

# SNDH-T SERIES

000641  
Issue 4

## Quadrature Speed and Direction Sensors

### DESCRIPTION

The SNDH-T Series is a dual differential Hall-effect sensor that provides speed and direction information using a quadrature output with signals 90° phase shifted from each other. Target direction is determined by output lead/lag phase shifting. This product is designed for applications where extremely high resolution is required at wide frequency ranges, 1 kHz to 15 kHz, and large air gaps. BiCMOS (bipolar complementary metal-oxide-semiconductor). Hall-effect technology, using advanced digital signal processing for dynamic off-set cancellation, provides enhanced air gap performance and phase shift accuracy over most conditions.

Unique patented (pending) IC (integrated circuit) packaging provides output phase shift tolerancing with enhanced accuracy. The robust package is automotive under-the-hood grade for most environmental conditions, as well as EMI (electromagnetic interference) hardened. Multiple connection options are available. Package design includes an O-ring seal for pressure applications and a fixed mounting flange.

### FEATURES

- Hall-effect magnetic sensing technology
- Dual differential Hall provides enhanced target resolution
- Advanced performance dynamic offset self calibration
- Air gap up to 2 mm [0.08 in]
- Near zero speed
- Automotive under-the-hood packaging integrity
- EMI hardened
- High frequency switching capability: 1 Hz to 15 kHz
- Wide operating temperature range: -40°C to 150°C [-40°F to 302°F]
- Multiple connector options
- Short circuit protection
- Reverse voltage protection
- Open collector output
- Low jitter output
- O-ring seal

### POTENTIAL TRANSPORTATION APPLICATIONS

- Steering position
- Tachometers/counters
- Encoders
- Speed and direction of gears and shafts in transmissions, hydraulic motors, pumps, and gear boxes

SNDH-T4C-G01



SNDH-T4L-G01



SNDH-T4P-G01



SNDH-T4P-G02



### PORTFOLIO

The SNDH-T Series joins the SND-Q Series speed and direction sensors. For speed only sensors, see the SNDH-H Series, LCZ Series, ZH10 Series.

## QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

**TABLE 1. ELECTRICAL SPECIFICATIONS**

CHARACTERISTIC	PARAMETER	COMMENT
Voltage: supply	4.5 V to 18 V	—
max. continuous supply	18 V	—
Output signal: type	square wave	Two channel, phase shifted by 90° either channel, may lead or lag/push/pull.
duty cycle <sup>1</sup>	50% ±10%	
phase shift	90° ±20°	See Figures 2, 3, 4, 5 for recommended orientation.
high	≥Vs - 0.5 V	Using recommended target tooth/slot <sup>2</sup> .
low	≤0.5 V	See Figures 2, 3, 4, 5 for recommended orientation.
load current	20 mA max.	Applies to each output at all conditions.
rise time	10 us max.	Dependent on load resistor.
fall time	1 us max.	—
frequency	1 Hz to 15 kHz	Frequencies >10 kHz may be dependent on target geometry and air gap.
Short circuit protection	80 mA max.	all conditions
Supply current: normal	12 mA	all conditions
max.	18 mA	
Reverse voltage	-18 V max.	continuous

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

<sup>2</sup>≥Vpull - up - 0.5 V if not the same as Vs..

**TABLE 2. MECHANICAL SPECIFICATIONS**

CHARACTERISTIC	PARAMETER
Sensing air gap	0,0 mm to 2,0 mm [0.0 in to 0.08 in]
Target: width <sup>1</sup>	>5,0 mm [0.20 in] recommended; 12,7 mm [0.5 in] typ.
slot width <sup>2</sup>	2,0 mm [0.08 in] recommended
tooth width <sup>2</sup>	2,0 mm [0.08 in] recommended
tooth height <sup>3</sup>	>3,0 mm [0.12 in] recommended; 5,0 mm [0.20 in] typ.
Sensor misposition to target	±1.5 mm
Materials: insert	plastic Valox® K4560
housing	304 stainless steel
bushing	brass
O-ring	fluorocarbon (Viton™)
cable <sup>5</sup>	EVA, four conductor, 36AWG, 28 strand, Ø5,2 mm [Ø0.20 in] jacket
Mounting: bore size <sup>4</sup>	Ø15,05 mm to Ø15,15 mm [Ø0.60 in to Ø0.61 in]
torque	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.

# QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

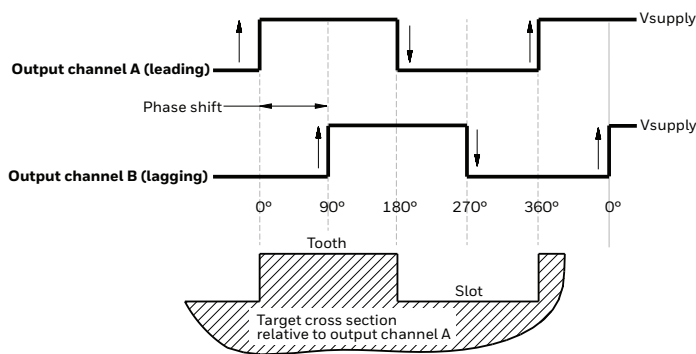
**TABLE 3. ENVIRONMENTAL SPECIFICATIONS**

CHARACTERISTIC	CONDITION	PARAMETER
EMI:		
radiated immunity	400 Hz to 2 GHz	100 V/m
bulk current injection	20 MHz to 400 MHz	60 mA
ESD	against the connector (150 pF, 330 Ohm)	16 kV air and 8 kV contact
fast transient burst	EN 60947-5-2/A1:2012	EN61000-4-4 Level 4
Operating temperature	continuous	-40°C to 150°C [-40°F to 302°F]
Thermal shock, air to air	0.5 hr dwell, <105 transition	-40°C to 150°C [-40°F to 302°F]
Humidity	95% humidity at 90°C [194°F]	168 hr
Salt fog	DIN IEC 6872-11	96 hr
Thermal saline dunk	105°C to 0°C [221°F to 32°F] air to liquid, 5% saline	5 dunks
High temperature exposure with power	—	1000 hr at 150°C [302°F]
Mechanical shock	—	50 g
Vibration	—	30 g, 10 Hz to 2 kHz
Sensor degree of protection	—	IP69K
Resistance to fluids	—	general under-the-hood automotive fluids

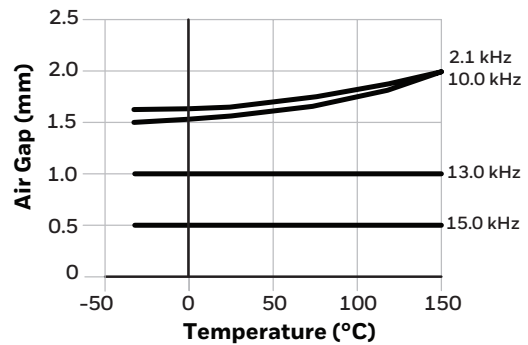
**TABLE 4. CATALOG LISTINGS**

CATALOG LISTING	DESCRIPTION
SNDH-T4C-G01	SNDH-T Series, quadrature speed and direction sensor, stainless steel housing, 45 mm [1.77 in] housing length, integral connector, straight exit,
SNDH-T4L-G01	SNDH-T Series, quadrature speed and direction sensor stainless steel housing, 45 mm [1.77 in] housing length, 555 mm [21.85 in] cable with leads, straight exit,
SNDH-T4P-G01	SNDH-T Series, quadrature speed and direction sensor stainless steel housing, 45 mm [1.77 in] housing length, connector with 203,8 mm [8.02 in] cable, straight exit
SNDH-T4P-G02	SNDH-T Series, quadrature speed and direction sensor, stainless steel housing, 45 mm [1.77 in] housing length, connector with 555 mm [21.85 in] cable, straight exit,

