Enabling the Electronics Revolution

PIHER sensing systems
an Amphenol® company

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

The PT-10 and PTC-10 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 16 mechanical detents (stop positions) 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 anti-logarithmic tapers
- Self extinguishable plastic (UL 94V-0) available
- SPDT switch and low torque version available

On request

- Embossed tape packaging

### ELECTRICAL SPECIFICATIONS

| | PT-10 ((carbon) | PTC-10 (cermet) |
|---|---|---|
| Taper[1] | Lin, Log, Alog | |
| Range of values[1]<br>Lin<br>Log, Alog | (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)<br>100Ω ≤ Rn ≤ 5MΩ<br>1KΩ ≤ Rn ≤ 5MΩ | |
| Standard Tolerance[1]<br>100Ω ≤ Rn ≤ 1MΩ<br>1MΩ < Rn ≤ 5MΩ | <br>± 20%<br>± 30% | |
| Max. Voltage<br>Lin<br>Log, Alog | <br>200 VDC<br>100 VDC | |
| Nominal power<br>Lin<br>Log, Alog | 50°C (122°F)<br>0.15 W<br>0.07 W | 70°C (158°F)<br>0.33 W<br>0.17 W |
| Residual resistance[1] | ≤ 0.5% Rn (5Ω min.) | |
| Equivalent noise resistance | ≤ 3% Rn (3Ω min.) | |
| Operating temperature | -25°C to +70°C [2]<br>(-13°F to + 158°F) | -40°C to +90°C [3]<br>(-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

### EXAMPLES OF APPLICATIONS

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

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

### MECHANICAL SPECIFICATIONS

| | PT-10 | PTC-10 |
|---|---|---|
| Mechanical rotation angle[1] | 235° ± 5° | |
| Electrical rotation angle[1] | 220° ± 20° | |
| Torque<br>Rotational<br>Stop | <br>0.4 to 2 Ncm (0.6 to 2.7 in-oz)<br>› 5 Ncm (›7 in-oz) | |
| Push-pull force over the rotor | › 49N | |
| Life[2] | Up to 100k cycles | Up to 10k cycles |

1 Endless rotation available: ST-10; 2 Others check availability

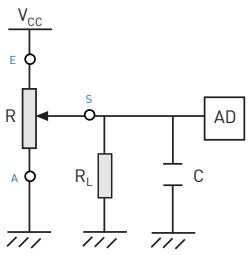
### ENVIRONMENTAL TESTING

| | Test method (CEI 393-1) | PT-10<br>ΔR(%)- Piher typical test results | PTC-10<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 |
| 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

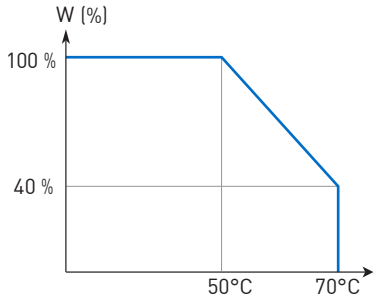
Recommended connection circuit for a position sensor or control application (voltage divider circuit electronic design).



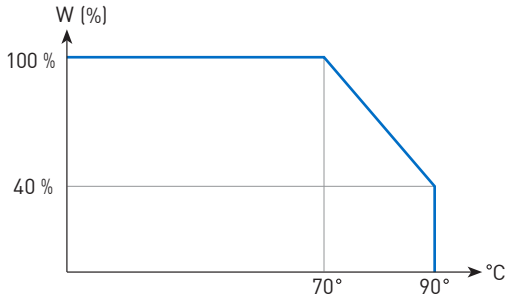

$R_L \approx 100 \times R$

### POWER RATING CURVE

PT-10




PTC-10



# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

### HOW TO ORDER

#### Carbon potentiometer

PT10 _ ___ - ___ _ ____ | Optional features: _ - ___ - ___ - _ - _ - _ - __ - __ - _ - S

**Series**

**Rotors[1]**
- B, G, K, L, M, R
- W, X | inserted shaft
- Y, Z | inserted knob

**Mounting method[2]**
- H01, H04, H05, H07 | horizontal adjust
- H02, H10 | crimped terminals
- V05, V10 | vertical adjust
- V11, V13 | 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%

