 100Ω ≤ R <sub>n</sub> ≤ 1MΩ      | ± 20%   |   |
| 1MΩ < R <sub>n</sub> ≤ 5MΩ       | ± 30%   |   |
| Max. Voltage                     |   |   |
| Lin                              | 250 VDC   |   |
| Log, Alog                        | 125 VDC   |   |
| Nominal power                    | 50°C (122°F)                                      | 70°C (158°F)                                      |
| Lin                              | 0.25 W  | 0.50 W  |
| Log, Alog                        | 0.12 W  | 0.25 W  |
| Residual resistance <sup>1</sup> | ≤ 0.5% R <sub>n</sub> (5Ω min.)                   |   |
| Equivalent noise resistance      | ≤ 3% R <sub>n</sub> (3Ω min.)                     |   |
| Operating temperature            | -25°C to +70°C <sup>2</sup><br>[-13°F to + 158°F] | -40°C to +90°C <sup>3</sup><br>[-40°F to + 194°F] |

<sup>1</sup> Others available on request; <sup>2</sup> Up to 85°C depending on application.; <sup>3</sup> +120°C/+248°F upon request

### APPLICATIONS

- ▶ Appliance program selection
- ▶ Thermostat adjustment
- ▶ Timer and control relays
- ▶ Consumer electronics
- ▶ Power tool controls
- ▶ Test and measurement equipment

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### MECHANICAL SPECIFICATIONS

|  | PT-15   | PTC-15           |
|--|---|------------------|
| Mechanical rotation angle <sup>1</sup> | 265° ± 5°   |                  |
| Electrical rotation angle              | 240° ± 20°  |                  |
| Torque<br>Rotational<br>Stop           | 0.5 to 2.5 Ncm (0.7 to 3.4 in-oz)<br>> 10 Ncm (>14 in-oz) |                  |
| Life <sup>2</sup>                      | Up to 100k cycles   | Up to 10k cycles |

<sup>1</sup> 240° ± 5° available upon request. Endless rotation available: ST-15; <sup>2</sup> Others check availability

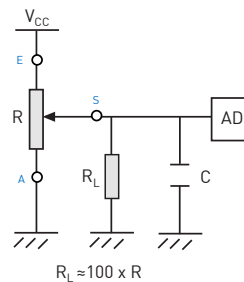
### ENVIRONMENTAL TESTING

|                         | Test method (CEI 393-1)                                    | PT-15<br>ΔR(%)- Piher typical test results | PTC-15<br>ΔR(%)- Piher typical test results |
|-------------------------|--|--|---|
| Electrical life         | 1.000h at 50°C; 0.15W<br>1.000h at 70°C; 0.33W             | ±5%<br>n/a                                 | n/a<br>±2%                                  |
| Mechanical life         | 1000 cycles at 10 to 15 cpm                                | ±3 % (Rn < 1M )                            | ±2%   |
| Temperature coefficient | -25°C; +70°C<br>-40°C; +90°C                               | ±300 ppm/°C (Rn < 100K)<br>n/a             | n/a<br>±100 ppm/°C (Rn < 100K)              |
| Thermal cycling         | 16h at 85°C and 2h at -25°C<br>16h at 90°C and 2h at -40°C | ±2.5%<br>n/a                               | n/a<br>±2%                                  |
| Damp heat               | 500h at 40°C and 95% relative humidity (RH)                | ±5%  | ±2%   |
| Vibration               | 2h each plane at 10Hz - 55Hz                               | ±2%  | ±2%   |
| Storage                 | 6 month at 23°C ±2°C and 50% RH                            | ±2.5%                                      | ±2%   |

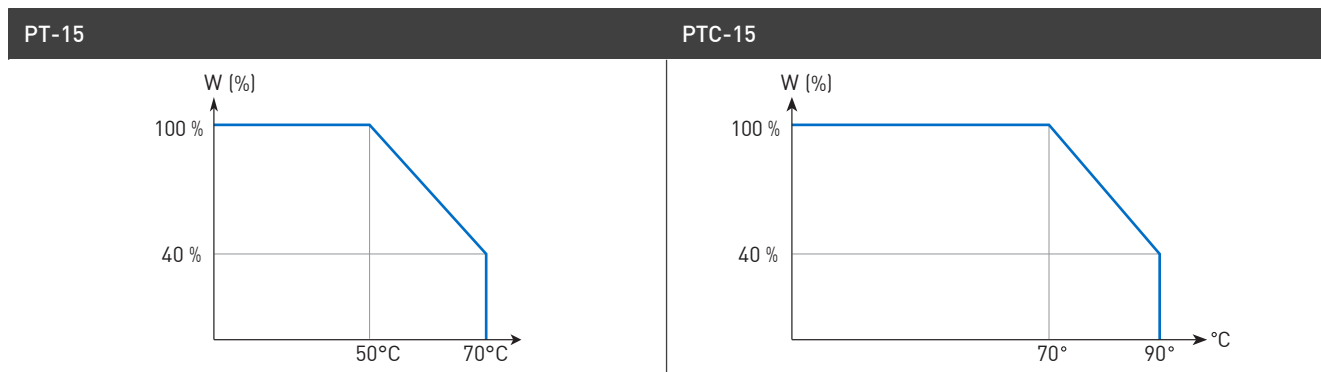
Out of range values may not comply with these results. Standard test conditions: temperature: 23°C ±2°C and 45% to 70% RH

