

## Ten Turns Servo or Bushing Mount Hall Effect Sensor in Size 09 (22.2 mm)



### FEATURES

- All electrical angles available up to: 3600°
- Accurate linearity down to:  $\pm 0.5\%$
- Very long life: 50M cycles for servo, 10M cycles for bushing
- Non contacting technology: Hall effect; true power on sensor
- Model dedicated to applications requiring long life
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

| QUICK REFERENCE DATA |                                    |
|----------------------|------------------------------------|
| Sensor type          | Multi Turn ROTATIONAL, hall effect |
| Output type          | Wires or rear turrets              |
| Market appliance     | Industrial                         |
| Dimensions           | 7/8" (22.2 mm)                     |

| ELECTRICAL SPECIFICATIONS   |  |                              |
|-----------------------------|--|------------------------------|
| PARAMETER                   | STANDARD   | SPECIAL                      |
| Electrical angle            | 10 turns 3600°   | Any other angle upon request |
| Linearity                   | $\pm 1\%$  | $\pm 0.5\%$                  |
| Supply voltage              | 5 V <sub>DC</sub> $\pm 10\%$   | Other upon request           |
| Supply current              | < 16 mA for single   | < 32 mA for redundant        |
| Output signal               | Analog ratiometric 1 % to 99 % of V <sub>supply</sub> (other on request) or PWM 1 kHz, 10 % to 90 % duty cycle or SPI binary on 5 V or binary on 3.3 V |                              |
| Over voltage protection     | + 20 V <sub>DC</sub>   |                              |
| Reverse voltage protection  | - 10 V <sub>DC</sub>   |                              |
| Load resistance recommended | Min. 1 k $\Omega$ for analog output and PWM output   |                              |
| Hysteresis static           | 10° on drive shaft   |                              |

| MECHANICAL SPECIFICATIONS |  |
|---------------------------|--|
| PARAMETER                 |  |
| Mechanical travel         | 3600° continuous   |
| Bearing type              | A sleeve bearing for bushing model/2 ball bearings for servo model |
| Standard                  | IP 50; other on request  |
| Resolution                | 12 bits for analog and PWM, 14 bits for SPI                        |

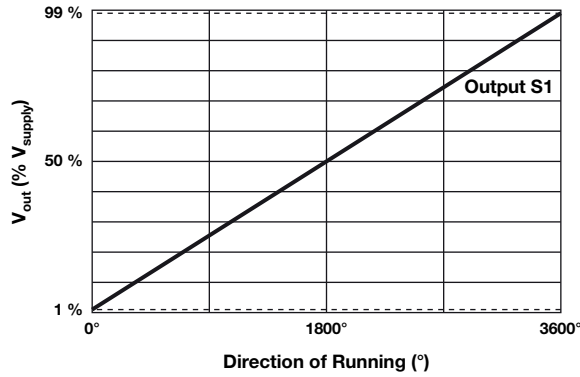
| ORDERING INFORMATION/DESCRIPTION                |                        |                           |                                |                                     |   |  |                 |                |             |
|---|------------------------|---------------------------|--------------------------------|-------------------------------------|---|--|-----------------|----------------|-------------|
| 34 THE  | B                      | 1                         | A                              | T                                   | A   | 2S22   | XXXX            | BO 1           | e1          |
| MODEL   | MOUNTING TYPE          | NUMBER OF SIGNALS         | LINEARITY                      | OUTPUT TYPE                         | OUTPUT SIGNAL   | SHAFT TYPE   | SPECIAL REQUEST | PACKAGING      | LEAD FINISH |
|   | B: Bushing<br>S: Servo | 1: Single<br>2: Redundant | A: $\pm 1\%$<br>B: $\pm 0.5\%$ | T: Turrets<br>Z: Custom<br>W: Wires | A: Analog CW<br>B: Analog CCW<br>C: PWM CW<br>D: PWM CCW<br>E: SPI CW <sup>(1)</sup><br>F: SPI CCW <sup>(1)</sup><br>G: Analog inverted slope<br>H: PWM inverted slope<br>K: SPI inverted slope <sup>(1)</sup><br>Z: Other output | 2: 3.175 mm<br>9: Special<br>P: Plain<br>S: Slotted<br>Z: Other type |                 | Box of 1 piece |             |
| Shaft length from mounting face standard: 22 mm |                        |                           |                                |                                     |   |  |                 |                |             |

