

# 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> [-13°F to + 158°F]	-40°C to +90°C <sup>3</sup> [-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

# PT-15 / PTC-15

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

### MECHANICAL SPECIFICATIONS

	PT-15	PTC-15
Mechanical rotation angle <sup>1</sup>	265° ± 5°	
Electrical rotation angle	240° ± 20°	
Torque Rotational Stop	0.5 to 2.5 Ncm (0.7 to 3.4 in-oz) > 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

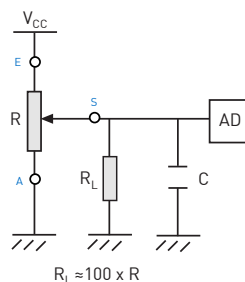
### ENVIRONMENTAL TESTING

	Test method (CEI 393-1)	PT-15 ΔR[%] - Piher typical test results	PTC-15 ΔR[%] - Piher typical test results
Electrical life	1.000h at 50°C; 0.15W 1.000h at 70°C; 0.33W	±5% n/a	n/a ±2%
Mechanical life	1000 cycles at 10 to 15 cpm	±3 % (Rn < 1M )	±2%
Temperature coefficient	-25°C; +70°C -40°C; +90°C	±300 ppm/°C (Rn < 100K) n/a	n/a ±100 ppm/°C (Rn < 100K)
Thermal cycling	16h at 85°C and 2h at -25°C 16h at 90°C and 2h at -40°C	±2.5% n/a	n/a ±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%

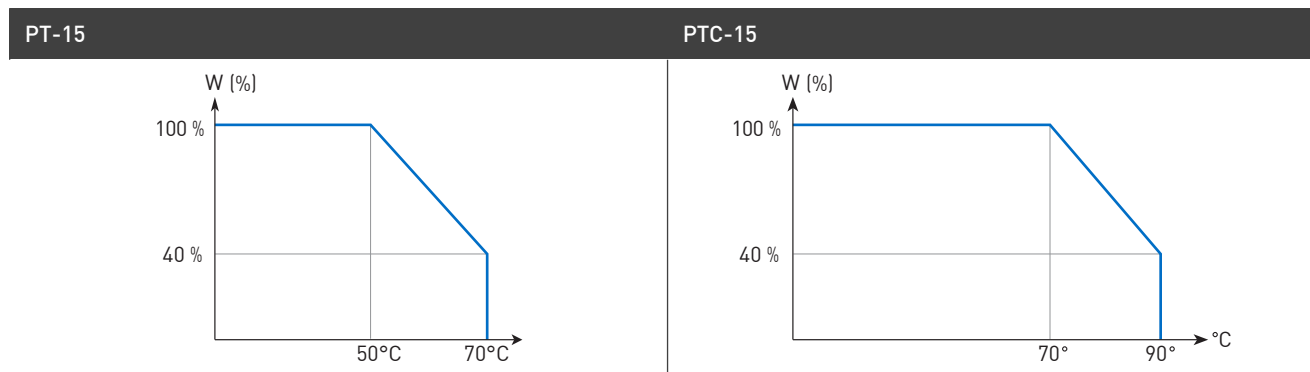
Out of range values may not comply with these results. Standard test conditions: temperature: 23°C ±2°C and 45% to 70% RH

### RECOMMENDED CONNECTIONS

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



### POWER RATING CURVE



# PT-15 / PTC-15

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

### HOW TO ORDER

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

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

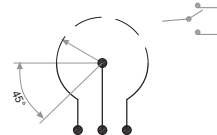
Cermet potentiometer (Example: PTC15LH01-223A2020)

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

# PT-15 / PTC-15

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

### 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 Screw driver - through hole	N Removable shaft or thumbwheel	G Removable shaft or thumbwheel

#### Wiper shown positioned at 50%

M Hexagonal - through hole	C	F	R	T

#### With inserted shaft

#### With inserted thumbwheel

W Adjustable from terminal side	X Adjustable from collector side	Y Adjustable from terminal side	Z Adjustable from collector side

Default delivery is at initial position.