**FIGURE 1. SENSOR OUTPUT**

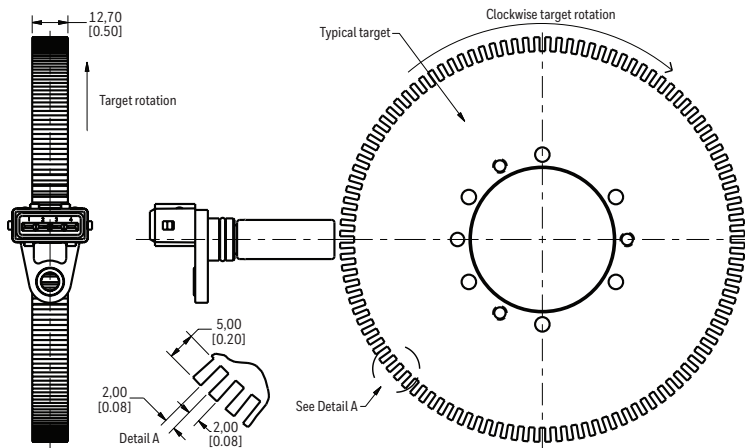


**FIGURE 2. TEMPERATURE AIR GAP FREQUENCY DERATING CURVE**

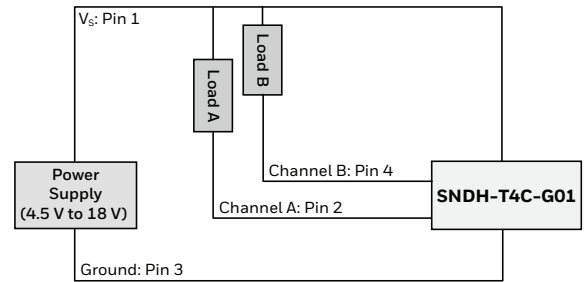


# QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

FIGURE 3. SNDH-T4C-G01 DIMENSIONAL DRAWINGS (FOR REFERENCE ONLY: MM [IN]).