**Cut track**
- [empty]
- PCI
- PCF

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

**Detents**
- [empty]
- PAI
- PAM
- PAF
- P1I
- P1F
- P02
- ...
- P16

**Packaging[5]**
- [empty] = bulk
- T = magazines

**Shaft/Knob**
- [empty] = none
- 1 = Fig.1
- 2 = Fig.2
- ...
- 18 = Fig.18

**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**
- [empty] = standard
- L = ≤ 1 Ncm

check inventory

#### Cermet potentiometer

PTC10 _ ___ - ___ _ ____ | Optional features: _ - ___ - _ - _ - __ - __ - _

**Series**

**Rotors[1]**
- B, G, K, L, M, R
- W, X | inserted shaft
- Y, Z | inserted knob

**Mounting method[2]**
- H01, H04, H05 | horizontal adjust
- H02, H10 | crimped terminals
- V05, V10 | vertical adjust
- V11, V13 | 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
- ...
- P16

**Packaging**
- [empty] = bulk
- T = magazines

**Shaft/knob**
- [empty] = none
- 1 = Fig.1
- 2 = Fig.2
- ...
- 18 = Fig.18

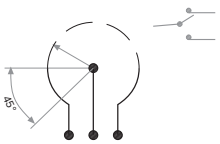
**Shaft/knob color**
- [empty] = cream
- NE = black

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

**Torque**
- [empty] = standard
- L = ≤ 1 Ncm

check inventory

1. Rotors: "Z" adjustment only available on "H"-mounting versions. Rotor "G" only available in purple (color "VI")
2. Mounting method: "V05", "H07" terminals material: brass.
3. Ω- Value: XXX - First two digits of Ω-value 000 = CM = switch SPDT version
   XXX - Number of zeros




4. Tolerance: for custom tolerances please contact info@piher.net
5. Packaging: available options depend on mounting method, see "available packaging option" below. Embossed tape packaging on request.
6. Non-flammable according to UL 94V-0: housing, rotor and shaft. PTC-10 made of non-flammable material by standard.

### ORDER CODE EXAMPLES

**PT10LH01-103A2020-S**

10mm carbon potentiometer with white rotor "L" (arrow shape), H01 mounting method (horizontal adjustment), 10K value, linear taper and 20% resistive tolerance.

**PTC10WV05-104A1010-9-NE**

10mm cermet potentiometer with rotor "W" (pre-inserted shaft), V05 mounting method (vertical adjustment), 100K resistive value, linear taper, 10% resistive tolerance and black ref. "9" shaft.

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

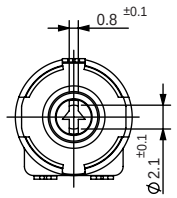
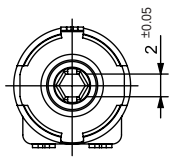
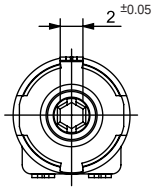
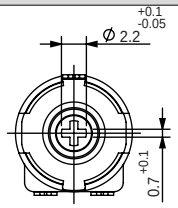
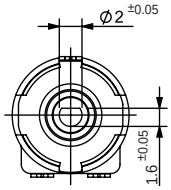
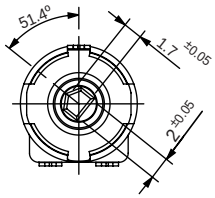
### STANDARD CONFIGURATION

| | PT-10 | PTC-10 |
|---|---|---|
| Life | 1.000 cycles | |
| Cut track | no | n/a |
| Detents | none | |
| Packaging | bulk | |
| Shaft/knob/thumbwheel | none | |
| Non-flammability | no | yes |
| Housing color | black | cream |
| Rotor color | white | cream |
| Shaft/knob/thumbwheel color (if applicable) | Not coloured (natural) | cream |
| Wiper Position | initial | |
| Torque | 0.4 to 2 Ncm | |
| Linearity* | not controlled | |