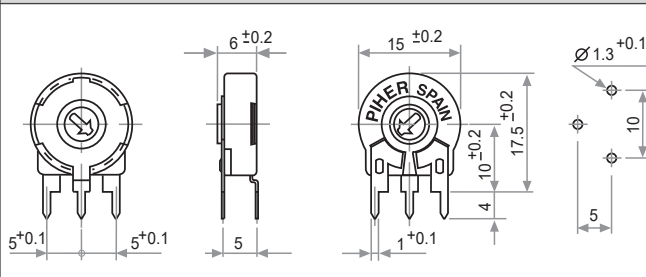


Download the STEP file here:  
<https://www.piher.net/piher/?p=916>

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

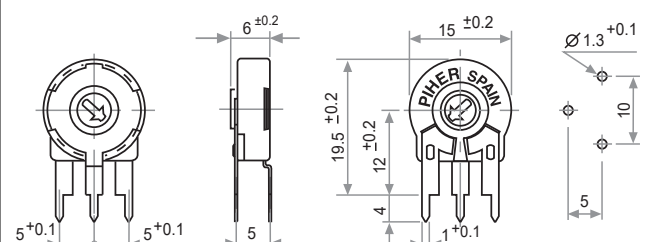
Horizontal adjust / vertical mounting

H05 -5mm / H10 with crimped terminals

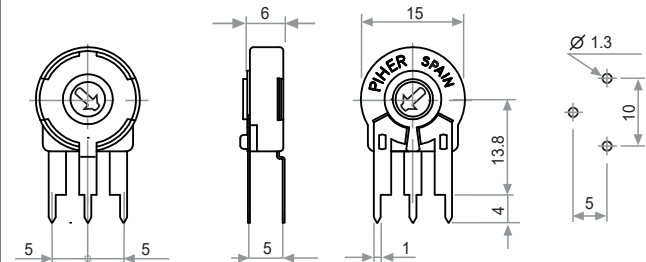


A = Initial      S = Wiper      E = Final

H15 - A5

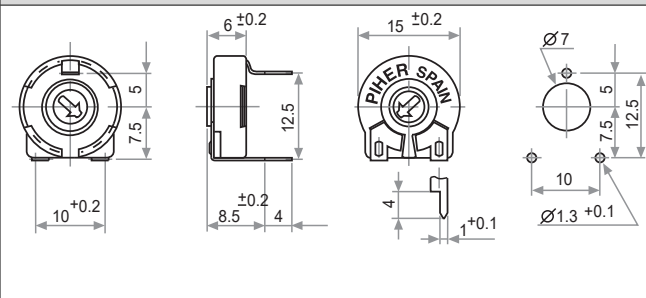


Available on request



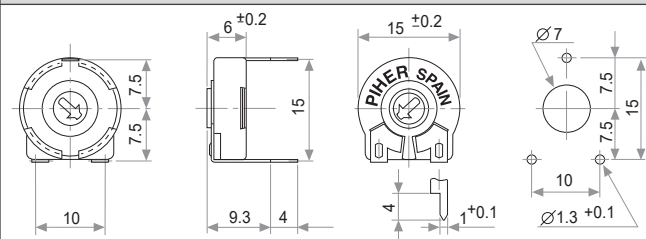
V02 - 12.5mm / V21 with crimped terminals

V12 - 12.5mm / V22 with crimped terminals



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

V20 - 15mm (L)



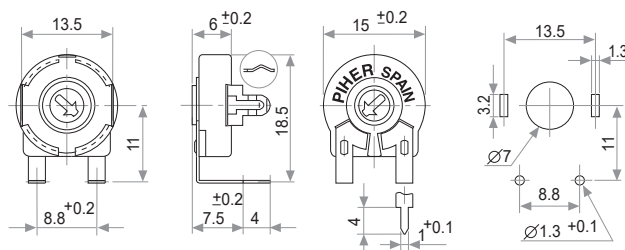
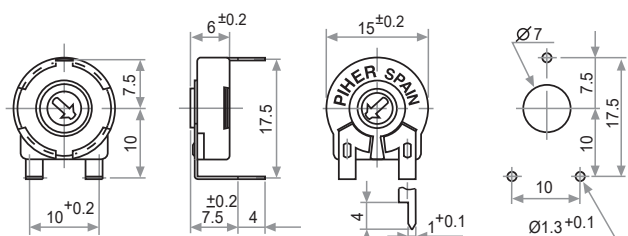
## 15-mm carbon / cermet through-hole potentiometer

## MOUNTING METHOD

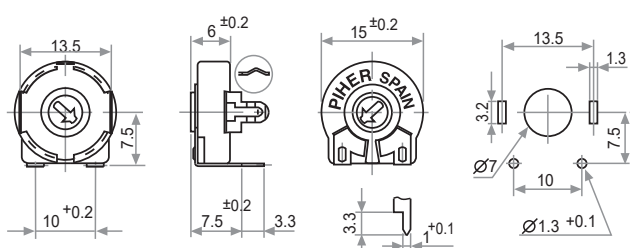
### Vertical adjust / horizontal mounting

