**FEATURES**

- Carbon resistive element.
- IP54 protection according to IEC 60529.
- Polyester substrate.
- Also upon request:
  - Long life model for low cost control pot. applications
  - Low torque option
  - Supplied in magazines for automatic insertion.
  - Wiper positioned at initial, 50% or fully clockwise.
  - Self extinguishable plastic UL 94V-0.
  - Cut track option.
  - Special Tapers.
  - Mechanical detents.

**ELECTRICAL SPECIFICATIONS**

- Range of values*:
  \[ 100\Omega \leq R_n \leq 5\text{M}\Omega \]  \((\text{Decad. } 1.0 \text{ to } 2.0 \text{ to } 2.2 \text{ to } 2.5 \text{ to } 4.7 \text{ to } 5.0)\]

- Tolerance*:
  \[ 100\Omega \leq R_n \leq 1\text{M}\Omega : \quad \pm \ 20\% \]
  \[ 1\text{M}\Omega \leq R_n \leq 5\text{M}\Omega : \quad \pm \ 30\% \]

- Max. Voltage: 250 VDC (lin) 125 VDC (no lin)

- Nominal Power 50°C (122°F) (see power rating curve)
  \[ 0.25 \text{ W (lin)} \leq 0.12 \text{ W (no lin)} \]

- Taper*: (Log. & Alog. only Rn ≥ 1K) Lin ; Log; Alog.

- Residual resistance*: ≤ 0.5% Rn (5Ω min.)

- Equivalent Noise Resistance: ≤ 3% Rn (3Ω min.)

- Operating temperature**: -25°C + 70°C (-13°F + 158°F)

**MECHANICAL SPECIFICATIONS**

- Mechanical rotation angle: 265° ± 5°

- Electrical rotation angle: 240° ± 20°

- Torque: 0.5 to 2.5 Ncm. (0.7 to 3.4 in-oz)

- Stop torque: > 10 Ncm. (>14 in-oz)

- Life*:
  - Up to 100K cycles

* Others: check availability.

** HOW TO ORDER **

**OPTIONAL EXTRAS**

**NOTES:**

(1) “Z” adjustment only available on “H” versions. Standard colour for the “T” rotor: Orange.

(2) Terminal styles: “P” are crimped terminals. V24 terminals material: brass. <sup> </sup>V=Vertical adjust; H=Horizontal Adjust

(3) Value: Example: Code: 10 1/10 100 0Ω  Numb of zeros.  First two digits of the value.

(4) Non standard tolerance: check availability.

(5) Life
  - Standard: 1K cycles.
  - Long life: 10K cycles.
  - Extra long life: 100K cycles (Only for low torque versions. To be studied case by case.)

(6) Non flammable: housing, rotor and shaft. According to UL 94V-0

(7) Colour shaft/rotor:
  - Potentiometer without shaft: only rotor
  - Potentiometer with shaft: only shaft

- Cream colour only available in standard plastic.

(8) Low torque: ≤ 1.5Ncm. No detent option available for low torque models.

(9) Magazines (35 pcs/mag): available for VA (12.5), V (12.5), V (12.5P), V (15), V15 (P) and H models.

For more information please contact your nearest Piher supplier.

(10) If you wish to use your own custom plastic shaft/knob/actuator please contact Piher for advice about compatible materials.
This way of ordering should be used for options which are not included in the “How to order” standard and optional extras.

**STANDARD OPTIONS**
- Cut track: No
- Detents: None
- Non flammable: No
- Rotor colour: White
- Shaft colour: Natural
- Wiper position: Initial
- Torque: Standard
- Terminals material: Steel
- Life: 1000 cycles

**ROTORS**

<table>
<thead>
<tr>
<th>Wipers positioned at initial (without shaft)</th>
<th>Wipers positioned at 50% (without shaft)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Initial Wiper Position" /></td>
<td><img src="image2.png" alt="50% Wiper Position" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Shaft Options" /></td>
<td><img src="image4.png" alt="Thumbwheel Options" /></td>
</tr>
</tbody>
</table>

**VERTICAL MOUNT - HORIZONTAL ADJUST**

<table>
<thead>
<tr>
<th>H (2.5)</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image5.png" alt="H(2.5) Options" /></td>
<td><img src="image6.png" alt="B Options" /></td>
</tr>
</tbody>
</table>

**Check availability.**

Download STEP files here: [https://piher.net/piher/?p=916](https://piher.net/piher/?p=916)
HORIZONTAL MOUNT - VERTICAL ADJUST

V (12.5)

VA (12.5)

V (15)

VL (15)

V (17.5)

D

DETENT DETAILS

22 detents example

CRIMPED TERMINALS (DETAIL)

POWER RATING CURVE

TAPERS

Please note terminals disposition when ordering non linear curves.
### Hollow model shafts

<table>
<thead>
<tr>
<th>FIG.</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12</td>
<td>9</td>
<td>8</td>
<td>6</td>
<td>5272</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>9</td>
<td>15</td>
<td>6</td>
<td>5214</td>
</tr>
<tr>
<td>5</td>
<td>9.5</td>
<td>6.5</td>
<td>5.5</td>
<td>6</td>
<td>5208</td>
</tr>
<tr>
<td>9</td>
<td>35</td>
<td>9</td>
<td>33.8</td>
<td>6</td>
<td>5216</td>
</tr>
<tr>
<td>10</td>
<td>37.8</td>
<td>9</td>
<td>31</td>
<td>6</td>
<td>5218</td>
</tr>
<tr>
<td>11</td>
<td>35</td>
<td>25</td>
<td>31</td>
<td>6</td>
<td>5209</td>
</tr>
<tr>
<td>13</td>
<td>7.8</td>
<td>4.8</td>
<td>3.8</td>
<td>6</td>
<td>5265</td>
</tr>
</tbody>
</table>