### RECOMMENDED CONNECTIONS

Recommended connection circuit for a position sensor or control application (voltage divider circuit electronic design).



### POWER RATING CURVE



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### HOW TO ORDER

Carbon potentiometer (Example: PT15LH01-223A2020-S)

| Series | Rotors <sup>1</sup>                                      | Mounting method <sup>2</sup>  | Ω-Value <sup>3</sup>  | Taper                            | Tolerance <sup>4</sup>  | Life <sup>5</sup>  | Cut track             | Detents   | Shaft/Thumbwheel  | Flammability <sup>6</sup>               | Shaft/Rotor color <sup>7</sup>  | Wiper position                              | Torque <sup>8</sup>               | Packaging <sup>9</sup>                               |
|--------|--|---|---|----------------------------------|---|--|-----------------------|---|---|---|---|---|-----------------------------------|--|
| PT15   | L<br>N<br>G<br>M<br>C<br>F<br>R<br>T<br>W<br>X<br>Y<br>Z | H01 horizontal adjust<br>H05 H25 crimped terminals<br>H02 H06 H10 vertical adjust<br>V02 V12 V15 V17 V18 V20 V24 crimped terminals<br>V21 V22 V23 V25 crimped terminals | 101 = 100Ω<br>201 = 200Ω<br>...<br>504 = 500KΩ<br>505 = 5MΩ | A = lin.<br>B = log.<br>C =alog. | 0505 = ±5%<br>0707 = ±7%<br>1010 = ±10%<br>2020 = ±20%<br>3030 = ±30%<br>XXYY = +XX-YY% | [empty] = 1K cycles<br>E = 10K cycles<br>U = 100K cycles | [empty]<br>PCI<br>PCF | [empty]<br>PAM<br>PAM<br>PAF<br>P11<br>P1F<br>P02<br>...<br>P38 | [empty] = none<br>01 = Fig.1<br>02 = Fig.2<br>28 = Fig.28 | [empty] = standard<br>I = non-flammable | [empty]<br>AM = yellow<br>AZ = blue<br>CR = cream<br>GR = grey<br>MA = brown<br>NA = orange<br>NE = black<br>RO = red<br>VE = green | [empty] = initial<br>PM = 50%<br>PF = final | [empty] = standard<br>L ≤ 1.5 Ncm | [empty] = bulk<br>T = magazines<br>R = embossed tape |

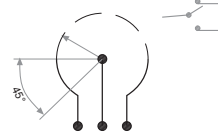
Cermet potentiometer (Example: PTC15LH01-223A2020)

| Series | Rotors <sup>1</sup>                                      | Mounting method <sup>2</sup>  | Ω-Value <sup>3</sup>  | Taper                            | Tolerance <sup>4</sup>  | Life <sup>5</sup>                     | Detents  | Shaft/Thumbwheel  | Shaft/Rotor color <sup>7</sup>  | Torque <sup>8</sup>               | Wiper position                              | Packaging <sup>9</sup>                               |
|--------|--|---|---|----------------------------------|---|---------------------------------------|--|---|---|-----------------------------------|---|--|
| PTC15  | L<br>N<br>G<br>M<br>C<br>F<br>R<br>T<br>W<br>X<br>Y<br>Z | H01 horizontal adjust<br>H05 H15 crimped terminals<br>H02 H06 H10 vertical adjust<br>V02 V12 V15 V17 V18 V20 V24 crimped terminals<br>V21 V22 V23 V25 crimped terminals | 101 = 100Ω<br>201 = 200Ω<br>...<br>504 = 500KΩ<br>505 = 5MΩ<br>000 = CM | A = lin.<br>B = log.<br>C =alog. | 0505 = ±5%<br>0707 = ±7%<br>1010 = ±10%<br>2020 = ±20%<br>3030 = ±30%<br>XXYY = +XX-YY% | [empty] = 1K cycles<br>E = 10K cycles | [empty]<br>PAI<br>PAM<br>PAM<br>PAF<br>P11<br>P1F<br>P02<br>...<br>P38 | [empty] = none<br>01 = Fig.1<br>02 = Fig.2<br>28 = Fig.28 | [empty]<br>AM = yellow<br>AZ = blue<br>GR = grey<br>MA = brown<br>NA = orange<br>NE = black<br>RO = red<br>VE = green | [empty] = standard<br>L ≤ 1.5 Ncm | [empty] = initial<br>PM = 50%<br>PF = final | [empty] = bulk<br>T = magazines<br>R = embossed tape |

