# Precision Rotative Transducers, Conductive Plastic, Servo Mounting

A complete range of servo mounting rotational transducers for applications requiring long life accuracy and speed.

## FEATURES

- Size 08 to 30
- Linearity ± 1 % down to ± 0.015 %
- Excellent repeatability
- Long life
- Essentially infinite resolution
- Up to 6 electrical functions with the same shaft
- On request custom design to meet your specifications
- Following MIL-R-39023 and NFC 93-255 requirements
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

| QUICK REFERENCE DATA | |
|---|---|
| Sensor type | ROTATIONAL, conductive plastic |
| Output type | Output by turrets |
| Market appliance | Professional |
| Dimensions | Various sizes |

## ELECTRICAL SPECIFICATIONS

| Size | 08 | 09 | 11 | 13 | 15 | 18 | 20 | 30 |
|---|---|---|---|---|---|---|---|---|
| Model | 34 SF | 78 SF | 116 SF | 156 SF | 176 SF | 134 SF | 200 SF | 300 SF |
| Functions | Linear, on request specific law | | | | | | | |
| Theoretical electrical angle (TEA) | TEA = actual electrical angle (AEA) - 2° | | | | | | | |
| Independent linearity (over TEA) | A ≤ ± 1 % or B ≤ ± 0.5 % or C ≤ ± 0.25 % or D ≤ ± 0.1 % | | | | | | | |
| On request best linearity available | D ≤ ± 0.1 % | | Down to E ≤ ± 0.05 % | | Down to F ≤ ± 0.025 % | | Down to ≤ ± 0.015 % | |
| Actual electrical angle (AEA) | 340° ± 3° | | 350° ± 2° | | | | | |
| Ohmic values ($R_T$) | 1 kΩ - 2 kΩ - 5 kΩ - 10 kΩ - on request other values | | | | | | | |
| Ohmic value tolerances at 20 °C | ± 10 %; on request ± 5 % | | | | | | | |
| Output smoothness | ≤ 0.025 % | | | | | | On request ≤ 0.01 % | |
| Maximum power rating at 70 °C | 0.25 W | 0.3 W | 0.4 W | 0.5 W | 0.75 W | 1.0 W | 1.2 W | 1.5 W |
| Wiper current/load resistance | Recommended: a few µA - 1 mA max. continuous/minimum $10^3 \times R_T$ | | | | | | | |
| Tap (current or voltage)<br>On request with angular position to be specified | U = Current | | | { Position: ± 2°<br>{ Width: ≤ 4° | | /T = voltage Position: ± 2° | | |
| Repeatability | ≤ 0.01 % | | | | | | | |
| End voltage | ≤ 0.4 % for 470 Ω v $R_T$ ≤ 1000 Ω/≤ 0.2 % for 1000 Ω ≤ $R_T$ ≤ 2200 Ω/≤ 0.1 % $R_T$ > 2200 Ω | | | | | | | |
| Insulation resistance | ≥ 1000 MΩ, 500 $V_{DC}$ | | | | | | | |
| Dielectric strength | ≤ 750 $V_{RMS}$, 50 Hz | | | | ≤ 1000 $V_{RMS}$, 50 Hz | | | |

## MECHANICAL SPECIFICATIONS

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Mechanical rotation | 360° continuous; stops on request | | | | | | | |
| Mounting/shaft guiding | Servo/ball bearings | | | | | | | |
| Housing | Diallylphtalate; on request anodized aluminum | | | | | | | |
| Shaft material/common option | Stainless steel/screw driver slot | | | | | | | |
| Termination | Turrets; on request flexible leads, cables... | | | | | | | |
| Wiper | Precious metal multi-finger contact | | | | | | | |
| Starting torque (N.cm) 1 cup | 0.2 | | | | 0.25 | | | |
| Starting torque (N.cm) each additional cup | 0.15 | | | | | | | |
| Moment of inertia (g. $cm^2$) | 0.3 | 0.4 | 0.6 | 0.8 | 2.2 | 2.8 | 3.5 | 10 |
| Weight (g) 1 cup | 11 ± 2 | 16 ± 2 | 20 ± 2 | 29 ± 2 | 49 ± 2 | 67 ± 3 | 79 ± 3 | 120 ± 10 |
| Weight (g) each additional cup | 5 ± 2 | 6 ± 2 | 7 ± 2 | 10 ± 2 | 16 ± 2 | 18 ± 3 | 21 ± 3 | 62 ± 10 |

## PERFORMANCE

| | |
|---|---|
| Life (million of cycles) | ≥ 50 |
| Temperature range | -55 °C to +125 °C |
| Climatic category | 55/125/04 |
| Maximum rotation speed (RPM) | 600 |
| Sine vibration on 3 axes | 1.5 mm or 20 *g* from 10 Hz to 2000 Hz |
| Mechanical shocks on 3 axes | 50 *g* - 11 ms - half sine |

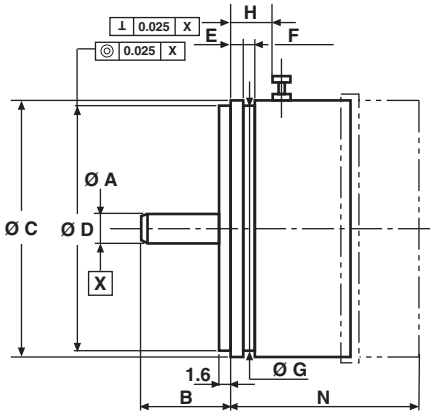
**Note**

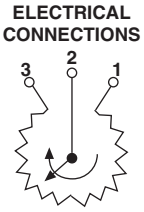
- Nothing stated herein shall be construed as a guarantee of quality or durability.

