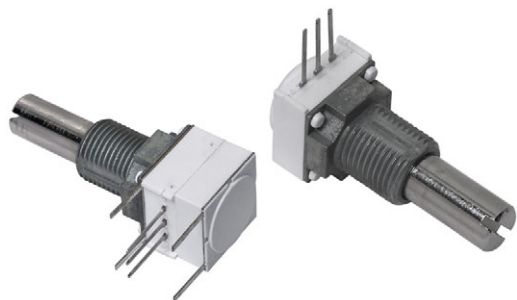


# 1/2" (12.7 mm) Conductive Plastic and Cermet Potentiometer



## LINKS TO ADDITIONAL RESOURCES



QUICK REFERENCE DATA	
Multiple module	Up to 3 modules
Switch module	Yes
Detent module	Yes
Special electrical laws	A: linear, L: logarithmic, F: reverse logarithmic
Sealing level	IP 64
Lifespan	50K cycles

## FEATURES

- Robust construction
- High rotational life (50 000 cycles)
- Up to three sections PC support plates
- Rotary switches, tactile feedback, and solder lug terminals available
- Tests according to CECC 41000 or IEC 60393-1
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

## 148 FEATURES

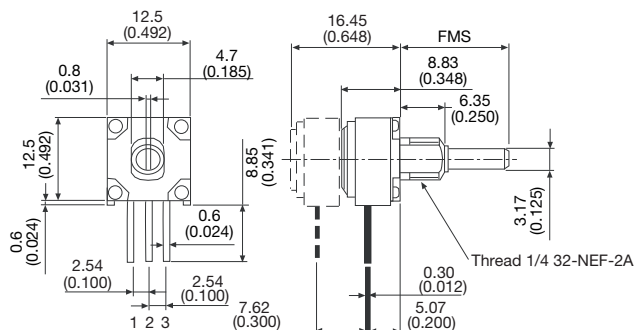
- Conductive plastic element
- Quiet electrical output

## 149 FEATURES

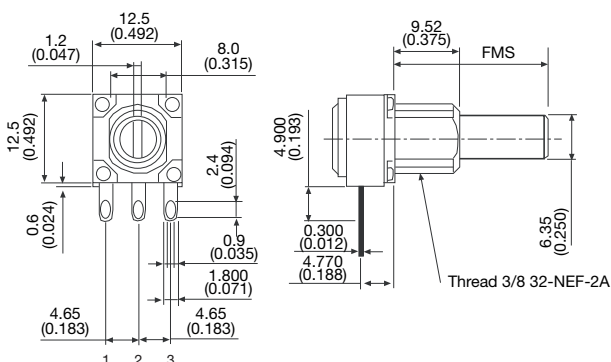
- Cermet element
- Low temperature coefficient ( $\pm 150$  ppm/ $^{\circ}$ C)

## DIMENSIONS in millimeters (inches) $\pm 0.5$ mm ( $\pm 0.02$ " )

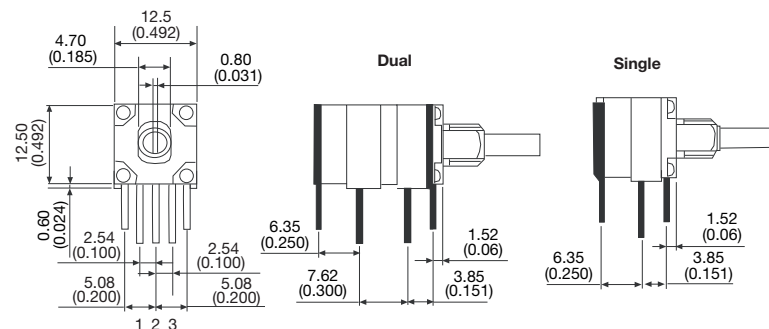
### Single, dual or triple

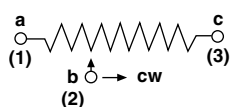


### Solder lug terminals



### Front and rear support plates E = flush with board surface



<b>ELECTRICAL SPECIFICATIONS</b>		
PARAMETER	148	149
Resistance range	linear	1 k $\Omega$ to 500 k $\Omega$
	non-linear	500 $\Omega$ to 250 k $\Omega$
Tolerance	linear	10 %
	non-linear	20 % on request 10 %
Linearity (typical)	$\pm 5$ % independent	
End resistance	4 $\Omega$ maximum each end	
Power rating	0.5 W at 70 °C 0 W at 120 °C	1 W at 70 °C 0 W at 150 °C
	Non-linear or PC mount, derate 50 %	
Circuit diagram		
Effective rotation	270° $\pm$ 10° without rotary switch 240° $\pm$ 10° with rotary switch	
Contact resistance variation (typical)	1.5 % of total resistance	3 % of total resistance
Maximum continuous working voltage	350 V <sub>AC</sub> across end terminals, but within power rating	
Dielectric withstanding voltage	Sea level -750 V <sub>AC</sub>	

