

Knob Potentiometer With Switch

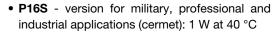


LINKS TO ADDITIONAL RESOURCES



The P16S is a revolutionary concept in panel mounted potentiometers. This unique design consists of a knob driving and incorporating a cermet potentiometer. Only the mounting hardware and terminals are situated on the back side of the panel reducing to a minimum the required clearance.

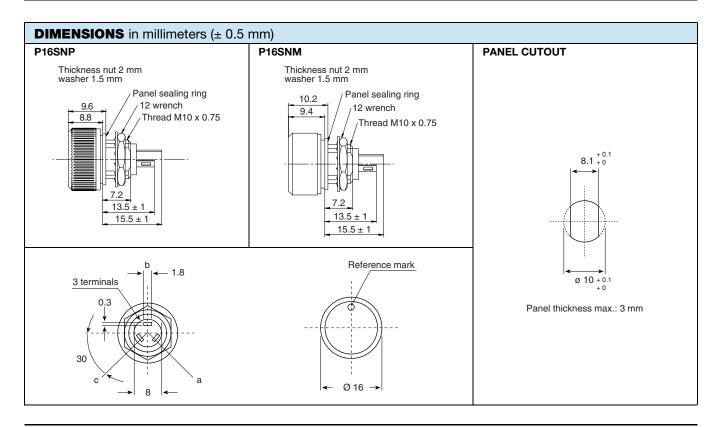
FEATURES





- PA16S version for professional audio applications (conductive plastic): 0.5 W at 40 °C
- Compact (integrated)
- Detent and electric cut off at beginning of travel
- Fully sealed and panel sealed
- Metallic or plastic knob options
- · Custom knob on request
- Test according to CECC 41000 or IEC 60393-1
- Material categorization: for definitions of compliance please see www.vishav.com/doc?99912

| QUICK REFERENCE DATA | | | | | |
|-------------------------|---|--|--|--|--|
| Multiple module | No | | | | |
| Switch module | Yes | | | | |
| Detent module | Yes | | | | |
| Special electrical laws | A: linear, L: logarithmic, F: reverse logarithmic | | | | |
| Sealing level | IP 67 | | | | |
| Lifespan | 10K cycles (switch), 50K cycles (track) | | | | |



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| | | P16S PA16S | | | | |
|--|-----------------------------|--|--|--|--|--|
| Resistive element | | Cermet | Conductive plastic | | | |
| Electrical travel | | 220° ± 10° | 220° ± 10° | | | |
| Power rating chart | | 1.25 P16S LIN. TAPER "A" 1.00 P16S LOG. TAPER "L & F" & PA16S LIN. TAPER 0.25 PA16S LOG. TAPER 0 20 40 60 80 100 120 140 AMBIENT TEMPERATURE IN °C | | | | |
| Circuit diagram | å (1) b b → cw (2) | | | | | |
| Taper | | 100 Switch on-off 80 F A L 101 | | | | |
| Resistance range | linear law logarithmic laws | 22 Ω to 10 M Ω 100 Ω to 2.2 M Ω | 1 k Ω to 1 M Ω 470 Ω to 500 k Ω | | | |
| Standard series e3 | | 1 - 2.2 - 4.7 and on request 1 - 2 - 5 | 1 - 2.2 - 4.7 | | | |
| Tolerance - | standard on request | ± 20 % ± 10 % | ± 20 % ± 10 % (1 kΩ to 100 kΩ) | | | |
| Power rating | linear logarithmic | 1 W at +40 °C 0.5 W at +40 °C | 0.5 W at +40 °C 0.25 W at +40 °C | | | |
| Temperature coefficient (typical) | | ± 150 ppm | ± 500 ppm | | | |
| Dielectric strength (RMS) | | 2500 V | 2500 V | | | |
| Limiting element voltage (linear law) | | 350 V | 350 V | | | |
| Contact resistance variation | | 3 % Rn or 3 Ω | 2 % Rn or 3 Ω | | | |
| End resistance (typical) | | 1 Ω | 1 Ω | | | |
| Insulation resistance (500 V _{DC}) | | $10^6\mathrm{M}\Omega$ | 10 ⁶ MΩ | | | |



