Enabling the Electronics Revolution

PIHER sensing systems
an Amphenol® company

PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

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

1 Others available on request
2 Up to 85°C depending on application.
3 +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

sales@prom-elec.com / ООО ПРОМЭЛЕКТРОНИКА

PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

MECHANICAL SPECIFICATIONS

	PT-15	PTC-15
Mechanical rotation angle[1]	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[2]	Up to 100k cycles	Up to 10k cycles

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

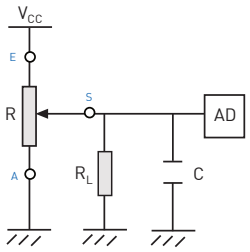
ENVIRONMENTAL TESTING

	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

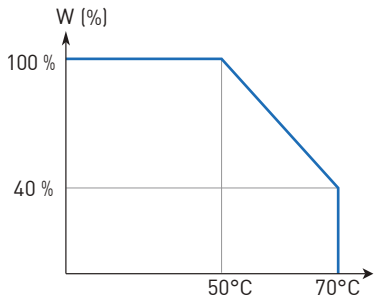
Recommended connection circuit for a position sensor or control application (voltage divider circuit electronic design).



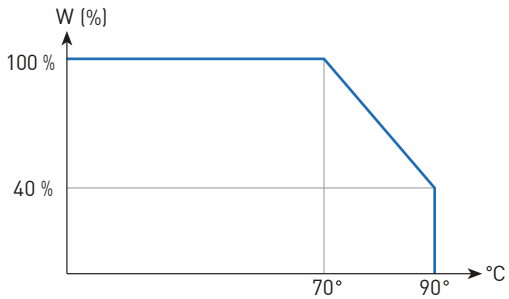
$R_L \approx 100 \times R$

POWER RATING CURVE

PT-15



PTC-15



PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

HOW TO ORDER

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

PT15 _ ___ - ___ _ ____ Optional features _ ___ ___ __ _ __ __ _ _ - S

Series

Rotors[1]
- L
- N
- G
- M
- C
- F
- R
- T
- W, X — inserted shaft
- Y, Z — inserted knob

Mounting method[2]
- H01, H05 — horizontal adjust
- H02, H06, H10 — crimped terminals
- V02, V12, V15, V17, V18, V20, V24 — vertical adjust
- V21, V22, V23 — crimped terminals

Ω-Value[3]
- 101 = 100Ω
- 201 = 200Ω
- ...
- 504 = 500KΩ
- 505 = 5MΩ

Taper
- A = lin.
- B = log.
- C = alog.

Tolerance[4]
- 0505 = ±5%
- 0707 = ±7%
- 1010 = ±10%
- 2020 = ±20%
- 3030 = ±30%
- XXYY = +XX -YY%

Life[5]
- [empty] = 1K cycles
- E = 10K cycles
- U = 100K cycles

Cut track
- [empty]
- PCI
- PCF

Detents
- [empty]
- PAI
- PAM
- PAF
- P1I
- P1F
- P02
- ...
- P38

Shaft/ Thumbwheel
- [empty] = none
- 01 = Fig.1
- 02 = Fig.2
- ...
- 28 = Fig.28

Flammability[6]
- [empty] = standard
- I = non-flammable

Shaft/Knob color
- [empty]
- IN = not colored (natural)
- NE = black
- CR = cream

Wiper position
- [empty] = initial
- PM = 50%
- PF = final

Torque[7]
- [empty] = standard
- L = ≤ 1.5 Ncm

Packaging[8]
- [empty] = bulk
- T = magazines
- R = embossed tape

check inventory

Cermet potentiometer (Example: PTC15LH01-223A2020)

PTC15 _ ___ - ___ _ ____ Optional features _ ___ __ __ __ _ _

Series

Rotors[1]
- L
- N
- G
- M
- C
- F
- R
- T
- W, X — inserted shaft
- Y, Z — inserted knob

Mounting method
- H01, H05 — horizontal adjust
- H02, H06, H10 — crimped terminals
- V02, V12, V15, V17, V18 — vertical adjust
- V21, V22, V23, V25 — crimped terminals

Ω-Value[3]
- 101 = 100Ω
- 201 = 200Ω
- ...
- 504 = 500KΩ
- 505 = 5MΩ
- 000 = CM

Taper
- A = lin.
- B = log.
- C = alog.