<b>MECHANICAL SPECIFICATIONS</b>		
Mechanical travel	300° $\pm$ 5°	
Operating torque (typical)	Single section 0.2 oz. to 3.0 oz. - in dual or triple section 0.3 oz.-inch to 4.5 oz.-inch	
End stop torque	bushing A and B	2.1 lb-inch max.
	bushing F	6.8 lb-inch max.
Weight (approx.)	single	0.19 oz.
	dual	0.27 oz.
	triple	0.35 oz.
Terminals	electrical elements	e3: pure Sn
	switch elements	e4: gold plated

<b>ENVIRONMENTAL SPECIFICATIONS</b>		
	148	149
Operating temperature	-40 °C to +125 °C	-40 °C to +125 °C
Storage temperature	-55 °C to +125 °C	-55 °C to +125 °C
Temperature cycling (5 cycles)	-40 °C to +125 °C (4 % $\Delta R_T$ )	-40 °C to +125 °C (3 % $\Delta R_T$ )
Load life (1000 h rated load at 70 °C)	10 % $\Delta R_T$	5 % $\Delta R_T$
Mechanical endurance	50 000 cycles	
TCR (typical)	$\pm 500$ ppm/°C	$\pm 150$ ppm/°C
Sealing	IP64	

**Note**

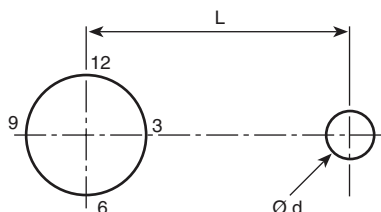
- Nothing stated herein shall be construed as a guarantee of quality or durability

<b>MARKING</b>
Vishay logo, SAP code of ohmic value, tolerance in %, variation law, manufacturing date (four digits), "3" for the lead 3, product series (148, 149)

### LOCATING PEGS (anti-rotation lug)

The locating peg is provided by a plate mounted on the bushing and positioned by the module sides. Four set positions are available, clock face orientation: 12, 3, 6, 9.

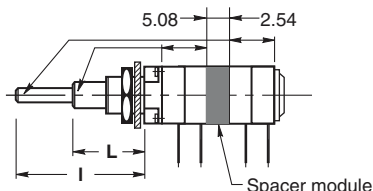
All 148, 149 bushings have a double flat. When panel mounting holes have been punched accordingly, an anti-rotation lug is not necessary.



CODE	VERSION	BUSHING A, B	BUSHING F	EFFECTIVE HIGH PEG
A	Ø d mm	2	2	0.7
	L mm	6.2	6.2	-
B	Ø d mm	2	2	0.7
	L mm	7.75	7.75	-
C	Ø d mm	-	3.5	1.1
	L mm	-	13.5	-

Locating pegs are supplied in separate bags with nuts and washers

### RSID OPTION: ROTARY SWITCH MODULES



- Rotary switches
- Current up to 2 A
- SPDT: single pole, changeover switch in CCW position - 3 pins
- Sealing IP60

#### MODULES: RS ON/OFF SWITCH RSI CHANGEOVER SWITCH

The position of each module is free.  
RS and RSI rotary switches are housed in a standard 148, 149 module size 12.7 mm x 12.7 mm x 5.08 mm (0.5" x 0.5" x 0.2"). They have the same terminal styles as the assembled electrical modules.

An assembly can comprise 1 or more switch modules.

Switch actuation is described as seen from the shaft end.  
D: means actuation in maximum CCW position

The switch actuation travel is 25° with a total mechanical travel of 300° ± 5° and electrical travel of electrical modules is 238° ± 10°.

#### RSID Single Pole CHANGEOVER

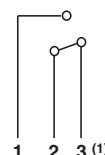
In full CCW position, the contact is made between 3 and 2 and open between 3 and 1. Switch actuation (CW direction) reverses these positions.

