

## Single Turn Servo 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)
- Very long life: Greater than 50M cycles
- Non contacting technology: Hall effect
- Model dedicated to high quality applications
- 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 | Professional                        |
| 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 typ./16 mA max.                                                                 | 16 mA for PWM output         |
| Output signal               | Analog ratiometric 10 % to 90 % of $V_{supply}$ or PWM 1 kHz, 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 static           | 0.2° max.                                                                             |                              |

### MECHANICAL SPECIFICATIONS

| PARAMETER         |                                            |
|-------------------|--------------------------------------------|
| Mechanical travel | $360^\circ$ continuous, stops upon request |
| Bearing type      | 2 ball bearings                            |
| Standard          | IP 50; other on request                    |

### ORDERING INFORMATION/DESCRIPTION

| 78 SHE                                          | 1                                               | A                              | 1                                                                                      | W                                   | A                                                                           | 1S16                                                                                          | XXXX            | BO 1           | e1          |
|-------------------------------------------------|-------------------------------------------------|--------------------------------|----------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|-----------------|----------------|-------------|
| MODEL                                           | NUMBER OF CUPS                                  | LINEARITY                      | ELECTRICAL ANGLE                                                                       | OUTPUT TYPE                         | OUTPUT SIGNAL                                                               | SHAFT TYPE                                                                                    | SPECIAL REQUEST | PACKAGING      | LEAD FINISH |
|                                                 | 1: 1 Cup<br>2: 2 Cups<br>3: 3 Cups<br>4: 4 Cups | 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 | T: Turrets<br>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 1 piece |             |
| Shaft length from mounting face standard: 16 mm |                                                 |                                |                                                                                        |                                     |                                                                             |                                                                                               |                 |                |             |

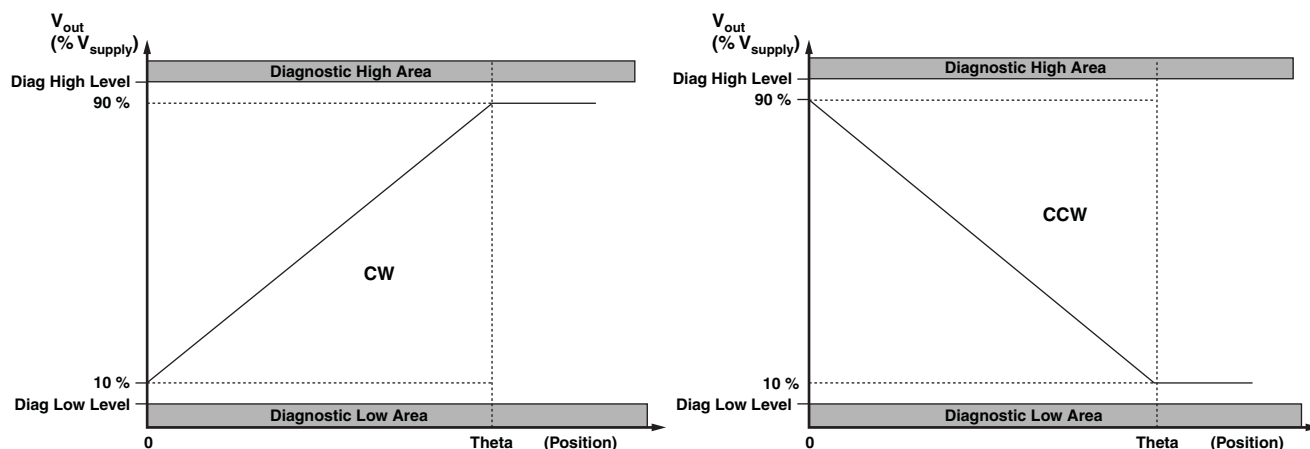
### SAP PART NUMBERING GUIDELINES

| 78 SHE | 4                        | B         | 9                | T           | C             | 2P22       | XXXX            |
|--------|--------------------------|-----------|------------------|-------------|---------------|------------|-----------------|
| MODEL  | NUMBER OF CUPS (Signals) | LINEARITY | ELECTRICAL ANGLE | OUTPUT TYPE | OUTPUT SIGNAL | SHAFT TYPE | SPECIAL REQUEST |

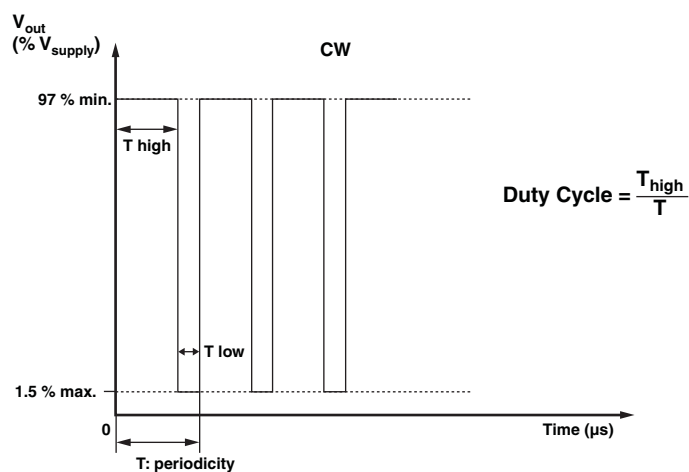


## V<sub>OUT</sub> ANALOG

|                       |           |           |
|-----------------------|-----------|-----------|
| 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                                                    |