V17 - 17.5mm / V25 with crimped terminals

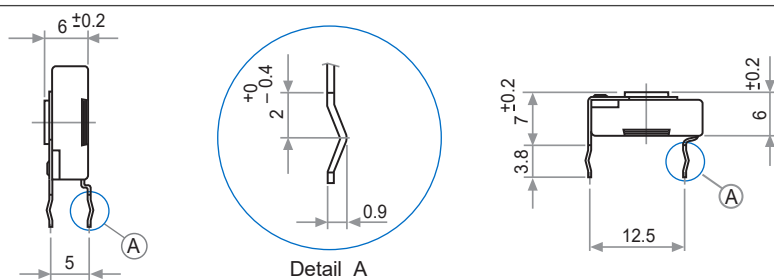
V18 - 18.5mm (D)



V24 - 15mm (D15)



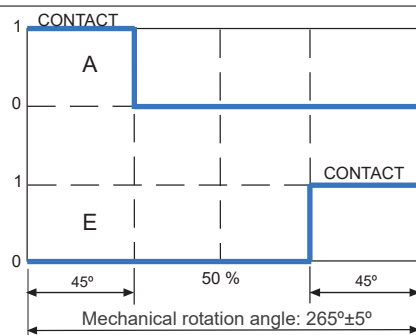
## CRIMPED TERMINALS (DETAIL)



## STANDARD RESISTANCE-VALUES AND TOLERANCES

Resistance Ω	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**



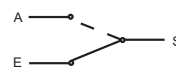
### Standard Specification

Power rating: 24V / 15mA

ON position resistance:  $\leq 5\Omega$

Insulation resistance:  $\geq 30\text{M}\Omega$

A = Initial  
S = Wiper  
E = Final

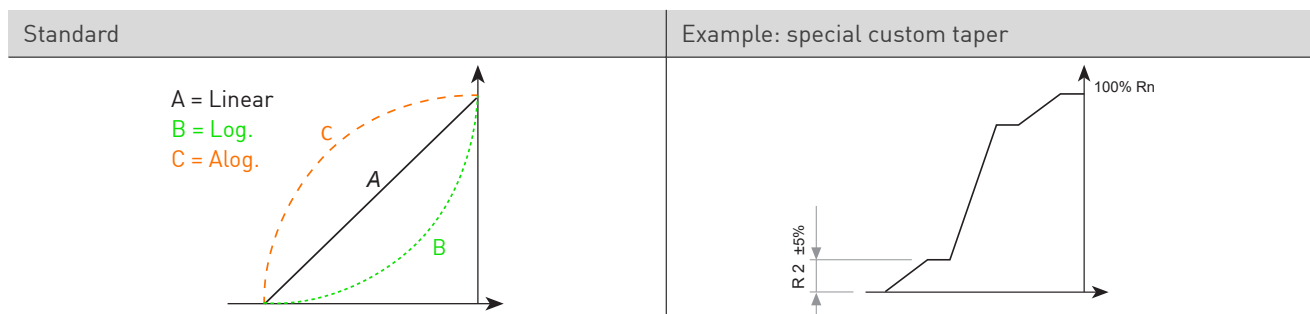


Contact Piher Sensing Systems for ordering information.

# PT-15 / PTC-15

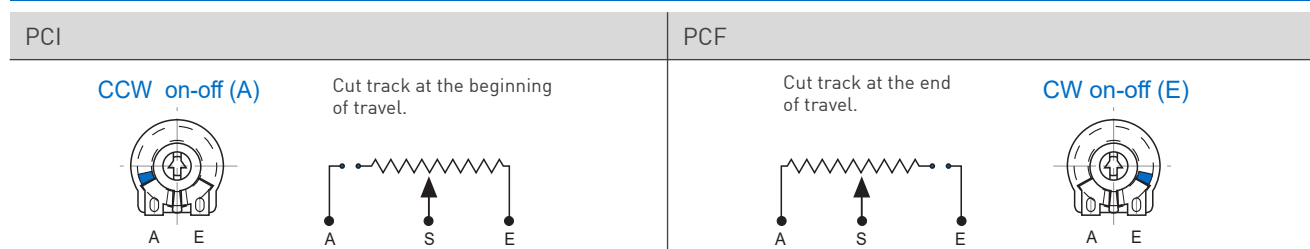
## 15-mm carbon / cermet through-hole potentiometer