#### SWITCH SPECIFICATIONS

Switching power maximum		62.5 VA v 15 VA =
Switching current maximum		0.25 A 250 V v 0.5 A 30 V =
Maximum current through element		2 A
Contact resistance		100 mΩ
Dielectric strength	Terminal to terminal	1000 V <sub>RMS</sub>
	Terminal to bushing	2000 V <sub>RMS</sub>
Maximum voltage operation		250 V v 30 V =
Insulation resistance between contacts		10 <sup>6</sup> MΩ
Life at P <sub>max.</sub>		10 000 actuations
Minimal travel		25°
Operating temperature		-40 °C to +85 °C

#### ELECTRICAL DIAGRAM

##### RSID CCW POSITION



#### Note

(1) Common

**ORDERING INFORMATION** (part number)

<b>1</b>	<b>4</b>	<b>8</b>	<b>1</b>	<b>0</b>	<b>F</b>	<b>0</b>	<b>G</b>	<b>J</b>	<b>S</b>	<b>X</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>K</b>	<b>A</b>
MODEL	NUMBER OF MODULES	SWITCH / DETENT	BUSHING	LOCATING PEG	SHAFT	SHAFT END	LEADS	RESISTANCE CODE / TOLERANCE / TAPER OR SPECIAL									
148 = plastic conductive 149 = cermet element	1 2 3	1 = RSID 2 = CV1M 3 = CV21 0 = without switch	See table "Bushing"	0 = without A B C	See table "Shaft"	S = slotted On request: R = round F = flattened	See table "Leads"	Resistance code: 101 = 100 Ω to 105 = 1 MΩ Tolerance code: M = 20 %; K = 10 % Taper: A (S); L (Z); F (R) or Special code given by Vishay									

**BUSHING**

	Ø	L	OLD CODES
A	1/4"	1/4"	N
B	1/4"	3/8"	J
F	3/8"	3/8"	G

**LEADS**

	TYPE	PIN SPACING	SPACE BETWEEN MODULES	OLD CODES
X10	PCB pins	2.54 mm (0.100")	n/a	P
X13			7.62 mm (0.300")	
A10	PCB pins and support plates	2.54 mm (0.100")	n/a	E
A13			7.62 mm (0.300")	
Y00	Sold, lugs	4.65 mm (0.183")	n/a	S
Y03			7.62 mm (0.300")	

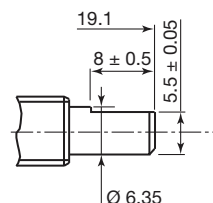
**SHAFT**

	Ø	FMS	OLD CODES
BB	1/8"	1/2"	32
BG	1/8"	5/8"	40
BH	1/8"	3/4"	48
BJ	1/8"	7/8"	56
GB	1/4"	1/2"	32
GG	1/4"	5/8"	40
GH	1/4"	3/4"	48
GJ	1/4"	7/8"	56
GL	1/4"	1"	64
GN	1/4"	1 1/4"	80

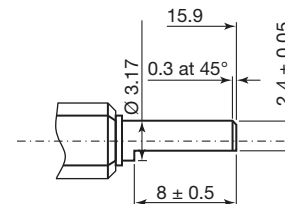
The shaft length is always measured from the mounting face. Standard shafts are designed by a 3 letters code (3 digits). Shafts slots are aligned to  $\pm 10^\circ$  of the wiper position. All standard shafts are slotted except flattened and splined, see exceptions for bushing.

**FLATTED SHAFT**

Bushing: F  
Shaft: GHF



Bushing: A  
Shaft: BGF

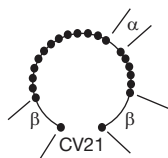
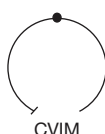


## DETENT OPTION (haptic technology)

Detent option is a positive tactile feedback.  
The detents mechanism is housed in a standard P11 module.  
Up to 21 detent positions available.

Available: CV1M  
CV21

Mechanical endurance: 10 000 cycles



$$\alpha = \frac{270^\circ}{n-1}$$

$$\beta = \alpha + 15^\circ$$

## ORDERING INFORMATION

(first order only for special code creation)

**CV1M**

**CV1M** 1 detent at half travel  
**CV21** 21 detents

## PART NUMBER DESCRIPTION (for information only)

148	1	0	F	0	GJ	S	X10	BO50	10K	10 %	A			e3
MODEL	MODULES	SWITCH	BUSHING	LOCATING PEG	SHAFT	SHAFT	LEADS	PACK.	VALUE	TOL.	TAPER	SPECIAL	SPECIAL	LEAD FINISH

## ACCESSORIES

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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