Tolerance[4]
- 0505 = ±5%
- 0707 = ±7%
- 1010 = ±10%
- 2020 = ±20%
- 3030 = ±30%
- XXYY = +XX-YY%

Life
- [empty] = 1K cycles
- E = 10K cycles

Detents
- [empty]
- PAI
- PAM
- PAF
- P1I
- P1F
- P02
- ...
- P38

Shaft/ Thumbwheel
- [empty] = none
- 01 = Fig.1
- 02 = Fig.2
- ...
- 28 = Fig.28

Shaft/knob color
- [empty] = cream
- NE = black

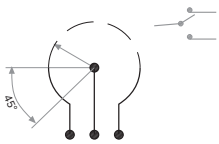
Wiper position
- [empty] = initial
- PM = 50%
- PF = final

Torque[7]
- [empty] = standard
- L = ≤ 1.5 Ncm

Packaging[8]
- [empty] = bulk
- T = magazines
- R = embossed tape

check inventory

1. Rotors: "Z" adjustment only available on "H"-mounting versions. Color for "T" rotor is 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. Torque: Detent option not available with low torque models.
8. Packaging: Magazine packaging available for all H and V12, V02, V21, V15 and V23 mounting.

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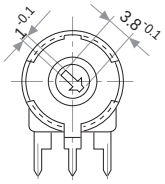
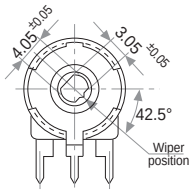
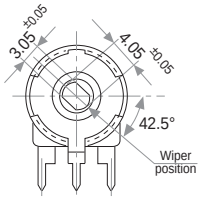
DEFAULT CONFIGURATION

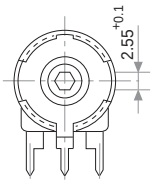
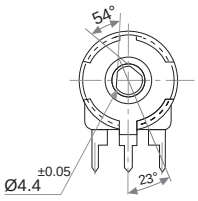
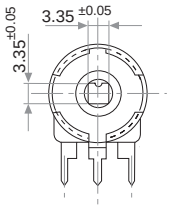
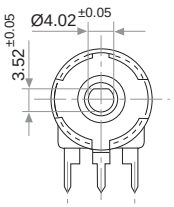
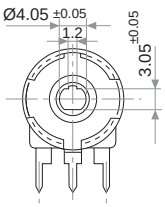
	PT-15	PTC-15
Life	1.000 cycles	
Cut track	no	n/a
Detents	none	
Packaging	bulk	
Shaft/thumb wheel	none	
Non-flammability	no	yes
Housing color	black	cream
Rotor color	white	cream
Shaft/knob/thumbwheel color (if applicable)	Not colured (natural)	cream
Wiper Position	initial	
Torque	0.5 to 2.5 Ncm	
Terminal material	steel	brass
Linearity	not controlled	

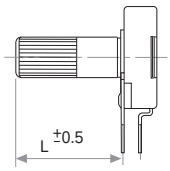
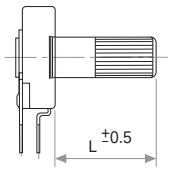
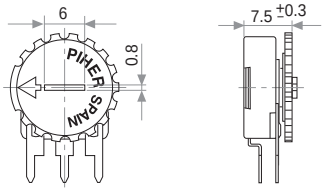
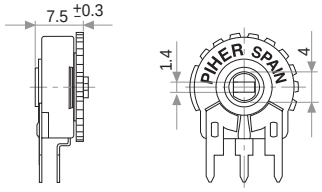
ROTORS

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 files here:
www.piher.net

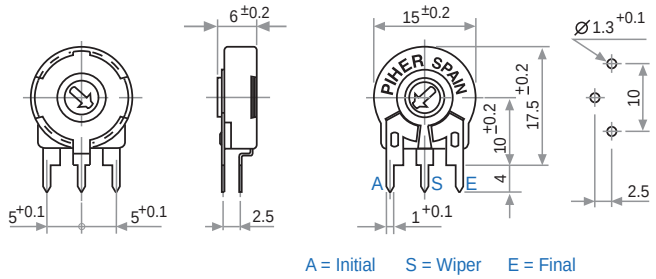
PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