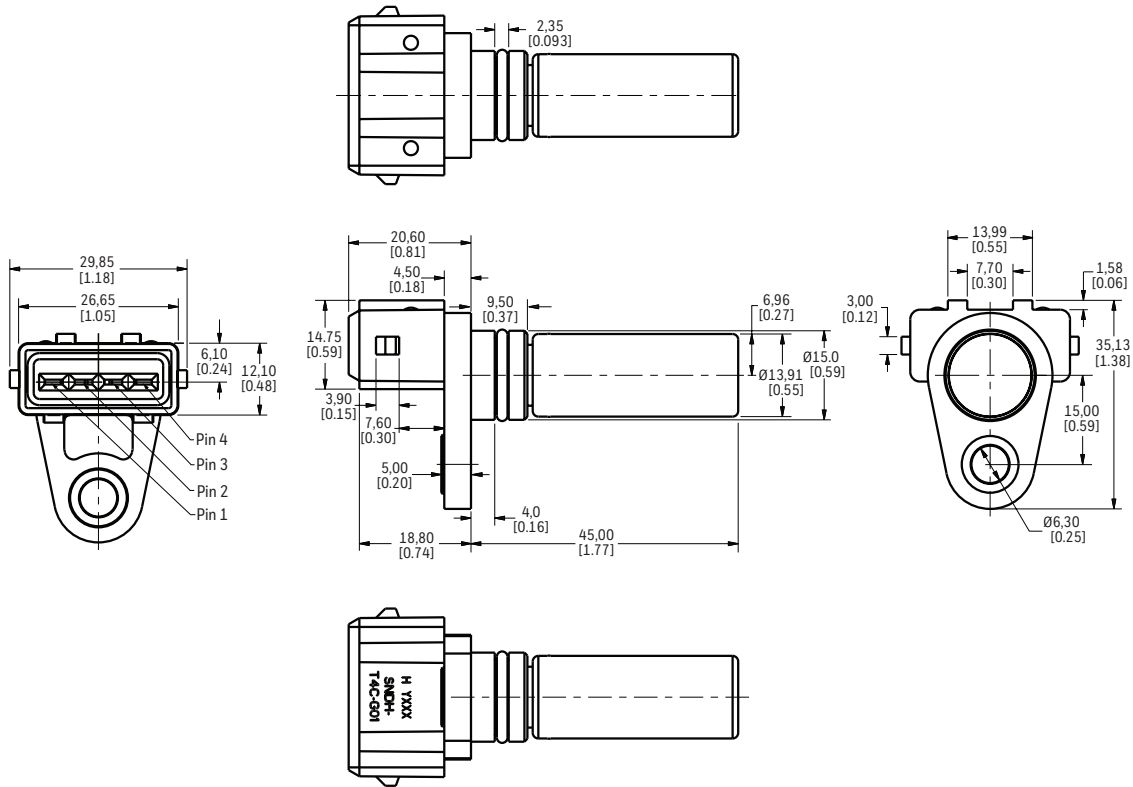
## Circuit Diagram



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 20 mA.

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

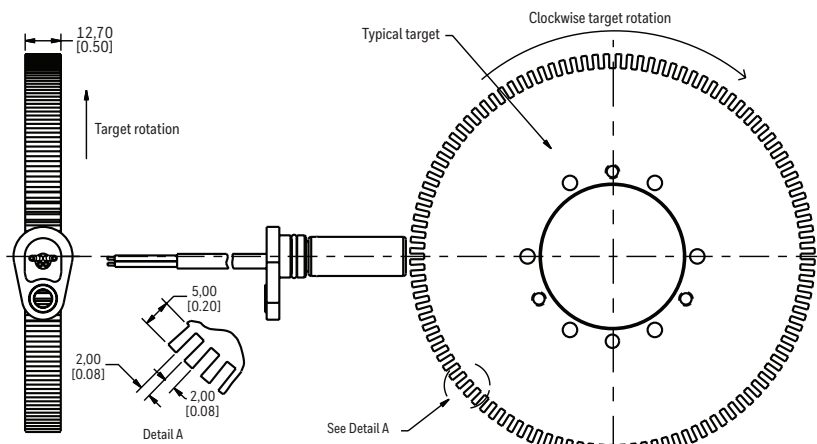
$$R = V / 0.04 \text{ A}$$



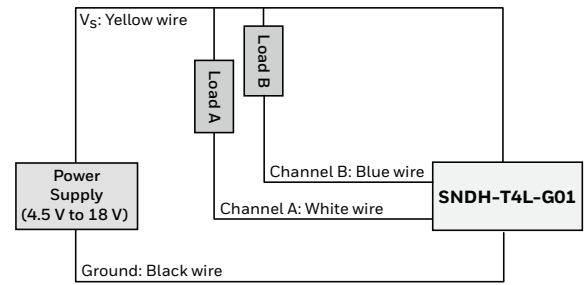
PINOUT (Mating connector: AMP C-282192)			
Pin 1	Pin 2	Pin 3	Pin 4
(+)	Channel A	(-)	Channel B

# QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

FIGURE 4. SNDH-T4L-G01 DIMENSIONAL DRAWINGS (FOR REFERENCE ONLY: MM [IN.] )



