

## 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: over 20M cycles
- Non contacting technology: Hall effect
- Model dedicated to all applications in harsh environments
- Robust tool machined aluminum housing
- Compliant to RoHS directive 2002/95/EC



### 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                  | $< 0.2\%$                                                                      |                              |

### MECHANICAL SPECIFICATIONS

| PARAMETER         |                         |                           |
|-------------------|-------------------------|---------------------------|
| Mechanical Travel | $360^\circ$ continuous  |                           |
| Bearing Type      | Sleeve bearing          | Ball bearing upon request |
| Standard          | IP 50; other on request |                           |
| Weight            | 20 g $\pm$ 2 g          |                           |

### ORDERING INFORMATION/DESCRIPTION

| 631HE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 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 |
| <b>0:</b> Continuous rotation and antirotation pin<br><b>1:</b> Continuous rotation and no antirotation pin<br><b>A:</b> $\pm 1\%$<br><b>B:</b> $\pm 0.5\%$<br><b>1:</b> $90^\circ$<br><b>2:</b> $180^\circ$<br><b>3:</b> $270^\circ$<br><b>4:</b> $360^\circ$<br><b>9:</b> Other angles<br><b>W:</b> Wires<br><b>Z:</b> Custom<br><b>A:</b> Analog CW<br><b>B:</b> Analog CCW<br><b>C:</b> PWM CW<br><b>D:</b> PWM CCW<br><b>Z:</b> Other output<br><b>0:</b> 6 mm<br><b>1:</b> 6.35 mm<br><b>2:</b> 3.175 mm<br><b>9:</b> Special<br><b>P:</b> Plain<br><b>S:</b> Slotted<br><b>Z:</b> Other type<br>Shaft length from mounting face 22 mm to 72 mm max. per step of 5 mm |          |           |                  |             |               |            |                 |                  |             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |           |                  |             |               |            |                 | Box of 10 pieces |             |

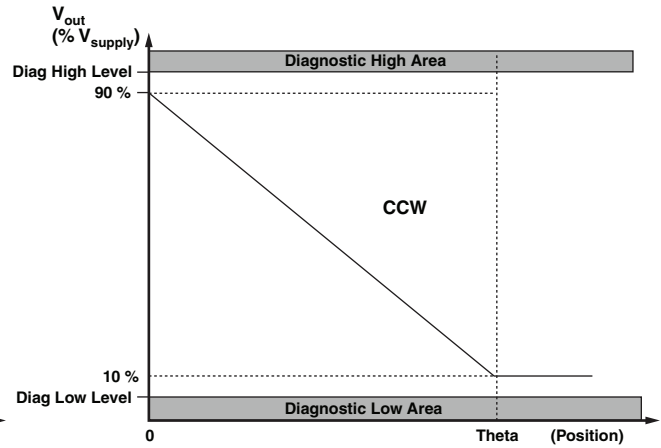
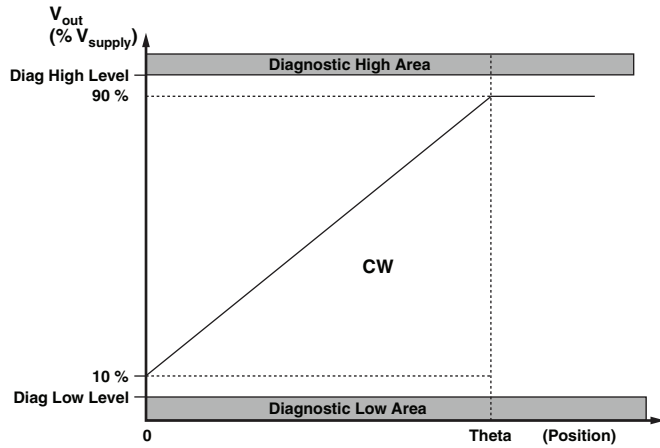
### SAP PART NUMBERING GUIDELINES

| 631HE | 1                   | B         | 9                | Z           | C             | 0P27       | XXXX            |
|-------|---------------------|-----------|------------------|-------------|---------------|------------|-----------------|
| MODEL | MECHANICAL FEATURES | LINEARITY | ELECTRICAL ANGLE | OUTPUT TYPE | OUTPUT SIGNAL | SHAFT TYPE | SPECIAL REQUEST |

