

## 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

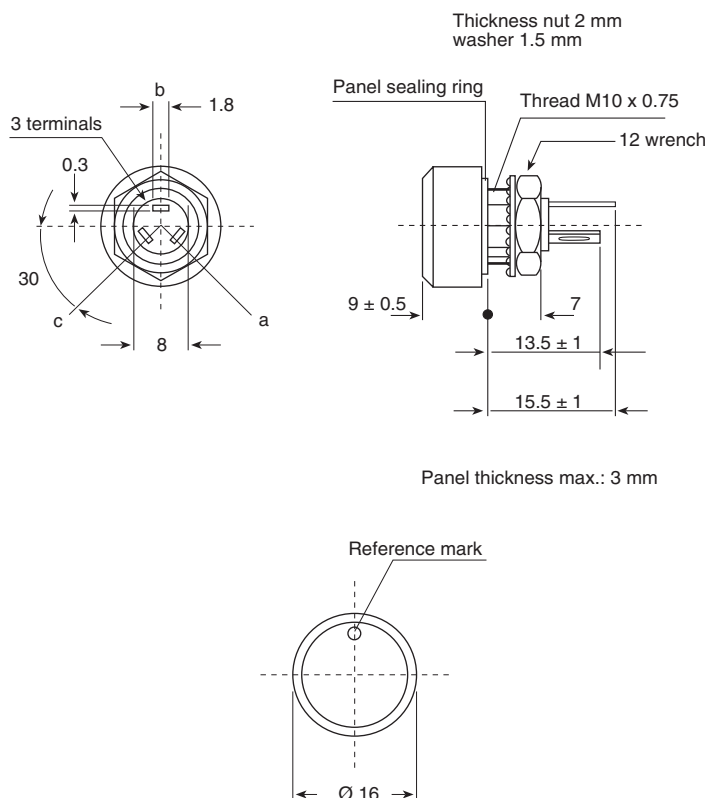
- Test according to CECC 41000 or IEC 60393-1
- **P16** - Version for professional and industrial applications (cermet)  
1 W at 40 °C
- **PA16** - Version for professional audio applications (conductive plastic)  
0.5 W at 40 °C
- Compact (integrated)
- High dielectric strength: 2500 V<sub>RMS</sub>
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Custom knob on request
- Compliant to RoHS Directive 2002/95/EC



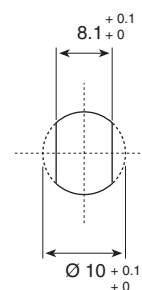
**RoHS**  
COMPLIANT

### DIMENSIONS in millimeters (± 0.5 mm)

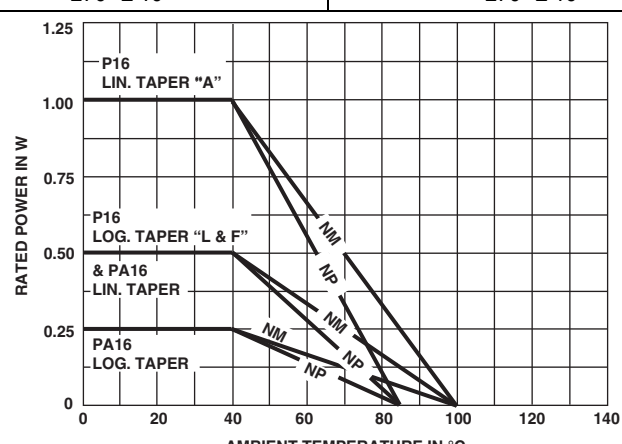
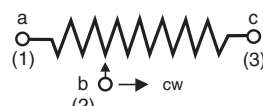
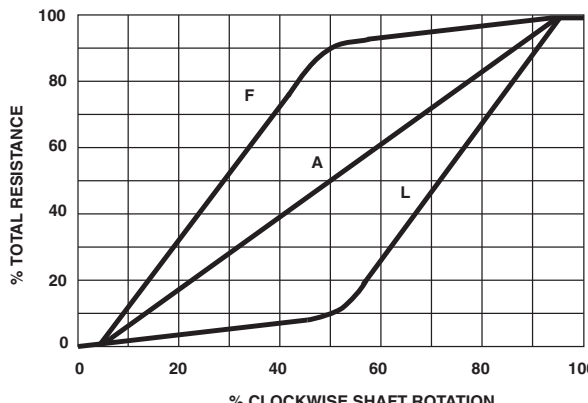
#### P16, PA16



#### PANEL CUTOUT



**ELECTRICAL SPECIFICATIONS**

	P16	PA16
Resistive Element	Cermet	Conductive plastic
Electrical Travel	$270^\circ \pm 10^\circ$	$270^\circ \pm 10^\circ$
Power Rating Chart		
Circuit Diagram		
Taper		
Resistance Range	Linear Taper 22 $\Omega$ to 10 M $\Omega$ Logarithmic Taper 100 $\Omega$ to 2.2 M $\Omega$	1 k $\Omega$ to 1 M $\Omega$ 470 $\Omega$ to 500 k $\Omega$
Standard Series E3	1 - 2.2 - 4.7 and on request 1 - 2 - 5	1 - 2.2 - 4.7
Tolerance	Standard $\pm 20\%$ On Request $\pm 10\%$	$\pm 20\%$ $\pm 10\%$ (1 k $\Omega$ to 100 k $\Omega$ )
Power Rating	Linear 1 W at $+40^\circ\text{C}$ Logarithmic 0.5 W at $+40^\circ\text{C}$	0.5 W at $+40^\circ\text{C}$ 0.25 W at $+40^\circ\text{C}$
Temperature Coefficient (Typical)	$\pm 150$ ppm/ $^\circ\text{C}$	$\pm 500$ ppm/ $^\circ\text{C}$
Dielectric Strength (RMS)	2500 V	2500 V
Limiting Element Voltage (Linear Law)	350 V	350 V
Contact Resistance Variation	3 % R <sub>n</sub> or 3 $\Omega$	2 % R <sub>n</sub> or 3 $\Omega$
End Resistance (Typical)	1 $\Omega$	1 $\Omega$
Insulation Resistance (500 V <sub>DC</sub> )	10 <sup>6</sup> M $\Omega$	10 <sup>6</sup> M $\Omega$

**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**

	<b>Metallic Knob</b>	<b>Plastic Knob</b>
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**

- 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 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**

STAN- DARD RESIS- TANCE VALUES	LINEAR TAPER			LOG TAPER		
	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH H WIPER	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH H 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**

STAN- DARD RESIS- TANCE 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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