

## Fully Sealed Container Cermet Potentiometer Professional Grade



### LINKS TO ADDITIONAL RESOURCES



Their excellent performances are due to the use of a cermet-track sealed in a large case.

P13 interchangeability with RV6, combined with the excellent stability of its rated characteristics make it fully acceptable for military and professional uses.

### FEATURES

- High power rating 1.5 W at 70 °C
- Product qualification: according to CECC 41 301-001 (A, B, C)
- Test according to CECC 41000 or IEC 60393-1
- GAM T1
- Cermet element
- Tight temperature coefficient ( $\pm 75$  ppm/°C typical)
- Mechanical strength
- Construction: fully sealed
- Professional grade
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

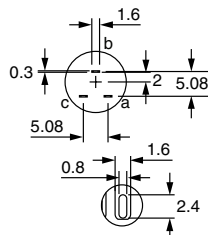
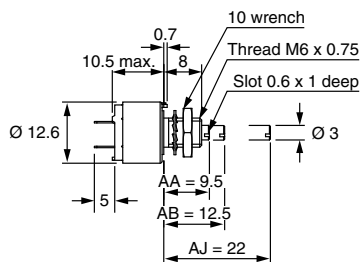


RoHS COMPLIANT

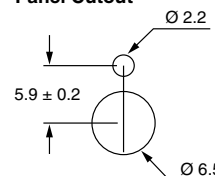
QUICK REFERENCE DATA	
Multiple module	No
Switch module	n/a
Detent module	n/a
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic
Sealing level	IP 67
Lifespan	25K cycles

### DIMENSIONS in millimeters ( $\pm 0.5$ )

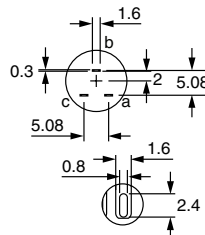
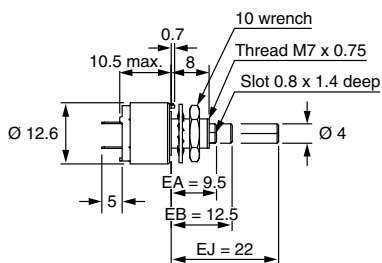
#### P13T-(PC32) A



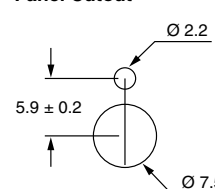
#### Panel Cutout



#### P13Q-B



#### Panel Cutout



DIMENSIONS in millimeters ( $\pm 0.5$ )	
<b>P13L-(PC33) C</b>	
	<p><b>Panel Cutout</b></p>

ELECTRICAL SPECIFICATIONS	
Resistive element	Cermet
Electrical travel	$270^\circ \pm 10^\circ$
Resistance range	Linear taper: $22 \Omega$ to $10 \text{ M}\Omega$ Logarithmic taper: $1 \text{ k}\Omega$ to $2.2 \text{ M}\Omega$
Standard series e3	1, 2.2, 4.7 and on request 1, 2, 5
Tolerance	Standard: $\pm 20 \%$ On request: $\pm 10 \%$ to $\pm 5 \%$
Taper	
Circuit diagram	
Power rating	<p>Linear: <math>1.5 \text{ W}</math> at <math>70^\circ \text{C}</math> Logarithmic: <math>0.75 \text{ W}</math> at <math>70^\circ \text{C}</math></p>
Temperature coefficient (typical)	$\pm 150 \text{ ppm}/^\circ\text{C}$ For values $\geq 100 \Omega$ and in temperature range $+20^\circ \text{C}$ to $+70^\circ \text{C}$ , the typical temperature coefficient is $\pm 75 \text{ ppm}/^\circ\text{C}$
Limiting element voltage (linear law)	$350 \text{ V}$
Contact resistance variation	$3 \%$ $R_n$ or $3 \Omega$
End resistance (typical)	$1 \Omega$
Dielectric strength (RMS)	$2000 \text{ V}$
Insulation resistance ( $300 \text{ V}_{\text{DC}}$ )	$10^6 \text{ M}\Omega$
Independent linearity (typical)	$\pm 5 \%$



