

Vishay Sfernice

## **Knob Potentiometer**



## **LINKS TO ADDITIONAL RESOURCES**







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**





P16 - version for professional and industrial applications (cermet)

RoHS COMPLIANT

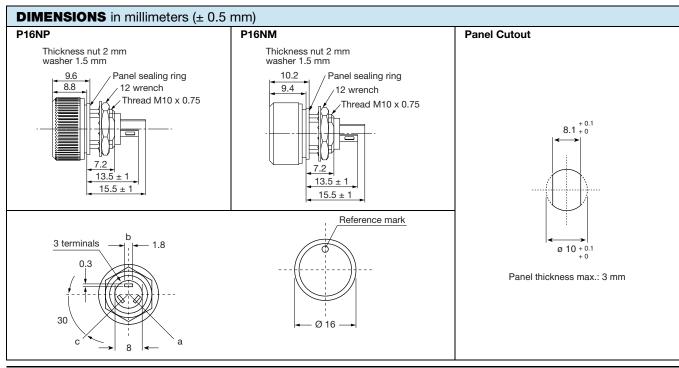
1 W at 40 °C

 PA16 - version for professional audio applications (conductive plastic)

0.5 W at 40 °C

- Compact (integrated)
- High dielectric strength: 2500 V<sub>RMS</sub>
- 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 knob and marking on request
- Detent option on request (haptic technology)
- Material categorization: for definitions of compliance please see <a href="https://www.vishay.com/doc?99912"><u>www.vishay.com/doc?99912</u></a>

QUICK REFERENCE DATA				
Multiple module	No			
Switch module	Upgrade for switch version with P16S			
Detent module	Yes			
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic			
Sealing level	IP 67			
Lifespan	50K cycles			



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ELECTRICAL SPECIFICATIONS				
	P16	PA16		
Resistive element	Cermet Conductive plastic			
Electrical travel	270° ± 10°	270° ± 10°		
Power rating chart	1.25 P16 LIN. TAPER "A"  1.00  A P16 LOG. TAPER "L & F"  8 PA16 LIN. TAPER  0.25 PA16 LOG. TAPER  0 0 20 40 60 80 100 120 140  AMBIENT TEMPERATURE IN °C			
Circuit diagram	a O (1) b O → cw (2)			
Taper	100 80 F 40 0 0 20 40 % CLOCK	A L L GO 80 100 WISE SHAFT ROTATION		
Resistance range Linear taper Logarithmic taper	22 Ω to 10 MΩ 100 Ω to 2.2 MΩ	1 kΩ to 1 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 (typical)	± 150 ppm/°C	± 500 ppm/°C		
Dielectric strength (RMS)	2500 V	2500 V		
Limiting element voltage (linear law)	350 V	350 V		
Contact resistance variation	3 % Rn or 3 Ω	2 % Rn or 3 Ω		
End resistance (typical)	1 Ω	1 Ω		
Insulation resistance (500 V <sub>DC</sub> )	$10^6\mathrm{M}\Omega$	$10^6\mathrm{M}\Omega$		





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MECHANICAL SPECIFICATIONS				
Mechanical travel	300° ± 5°			
Operating torque	2 Ncm typical			
End stop torque	25 Ncm maximum			
Max. 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					

## **MARKING**

- Ohmic value code, tolerance code and taper
- Manufacturing date code

### **PACKAGING**

• Carton box of 20 pieces

Hardware: nuts, washer, and O-ring are separately supplied (not mounted on the potentiometer), in a small bag placed in the packaging.

## **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.

## **DETENT OPTION** (haptic technology)

Detent option is a positive tactile feedback.

On request:

the detent mechanism is housed in the P16

Mechanical endurance: 10 000 cycles

One detent in CCW position (CV1D)
One detent in CW position (CV1F)

One detent in CW position and CCW

position (CVDF)

Ordering information (special code):

CV1D

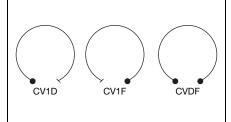
One detent in CCW position

CV1F

Detent in CW position

CVDF

Detent in CW position and CCW position







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P16 STANDARD RESISTANCE ELEMENT DATA						
STAN-	LINEAR TAPER			L	OG TAPE	R
DARD RESIS- TANCE VALUES	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER
Ω	W	٧	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
1K	1	31.6	31.6	0.5	22.4	22.4
2.2K	1	46.9	21.3	0.5	33.2	15.1
4.7K	1	68.5	14.6	0.5	48.5	10.3
10K	1	100	10	0.5	70.7	7.07
22K	1	148	6.74	0.5	105	4.77
47K	1	217	4.61	0.5	153	3.26
100K	1	316	3.16	0.5	224	2.24
220K	0.56	350	1.59	0.5	332	1.51
470K	0.26	350	0.75	0.26	350	0.74
1M	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			

