

## Precision Rotative Transducers, Conductive Plastic, Bushing Mounting



A complete range of bushing mounting rotational motion transducers.

**FEATURES**

- Size 08 to 30
- Linearity  $\pm 1\%$  down to  $\pm 0.05\%$
- Good 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](http://www.vishay.com/doc?99912)


**QUICK REFERENCE DATA**

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

| SIZE  | 08    | 09    | 11     | 13     | 15     | 18     | 20     | 30     |
|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| MODEL | 34 BF | 78 BF | 116 BF | 156 BF | 176 BF | 134 BF | 200 BF | 300 BF |

**ELECTRICAL SPECIFICATIONS**

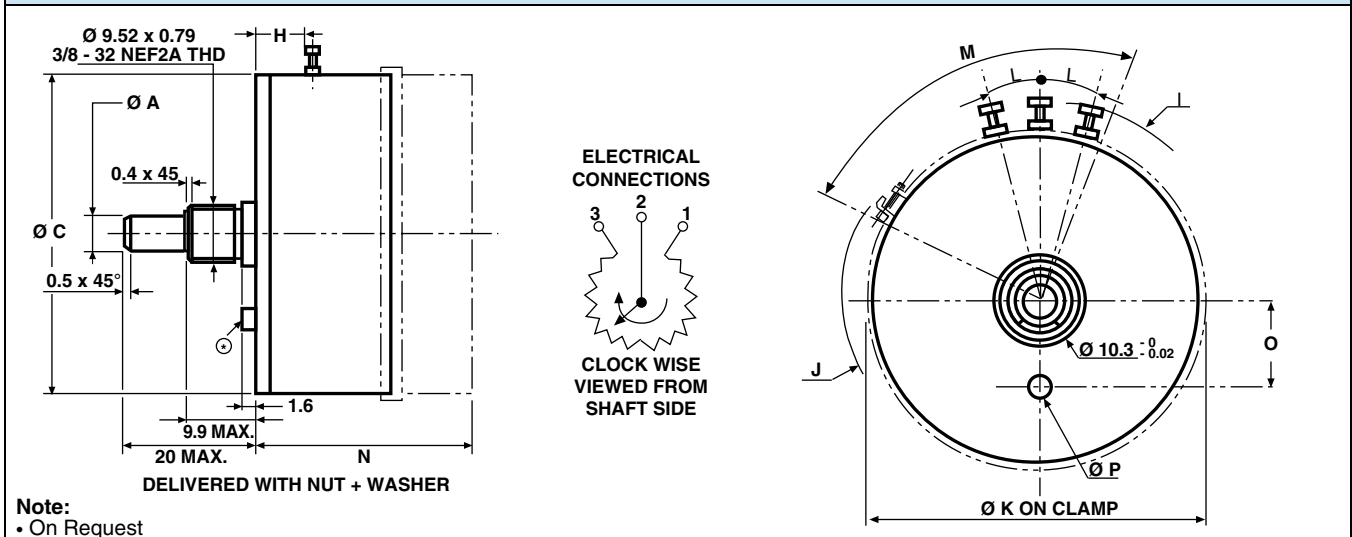
|  |   |       |                            |       |  |                                       |       |       |
|--|---|-------|----------------------------|-------|--|---------------------------------------|-------|-------|
| Functions  | Linear, on request specific law   |       |                            |       |  |                                       |       |       |
| Theoretical electrical angle (TEA)               | Actual electrical angle (AEA) - 2°  |       |                            |       |  |                                       |       |       |
| Independent linearity (over TEA)                 | A $\leq \pm 1\%$  |       | or B $\leq \pm 0.5\%$      |       | or C $\leq \pm 0.25\%$                     |                                       |       |       |
| Best linearity available                         | C $\leq \pm 0.25\%$   |       | Down to D $\leq \pm 0.1\%$ |       |  | Down to E $\leq \pm 0.05\%$           |       |       |
| Actual electrical angle (AEA)                    | 340° $\pm 3^\circ$  |       | 350° $\pm 2^\circ$         |       |  |                                       |       |       |
| Ohmic values (R <sub>T</sub> )                   | 1 k $\Omega$ - 2 k $\Omega$ - 5 k $\Omega$ - 10 k $\Omega$ - on request other values  |       |                            |       |  |                                       |       |       |
| Ohmic value tolerances at 20 °C                  | $\pm 10\%$  |       |                            |       |  |                                       |       |       |
| Output smoothness                                | $\leq 0.05\%$   |       |                            |       |  | $\leq 0.025\%$                        |       |       |
| 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                                    | Recommended: a few $\mu\text{A}$ - 1 mA max. (continuous)   |       |                            |       |  |                                       |       |       |
| Tap (current or voltage)                         | { Position: $\pm 2^\circ$   |       |                            |       |  |                                       |       |       |
| On request with angular position to be specified | U = current   |       | { Width: $\leq 4^\circ$    |       |  | / T = voltage Position: $\pm 2^\circ$ |       |       |
| Load resistance on wiper (R <sub>L</sub> )       | min. 10 <sup>3</sup> x R <sub>T</sub>   |       |                            |       |  |                                       |       |       |
| Repeatability                                    | $\leq 0.02\%$   |       |                            |       |  |                                       |       |       |
| End voltage                                      | $\leq 0.4\%$ for 470 $\Omega \leq R_T \leq 1000 \Omega$ / $\leq 0.2\%$ for 1000 $\Omega < R_T \leq 2200 \Omega$ / $\leq 0.1\%$ for R <sub>T</sub> > 2200 $\Omega$ |       |                            |       |  |                                       |       |       |
| Insulation resistance                            | $\geq 1000 \text{ M}\Omega$ , 500 V <sub>DC</sub>   |       |                            |       |  |                                       |       |       |
| Dielectric strength                              | $\geq 750 \text{ V}_{\text{RMS}}$ , 50 Hz   |       |                            |       | $\geq 1000 \text{ V}_{\text{RMS}}$ , 50 Hz |                                       |       |       |