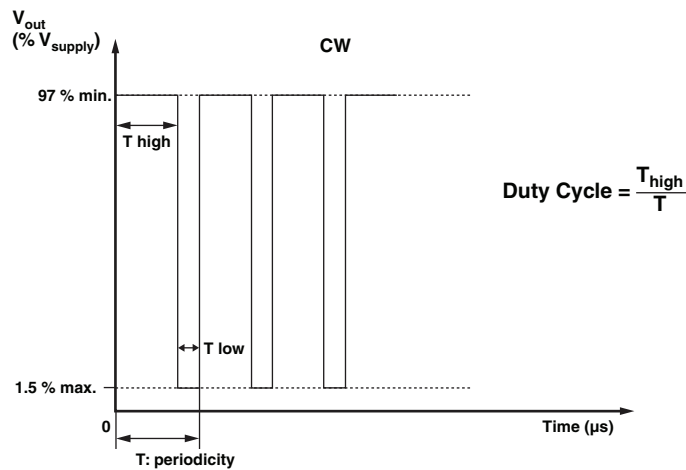


### V<sub>OUT</sub> ANALOG

|                       |           |           |
|-----------------------|-----------|-----------|
| Operating Temperature | 85 °C     | 125 °C    |
| Diagnostic High Level | 96 % min. | 96 % min. |
| Diagnostic Low Level  | 2 % max.  | 4 % max.  |