1. Rotors: "Z" adjustment only available on "H"-mounting versions. Standard color for the "T" rotor: Orange.

2. Mounting method: "V24" terminals material: brass.

3. Ω- Value: XXX - First two digits of Ω-value      000 = CM = 45° switch SPDT version  
XXX - Number of zeros



4. Tolerance: for custom tolerance please check availability: info@piher.net

5. Life: "U" only available for low-torque versions and to be studied case by case.

6. Non-flammable according to UL 94V-0: housing, rotor and shaft. PTC-15 made of non-flammable material by standard.

7. Shaft/rotor color: Without shaft: only the rotor. With shaft: only the shaft.

8. Torque: Detent option not available with low torque models.

9. Packaging: Magazine packaging available for all H and V12, V02, V21, V15 and V23 mounting.

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| STANDARD CONFIGURATION |                |        |
|------------------------|----------------|--------|
|                        | PT-15          | PTC-15 |
| Life                   | 1.000 cycles   |        |
| Cut track              | no             | n/a    |
| Detents                | none           |        |
| Packaging              | bulk           |        |
| Shaft/thumb wheel      | none           |        |
| Non-flammability       | no             | yes    |
| Housing color          | black          | cream  |
| Rotor color            | white          | cream  |
| Wiper Position         | initial        |        |
| Torque                 | 0.5 to 2.5 Ncm |        |
| Terminal material      | steel          | brass  |
| Linearity              | not controlled |        |

### ROTORS

| Wiper shown at initial position    |                                     |                                    |                                     |   |
|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|---|
| L<br>Screw driver - through hole   | N<br>Removable shaft or thumbwheel  | G<br>Removable shaft or thumbwheel |                                     |   |
|                                    |                                     |                                    |                                     |   |
| Wiper shown positioned at 50%      |                                     |                                    |                                     |   |
| M<br>Hexagonal - through hole      | C                                   | F                                  | R                                   | T |
|                                    |                                     |                                    |                                     |   |
| With inserted shaft                |                                     | With inserted thumbwheel           |                                     |   |
| W<br>Adjustable from terminal side | X<br>Adjustable from collector side | Y<br>Adjustable from terminal side | Z<br>Adjustable from collector side |   |
|                                    |                                     |                                    |                                     |   |

Default delivery is at initial position.



Download the STEP file here:  
<https://www.piher.net/piher/?p=916>

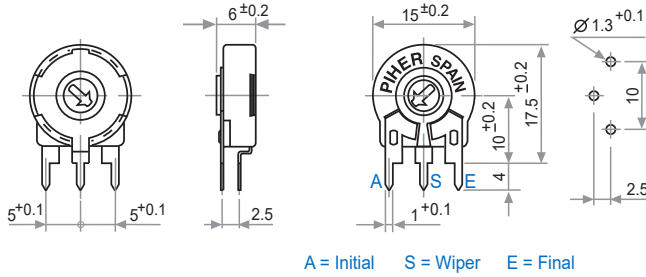
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## 15-mm carbon / cermet through-hole potentiometer

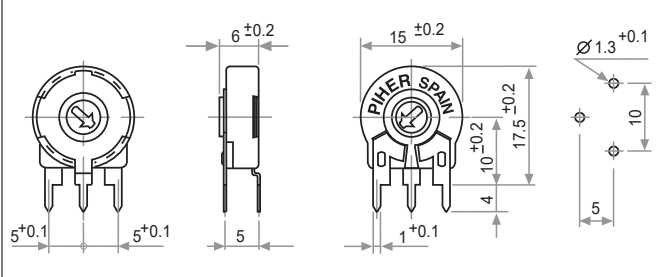
### MOUNTING METHOD

#### Horizontal adjust / vertical mounting

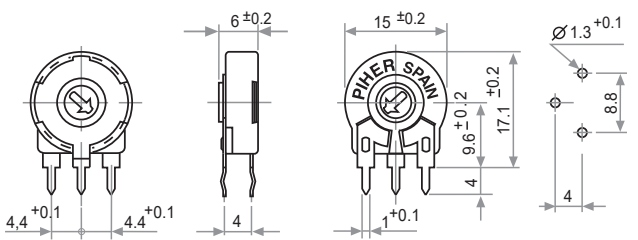
H01 - 2.5mm / H02 with crimped terminals