**Note**
<sup>(1)</sup> SPI output → output type: Wires

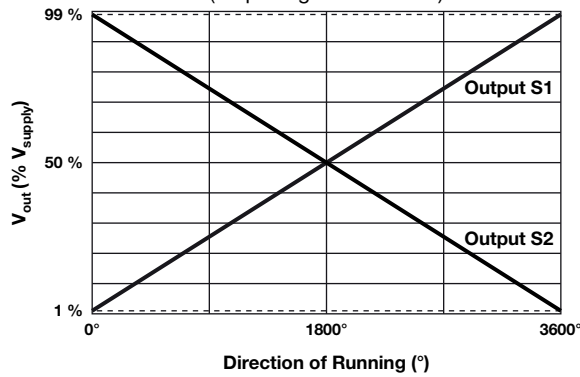
| SAP PART NUMBERING GUIDELINES |            |                  |                |             |               |            |                 |
|-------------------------------|------------|------------------|----------------|-------------|---------------|------------|-----------------|
| 34 THE                        | S          | 2                | B              | T           | C             | 2P12       | XXXX            |
| MODEL                         | SERVO TYPE | 2 OUTPUT SIGNALS | LINEARITY      | OUTPUT TYPE | OUTPUT SIGNAL | SHAFT TYPE | SPECIAL REQUEST |
|                               |            |                  | B: $\pm 0.5\%$ |             |               |            |                 |

**V<sub>OUT</sub> ANALOG**

**Single Output** (output signal code: "A")

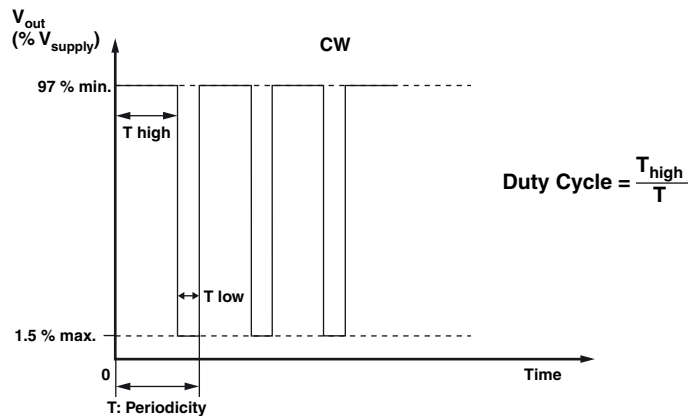


**Redundant Output: with inverted slope**  
(output signal code: "G")



**V<sub>OUT</sub> PWM**

**Single Output:** (output signal code: "C")



**V<sub>OUT</sub> SPI**

Notice on demand

Output signal code: "E" if CW (single or redundant identical)

Output signal code: "F" if CCW (single or redundant identical)

Output signal code: "K" if CW (if redundant but inverted slope)