STANDARD RESISTANCE ELEMENT DATA							
STANDARD RESISTANCE VALUES	LINEAR TAPER			LOG. TAPER			TYPICAL TCR -55 °C +125 °C
	MAX. POWER AT 70 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 70 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	
Ω	W	V	mA	W	V	mA	ppm/°C
22	1.5	5.74	261				± 150
47	1.5	8.4	177				
100	1.5	12.2	122				
220	1.5	18.2	82.6				
470	1.5	26.5	56.5				
1K	1.5	38.7	38.7	0.75	27	27	
2.2K	1.5	57.5	26.1	0.75	40	18	
4.7K	1.5	84	17.9	0.75	59	12	
10K	1.5	122.5	12.2	0.75	87	8.7	
22K	1.5	182	8.26	0.75	128	5.8	
47K	1.5	265	5.65	0.75	187	3.9	
100K	1.22	350	3.5	0.75	273	2.7	
220K	0.56	350	1.6	0.56	350	1.6	
470K	0.26	350	0.74	0.26	350	0.74	
1M	0.12	350	0.35	0.12	350	0.35	
2.2M	0.05	350	0.16	0.05	350	0.16	
4.7M	0.026	350	0.074				
10M	0.012	350	0.035				

MECHANICAL SPECIFICATIONS		
Mechanical travel	300° ± 5°	
Operating torque (typical)	2 Ncm	2.85 oz. inch
End stop torque		
Style T, Q	35 Ncm max.	3.1 lb inch max.
Style L	80 Ncm max.	7.1 lb inch max.
Tightening torque of mounting nut		
Style T, Q	150 Ncm max.	13.3 lb inch max.
Style L	250 Ncm max.	22.1 lb inch max.
Unit weight	6 g to 18 g	0.22 oz. to 0.64 oz.
Terminals	e3: pure Sn	

ENVIRONMENTAL SPECIFICATIONS	
Temperature range	-55 °C to +125 °C
Climatic category	55 / 125 / 56
Sealing	Fully sealed - container IP67

OPTIONS	
Special feature command shaft	<p>Length is measured from the mounting surface to the free end of the shaft. The screwdriver slot is aligned with the wiper within <math>\pm 10^\circ</math>. Special shafts are available, in accordance to drawings supplied by customers. We recommend that customers should not machine tool shafts, in order to avoid damage. Bending or torsion of terminals should also be avoided.</p>
Panel sealing	<p>Potentiometers P13T and P13L can be fitted with a device providing sealing between the threaded bushing and the front panel. Their designation is P13P and P13N respectively or with a locating peg P13P...E and P13N...E.</p> <p><b>Panel sealed version</b>  <b>P13P</b>  <b>P13P...E: Including locating peg</b></p> <p><b>Panel Cutout</b></p>
	<p><b>Panel sealed version</b>  <b>P13N</b>  <b>P13N...E: Including locating peg</b></p> <p><b>Panel Cutout</b></p>
Shaft locking	<p>On potentiometers equipped with a 3 mm Ø shaft, shaft locking can be obtained:</p> <ul style="list-style-type: none"> <li>• Either by a taper nut tightening a slotted bushing. Ask for P13O type. These devices are normally equipped with an AB type shaft (12.5 mm with a slot).</li> </ul> <p><b>P13O</b></p> <ul style="list-style-type: none"> <li>• Or by a tightening nut locked by a screw. Ask for ES1 type. On potentiometers equipped with a Ø 6 mm shaft, locking can be obtained by a taper nut applying pressure on a slotted notched washer. This device is supplied in a box as an accessory. Ask for DBAN. These devices are ordered separately. Please consult Vishay Sfernice.</li> </ul> <p><b>P13L DBAN</b></p> <p>No locking on shaft Ø 4 mm.</p>

**MARKING**

Printed:

- Vishay trademark
- Part number (including ohmic value code, tolerance code and taper)
- Manufacturing date
- Marking of terminals a