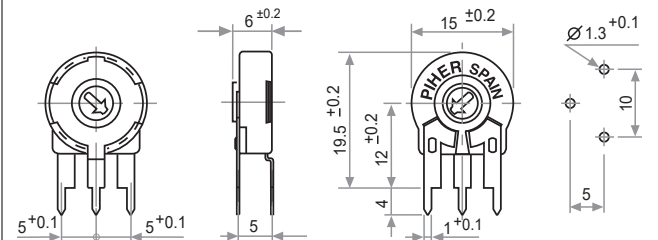
H05 - 5mm / H10 with crimped terminals



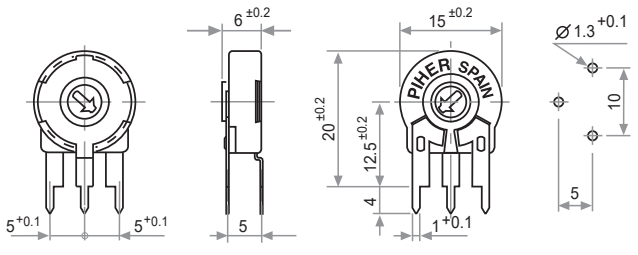
H06 - B



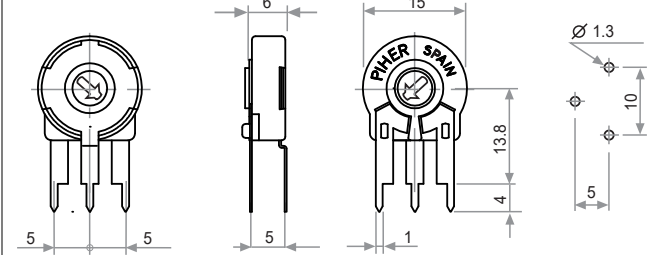
H15 - A5



H25 - C5

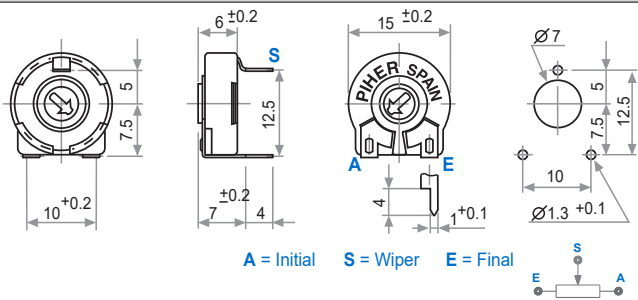


Available on request

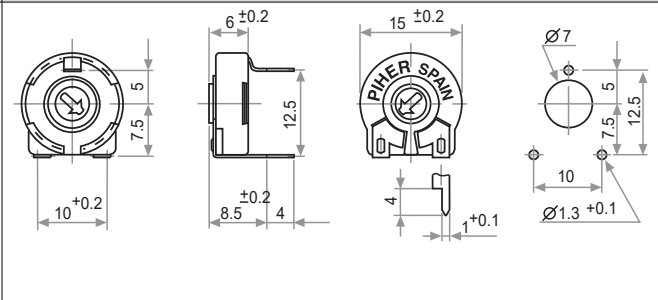


#### Vertical adjust / horizontal mounting

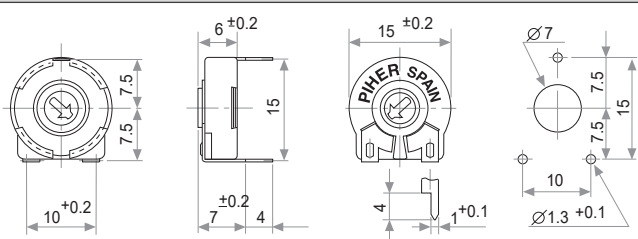
V02 - 12.5mm / V21 with crimped terminals



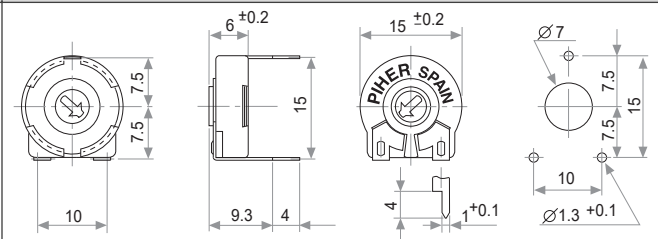
V12 - 12.5mm / V22 with crimped terminals



