Honeywell

# 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 ºC to 150 ºC [-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
-

# 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.

| **SNG-Q** | **P** | **L** | **A** | - | **000** |
|---|---|---|---|---|---|
| Series | Housing Material[1] | Connection Type[2] | Housing Length | | For Internal Use Only |

4-wire quadrature speed and direction sensor

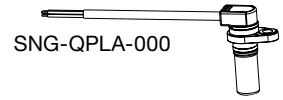
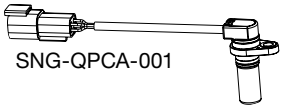
| | |
|---|---|
| **P** | Plastic |

| | |
|---|---|
| **S** | Integral Amp Superseal 1.5 connector, straight exit[3] |
| **R** | Integral Amp Superseal 1.5 connector, right angle exit |
| **L** | 500 mm [19.7 in] cable with leads, right angle exit |
| **M** | 500 mm [19.7 in] cable with leads, straight exit (coming soon) |
| **C** | 1,25 m [49.2 in] cable with Deutsch DTM04-MP connector, right angle exit |
| **D** | 1,25 m [49.2 in] cable with Deutsch DTM04-MP connector, straight exit (coming soon)[3] |

| | |
|---|---|
| **A** | 35 mm [1.38 in] |
| **B** | 45 mm [1.77 in] (coming soon) |

[1] Contact Honeywell for other Housing Material options.
[2] Other cable lengths available upon request.
[3] Contact Honeywell.

**Table 2. Electrical Specifications**

| | Parameter | | |
|---|---|---|---|
| | **Available Now** | **Coming Soon** | **Comment** |
| | SNG-QPLA-000  SNG-QPCA-001  SNG-QPRA-000  | SNG-QPMB-000  | |
| 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. |
| duty cycle[1] | 50% ±10% | 50% ±10% | Dependent on target geometry and sensor-to-target orientation; see Figures 2, 3, 4, 5 for recommended orientation. |
| phase shift | 90° ±45° | 90° ±45° | Dependent on target geometry and sensor-to-target orientation; see Figures 2, 3, 4, 5 for recommended orientation. |
| 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 |
| rise time | 10 µs max. | 10 µs max. | 1 kOhm pull-up resistor, dependent on load resistor. |
| fall time | 5 µs max. | 5 µs max. | 1 kOhm pull-up resistor, dependent on load resistor. |
| frequency | 3 Hz to 20 kHz | 3 Hz to 20 kHz | Frequencies >10 kHz may be dependent on target geometry and air gap. |
| 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 |

[1]Duty cycle = Time high/time total.

**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 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**

| Character-istic | Parameter | |
|---|---|---|
| | **SNG-QPLA-000<br>SNG-QPRA-000<br>SNG-QPCA-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[1]<br>slot width[2]<br>tooth width[2]<br>tooth height[3] | <br>>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. | <br>>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><br>cable[5] | <br>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 | <br>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[4]<br>torque | <br>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 | <br>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 |

[1]Narrower targets may limit axial offsets.
[2]Other geometry may be suitable.
[3]Shorter tooth heights may limit maximum air gap performance.
[4]Application dependent.
[5]Applies to SNG-QPLA-001, SNG-QPCA-001, SNG-QPMB-001.

