

## Quadrature Speed and Direction Sensors SNG-Q Series

**32304260**  
Issue B

Datasheet



### 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**

| Catalog Listing | Availability | Description   |
|-----------------|--------------|---|
| SNG-QPLA-000    | Now          | 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                      |
| SNG-QPCA-001    | Now          | 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 |
| SNG-QPRA-000    | Now          | 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                   |
| SNG-QPMB-000    | Coming soon  | 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                         |

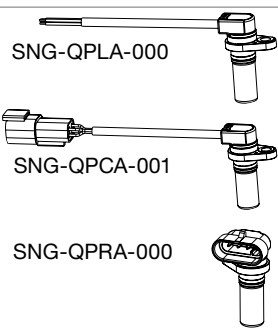
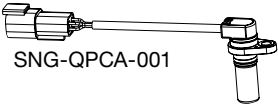
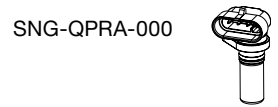
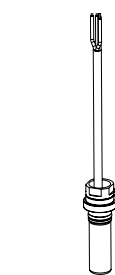
**Figure 1. Nomenclature Guide (All options available now, unless otherwise noted.)**

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.

| <b>SNG-Q</b><br>Series                       | <b>P</b><br>Housing Material <sup>1</sup> | <b>L</b><br>Connection Type <sup>2</sup>  | <b>A</b><br>Housing Length             | <b>000</b><br>For Internal Use Only |
|--|---|---|--|-------------------------------------|
| 4-wire quadrature speed and direction sensor | <b>P</b> Plastic                          | <b>S</b> Integral Amp Superseal 1.5 connector, straight exit <sup>3</sup>                                 | <b>A</b> 35 mm [1.38 in]               |                                     |
|  |   | <b>R</b> Integral Amp Superseal 1.5 connector, right angle exit   | <b>B</b> 45 mm [1.77 in] (coming soon) |                                     |
|  |   | <b>L</b> 500 mm [19.7 in] cable with leads, right angle exit  |  |                                     |
|  |   | <b>M</b> 500 mm [19.7 in] cable with leads, straight exit (coming soon)                                   |  |                                     |
|  |   | <b>C</b> 1,25 m [49.2 in] cable with Deutsch DTM04-MP connector, right angle exit                         |  |                                     |
|  |   | <b>D</b> 1,25 m [49.2 in] cable with Deutsch DTM04-MP connector, straight exit (coming soon) <sup>3</sup> |  |                                     |

<sup>1</sup> Contact Honeywell for other Housing Material options.  
<sup>2</sup> Other cable lengths available upon request.  
<sup>3</sup> Contact Honeywell.

**Table 2. Electrical Specifications**

|                          | Parameter   |   | Comment   |
|--------------------------|---|---|---|
|                          | Available Now   | Coming Soon   |   |
|                          |  <p>SNG-QPLA-000</p>  <p>SNG-QPCA-001</p>  <p>SNG-QPRA-000</p> |  <p>SNG-QPMB-000</p> |   |
| Supply voltage           | 4.5 V to 26 V   | 4.5 V to 26 V   | —   |
| Output signal: type      | square wave   | square wave   | Two channel, phase shifted by 90° either channel, may lead or lag. Dependent on target geometry and sensor-to-target orientation; see Figures 2, 3, 4, 5 for recommended orientation.                                 |
| duty cycle <sup>1</sup>  | 50% ±10%  | 50% ±10%  |   |
| phase shift              | 90° ±45°  | 90° ±45°  |   |
| high                     | ≥Vs - 0.5 V   | ≥Vs - 0.5 V   | —   |
| low                      | ≤0.5 V (SNG-QPLA/QPCA), ≤1.75 V (SNG-QPRA)  | ≤0.5 V  | —   |
| load current             | 40 mA max.  | 40 mA max.  | Each output at all conditions<br>1 kOhm pull-up resistor, dependent on load resistor.<br>1 kOhm pull-up resistor, dependent on load resistor.<br>Frequencies >10 kHz may be dependent on target geometry and air gap. |
| rise time                | 10 μs max.  | 10 μs max.  |   |
| fall time                | 5 μs max.   | 5 μs max.   |   |
| frequency                | 3 Hz to 20 kHz  | 3 Hz to 20 kHz  |   |
| Short circuit protection | 50 mA max.  | 50 mA max.  | —   |
| Supply current           | 12 mA normal, 18 mA max.  | 12 mA normal, 18 mA max.  | all conditions  |
| Reverse voltage          | -26 V max.  | -26 V max.  | 10 min duration   |

