

Knob Potentiometer With Switch



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
- Blue, white, yellow, red, and black knob
- Several marking: dot, line, gradient, 5 graduations, 10 graduations, fan, light, volume, temperature
- Metallic or plastic knob options
- Custom knobs and marking on request
- Test according to CECC 41000 or IEC 60393-1
- Material categorization: for definitions of compliance please see www.vishay.com/doc299912



LINKS TO ADDITIONAL RESOURCES



3D Models



Capabilities and Custom Options

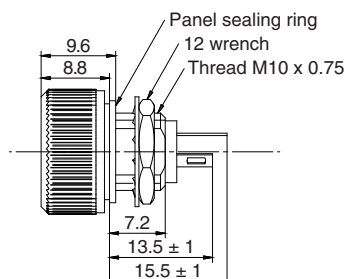
The P16S is a revolutionary concept in panel mounted potentiometers. This unique design consists of a knob driving and incorporating a cermet potentiometer. Only the mounting hardware and terminals are situated on the back side of the panel reducing to a minimum the required clearance.

QUICK REFERENCE DATA

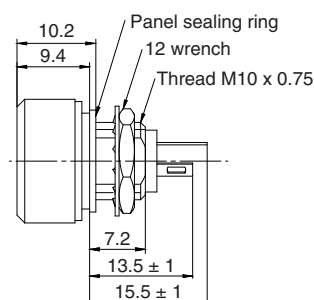
Multiple module	No
Switch module	Yes
Detent module	Yes
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic
Sealing level	IP 67
Lifespan	10K cycles (switch), 50K cycles (track)

DIMENSIONS in millimeters (± 0.5 mm)

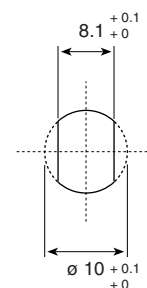
P16SNP

Thickness nut 2 mm
washer 1.5 mm


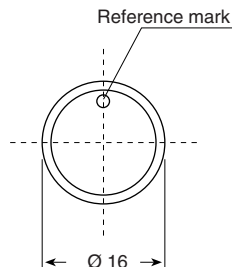
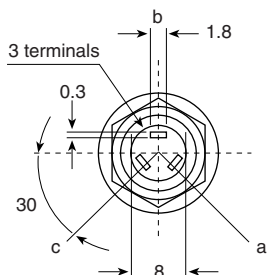
P16SNM

Thickness nut 2 mm
washer 1.5 mm


PANEL CUTOUT



Panel thickness max.: 3 mm





ELECTRICAL SPECIFICATIONS			
		P16S	PA16S
Resistive element		Cermet	Conductive plastic
Electrical travel		$220^\circ \pm 10^\circ$	$220^\circ \pm 10^\circ$
Power rating chart			
Circuit diagram			
Taper			
Resistance range	linear law	22 Ω to 10 M Ω	1 k Ω to 1 M Ω
	logarithmic laws	100 Ω to 2.2 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	$\pm 20\%$	$\pm 20\%$
	on request	$\pm 10\%$	$\pm 10\%$ (1 k Ω to 100 k Ω)
Power rating	linear	1 W at $+40^\circ\text{C}$	0.5 W at $+40^\circ\text{C}$
	logarithmic	0.5 W at $+40^\circ\text{C}$	0.25 W at $+40^\circ\text{C}$
Temperature coefficient (typical)		± 150 ppm	± 500 ppm
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
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	

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	3 Ncm typical	
Switch actuation travel	30° ± 5°	
Dielectric strength terminal to terminal (RMS)	1000 V	
Insulation resistance between contacts	10 ⁶ MΩ	
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

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 ⁴ MΩ Contact res. variation: < 2 % R _n
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 % R _n
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			
P16S = cermet PA16S = 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			
SPECIAL NUMBER FOR KNOB MARKING																	
F1 = line marking F2 = 10 graduations marking F3 = 5 graduations marking F4 = gradient marking F5 = light marking F6 = fan F7 = temperature F8 = volume																	

KNOB STYLES		
STYLE	EXAMPLE IMAGES	
NP = black plastic		
WP = white plastic		
BP = blue plastic		

KNOB STYLES		
STYLE	EXAMPLE IMAGES	
RP = red plastic		
YP = yellow plastic		
NM = black metal		

KNOB MARKING OPTIONS

Several marking options on the top face of the knob are available.

SPECIAL NUMBER	MARKING	EXAMPLE IMAGES		AVAILABILITY FOR PLASTIC KNOB	AVAILABILITY FOR METALLIC KNOB
-	Dot (standard)			Yes	Yes
F1	Line			Yes	Yes
F2	10 graduations			Yes	Yes
F3	5 graduations			Yes	Yes
F4	Gradient			On request	Yes
F5	Light			On request	Yes
F6	Fan			On request	Yes

SPECIAL NUMBER	MARKING	EXAMPLE IMAGES		AVAILABILITY FOR PLASTIC KNOB	AVAILABILITY FOR METALLIC KNOB
F7	Temperature			On request	Yes
F8	Volume			On request	Yes
(Special code)	Other on demand			On request	On request

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

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
Capabilities and Custom Options	www.vishay.com/doc?48493



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