V15 - 15mm / V23 with crimped terminals



V20 - 15mm (L)



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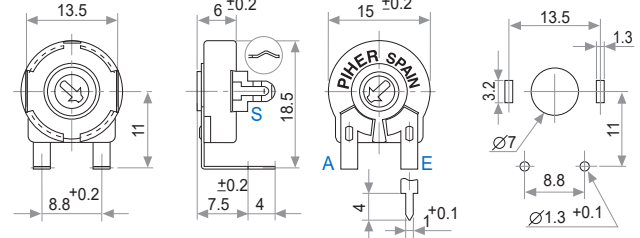
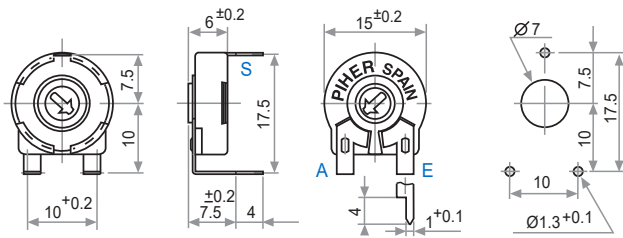
## 15-mm carbon / cermet through-hole potentiometer

### MOUNTING METHOD

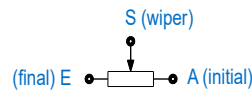
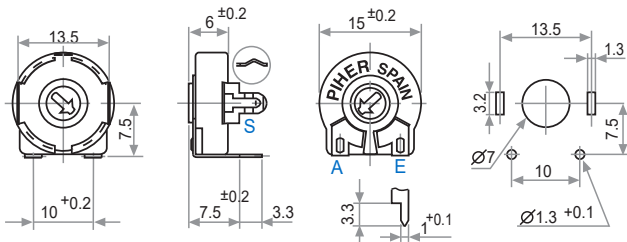
#### Vertical adjust / horizontal mounting

V17 - 17.5mm / V25 with crimped terminals

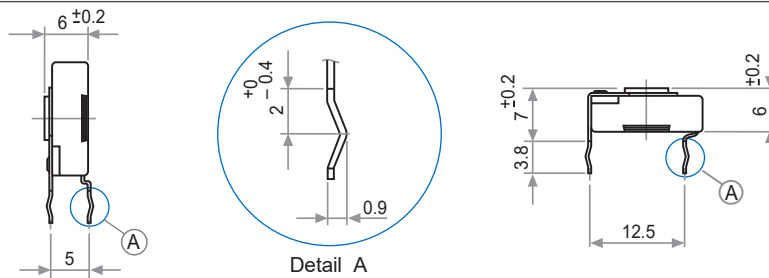
V18 - 18.5mm (D)



V24 - 15mm (D15)



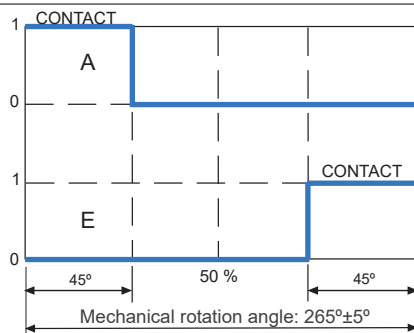
### CRIMPED TERMINALS (DETAIL)



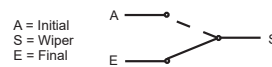
### STANDARD RESISTANCE-VALUES AND TOLERANCES

| Resistance $\Omega$ | 100 | 200 | 220 | 250 | 470 | 500 | 1K  | 2K  | 2.2K | 2.5K | 4.7K | 5K  | 10K | 20K | 22K | 25K | 47K | 50K | 100K | 200K | 220K | 250K | 470K | 500K | 1M  | 2M  | 2.5M | 4.7M | 5M  |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|-----|-----|------|------|-----|
| Order Code          | 101 | 201 | 221 | 251 | 471 | 501 | 102 | 202 | 222  | 252  | 472  | 502 | 103 | 203 | 223 | 253 | 473 | 503 | 104  | 204  | 224  | 254  | 474  | 504  | 105 | 205 | 255  | 475  | 505 |
| Tolerance           | 20% |     |     |     |     |     |     |     |      |      |      |     |     |     |     |     |     |     |      |      |      |      |      |      | 30% |     |      |      |     |

### SWITCH VERSIONS AVAILABLE WITH OR WITHOUT DETENTS



**Standard Specification**  
 Power rating: 24V / 15mA  
 ON position resistance:  $\leq 5\Omega$   
 Insulation resistance:  $\geq 30M\Omega$