### TAPERS



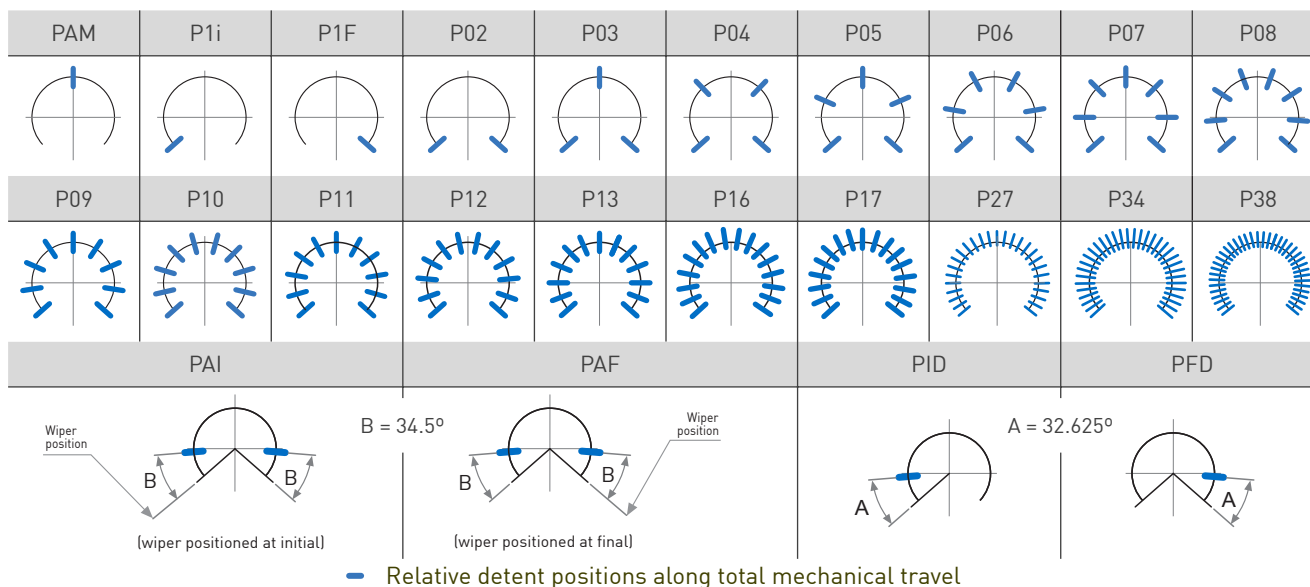
For more information on custom tapers contact Piher Sensing Systems.

### CUT TRACKS (OPEN CIRCUIT DESIGN)



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

### DETENTS

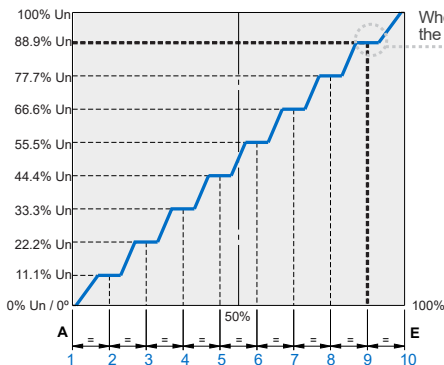


- Standard mechanical life is 500 cycles.
- Long life versions are available upon request and have the following characteristics at T<sup>a</sup>: Potentiometers with 1 to 3 detents up to 10K cycles; Potentiometers with 4 and more detents up to 5K cycles
- Please consult Piher Sensing Systems if unique 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 V02, V21, V12, V22, V18 and V24 mounting detent configuration will be studied case by case.
- For more than 13 detents versions please contact Piher Sensing Systems.

