Knob Potentiometer

LINKS TO ADDITIONAL RESOURCES

3D Models

Capabilities and Custom Options

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

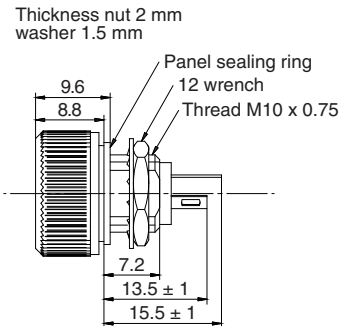
RoHS COMPLIANT

- Test according to CECC 41000 or IEC 60393-1
- **P16** - version for professional and industrial applications (cermet)
  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_{RMS}
- 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
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

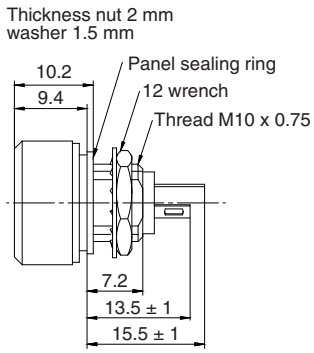
QUICK REFERENCE DATA	
Multiple module	No
Switch module	Upgrade for switch version with P16S
Detent module	n/a
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic
Sealing level	IP 67
Lifespan	50K cycles

DIMENSIONS in millimeters (± 0.5 mm)

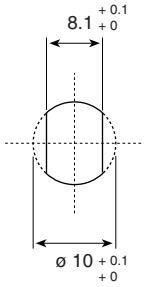
P16NP



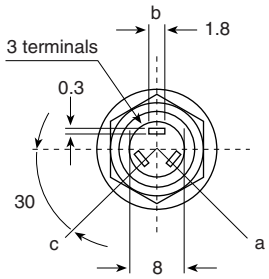
P16NM

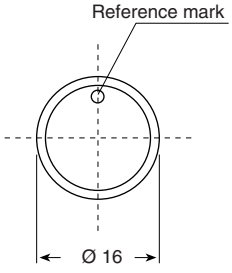


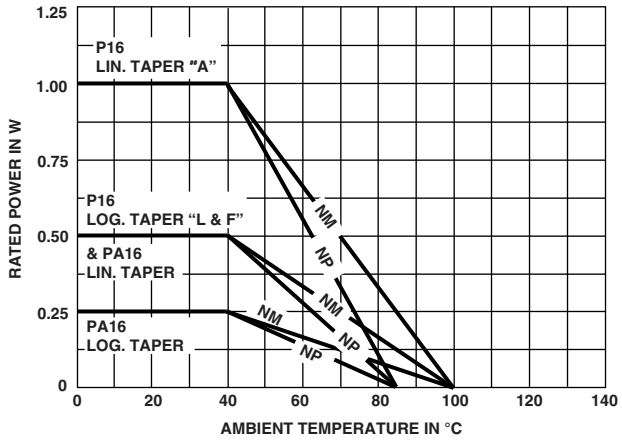
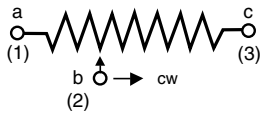
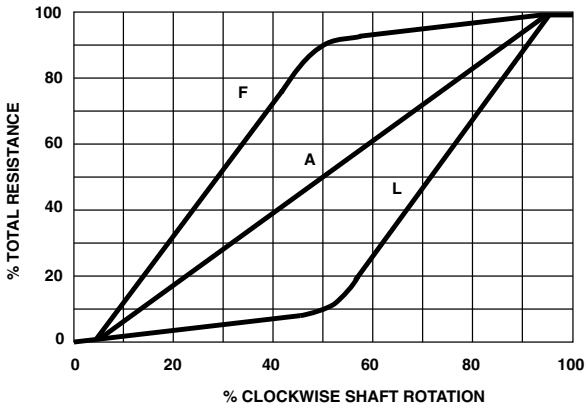
Panel Cutout



Panel thickness max.: 3 mm





ELECTRICAL SPECIFICATIONS			
		P16	**PA16**
Resistive element		Cermet	Conductive plastic
Electrical travel		270° ± 10°	270° ± 10°
Power rating chart			
Circuit diagram			
Taper			
Resistance range	Linear taper	22 Ω to 10 MΩ	1 kΩ to 1 MΩ
	Logarithmic taper	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 (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_{DC})		10^6 MΩ	10^6 MΩ

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.

P16 STANDARD RESISTANCE ELEMENT DATA

STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG TAPER		
	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
22	1	4.69	213			
47	1	6.85	146			
100	1	10	100			
220	1	14.8	67.4	0.5	7.1	71
470	1	21.7	46.1	0.5	10.5	48
1K	1	31.6	31.6	0.5	15.3	32.6
2.2K	1	46.9	21.3	0.5	22.4	22.4
4.7K	1	68.5	14.6	0.5	33.2	15.1
10K	1	100	10	0.5	48.5	10.3
22K	1	148	6.74	0.5	70.7	7.07
47K	1	217	4.61	0.5	105	4.77
100K	1	316	3.16	0.5	153	3.26
220K	0.56	350	1.59	0.5	224	2.24
470K	0.26	350	0.75	0.5	332	1.51
1M	0.12	350	0.35	0.26	350	0.74
2.2M	0.05	350	0.16	0.12	350	0.35
4.7M	0.02	350	0.07	0.056	350	0.16
10M	0.01	350	0.012			

PA16 STANDARD RESISTANCE ELEMENT DATA

STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG TAPER		
	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
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		
		$\Delta R_T/R_T$ (%)	$\Delta R_{1\text{-}2}/R_{1\text{-}2}$ (%)	OTHER
Electrical endurance	1000 h at rated power 90'/30' cycle at +40 °C	± 5 %	-	Insulation resistance: > 10^4 MΩ Contact res. variation: < 2 % Rn
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 % 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 *g*'s during 6 h	± 0.2 %	-	$\Delta V_{1\text{-}2}/\Delta V_{1\text{-}3} \leq$ ± 0.5 %

Note

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

ORDERING INFORMATION

P	1	6	N	P	2	2	3	M	A	B	1	5					

MODEL	STYLE	OHMIC VALUE	TOLERANCE	TAPER	PACKAGING CODE	SPECIAL NUMBER
P16 = cermet **PA16** = 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)

P16	NP	22 kΩ	20 %	A		BO		e3
MODEL	STYLE	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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