**Quadrature Speed and Direction Sensors**

**SNG-Q Series**

**DESCRIPTION**

Honeywell’s SNG-Q Series Quadrature Speed and Direction Sensors are designed to provide both speed and direction information. Speed information is provided from digital square wave outputs; direction is provided using a quadrature output with signals 90° phase shifted from each other. With the quadrature output, target direction is determined by output lead/lag phase shifting.

The SNG-Q Series are designed and manufactured using a platform-based approach that enables cost-competitiveness and mechanical and electrical configurability for customers. The Series are designed for applications where enhanced accuracy is required to detect small target features. This accuracy is enabled by dual differential Hall-effect sensor IC technology. The SNG-Q Series provide a wide operating temperature range, robust electrical noise immunity and industry leading environmental sealing capability. This product includes an O-ring seal for pressure applications, and a fixed mounting flange for simple installation using one fastener.

**FEATURES**

- Wide operating temperature range: -40 °C to 150 °C [-40 °F to 302 °F]
- Environmental sealing: Moisture ingress protection rated to IP69K
- Robust electrical noise immunity: Electrical noise radiated immunity (EMC) rated to 100 V/m
- High frequency switching capability: 3 Hz to 20 kHz
- Direction information: From phase-shifted dual output signals
- O-ring seal: Enables environmental sealing to mounting surface
- Supply voltage range: 4.5 V to 26 V

**POTENTIAL APPLICATIONS**

**Industrial**

- AC induction motors in material handling, agriculture, and construction machines: May be used to help control power delivered by the ac induction motor
- Hydraulic pump motors in material handling, agriculture, and construction machines: May be used to help control power delivered by the hydraulic pump motor
- Escalators and elevators: May be used to help control speed and position

**Transportation**

- Hybrid electric transmissions in heavy duty trucks, buses, agriculture and construction machines: May be used to help control power regulation of the hybrid system
- Wheel speed detection in material handling, agriculture, and construction machines: May be used to detect the speed and direction of the wheels, which translates to the speed and direction of the machine
- Hybrid engines in heavy duty trucks, buses, agriculture and construction machines: May be used to help control power regulation of the hybrid system

Not recommended for Aerospace or Defense applications.

**PORTFOLIO**

The SNG-Q Series joins the 1GT Series, LCZ Series, ZH10 Series, 584XX Series, SNDH-T Series, and the SNDH-H Series.
Quadrature Speed and Direction Sensors, SNG-Q Series

Table 1. Order Guide

<table>
<thead>
<tr>
<th>Catalog Listing</th>
<th>Availability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNG-QPLA-000</td>
<td>Now</td>
<td>SNG-Q Series, 4-wire quadrature speed and direction sensor, plastic housing, 500 mm [19.7 in] cable with leads, right angle exit, 35 mm [1.38 in] housing length</td>
</tr>
<tr>
<td>SNG-QPCA-001</td>
<td>Now</td>
<td>SNG-Q Series, 4-wire quadrature speed and direction sensor, plastic housing, 1,25 m [49.2 in] cable with Deutsch DTM04-4P connector, right angle exit, 35 mm [1.38 in] housing length</td>
</tr>
<tr>
<td>SNG-QPRA-000</td>
<td>Now</td>
<td>SNG-Q Series, 4-wire quadrature speed and direction sensor, plastic housing, integral Amp Superseal 1.5 connector, right angle exit, 35 mm [1.38 in] housing length</td>
</tr>
<tr>
<td>SNG-QPMB-000</td>
<td>Coming soon</td>
<td>SNG-Q Series, 4-wire quadrature speed and direction sensor, plastic housing, 500 mm [19.7 in] cable with leads, straight exit, 45 mm [1.77 in] housing length</td>
</tr>
</tbody>
</table>

For example, SNG-QPLA-000 defines an SNG-Q Series quadrature speed and direction sensor, 500 mm [19.7 in] cable with leads, right angle exit, 35 mm [1.38 in] housing length.

Table 2. Electrical Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Available Now</th>
<th>Coming Soon</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>4.5 V to 26 V</td>
<td>4.5 V to 26 V</td>
<td>—</td>
</tr>
<tr>
<td>Output signal:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>type</td>
<td>square wave</td>
<td>square wave</td>
<td></td>
</tr>
<tr>
<td>duty cycle¹</td>
<td>50% ±10%</td>
<td>50% ±10%</td>
<td></td>
</tr>
<tr>
<td>phase shift</td>
<td>90° ±45°</td>
<td>90° ±45°</td>
<td></td>
</tr>
<tr>
<td>high</td>
<td>&gt;Vs - 0.5 V</td>
<td>&gt;Vs - 0.5 V</td>
<td></td>
</tr>
<tr>
<td>low</td>
<td>≤0.5 V (SNG-QPLA/QPCA), ≤1.75 V (SNG-QPRA)</td>
<td>≤0.5 V</td>
<td></td>
</tr>
<tr>
<td>load current:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rise time</td>
<td>40 mA max.</td>
<td>40 mA max.</td>
<td></td>
</tr>
<tr>
<td>fall time</td>
<td>10 μs max.</td>
<td>10 μs max.</td>
<td></td>
</tr>
<tr>
<td>frequency</td>
<td>3 Hz to 20 kHz</td>
<td>3 Hz to 20 kHz</td>
<td></td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>50 mA max.</td>
<td>50 mA max.</td>
<td></td>
</tr>
<tr>
<td>Supply current</td>
<td>12 mA normal, 18 mA max.</td>
<td>12 mA normal, 18 mA max.</td>
<td>all conditions</td>
</tr>
<tr>
<td>Reverse voltage</td>
<td>-26 V max.</td>
<td>-26 V max.</td>
<td>10 min duration</td>
</tr>
</tbody>
</table>