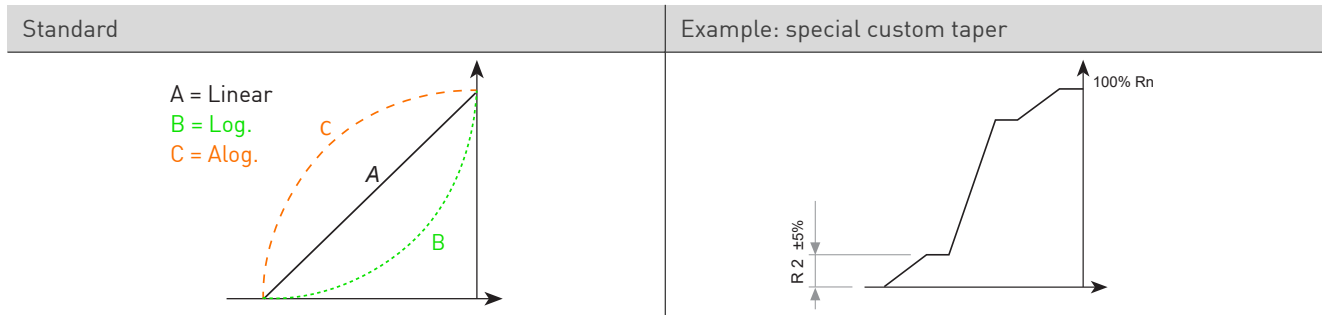


Contact Piher Sensing Systems for ordering information.

# PT-15 / PTC-15

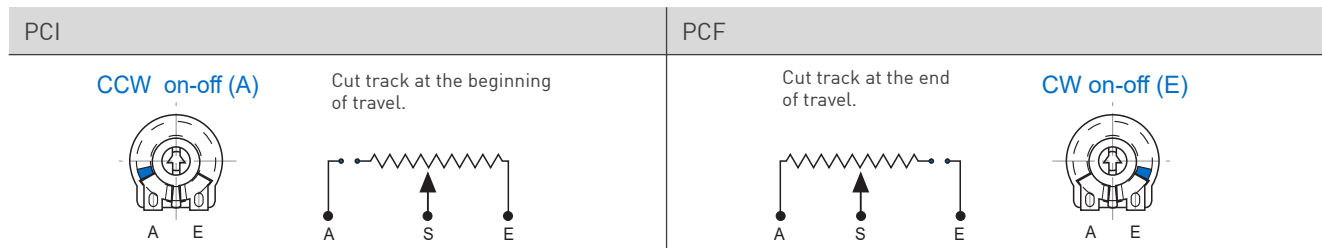
## 15-mm carbon / cermet through-hole potentiometer

### TAPERS



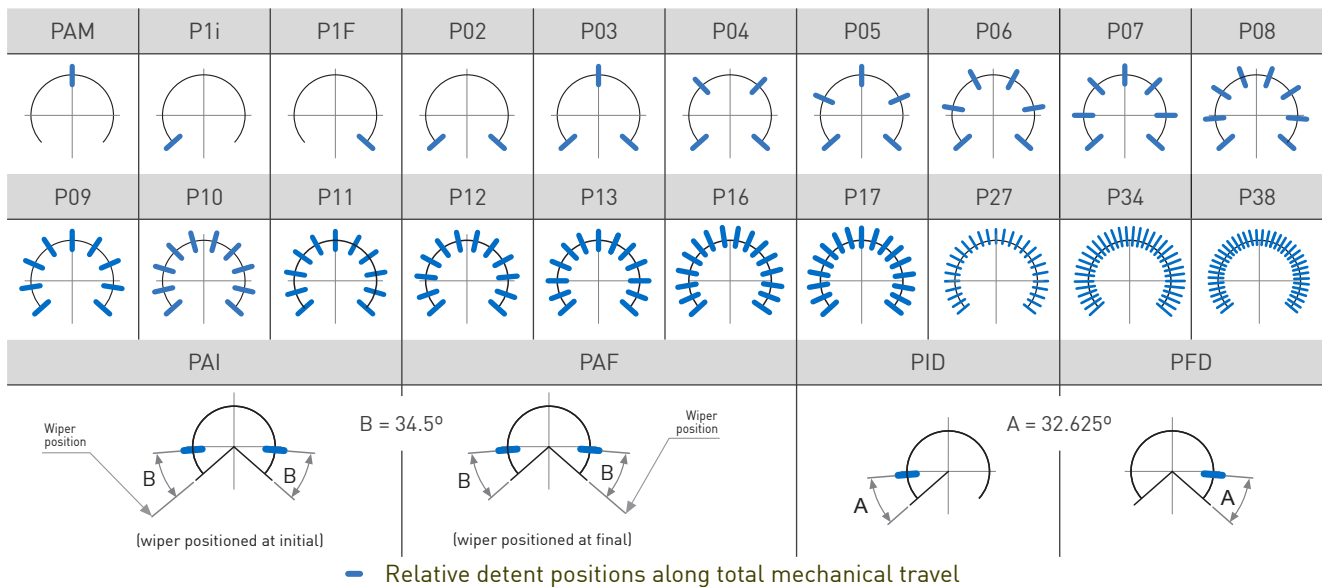
For more information on custom tapers contact Piher Sensing Systems.