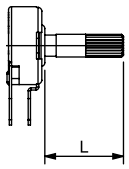
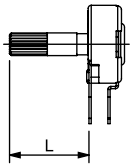
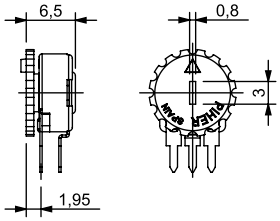
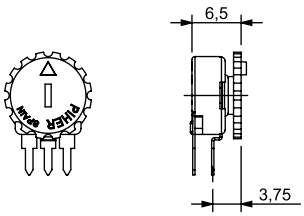
* Others upon request

### ROTORS

**Without shaft or knob**

| L<br>Screwdriver | M<br>Hexagonal | G<br>Hexagonal | K<br>Cross slot | R | B |
|---|---|---|---|---|---|
|  |  |  |  |  |  |

**With inserted shaft** / **With inserted knob / thumbwheel**

| X<br>Adjustable from collector side | W<br>Adjustable from terminal side | Y<br>Adjustable from terminal side<br>Default knob is Fig. 5 - Ref. 5034 | Z<br>Adjustable from collector side<br>Default knob is Fig. 5 - Ref. 5034 |
|---|---|---|---|
|  |  |  |  |

Default delivery is at initial position. Wipers are shown positioned at 50% for the picture.

Download the STEP files here:
www.piher.net

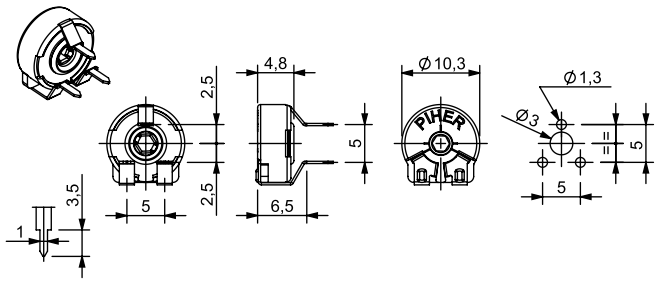
# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