² Duty cycle = Time high/time total.

1 Contact Honeywell for other Housing Material options.
2 Other cable lengths available upon request.
3 Contact Honeywell.
# Quadrature Speed and Direction Sensors, SNG-Q Series

## Table 3. Environmental Specifications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Condition</th>
<th>SNG-QPLA-000</th>
<th>SNG-QPCA-001</th>
<th>SNG-QPRA-000</th>
<th>SNG-QPMB-000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(Available Now)</td>
<td></td>
<td>(Coming Soon)</td>
<td></td>
</tr>
<tr>
<td>EMI: radiated immunity</td>
<td>ISO 11452-2, 400 MHz to 1 GHz, ISO 11452-4, 1 MHz to 400 MHz, ISO 10605, Section 9</td>
<td>100 V/m</td>
<td>100 V/m</td>
<td>100 V/m</td>
<td>100 V/m</td>
</tr>
<tr>
<td></td>
<td>bulk current injection</td>
<td>100 mA</td>
<td>100 mA</td>
<td>100 mA</td>
<td>100 mA</td>
</tr>
<tr>
<td></td>
<td>ESD</td>
<td>±8 kV contact, ±15 kV air</td>
<td>±8 kV contact, ±15 kV air</td>
<td>±8 kV contact, ±15 kV air</td>
<td>±8 kV contact, ±15 kV air</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-40 °C to 150 °C [-40 °F to 302 °F]</td>
<td>500 cycles</td>
<td>500 cycles</td>
<td>240 hr</td>
<td>240 hr</td>
</tr>
<tr>
<td>Thermal shock, air to air</td>
<td>-40 °C to 150 °C [-40 °F to 302 °F], 60 min. soak. &lt;3 s transfer</td>
<td>240 hr</td>
<td>240 hr</td>
<td>96 hr</td>
<td>96 hr</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% humidity at 38 °C [100 °F]</td>
<td>240 hr</td>
<td>240 hr</td>
<td>96 hr</td>
<td>96 hr</td>
</tr>
<tr>
<td>Salt fog</td>
<td>5% salt solution by mass at 35 °C [95 °F]</td>
<td>10 cycles</td>
<td>10 cycles</td>
<td>96 hr</td>
<td>96 hr</td>
</tr>
<tr>
<td>Thermal saline dunk</td>
<td>100 °C to 25 °C [212 °F to 77 °F] air to liquid, 5% saline</td>
<td>10 cycles</td>
<td>10 cycles</td>
<td>96 hr</td>
<td>96 hr</td>
</tr>
<tr>
<td>High temperature exposure with power</td>
<td>150 °C [302 °F], 13.5 Vdc, 1 kOhm load</td>
<td>500 hr</td>
<td>500 hr</td>
<td>96 hr</td>
<td>96 hr</td>
</tr>
<tr>
<td>Sensor degree of protection</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>IP69K</td>
<td>IP69K</td>
</tr>
<tr>
<td>Resistance to fluids</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>general under-the-hood automotive fluids</td>
<td>general under-the-hood automotive fluids</td>
</tr>
</tbody>
</table>

