

## Analog Displacement Sensors for Transportation Applications



### FEATURES

- Conductive plastic potentiometer technology
- Use in engine compartment
- Lever drive with return spring
- Wire outputs

### 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<br>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>p</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       | 2.3 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                             |

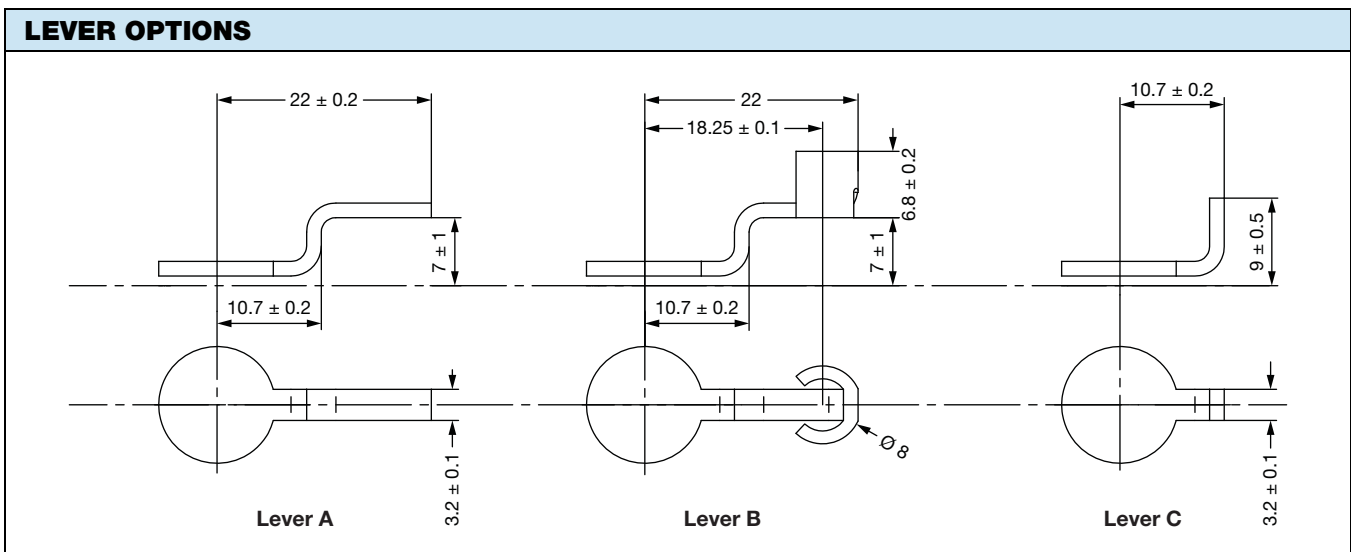
| ORDERING INFORMATION / DESCRIPTION                    |   |  |   |
|---|---|--|---|
| <b>PMR 422</b>  | <b>A</b>                                  | <b>SH</b>  | .....   |
| SENSOR TYPE<br>(See "Specific Characteristics" table) | LEVER TYPE<br>(See "Lever Options" table) | CLOCKWISE LEVER RETURN<br>(Counterclockwise:<br>leave blank) | SPECIAL FEATURE OR OPTION<br>(Plain language) |

| SPECIFIC CHARACTERISTICS |                                    |                                       |                  |                             |
|--------------------------|------------------------------------|---------------------------------------|------------------|-----------------------------|
| SENSOR TYPE              | LIFE                               |                                       | PROTECTION CLASS | PACKAGE TYPE <sup>(1)</sup> |
|                          | MICRO-MOVEMENTS<br>(dither stroke) | NUMBER OF CYCLES<br>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                           |