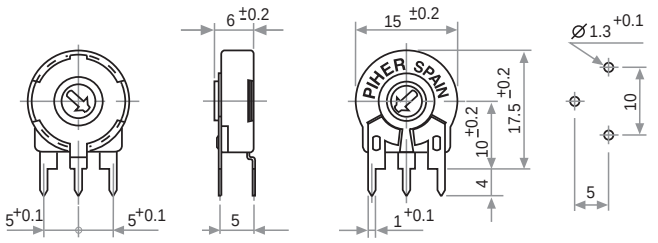
MOUNTING METHOD

Horizontal adjust / vertical mounting

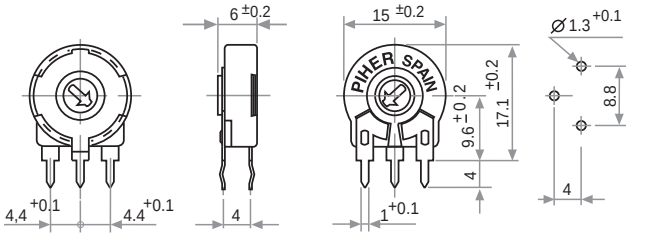
H01 - 2.5mm / H02 with crimped terminals



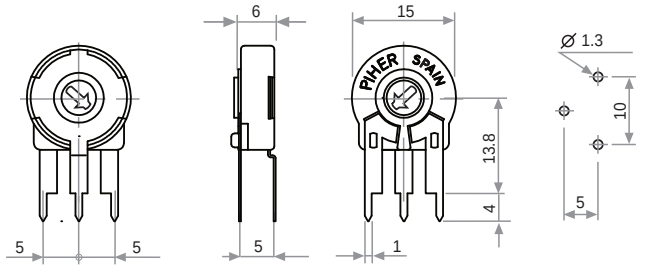
H05 -5mm / H10 with crimped terminals



H06 - B

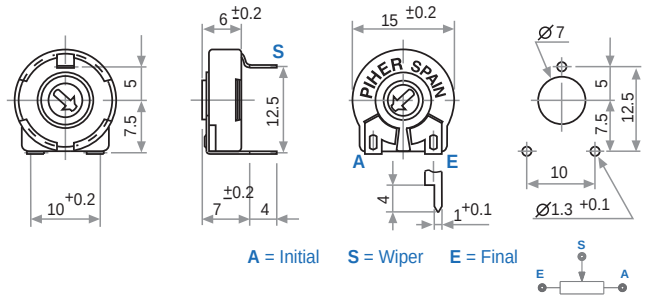


Available on request

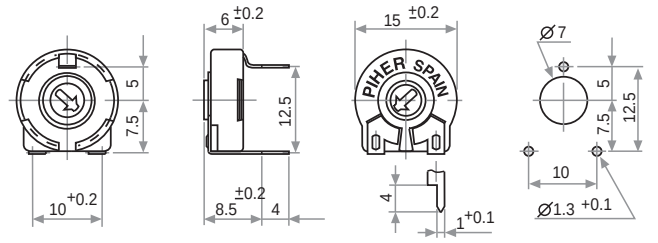


Vertical adjust / horizontal mounting

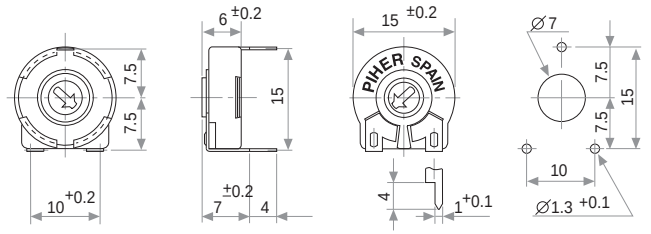
V02 - 12.5mm / V21 with crimped terminals



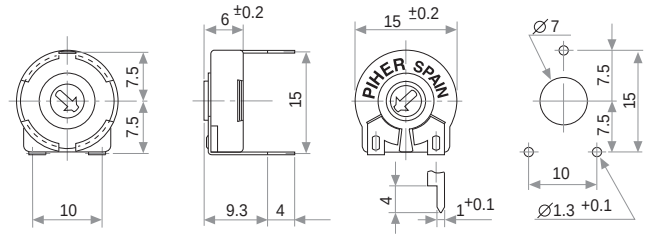
V12 - 12.5mm / V22 with crimped terminals



V15 - 15mm / V23 with crimped terminals



V20 - 15mm (L)



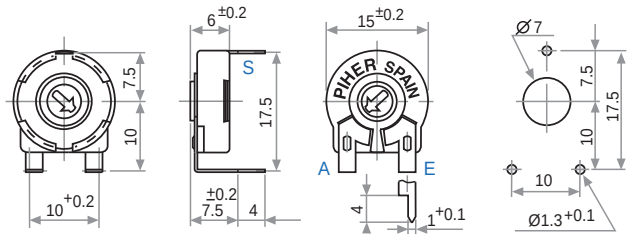
PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