### Solid model shafts

<table>
<thead>
<tr>
<th>FIG.</th>
<th>A</th>
<th>B</th>
<th>D</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>5219</td>
</tr>
<tr>
<td>7</td>
<td>16.8</td>
<td>9</td>
<td>6</td>
<td>5220</td>
</tr>
<tr>
<td>8</td>
<td>25.3</td>
<td>9</td>
<td>6</td>
<td>5207</td>
</tr>
<tr>
<td>12</td>
<td>46</td>
<td>5</td>
<td>6</td>
<td>5227</td>
</tr>
</tbody>
</table>

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

---

**Options**

**Positioning**

- **CCW on-off (A)**
- **CW on-off (E)**

**Tests**

| ELECTRICAL LIFE | 1.000 h. @ 50°C; 0.25 W | ±5 % |
| MECHANICAL LIFE (CYCLES) | 1000 @ 10 CPM ... 15 CPM | ±3 % (Rn < 1 MΩ) |
| TEMPERATURE COEFFICIENT | -25°C; +70°C | ±300 ppm (Rn <100 K) |
| THERMAL CYCLING | 16 h. @ 85°C; 2h. @ -25°C | ±2.5 % |
| DAMP HEAT | 500 h. @ 40°C @ 95% HR | ±5 % |
| VIBRATION (for each plane X,Y,Z) | 2 h. @ 10 Hz ... 55 Hz. | ±2% |

**Variations**

**Positioning**

- CCW on-off (A)
- CW on-off (E)

**Recommended Connections**

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

---

**Shafts (for N, G and T rotor types, top view)**

*A = Length (FRS)
B = Knurling length
C = Hollow depth
D = Shaft diameter
FRS = From rotor surface*
By default shafts, knobs & thumbwheels are delivered unassembled. Mounted shafts, knobs & thumbwheels are delivered at random position. Positioning available, check availability. If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.

**SHAFTS (for N, G and T rotor types, top view)**

Fig. 3 / Ref. 5372

Fig. 5 / 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

* Not available in self extinguishable plastic

**THUMBWHEEL**

By default shafts, knobs & thumbwheels are delivered unassembled. Mounted shafts, knobs & thumbwheels are delivered at random position. Custom positioning available. If you wish to use your own plastic shaft/knob/actuator please contact Piher for advice about compatible materials.

Fig. 4 / Ref. 5371

**PACKAGING**

<table>
<thead>
<tr>
<th>Model</th>
<th>Units per box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without shaft thumbwheel</td>
<td>400 (80 x 85 x 185 mm.)</td>
</tr>
<tr>
<td>With thumbwheel</td>
<td>200 (80 x 85 x 185 mm.)</td>
</tr>
<tr>
<td>With shaft</td>
<td>Contact Piher</td>
</tr>
</tbody>
</table>
This innovative PT’s with detents family has been specifically developed to allow the integration of otherwise large and expensive external mechanisms into the body of the potentiometer thus allowing a high range of configurations: special tapers, torque, tolerances, linearity, cut track, etc.

This detent (stop position) design not only adds a “click” sensation of position, but also offers enormous savings in both cost and space for any given application.

Strong and weak detents can be mixed as per customer’s request.

Detent number and positions can be made or fitted to the customer needs or preferences.

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

NOTES FOR DETENTED VERSIONS:

- For the following mounting methods, the detents configurations will be studied individually case by case:
  - V02 & V21
  - V12 & V22
  - V18
  - V24
- For more than 13 detents versions please contact your nearest PIHER authorised distributor.
- Standard mechanical life is 500 cycles.
- Long life versions are available under 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
- 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.
- Please consult your nearest Piher supplier 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 (under request).

DETENTS WITH CONSTANT VALUE ZONES

PIHER’s potentiometers may feature special stepped outputs or ‘constant voltage zones’ for the 6, 10 and 15mm product families.

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

In addition to established catalogue detent configurations, we will design and manufacture any other configuration on our tried-and-tested carbon/cermet & THM/SMD potentiometer technology and processes.

With its exacting control capabilities, our potentiometers series are well suited for many consumer, industrial and automotive applications such as ovens, ranges, dishwashers, lighting (dimmers), power hand tools, washing machines and HVAC systems.

Constant value zones can be combined with strategically located stops matching the flat areas of the output. If you require this feature, please, send us your requirements to sales@piher.net

10 stepped outputs version example:

When the potentiometer’s wiper position is located at detent d8, the output voltage will be 88.9% Un ± % tolerance.
DETENTS WITH CONSTANT VALUE ZONES

Improved repeatability

By combining the constant value zones with the detents, engineers can align the same voltage values with each of the detent stops when rotating the control both forward and backward.

This provides clear mechanical positions that are not only repeatable, but perfectly aligned electrical outputs at each of the (detent) angles.

Piher’s detents also prevent output values from changing due to vibration or accidental rotor movements, furthering reliable control consistency.

Design tip. Cost-effectiveness

Absolute encoders can easily be replaced connecting the potentiometer to the microprocessor’s analogue input.

Main advantages

- Unique, non-overlapping values at each stop (detent position)
- Prevents output value change due to light vibration or accidental rotor micro-movements
- Fully customisable according to customer’s needs
- Cost effective replacement for absolute encoders

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Our Advantage

Value added proposition

Engineering design-in support

Global footprint

Output customization

Manufacturing capabilities for high and low volume programs

Cable harness and connector assembly

One-stop solution provider for different position sensing technologies

- Hot-effect
- Potentiometric
- Inductive
- Capacitive
- Reed switch
- Printed PCB

Diverse portfolio of standard and customised sensors:

- Temperature, Gas & Moisture, Pressure, etc.