

# Analog Displacement Sensors for Transportation Applications



## FEATURES

- Conductive plastic potentiometer technology
- Use in engine compartment
- Lever drive with return spring
- Wire outputs
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## LINKS TO ADDITIONAL RESOURCES



QUICK REFERENCE DATA	
Sensor type	ROTATIONAL, conductive plastic
Output type	Output by wires
Market appliance	Transportation
Dimensions	39.2 mm (or 42 mm, or 47 mm) x 31.5 mm (or 34.2 mm) x 23.37 mm

ELECTRICAL SPECIFICATIONS	
PARAMETER	
Total electrical travel	94° ± 2°
Independent linearity standard	± 1.5 %
Total resistance (R <sub>n</sub> )	3.85 kΩ ± 20 %
Output smoothness	< 0.1 % (NFC 93255)
Power rating at +40 °C	0.5 W
Power rating at +125 °C	0.05 W
Wiper current limiting resistance (R <sub>w</sub> )	1.7 kΩ ± 20 %
Recommended wiper current	< 100 μA
Maximum wiper current	15 mA for 1 min
Recommended load impedance	≥ 100 R <sub>n</sub>

MECHANICAL SPECIFICATIONS	
PARAMETER	
Mechanical travel	125° ± 4°
Lever return torque at start of travel	≥ 1 N cm
Lever return torque at end of travel	≤ 10 N cm
Stop strength	60 N cm
Lever return	Counterclockwise
Protection class	See "Specific Characteristics" table
Mounting screw tightening torque	1.2 N m maximum

PERFORMANCE	
PARAMETER	
Operating temperature range	-40 °C to +125 °C
Storage temperature range	-55 °C to +135 °C
Vibrations	Severity 10 Hz to 2000 Hz, 10 mm or 50 g
Life	See "Specific Characteristics" table
Micro-movements (dither stroke)	> 50M cycles



SAP PART NUMBERING GUIDELINES						
MODEL	TYPE	LEVER TYPE	VALUE	ANGLE	LEADS	PACKAGING
PMR4	03	A = lever A C = lever C	392 = 3K9	094	W = wire	C = 20 pcs G = 100 pcs P = 500 pcs
	23					
	02					
	22					
	04					
	24					
	01					
	21					
	11					
	31					
	12					
	16					
	26					
	18					
	28					
(see "Specific Characteristics")						

SPECIFIC CHARACTERISTICS				
SENSOR TYPE	LIFE		PROTECTION CLASS	PACKAGE TYPE <sup>(1)</sup>
	MICRO-MOVEMENTS (dither stroke)	NUMBER OF CYCLES ELECTRICAL TRAVEL		
403	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	1
423	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	2
402	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	3
422	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	4
404	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	1
424	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	2
401	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	3
421	10 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	4
411	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	1
431	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	2
412	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP64	3
416	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	1
426	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	2
418	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	3
428	50 x 10 <sup>6</sup>	5 x 10 <sup>6</sup>	IP66	4

