Rotational Absolute Magnetic Kit Encoder Version 40 mm HP Displacement Sensor

FEATURES
- Especially dedicated to hard conditions (vibrations, shocks, CEM, ...)
- Not sensitive to external magnetic fields and temperature
- Not sensitive to moisture and pollution
- Plug and play
- Small error due to misalignment
- Hall effect principle
- High Precision (HP)
- Protected design, patent EP 2711663
- 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, magnetic technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output type</td>
<td>Wires or cables</td>
</tr>
<tr>
<td>Market appliance</td>
<td>Industrial</td>
</tr>
<tr>
<td>Dimensions</td>
<td>Diameter 40.65 mm</td>
</tr>
</tbody>
</table>

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage supply</td>
<td>5 V ± 0.25 V (or 9 V to 35 V in option)</td>
</tr>
<tr>
<td>Current supply</td>
<td>≤ 110 mA max. at 5 V</td>
</tr>
<tr>
<td>Output</td>
<td>SSI (SPI on request)</td>
</tr>
<tr>
<td>Connection</td>
<td>Ultra-flex AWG32 wires (shielded cable and connector on request)</td>
</tr>
<tr>
<td>Useful electrical angle</td>
<td>360° (single turn)</td>
</tr>
<tr>
<td>Absolute accuracy at 25 °C</td>
<td>± 0.03° &gt; 13 bits</td>
</tr>
<tr>
<td>Absolute accuracy at -40 °C to +105 °C</td>
<td>± 0.05° ~ 13 bits</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.0017° (&gt; 17 bits, 212 992 points)</td>
</tr>
<tr>
<td>Startup time</td>
<td>≤ 20 ms</td>
</tr>
<tr>
<td>Refresh time</td>
<td>≤ 100 μs</td>
</tr>
<tr>
<td>Latency time</td>
<td>≤ 200 μs</td>
</tr>
<tr>
<td>Sampling rate</td>
<td>10 kHz ± 5 %</td>
</tr>
</tbody>
</table>

MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical angle</td>
<td>360°</td>
</tr>
<tr>
<td>Maximum speed rotation</td>
<td>50 rpm (up to 380 rpm with decreasing of accuracy, see “Maximum Speed vs. Accuracy” chart)</td>
</tr>
<tr>
<td>Maximum mechanical speed</td>
<td>9000 rpm (or more on request)</td>
</tr>
<tr>
<td>Weight</td>
<td>Rotor: 12 g ± 1 g; stator: 16.5 g ± 1 g</td>
</tr>
</tbody>
</table>

SAP PART NUMBERING GUIDELINES

<table>
<thead>
<tr>
<th>TYPE</th>
<th>MODEL</th>
<th>DESIGN</th>
<th>SIZE (mm)</th>
<th>TYPE</th>
<th>FUNCTION</th>
<th>ACCURACY (BITS)</th>
<th>RESOLUTION (BITS)</th>
<th>OUTPUT</th>
<th>PACKAGING</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>AM</td>
<td>K = kit</td>
<td>040</td>
<td>M</td>
<td>1</td>
<td>13</td>
<td>17</td>
<td>J = SSI CCW</td>
<td>B = box</td>
</tr>
</tbody>
</table>
PERFORMANCE

PARAMETER

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature range</td>
<td>-40 °C to +105 °C (-55 °C to +105 °C on request)</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-45 °C to +105 °C (-55 °C to +105 °C on request)</td>
</tr>
<tr>
<td>Acceleration</td>
<td>70 g for 1 s</td>
</tr>
<tr>
<td>Vibration</td>
<td>0.05 g²/Hz, 20 Hz to 2000 Hz for 1 h along the three major axis</td>
</tr>
<tr>
<td>Shock</td>
<td>180 g, 14 ms, 1/2 sine</td>
</tr>
</tbody>
</table>

EMC
- MIL-STD-461F
  - CS114: conducted susceptibility, bulk cable injection, 10 kHz to 200 MHz table VI army ground level common mode injection and differential mode on positive
  - RS101: magnetic susceptibility, magnetic field, fig. RS101-2 from 30 Hz to 100 kHz
  - RS103: radiated susceptibility, electric field, 2 MHz to 18 GHz (level: 50 V/m)
  - RE102: radiated emissions, electric field, fig. RE102-4 - navy mobile and army - 10 kHz to 16 MHz

Humidity
HR ≤ 80 % (non-condensing)

MAXIMUM SPEED VS. ACCURACY CHART

DIMENSIONS in millimeters

BASIC: AXIAL OUTPUT

SECTION A-A

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For technical questions, contact: mcbprecisionpot@vishay.com
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DIMENSIONS in millimeters

