



## Single Turn Bushing Mount Hall Effect Sensor in Size 09 (22.2 mm)



### FEATURES

- Accurate linearity down to:  $\pm 0.5\%$
- All electrical angles available up to:  $360^\circ$  (no dead band)
- Long life: greater than 10M cycles
- Non contacting technology: Hall effect
- Model dedicated to all applications in harsh environments
- 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      | ROTATIONAL, single turn hall effect |
| Output type      | Wires                               |
| Market appliance | Industrial                          |
| Dimensions       | 7/8" (22.2 mm)                      |

### ELECTRICAL SPECIFICATIONS

| PARAMETER                   | STANDARD                                                                       | SPECIAL                      |
|-----------------------------|--------------------------------------------------------------------------------|------------------------------|
| Electrical angle            | $90^\circ, 180^\circ, 270^\circ, 360^\circ$                                    | Any other angle upon request |
| Linearity                   | $\pm 1\%$                                                                      | $\pm 0.5\%$                  |
| Supply voltage              | $5 V_{DC} \pm 10\%$                                                            | Other upon request           |
| Supply current              | 10 mA typical                                                                  | 16 mA for PWM output         |
| Output signal               | Analog ratiometric 10 % to 90 % of $V_{supply}$ or PWM 10 % to 90 % duty cycle | Other upon request           |
| Over voltage protection     | $+20 V_{DC}$                                                                   |                              |
| Reverse voltage protection  | $-10 V_{DC}$                                                                   |                              |
| Load resistance recommended | Min. 1 k $\Omega$ for analog output and PWM output                             |                              |
| Hysteresis                  | $< 0.35^\circ$                                                                 |                              |

### MECHANICAL SPECIFICATIONS

| PARAMETER         |                                                                     |
|-------------------|---------------------------------------------------------------------|
| Mechanical travel | $360^\circ$ continuous, stops upon request: $340^\circ \pm 3^\circ$ |
| Bearing type      | Sleeve bearing                                                      |
| Standard          | IP 50; other on request                                             |
| Weight            | 20 g $\pm$ 2 g                                                      |

### ORDERING INFORMATION/DESCRIPTION

| 351HE | 0                                            | A                              | 1                                                                                      | W                     | A                                                                           | 1S22                                                                                          | XXXX            | BO 10            | e1          |
|-------|----------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------|------------------|-------------|
| MODEL | FEATURES                                     | LINEARITY                      | ELECTRICAL ANGLE                                                                       | OUTPUT TYPE           | OUTPUT SIGNAL                                                               | SHAFT TYPE                                                                                    | SPECIAL REQUEST | PACKAGING        | LEAD FINISH |
| 0:    | Continuous rotation and antirotation pin     | A: $\pm 1\%$<br>B: $\pm 0.5\%$ | 1: $90^\circ$<br>2: $180^\circ$<br>3: $270^\circ$<br>4: $360^\circ$<br>9: Other angles | W: Wires<br>Z: Custom | A: Analog CW<br>B: Analog CCW<br>C: PWM CW<br>D: PWM CCW<br>Z: Other output | 0: 6 mm<br>1: 6.35 mm<br>2: 3.175 mm<br>9: Special<br>P: Plain<br>S: Slotted<br>Z: Other type |                 | Box of 10 pieces |             |
| 1:    | Continuous rotation and no antirotation pin  |                                |                                                                                        |                       |                                                                             |                                                                                               |                 |                  |             |
| 2:    | Stops at $330^\circ$ and antirotation pin    |                                |                                                                                        |                       |                                                                             |                                                                                               |                 |                  |             |
| 3:    | Stops at $330^\circ$ and no antirotation pin |                                |                                                                                        |                       |                                                                             |                                                                                               |                 |                  |             |