**Figure 1. Sensor Output (All catalog listings)**

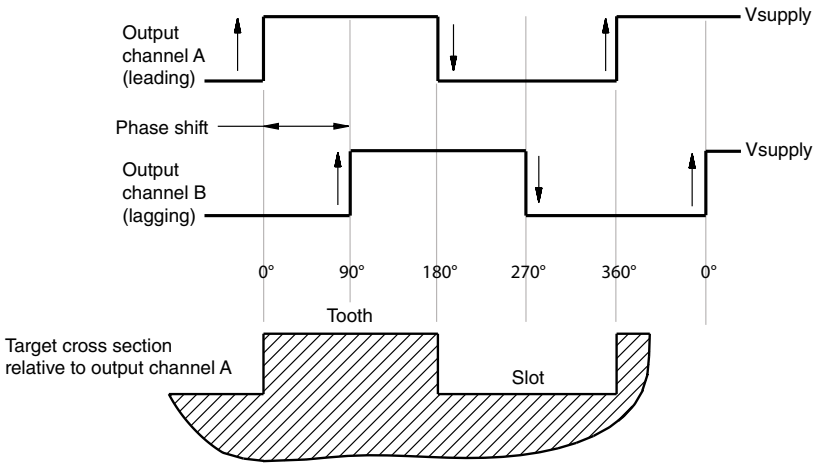
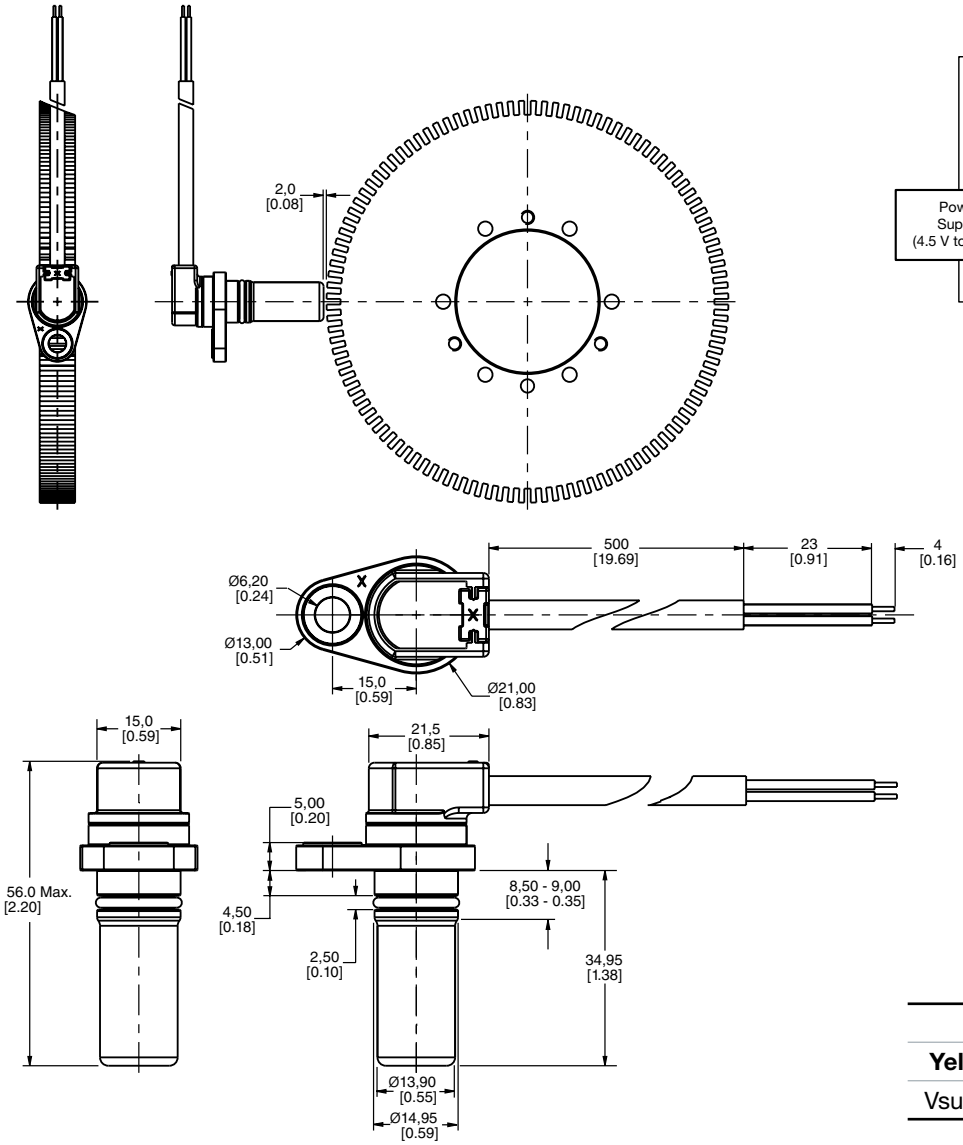
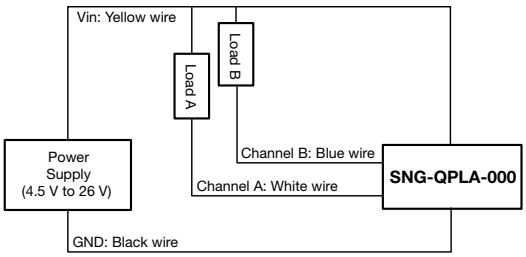



