



Long Life Cermet Potentiometer up to 2 Million Cycles



FEATURES

- 2 million cycles for bushing L and N
- 1 million cycles for bushing T, Q, O, and P
- High power rating 1.5 W at 70 °C
- Test according to CECC 41000 or IEC 60393-1
- Cermet element
- Fully sealed case
- Mechanical strength
- Custom designs on request
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

LINKS TO ADDITIONAL RESOURCES



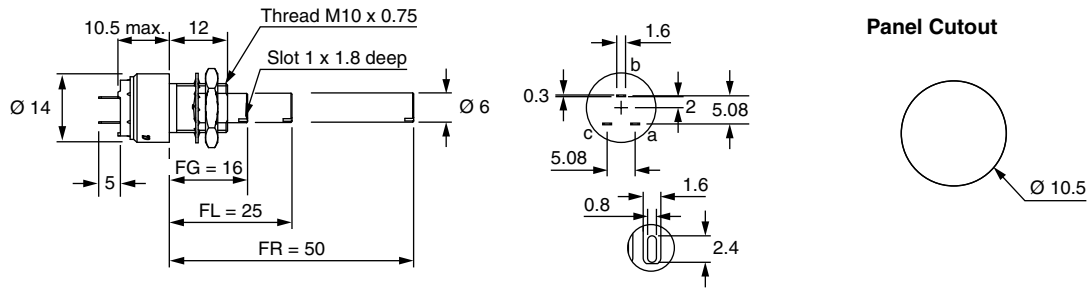
Their excellent performances are due to the use of a cermet-track sealed in a large case.

P13 interchangeability with RV6, combined with the excellent stability of its rated characteristics make it fully acceptable for industrial and professional uses.

| QUICK REFERENCE DATA | |
|-------------------------|---|
| Multiple module | No |
| Switch module | n/a |
| Detent module | n/a |
| Special electrical laws | A: linear, L: logarithmic, F: reverse logarithmic |
| Sealing level | IP 67 |
| Lifespan | 1M cycles |

| DIMENSIONS in millimeters (± 0.5) | | |
|-----------------------------------|--|----------------------------|
| <p>P13LT</p> | | <p>Panel Cutout</p> |
| <p>P13LQ</p> | | <p>Panel Cutout</p> |

DIMENSIONS in millimeters (± 0.5)

P13LL

ELECTRICAL SPECIFICATIONS

| Resistive element | Cermet | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|--------------------------------|-------------------------|--------------------------|------------------|--|-------------------------|--------------------------|-------------------------|--------------------------|---|-----|------|------|------|---|-----|------|------|------|----|-----|-----|------|----|----|-----|-----|------|-----|
| Electrical travel | $270^\circ \pm 10^\circ$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Standard resistance value | 1 k Ω , 5 k Ω , 10 k Ω , 50 k Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tolerance | $\pm 20\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Taper | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Circuit diagram | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Power rating | <p>Linear 1.5 W at 70 °C</p> <p>Logarithmic 0.75 W at 70 °C</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Standard resistance element data | <table border="1"> <thead> <tr> <th rowspan="2">Resistance Value (kΩ)</th> <th colspan="2">Linear Taper</th> <th colspan="2">Non-Linear Taper</th> </tr> <tr> <th>Max. Power at 70 °C (W)</th> <th>Max. Working Voltage (V)</th> <th>Max. Power at 70 °C (W)</th> <th>Max. Working Voltage (V)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.5</td> <td>38.7</td> <td>0.75</td> <td>27.4</td> </tr> <tr> <td>5</td> <td>1.5</td> <td>86.6</td> <td>0.75</td> <td>61.2</td> </tr> <tr> <td>10</td> <td>1.5</td> <td>122</td> <td>0.75</td> <td>87</td> </tr> <tr> <td>50</td> <td>1.5</td> <td>274</td> <td>0.75</td> <td>194</td> </tr> </tbody> </table> | Resistance Value (k Ω) | Linear Taper | | Non-Linear Taper | | Max. Power at 70 °C (W) | Max. Working Voltage (V) | Max. Power at 70 °C (W) | Max. Working Voltage (V) | 1 | 1.5 | 38.7 | 0.75 | 27.4 | 5 | 1.5 | 86.6 | 0.75 | 61.2 | 10 | 1.5 | 122 | 0.75 | 87 | 50 | 1.5 | 274 | 0.75 | 194 |
| Resistance Value (k Ω) | Linear Taper | | Non-Linear Taper | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Max. Power at 70 °C (W) | Max. Working Voltage (V) | Max. Power at 70 °C (W) | Max. Working Voltage (V) | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 50 | 1.5 | 274 | 0.75 | 194 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature coefficient (typical) | ± 150 ppm/°C | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Limiting element voltage (linear law) | 350 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| End resistance (typical) | 1 Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric strength (RMS) | 2000 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Insulation resistance (300 V _{DC}) | 10 ⁶ M Ω | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Independent linearity (typical) | $\pm 5\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| MECHANICAL SPECIFICATIONS | | |
|-----------------------------------|------------------|----------------------|
| Mechanical travel | 300° ± 5° | |
| Operating torque (typical) | 2 Ncm max. | 2.85 oz. inch max. |
| End stop torque | | |
| Style T, Q | 35 Ncm max. | 3.1 lb inch max. |
| Style L | 80 Ncm max. | 7.1 lb inch max. |
| Tightening torque of mounting nut | | |
| Style T, Q | 150 Ncm max. | 13.3 lb inch max. |
| Style L | 250 Ncm max. | 22.1 lb inch max. |
| Unit weight | 6 g to 18 g max. | 0.22 oz. to 0.64 oz. |
| Terminals | e3: Pure Sn | |

