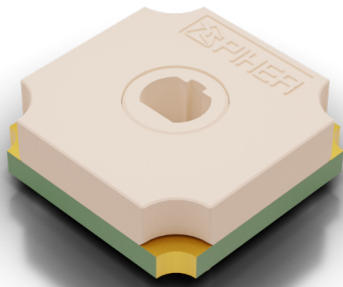


N-15

Low Profile Rotary Position Sensor / Potentiometer

The N-15 series offers you endless rotation, 340° wide electrical angle, SMD or through-hole mount, an extended working temperature range of -40°C to +120°C and a whole series of customisation possibilities making it the most flexible product on the market. The N-15 is ideal for appliance and automotive control and sensor applications.



KEY FEATURES

- ▶ SMD or Through-hole mount
- ▶ Excellent performance (3% linearity)
- ▶ Up to 2.000.000 life cycles
- ▶ IP54 protection
- ▶ 360° endless rotation
- ▶ 340° electrical angle
- ▶ Low profile (4.4 mm) and footprint (15 mm)
- ▶ High operating temperature range
- ▶ Polarised "T" rotor (European Home Appliance standard)
- ▶ Embossed tape packaging according to IEC 60286-3:2007
- ▶ All PT-15 shafts compatible

Also available as 6-pulse incremental encoder or mechanical switch with up to 12 positions.

ELECTRICAL SPECIFICATIONS

| | Standard | Extra-long life |
|-------------------------------|--------------------------------|-----------------|
| Taper | Linear | |
| Resistance range ¹ | 5 kΩ ≤ R _n ≤ 100 kΩ | 5 kΩ |
| Tolerance | ±30% | |
| Max. voltage | 120 Vdc | 27 Vdc |
| Nominal power at 50°C (122°F) | 0.15 W | |
| Linearity (absolute) | 3% | |
| Operating temperature | -40°C to +120°C | |

¹ Others check availability

MECHANICAL SPECIFICATIONS

| | Standard | Extra-long life |
|---------------------------|----------------------|------------------------|
| Mechanical rotation angle | 360° | |
| Electrical rotation angle | 340° ±10° | 110° ±10° |
| Rotational torque | ≤20 mN.m | |
| Mounting method | SMD or Through-hole | SMD |
| Mechanical life | Up to 200,000 cycles | Up to 2,000,000 cycles |

APPLICATIONS

Appliances

- ▶ Timer and program selection
- ▶ Temperature controls

Automotive

- ▶ HVAC control
- ▶ Seat position
- ▶ Mirror actuator feedback
- ▶ Gear Shift Position

Size and position detectors

N-15

Low Profile Rotary Position Sensor / Potentiometer

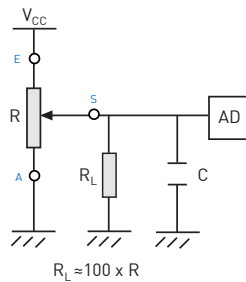
ENVIRONMENTAL TESTING

| | Test method | ΔR [%]- typical test results |
|-------------------------|--|--------------------------------------|
| Electrical life | 1.000 h at 50°C; 0.15 W | $\pm 40\%$ |
| Mechanical life | 100,000 cycles at 20 cpm | $\pm 40\%$ (Rn < 100 k) |
| Temperature coefficient | -40°C; +120°C | ± 300 ppm/°C (Rn < 100 k) |
| Thermal cycling | 10h at 120°C and 10h at -40°C | $\pm 40\%$ |
| Damp heat | 480h at 40°C and 95% relative humidity (RH) | $\pm 40\%$ |
| Storage | 6 month at 23°C $\pm 2^\circ\text{C}$ and 50% RH | $\pm 40\%$ |

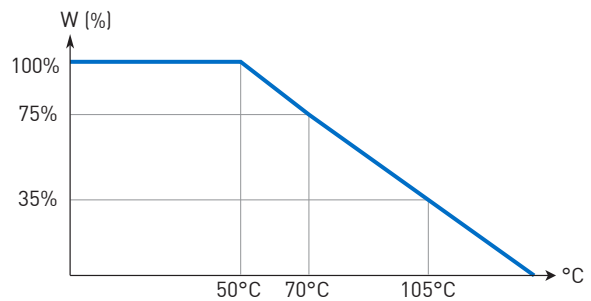
Out of range values may not comply with these results. Standard test conditions: temperature: 23°C $\pm 2^\circ\text{C}$ and 45% to 70% RH