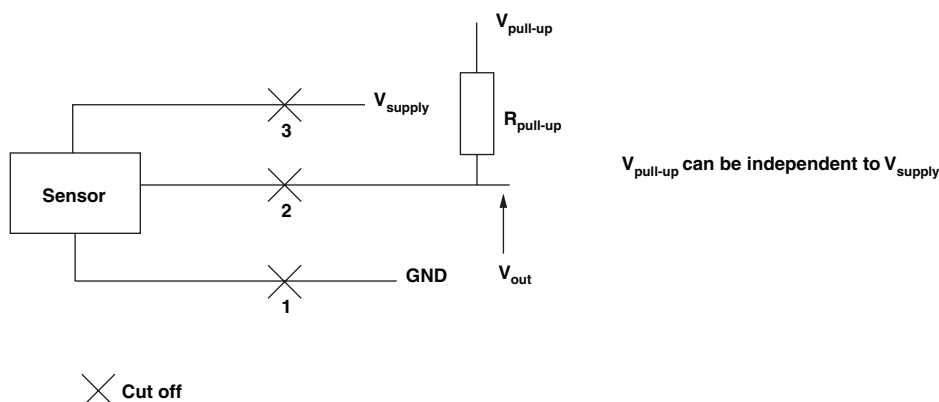


### V<sub>OUT</sub> PWM



## DIAGNOSTIC MODES

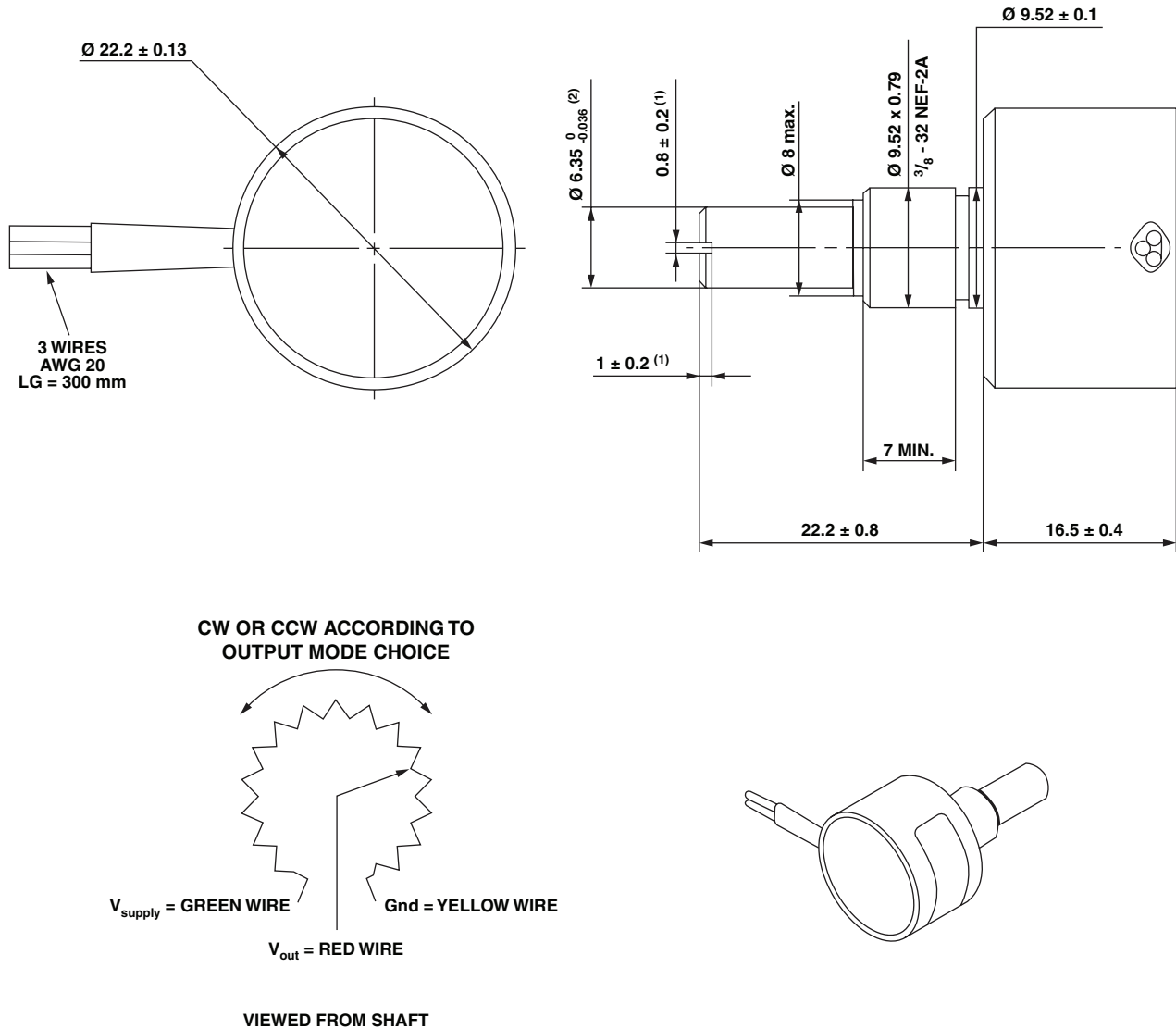
| FAILURE                                   | $V_{out}$ Analog<br>$R_{pull-up}$ | $V_{out}$ Analog<br>$R_{pull-down}$ | $V_{out}$ PWM<br>$R_{pull-up} = 1\text{ k}\Omega$<br>$V_{pull-up} = V_{supply} = 5\text{ V}$ |
|-------------------------------------------|-----------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------|
| 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                                                    |



## 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                                              | 20M 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 dB $\mu$ V/m                                             |
| Electrostatic Discharges                          | Contact discharges: $\pm 4\text{ kV}$<br>Air discharges: $\pm 8\text{ kV}$ |
| <b>Materials</b>                                  |                                                                            |
| Housing                                           | Aluminum anodized                                                          |
| Shaft                                             | Stainless steel                                                            |
| Output                                            | 3 lead wires                                                               |
| <b>Bushing Mount Hardware</b>                     |                                                                            |
| Lockwasher Internal Tooth                         | Steel nickel plated                                                        |
| Panel Nut                                         | Brass nickel plated                                                        |

### DIMENSIONS in millimeters



### Dimensions in millimeter

Delivered with nut and washer

### Notes

(1) For version slotted shaft

(2) For shaft type "1"

### MARKING

#### Unit Identification

Manufacturer's name and complete sap part reference, date code, and wiring correspondence: colors versus connections.



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