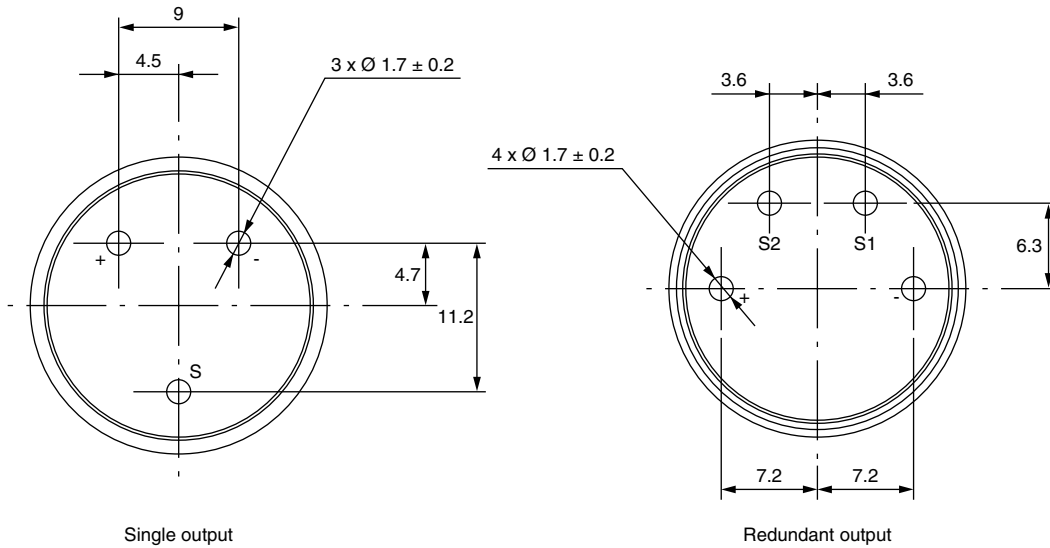
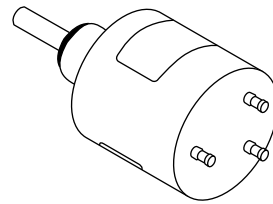
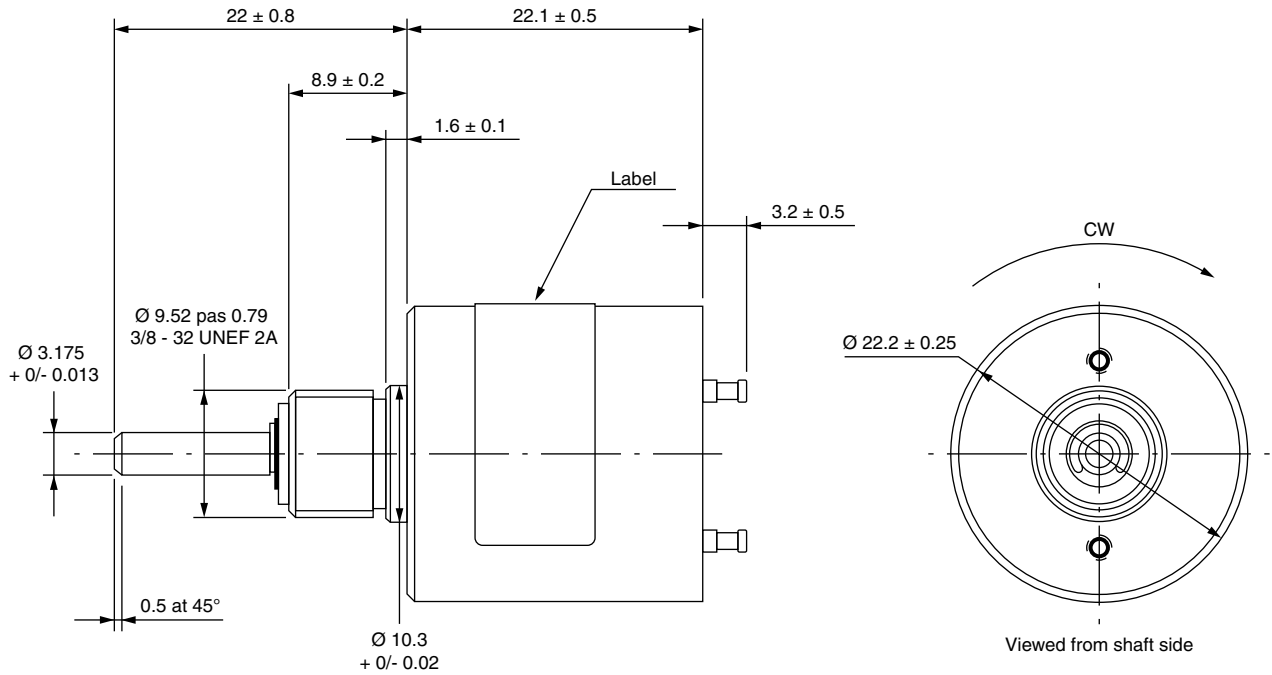
| MECHANICAL SPECIFICATIONS |  |                  |
|---------------------------|--|------------------|
| PARAMETER                 | STANDARD   | SPECIAL          |
| Mounting type             | Servo mounting type or bushing mount (delivered with nut and washer) |                  |
| Housing                   | Anodized aluminum  |                  |
| Shaft guiding             | 2 ball bearings for servo and sleeve bearing for bushing             |                  |
| Shaft                     | Stainless steel Ø 3.175  | Other on request |
| Outputs                   | Turrets  | Other on request |
| Mechanical travel         | 3600° and no stop  |                  |

| ENVIRONMENTAL SPECIFICATIONS                      |  |
|---|--|
| Operating temperature range                       | - 40 °C; + 85 °C   |
| Life  | > 10M of cycles for bushing<br>> 50M of cycles for servo           |
| Rotational speed (max.)                           | 1200 rpm   |
| Immunity to radiated electromagnetic disturbances | 200 V/m 150 kHz/1 GHz, IEC 62132-2 part 2 (level A)                |
| Immunity to power frequency magnetic field        | 200 A/m 50 Hz/60 Hz, EN 61000-4-8 (level A)                        |
| Radiated electromagnetic emissions                | 30 MHz/1 GHz < 30 dBµV/m, EN 61000-6-4 (level A)                   |
| Electrostatic discharges                          | Contact discharges: ± 4 kV<br>Air discharges: ± 8 kV, EN 61000-4-2 |
| 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   |



