

## Knob Potentiometer with Switch



The P16S 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

- **P16S** - Version for military, professional and industrial applications (cermet): 1 W at 40 °C
- **PA16S** - Version for professional audio applications (conductive plastic): 0.5 W at 40 °C
- Compact (integrated)
- Detent and electric cut off at beginning of travel
- Fully sealed and panel sealed
- Metallic or plastic knob options
- Custom knob on request
- Test according to CECC 41000 or IEC 60393-1
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

DIMENSIONS in millimeters ( $\pm 0.5$ mm)		
<p><b>P16SNP</b></p> <p>Thickness nut 2 mm washer 1.5 mm</p>	<p><b>P16SNM</b></p> <p>Thickness nut 2 mm washer 1.5 mm</p>	<p><b>PANEL CUTOUT</b></p>

<b>ELECTRICAL SPECIFICATIONS</b>		<b>P16S</b>	<b>PA16S</b>
<b>Resistive Element</b>		Cermet	Conductive plastic
<b>Electrical Travel</b>		220° ± 10°	220° ± 10°
<b>Power Rating Chart</b>			
<b>Circuit Diagram</b>			
<b>Taper</b>			
<b>Resistance Range</b>	<b>Linear Law</b> <b>Logarithmic Laws</b>	22 Ω to 10 MΩ 100 Ω to 2.2 MΩ	1 kΩ to 1 MΩ 470 Ω to 500 kΩ
<b>Standard Series e3</b>		1 - 2.2 - 4.7 and on request 1 - 2 - 5	1 - 2.2 - 4.7
<b>Tolerance</b>	<b>Standard</b> <b>On Request</b>	± 20 % ± 10 %	± 20 % ± 10 % (1 kΩ to 100 kΩ)
<b>Power Rating</b>	<b>Linear</b> <b>Logarithmic</b>	1 W at + 40 °C 0.5 W at + 40 °C	0.5 W at + 40 °C 0.25 W at + 40 °C
<b>Temperature Coefficient (Typical)</b>		± 150 ppm	± 500 ppm
<b>Dielectric Strength (RMS)</b>		2500 V	2500 V
<b>Limiting Element Voltage (Linear Law)</b>		350 V	350 V
<b>Contact Resistance Variation</b>		3 % Rn or 3 Ω	2 % Rn or 3 Ω
<b>End Resistance (Typical)</b>		1 Ω	1 Ω
<b>Insulation Resistance (500 V<sub>DC</sub>)</b>		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
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	

SWITCH ELECTRICAL AND MECHANICAL SPECIFICATIONS		
ON/OFF Switch	Actuation in counter clockwise position (between terminal a and terminal b)	
Switching Current	P16S	100 mA max.
	PA16S	1 mA max.
Switch Actuation Torque	4 Ncm min.	
Switch Actuation Travel	30° ± 5°	
Dielectric Strength Terminal to Terminal (RMS)	1000 V	
Insulation Resistance between Contacts	10 <sup>6</sup> MΩ	
Switch Mechanical Endurance	10 000 cycles	
1 Cycle	ON-OFF-ON	

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

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

STANDARD RESISTANCE ELEMENT DATA												
STANDARD RESISTANCE VALUES	P16S CERMET						PA16S CONDUCTIVE PLASTIC					
	LINEAR TAPER			LOGARITHMIC TAPER			LINEAR TAPER			LOGARITHMIC TAPER		
	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	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	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				0.25	10.8	23.1
1K	1	31.6	31.6	0.5	22.4	22.4	0.5	22.4	22.4	0.25	15.8	16
2.2K	1	46.9	21.3	0.5	33.2	15.1	0.5	33.2	15.1	0.25	23.5	11
4.7K	1	68.5	14.6	0.5	48.5	10.3	0.5	48.5	10.3	0.25	34.3	7
10K	1	100	10	0.5	70.7	7.07	0.5	70.7	7.07	0.25	50	5
22K	1	148	6.74	0.5	105	4.77	0.5	105	4.77	0.25	74	3.4
47K	1	217	4.61	0.5	153	3.26	0.5	153	3.26	0.25	108	2.3
100K	1	316	3.16	0.5	224	2.24	0.5	224	2.24	0.25	158	1.6
220K	0.56	350	1.59	0.5	332	1.51	0.5	332	1.51	0.25	235	1.1
470K	0.26	350	0.75	0.26	350	0.74	0.26	350	0.74	0.25	343	0.7
1M	0.12	350	0.35	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									



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 dimensions	± 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	S	N	P	2	2	3	M	A	B	1	5				
MODEL	STYLE			OHMIC VALUE			TOLERANCE		TAPER		PACKAGING CODE		SPECIAL NUMBER				
<b>P16S</b> = Cermet <b>PA16S</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)								
P16S	NP	22 kΩ	20 %	A		BO20		e3
MODEL	STYLE	OHMIC VALUE	TOLERANCE	TAPER	SPECIAL	PACKAGING	SPECIAL	LEAD (Pb)-FREE



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