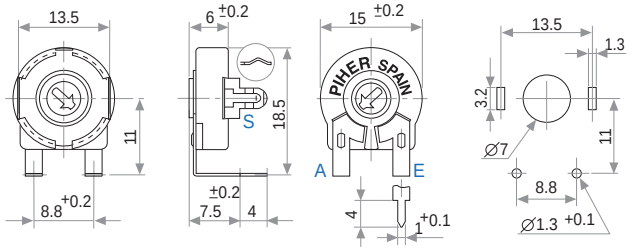
MOUNTING METHOD

Vertical adjust / horizontal mounting

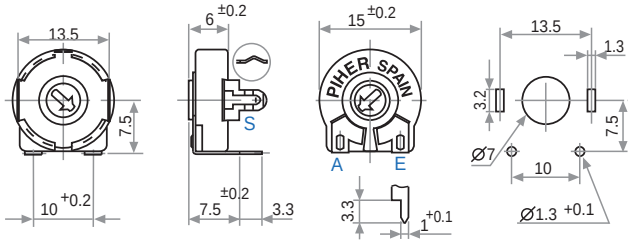
V17 - 17.5mm / V25 with crimped terminals

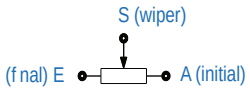


V18 - 18.5mm (D)

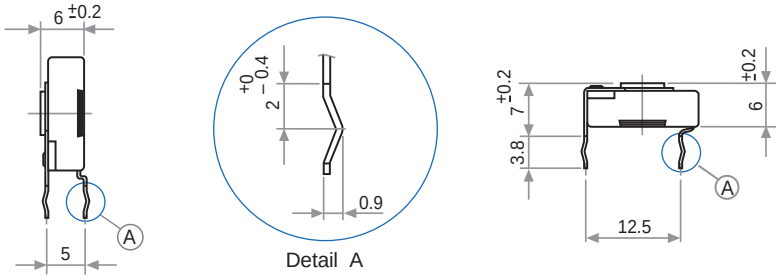


V24 - 15mm (D15)





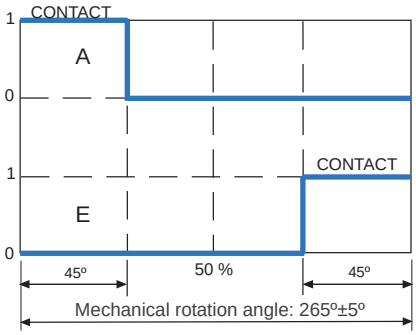
CRIMPED TERMINALS (DETAIL)



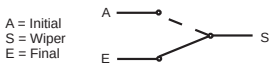
STANDARD RESISTANCE-VALUES AND TOLERANCES

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: ≤ 5Ω
Insulation resistance: ≥ 30MΩ



Contact Piher Sensing Systems for ordering information.

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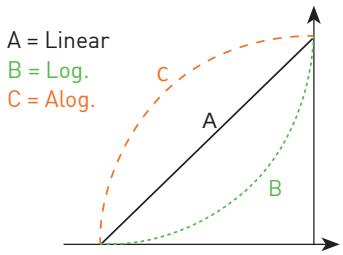
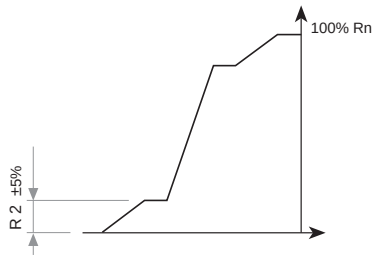
TAPERS

Standard	Example: special custom taper



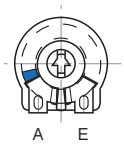


For more information on custom tapers contact Piher Sensing Systems.

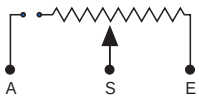
CUT TRACKS (OPEN CIRCUIT DESIGN)

PCI	PCF

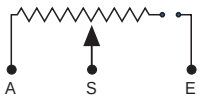
CCW on-of (A)



Cut track at the beginning of travel.