### CUT TRACKS (OPEN CIRCUIT DESIGN)



Other configurations available upon request. Cut Track not available for PTC-15.

### DETENTS

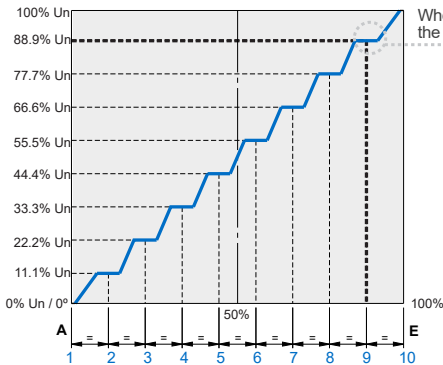


- Standard mechanical life is 500 cycles.
- Long life versions are available upon request and have the following characteristics at T<sup>a</sup>: Potentiometers with 1 to 3 detents up to 10K cycles; Potentiometers with 4 and more detents up to 5K cycles
- Please consult Piher Sensing Systems if unique non-overlapping values at each detent position or LOG/ALOG tapers are required.
- Different output voltage values can be matched at each detent position [see next section].
- 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
- For V18 and V24 mounting detent configuration will be studied case by case.
- For more than 13 detents versions please contact Piher Sensing Systems.

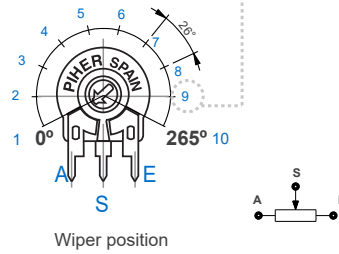
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## 15-mm carbon / cermet through-hole potentiometer

### STEPPED OUTPUTS / CONSTANT VALUE ZONES



When the potentiometer's wiper is located at detent n°9, the output voltage will be 88.9% Un  $\pm$  % tolerance.

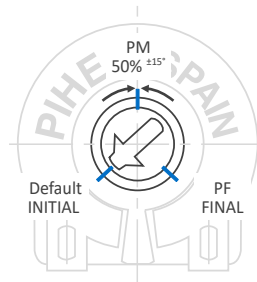


### IMPROVED REPEATABILITY

Constant value zones can be combined with strategically located mechanical detents to provide exact alignment between the electrical output (flat areas) and the mechanical detent position. This provides clear mechanical positions that are not only repeatable, but perfectly aligned electrical outputs at each of the (detent) angles. The detents also prevent output values from changing due to vibration or accidental rotor movements. The result is a higher level of precision in controlling lighting, temperature, motor or other electronic control systems.

Contact Piher Sensing Systems for ordering information.

### POSITIONING



Special delivery positions available on request.

### PACKAGING

#### Bulk



Dimensions (mm): 185x85x80

Without shaft: 400 units per box  
 With thumbweel: 200 units per box  
 With shaft: contact Piher Sensing Systems

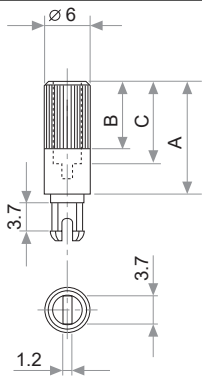


# PT-15 / PTC-15

## 15-mm carbon / cermet through-hole potentiometer

### SHAFTS AND THUMBWHEELS (TOP VIEW, FOR N, G AND T ROTOR TYPES)

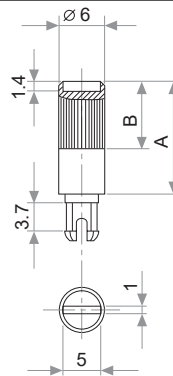
#### Hollow shafts models



| Fig. | Ref. | A    | B   | C    |
|------|------|------|-----|------|
| 1    | 5272 | 12   | 9   | 8    |
| 2    | 5214 | 19   | 9   | 15   |
| 5    | 5208 | 9.5  | 6.5 | 5.5  |
| 9    | 5216 | 35   | 9   | 31   |
| 10   | 5218 | 37.8 | 9   | 33.8 |
| 11   | 5209 | 35   | 25  | 31   |