**PACKAGING**

- In box

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

**PERFORMANCE**

TESTS	CONDITIONS	REQUIREMENTS			TYPICAL VALUES AND DRIFTS		
		$\Delta R_T/R_T$ (%)	$\Delta R_{1-2}/R_{1-2}$ (%)	OTHER	$\Delta R_T/R_T$ (%)	$\Delta R_{1-2}/R_{1-2}$ (%)	OTHER
Electrical endurance	1000 h at rated power 90°/30° - ambient temp. 70 °C	± 10 %	-	Contact res. variation: < 7 % Rn	± 1 %	-	Contact res. variation: < 3 % Rn
Climatic sequence	Phase A dry heat 125 °C Phase B damp heat Phase C cold -55 °C Phase D damp heat 5 cycles	± 10 %	± 10 %	-	± 0.5 %	± 1 %	-
Damp heat, steady state	56 days 40 °C, 93 % HR	± 10 %	± 10 %	Dielectric strength: 250 V Insulation resistance: > 100 MΩ	± 0.5 %	± 1 %	Dielectric strength: 1000 V Insulation resistance: > 10 <sup>4</sup> MΩ
Change of temperature	5 cycles -55 °C at +125 °C	± 3 %	-	-	± 0.5 %	-	-
Mechanical endurance	25 000 cycles	± 10 %	-	Contact res. variation: < 7 % Rn	± 3 %	-	Contact res. variation: < 2 % Rn
Shock	50 g's at 11 ms 3 successive shocks in 3 directions	± 2 %	-	-	± 0.1 %	± 0.2 %	-
Vibration	10 Hz to 55 Hz 0.75 mm or 10 g's during 6 h	± 2 %	-	-	± 0.1 %	-	$\Delta V_{1-2}/V_{1-3} < \pm 0.2 \%$

**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:

- 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 (part number)																	
P	1	3	P	A	B	1	0	3	M	L	B	1	7	E			
MODEL	BUSHING			SHAFT				OHMIC VALUE	TOLERANCE	TAPER	PACKAGING	SPECIAL					
P13	∅	L	Old codes	∅	L	Only with bushing	Old Shaft codes	Linear law from 22 Ω to 10 MΩ	M = 20 % On request: K = 10 %	A = linear L = clockwise logarithmic F = inverse clockwise logarithmic	Bushing L or N: shaft < 45 mm B10 = box of 10 pieces shaft > 45 mm B08 = box of 8 pieces Other bushings: shaft < 20 mm B17 = box of 25 pieces shaft > 20 mm B12 = box of 15 pieces	E = locating peg or special code given by Vishay					
	T	6	8	T				Logarithmic law from 1 kΩ to 2.2. MΩ									
	Q	7	8	Q	AA	3	9.5	T, P	K								
	L	10	12	V	AB	3	12.5	T, P, O	L, M								
	O	6	11	H	AJ	3	22	T, P	R								
	P	6	8	TP	EA	4	9.5	Q	E								
	N	10	9.5	VP	EB	4	12.5	Q	F								
					EJ	4	22	Q	G								
					FG	6	16	L	AC								
					FL	6	25	L	AM								
					FR	6	50	L	AL								
					FE	6	13	N	AC								
					FK	6	22	N	AM								
					FQ	6	47.5	N	AL								

PART NUMBER DESCRIPTION (for information only)												
P13	T	PE	M	10K	20 %	L		BO				e3
MODEL	BUSHING	SPECIAL	SHAFT	OHMIC VALUE	TOL.	TAPER	SPECIAL	PACKAGING	SPECIAL	SHAFT	SPECIAL	LEAD (Pb)-FREE

ACCESSORIES	
Potentiometers are delivered with accessories (nut, washer...)	
Additional Accessories (to order separately)	<a href="http://www.vishay.com/doc?51051">www.vishay.com/doc?51051</a>
Control knobs	<a href="http://www.vishay.com/doc?51101">www.vishay.com/doc?51101</a>

RELATED DOCUMENTS	
APPLICATION NOTES	
Potentiometers and Trimmers	<a href="http://www.vishay.com/doc?51001">www.vishay.com/doc?51001</a>
Guidelines for Vishay Sfernice Resistive and Inductive Components	<a href="http://www.vishay.com/doc?52029">www.vishay.com/doc?52029</a>



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