

## SNDH-T Series

### Quadrature General Industrial Speed and Direction Sensors



#### DESCRIPTION

The SNDH-T Series is a dual differential hall 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.

#### 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)
- -40 °C to 150 °C [-40 °F to 302 °F] continuous operating temperature
- Multiple connector options
- Short circuit protection
- Reverse voltage protection
- Open collector output
- Low jitter output
- O-ring seal

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, including wire harness and integral connector versions using AMP super seal or AMP Jr. Timer connectors, are available. Package design includes an o-ring seal for pressure applications and a fixed mounting flange.

#### POTENTIAL APPLICATIONS

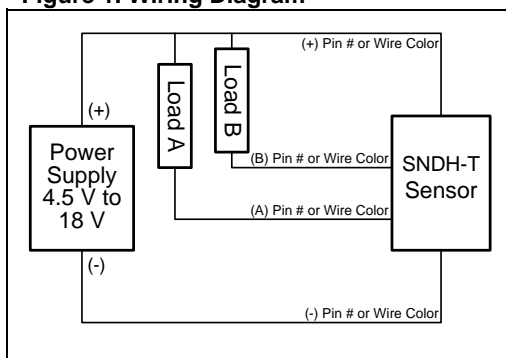
- Steering position
- Tachometers/counters
- Encoders
- Speed and direction of gears and shafts in transmissions, hydraulic motors, pumps, and gear boxes

# SNDH-T Series

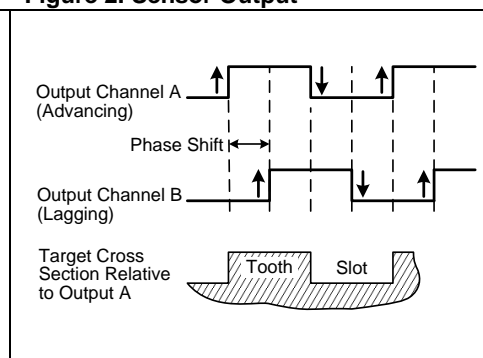
**Table 1. Specifications**

| Characteristic                 | Parameter                                | Note  |
|--------------------------------|--|---|
| Sensing air gap                | 0 mm to 2,0 mm [0 in to 0.08 in]         | may achieve larger gaps with testing of actual target                           |
| Target tooth width             | 2,0 mm [0.08 in] (recommended)           | other geometry may be suitable  |
| Target slot width              | 2,0 mm [0.08 in] (recommended)           | other geometry may be suitable  |
| Tooth height                   | >3,0 mm [0.12] (recommended)             | shorter tooth heights may limit max. air gap performance                        |
| Target width                   | >5,0 mm [0.20] (recommended)             | narrow targets may limit axial offsets  |
| Sensor misposition to target   | ±1,5 mm [0.06]                           | dependent on target geometry  |
| EMI radiated immunity          | 100 V/m peak                             | 400 Hz to 2 GHz   |
| EMI bulk current injection     | 60 mA                                    | 20 MHz to 400 MHz   |
| EMI ESD                        | 16/8 KV air/contact                      | against the connector (150 pF, 330 Ohm)   |
| EMI fast transient burst       | EN61000-4-4 Level 4                      | —   |
| Operating temperature          | -40 °C to 150 °C [-40 °F to 302 °F]      | continuous  |
| Thermoshock                    | -40 °C to 150 °C [-40 °F to 302 °F]      | —   |
| Humidity                       | 168 hr                                   | 95% humidity at 90 °C [194 °F]  |
| Salt fog                       | 96 hr                                    | DIN IEC 6872-11   |
| Thermosaline dunk              | 5 dunks                                  | 105 °C to 0 °C [221 °F to 32 °F] air to liquid, 5% saline                       |
| High temp exposure with power  | 1000 hr at 150 °C [302 °F]               | —   |
| Mechanical shock               | 50 g                                     | —   |
| Vibration                      | 30 g, 10 Hz to 2 kHz                     | —   |
| Resistance to fluids           | general automotive under the hood fluids | —   |
| Supply voltage                 | 4.5 V to 18 V                            | —   |
| Max. continuous supply voltage | 18 V                                     | —   |
| Reverse voltage                | -18 V max.                               | continuous  |
| Current (normal)               | 13.6 mA                                  | all conditions  |
| Current (max.)                 | 18 mA                                    | all conditions  |
| Short circuit protection       | 80 mA                                    | —   |
| Output signal type             | square wave                              | two channel, phase shifted by 90°, either channel can lead or lag, push/pull    |
| Duty cycle                     | 50% ±10%                                 | —   |
| Phase shift                    | 90° ±20°                                 | using recommended target tooth/slot   |
| Output high                    | ≥Vs -0.5 V                               | —   |
| Output low                     | ≤0.5 V                                   | —   |
| Load current                   | 20 mA max.                               | each output at all conditions   |
| Output low                     | ≤0.5 V                                   | —   |
| Rise time                      | 10 μs typ.                               | dependent on load resistor  |
| Fall time                      | 1 μs typ.                                | —   |
| Frequency                      | 1 Hz to 15 kHz                           | higher frequencies about 10 kHz may be dependent on target geometry and air gap |