<sup>1</sup>Duty cycle = Time high/time total.

# Quadrature Speed and Direction Sensors, SNG-Q Series

**Table 3. Environmental Specifications**

| Characteristic   | Condition   | Parameter   |  |
|--|---|---|--|
|  |   | SNG-QPLA-000<br>SNG-QPCA-001<br>SNG-QPRA-000<br>(Available Now) | SNG-QPMB-000<br>(Coming Soon)                  |
| EMI:<br>radiated immunity<br>bulk current injection<br>ESD | ISO 11452-2, 400 MHz to 1 GHz<br>ISO 11452-4, 1 MHz to 400 MHz<br>ISO 10605, Section 9<br>conforms to CE Mark standards<br>EN60947-5-2:2007 and<br>EN 60947-5-2/A1:2012 | 100 V/m<br>100 mA<br>±8 kV contact, ±15 kV air                  | 100 V/m<br>100 mA<br>±8 kV contact, ±15 kV air |
| Operating temperature                                      | —   | -40 °C to 150 °C [-40 °F to 302 °F]                             | -40 °C to 150 °C [-40 °F to 302 °F]            |
| Thermal shock, air to air                                  | -40 °C to 150 °C [-40 °F to 302 °F],<br>60 min. soak. <3 s transfer   | 500 cycles  | 500 cycles                                     |
| Humidity   | 95% humidity at 38 °C [100 °F]  | 240 hr  | 240 hr   |
| Salt fog   | 5% salt solution by mass<br>at 35 °C [95 °F]  | 96 hr   | 96 hr  |
| Thermal saline dunk  | 100 °C to 25 °C [212 °F to 77 °F]<br>air to liquid, 5% saline   | 10 cycles   | 10 cycles                                      |
| High temperature exposure<br>with power                    | 150 °C [302 °F], 13.5 Vdc,<br>1 kOhm load   | 500 hr  | 500 hr   |
| Vibration  | 3 perpendicular axes, 48 hr per axis  | 29.28 GMS, 50 Hz to 2000 Hz<br>MIL-STD-202-214                  | 29.28 GMS, 50 Hz to 2000 Hz<br>MIL-STD-202-214 |
| Sensor degree of protection                                | —   | IP69K   | IP69K  |
| Resistance to fluids                                       | —   | general under-the-hood<br>automotive fluids                     | general under-the-hood<br>automotive fluids    |