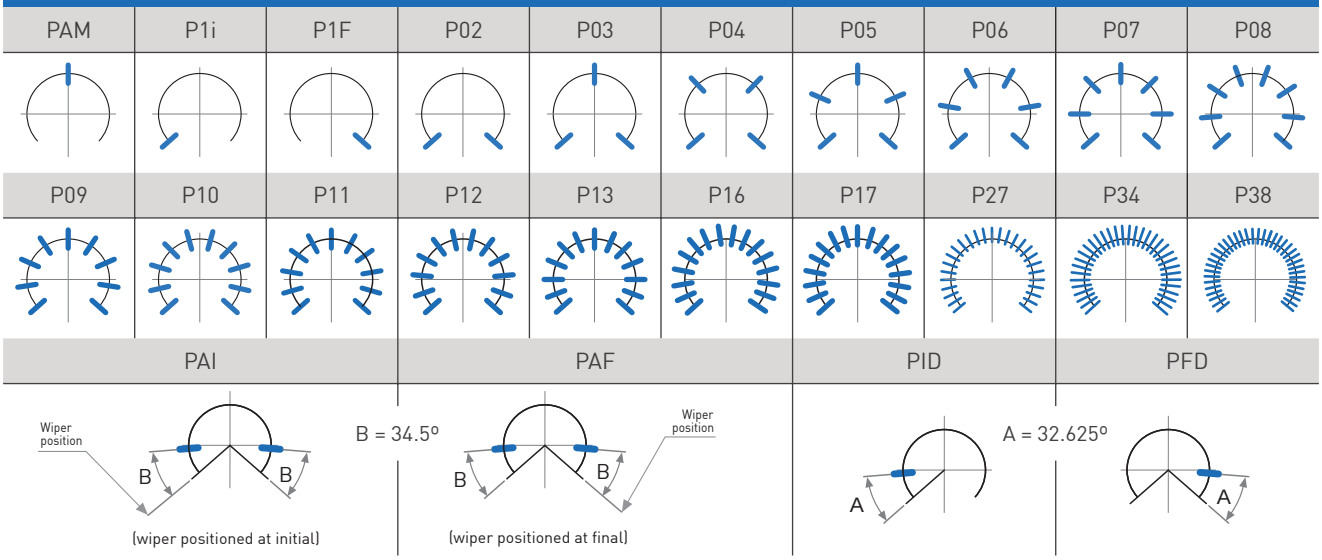
Cut track at the end of travel.



CW on-of (E)

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

DETENTS

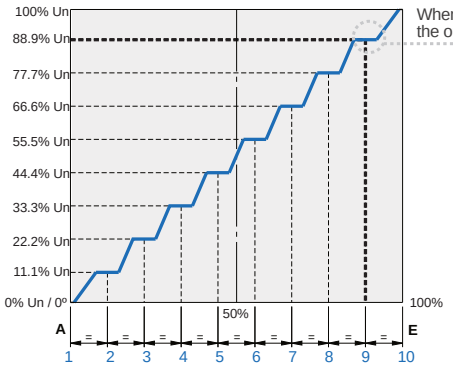


- Standard mechanical life is 500 cycles.
- Long life versions are available upon request and have the following characteristics at Tª: Potentiometers with 1 to 3 detents up to 10K cycles; Potentiometers with 4 and more detents up to 5K cycles.
- Please consult Piher Sensing Systems if unique non-overlapping 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.

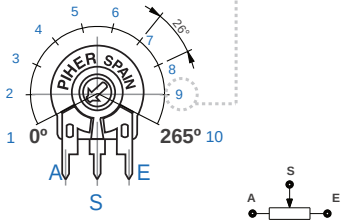
PT-15 / PTC-15

15-mm carbon / cermet through-hole potentiometer

STEPPED OUTPUTS / CONSTANT VALUE ZONES



When the potentiometer's wiper is located at detent nº9, the output voltage will be 88.9% Un ±% tolerance.



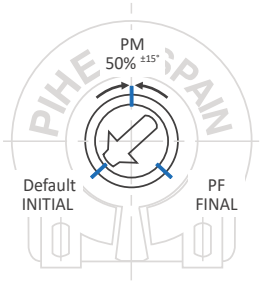
Wiper position

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

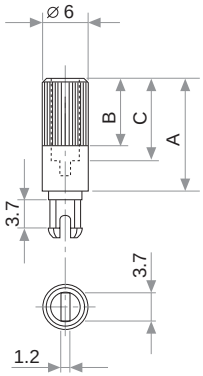


Fig.	Ref.	A	B	C
1	5272	12	9	8
2	5214	19	9	15
5	5208	9.5	6.5	5.5
9	5216	35	9	31
11	5209	35	25	31