Shaft length from mounting face 22 mm to 72 mm max. per step of 5 mm

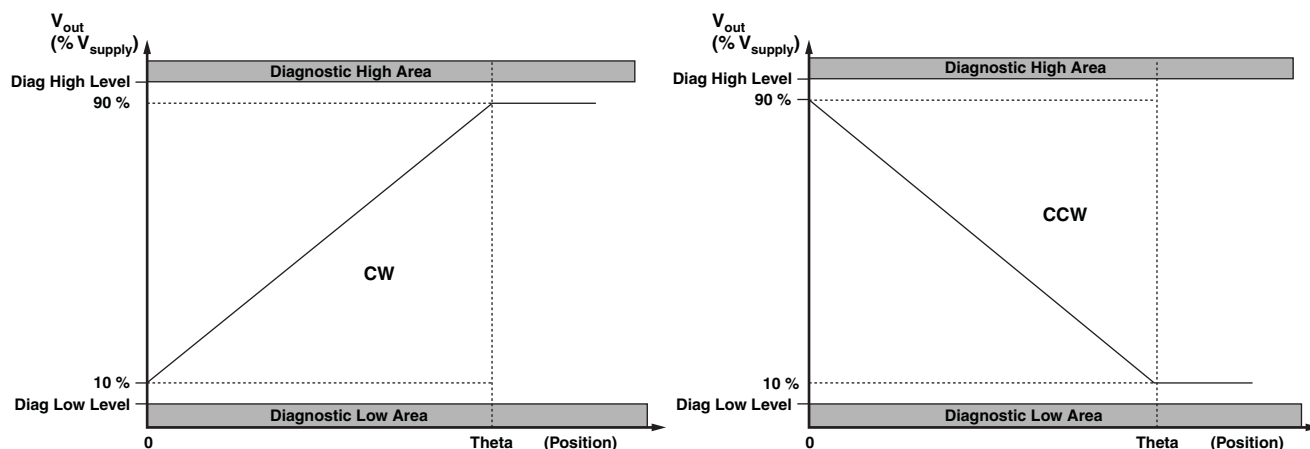
### SAP PART NUMBERING GUIDELINES

| 351HE | 1                   | B         | 9               | Z            | C             | 0P27       | XXXX            |
|-------|---------------------|-----------|-----------------|--------------|---------------|------------|-----------------|
| MODEL | MECHANICAL FEATURES | LINEARITY | ELECTRICAL TYPE | OUTPUT ANGLE | OUTPUT SIGNAL | SHAFT TYPE | SPECIAL REQUEST |

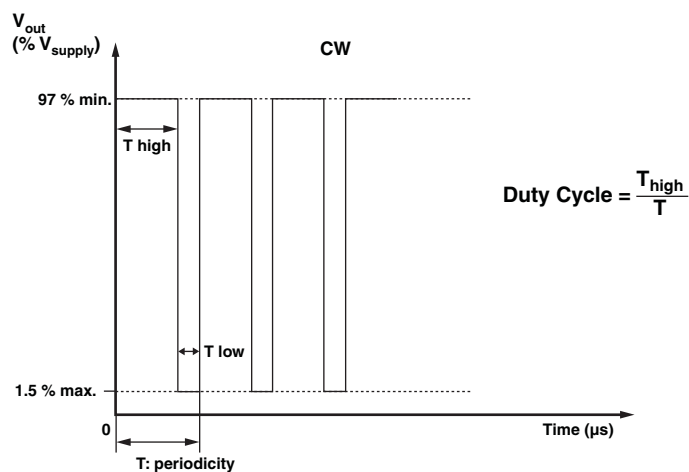


### V<sub>OUT</sub> ANALOG

|                       |           |           |
|-----------------------|-----------|-----------|
| Operating temperature | 85 °C     | 125 °C    |
| Diagnostic high level | 96 % min. | 96 % min. |
| Diagnostic low level  | 2 % max.  | 4 % max.  |



### V<sub>OUT</sub> PWM



**DIAGNOSTIC MODES**

| FAILURE                                   | $V_{out}$ ANALOG<br>$R_{pull-up}$ | $V_{out}$ ANALOG<br>$R_{pull-down}$ | $V_{out}$ PWM<br>$R_{pull-up} = 1\text{ k}\Omega$<br>$V_{pull-up} = V_{supply} = 5\text{ V}$ |
|-------------------------------------------|-----------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------|
| 1: Broken GND                             | Diagnostic high area              | Diagnostic low area                 | $> 97\% V_{supply}$<br>without modulation                                                    |
| 2: Broken $V_{out}$                       | Diagnostic high area              | Diagnostic low area                 | $> 97\% V_{supply}$<br>without modulation                                                    |
| 3: Broken $V_{supply}$                    | Diagnostic high area              | Diagnostic low area                 | $> 97\% V_{supply}$<br>without modulation                                                    |
| Over voltage $V_{supply} > 7\text{ V}$    | Diagnostic high area              | Diagnostic low area                 | $> 97\% V_{supply}$<br>without modulation                                                    |
| Under voltage $V_{supply} < 2.7\text{ V}$ | Diagnostic high area              | Diagnostic low area                 | $> 97\% V_{supply}$<br>without modulation                                                    |

$V_{pull-up}$  can be independent to  $V_{supply}$

✕ Cut off

**ENVIRONMENTAL SPECIFICATIONS**

|                                                   |                                                                            |
|---------------------------------------------------|----------------------------------------------------------------------------|
| Vibrations                                        | 20 g from 10 Hz to 2000 Hz                                                 |
| Shocks                                            | 3 shocks/axis; 50 g half a sine 11 ms                                      |
| Operating temperature range                       | -45 °C; +125 °C                                                            |
| Life                                              | > 10M of cycles                                                            |
| Rotational speed (max.)                           | 120 rpm                                                                    |
| Immunity to radiated electromagnetic disturbances | 200 V/m 150 kHz/1 GHz                                                      |
| Immunity to power frequency magnetic field        | 200 A/m 50 Hz/60 Hz                                                        |
| Radiated electromagnetic emissions                | 30 MHz/1 GHz < 30 dBμV/m                                                   |
| Electrostatic discharges                          | Contact discharges: $\pm 4\text{ kV}$<br>Air discharges: $\pm 8\text{ kV}$ |

**MATERIALS**

|         |                       |
|---------|-----------------------|
| Housing | Thermoplastic housing |
| Bushing | Brass nickel plated   |
| Shaft   | Stainless steel       |
| Output  | 3 lead wires          |

