

## Knob Potentiometer



The P16 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

- Test according to CECC 41000 or IEC 60393-1
- **P16** - Version for professional and industrial applications (cermet)  
1 W at 40 °C
- **PA16** - Version for professional audio applications (conductive plastic)  
0.5 W at 40 °C
- Compact (integrated)
- Safety in use due to good insulation:  $> 10^4 \text{ M}\Omega$  500 V<sub>DC</sub>
- High dielectric strength: 2500 V<sub>RMS</sub>
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Custom knob on request
- Compliant to RoHS Directive 2002/95/EC



DIMENSIONS in millimeters ( $\pm 0.5 \text{ mm}$ )	
<p><b>P16, PA16</b></p> <p>Thickness nut 2 mm washer 1.5 mm</p> <p>Panel sealing ring</p> <p>Thread M10 x 0.75</p> <p>12 wrench</p> <p>9 ± 0.5</p> <p>7</p> <p>13.5 ± 1</p> <p>15.5 ± 1</p> <p>Panel thickness max.: 3 mm</p> <p>Reference mark</p> <p>Ø 16</p>	<p><b>PANEL CUTOUT</b></p> <p>8.1<sup>+0.1</sup><sub>+0</sub></p> <p>Ø 10<sup>+0.1</sup><sub>+0</sub></p>

ELECTRICAL SPECIFICATIONS		
	P16	PA16
Resistive Element	Cermet	Conductive plastic
Electrical Travel	270° ± 10°	270° ± 10°
Power Rating Chart		
Circuit Diagram		
Taper		
Resistance Range	<b>Linear Taper</b> 22 Ω to 10 MΩ <b>Logarithmic Taper</b> 100 Ω to 2.2 MΩ	1 kΩ to 1 MΩ 470 Ω to 500 kΩ
Standard Series E3	1 - 2.2 - 4.7 and on request 1 - 2 - 5	1 - 2.2 - 4.7
Tolerance	<b>Standard</b> ± 20 % <b>On Request</b> ± 10 %	± 20 % ± 10 % (1 kΩ to 100 kΩ)
Power Rating	<b>Linear</b> 1 W at + 40 °C 0.5 W at + 40 °C <b>Logarithmic</b>	0.5 W at + 40 °C 0.25 W at + 40 °C
Temperature Coefficient (Typical)	± 150 ppm/°C	± 1000 ppm/°C
Dielectric Strength (RMS)	2500 V	2500 V
Limiting Element Voltage (Linear Law)	350 V	350 V
Insulation Resistance (500 V <sub>DC</sub> )	≥ 10 <sup>4</sup> MΩ	≥ 10 <sup>4</sup> MΩ
Contact Resistance Variation	3 % R <sub>n</sub> or 3 Ω	2 % R <sub>n</sub> or 3 Ω
End Resistance (Typical)	1 Ω	1 Ω
Insulation Resistance (500 V <sub>DC</sub> )	10 <sup>6</sup> MΩ	10 <sup>6</sup> MΩ



MECHANICAL SPECIFICATIONS	
Mechanical Travel	300° ± 5°
Operating Torque	2 Ncm typical
End Stop Torque	25 Ncm maximum
Max. Tightening Torque of Mounting Nut	250 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	

MARKING
<ul style="list-style-type: none"> <li>Ohmic value, tolerance, taper</li> <li>Manufacturing date</li> </ul>

PACKAGING
<ul style="list-style-type: none"> <li>Carton box of 20 pieces</li> </ul>

CONTROL KNOB
Black metallic knob (NM).
Black plastic knob (NP).
For white and blue color see ordering information.
Other dimensions, shapes, 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.

P16 STANDARD RESISTANCE ELEMENT DATA						
STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG TAPER		
	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER
Ω	W	V	mA	W	V	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
1K	1	31.6	31.6	0.5	22.4	22.4
2.2K	1	46.9	21.3	0.5	33.2	15.1
4.7K	1	68.5	14.6	0.5	48.5	10.3
10K	1	100	10	0.5	70.7	7.07
22K	1	148	6.74	0.5	105	4.77
47K	1	217	4.61	0.5	153	3.26
100K	1	316	3.16	0.5	224	2.24
220K	0.56	350	1.59	0.5	332	1.51
470K	0.26	350	0.75	0.26	350	0.74
1M	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			

PA16 STANDARD RESISTANCE ELEMENT DATA						
STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG TAPER		
	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 70 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER
Ω	W	V	mA	W	V	mA
470				0.25	10.8	23.1
1K	0.5	22.4	22.4	0.25	15.8	16
2.2K	0.5	33.2	15.1	0.25	23.5	11
4.7K	0.5	48.5	10.3	0.25	34.3	7
10K	0.5	79.7	7.07	0.25	50.0	5.0
22K	0.5	105	4.77	0.25	74	3.4
47K	0.5	153	3.26	0.25	108	2.3
100K	0.5	224	2.24	0.25	158	1.6
220K	0.5	332	1.51	0.25	235	1.1
470K	0.26	350	0.74	0.25	343	0.7
1M	0.12	350	0.35			



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° cycle at + 40 °C	± 5 %	-	Insulation resistance: > 10 <sup>4</sup> MΩ Contact res. variation: < 2 % Rn
Damp Heat, Steady State	56 days 40 °C, 93 % HR	± 2 %	± 1 %	Insulation resistance: > 10 <sup>4</sup> MΩ
Mechanical Endurance	50 000 cycles	± 5 %	-	Contact res. variation: < 2 % Rn
Shock	50 g's at 11 ms 3 successive shocks in 3 directions	± 0.2 %	± 0.5 %	-
Vibration	10 Hz to 55 Hz 0.75 mm or 10 g's during 6 h	± 0.2 %	-	$\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 0.5 \%$

ORDERING INFORMATION																			
P	1	6	N	P	2	2	3	M	A	B	1	5							
MODEL	STYLE			OHMIC VALUE	TOLERANCE	TAPER		PACKAGING CODE	SPECIAL NUMBER										
<b>P16</b> = Cermet  <b>PA16</b> = Conductive plastic	<b>NM</b> : Metallic black <b>NP</b> : Plastic black <b>WM</b> : Metallic white <b>WP</b> : Plastic white <b>BP</b> : Plastic blue			<b>223</b> = 22 kΩ for ohmic value range see electrical specification	<b>M</b> = ± 20 %  On request: <b>K</b> = ± 10 %	<b>A</b> : Linear <b>L</b> : Clockwise logarithmic <b>F</b> : Inverse clockwise logarithmic		<b>B15</b> = Box of 20 pieces	(If applicable) Given by Vishay for custom design										

PART NUMBER DESCRIPTION (for information only)								
P16	NP	22 kΩ	20 %	A		BO		e3
MODEL	STYLE	VALUE	TOLERANCE	TAPER	SPECIAL	PACKAGING	SPECIAL	LEAD (Pb)-FREE



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