**PT-15** 15 mm Carbon Potentiometer

### Features
- Carbon resistive element.
- IP54 protection according to IEC 60529.
- Polyester substrate.
- Also chupon 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.

### Mechanical Specifications
- **Mechanical rotation angle:** 265° ± 5°
  240° ± 5° available under drawing (blue housing only)
- **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.
** Up to 85°C depending on application.

### Electrical Specifications
- **Range of values:**
  - 100Ω ≤ Rn ≤ 5 M (Decad. 1.0 - 2.0 - 2.2 - 2.5 - 4.7 - 5.0)
- **Tolerance:**
  - 100Ω ≤ Rn ≤ 1M Ω ......... ± 20%
  - 1MΩ < Rn ≤ 5M Ω ......... ± 30%
- **Max. Voltage:** 250 VDC (lin) 125 VDC (no lin)
- **Nominal Power:** 50°C (122°F) (see power rating curve)
- **25 W (lin) 0.12 W (no lin)
- **Taper** (Log. & Alog. only Rn ≥1K)
  - Log; Alog. 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)

### How to Order

<table>
<thead>
<tr>
<th>Series</th>
<th>Code</th>
<th>Mounting Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H01</td>
<td>H2.5</td>
</tr>
<tr>
<td></td>
<td>H05</td>
<td>H5</td>
</tr>
<tr>
<td></td>
<td>H25</td>
<td>HC5</td>
</tr>
<tr>
<td></td>
<td>H06</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>H02</td>
<td>H2.5P</td>
</tr>
<tr>
<td></td>
<td>H10</td>
<td>H5P</td>
</tr>
<tr>
<td></td>
<td>V02</td>
<td>V12.5</td>
</tr>
<tr>
<td></td>
<td>V12</td>
<td>VA</td>
</tr>
<tr>
<td></td>
<td>V15</td>
<td>V15</td>
</tr>
<tr>
<td></td>
<td>V17</td>
<td>V17.5</td>
</tr>
<tr>
<td></td>
<td>V18</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>V24</td>
<td>VD15</td>
</tr>
<tr>
<td></td>
<td>V21</td>
<td>V12.5P</td>
</tr>
<tr>
<td></td>
<td>V22</td>
<td>VAP</td>
</tr>
<tr>
<td></td>
<td>V23</td>
<td>V15P</td>
</tr>
</tbody>
</table>

(See note 1)

### Optional Extras

<table>
<thead>
<tr>
<th>Life</th>
<th>Detents</th>
<th>Flammability</th>
<th>Wiper position</th>
<th>Magazine</th>
</tr>
</thead>
<tbody>
<tr>
<td>E= Long life</td>
<td>PAI</td>
<td>Non Flammable</td>
<td>PM= 50%</td>
<td>T</td>
</tr>
<tr>
<td>U= Extra Long life</td>
<td>PAM</td>
<td></td>
<td>PF= Final</td>
<td>(See note 8)</td>
</tr>
<tr>
<td></td>
<td>PAF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P1F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P38</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Cut Track

<table>
<thead>
<tr>
<th>Shaft/Thum</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI= Initial</td>
<td>RO= Red</td>
</tr>
<tr>
<td>PCF= Final</td>
<td>NE= Black</td>
</tr>
<tr>
<td>01 – Fig. 1</td>
<td>V= Green</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>AM= Yellow</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>AZ= Blue</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>MA= Brown</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>GR= Grey</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>NA= Orange</td>
</tr>
<tr>
<td>28 – Fig. 28</td>
<td>CR= Cream</td>
</tr>
</tbody>
</table>

(See note 7)

### Value and Tolerance

<table>
<thead>
<tr>
<th>Value</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10Ω</td>
<td>2020 ± 20%</td>
</tr>
<tr>
<td>100Ω</td>
<td>3030 ± 30%</td>
</tr>
</tbody>
</table>

(See note 4)

### Codes

(See note 2)

### Notes:
1. "Z" adjustment only available on "H" versions. Standard colour for the "T" rotor: Orange.
2. Terminal styles: *P* are crimped terminals. V24 steel terminals material: brass. V=Vertical adjust; H=Horizontal Adjust
3. Value: Example: Code: 10Ω 100Ω; Numb. of zeros. First two digits of the value.
   - 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.
   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.