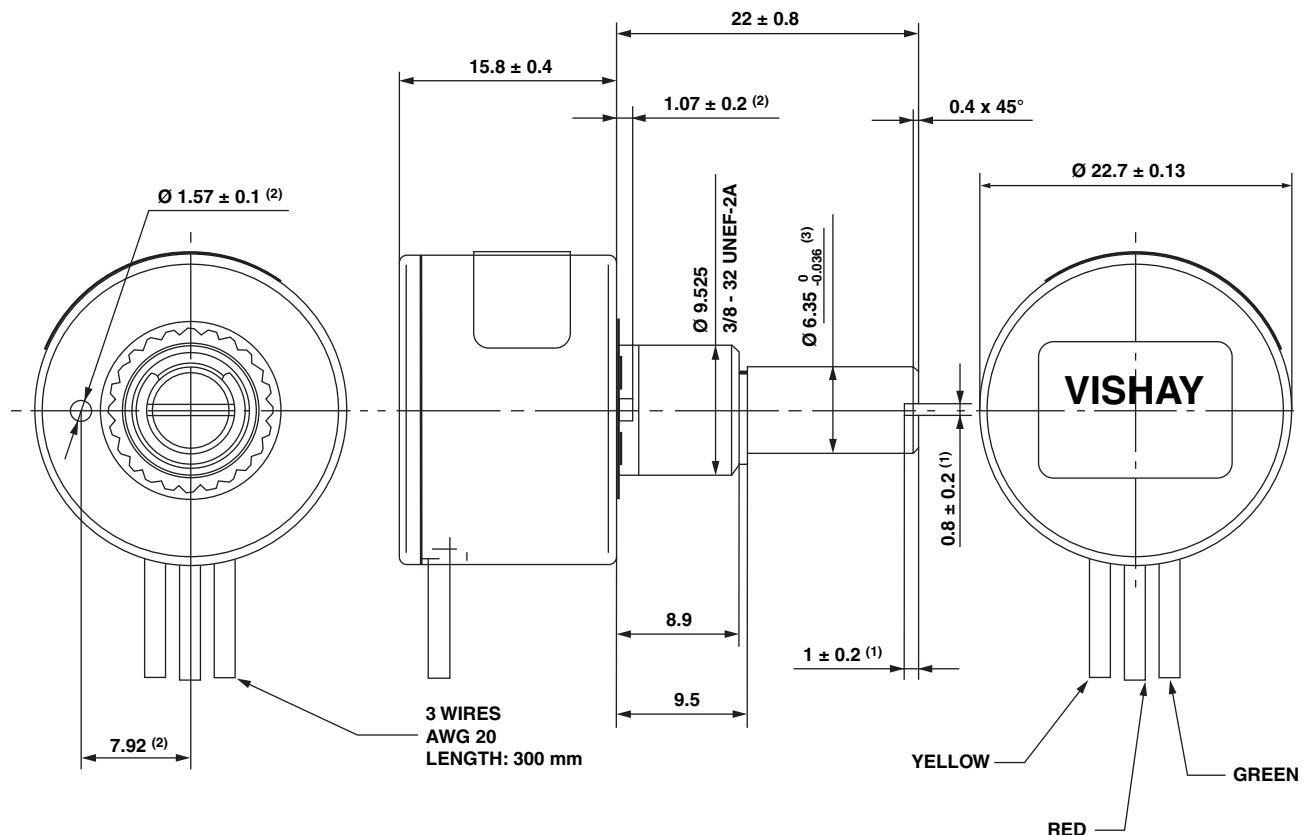
**BUSHING MOUNT HARDWARE**

|                           |                     |
|---------------------------|---------------------|
| Lockwasher internal tooth | Steel nickel plated |
| Panel nut                 | Brass nickel plated |

**Note**

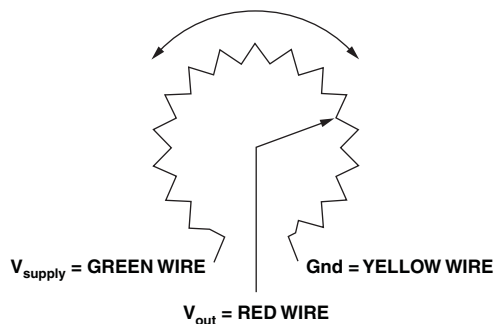
- Nothing stated herein shall be construed as a guarantee of quality or durability.

**DIMENSIONS** in millimeters

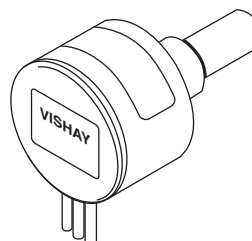


**GENERAL TOLERANCE:  $\pm 0.5$  mm**

### CW OR CCW ACCORDING OUTPUT MODE CHOICE



VIEWED FROM SHAFT



## Notes

- (1) For version slotted shaft
- (2) For version non turn pin
- (3) For shaft type "1"

## MARKING

|                            |                                                                                                                       |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Unit Identification</b> | Manufacturer's name and complete sap part reference, date code, and wiring correspondence: colors versus connections. |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------|



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