**Table 4. Mechanical Specifications**

| Characteristic  | Parameter   |   |
|---|---|---|
|   | SNG-QPLA-000<br>SNG-QPCA-001<br>SNG-QPRA-001<br>(Available Now)   | SNG-QPMB-000<br>(Coming Soon)   |
| Sensing air gap   | 0,0 mm to 2,0 mm [0.0 in to 0.08 in]  | 0,0 mm to 2,0 mm [0.0 in to 0.08 in]  |
| Target:<br>width <sup>1</sup><br>slot width <sup>2</sup><br>tooth width <sup>2</sup><br>tooth height <sup>3</sup> | >5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.<br>2,0 mm [0.08 in] min.<br>2,0 mm [0.08 in] min.<br>>3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.          | >5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.<br>2,0 mm [0.08 in] min.<br>2,0 mm [0.08 in] min.<br>>3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.          |
| Materials:<br>housing<br>bushing<br>O-ring<br>cable <sup>5</sup>  | PBT<br>brass<br>fluorocarbon with PTFE coating, Ø11,8 mm [Ø0.47 in] OD x<br>Ø1,80 mm [Ø0.07 in] CS<br>EVA, four conductor, 36 AWG, 28 strand, Ø5,2 mm [Ø0.20 in] jacket | PBT<br>brass<br>fluorocarbon with PTFE coating, ø11,8 mm [Ø0.47 in] OD x<br>Ø1,80 mm [Ø0.07 in] CS<br>EVA, four conductor, 36 AWG, 28 strand, Ø5,2 mm [Ø0.20 in] jacket |
| Mounting:<br>bore size <sup>4</sup><br>torque   | Ø15,15 mm to Ø15,40 mm [Ø0.60 in to Ø0.61 in]<br>10 N m [88.5 in-lb] max. with M6 X 1.0 bolt  | Ø15,15 mm to Ø15,40 mm [Ø0.60 in to Ø0.61 in]<br>10 N m [88.5 in-lb] max. with M6 X 1.0 bolt  |

<sup>1</sup>Narrower targets may limit axial offsets.

<sup>2</sup>Other geometry may be suitable.

<sup>3</sup>Shorter tooth heights may limit maximum air gap performance.

<sup>4</sup>Application dependent.

<sup>5</sup>Applies 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)