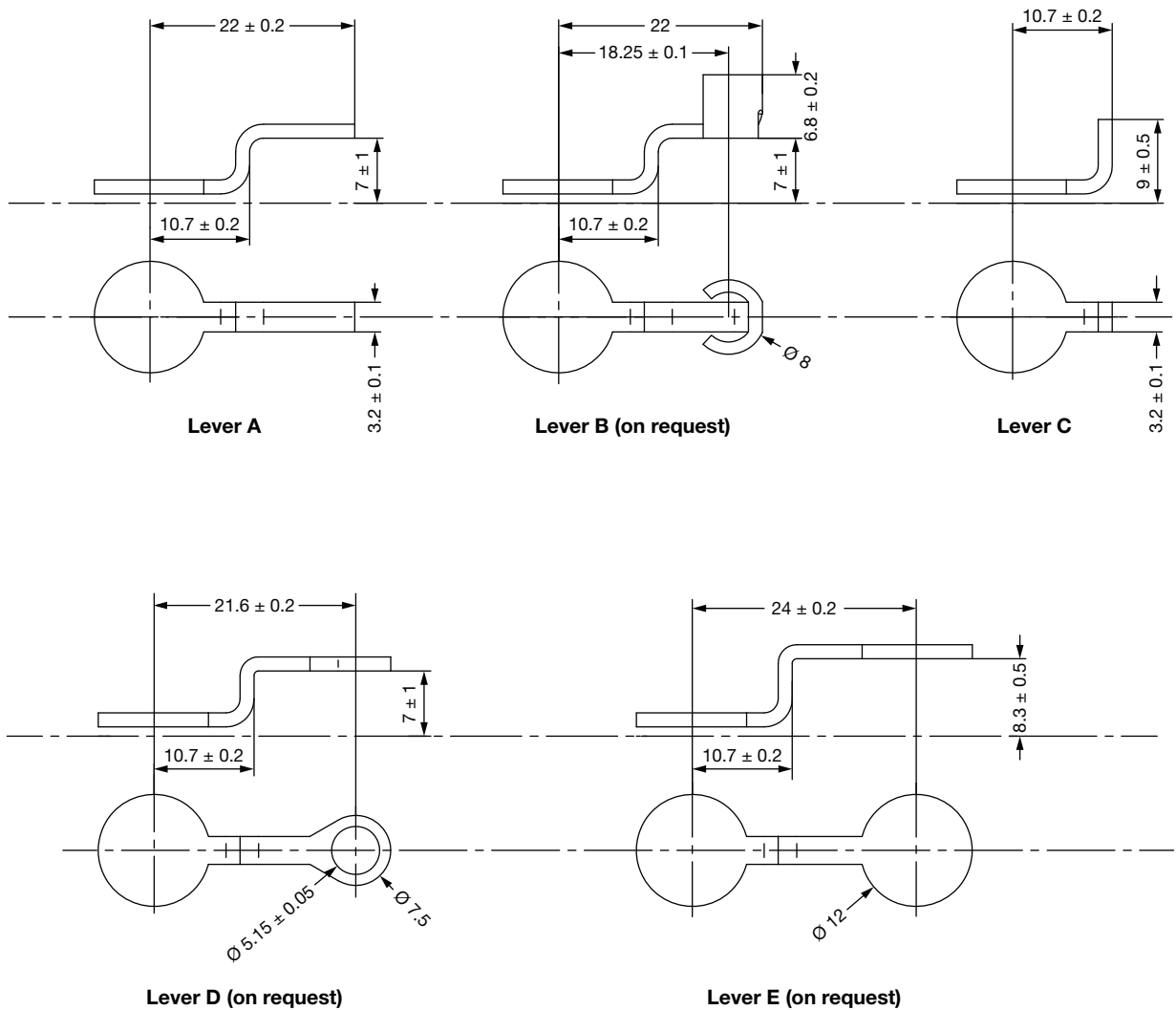
Notes

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

(1) Package types

- 1: Little ears                      Fixation: 2 screws M4 with Ø: 31.5 mm
- 2: Little tightened ears        Fixation: 2 screws M4 with Ø: 31.5 mm
- 3: Big ears                         Fixation: 2 screws M4 with Ø: 34 mm
- 4: Big tightened ears          Fixation: 2 screws M4 with Ø: 34 mm

