

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.

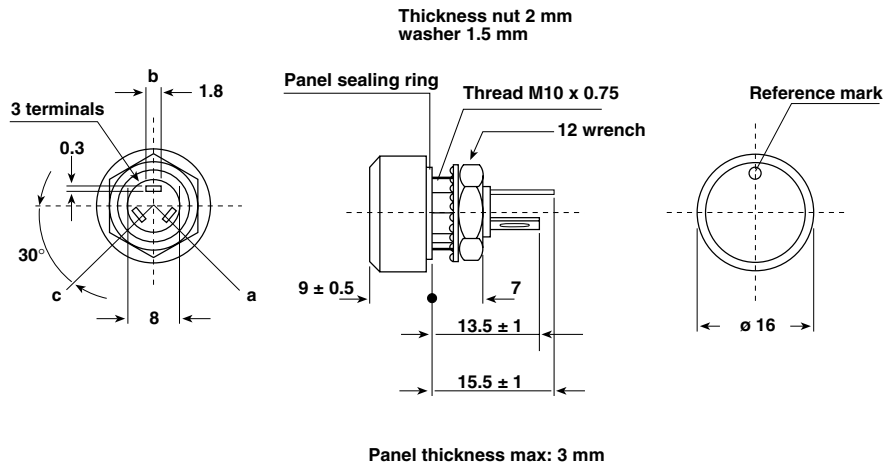
FEATURES

- 1 Watt at 40 °C
- Test according to CECC 41300
- **P16** - version for professional and industrial applications
- **PA16** - version for professional audio applications
- Compact (integrated)
- Minimum clearance required
- Safety in use due to good insulation: $> 10^4 \text{ M}\Omega$ 500 V_{DC}
- High dielectric strength: 2500 V_{RMS}
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Cermet or conductive plastic

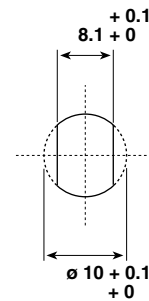


DIMENSIONS in millimeters

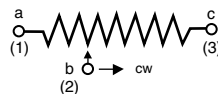
P16 - PA16



PANEL CUTOUT



CIRCUIT DIAGRAM





ELECTRICAL SPECIFICATIONS				
			P16	PA16
Resistive Element			cermet	conductive plastic
Electrical Travel			270° ± 10°	270° ± 10°
Resistance Range	Linear Law		22 Ω to 10 MΩ	1 kΩ to 1 MΩ
	Logarithmic Laws		100 Ω to 2.2 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	Standard		± 20 %	± 20 %
	On Request		± 10 %	± 10 % (1 kΩ to 100 kΩ)
Power Rating	Linear		1 W at + 40 °C	0.5 W at + 40 °C
	Logarithmic		0.5 W at + 40 °C	0.25 W at + 40 °C
Temperature Coefficient			See Standard Resistance Element Data	± 1000 ppm/°C
Dielectric Strength (RMS)			2500 V	2500 V
Limiting Element Voltage (Linear Law)			350 V	350 V
Insulation Resistance (500 VDC)			≥ 10 ⁴ MΩ	≥ 10 ⁴ MΩ
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 VDC)			10 ⁶ MΩ	10 ⁶ MΩ

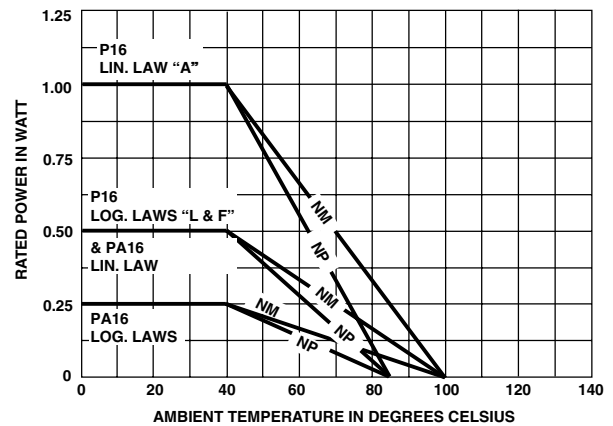
MECHANICAL SPECIFICATIONS

Mechanical Travel	300° ± 5°
Operating Torque (Ncm)	2 typical
End Stop Torque (max. Ncm)	25
Max Tightening Torque of Mounting Nut (max. Ncm)	250
Unit Weight	4.5 g typical

