Throttle Position Sensor in Hall Effect Technology
Hollow and D-Shaft Versions

FEATURES
- Accurate linearity down to: ± 0.5 %
- Easy mounting principle
- Non contacting technology: Hall effect
- Model dedicated to all applications in harsh environments
- Spring loaded types available
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

QUICK REFERENCE DATA

<table>
<thead>
<tr>
<th>Sensor type</th>
<th>ROTATIONAL, single turn hall effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>Wires</td>
</tr>
<tr>
<td>Market appliance</td>
<td>Industrial</td>
</tr>
<tr>
<td>Dimensions</td>
<td>47 mm x 22 mm</td>
</tr>
</tbody>
</table>

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>STANDARD</th>
<th>SPECIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical angle</td>
<td>90°, 120°, 180°, 270°, 360°</td>
<td>Any other angle upon request</td>
</tr>
<tr>
<td>Linearity</td>
<td>± 1 %</td>
<td>± 0.5 %</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>5 V&lt;sub&gt;DC&lt;/sub&gt; ± 10 %</td>
<td>Other upon request</td>
</tr>
<tr>
<td>Supply current</td>
<td>10 mA typical / 16 mA max.</td>
<td>16 mA for PWM output</td>
</tr>
<tr>
<td>Output signal</td>
<td>Analog ratiometric 10 % to 90 % of V&lt;sub&gt;supply&lt;/sub&gt; or PWM 1 kHz, 10 % to 90 % duty cycle</td>
<td>Other upon request</td>
</tr>
<tr>
<td>Over voltage protection</td>
<td>+20 V&lt;sub&gt;DC&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td>Reverse voltage protection</td>
<td>-10 V&lt;sub&gt;DC&lt;/sub&gt;</td>
<td></td>
</tr>
<tr>
<td>Load resistance recommended</td>
<td>Min. 1 kΩ for analog output and PWM output</td>
<td></td>
</tr>
<tr>
<td>Hysteresis static (D-shaft version)</td>
<td>&lt; 0.3°</td>
<td></td>
</tr>
</tbody>
</table>

MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical travel</td>
<td>360° continuous, stops upon request: 124° ± 3°</td>
</tr>
<tr>
<td>Bearing type</td>
<td>Sleeve bearing</td>
</tr>
<tr>
<td>Standard</td>
<td>IP 50; other on request</td>
</tr>
<tr>
<td>Weight</td>
<td>19 g ± 2 g hollow shaft model/22 g ± 2 g D-shaft model</td>
</tr>
</tbody>
</table>

ORDERING INFORMATION/DESCRIPTION

<table>
<thead>
<tr>
<th>MODEL FEATURES LINEARITY</th>
<th>ELECTRICAL ANGLE</th>
<th>OUTPUT TYPE</th>
<th>OUTPUT SIGNAL</th>
<th>SHAFT TYPE</th>
<th>SPECIAL REQUEST</th>
<th>PACKAGING</th>
<th>LEAD FINISH</th>
</tr>
</thead>
<tbody>
<tr>
<td>981HE</td>
<td>0</td>
<td>A: ± 1 %</td>
<td>W: wires</td>
<td>A: analog CW</td>
<td>1: 6.35 mm</td>
<td>Box of 10 pieces</td>
<td></td>
</tr>
<tr>
<td>1: continuous rotation</td>
<td>1: 90°</td>
<td>B: ± 0.5 %</td>
<td>Z: custom</td>
<td>B: analog CCW</td>
<td>S: special</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2: spring return CW</td>
<td>2: 180°</td>
<td></td>
<td></td>
<td>C: PWM CCW</td>
<td>P: plain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3: spring return CCW</td>
<td>3: 270°</td>
<td></td>
<td></td>
<td>D: PWM CCW</td>
<td>F: flatted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4: 360°</td>
<td></td>
<td></td>
<td>Z: other output</td>
<td>S: slotted</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5: 120°</td>
<td></td>
<td></td>
<td></td>
<td>Z: other type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9: other angles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAP PART NUMBERING GUIDELINES

| MODEL MECHANICAL FEATURES LINEARITY ELECTRICAL ANGLE OUTPUT TYPE OUTPUT SIGNAL SHAFT TYPE SPECIAL REQUEST |
|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| 981HE                                                          | 1                                                             | 9                                                             | Z                                                             | C                                                             | 8H01 XXXX |

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For technical questions, contact: sferprecisionpot@vishay.com
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**V\text{OUT ANALOG}**

![Diagram of V\text{OUT ANALOG}](image)