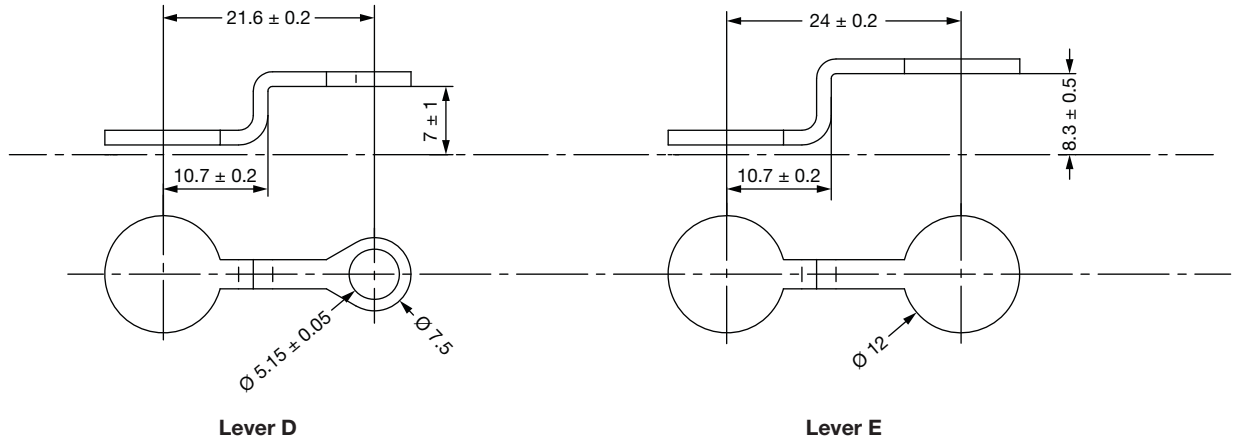
**Notes**

- Nothing stated herein shall be construed as a guarantee of quality or durability.
- <sup>(1)</sup> 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