**NOTE:** The information contained here should be used for reference purposes only.

www.piher.net
HOW TO ORDER CUSTOM DRAWING

PT-15 LH 01 + DRAWING NUMBER (Max. 16 digits)

This way of ordering should be used for options which are not included in the "How to order" standard and optional extras.

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="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
</tbody>
</table>

With shaft

X = Adjustable from collector side

W = Adjustable from terminal side

With thumbwheel

Y = Adjustable from terminal side

Z = Adjustable from collector side

VERTICAL MOUNT - HORIZONTAL ADJUST

<table>
<thead>
<tr>
<th>h (2.5)</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

A = Initial

S = Wiper

E = Final

h (5)

<table>
<thead>
<tr>
<th><a href="image5.png">Image</a></th>
</tr>
</thead>
</table>

h c 5

<table>
<thead>
<tr>
<th><a href="image6.png">Image</a></th>
</tr>
</thead>
</table>

Check availability.

www.piher.net
HORIZONTAL MOUNT - VERTICAL ADJUST

\( v \) (12.5)

A = Initial  S = Wiper  E = Final

\( v_a \) (12.5)

\( v \) (15)

\( v \) (17.5)

Check availability.

DETENT DETAILS

13 detents example

CRIMPED TERMINALS (DETAIL)

POWER RATING CURVE

TAPERS

NOTE: Please note terminals disposition when ordering non linear curves.
Options

Positioning

P.M.
50% ±20°

CCW

CW

Cut Track

CCW on-off (A)

Std. Position = CCW

CW on-off (E)

A = Initial
S = Wiper
E = Final

Tests

| ELECTRICAL LIFE | 1,000 h. @ 50°C; 0.25 W |
| MECHANICAL LIFE (CYCLES) | 1000 @ 10 CPM ... 15 CPM |
| TEMPERATURE COEFFICIENT | ±3 % (Rn < 1 MΩ) |
| THERMAL CYCLING | ±3 °C | ±300 ppm (Rn <100 K) |
| DAMP HEAT | ±5 % |
| VIBRATION (for each plane X, Y, Z) | 2 h. @ 10 Hz ... 55 Hz. |

Variations

|  | ±5 % |
| | ±3 % |
| | ±2.5 % |
| | ±5 % |
| | ±2 % |

NOTE: Out of range values may not comply these results.

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

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>31</td>
<td>6</td>
<td>5216</td>
</tr>
<tr>
<td>10</td>
<td>37.8</td>
<td>9</td>
<td>33.8</td>
<td>6</td>
<td>5218</td>
</tr>
<tr>
<td>11</td>
<td>35</td>
<td>25</td>
<td>15</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>

A = Length (FRS)
B = Knurling length
C = Hollow depth
D = Shaft diameter
FRS = From rotor surface

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.

Recommended Connections

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

VCC

R

S

AD

RL

Noise filter

RL ±100 x R
SHAFTS (for N, G and T rotor types, top view)

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.

**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**

* Not available in self-extinguishable plastic

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THUMBWHEEL

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.

**Fig. 4 / Ref. 5371**
DETENT CONFIGURATIONS EXAMPLES

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 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).

A = 32.625°
B = 34.5°

Wiper position

NOTES FOR DETENTED VERSIONS:

1. For the following mounting methods, the detents configurations will be studied individually case by case:
   - V02 & V21
   - V12 & V22
   - V18
   - V24

2. For more than 13 detents versions please contact your nearest PIHER authorised distributor.

3. Standard mechanical life is 500 cycles.

4. Long life versions are available under request and have the following characteristics at T°:
   - Potentiometers with 1 to 3 detents: up to 10K cycles
   - Potentiometers with 4 and more detents: up to 5K cycles

5. 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.

6. Please consult your nearest PIHER supplier if unique non-overlapping values at each detent position or LOG/ALOG tapers are required.

7. 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 10mm 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 10mm and 15mm potentiometers series are well suited for many consumer applications such as ovens, ranges, dishwashers, lighting (dimmers), power hand tools, washing machines and HVAC systems.

www.pither.net
**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.

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

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### 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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