



Fully Sealed Container Cermet Potentiometers Submarine Applications

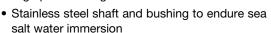


P13SM is designed for applications which need to set electrical parameters with an immersed potentiometer in deep water conditions up to 30 m (100 feet).

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 68		
Lifespan	25K cycles		

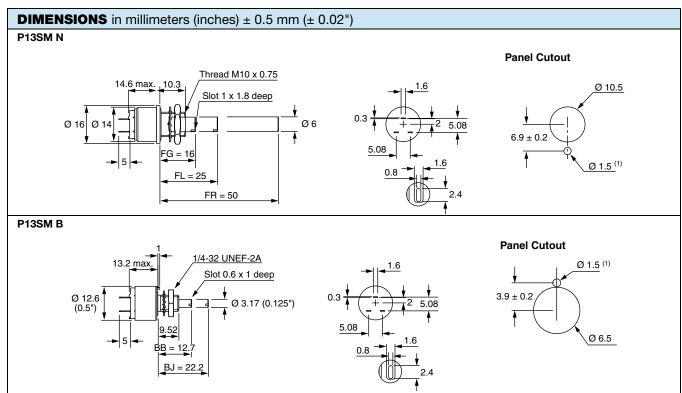
FEATURES

High power rating 1.5 W at 70 °C





- Fully sealed IP68 on panel
- Tight temperature coefficient (± 75 ppm/°C typical)
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>



Note

(1) CAUTION: Ø 1.5 of panel cut out must not be fully through-hole

Undergoes European Quality Insurance System



Vishay Sfernice

Resistive element		Cermet		
Electrical travel		270° ± 10°		
linear taper				
Resistance range		22 Ω to 10 MΩ		
Standard series E3	logarithmic taper 1 kΩ to 2.2 MΩ			
Standard Series E3	otondord	1, 2.2, 4.7, and on request 1, 2, 5 ± 20 %		
Tolerance standard on request		± 10 % to ± 5 %		
Taper		100 80 F 60 100 100 100 100 80 100 % CLOCKWISE SHAFT ROTATION		
Circuit diagram		$ \begin{array}{c} a \\ \bigcirc \\ \bigcirc \\ (1) \\ b \\ \bigcirc \\ C \\ \bigcirc \\ (3) \\ (3) \end{array} $ (3) (2)		
Power rating		Linear 1.5 W at 70 °C Logarithmic 0.75 W at 70 °C AMBIENT TEMPERATURE IN °C		
Temperature coefficient	(typical)	\pm 150 ppm/°C For values \geq 100 Ω and in temperature range +20 °C to +70 °C, the typical temperature coefficient is \pm 75 ppm/°C		
Limiting element voltage	(linear law)	350 V		
Contact resistance varia	tion	3 % Rn or 3 Ω		
End resistance (typical)		1 Ω		
Dielectric strength (RMS)	2000 V		
Insulation resistance (30	0 V _{DC})	10 ⁶ MΩ		
		± 5 %		

Vishay Sfernice

STANDARD	STANDARD RESISTANCE ELEMENT DATA						
STANDARD	LINEAR TAPER		LOGS TAPED			TYPICAL	
RESISTANCE VALUES	MAX. POWER AT 70 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	MAX. POWER AT 70 °C	MAX. WORKING VOLTAGE	MAX. CUR. THROUGH WIPER	TCR -55 °C +125 °C
Ω	W	V	mA	W	V	mA	ppm/°C
22	1.5	5.74	261	-	-	-	
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	± 150
22K	1.5	182	8.26	0.75	128	5.8	1 100
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		
Style B	300°	±5°
Style N	310°	±5°
Operating torque (typical)	2 Ncm	2.85 oz. inch
End stop torque		
Style B	35 Ncm max.	3.1 lb inch max.
Style N	80 Ncm max.	7.1 lb inch max.
Tightening torque of mounting nut		
Style B	80 Ncm min., 150 Ncm max.	7 lb inch min., 13.3 lb inch max.
Style N	80 Ncm min., 250 Ncm max.	7 lb inch min., 22.1 lb inch max.
Unit weight	8 g to 27 g	0.3 oz. to 1 oz.
Terminals	e3: po	ure Sn