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| MECHANICAL SPECIFICATIONS | | | | | | |
|-----------------------------------|-----------------|--|--|--|--|--|
| Mechanical travel | 300° ± 5° | | | | | |
| Operating torque | 2 Ncm typical | | | | | |
| End stop torque | 25 Ncm maximum | | | | | |
| Tightening torque of mounting nut | 180 Ncm maximum | | | | | |
| Unit weight | 4.5 g typical | | | | | |

| ENVIRONMENTAL SPECIFICATIONS | | | | | | |
|------------------------------|-----------------------------------|------------------|--|--|--|--|
| | METALLIC KNOB | PLASTIC KNOB | | | | |
| Temperature range | -40 °C to +125 °C | -40 °C to +85 °C | | | | |
| Climatic category | 40/100/56 | 40/85/56 | | | | |
| Sealing | Sealed container and panel sealed | | | | | |
| Protection grades | IP67 | | | | | |

| SWITCH ELECTRICAL AND MECHANICAL SPECIFICATIONS | | | | | | |
|---|------------------------|--|--|--|--|--|
| ON / OFF switch | Actuation in cor | unter clockwise position (between terminal a and terminal b) | | | | |
| Switching current | P16S | 100 mA max. | | | | |
| Switching current | PA16S | 1 mA max. | | | | |
| Switch actuation torque | 3 Ncm typical | | | | | |
| Switch actuation travel | 30° ± 5° | | | | | |
| Dielectric strength terminal to terminal (RMS) | 1000 V | | | | | |
| Insulation resistance between contacts | $10^6\mathrm{M}\Omega$ | | | | | |
| Switch mechanical endurance | 10 000 cycles | | | | | |
| 1 cycle | ON-OFF-ON | | | | | |

Note

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

MARKING

- Ohmic value code, tolerance, code and taper
- Manufacturing date code

PACKAGING

Carton box of 20 pieces

CONTROL KNOB

Black metallic knob (NM). Black plastic knob (NP).

For white, blue, red, and yellow color see ordering information. Other dimensions, shape, marking, colors of control knobs are manufactured on request - please consult Vishay. Other reference marks (shapes, colors) and legends can be printed on plastic knob on request - please consult Vishay.