**Figure 2. SNG-QPLA-000 Mounting Dimensions (For reference only: mm/[in].) (Available now.)**




**Circuit Diagram**



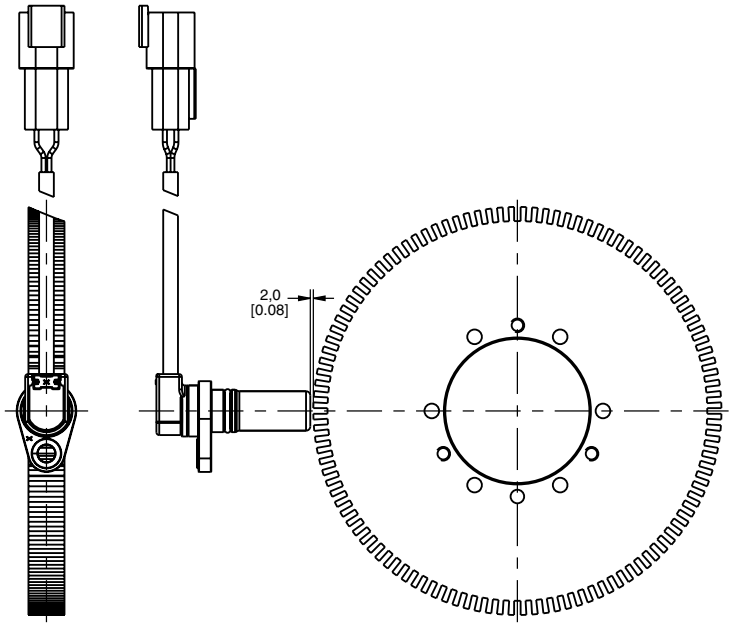

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

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

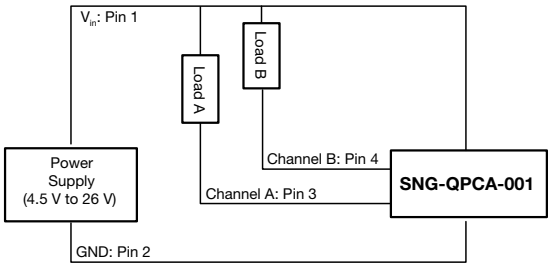
R = V / 0.04 A

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

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



