

Knob Potentiometer



LINKS TO ADDITIONAL RESOURCES



3D Models



Capabilities and Custom Options



Infographics

The P16F 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

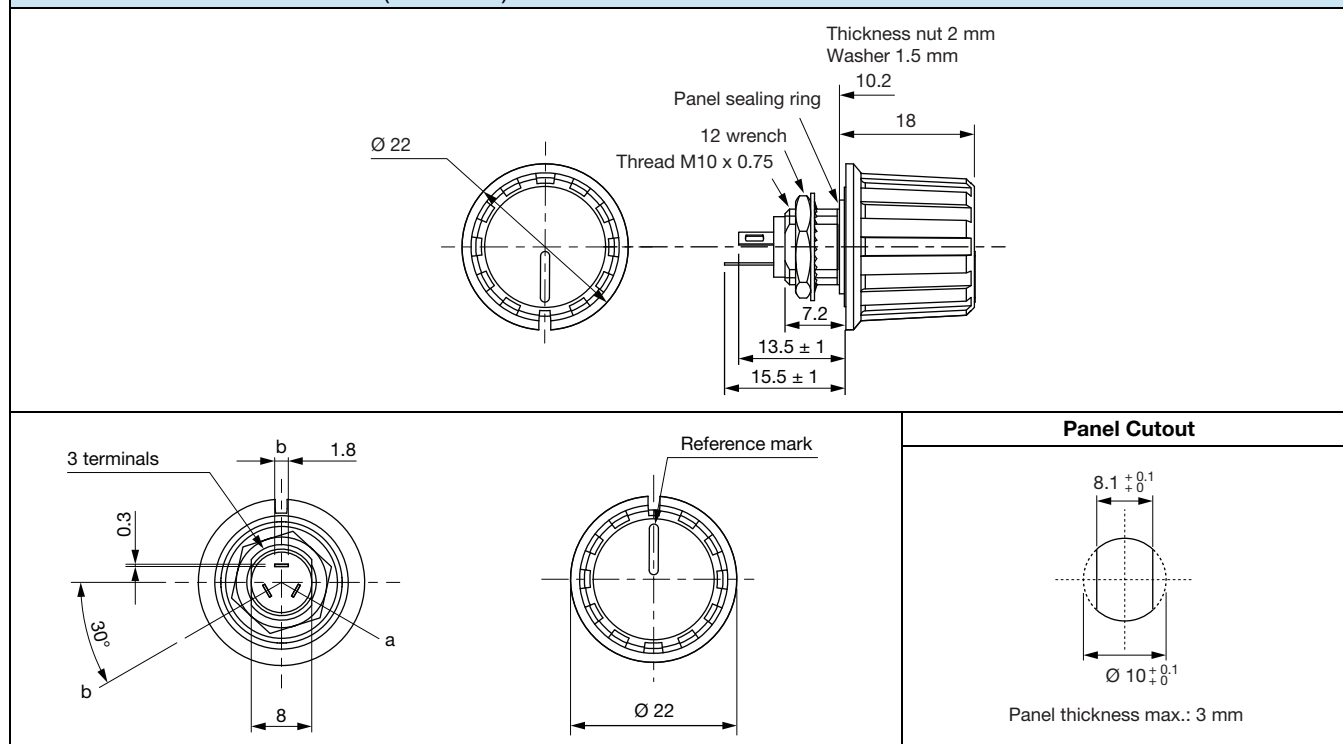
- Test according to CECC 41000 or IEC 60393-1
- **P16F** - version for professional and industrial applications (cermet)
1 W at 40 °C
- **PA16F** - version for professional audio applications (conductive plastic)
0.5 W at 40 °C
- Compact (integrated)
- High dielectric strength: 5000 V_{AC}
- Metallic knob, special marking, or custom knob on request
- Custom knob and marking on request
- Detent option on request (haptic technology)
- Construction: fully sealed
- Professional grade
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS
COMPLIANT

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), 200 cycles (track)

DIMENSIONS in millimeters (± 0.5 mm)





ELECTRICAL SPECIFICATIONS			
		P16F	PA16F: VERSION FOR AUDIO PROFESSIONAL APPLICATION
Resistive element		Cermet	Conductive plastic
Electrical travel		270° ± 10°	270° ± 10°
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
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)
Temperature coefficient (typical)		± 150 ppm/°C	± 500 ppm/°C
Dielectric strength (RMS)		5000 V _{AC}	5000 V _{AC}
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 MΩ	10 ⁶ MΩ

**MECHANICAL SPECIFICATIONS**

Mechanical travel	300° ± 5°
Operating torque	3 Ncm typical
End stop torque	25 Ncm maximum
Max. tightening torque of mounting nut	180 Ncm maximum
Unit weight	10 g typical

ENVIRONMENTAL SPECIFICATIONS

	METALLIC KNOB (on request)	PLASTIC KNOB
Temperature range	-40 °C to +85 °C	
Climatic category	40 / 85 / 56	
Sealing	Sealed container and panel sealed	
Protection grades	IP67	

MARKING

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

CONTROL KNOB

Black metallic knob (NM). On request, please consult Vishay.
Black plastic knob (NP).