ENVIRONMENTAL SPECIFICATIONS			
Temperature range	-55 °C to +125 °C		
Climatic category	55 / 125 / 56		
Sealing	Fully sealed - container IP68		
Panel sealing	Immersion at 30 m (100 feet) in sea salt water or clear water		



www.vishay.com

Vishay Sfernice

OPTIONS

Special feature command shaft

Length is measured from the mounting surface to the free end of the shaft. The screwdriver slot is aligned with the wiper within $\pm\,10^\circ$. 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.

MARKING

Printed:

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

PACKAGING

In box

Packaging quantity depending on shafts:

- Box of 5 pieces for shaft FR (code BO5)
- Box of 10 pieces for shaft FG or FL (code BO10)
- Box of 15 pieces for shaft BJ (code BO15)
- Box of 25 pieces for shaft BB (code BO25)

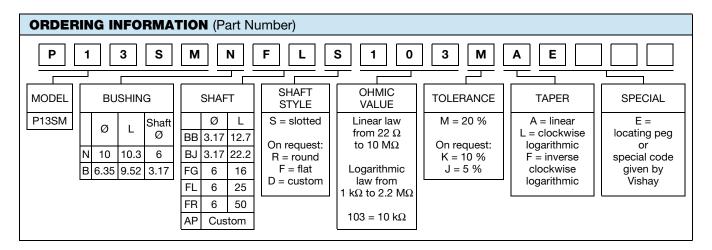
PERFORMANCE					
TESTS	CONDITIONS	TYPICAL VALUES AND DRIFTS			
12313	CONDITIONS	$\Delta R_{T}/R_{T}$ (%)	$\Delta R_{1-2}/R_{1-2}$ (%)	OTHER	
Electrical endurance	1000 h at rated power 90'/30' - ambient temperature 70 °C	± 1 %	-	Contact res. variation: < 3 % Rn	
Climatic sequence	Phase A dry heat 125°C Phase B damp heat Phase C cold -55°C Phase D damp heat 5 cycles	± 0.5 %	± 1 %	-	
Damp heat, steady state	56 days 40 °C, 93 % HR	± 0.5 %	± 1 %	Dielectric strength: 1000 V Insulation resistance: $> 10^4 \text{M}\Omega$	
Change of temperature 5 cycles -55 °C at +125 °C		± 0.5 %	-	-	
Mechanical endurance	25 000 cycles	± 3 %	-	Contact res. variation: < 2 % Rn	
Shock	50 g's at 11 ms 3 successive shocks in 3 directions		± 0.2 %	-	
Vibration	10 Hz to 55 Hz 0.75 mm or 10 <i>g</i> 's during 6 h	± 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

www.vishay.com

Vishay Sfernice



PART NUMBER DESCRIPTION (for information only)				
P13SM N E MODEL BUSHING SPECIAL S	FL S 10K SHAFT SHAFT VALU	20 % A TOLERANCE TAPE	BO10 ER SPECIAL PACKAGING	SHAFT 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



Legal Disclaimer Notice

Vishay

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.

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.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

<u>P13SMNFGS102MA</u> <u>P13SMNFGS103MA</u> <u>P13SMNFGS471MA</u> <u>P13SMNFGS472MA</u> <u>P13SMNFLS473MA</u> <u>P13SMNFLS473MA</u> <u>P13SMNFLS473MA</u> <u>P13SMNFRS102MA</u> <u>P13SMNFRS103MA</u> <u>P13SMNFRS471MA</u> <u>P13SMNFRS472MA</u> <u>P13SMNFRS473MA</u>