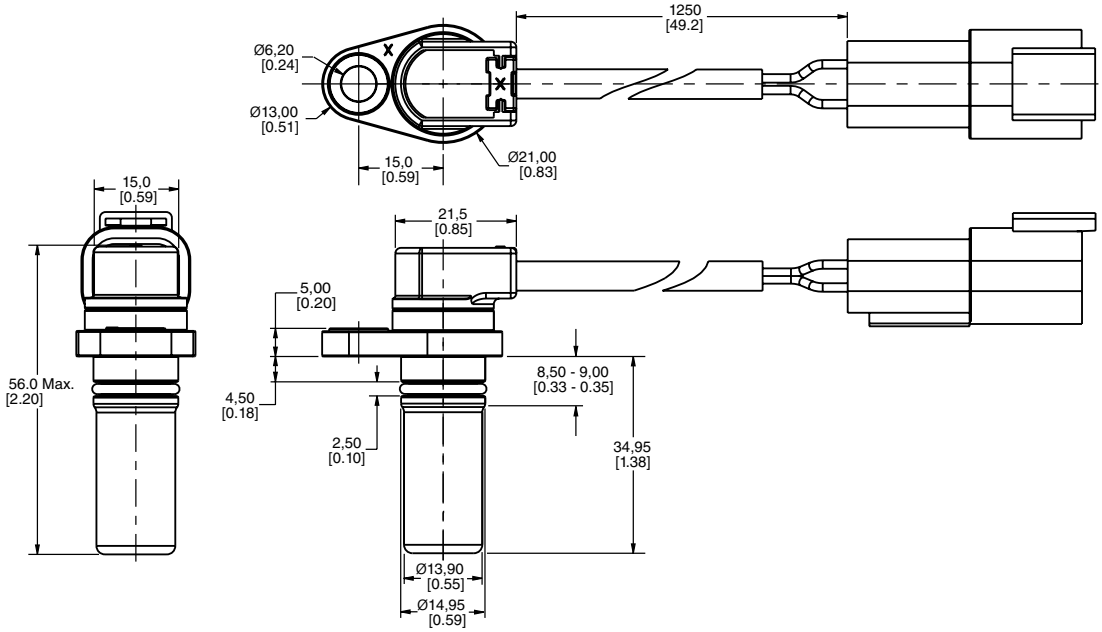

**Circuit Diagram**

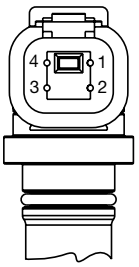



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

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

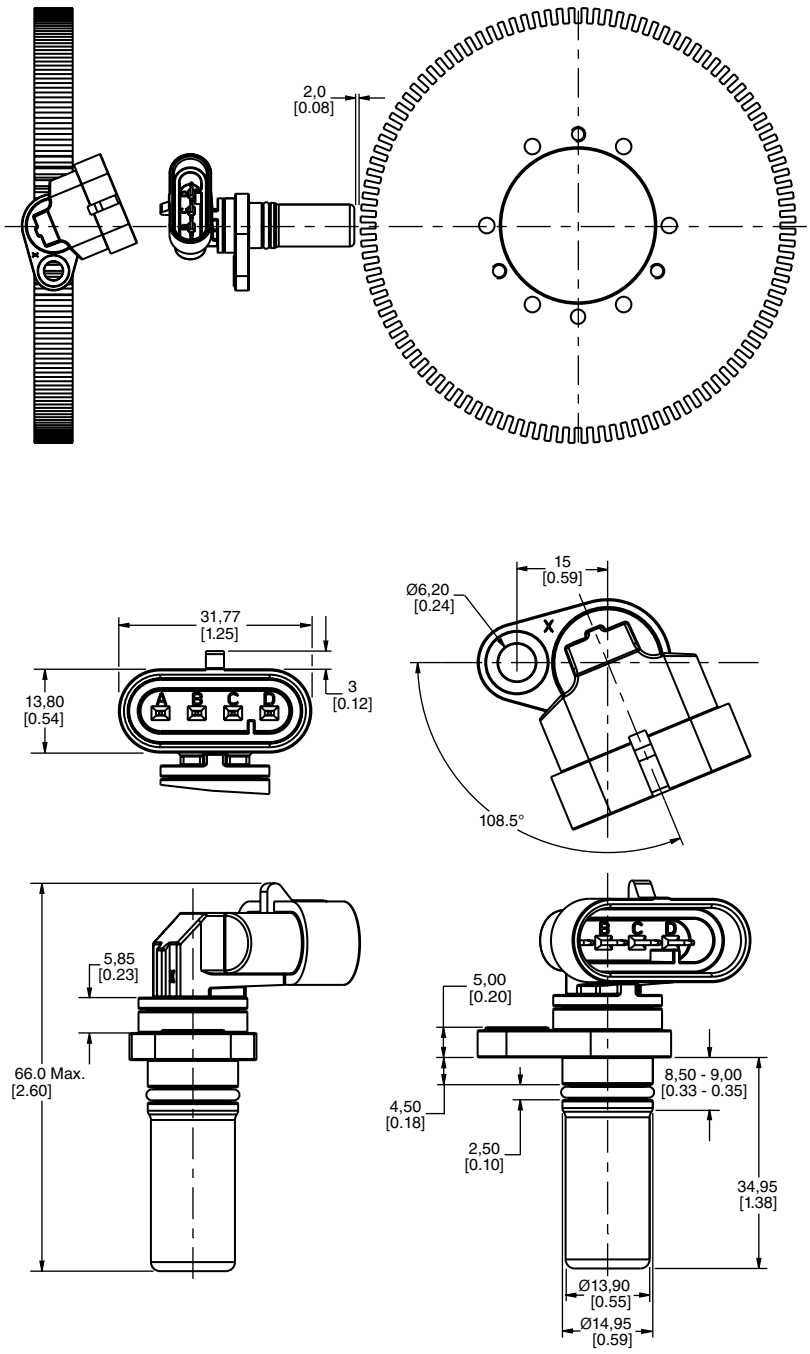
R = V / 0.04 A



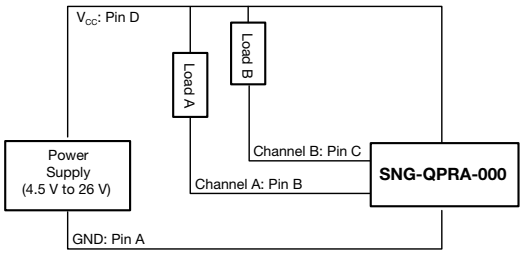




| Deutsch DTM04-4P Pinout (mating connector Deutsch DTM06-4S) | | | |
|---|---|---|---|
| **1** | **2** | **3** | **4** |
| Vin | ground | channel A | channel B |