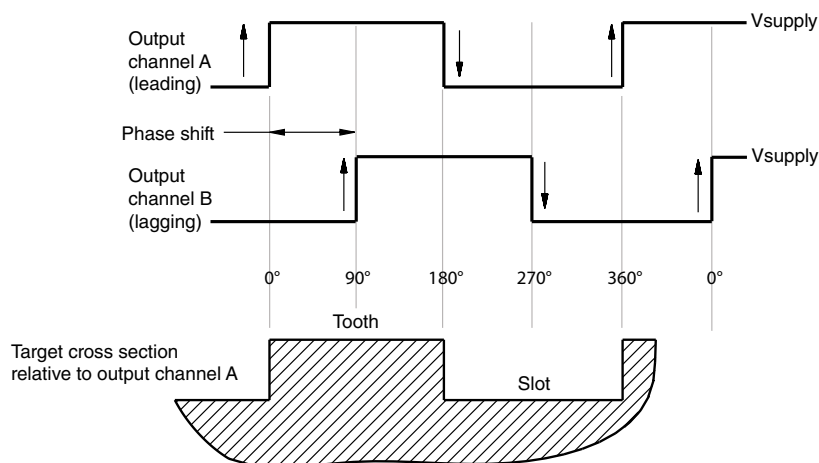
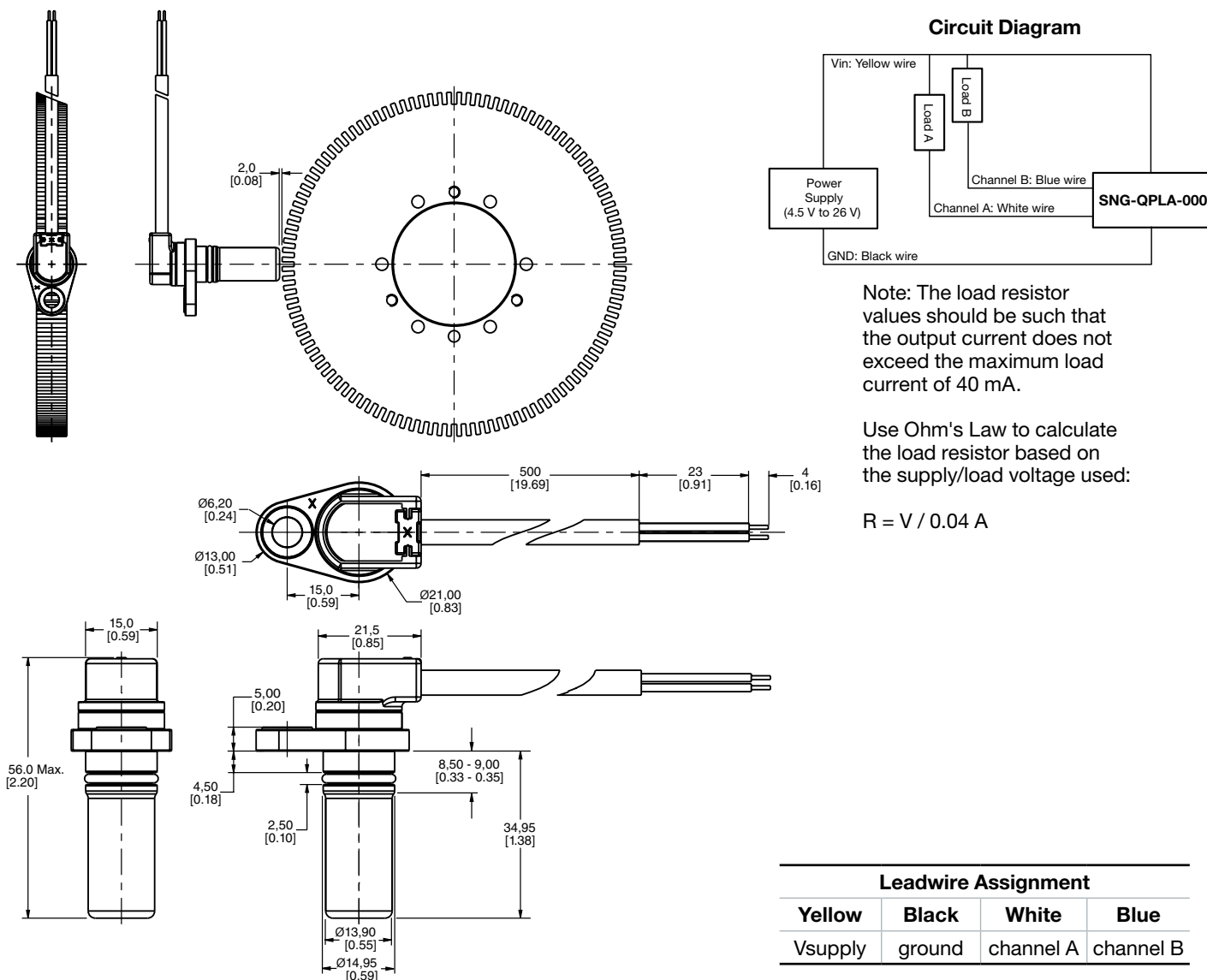
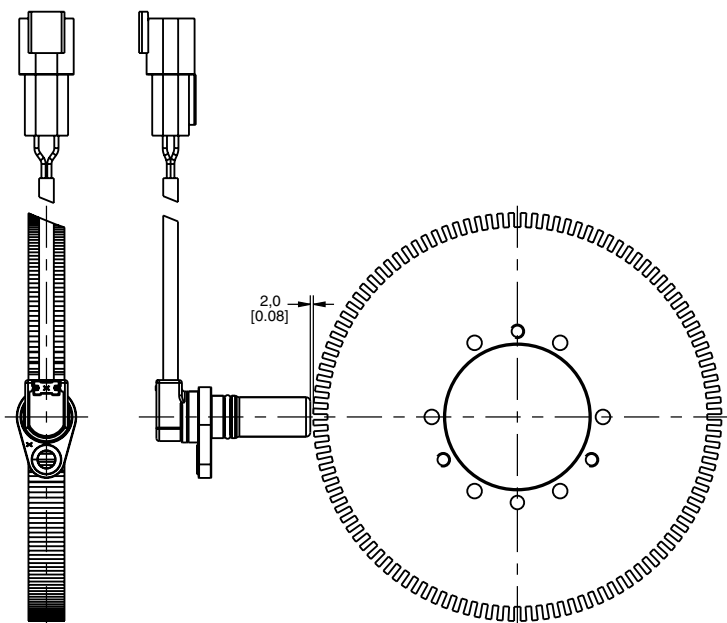


Figure 2. SNG-QPLA-000 Mounting Dimensions (For reference only: mm/[in.]) (Available now.)