**MECHANICAL SPECIFICATIONS**

|   |  |            |            |            |            |            |            |            |              |
|---|--|------------|------------|------------|------------|------------|------------|------------|--------------|
| Mechanical rotation                     | 360° continuous; stops on request                    |            |            |            |            |            |            |            |              |
| Mounting type                           | Bushing  |            |            |            |            |            |            |            |              |
| Shaft guiding                           | Sleeve bearings; on request ball bearings            |            |            |            |            |            |            |            |              |
| Shaft                                   | Stainless steel                                      |            |            |            |            |            |            |            |              |
| Housing                                 | Plastic molding; on request anodized aluminum        |            |            |            |            |            |            |            |              |
| Termination                             | Turrets; on request flexible leads, cables...        |            |            |            |            |            |            |            |              |
| Wiper                                   | Precious metal multi-finger contact                  |            |            |            |            |            |            |            |              |
| Starting torque (N.cm)                  | $\leq 0.5$ 1 cup; $\leq 0.3$ for each additional cup |            |            |            |            |            |            |            |              |
| Moment of Inertia (g. cm <sup>2</sup> ) | 0.3  | 0.4        | 0.6        | 0.8        | 2.2        | 2.8        | 3.5        | 10         |              |
| Weight (g)                              | 1 cup  | 11 $\pm 2$ | 20 $\pm 2$ | 21 $\pm 2$ | 30 $\pm 2$ | 33 $\pm 2$ | 45 $\pm 3$ | 54 $\pm 3$ | 120 $\pm 10$ |
|   | each additional cup                                  | 5 $\pm 2$  | 6 $\pm 2$  | 7 $\pm 2$  | 14 $\pm 2$ | 16 $\pm 2$ | 18 $\pm 3$ | 21 $\pm 3$ | 62 $\pm 10$  |

**PERFORMANCE**

|                          |                     |
|--------------------------|---------------------|
| Life (million of cycles) | ≥ 20                |
| Temperature range        | - 55 °C to + 125 °C |
| Climatic category        | 55/125/04           |
| Rotation speed (RPM)     | 150                 |

**DIMENSIONS** in millimeters, general tolerance ± 0.5 mm


| DIMENSIONS       | DESIGNATION               | SIZE | POTENTIOMETER REFERENCE |       |       |        |        |        |        |        |
|------------------|---------------------------|------|-------------------------|-------|-------|--------|--------|--------|--------|--------|
|                  |                           |      | 08                      | 09    | 11    | 13     | 15     | 18     | 20     | 30     |
|                  |                           |      | MODEL                   | 34 BF | 78 BF | 116 BF | 156 BF | 176 BF | 134 BF | 200 BF |
| A - 0<br>- 0.013 | Ø shaft                   |      | 3.175                   | 3.175 | 3.175 | 3.175  | 6.345  | 6.345  | 6.345  | 6.345  |
| C max.           | Ø body                    |      | 19.18                   | 22.3  | 27.07 | 33.35  | 36.6   | 44.5   | 50.9   | 76.4   |
| H min.           | Turret location           |      | 4.2                     | 4.7   | 5.35  | 5.35   | 8      | 8      | 7.45   | 5.55   |
| I max.           | Radius on turrets         |      | 14                      | 15.4  | 17.3  | 20.8   | 23.1   | 26.6   | 29.7   | 43.7   |
| J max.           | Radius on screw clamp     |      | 13.5                    | 15.4  | 17.3  | 18.9   | 23.1   | 26.5   | 29.3   | 42.6   |
| K                | Ø on clamp                |      | 19.6                    | 23.8  | 27.7  | 33.6   | 37.4   | 44.5   | 50.8   | 77.5   |
| O                | Locating pin (on request) |      | 7.2                     | 8     | 8.8   | 9      | 14.4   | 16.8   | 13.48  | -      |
| P max.           | Ø pin (on request)        |      | 1.6                     | 1.6   | 3.25  | 3.25   | 3.25   | 3.25   | -      | -      |
| 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                     |      | 14.5                    | 19    | 19    | 19     | 21     | 21     | 21     | 20.5   |
|                  | 2 cups                    |      | 21.5                    | 25    | 21.5  | 24     | 24.5   | 24.5   | 26     | 23.5   |
|                  | 3 cups                    |      | 34.5                    | 38    | 34.5  | 38     | 37.5   | 37.5   | 38     | -      |
|                  | 4 cups                    |      | 40.5                    | 48    | 40.5  | 45.5   | 48     | 48     | 48     | -      |
|                  | 5 cups                    |      | 53                      | 61    | 53    | 59     | 60.5   | 61     | 62     | -      |
|                  | 6 cups                    |      | 59                      | 72    | 59    | 67     | 72     | 72     | 72     | -      |



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

**Note**

- Special characteristics and designs on request

| SAP PART NUMBERING GUIDELINES |                |           |             |
|-------------------------------|----------------|-----------|-------------|
| RO 116BF                      | 1              | D         | 103         |
| MODEL                         | GANG NUMBER    | LINEARITY | OHMIC VALUE |
|                               | From 1 up to 6 |           | 10 kΩ       |



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