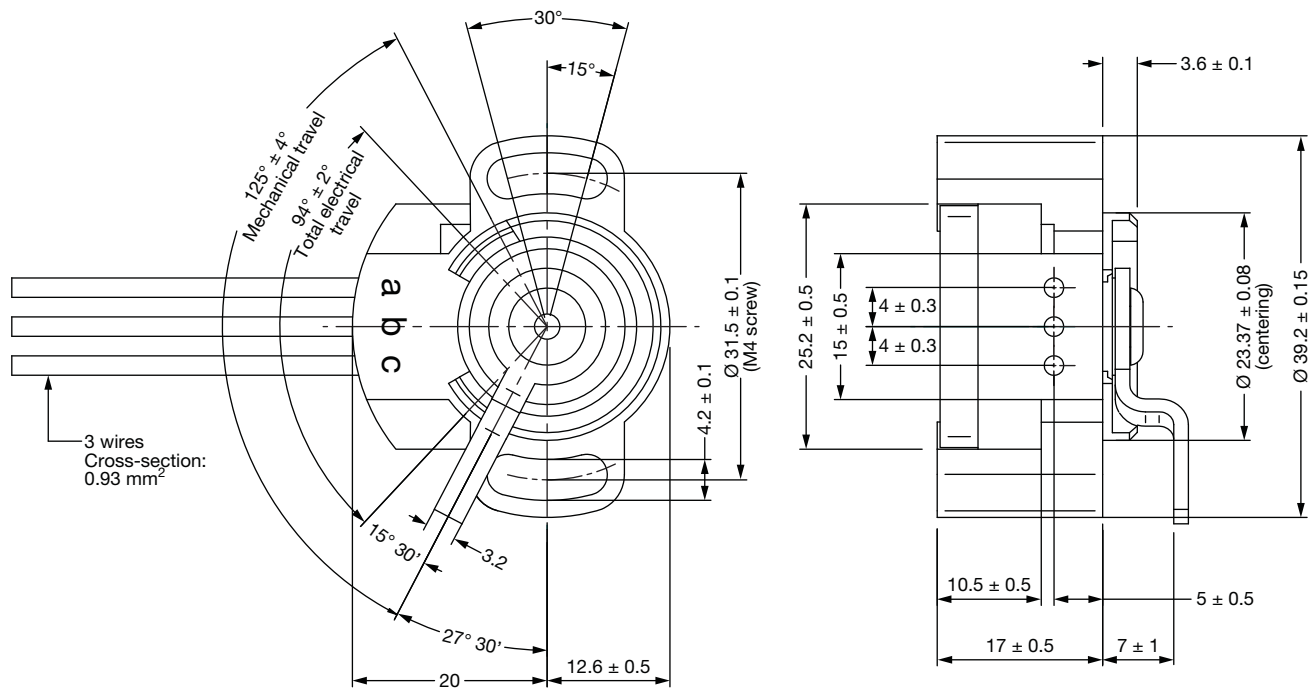
## CONNECTIONS

**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

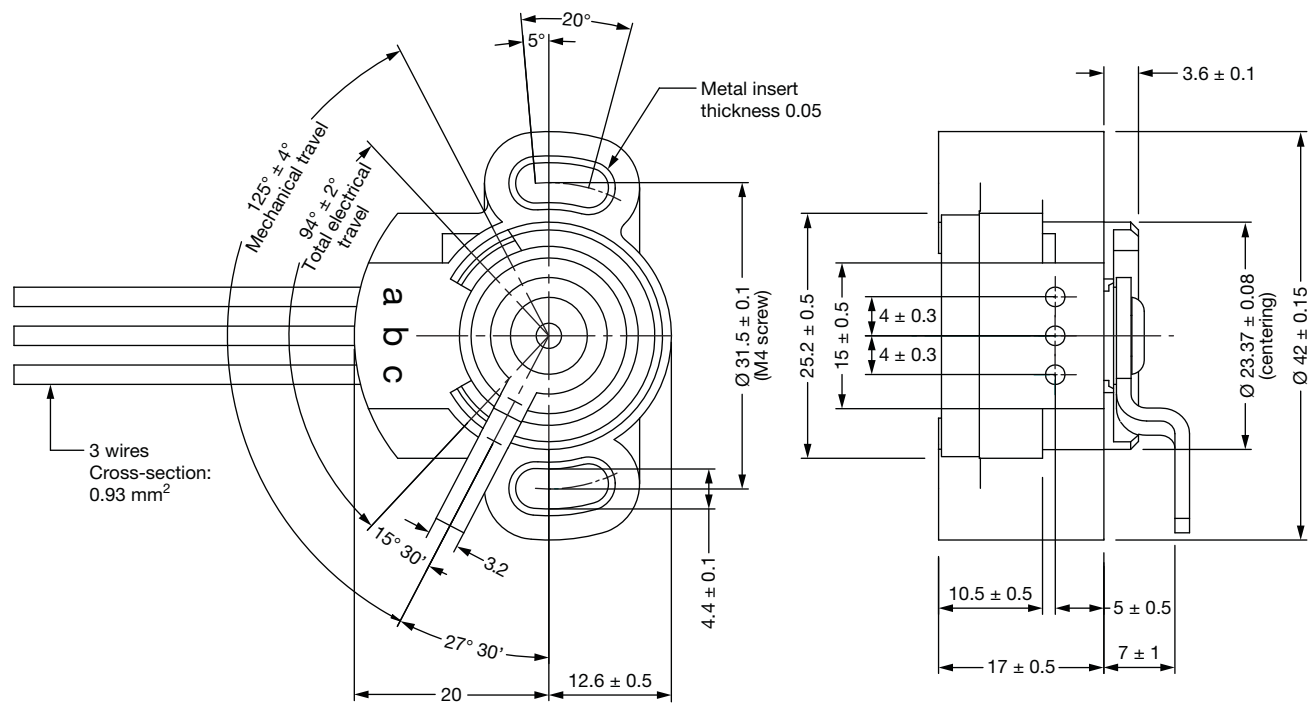
## DIMENSIONS in millimeters

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