**V\text{OUT PWM}**

![Diagram of V\text{OUT PWM}](image)
### DIAGNOSTIC MODES

<table>
<thead>
<tr>
<th>FAILURE</th>
<th>$V_{\text{out\ ANALOG}}$</th>
<th>$V_{\text{out\ ANALOG}}$</th>
<th>$V_{\text{out\ PWM}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R_{\text{pull-up}}$</td>
<td>$R_{\text{pull-down}}$</td>
<td>$R_{\text{pull-up}} = 1\ k\Omega$</td>
</tr>
<tr>
<td>1: Broken GND</td>
<td>Diagnostic high area</td>
<td>Diagnostic low area</td>
<td>$&gt; 97% V_{\text{Supply}}$ without modulation</td>
</tr>
<tr>
<td>2: Broken $V_{\text{out}}$</td>
<td>Diagnostic high area</td>
<td>Diagnostic low area</td>
<td>$&gt; 97% V_{\text{Supply}}$ without modulation</td>
</tr>
<tr>
<td>3: Broken $V_{\text{Supply}}$</td>
<td>Diagnostic high area</td>
<td>Diagnostic low area</td>
<td>$&gt; 97% V_{\text{Supply}}$ without modulation</td>
</tr>
<tr>
<td>Over voltage $V_{\text{Supply}} &gt; 7\ V$</td>
<td>Diagnostic high area</td>
<td>Diagnostic low area</td>
<td>$&gt; 97% V_{\text{Supply}}$ without modulation</td>
</tr>
<tr>
<td>Under voltage $V_{\text{Supply}} &lt; 2.7\ V$</td>
<td>Diagnostic high area</td>
<td>Diagnostic low area</td>
<td>$&gt; 97% V_{\text{Supply}}$ without modulation</td>
</tr>
</tbody>
</table>

$V_{\text{pull-up}}$ can be independent to $V_{\text{Supply}}$

### ENVIRONMENTAL SPECIFICATIONS

- **Vibrations**: 20 g from 10 Hz to 2000 Hz, EN 60068-2-6
- **Shocks**: 3 shocks/axis; 50 g half sine 11 ms, EN 60068-2-7
- **Operating temperature range**: -45 °C to +125 °C
- **Life (in cycles)**: > 5M for hollow shaft model / > 10M for D-shaft model
- **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 dBuV/m, EN 61000-6-4 (level A)
- **Electrostatic discharges**: Contact discharges: ± 8 kV
  Air discharges: ± 15 kV, EN 61000-4-2

### MATERIALS

- **Housing**: Thermoplastic housing
- **Shaft**: Stainless steel
- **Output**: 3 lead wires

**Note**
- Nothing stated herein shall be construed as a guarantee of quality or durability
VARIous Possible Types of Model 981 HE in D-SHAFT Version

1. 981 HE D-Shaft
   Spring return CCW
   Shaft: Ø 6.35 flatted length 16 mm FMF
   Model: 981HE-3-x-x-W-x-1F16

2. 981 HE D-Shaft
   Spring return CW
   Shaft: Ø 6.35 flatted 16 mm FMF
   Model: 981HE-2-x-x-W-x-1F16

3. 981 HE D-Shaft
   Continuous rotation
   Shaft: Ø 6.35 flatted 16 mm FMF
   Model: 981HE-0-x-x-W-x-1F16

Dimension Standard Option Wires
A  36  38  Yellow  GND (-) Red  Signal Green  VCC (+)
B  47  48

Mechanical stroke

Direction of running

"0 position": 120°

"0 position" Prog CW: 10 % Prog CCW: 90 %
Mech. stop

3 wires AWG20 lg 300 mm
**DIMENSIONS** in millimeters

**VARIOUS POSSIBLE TYPES OF MODEL 981 HE IN HOLLOW SHAFT VERSION**

1. **981 HE Hollow shaft**
   - Spring return CCW
   - Shaft: Ø 8
   - Model: 981HE-3-x-x-W-x-8H00

2. **981 HE Hollow shaft**
   - Spring return CW
   - Shaft: Ø 8
   - Model: 981HE-2-x-x-W-x-8H00

3. **981 HE Hollow shaft**
   - Continuous rotation
   - Shaft: Ø 8
   - Model: 981HE-0-x-x-W-x-8H01

4. **981 HE Hollow shaft**
   - Continuous rotation
   - Shaft: Ø 8
   - Model: 981HE-1-x-x-W-x-8H01

End shaft recommended

- Ø 7.8 ± 0.1
- 2 min.
- 7 max.
- Mounting face

Mechanical stop

- "0 position" Prog CW: 10 %
- Prog CCW: 90 %
- 2° Typ.

Mechanical stroke

- "0 position": 120°

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