**DIMENSIONS** in millimeters

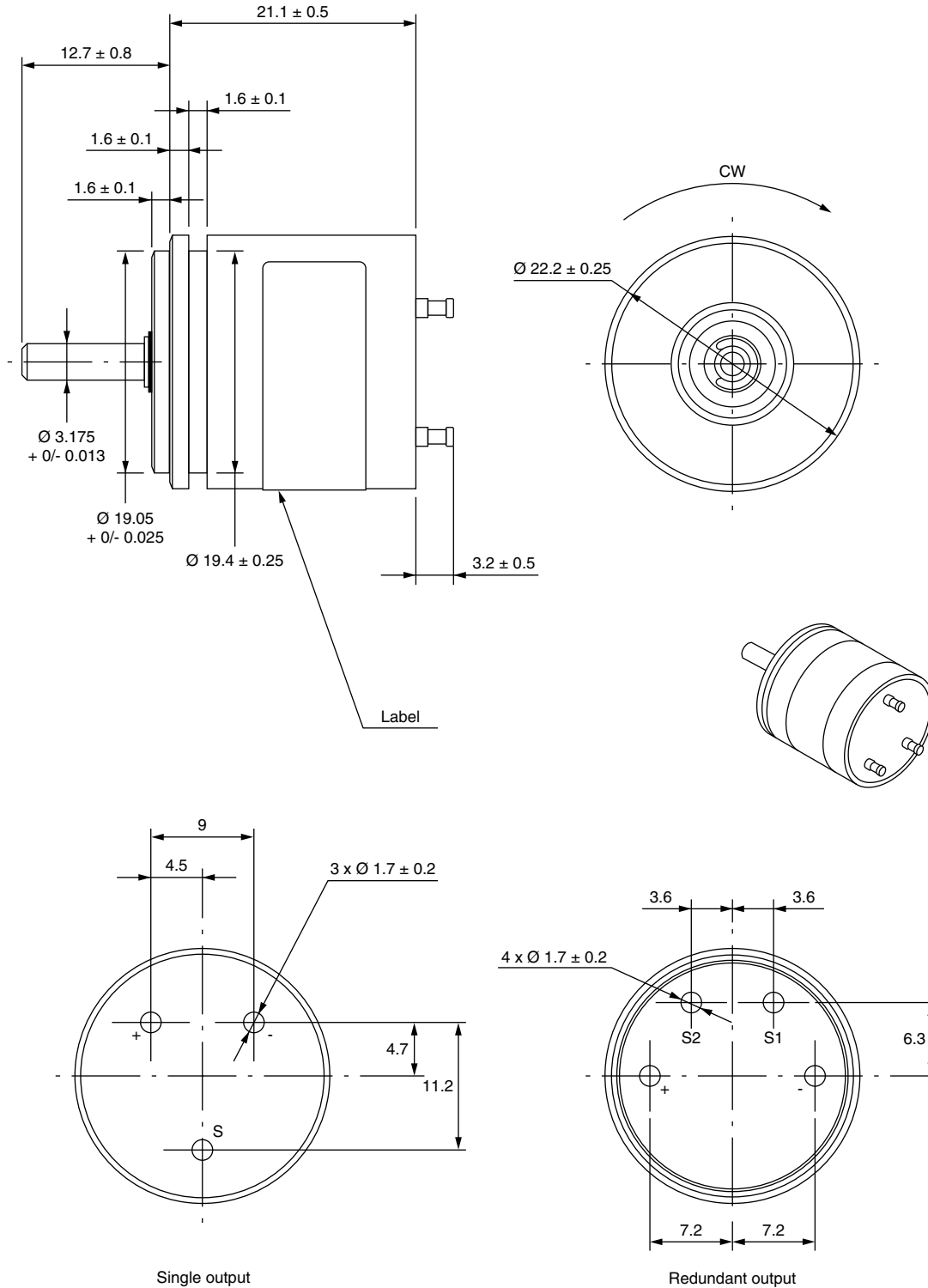
Drawing for bushing mount type: 34THEB...





**DIMENSIONS** in millimeters

Drawing for servo mount type: 34THES...



**BUSHING AND SERVO TYPES**

Output by wires for output signal "SPI" single and redundant



| SINGLE SPI OUTPUT (servo and bushing) |                     |
|---------------------------------------|---------------------|
| WIRE COLOR                            | OUTPUT              |
| Yellow                                | GND (-)             |
| Red                                   | MOSI                |
| Green                                 | V <sub>CC</sub> (+) |
| White                                 | SS                  |
| Blue                                  | SCLK                |



| REDUNDANT SPI OUTPUT (servo and bushing) |        |
|--|--------|
| WIRE COLOR                               | OUTPUT |
| Black                                    | V-     |
| Red                                      | V+     |
| Yellow                                   | O/I 1  |
| Blue                                     | CLK 1  |
| White                                    | /SS 1  |
| Green                                    | O/I 2  |
| Violet                                   | CLK 2  |
| Grey                                     | /SS 2  |



## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.