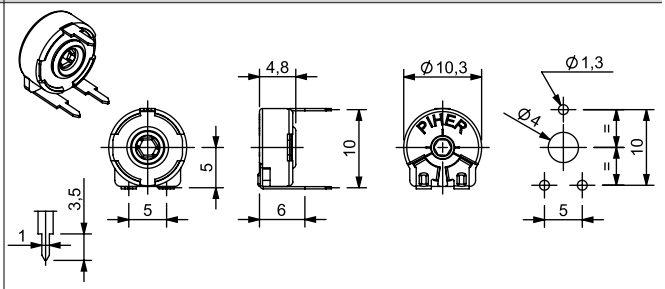
### MOUNTING METHOD

#### Vertical adjust / Horizontal mounting - straight terminals

V05 - 5mm

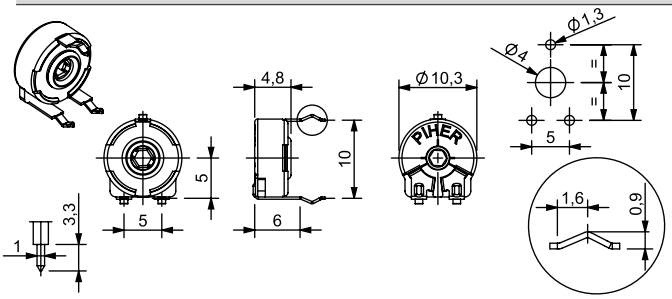



V10 -10mm

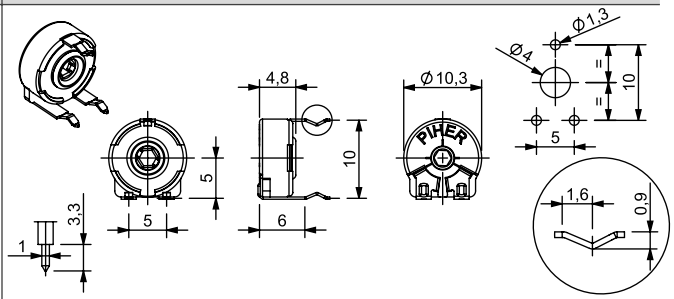



#### Vertical adjust / Horizontal mounting - crimped terminals

V11 - 10mm

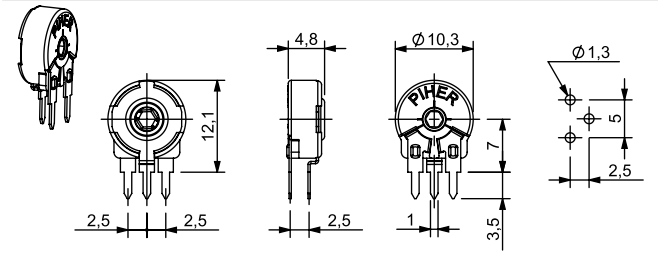



V13 - 10mm

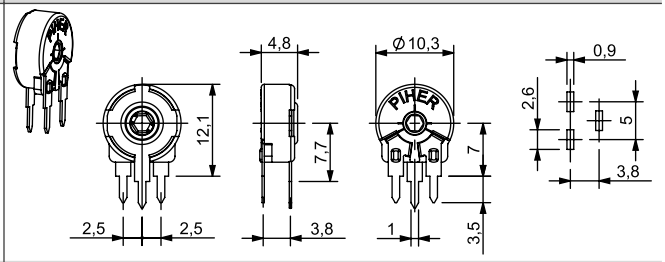



#### Horizontal adjust / Vertical mounting - straight terminals

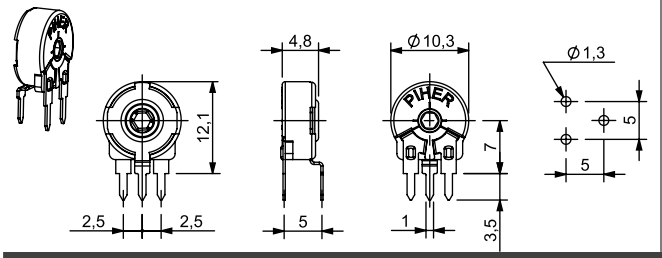
H01 - 2.5mm



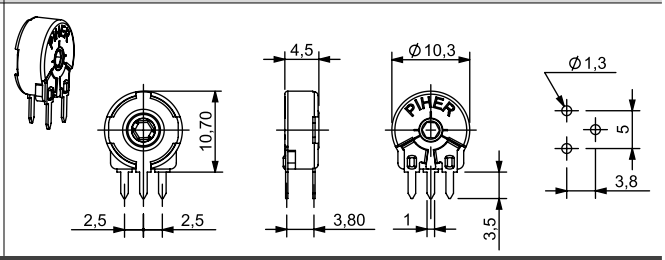

H04 - 3.8mm




H05 - 5mm

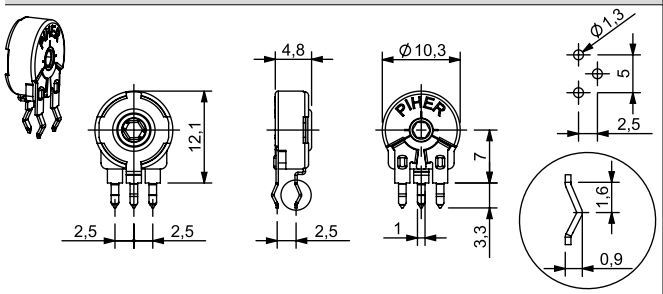



H07 - 3.8mm (only PT-10)

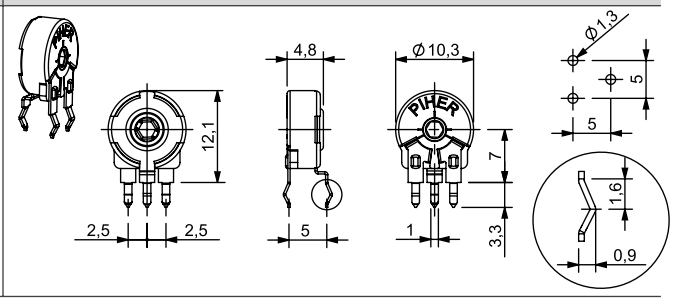



#### Horizontal adjust / Vertical mounting - crimped terminals

H02 - 2.5mm




H10 - 5mm



# PT-10 / PTC-10

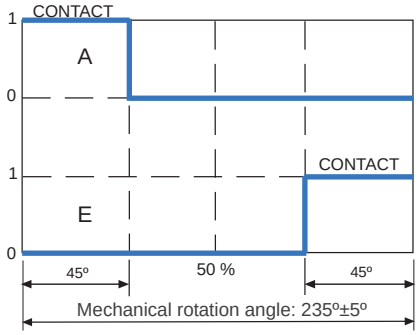
## 10mm carbon / cermet through-hole potentiometer