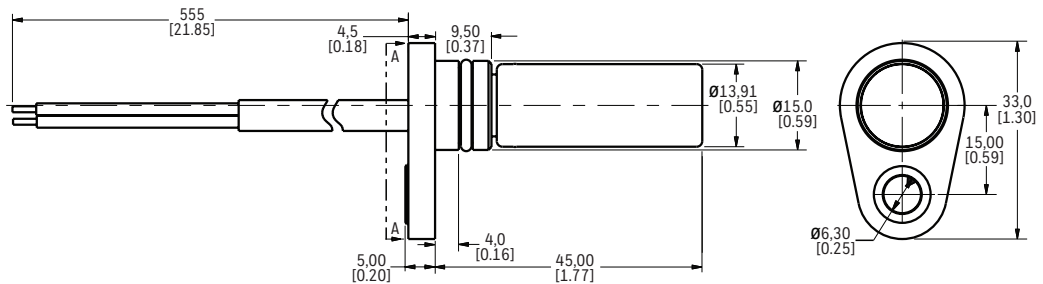
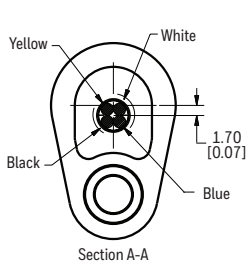
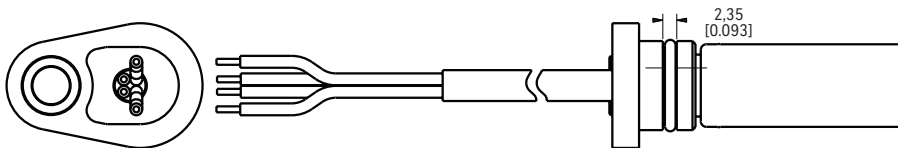
## Circuit Diagram



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 20 mA.

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

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

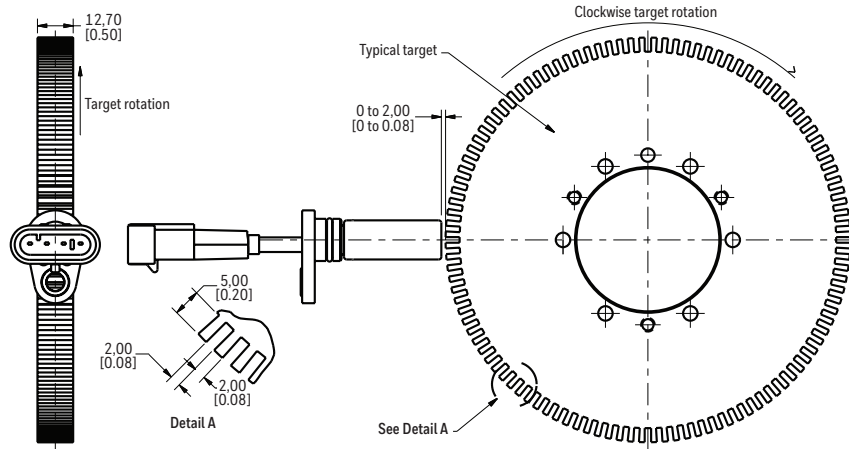


## LEADWIRE ASSIGNMENT

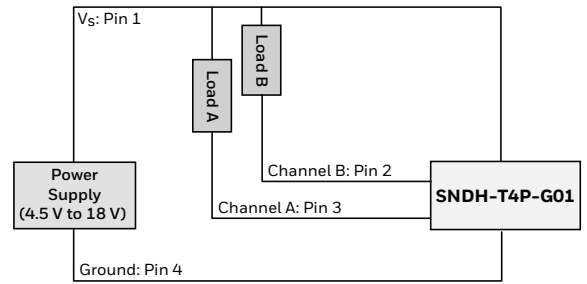
Yellow	Black	White	Blue
(+)	(-)	Channel A	Channel B

# QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

FIGURE 5. SNDH-T4P-G01 DIMENSIONAL DRAWINGS (FOR REFERENCE ONLY: MM [IN].)