| ENVIRONMENTAL SPECIFICATIONS | |
|------------------------------|-------------------------------|
| Temperature range | -55 °C to +125 °C |
| Climatic category | 55/125/56 |
| Sealing | Fully sealed - container IP67 |

| OPTIONS | |
|-------------------------------|--|
| Special feature command shaft | Length is measured from the mounting surface to the free end of the shaft. The screwdriver slot is aligned with the wiper within ± 10°. Special shafts are available, in accordance to drawings supplied by customers. We recommend that customers should not machine tool shafts, in order to avoid damage. Bending or torsion of terminals should also be avoided. |
| Panel sealing | <p>Potentiometers P13LT and P13LL can be fitted with a device providing sealing between the threaded bushing and the front panel. Their designation is P13LP and P13LN respectively or with a locating peg P13LP...E and P13LN...E.</p> <p>Panel sealed version P13LP P13LP...E: Including locating peg</p> |
| | <p>Panel sealed version P13LN P13LN...E: Including locating peg</p> |

| OPTIONS | |
|---------------|--|
| Shaft locking | <p>On potentiometers equipped with a 3 mm Ø shaft, shaft locking can be obtained:</p> <ul style="list-style-type: none"> • Either by a taper nut tightening a slotted bushing. Ask for P13LO type. These devices are normally equipped with an AB type shaft (12.5 mm with a slot). <p>P13LO</p> <ul style="list-style-type: none"> • Or by a tightening nut locked by a screw. Ask for ES1 type. On potentiometers equipped with a Ø 6 mm shaft, locking can be obtained by a taper nut applying pressure on a slotted notched washer. This device is supplied in a box as an accessory. Ask for DBAN. These devices are ordered separately. Please consult Vishay Sfernice. <p>P13LL DBAN</p> <p>No locking on shaft Ø 4 mm.</p> |

| MARKING |
|--|
| Printed: <ul style="list-style-type: none"> • Vishay trademark • Part number (including ohmic value code, tolerance code and taper) • Manufacturing date code • Marking of terminals a |

| APPLICATION NOTE | |
|--|--|
| <p>The potentiometer shall be used in voltage divider with an impedance load at least 100 times higher than the total potentiometer nominal resistance value.</p> <p>Advised load impedance: 1 MΩ min. for resistance range of 1 kΩ to 50 kΩ</p> | |

| PACKAGING |
|---|
| <ul style="list-style-type: none"> • In box of 8 pieces for shafts FR and FQ • In box of 10 pieces for shafts FE, FL, FG, and FK • In box of 15 pieces for shafts AJ and EJ • In box of 25 pieces for shafts AB, AA, EA, and EB |
| Hardware: nuts, washer, and O-ring are separately supplied (not mounted on the potentiometer), in a small bag placed in the packaging. |