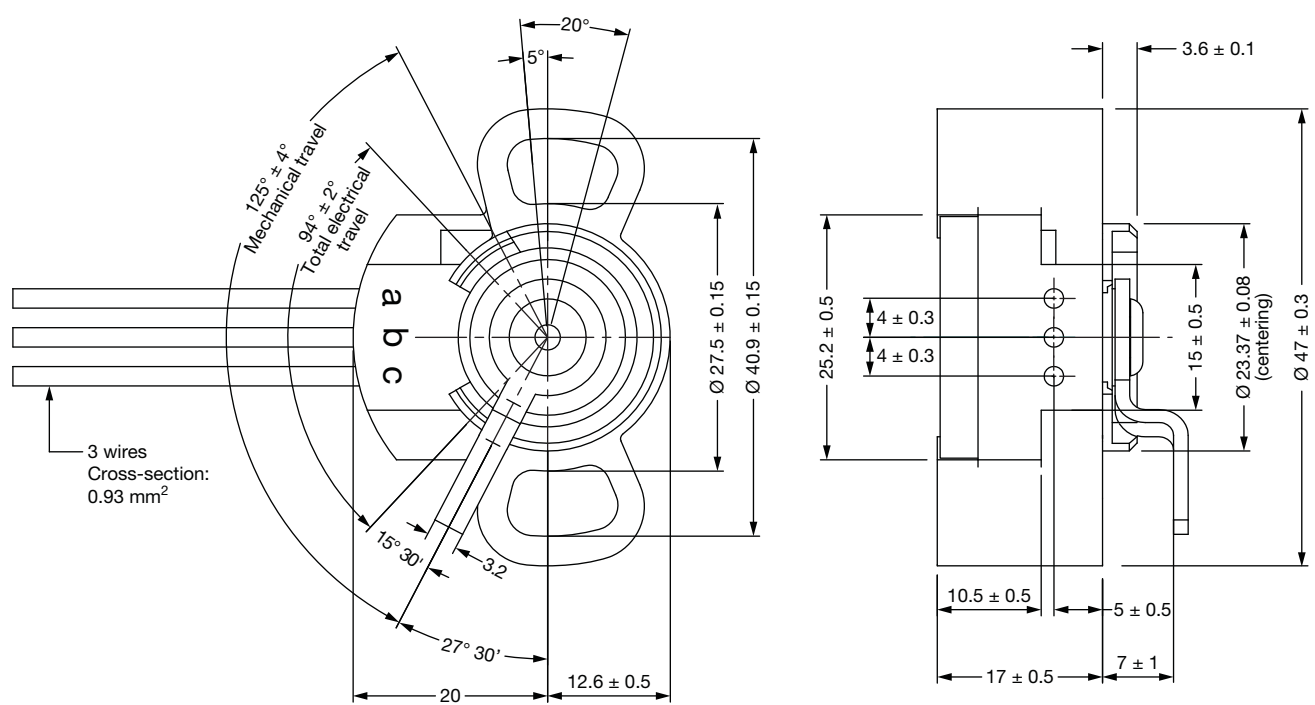


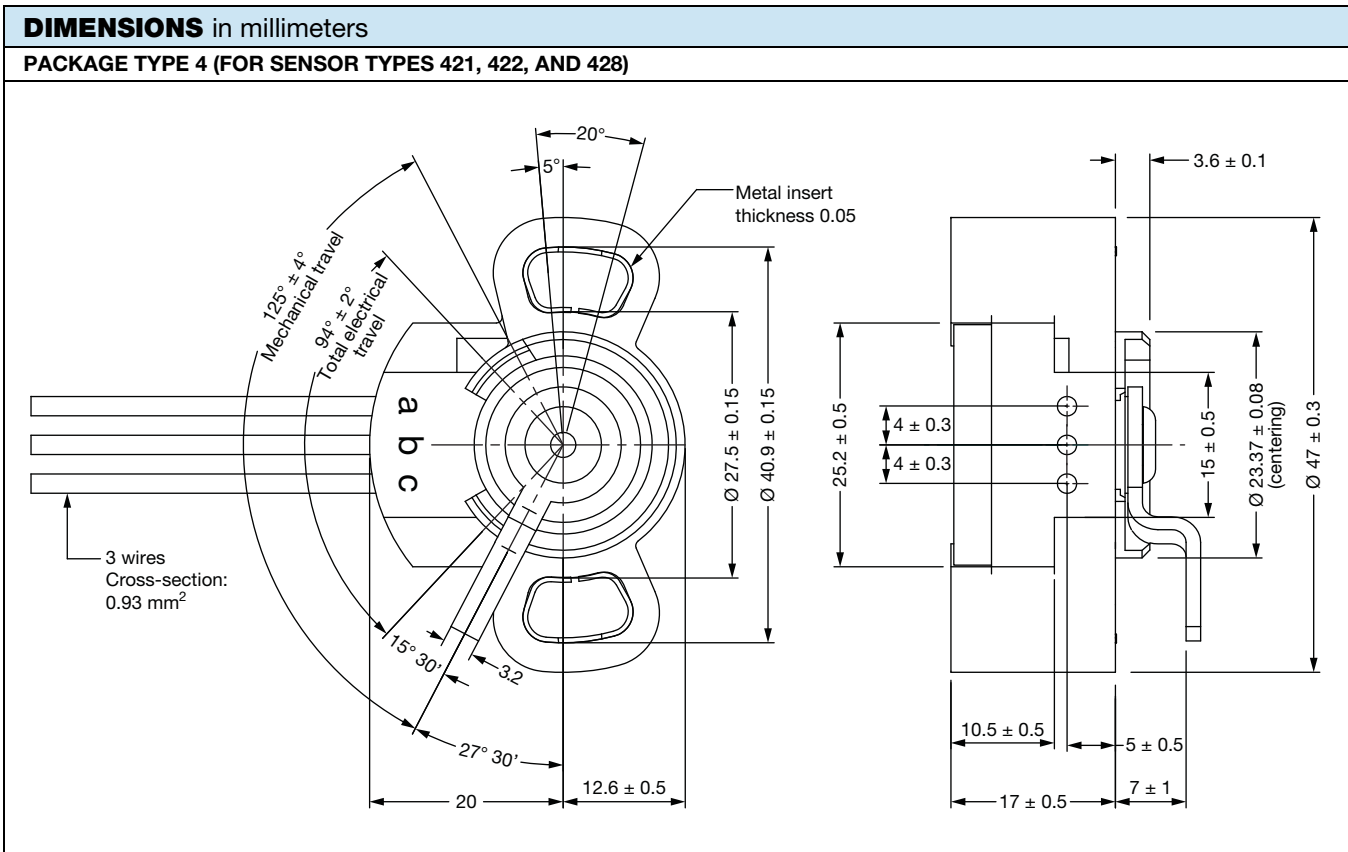
### DIMENSIONS in millimeters

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

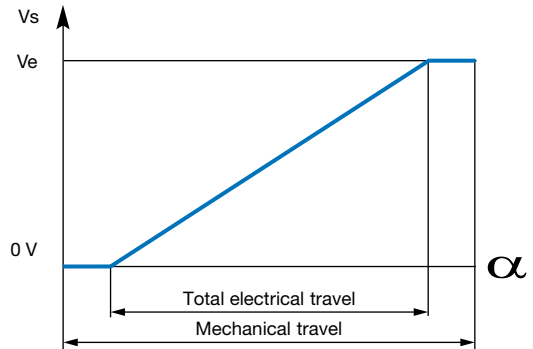
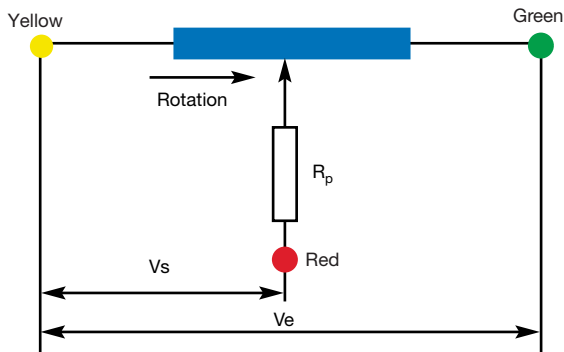


#### PACKAGE TYPE 3 (FOR SENSOR TYPES 401, 402, 412, AND 418)





## 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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