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**Vishay Sfernice** 

# **Knob Potentiometer With Switch**



## LINKS TO ADDITIONAL RESOURCES



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.

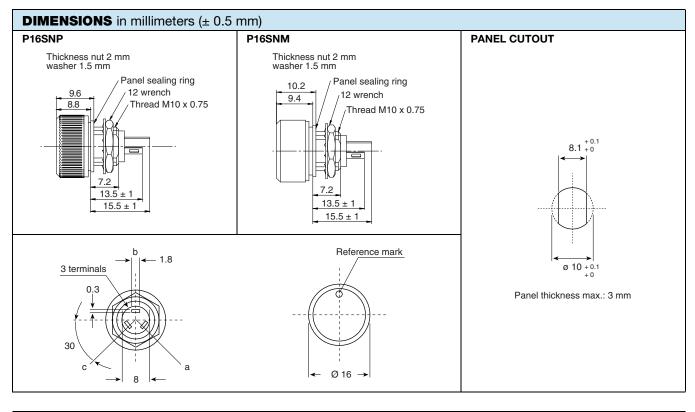
## **FEATURES**

• 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

QUICK REFERENCE DATA					
Multiple module	No				
Switch module	Yes				
Detent module	Yes				
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic				
Sealing level	IP 67				
Lifespan	10K cycles (switch), 50K cycles (track)				



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For technical questions, contact: sferpottrimmers@vishay.com

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**ELECTRICAL SPECIFICATIONS** 

P16S, PA16S

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#### P16S **PA16S Resistive element** Cermet Conductive plastic $220^{\circ} \pm 10^{\circ}$ 220° ± 10° Electrical travel 1.25 P16S LIN. TAPER "A 1.00 RETED POWER IN W 0.75 P16S LOG. TAPER "L & F Power rating chart N 0.50 & PA16S 3 LIN. TAPER 0.25 PA16S LOG. TAPER 0 20 40 60 100 120 140 0 80 AMBIENT TEMPERATURE IN °C a 0-(1) Circuit diagram Switch on-off 100 80 F % TOTAL RESISTANCE 60 Δ Taper L 40 20 0 0 10 20 40 60 80 100 % CLOCKWISE KNOB ROTATION linear law 22 $\Omega$ to 10 $M\Omega$ 1 k $\Omega$ to 1 M $\Omega$ Resistance range logarithmic laws 100 $\Omega$ to 2.2 $M\Omega$ 470 $\Omega$ to 500 k $\Omega$ 1 - 2.2 - 4.7 and on request 1 - 2 - 5 Standard series e3 1 - 2.2 - 4.7 standard ± 20 % ± 20 % Tolerance on request ± 10 % $\pm$ 10 % (1 k $\Omega$ to 100 k $\Omega$ ) 1 W at +40 °C 0.5 W at +40 °C linear Power rating logarithmic 0.5 W at +40 °C 0.25 W at +40 °C Temperature coefficient (typical) ± 150 ppm ± 500 ppm 2500 V Dielectric strength (RMS) 2500 V Limiting element voltage (linear law) 350 V 350 V Contact resistance variation 3 % Rn or 3 Ω 2 % Rn or 3 $\Omega$ End resistance (typical) 1Ω 1Ω $10^6 M\Omega$ $10^6 M\Omega$ Insulation resistance (500 V<sub>DC</sub>)

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## MECHANICAL SPECIFICATIONS

Mechanical travel	300° ± 5°
Operating torque	2 Ncm typical
End stop torque	25 Ncm maximum
Tightening torque of mounting nut	180 Ncm maximum
Unit weight	4.5 g typical

# ENVIRONMENTAL SPECIFICATIONSMETALLIC KNOBPLASTIC KNOBTemperature range-40 °C to +125 °CClimatic category-40 °C to +125 °CClimatic category40/100/56SealingSealed container and panel sealedProtection gradesIP67

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.				
Switching current	PA16S	1 mA max.				
Switch actuation torque	3 Ncm typical					
Switch actuation travel	30° ± 5°					
Dielectric strength terminal to terminal (RMS)	1000 V					
Insulation resistance between contacts	10 <sup>6</sup> ΜΩ					
Switch mechanical endurance	10 000 cycles					
1 cycle	ON-OFF-ON					

#### Note

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

#### 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, 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.

STANDARD RESISTANCE ELEMENT DATA													
SIANDA	RD RE	.313 I AN			JAIA		1						
	P16S CERMET						PA16S CONDUCTIVE PLASTIC						
STANDARD	-	LINEAR TAP		LOGARITHMIC TAPER			LINEAR TAPER			LOGARITHMIC TAPER			
RESISTANCE VALUES	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										
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										

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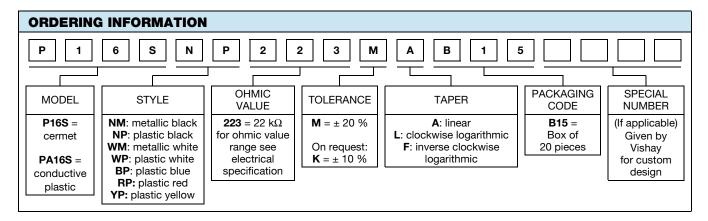
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# P16S, PA16S

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PERFORMANCE							
TESTS	CONDITIONS	TYPICAL VALUES AND DRIFTS					
12313	CONDITIONS	∆ <b>R<sub>T</sub>/R<sub>T</sub> (%)</b>	∆ <b>R<sub>1-2</sub>/R<sub>1-2</sub> (%)</b>	OTHER			
Electrical endurance	1000 h at rated power 90'/30' cycle at +40 °C	± 5 %	-	Insulation resistance: > $10^4 M\Omega$ Contact res. variation: < 2 % Rn			
Damp heat, steady state	56 days 40 °C, 93 % HR	± 2 %	± 1 %	Insulation resistance: > $10^4 \text{ M}\Omega$			
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 <i>g</i> 's during 6 h	± 0.2 %	-	$\Delta V_{1\text{-}2}/\Delta V_{1\text{-}3} \leq \pm 0.5 \%$			



PART NUMBER DESCRIPTION (for information only)								
P16S	NP	<b>22 k</b> Ω	20 %	Α		BO20		e3
MODEL	STYLE	OHMIC 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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