RECOMMENDED CONNECTIONS

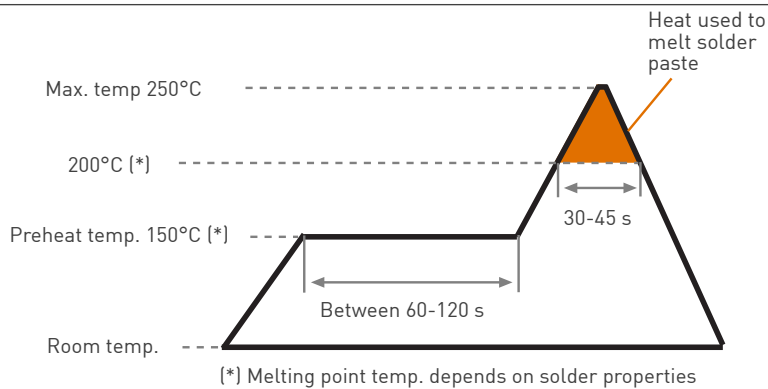
Recommended connection circuit for a position sensor or control application (voltage divider circuit electronic design).



POWER RATING CURVE



RECOMMENDED REFLOW PROFILE



The recommended reflow profile is provided as a guideline. Optimal profile may differ due to oven type, assembly layout or other design or process variables. Customers should verify actual device performance in their specific application and reflow process. Please contact Piher if you require additional support.

N-15

Low Profile Rotary Position Sensor / Potentiometer

HOW TO ORDER

Standard version

| | | | | | | |
|--------|------------|--|---|--------------------------------|---------------------------------------|--|
| N15 | T | - | - - - - | A | 3030 | Optional features - - |
| Series | Rotor T | Mounting method ¹ S = SMD V = Through-hole H = Horizontal adjust | Ω-Value ² 502 = 5 kΩ ... 104 = 100 kΩ | Taper ³ A = lin. | Tolerance ⁴ 3030 = ±30% | Life [empty] = 100k cycles U = 200k cycles |

Long-life version

| | | | | | |
|--------|------------|---|-----------------------|--------------------------------|---------------------------------------|
| Z15 | T | S | - 502 | A | 3030 |
| Series | Rotor T | Mounting method ¹ S = SMD | Ω-Value 502 = 5 kΩ | Taper ³ A = lin. | Tolerance ⁴ 3030 = ±30% |