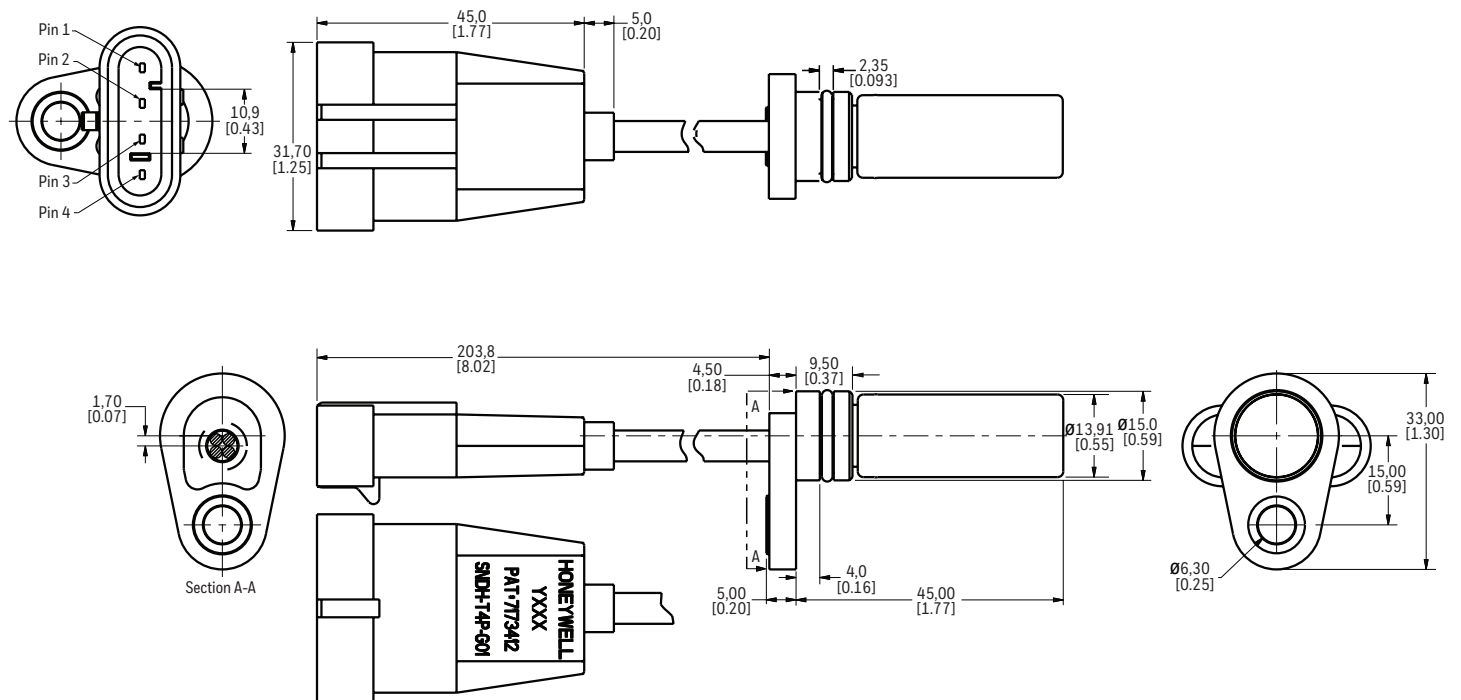
## Circuit Diagram



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 20 mA.

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

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



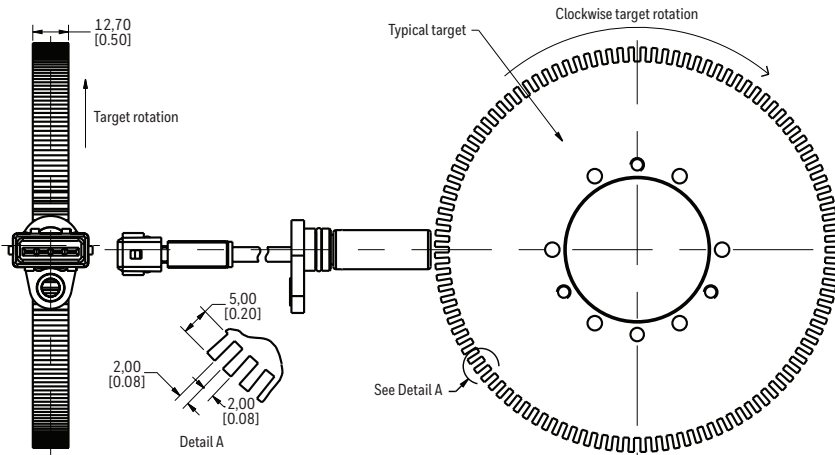
## PINOUT

(Mating connector: AMP SuperSeal 282088)