### STANDARD RESISTANCE-VALUES AND TOLERANCES

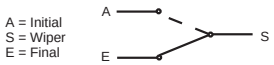
| Resistance Ω | 100 | 200 | 220 | 250 | 470 | 500 | 1K | 2K | 2.2K | 2.5K | 4.7K | 5K | 10K | 20K | 22K | 25K | 47K | 50K | 100K | 200K | 220K | 250K | 470K | 500K | 1M | 2M | 2.5M | 4.7M | 5M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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

| A80 Switch code | Switch standard specification |
|---|---|



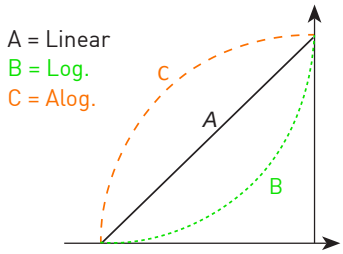

Power rating: 24V / 15mA
ON position resistance: ≤ 5Ω
Insulation resistance: ≥ 30MΩ

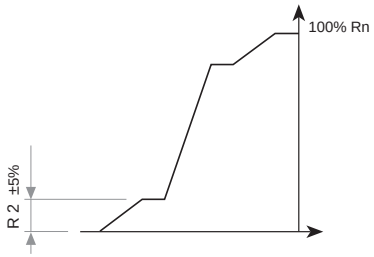



Contact Piher Sensing Systems for ordering information.

### TAPERS

| Standard | Example: special custom taper |
|---|---|



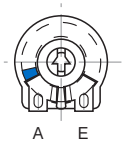




For more information on custom tapers contact Piher Sensing Systems.

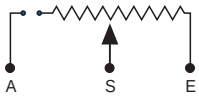
### CUT TRACKS (OPEN CIRCUIT DESIGN)

| PCI | PCF |
|---|---|

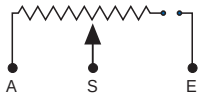
CCW on-of (A)



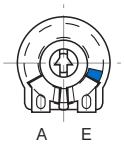

Cut track at the beginning of travel.




Cut track at the end of travel.




CW on-of (E)