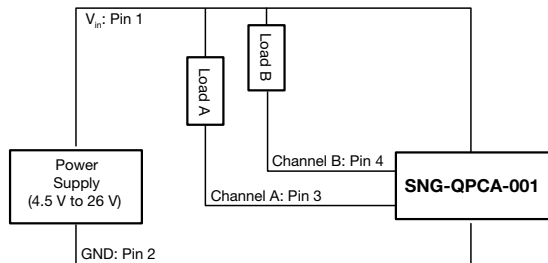


# Quadrature Speed and Direction Sensors, SNG-Q Series

Figure 3. SNG-QPCA-001 Mounting Dimensions (For reference only: mm/[in.]) (Available now.)



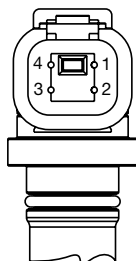
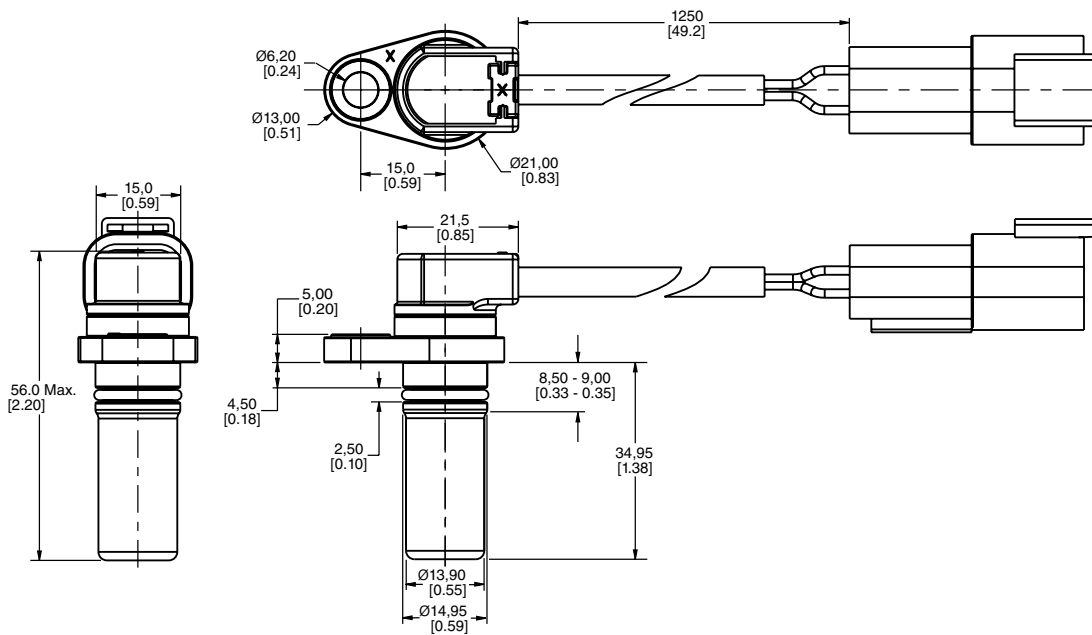
### Circuit Diagram



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:

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

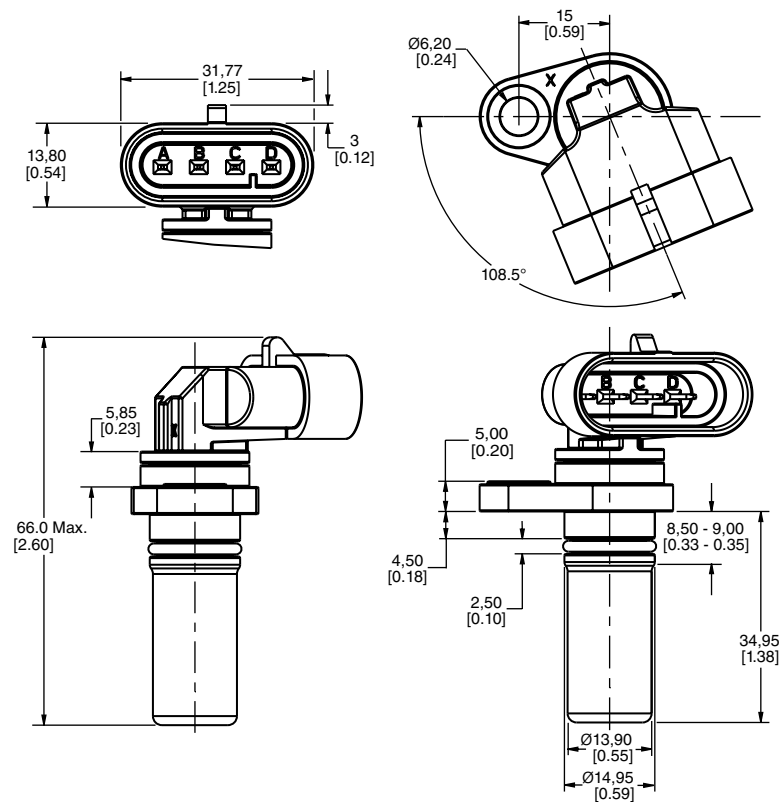
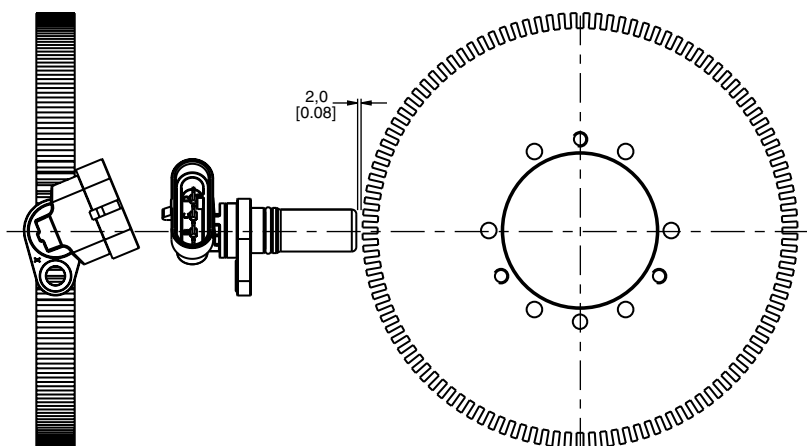


### Deutsch DTM04-4P Pinout (mating connector Deutsch DTM06-4S)

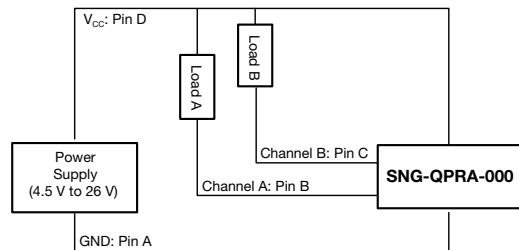
| 1   | 2      | 3         | 4         |
|-----|--------|-----------|-----------|
| Vin | ground | channel A | channel B |