**LEVER OPTIONS**

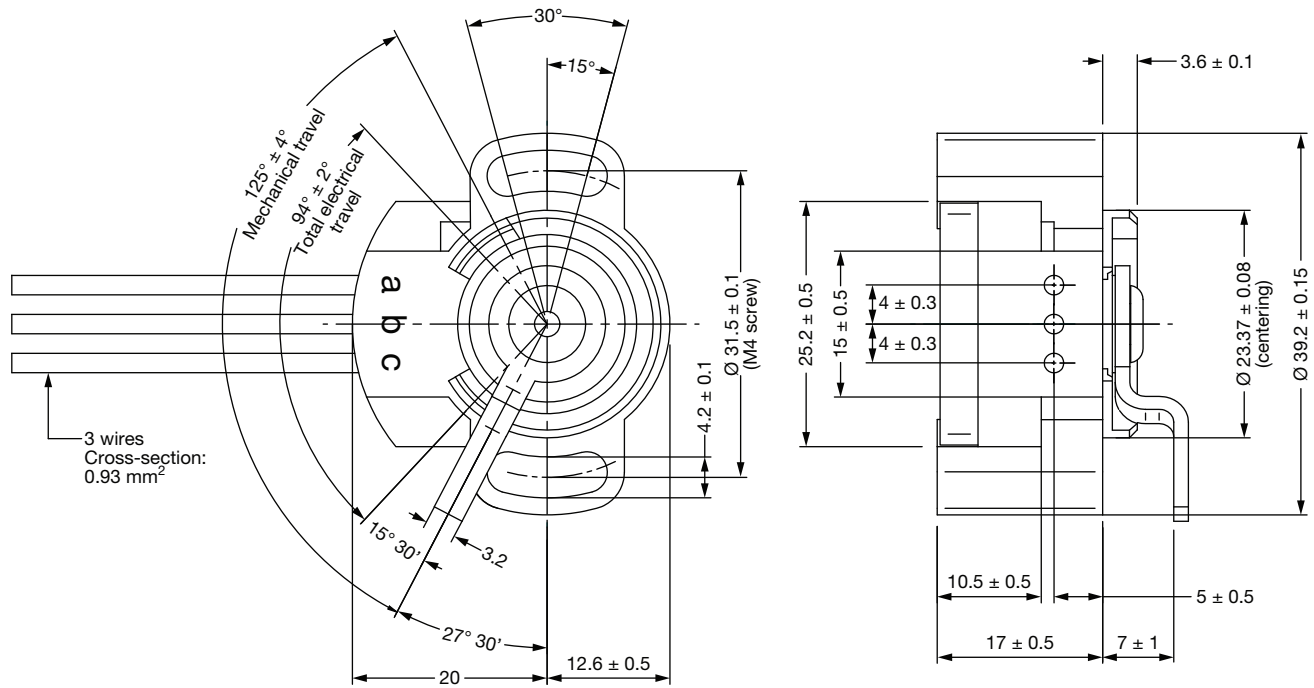


**CONNECTIONS**

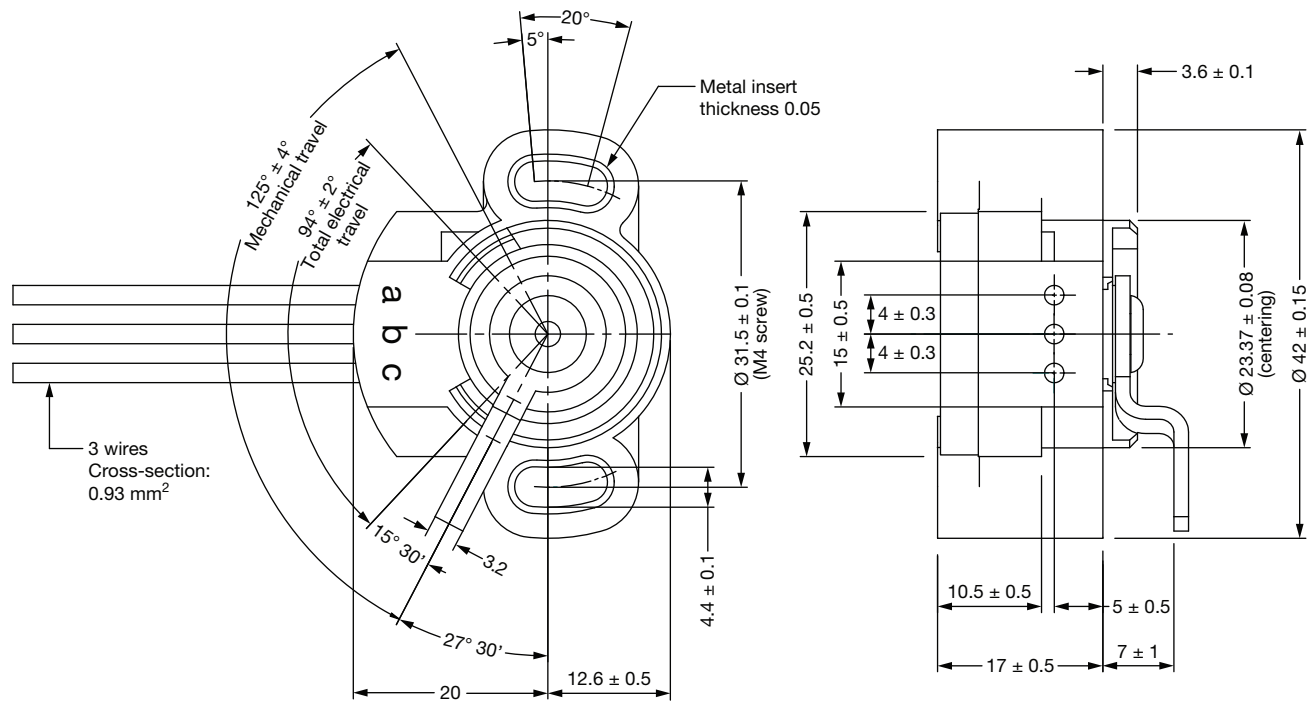
**Wire Outputs:** -40 °C to +105 °C (3 x 0.93 mm<sup>2</sup> length 300 mm)  
**Sheathed Wire Outputs:** -40 °C to +125 °C optional

