

## 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.

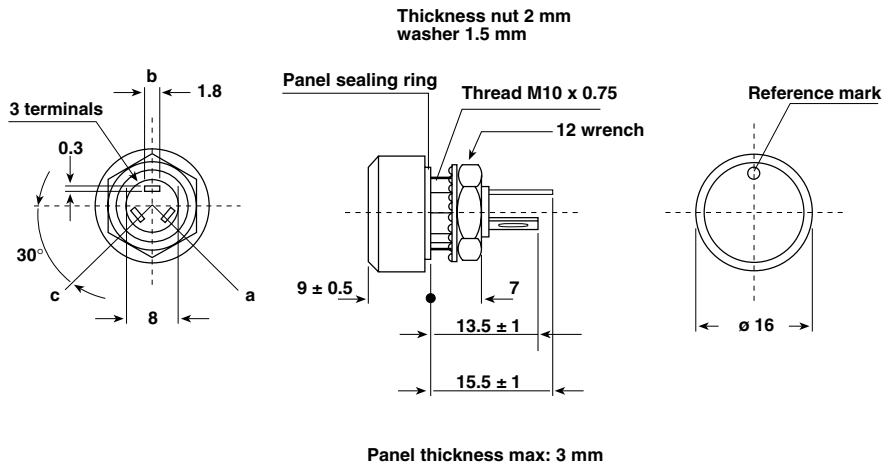
### FEATURES

- 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<sub>DC</sub>
- High dielectric strength: 2500 V<sub>RMS</sub>
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Cermet or conductive plastic

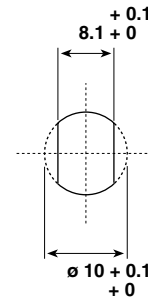


### DIMENSIONS in millimeters

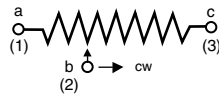
#### P16 - PA16



#### 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 <sup>4</sup> MΩ	≥ 10 <sup>4</sup> MΩ
Contact Resistance Variation		3 % Rn or 3 Ω	2 % Rn or 3 Ω
End Resistance (Typical)		1 Ω	1 Ω
Insulation Resistance (500 VDC)		10 <sup>6</sup> MΩ	10 <sup>6</sup> MΩ

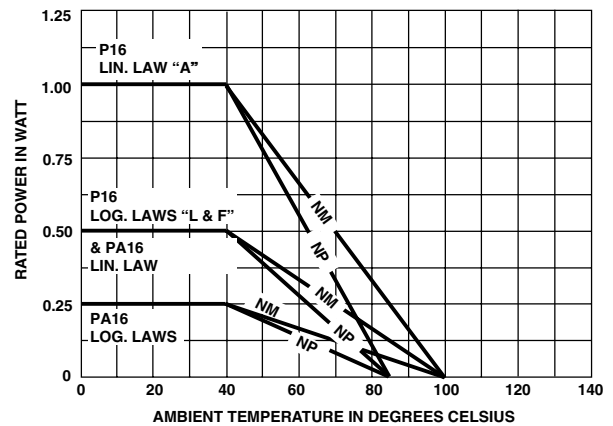
**MECHANICAL SPECIFICATIONS**

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

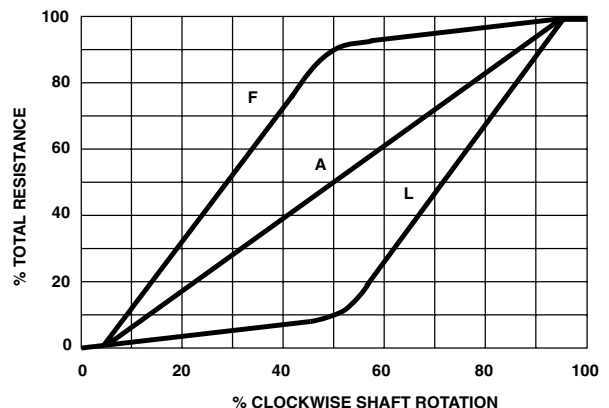
**ENVIRONMENTAL SPECIFICATIONS**

	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/12 5°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 <sup>4</sup> 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							
STANDARD RESISTANCE 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)	$U_m = \sqrt{P1XRn}$ 350 V <sub>DC</sub>	I <sub>m</sub> (mA)	P1 (W)	$U_m = \sqrt{P1XRn}$ 350 V <sub>DC</sub>	I <sub>m</sub> (mA)	10 <sup>-6</sup> /°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	↓   ↓	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   ↓	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 <sup>4</sup> MΩ Contact res. variatio: < 2 % Rn	
Long Term Damp Heat	56 days 40 °C 93 % HR	± 2 % Insulation resistance: > 10 <sup>4</sup> 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 %	$\frac{\Delta V_{1-2}}{V_{1-3}}$ ≤ ± 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
	<b>NM</b> : metallic black color <b>NP</b> : plastic black color <b>WM</b> : metallic white color <b>WP</b> : plastic white color <b>BP</b> : plastic blue color			<b>A</b> : linear <b>L</b> : clockwise logarithmic <b>F</b> : 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																		



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