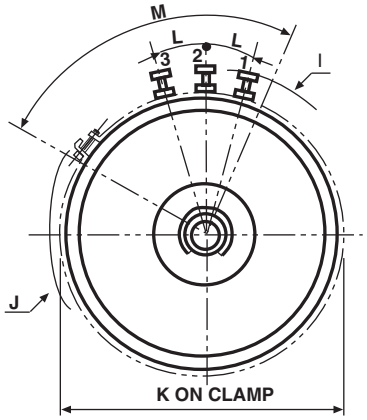


For technical questions, contact: sferprecisionpot@vishay.com

## DIMENSIONS in millimeters, general tolerance ± 0.5 mm




| DIMENSIONS | DESIGNATION | SIZE | POTENTIOMETER REFERENCE | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | 08 | 09 | 11 | 13 | 15 | 18 | 20 | 30 |
| | | MODEL | 34 SF | 78 SF | 116 SF | 156 SF | 176 SF | 134 SF | 200 SF | 300 SF |
| A - 0 - 0.013 | Ø shaft stainless steel | | 3.175 | 3.175 | 3.175 | 3.175 | 6.345 | 6.345 | 6.345 | 6.345 |
| B max. | Shaft length | | 13 | 16.6 | 16.6 | 16.6 | 16.6 | 16.6 | 16.6 | 16.6 |
| C max. | Ø body plastic molded | | 19.18 | 22.3 | 27.07 | 33.35 | 36.6 | 44.5 | 50.9 | 76.3 |
| D | Ø flange | | 15.875 | 19.05 | 24.608 | 30.16 | 33.337 | 39.674 | 47.625 | 73.025 |
| | Tolerance on flange | | +0 - 13 µm | | | | | | +0 - 25 µm | |
| E | Shoulder | | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 2.4 | 2.4 |
| F min. | Width of groove | | 1.5 | 1.5 | 1.5 | 1.5 | 2.2 | 1.8 | 2.2 | 1.75 |
| Ø G max. | Diameter of groove | | 17.57 | 19.8 | 24.8 | 30.9 | 33.3 | 41.4 | 47.6 | 73.1 |
| H min. | Turret location | | 5.8 | 5.95 | 6.3 | 6.3 | 7 | 10.15 | 10.2 | 10.2 |
| I max. | Radius on turrets | | 14 | 15.4 | 17.3 | 20.5 | 23.1 | 26.5 | 29.7 | 43.7 |
| J max. | Radius on screw clamp | | 13.5 | 15.4 | 17.3 | 18.9 | 23.1 | 26.5 | 29.7 | 42.6 |
| K max. | Ø on clamp | | 19.6 | 23.8 | 27.7 | 33.6 | 37.4 | 44.5 | 50.8 | 77.5 |
| L ± 2° | Angle between turrets | | 30° | 30° | 25° | 20° | 20° | 25° | 15° | 15° |
| M max. | Total angle | | 100° | 100° | 100° | 100° | 80° | 80° | 80° | 80° |
| N max. | 1 cup | | 16 | 20.5 | 20.5 | 20.5 | 23.5 | 23.5 | 23.5 | 23 |
| | 2 cups | | 23 | 27 | 23 | 25.5 | 26.13 | 26 | 28.5 | 34.5 |
| | 3 cups | | 36 | 40 | 36 | 39.5 | 39.5 | 39.5 | 40.97 | - |
| | 4 cups | | 42 | 50 | 42 | 47 | 49.5 | 49.5 | 50.72 | - |
| | 5 cups | | 54.5 | 63 | 54 | 60.5 | 62.5 | 62.5 | 64.5 | - |
| | 6 cups | | 60.5 | 74 | 60.5 | 68.5 | 73.5 | 73.5 | 74.5 | - |

## ORDERING INFORMATION/DESCRIPTION

| ROT | 156 | S | F | 1 | C | T | 502 | e1 |
|---|---|---|---|---|---|---|---|---|
| SERIES | MODEL | MOUNTING TYPE<br>S: Servo | CONDUCTOR<br>F: Plastic film | NUMBER OF CUPS<br>From 1 up to 6 | LINEARITY<br>A: ± 1 %<br>B: ± 0.5 %<br>C: ± 0.25 %<br>D: ± 0.1 %<br>E: ± 0.05 %<br>F: ± 0.025 % | TAP<br>On request<br>T: Voltage<br>U: Current position to be specified | OHMIC VALUE<br>First 2 digits are significant numbers 3rd digit indicates number of zeros | LEAD FINISH |

**Note**

- Special characteristics designs on request

## SAP PART NUMBERING GUIDELINES

| RO 116SF | 1 | D | 502 |
|---|---|---|---|
| MODEL | GANG NUMBER<br>From 1 up to 6 | LINEARITY | OHMIC VALUE<br>5 kΩ |

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LifeElectronics
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