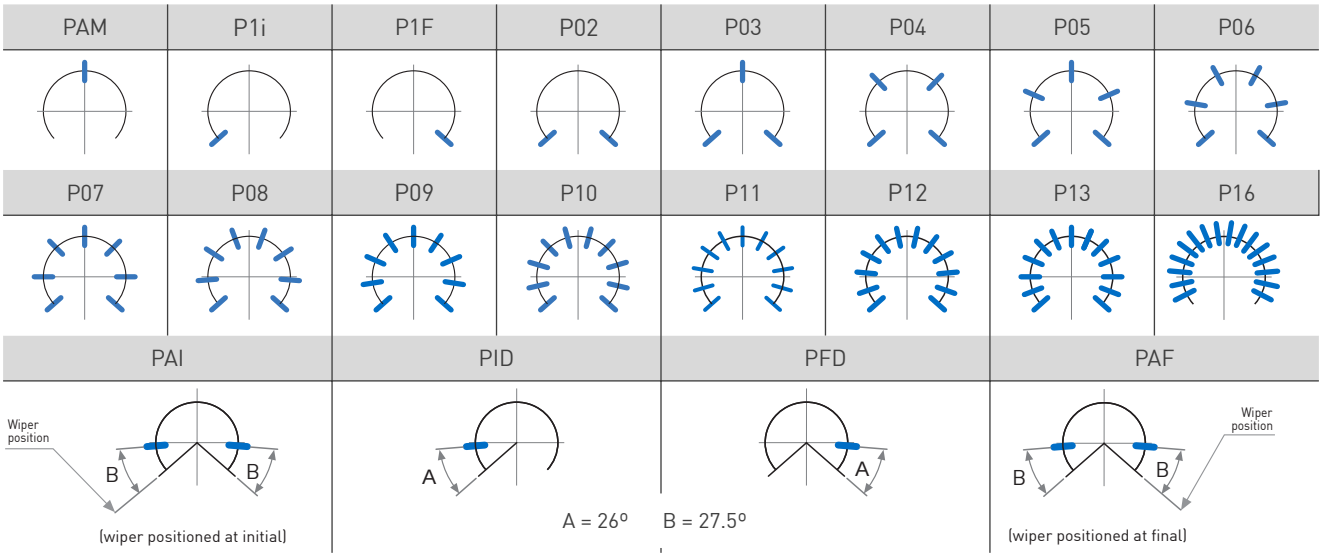



Other configurations available upon request. Cut Track not available for PTC-10.

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

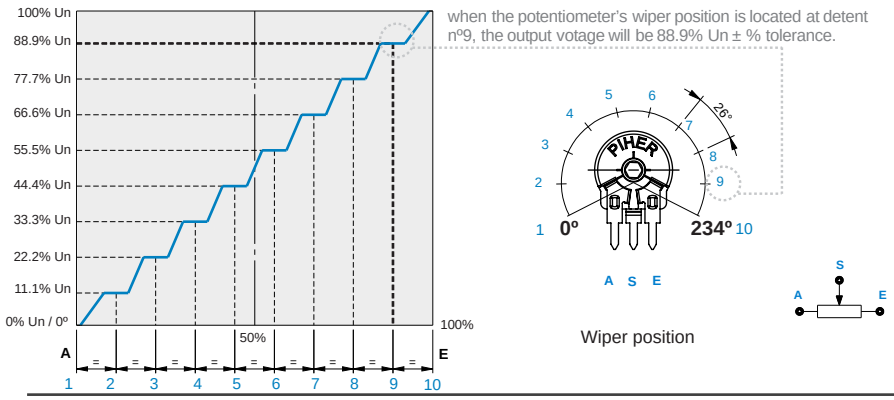
### DETENTS




Relative detent positions along total mechanical travel

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 more than 16 detents versions please contact Piher Sensing Systems.

### STEPPED OUTPUTS / CONSTANT VALUE ZONES




Contact Piher Sensing Systems for ordering information.

### 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.

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

## PACKAGING

### Bulk

Dimensions (mm): 185x85x80

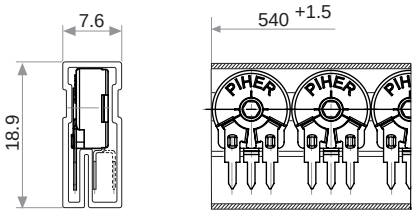
Without shaft: 1000 units per box

With Thumbweel: 800 units per box

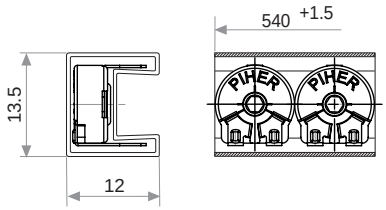
With shaft: 400 units per box

### Magazine for automatic insertion (50 units)

Horizontal adjust




Vertical adjust




## AVAILABLE PACKAGING OPTIONS

| Mounting Type | Terminal Style | Mounting Method | Bulk | Magazine |
|---|---|---|---|---|
| Horizontal adjust | Straight | H01 | x | x |
| | | H04 | x | x |
| | | H05 | x | x |
| | | H07 | x | x |
| | Crimped | H02 | x | x |
| | | H10 | x | |
| Vertical adjust | Straight | V05 | x | |
| | | V10 | x | x |
| | Crimped | V11 | x | x |
| | | V13 | x | |

Rotor Type X, W, Y, Z only in bulk packaging. Embossed tape packaging on request.