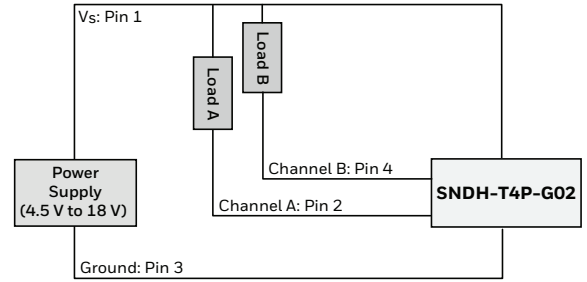
Pin 1	Pin 2	Pin 3	Pin 4
(+)	Channel B	Channel A	(-)

# QUADRATURE SPEED AND DIRECTION SENSORS, SNDH-T SERIES

FIGURE 6. SNDH-T4P-G02 DIMENSIONAL DRAWINGS (FOR REFERENCE ONLY: MM [IN].)



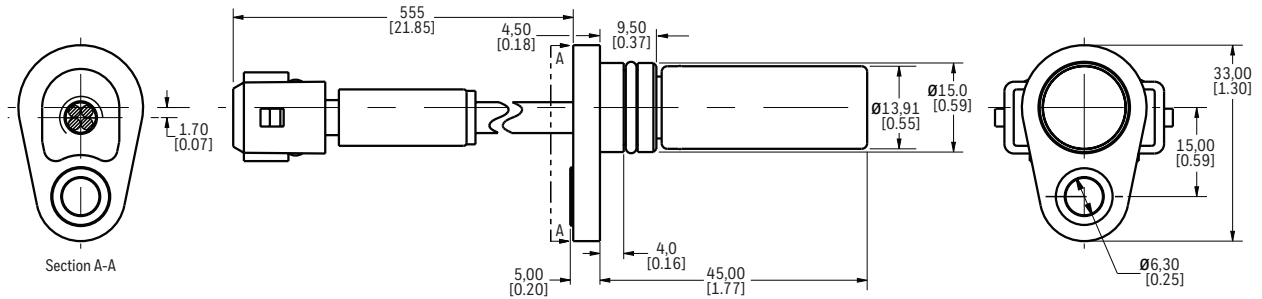
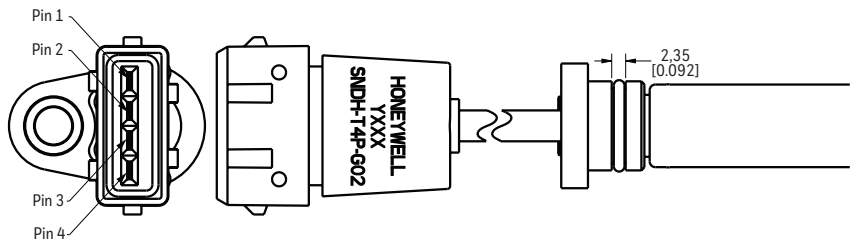
## Circuit Diagram



Note: The load resistor values should be such that the output current does not exceed the maximum load current of 20 mA.

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

$$R = V / 0.04 A$$



PINOUT (Mating connector: AMP C-282192)			
Pin 1	Pin 2	Pin 3	Pin 4
(+)	Channel A	(-)	Channel B

## ADDITIONAL MATERIALS

The following associated literature is available at [sensing.honeywell.com](http://sensing.honeywell.com):

- Product range guide
- Installation instructions
- Application note

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

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