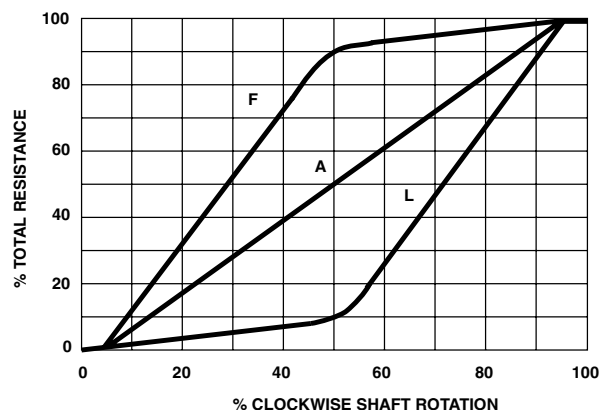
ENVIRONMENTAL SPECIFICATIONS

	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	

POWER RATING CHART



RESISTANCE LAWS





PERFORMANCE P16		
TESTS	CONDITIONS	TYPICAL VALUES AND DRIFTS
		$\frac{\Delta R_T}{R_T}$ (%) $\frac{\Delta R_{1-2}}{R_{1-2}}$ (%)
Load Life	1000 hours Pn 90°/30° at 40 °C	± 1 % Contact res. variation: < 3 % Rn
Climatic Sequence	Phase A dry heat 85 °C/125 °C Phase B damp heat Phase C cold - 55 °C Phase D damp heat 5 cycles	± 0.5 % ± 1 %
Long Term Damp Heat	56 days 40 °C 93 % HR	± 0.5 % Insulation resistance: > 10 ⁴ MΩ
Temperature Variations	5 cycles - 40 °C at + 85 °C/125 °C	± 0.5 %
Shock	50 g at 11 ms 3 successive shocks in 3 directions	± 0.1 % ± 0.2 %
Vibration	10 - 55 Hz 0.75 mm or 10 g during 6 hours	± 0.1 % $\frac{\Delta V_{1-2}}{V_{1-3}} \leq \pm 0.2 \%$
Rotational Life	25 000 cycles	± 3 % Contact res. variation: < 2 % Rn

STANDARD RESISTANCE ELEMENT DATA							
STAND- DARD RESIS- TANCE VALUES	LINEAR LAW			LOG LAW			TCR - 40 °C + 85 °C
	MAX. POWER AT 40 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 40 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	
Ω	P1 (W)	$U_m = \frac{\sqrt{P1XRn}}{350 V_{DC}}$	I _m (mA)	P1 (W)	$U_m = \frac{\sqrt{P1XRn}}{350 V_{DC}}$	I _m (mA)	10 ⁻⁶ /°C
22 47	1	4.69 6.85	213.2 145.8				- 50 + 200
100 220 470 1K 2.2K 4.7K 10K 22K 47K 100K 220K 470K 1M 2.2M 4.7M 10M	↓ 1 0.56 0.26 0.12 0.05 0.02 0.01	10 14.83 21.67 31.62 46.90 68.55 100 148.32 216.7 316.23 350 350 350 350 350 350 350	100 67.4 46.1 31.6 21.32 14.58 10 6.74 4.61 3.16 1.59 0.75 0.35 0.16 0.07 0.012	0.5 0.5 0.26 0.12	22.4 33.2 48.5 70.7 105 153 224 332 350 350	22.4 15.1 10.3 7.07 4.77 3.26 2.24 1.51 0.74 0.35	± 100

MARKING

- Printed:
 - VISHAY trademark
 - ohmic value
 - tolerance (in %)
 - resistance law
 - manufacturing date

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, colours) and legends can be printed on plastic knob on request - please consult VISHAY.

PACKAGING

Carton box of 20 pieces

PA16 PARTICULAR CHARACTERISTICS				
NOMINAL RESISTANCE	LINEAR LAW			TCR - 40 °C + 85 °C
	MAX. DISSIPATION AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH THE WIPER	
Ω	W	V	mA	ppm/°C
1K 2.2K 4.7K 10K 22K 47K 100K 220K 470K 1M	0.5 0.5 0.26 0.12	22.4 33.2 48.5 79.7 105 153 224 332 350 350	22.4 15.1 10.3 7.07 4.77 3.26 2.24 1.51 0.74 0.35	± 1000



PERFORMANCE			
TESTS	CONDITIONS	TYPICAL VALUES AND DRIFTS	
		$\frac{\Delta R_T}{R_T}$ (%)	$\frac{\Delta R_{1-2}}{R_{1-3}}$ (%)
Load Life	1000 hours at Pn 90°/30° cycle at + 40°C	± 5 % Insulation resistance: > 10 ⁴ MΩ Contact res. variatio: < 2 % Rn	
Long Term Damp Heat	56 days 40 °C 93 % HR	± 2 % Insulation resistance: > 10 ⁴ MΩ	± 1 %
Shock	50 g at 11 ms 3 successive shocks in 3 axes	± 0.2 %	± 0.5 %
Vibration	10 - 55 Hz 0.75 mm or 10 g during 6 hours	± 0.2 %	$\frac{\Delta V_{1-2}}{V_{1-3}} \leq \pm 0.5 \%$
Rotational Life	50 000 cycles	± 5 % Contact res. variation: < 2 % Rn	

ORDERING INFORMATION					
PA, PA16	NP	22 kΩ	20 %	A	BO20
SERIES	CONTROL KNOB DESIGNATION	OHMIC VALUE	TOLERANCE	LAW	PACKAGING
	NM : metallic black color NP : plastic black color WM : metallic white color WP : plastic white color BP : plastic blue color			A : linear L : clockwise logarithmic F : inverse clockwise logarithmic	

SAP PART NUMBERING GUIDELINES														
P	1	6	N	P	2	2	3	M	A	B	1	5		
MODEL		STYLE		OHMIC VALUE			TOL	LAW	PACKAGING CODE		SPECIAL (IF APPLICABLE)			
See the end of this data book for conversion tables														



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.