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




**Circuit Diagram**



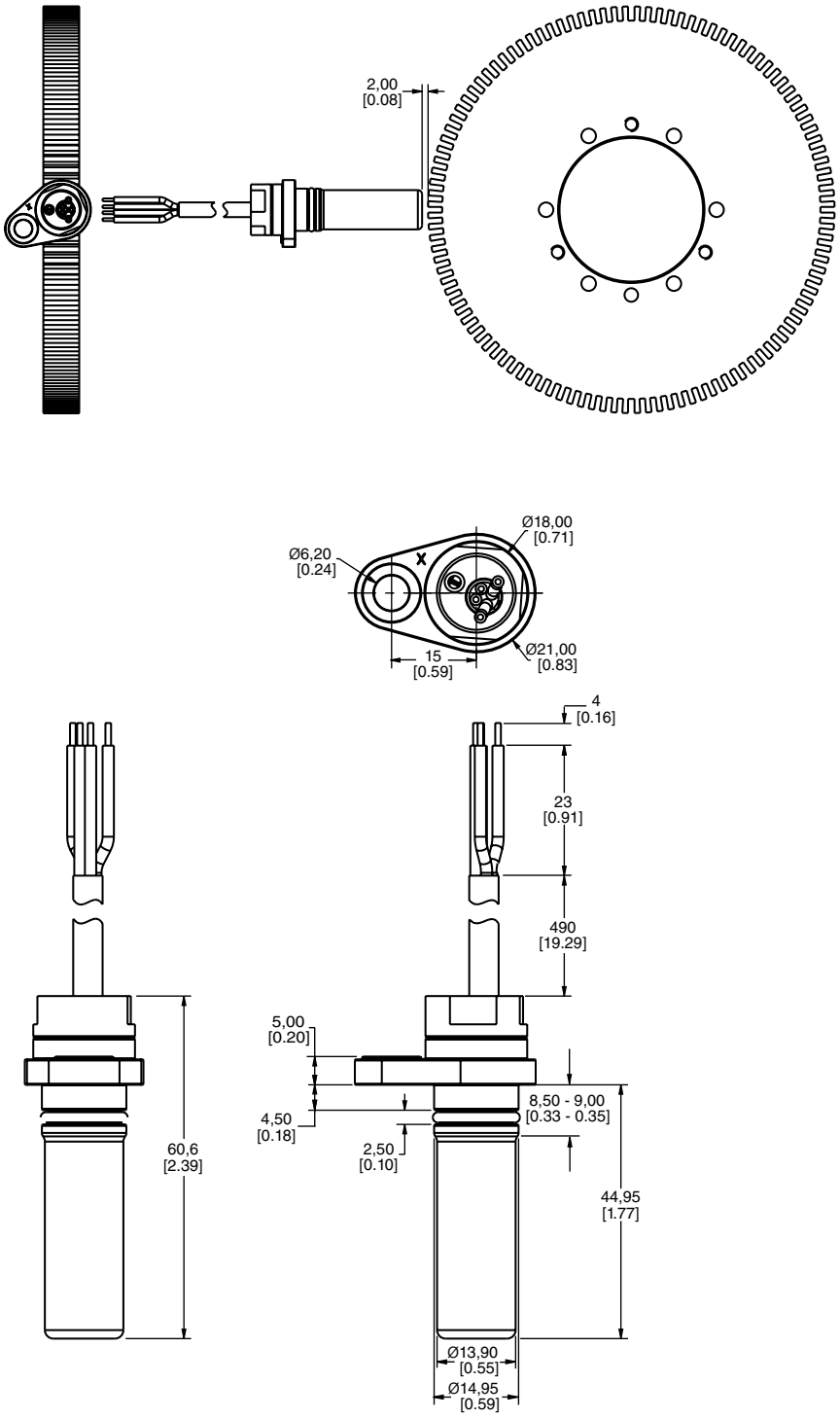

Note: The load resistor values should be such that the output current does not exceed the maximum load current of 40 mA.

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

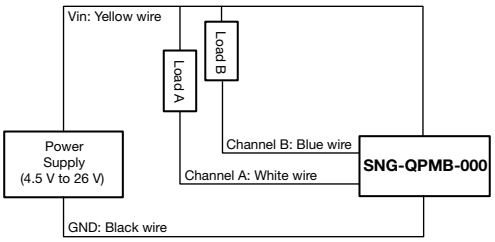
R = V / 0.04 A

| Amp Superseal 1.5 Connector Pinout (mating connector 282088) | | | |
|---|---|---|---|
| **A** | **B** | **C** | **D** |
| ground | channel A | channel B | $V_{cc}$ |

**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 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:

- 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.**

**For SNG-QPMB-000 (Coming soon.)**

## NOTICE

### EVALUATION PRODUCTS

**THESE PRODUCT ARE PROTOTYE PREPRODUCTION ITEMS THAT HAVE YET TO COMPLETE ALL PHASES OR PRODUCT RELEASE TESTING AND ARE FOR CUSTOMER EVALUATION ONLY.**

**THESE ITEMS ARE SOLD “AS IS” WITHOUT WARRANTY EXPRESS OR IMPLIED, INCLUDING THAT OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

**IN NO EVENT WILL HONEYWELL BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL OR DIRECT DAMAGES.**

# 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.**

Honeywell