**OPTION ON REQUEST: ANOTHER INTERFACE FOR THE ROTOR**

**SECTION A-A**

- $\Phi 40 \pm 0.4$
- $\Phi 37.1 \pm 0.2$
- $\Phi 30 \pm 0.2$
- $\Phi 13 \pm 0.2$
- $\Phi 18.5 \pm 0.2$
- $\Phi 29.7 \pm 0.2$
- $\Phi 40.57 \pm 0.03$

**DIMENSIONS**

- $3 \times \Phi 2.6 \pm 0.1 \pm 120^\circ$
- $3 \times \Phi 4.1 \pm 0.1 \pm 120^\circ$

**OPTION ON REQUEST: RADIAL OUTPUT**

**SECTION A-A**

- $\Phi 37.1 \pm 0.2$
- $\Phi 35.3 \pm 0.2$
- $\Phi 5.01 \pm 0.005$
- $\Phi 5.2 \pm 0.1$
- $\Phi 7.9 \pm 0.1$
- $\Phi 12 + 0.4 - 0.2$
- $\Phi 13 \pm 0.2$
- $\Phi 18.5 \pm 0.2$
- $\Phi 29.7 \pm 0.2$
- $\Phi 40.57 \pm 0.03$

**DIMENSIONS**

- $3 \times \Phi 2.6 \pm 0.1 \pm 120^\circ$
- $3 \times \Phi 4.1 \pm 0.1 \pm 120^\circ$

**DIMENSIONS** in millimeters

- $650 \pm 25$
- $3 \pm 0.5$
- $10 \pm 0.5$
- $2.9 \pm 0.5$
- $1.8 \pm 0.5$
- $0.7 \pm 0.5$
- $3.1 \pm 0.5$
- $1.9 \pm 0.5$
- $0.4 \pm 0.5$
- $0.7 \pm 0.5$
- $3.1 \pm 0.5$
- $1.8 \pm 0.5$
- $0.7 \pm 0.5$
- $3.1 \pm 0.5$
- $1.8 \pm 0.5$
- $0.7 \pm 0.5$
- $3.1 \pm 0.5$
- $1.8 \pm 0.5$
ELECTRICAL INTERFACE DESCRIPTION - SSI INTERFACE

### 6 WIRES CONNECTIONS

<table>
<thead>
<tr>
<th>NAME</th>
<th>WIRE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
<td>Black</td>
</tr>
<tr>
<td>+5 V</td>
<td>Red</td>
</tr>
<tr>
<td>CLK+</td>
<td>White</td>
</tr>
<tr>
<td>CLK-</td>
<td>Clear</td>
</tr>
<tr>
<td>DATA+</td>
<td>Yellow</td>
</tr>
<tr>
<td>DATA-</td>
<td>Green</td>
</tr>
</tbody>
</table>

Note
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(1) With marking sleeve (S, C, or D)

### SSI PARAMETERS

- **Output code**: Binary
- **Data differential interface**: RS422 according to EIA-RS422
- **CLK differential interface**: RS422 according to EIA-RS422
- **Minimum clock frequency**: 300 kHz
- **Maximum clock frequency**: 3 MHz
- **Data bit (n)**: 18 bits

**Timing Diagram**

\[
t_{\text{clock}} = \frac{1}{F_{\text{clock}}} \\
t = t_{\text{p}} = 12 \mu s \\
t_{s} = \geq 500 ns \\
t_{s} = \leq 200 ns \\
\]

### ELECTRICAL INTERFACE DESCRIPTION - SPI INTERFACE (on request)

#### 5 WIRES CONNECTIONS

<table>
<thead>
<tr>
<th>NAME</th>
<th>WIRE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>GND</td>
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</tr>
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<td>+5 V</td>
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<tr>
<td>CLK</td>
<td>White</td>
</tr>
<tr>
<td>DATA</td>
<td>Clear</td>
</tr>
<tr>
<td>CS</td>
<td>Yellow</td>
</tr>
</tbody>
</table>

### SPI PARAMETERS

- **Output code**: Binary
- **Minimum clock frequency**: 300 kHz
- **Maximum clock frequency**: 4 MHz
- **Data bit (n)**: 18 bits

**Timing Diagram**

\[
t_{c} = \geq 500 ns \\
t_{c} = \frac{1}{F_{\text{clock}}} \\
t_{c} = 18 + t_{c} + t_{c} = \mu s \\
t_{c} = \leq 1 \mu s \\
\]

### OPTIONS

- Other design on request (mechanical interfaces, electrical interfaces, ...)

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