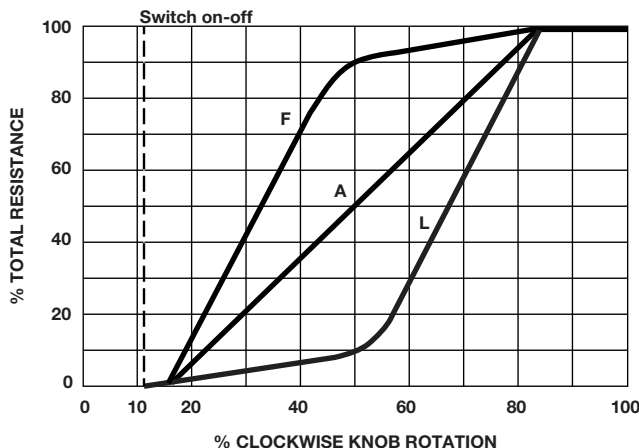
PACKAGING

- 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.

SWITCH OPTION

ON / OFF switch	Actuation in counter clockwise between terminal a and terminal b	
Switching current	P16F	100 mA max.
	P16AF, version for audio professional application	1 mA max.
Switching actuation torque	3 Ncm typical	
Switching 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	
Ordering information (special code)	RSD	





KNOB MARKING OPTIONS		
SPECIAL NUMBER	MARKING	EXAMPLE IMAGES
On request: several marking options on the top face of the knob		
F2	10 graduations	
F3	5 graduations	
F4	Gradient	
F5	Light	
F6	Fan	
F7	Temperature	
F8	Volume	
(Special code)	Other on demand	

P16F 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	0.5		
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	0.26	332	1.51
1M	0.12	350	0.35	0.12	350	0.74
2.2M	0.05	350	0.16	0.056	350	0.35
4.7M	0.02	350	0.07			
10M	0.01	350	0.012			

PA16F STANDARD RESISTANCE ELEMENT						
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						
1K	0.5	22.4	22.4	0.25	10.8	23.1
2.2K	0.5	33.2	15.1	0.25	15.8	16
4.7K	0.5	48.5	10.3	0.25	23.5	11
10K	0.5	70.7	7.07	0.25	34.3	7
22K	0.5	105	4.77	0.25	50.0	5.0
47K	0.5	153	3.26	0.25	74	3.4
100K	0.5	224	2.24	0.25	108	2.3
220K	0.5	332	1.51	0.25	158	1.6
470K	0.26	350	0.74	0.25	235	1.1
1M	0.12	350	0.35	0.25	343	0.7

DETENT OPTION (haptic technology)		
<p>Detent option is a positive tactile feedback.</p> <p>On request: the detent mechanism is housed in the P16</p> <p>Mechanical endurance: 10 000 cycles</p> <p>One detent in CCW position (CV1D)</p> <p>One detent in CW position (CV1F)</p> <p>One detent in CW position and CCW position (CVDF)</p>	<p>Ordering information (special code):</p> <p>CV1D One detent in CCW position</p> <p>CV1F Detent in CW position</p> <p>CVDF Detent in CW position and CCW position</p>	



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 % Rn
Damp heat, steady state	56 days 40 °C, 93 % HR	± 2 %	± 1 %	Insulation resistance: > 10 ⁴ MΩ
Mechanical endurance (No load)	200 000 cycles	± 2 %	-	Contact res. variation: < 3 % Rn Independent linearity ≤ ± 5 %
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 %	-	$\Delta V_{1-2}/\Delta V_{1-3} \leq \pm 0.5 \%$

Note

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

OPTION RELATIVE TO APPLICATION
“K14” OPTION for AMS applications (avionics, military, and space)
“K17” OPTION for MEDICAL applications
Option guarantees: <ul style="list-style-type: none"> Reinforced incoming inspection on raw material Traceability of all materials used in the composition of the product 50-year traceability (AMS market) / 20-year traceability (MEDICAL market) Customer information for any process or product modification having an impact on the function, mountability, shape or reliability of the product Periodic product monitoring Dedicated technical specification

ORDERING INFORMATION															
P	1	6	F	N	P	2	2	3	M	A					
MODEL P16F = cermet PA16F = conductive plastic	STYLE NP = plastic black NM = metallic black or other color on request		OHMIC VALUE 223 = 22 kΩ for ohmic value range see Electrical Specifications		TOLERANCE M = ± 20 % On request: K = ± 10 %		TAPER A = linear L = clockwise logarithmic F = inverse clockwise logarithmic		SPECIAL NUMBER (If applicable) Given by Vishay for custom design						
											SPECIAL NUMBER FOR OPTION RSD = switch CV1D = detent in CCW position CV1F = detent in CW position CVDF = detent in CW and CCW position F2 = 10 graduations marking F3 = 5 graduations marking F4 = gradient marking F5 = light marking F6 = fan F7 = temperature F8 = volume				

**PART NUMBER DESCRIPTION** (for information only)

P16F	NP	22 kΩ	20 %	A	
MODEL	STYLE	VALUE	TOLERANCE	TAPER	SPECIAL

ACCESSORIES

Potentiometers are delivered with accessories (nut, washer...)

Additional Accessories (to order separately)

www.vishay.com/doc?51051

Control knobs

www.vishay.com/doc?51101

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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