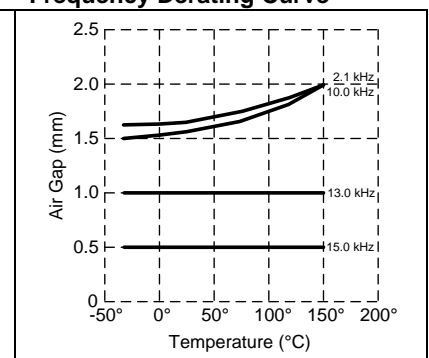
**Figure 1. Wiring Diagram**



**Figure 2. Sensor Output**

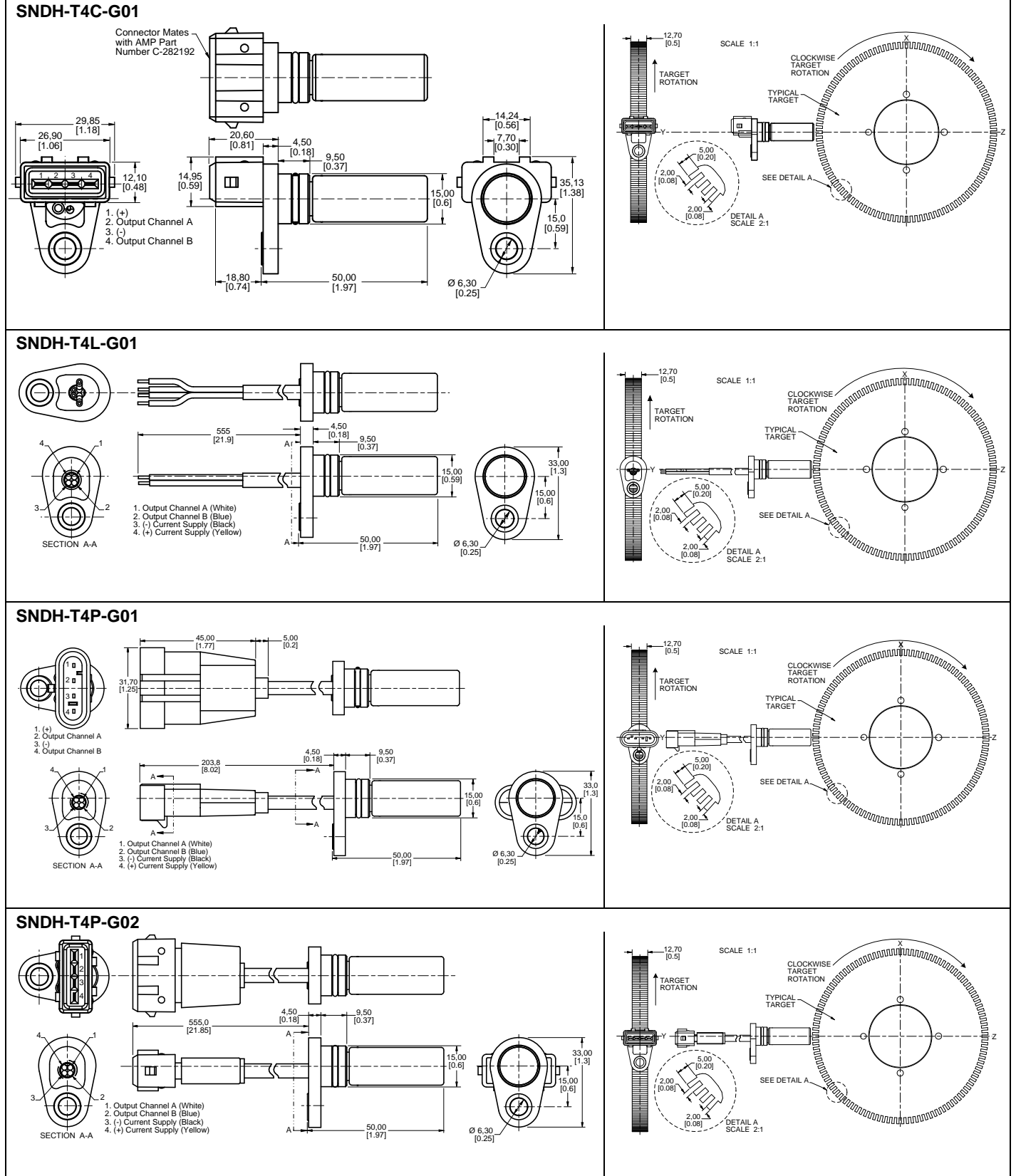


**Figure 3. Temperature Air Gap Frequency Derating Curve**



# Quadrature Speed and Direction Sensors

Figure 4. Mounting Dimensions and General Mounting Geometry (For reference only: mm [in.] )



## ORDERRDER GUIDE

| Catalog Listing | Description   |
|-----------------|---|
| SNDH-T4C-G01    | SNDH-T Series, dual hall speed and position sensor, 4 wire output, connector                          |
| SNDH-T4L-G01    | SNDH-T Series, dual hall speed and position sensor, 4 wire output, leadwire                           |
| SNDH-T4P-G01    | SNDH-T Series, dual hall speed and position sensor, 4 wire output, pigtail with rectangular connector |
| SNDH-T4P-G02    | SNDH-T Series, dual hall speed and position sensor, 4 wire output, pigtail with oval connector        |

### **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.**

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### **WARNING**

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- The information presented in this product sheet 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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