## Table 4. Mechanical Specifications

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>SNG-QPLA-000</th>
<th>SNG-QPCA-001</th>
<th>SNG-QPRA-000</th>
<th>SNG-QPMB-000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Available Now)</td>
<td></td>
<td>(Coming Soon)</td>
<td></td>
</tr>
<tr>
<td>Sensing air gap</td>
<td>0,0 mm to 2,0 mm [0.0 in to 0.08 in]</td>
<td>0,0 mm to 2,0 mm [0.0 in to 0.08 in]</td>
<td>0,0 mm to 2,0 mm [0.0 in to 0.08 in]</td>
<td></td>
</tr>
<tr>
<td>Target: width¹</td>
<td>&gt;5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.</td>
<td>&gt;5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.</td>
<td>&gt;5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt;3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.</td>
<td>&gt;3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.</td>
<td>&gt;3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.</td>
<td></td>
</tr>
<tr>
<td>Target: slot width²</td>
<td>12,7 mm [0.5 in] typ.</td>
<td>12,7 mm [0.5 in] typ.</td>
<td>12,7 mm [0.5 in] typ.</td>
<td></td>
</tr>
<tr>
<td>Target: tooth width²</td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td></td>
</tr>
<tr>
<td>Target: tooth height³</td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td>2,0 mm [0.08 in] min.</td>
<td></td>
</tr>
<tr>
<td>Target: O-ring</td>
<td>PBT</td>
<td>PBT</td>
<td>PBT</td>
<td>PBT</td>
</tr>
<tr>
<td>Target: cable⁵</td>
<td>PTFE coating, Ø11,8 mm [0.47 in] OD x Ø1,80 mm [0.07 in] CS</td>
<td>PTFE coating, Ø11,8 mm [0.47 in] OD x Ø1,80 mm [0.07 in] CS</td>
<td>PTFE coating, Ø11,8 mm [0.47 in] OD x Ø1,80 mm [0.07 in] CS</td>
<td>PTFE coating, Ø11,8 mm [0.47 in] OD x Ø1,80 mm [0.07 in] CS</td>
</tr>
<tr>
<td>Target: mounting bore size⁶</td>
<td>Ø15,15 mm to Ø15,40 mm [0.60 in to 0.61 in]</td>
<td>Ø15,15 mm to Ø15,40 mm [0.60 in to 0.61 in]</td>
<td>Ø15,15 mm to Ø15,40 mm [0.60 in to 0.61 in]</td>
<td></td>
</tr>
<tr>
<td>Target: mounting torque</td>
<td>10 N m [88.5 in-lb] max. with M6 X 1.0 bolt</td>
<td>10 N m [88.5 in-lb] max. with M6 X 1.0 bolt</td>
<td>10 N m [88.5 in-lb] max. with M6 X 1.0 bolt</td>
<td></td>
</tr>
</tbody>
</table>

¹Narrower targets may limit axial offsets.
²Other geometry may be suitable.
³Shorter tooth heights may limit maximum air gap performance.
⁴Application dependent.
⁵Applies to SNG-QPLA-001, SNG-QPCA-001, SNG-QPMB-001.
Quadrature Speed and Direction Sensors, SNG-Q Series

Figure 1. Sensor Output (All catalog listings)

Output channel A (leading)

Phase shift

Output channel B (lagging)

Vsupply

Vsupply

0° 90° 180° 270° 360° 0°

Target cross section relative to output channel A

Tooth

Slot

Figure 2. SNG-QPLA-000 Mounting Dimensions (For reference only: mm/[in.]) (Available now.)

Circuit Diagram

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

Use Ohm’s Law to calculate the load resistor based on the supply/load voltage used:

\[ R = \frac{V}{0.04 \text{ A}} \]

Leadwire Assignment

<table>
<thead>
<tr>
<th>Yellow</th>
<th>Black</th>
<th>White</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vsupply</td>
<td>ground</td>
<td>channel A</td>
<td>channel B</td>
</tr>
</tbody>
</table>

Vin: Yellow wire
GND: Black wire
Channel A: White wire
Channel B: Blue wire
SNG-QPLA-000
Load A
Load B
Power Supply (4.5 V to 26 V)
Figure 3. SNG-QPCA-001 Mounting Dimensions (For reference only: mm/[in.]) (Available now.)

Circuit Diagram

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

Use Ohm’s Law to calculate the load resistor based on the supply/load voltage used:

\[ R = \frac{V}{0.04 \text{ A}} \]
Quadrature Speed and Direction Sensors, SNG-Q Series

Figure 4. SNG-QPRA-000 Mounting Dimensions (For reference only: mm/[in.]) (Available now.)

Circuit Diagram

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

Use Ohm’s Law to calculate the load resistor based on the supply/load voltage used:

$$R = \frac{V}{0.04 \text{ A}}$$

Amp Superseal 1.5 Connector Pinout (mating connector 282088)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>ground</td>
<td>channel A</td>
<td>channel B</td>
<td>V_{CC}</td>
</tr>
</tbody>
</table>
Quadrature Speed and Direction Sensors, SNG-Q Series

Figure 5. SNG-QPMB-000 Mounting Dimensions (For reference only: mm/[in.]) (Coming soon.)

Circuit Diagram

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

Use Ohm’s Law to calculate the load resistor based on the supply/load voltage used:

\[ R = \frac{V}{0.04 \text{ A}} \]

ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site at sensing.honeywell.com:

- Product Range Guide
- Product Line Guide
- Product Installation Instructions
- Technical Information
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Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Find out more

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To learn more about Honeywell Sensing and Productivity Solutions’ products, call +1-815-235-6847 or 1-800-537-6945, visit sensing.honeywell.com, or e-mail inquiries to info.sc@honeywell.com

Preliminary

This publication does not constitute a contract between Honeywell and its customers. The contents may be changed at any time without notice. It is the customer’s responsibility to ensure safe installation and operation of the products. Detailed mounting drawings of all products illustrated are available upon request.