**DIMENSIONS** in millimeters

**PACKAGE TYPE 1 (FOR SENSOR TYPES 403, 404, 411, AND 416)**

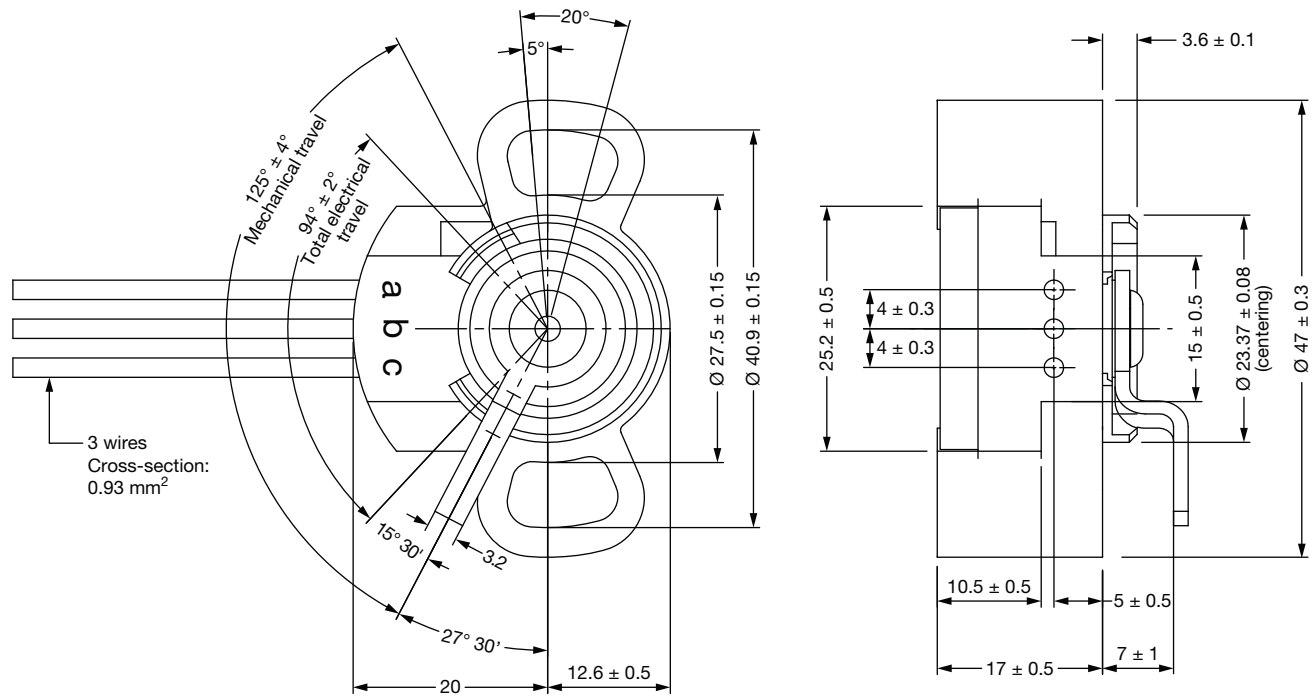


**PACKAGE TYPE 2 (FOR SENSOR TYPES 423, 424, 426, AND 431)**

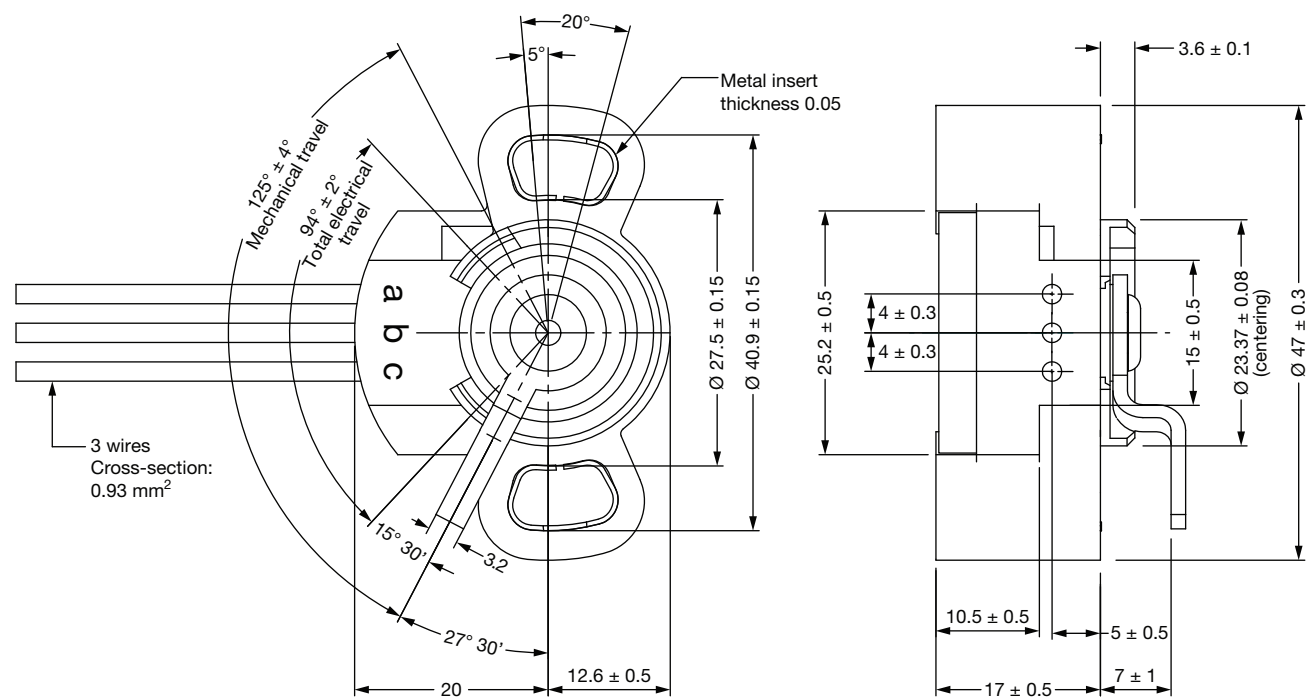


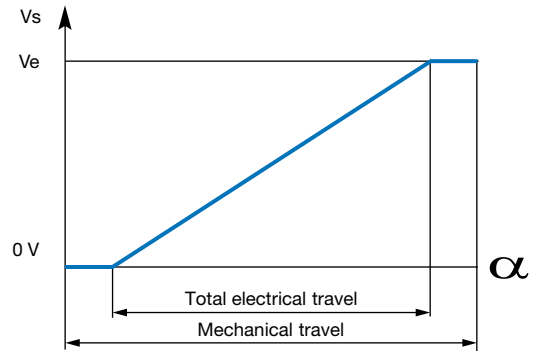
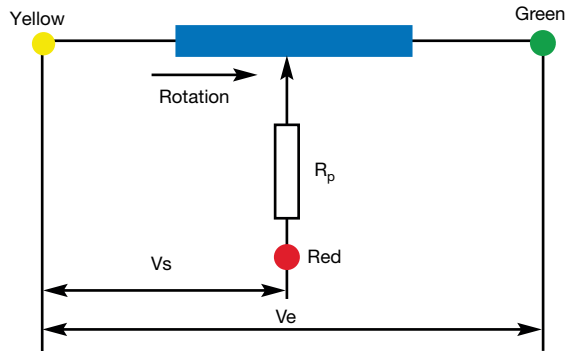
**DIMENSIONS** in millimeters

**PACKAGE TYPE 3 (FOR SENSOR TYPES 401, 402, 412, AND 418)**



**PACKAGE TYPE 4 (FOR SENSOR TYPES 421, 422, AND 428)**



**ELECTRICAL DIAGRAM**

**OPTIONS** (on request)

- Other total electrical travel
- Other resistance values
- Other linearity
- No protection resistance ( $R_p$ )
- High temperature sheathed wire outputs
- Specific connections
- Clockwise spring lever direction
- Other lever



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