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

Solid shafts models

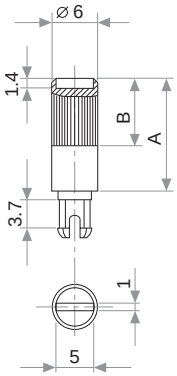


Fig.	Ref.	A	B
6	5219	15	9
7	5220	16.8	9
8	5207	25.3	9
12	5227	46	5

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

Fig. 3 - Ref. 5372

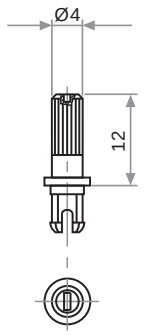


Fig. 15 - Ref. 5217

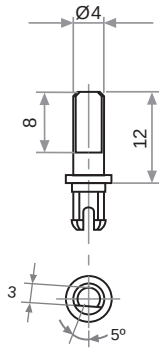


Fig. 17 - Ref. 5210

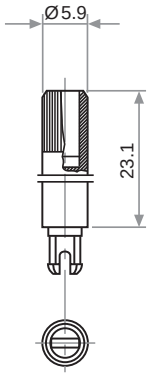


Fig. 18 - Ref. 5271

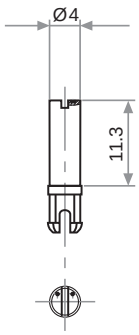


Fig. 19 - Ref. 6032*

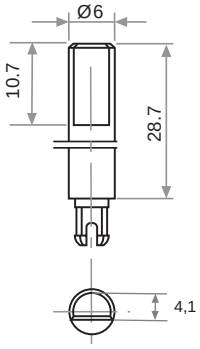


Fig. 20 - Ref. 5369*

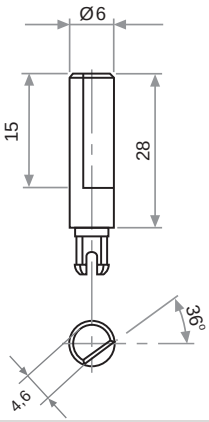


Fig. 21 - Ref. 6031*

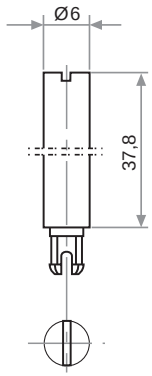


Fig. 22 - Ref. 6029

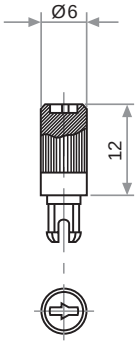


Fig. 23 - Ref. 6022

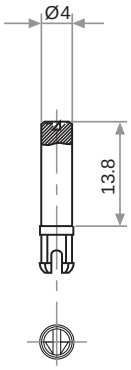


Fig. 29 - Ref. 6162

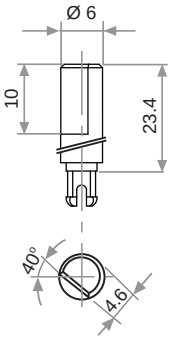


Fig. 25 - Ref. 6059

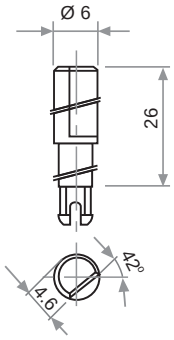


Fig. 27 - Ref. 5268*

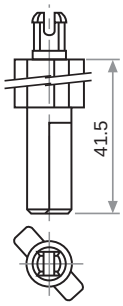


Fig. 28 - Ref. 6055

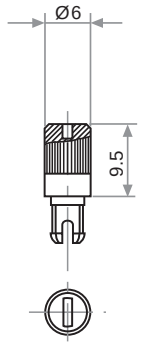
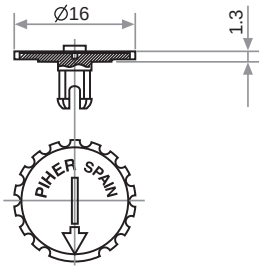


Fig. 4 - Ref. 5371



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 orderer 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.

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	✓	✓	
		H05	✓	✓	
		H06	✓	✓	
	Crimped	H02	✓	✓	
		H10	✓	✓	
Vertical adjust	Straight	V02	✓	✓	✓
		V12	✓	✓	
		V15	✓	✓	✓
		V17	✓		✓
		V18	✓		
		V20	✓		
		V24	✓		
	Crimped	V21	✓	✓	✓
		V22	✓		
		V23	✓	✓	✓
		V25	✓		✓

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

For the most up-to-date information, we recommend downloading the latest version of this datasheet from www.piher.net.

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