| PERFORMANCE | | | | |
|-------------------------|--|---------------------------|------------------------------|--|
| TESTS | CONDITIONS | TYPICAL VALUES AND DRIFTS | | |
| | | $\Delta R_T/R_T$ (%) | $\Delta R_{1-2}/R_{1-2}$ (%) | OTHER |
| Electrical endurance | 1000 h at rated power 90°/30° - ambient temperature 70 °C | ± 20 % | ± 20 % | - |
| Climatic sequence | Phase A dry heat 125 °C Phase B damp heat Phase C cold -55 °C Phase D damp heat 5 cycles | ± 0.5 % | ± 1 % | - |
| Damp heat, steady state | 56 days, 40 °C 93 % HR | ± 0.5 % | ± 1 % | Dielectric strength: 1000 V Insulation resistance: > 10 ⁴ MΩ |
| Change of temperature | 5 cycles, -55 °C at +125 °C | ± 0.5 % | - | - |
| Mechanical endurance | Bushings L and N: 2 000 000 cycles Bushings T, Q, O, and P: 1 000 000 cycles at rated power Turn angle ± 60° Temperature ± 20 °C | ± 20 % | - | Independent linearity: ± 10 % |
| Shock | 50 g's at 11 ms, 3 successive shocks in 3 directions | ± 0.1 % | ± 0.2 % | - |
| Vibration | 10 Hz to 55 Hz, 0.75 mm or 10 g's during 6 h | ± 0.1 % | - | $\Delta V_{1-2}/V_{1-3} < \pm 0.2 \%$ |

Note

- Nothing stated herein shall be construed as a guarantee of quality or durability

| ORDERING INFORMATION (part number) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|--|-------|---|------|-----------|-------------|-----------|-------|---------|---|---|----|----|---|---|----|---|---|---|---|----|-----|---|---|-------------------|---|--|----------|--|--|--|--|
| P | 1 | 3 | L | Q | E | A | S | 1 | 0 | 3 | M | L | E | | | | | | | | | | | | | | | | | | | |
| MODEL | BUSHING | SHAFT | | | SHAFT END | OHMIC VALUE | TOLERANCE | TAPER | SPECIAL | | | | | | | | | | | | | | | | | | | | | | | |
| P13L | <table border="1"> <tr><td></td><td>∅</td><td>L</td></tr> <tr><td>T</td><td>6</td><td>8</td></tr> <tr><td>Q</td><td>7</td><td>8</td></tr> <tr><td>L</td><td>10</td><td>12</td></tr> <tr><td>O</td><td>6</td><td>11</td></tr> <tr><td>P</td><td>6</td><td>8</td></tr> <tr><td>N</td><td>10</td><td>9.5</td></tr> </table> | | ∅ | L | T | 6 | 8 | Q | 7 | 8 | L | 10 | 12 | O | 6 | 11 | P | 6 | 8 | N | 10 | 9.5 | ∅ | L | Only with bushing | S = slotted F = flattened R = round D = custom | 102 = 1 kΩ 502 = 5 kΩ 103 = 10 kΩ 503 = 50 kΩ | M = 20 % | A = linear L = clockwise logarithmic F = inverse clockwise logarithmic | E = locating peg or special code given by Vishay | | |
| | ∅ | L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| T | 6 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | 7 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L | 10 | 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O | 6 | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P | 6 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| N | 10 | 9.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | AA | 3 | 9.5 | T, P | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | AB | 3 | 12.5 | T, P, O | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | AJ | 3 | 22 | T, P | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EA | 4 | 9.5 | Q | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EB | 4 | 12.5 | Q | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | EJ | 4 | 22 | Q | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FG | 6 | 16 | L | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FL | 6 | 25 | L | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FR | 6 | 50 | L | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FE | 6 | 13 | N | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FK | 6 | 22 | N | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | FQ | 6 | 47.5 | N | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| PART NUMBER DESCRIPTION (for information only) | | | | | | | | | | | |
|--|---------|---------|-------|-------|-----------|-------|---------|-----------|-------|---------|----------------|
| P13L | Q | E | EA | 10K | 20 % | L | | BO25 | | | e3 |
| MODEL | BUSHING | SPECIAL | SHAFT | VALUE | TOLERANCE | TAPER | SPECIAL | PACKAGING | SHAFT | SPECIAL | LEAD (Pb)-FREE |



| ACCESSORIES | |
|--|--|
| Additional Accessories (to order separately) | www.vishay.com/doc?51051 |
| Control knobs | www.vishay.com/doc?51101 |

| RELATED DOCUMENTS | |
|---|--|
| APPLICATION NOTES | |
| Potentiometers and Trimmers | www.vishay.com/doc?51001 |
| Guidelines for Vishay Sfernice Resistive and Inductive Components | www.vishay.com/doc?52029 |



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