A = Length measured from rotor surface  
B = Knurling length  
C = Hollow depth

#### Solid shafts models



| Fig. | Ref. | A    | B |
|------|------|------|---|
| 6    | 5219 | 15   | 9 |
| 7    | 5220 | 16.8 | 9 |
| 8    | 5207 | 25.3 | 9 |
| 12   | 5227 | 46   | 5 |

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

Fig. 3 - Ref. 5372

Fig. 15 - Ref. 5217

Fig. 17 - Ref. 5210

Fig. 18 - Ref. 5271

Fig. 19 - Ref. 6032\*

Fig. 20 - Ref. 5369\*

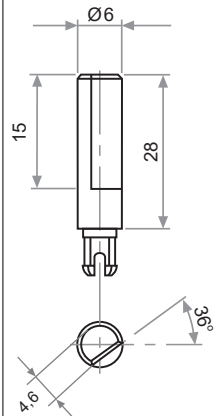
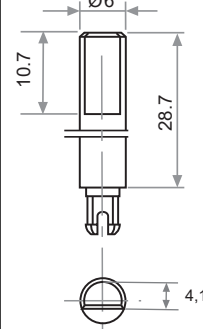
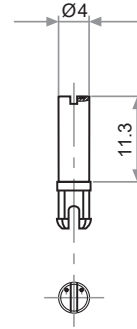
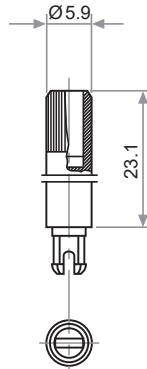
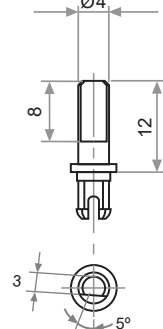
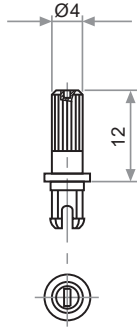


Fig. 21 - Ref. 6031\*

Fig. 22 - Ref. 6029

Fig. 23 - Ref. 6022

Fig. 29 - Ref. 6162

Fig. 25 - Ref. 6059

Fig. 27 - Ref. 5268\*

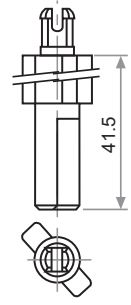
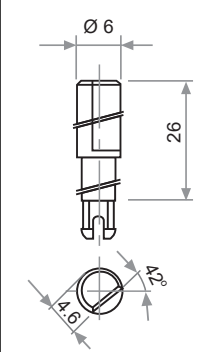
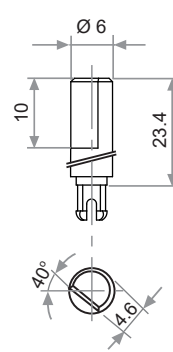
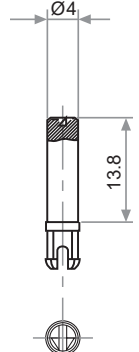
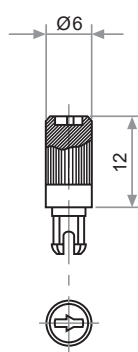
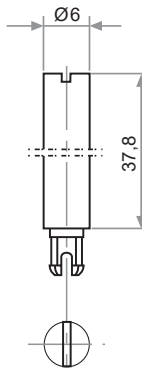
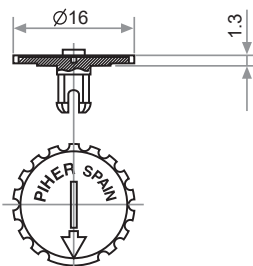
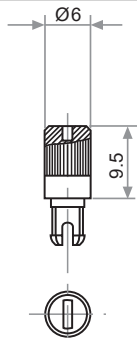


Fig. 28 - Ref. 6055

Fig. 4 - Ref. 5371



Thumbwheel and shafts are delivered unassembled if not specified otherwise in part number code (W, X, Y, Z). The position of the thumbwheel Fig 4 can be indicated in part number code: Initial (default), 50% (PM) or Final (PF), shafts will be delivered at random position by default. Custom specific positions are available for all shafts and thumbwheel on request.

The plastic color can be stated in the part number.  
Non flammable plastic available, if potentiometer is order with non-flammable plastic (UL-94V0), the shaft or knob will be delivered with non-flammable plastic.  
If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.  
\*Not available in self-extinguishable plastic.