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

$\times$  Cut off

**ENVIRONMENTAL SPECIFICATIONS**

|                                                   |                                                                                           |
|---------------------------------------------------|-------------------------------------------------------------------------------------------|
| Vibrations                                        | 20 g from 10 Hz to 2000 Hz, EN 60068-2-6                                                  |
| Shocks                                            | 3 shocks/axis; 50 g half a sine 11 ms, EN 60068-2-7                                       |
| Operating temperature range                       | -45 °C; +125 °C                                                                           |
| Life                                              | > 50M of cycles                                                                           |
| Rotational speed (max.)                           | 120 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: $\pm 4\text{ kV}$<br>Air discharges: $\pm 8\text{ kV}$ , EN 61000-4-2 |
| <b>MATERIALS</b>                                  |                                                                                           |
| Housing                                           | Thermoplastic housing                                                                     |
| Shaft                                             | Stainless steel                                                                           |
| Output                                            | 3 turrets or 3 lead wires (AWG 22)                                                        |

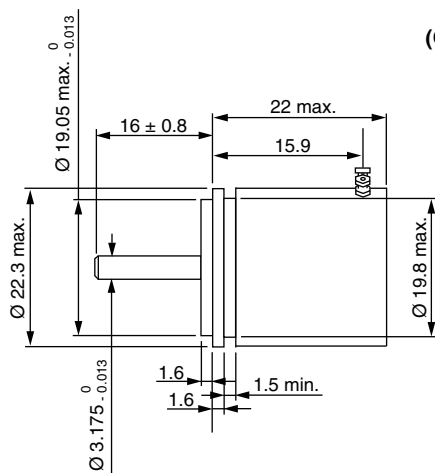
**Note**

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



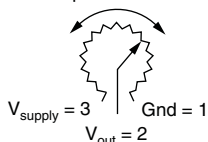
## DIMENSIONS in millimeters

### MODEL 78 SHE ...T (OUTPUT BY TURRETS)



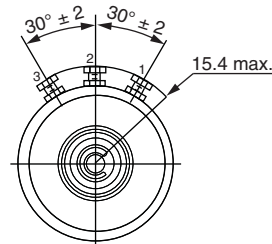
General tolerance:  $\pm 0.5$  mm

CW or CCW according  
to output mode choice

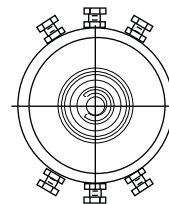


View from shaft side

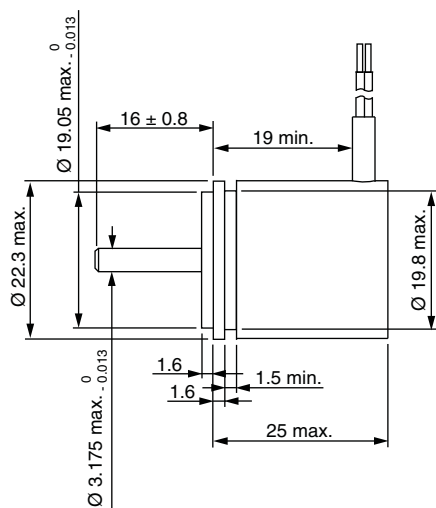
78 SHE (1 signal)



78 SHE (Redundant: 2 signals)

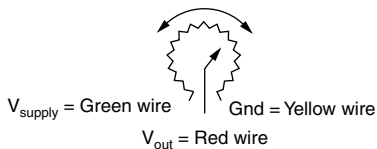


### MODEL 78 SHE ...W (OUTPUT BY WIRES)



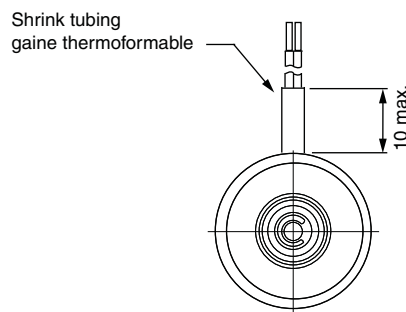
General tolerance:  $\pm 0.5$  mm

CW or CCW according  
to output mode choice

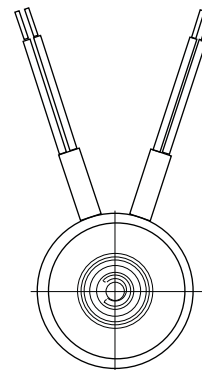


View from shaft side

78 SHE (1 signal)



78 SHE (Redundant: 2 signals)





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