| STANDA | STANDARD RESISTANCE ELEMENT DATA | | | | | | | | | | | | |
|----------------------|----------------------------------|-----------------|-------------------------------|---------------------------|-----------------|-------------------------------|---------------------------|--------------------------|-------------------------------|---------------------------|-----------------|-------------------------------|--|
| | P16S CERMET | | | | | | | PA16S CONDUCTIVE PLASTIC | | | | | |
| STANDARD | ı | INEAR TAP | PER | LOGARITHMIC TAPER | | LINEAR TAPER | | | LOGARITHMIC TAPER | | | | |
| RESISTANCE VALUES | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | MAX. POWER AT 40 °C | MAX. VOLTAGE | MAX. CUR. THROUGH WIPER | |
| Ω | W | ٧ | mA | W | V | mA | W | ٧ | mA | W | ٧ | mA | |
| 22 | 1 | 4.69 | 213 | | | | | | | | | | |
| 47 | 1 | 6.85 | 146 | | | | | | | | | | |
| 100 | 1 | 10 | 100 | 0.5 | 7.1 | 71 | | | | | | | |
| 220 | 1 | 14.8 | 67.4 | 0.5 | 10.5 | 48 | | | | | | | |
| 470 | 1 | 21.7 | 46.1 | 0.5 | 15.3 | 32.6 | | | | 0.25 | 10.8 | 23.1 | |
| 1K | 1 | 31.6 | 31.6 | 0.5 | 22.4 | 22.4 | 0.5 | 22.4 | 22.4 | 0.25 | 15.8 | 16 | |
| 2.2K | 1 | 46.9 | 21.3 | 0.5 | 33.2 | 15.1 | 0.5 | 33.2 | 15.1 | 0.25 | 23.5 | 11 | |
| 4.7K | 1 | 68.5 | 14.6 | 0.5 | 48.5 | 10.3 | 0.5 | 48.5 | 10.3 | 0.25 | 34.3 | 7 | |
| 10K | 1 | 100 | 10 | 0.5 | 70.7 | 7.07 | 0.5 | 70.7 | 7.07 | 0.25 | 50 | 5 | |
| 22K | 1 | 148 | 6.74 | 0.5 | 105 | 4.77 | 0.5 | 105 | 4.77 | 0.25 | 74 | 3.4 | |
| 47K | 1 | 217 | 4.61 | 0.5 | 153 | 3.26 | 0.5 | 153 | 3.26 | 0.25 | 108 | 2.3 | |
| 100K | 1 | 316 | 3.16 | 0.5 | 224 | 2.24 | 0.5 | 224 | 2.24 | 0.25 | 158 | 1.6 | |
| 220K | 0.56 | 350 | 1.59 | 0.5 | 332 | 1.51 | 0.5 | 332 | 1.51 | 0.25 | 235 | 1.1 | |
| 470K | 0.26 | 350 | 0.75 | 0.26 | 350 | 0.74 | 0.26 | 350 | 0.74 | 0.25 | 343 | 0.7 | |
| 1M | 0.12 | 350 | 0.35 | 0.12 | 350 | 0.35 | 0.12 | 350 | 0.35 | | | | |
| 2.2M | 0.05 | 350 | 0.16 | 0.056 | 350 | 0.16 | | | | | | | |
| 4.7M | 0.02 | 350 | 0.07 | | | | | | | | | | |
| 10M | 0.01 | 350 | 0.012 | | | | | | | | | | |

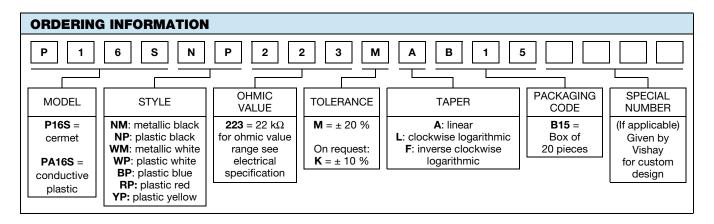
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| PERFORMANCE | | | | | | | |
|-------------------------|---|---------------------------|------------------------------|---|--|--|--|
| TESTS | CONDITIONS | TYPICAL VALUES AND DRIFTS | | | | | |
| 12313 | CONDITIONS | $\Delta R_{T}/R_{T}$ (%) | $\Delta R_{1-2}/R_{1-2}$ (%) | OTHER | | | |
| Electrical endurance | 1000 h at rated power 90'/30' cycle at +40 °C | ± 5 % | - | Insulation resistance: > $10^4 \text{M}\Omega$ Contact res. variation: < 2% Rn | | | |
| Damp heat, steady state | 56 days 40 °C, 93 % HR | ± 2 % | ± 1 % | Insulation resistance: $> 10^4 \text{ M}\Omega$ | | | |
| Mechanical endurance | 50 000 cycles | ± 5 % | - | Contact res. variation: < 2 % Rn | | | |
| Shock | 50 g's at 11 ms 3 successive shocks in 3 dimensions | ± 0.2 % | ± 0.5 % | - | | | |
| Vibration | 10 Hz to 55 Hz 0.75 mm or 10 <i>g</i> 's during 6 h | ± 0.2 % | - | $\Delta V_{1-2}/\Delta V_{1-3} \le \pm \ 0.5 \%$ | | | |



| PART NUMBER DESCRIPTION (for information only) | | | | | | | | |
|--|-------|----------------|-----------|-------|---------|-----------|---------|-------------------|
| P16S | NP | 22 k Ω | 20 % | Α | | BO20 | | e3 |
| MODEL | STYLE | OHMIC VALUE | TOLERANCE | TAPER | SPECIAL | PACKAGING | SPECIAL | LEAD (Pb)-FREE |

| 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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