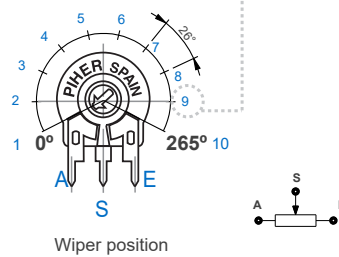
# PT-15 / PTC-15

## 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.

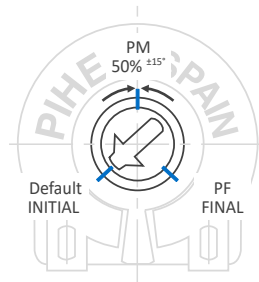


### IMPROVED REPEATABILITY

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

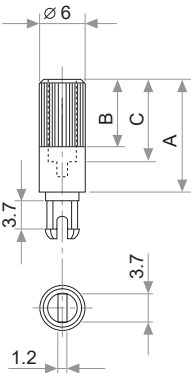
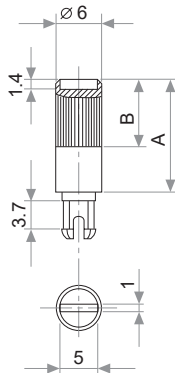
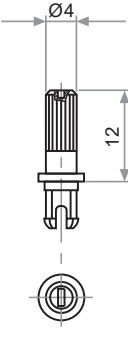
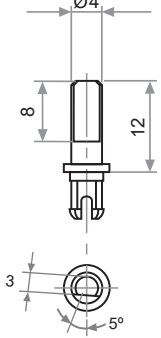
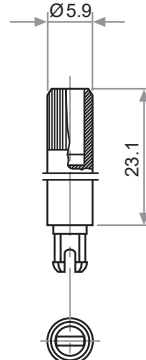
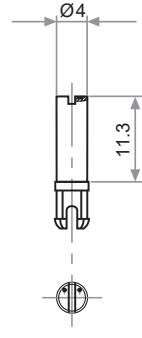
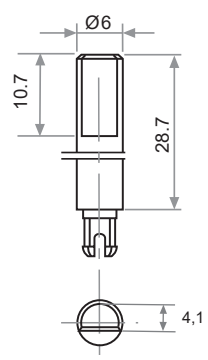
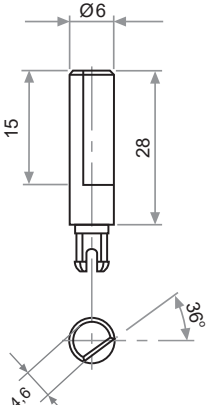
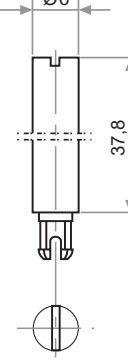
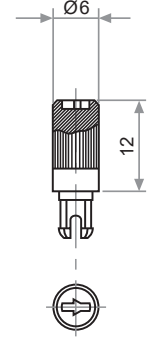
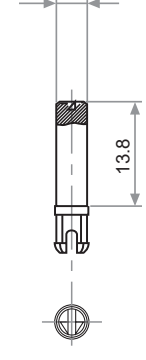
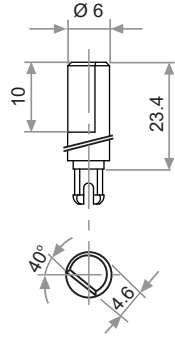
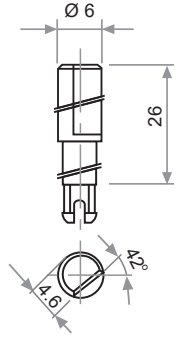
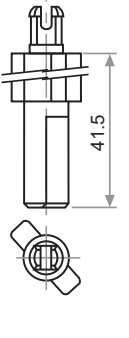
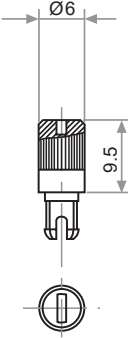
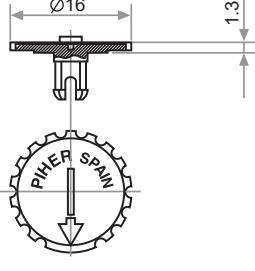
Without shaft: 400 units per box  
With thumbweel: 200 units per box  
With shaft: contact Piher Sensing Systems



# 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			Solid shafts models																																																									
	<table><tr><th>Fig.</th><th>Ref.</th><th>A</th><th>B</th><th>C</th></tr><tr><td>1</td><td>5272</td><td>12</td><td>9</td><td>8</td></tr><tr><td>2</td><td>5214</td><td>19</td><td>9</td><td>15</td></tr><tr><td>5</td><td>5208</td><td>9.5</td><td>6.5</td><td>5.5</td></tr><tr><td>9</td><td>5216</td><td>35</td><td>9</td><td>31</td></tr><tr><td>10</td><td>5218</td><td>37.8</td><td>9</td><td>33.8</td></tr><tr><td>11</td><td>5209</td><td>35</td><td>25</td><td>31</td></tr></table> <p>A = Length measured from rotor surface B = Knurling length C = Hollow depth</p>	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			<table><tr><th>Fig.</th><th>Ref.</th><th>A</th><th>B</th></tr><tr><td>6</td><td>5219</td><td>15</td><td>9</td></tr><tr><td>7</td><td>5220</td><td>16.8</td><td>9</td></tr><tr><td>8</td><td>5207</td><td>25.3</td><td>9</td></tr><tr><td>12</td><td>5227</td><td>46</td><td>5</td></tr></table> <p>Slot (1 x 1.4) perpendicular to wiper position. Fig. 12 slot is on line with wiper position.</p>	Fig.	Ref.	A	B	6	5219	15	9	7	5220	16.8	9	8	5207	25.3	9	12	5227	46	5	
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																																																								
Fig.	Ref.	A	B																																																									
6	5219	15	9																																																									
7	5220	16.8	9																																																									
8	5207	25.3	9																																																									
12	5227	46	5																																																									
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																																																											
																																																												