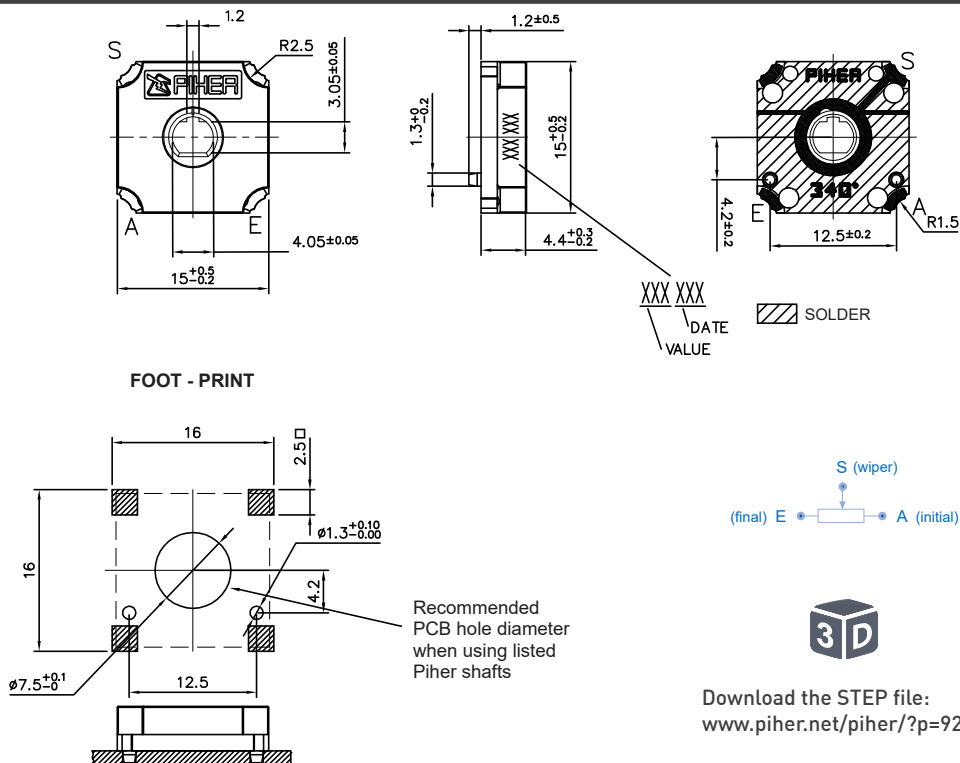
1. Mounting method: Horizontal adjust versions will be studied case by case.
 2. Ω- Value: XX - First two digits of Ω-value; XXX - Number of zeros
 3. A wide range of custom tapers and step curves is available on request.
 4. Other tolerances and optional precision laser-trimmed voltage divider calibration available.
- For Switch (S-15) and Incremental Encoder (E-15) versions see below or contact Piher Sensing Systems.

STANDARD RESISTANCE-VALUES

| Resistance Ω | 5k | 10k | 20k | 22k | 25k | 47k | 50k | 100k |
|--------------|-----|-----|-----|-----|-----|-----|-----|------|
| Order Code | 502 | 103 | 203 | 223 | 253 | 473 | 503 | 104 |

DIMENSIONS

SMD mount

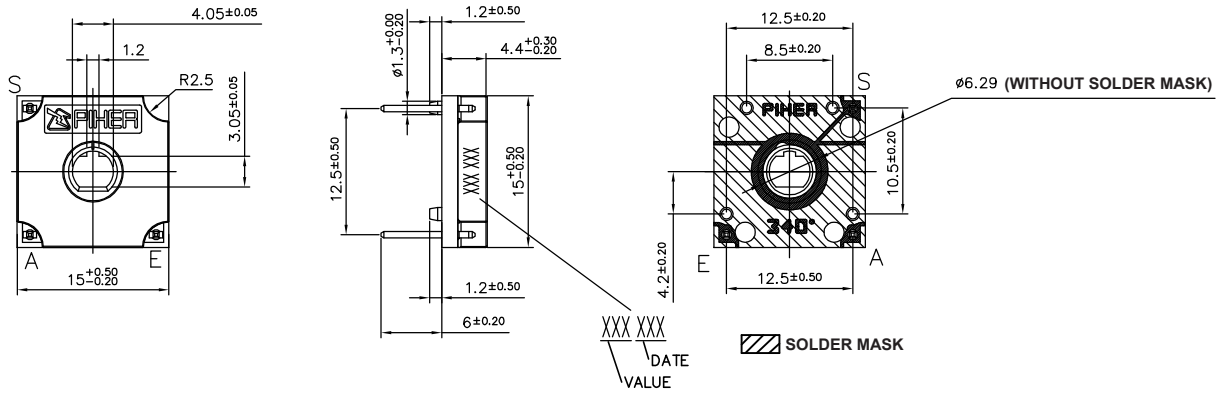


N-15

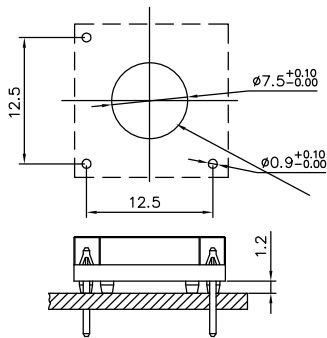
Low Profile Rotary Position Sensor / Potentiometer

