Knob Potentiometer With Switch

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.

FEATURES

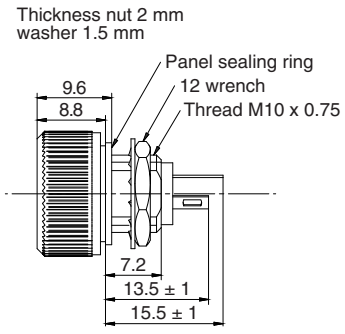
- **P16S** - version for military, professional and industrial applications (cermet): 1 W at 40 °C
- **PA16S** - version for professional audio applications (conductive plastic): 0.5 W at 40 °C
- Compact (integrated)
- Detent and electric cut off at beginning of travel
- Fully sealed and panel sealed
- 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/doc?99912

RoHS COMPLIANT

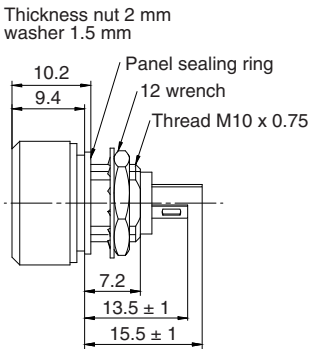
QUICK REFERENCE DATA	
Multiple module	No
Switch module	Yes
Detent module	Yes
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic
Sealing level	IP 67
Lifespan	10K cycles (switch), 50K cycles (track)

DIMENSIONS in millimeters (± 0.5 mm)

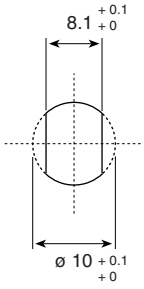
P16SNP



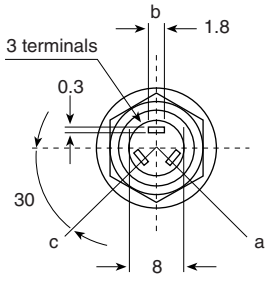
P16SNM

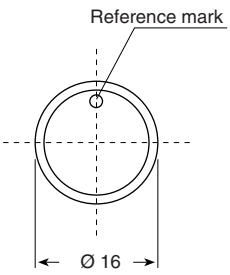


PANEL CUTOUT



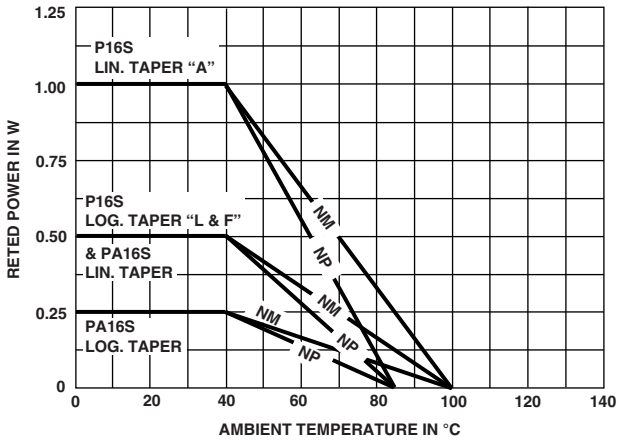
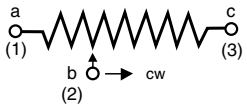
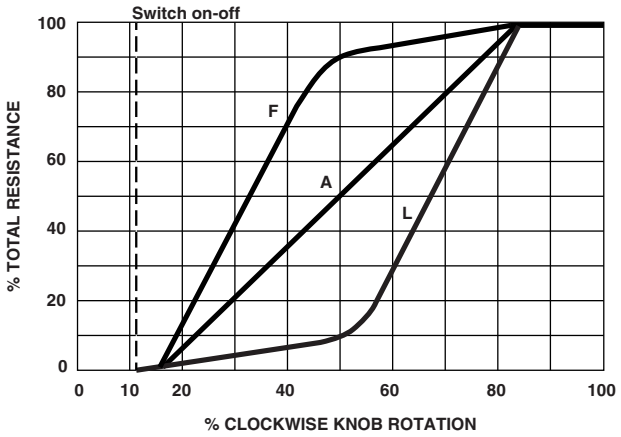
Panel thickness max.: 3 mm





For technical questions, contact: sferpottrimmers@vishay.com

ELECTRICAL SPECIFICATIONS

		P16S	PA16S
Resistive element		Cermet	Conductive plastic
Electrical travel		220° ± 10°	220° ± 10°
Power rating chart			
Circuit diagram			
Taper			
Resistance range	linear law	22 Ω to 10 MΩ	1 kΩ to 1 MΩ
	logarithmic laws	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	± 500 ppm
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
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		
		$\Delta R_T/R_T$ (%)	$\Delta R_{1\text{-}2}/R_{1\text{-}2}$ (%)	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 dimensions	± 0.2 %	± 0.5 %	-
Vibration	10 Hz to 55 Hz 0.75 mm or 10 *g*'s during 6 h	± 0.2 %	-	$\Delta V_{1\text{-}2}/\Delta V_{1\text{-}3} \leq \pm 0.5$ %

ORDERING INFORMATION

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

MODEL
P16S = cermet
PA16S = conductive plastic

STYLE
NM = metallic black
NP = plastic black
WM = metallic white
WP = plastic white
BP = plastic blue
RP = plastic red
YP = plastic yellow

OHMIC VALUE
223 = 22 kΩ
for ohmic value range see electrical specification

TOLERANCE
M = ± 20 %
On request:
K = ± 10 %

TAPER
A = linear
L = clockwise logarithmic
F = inverse clockwise logarithmic

PACKAGING CODE
B15 = box of 20 pieces

SPECIAL NUMBER
(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

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.