<p>By default, shafts, knobs and thumbwheels are delivered unassembled. If you need the shaft or knob to be delivered assembled from the factory, please select the appropriate rotor in the part number: X, W, Y or Z.</p> <p>On request, shafts, knobs and thumbwheels can be delivered at specific positions (drawing must be provided), otherwise they are delivered at random position.</p> <p>The plastic color can be stated in the part number.</p> <p>Non flammable plastic available, if potentiometer is orderer with non-flammable plastic (UL-94V0), the shaft or knob will be delivered with non-flammable plastic.</p> <p>If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.</p> <p>*Not available in self-extinguishable plastic.</p>																																																												

# PT-15 / PTC-15

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

### AVAILABLE PACKAGING OPTIONS

Mounting Type	Terminal Style	Mounting Method	Bulk	Magazine (35 units)	Embossed Tape
Horizontal adjust	Straight	H01	x	x	
		H05	x	x	
		H06	x	x	
		H25	x	x	
	Crimped	H02	x	x	
		H10	x	x	
Vertical adjust	Straight	V02	x	x	x
		V12	x	x	
		V15	x	x	x
		V17	x		x
		V18	x		
		V20	x		
		V24	x		
	Crimped	V21	x	x	x
		V22	x		
		V23	x	x	x
		V25	x		x

Rotor Type X, W, Y, Z only in bulk packaging

### OUR ADVANTAGE

- ▶ Leading-edge innovative position sensing solutions
  - ▷ Contactless (Hall-effect and Inductive Technology)
  - ▷ Contacting (Potentiometers, Printed Electronics)
- ▶ Engineering design-in support
- ▶ All our products can be customized to fit target application and customer requirement
- ▶ Capability to move seamlessly from development to true high-volume production
- ▶ A global footprint with global engineering and commercial support
- ▶ One-stop shop not limited to position sensors (temperature, pressure, gas,...) through group collaboration
- ▶ Flexibility and entrepreneurship of a medium-sized company with the backing of Amphenol Corporation



Please always use the latest updated datasheets and 3D models published on our website.

#### Disclaimer:

The product information in this catalog is for reference purposes. Please consult for the most up to date and accurate design information.  
 Piher Sensors & Controls S.A., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Piher"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product described herein.  
 Piher disclaims any and all liability arising out of the use or application of any product described herein or of any information provided herein to the maximum extent permitted by law. The product specifications do not expand or otherwise modify Piher's terms and conditions of sale, including but not limited to the warranty expressed therein, which apply to these products.  
 No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Piher.  
 The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications unless otherwise expressly indicated. Customers using or selling Piher products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify Piher for any damages arising or resulting from such use or sale. Please contact authorized Piher personnel to obtain written terms and conditions regarding products designed for such applications.  
 Product names and markings noted herein may be trademarks of their respective owners. Information contained in and/or attached to this catalog may be subject to export control regulations of the European Community, USA, or other countries. Each recipient of this document is responsible to ensure that usage and/or transfer of any information contained in this document complies with all relevant export control regulations. If you are in any doubt about the export control restrictions that apply to this information, please contact the sender immediately. For any Piher Exports, Note: All products / technologies are EAR99 Classified commodities. Exports from the United States are in accordance with the Export Administration Regulations. Diversion contrary to US law is prohibited.

### CONTACT

**Piher Sensing Systems**  
 Polígono Industrial Municipal  
 Vial T2, Nº22  
 31500 Tudela  
 Spain

**sales@piher.net**

**Europe:** +34 948 820 450  
**Americas:** +1 636 251 0855  
**Asia Pacific:** +65 9641 8886  
**India:** +91 9538 686 586

Rev-0301 2022 © 2022 Piher Sensors & Controls S.A.