

Knob Potentiometer



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_{RMS}
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Custom knob on request
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

LINKS TO ADDITIONAL RESOURCES



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.

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	50K cycles

DIMENSIONS in millimeters (± 0.5 mm)		
<p>P16NP</p> <p>Thickness nut 2 mm washer 1.5 mm</p>	<p>P16NM</p> <p>Thickness nut 2 mm washer 1.5 mm</p>	<p>Panel Cutout</p>

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 Ω to 10 M Ω Logarithmic taper 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 $\pm 20\%$ On request $\pm 10\%$	$\pm 20\%$ $\pm 10\%$ (1 k Ω to 100 k Ω)
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)	± 150 ppm/ $^\circ\text{C}$	± 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 _n or 3 Ω	2 % R _n or 3 Ω
End resistance (typical)	1 Ω	1 Ω
Insulation resistance (500 V _{DC})	10 ⁶ M Ω	10 ⁶ M Ω



MECHANICAL SPECIFICATIONS	
Mechanical travel	300° ± 5°
Operating torque	2 Ncm typical
End stop torque	25 Ncm maximum
Max. 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	

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

CONTROL KNOB
<p>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.</p>

PACKAGING
<ul style="list-style-type: none"> Carton box of 20 pieces <p>Hardware: nuts, washer, and O-ring are separately supplied (not mounted on the potentiometer), in a small bag placed in the packaging.</p>

P16 STANDARD RESISTANCE ELEMENT DATA						
STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG TAPER		
	MAX. POWER AT 40 °C	MAX. VOLTAGE THROUGH WIPER	MAX. CUR.	MAX. POWER AT 40 °C	MAX. VOLTAGE THROUGH WIPER	MAX. CUR.
	W	V	mA	W	V	mA
Ω	W	V	mA	W	V	mA
22	1	4.69	213			
47	1	6.85	146			
100	1	10	100			
220	1	14.8	67.4	0.5	7.1	71
470	1	21.7	46.1	0.5	10.5	48
1K	1	31.6	31.6	0.5	15.3	32.6
2.2K	1	46.9	21.3	0.5	22.4	22.4
4.7K	1	68.5	14.6	0.5	33.2	15.1
10K	1	100	10	0.5	48.5	10.3
22K	1	148	6.74	0.5	70.7	7.07
47K	1	217	4.61	0.5	105	4.77
100K	1	316	3.16	0.5	153	3.26
220K	0.56	350	1.59	0.5	224	2.24
470K	0.26	350	0.75	0.5	332	1.51
1M	0.12	350	0.35	0.26	350	0.74
2.2M	0.05	350	0.16	0.12	350	0.35
4.7M	0.02	350	0.07	0.056	350	0.16
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 THROUGH WIPER	MAX. CUR.	MAX. POWER AT 40 °C	MAX. VOLTAGE THROUGH WIPER	MAX. CUR.
	W	V	mA	W	V	mA
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	70.7	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 ⁴ MΩ Contact res. variation: < 2 % Rn
Damp heat, steady state	56 days 40 °C, 93 % HR	± 2 %	± 1 %	Insulation resistance: > 10 ⁴ 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 %	-	$\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 0.5$ %

Note

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

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								
P16 = cermet PA16 = conductive plastic	NM : metallic black NP : plastic black WM : metallic white WP : plastic white BP : plastic blue RP : plastic red YP : plastic yellow		223 = 22 kΩ for ohmic value range see electrical specification		M = ± 20 % On request: K = ± 10 %		A : linear L : clockwise logarithmic F : inverse clockwise logarithmic		B15 = 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

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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