PA16	PA16 STANDARD RESISTANCE ELEMENT DATA						
STAN-	LINEAR TAPER				LOG TAP	ER	
DARD RESIS- TANCE VALUES		MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 40 °C	MAX. VOLTAGE	MAX. CUR. THROUGH WIPER	
Ω	W	V	mA	W	V	mA	
470				0.25	10.8	23.1	
1K	0.5	22.4	22.4	0.25	15.8	16	
2.2K	0.5	33.2	15.1	0.25	23.5	11	
4.7K	0.5	48.5	10.3	0.25	34.3	7	
10K	0.5	70.7	7.07	0.25	50.0	5.0	
22K	0.5	105	4.77	0.25	74	3.4	
47K	0.5	153	3.26	0.25	108	2.3	
100K	0.5	224	2.24	0.25	158	1.6	
220K	0.5	332	1.51	0.25	235	1.1	
470K	0.26	350	0.74	0.25	343	0.7	
1M	0.12	350	0.35				

PERFORMANCE					
TESTS	CONDITIONS	TYPICAL VALUES AND DRIFTS			
12313	CONDITIONS	∆R <sub>T</sub> /R <sub>T</sub> (%)	∆R <sub>1-2</sub> /R <sub>1-2</sub> (%)	OTHER	
Electrical endurance	1000 h at rated power 90'/30' cycle at +40 °C	± 5 %	-	Insulation resistance: > $10^4  \text{M}\Omega$ 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 directions	± 0.2 %	± 0.5 %	-	
Vibration	10 Hz to 55 Hz 0.75 mm or 10 <i>g</i> 's during 6 h	± 0.2 %	-	$\Delta V_{1-2}/\Delta V_{1-3} \le \pm \ 0.5 \%$	

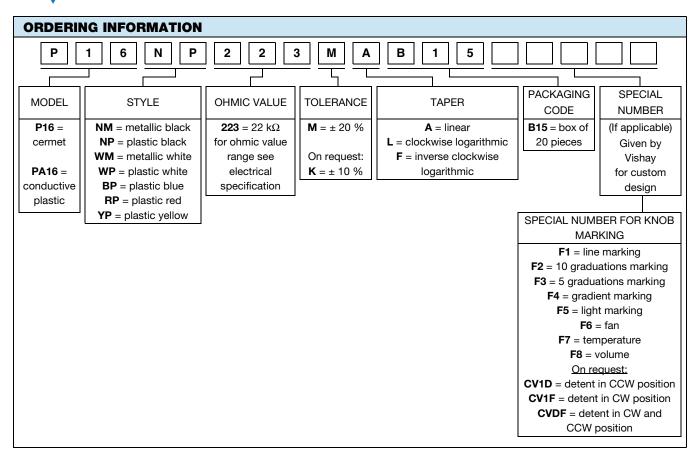
#### Note

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





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KNOB STYLES		
STYLE	EXAMPLI	EIMAGES
NP = black plastic		
WP = white plastic		
BP = blue plastic		
RP = red plastic		





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KNOB STYLES					
STYLE	EXAMPLI	IMAGES			
YP = yellow plastic					
NM = black metal					
WM = white metal					

### **KNOB MARKING OPTIONS**

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

SPECIAL NUMBER	MARKING	EXAMF	PLE IMAGES	AVAILABILITY FOR PLASTIC KNOB	AVAILABILITY FOR METALLIC KNOB
-	Dot (standard)			Yes	Yes
F1	Line			Yes	Yes
F2	10 graduations	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Yes	Yes
F3	5 graduations	3 2 2 3		Yes	Yes
F4	Gradient			Yes	Yes
F5	Light	*	*	Yes	Yes
F6	Fan	**	4	Yes	Yes



P16, PA16

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

P16         NP         22 kΩ         20 %         A         BO         e3           MODEL         STYLE         VALUE         TOLERANCE         TAPER         SPECIAL         PACKAGING         SPECIAL         LEAD (Pb)-FREE	PART NUMBER DESCRIPTION (for information only)								
II MODEL II STVIE II VALUE ILIOLEBANCEII TABER II SPECIAL ILBACKACING II SPECIAL II	P16	NP	<b>22 k</b> Ω	20 %	Α		во		e3
<u>                                     </u>	MODEL	STYLE	VALUE	TOLERANCE	TAPER	SPECIAL	PACKAGING	SPECIAL	

ACCESSORIES			
Additional Accessories (to order separately)	www.vishay.com/doc?51051		

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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