DIMENSIONS

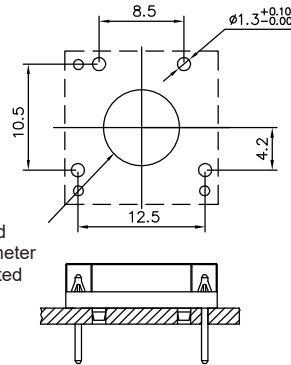
Through-hole mount



PCB HOLE LAYOUT 1

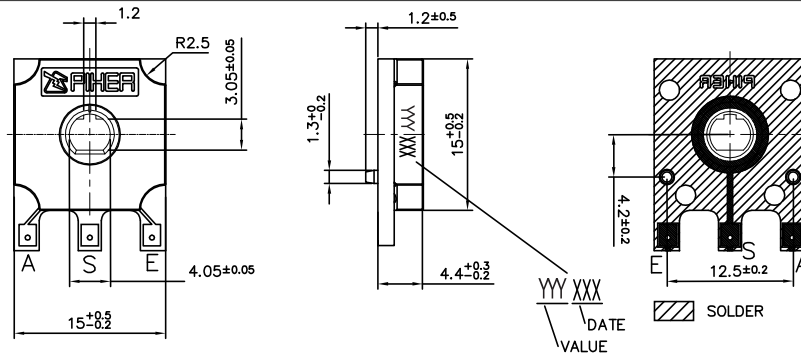


PCB HOLE LAYOUT 2

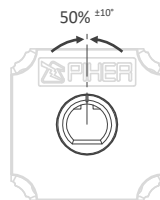


Recommended PCB hole diameter when using listed Piher shafts

Horizontal adjust - vertical mount



STANDARD WIPER POSITION



N-15

Rotary Switch (S-15) and Incremental Encoder (E-15)

| ROTARY SWITCH S-15 | | |
|-----------------------------|-------------------------|-------------------|
| Standard specifications | 2-position switch | 6-position switch |
| Switch Positions | | |
| Closed contact resistance | < 5 Ω | |
| Open contact resistance | > 10 mΩ | |
| Contact current | 10μA - 100mA | |
| Operating voltage | 13.5 ±0.2 Vdc | 16 Vdc |
| Temperature range | -40°C to +85°C | |
| Rotational torque | < 2 Ncm | |
| Mechanical rotational angle | 360° (endless rotation) | |
| Mechanical life | 15K cycles | 35K cycles |

For more information on switch sequence, dimensions, packaging or ordering code, please contact Piher Sensing Systems.

| INCREMENTAL ENCODER E-15 | | |
|-----------------------------|-------------------------|-----------------|
| Standard specifications | 3-pulse encoder | 6-pulse encoder |
| Graph Code | | |
| Closed contact resistance | < 5 Ω | |
| Open contact resistance | > 10 mΩ | |
| Contact current | 10μA - 100mA | |
| Operating voltage | 13.5 ±0.2 Vdc | 16 Vdc |
| Temperature range | -40°C to +120°C | |
| Rotational torque | < 2 Ncm | |
| Mechanical rotational angle | 360° (endless rotation) | |
| Mechanical life | 10K cycles | 36K cycles |

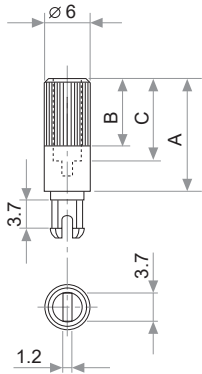
For more information on packaging options or ordering code, please contact Piher Sensing Systems.

N-15

Low Profile Rotary Position Sensor / Potentiometer

SHAFTS

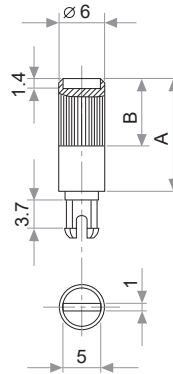
Hollow shafts models



| 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 |
| 10 | 5218 | 37.8 | 9 | 33.8 |
| 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 | <p>Shafts must be ordered separately and are delivered unassembled. *Not available in self-extinguishable plastic.</p> | | | | |
| | | | | | |