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

### SHAFTS, KNOBS, THUMBWHEELS (TOP VIEW, FOR G AND M ROTOR TYPES)

Fig. 1 - Ref. 5016

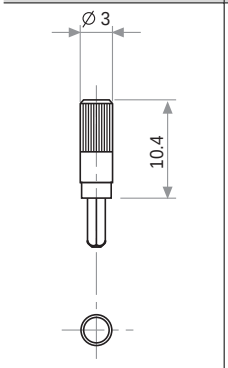



Fig. 3 - Ref. 5012

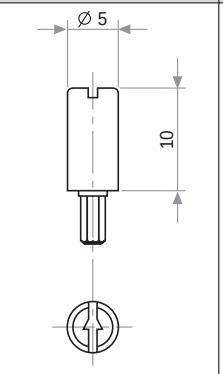



Fig. 4 - Ref. 6053

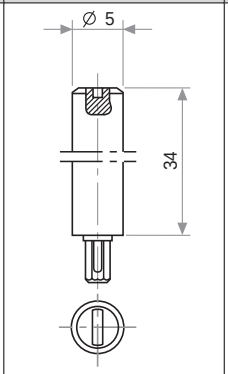



Fig. 5 - Ref. 5034

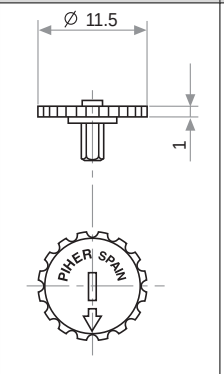



Fig. 12 - Ref. 6052

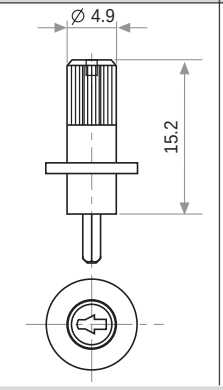



Fig. 14 - Ref. 5055

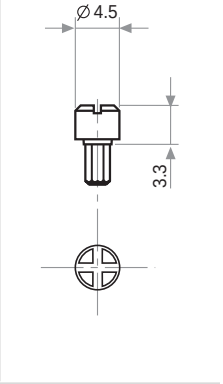



Fig. 7 - Ref. 5115

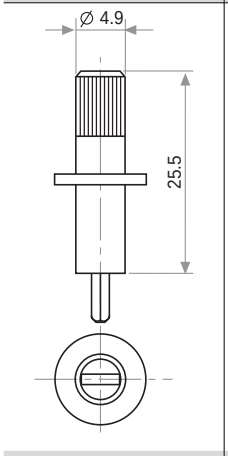



Fig. 8 - Ref.: 5116

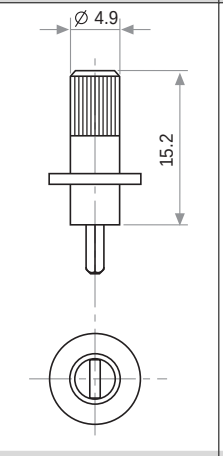



Fig. 9 - Ref 5119

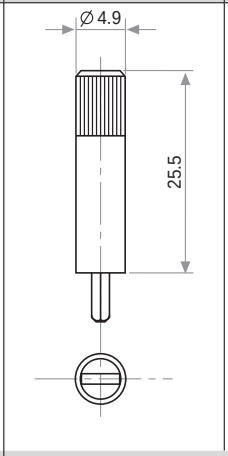



Fig. 10 - Ref. 5120

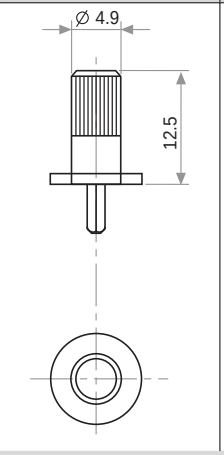



Fig. 17 - Ref. 5062

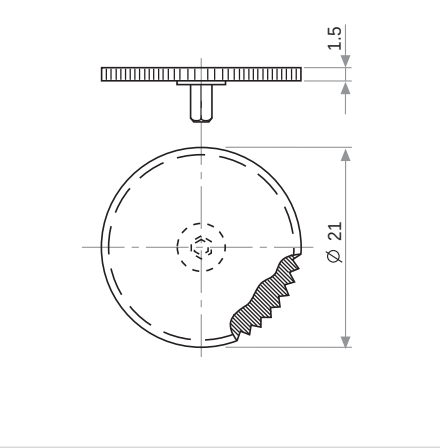



Fig. 15 - Ref. 6008

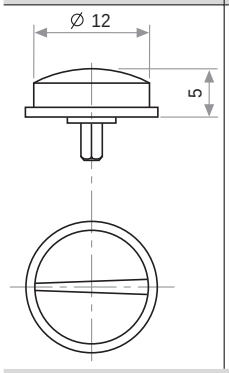
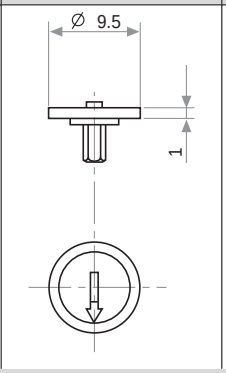
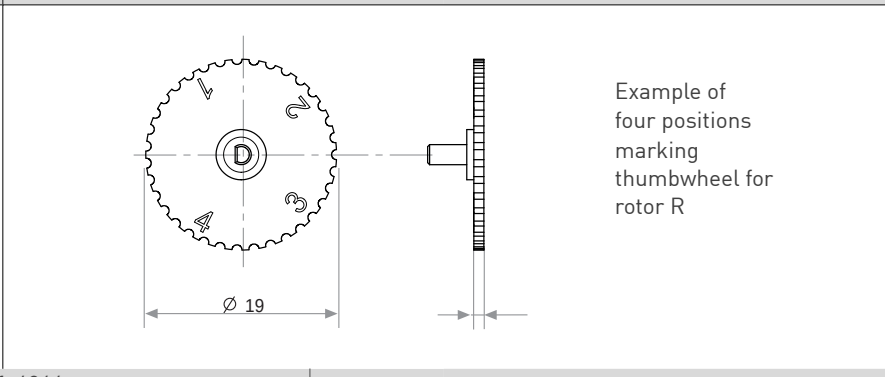



Fig. 16 - Ref. 5039

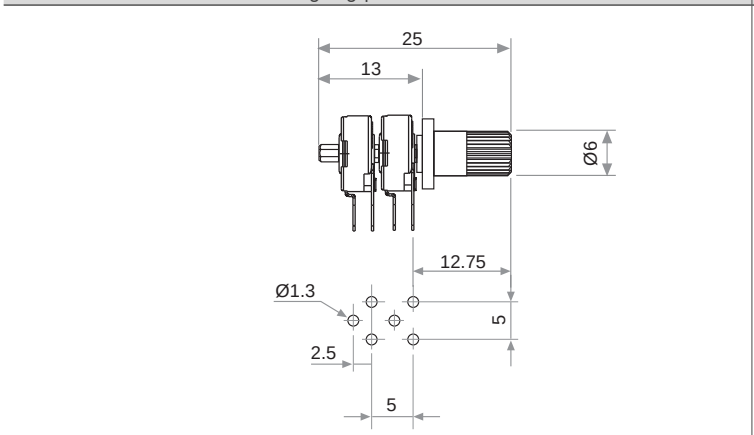



Upon request: thumb-wheel with configurable numbers or texts




Example of four positions marking thumbwheel for rotor R

Fig. 18 - Ref: 6064
2-gang plastic knob/shaft




Shafts, thumbwheels and knobs are delivered unassembled if not specified otherwise in the part number code.

The position of assembled knobs Fig 5, 15, 16 can be indicated in the part number code: Initial (default), 50% (PM) or Final (PF). Others will be delivered at random position by default.

Custom specific positions are available for all shafts and knobs, on request.

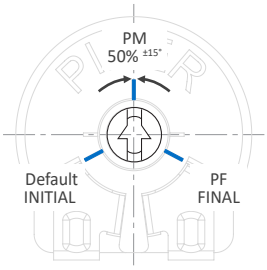
Non flammable plastic available, if potentiometer is ordered with non-flammable plastic (UL-94V0), the shaft or knob will be delivered with non-flammable plastic too.

If you wish to use your own plastic shaft/ knob/actuator please contact us for advice about compatible materials.

# PT-10 / PTC-10

## 10mm carbon / cermet through-hole potentiometer

### POSITIONING




Default wiper position is initial. Custom delivery positions available on request.
Default wiper positioning tolerance is ±15 deg. Other tolerances available on request.

### 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 manufacturing, 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.

Rev. 231022024 © Piher Sensors & Controls S.A

### CONTACT

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

**sales@piher.net**

✆ +34 948 820 450

**NEED QUICK HELP?**
Our AI Virtual Assistant is available 24/7 to provide instant support—click here to chat now!