# 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:

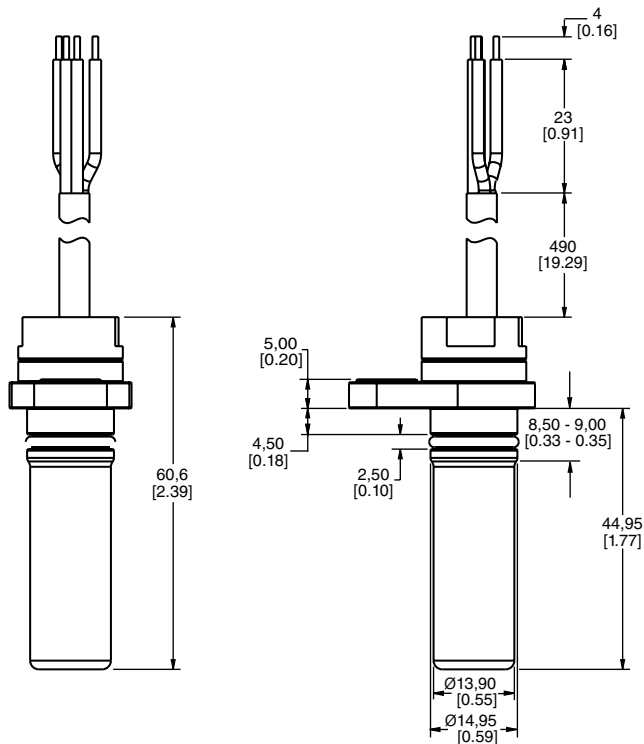
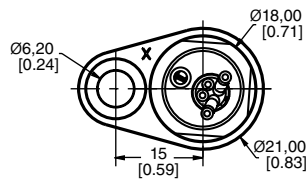
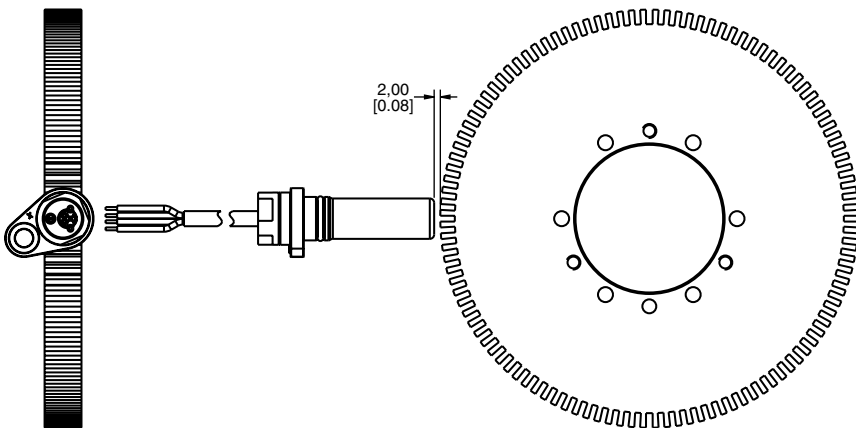
$$R = V / 0.04 \text{ A}$$

### Amp Superseal 1.5 Connector Pinout (mating connector 282088)

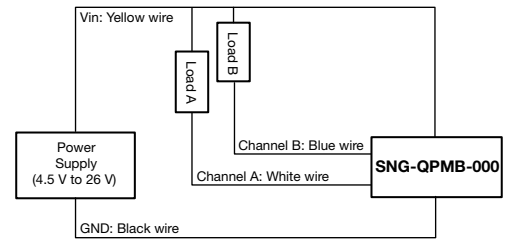
| A      | B         | C         | D               |
|--------|-----------|-----------|-----------------|
| ground | channel A | channel B | V <sub>cc</sub> |

# 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:

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

| Leadwire Assignment |        |           |           |
|---------------------|--------|-----------|-----------|
| Yellow              | Black  | White     | Blue      |
| Vsupply             | ground | channel A | channel B |

## ADDITIONAL INFORMATION

The following associated literature is available on the Honeywell web site at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product Range Guide
- Product Line Guide
- Product Installation Instructions
- Technical Information

For SNG-QPLA-000, SNG-QPCA-001, SNG-QPRA-000  
(Available now.)

### **⚠ WARNING**

#### **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING**

#### **MISUSE OF DOCUMENTATION**

- The information presented in this datasheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

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For SNG-QPMB-000 (Coming soon.)

### **NOTICE**

#### **EVALUATION PRODUCTS**

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# Preliminary

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