Bi-Directional, Dual Channel, Hall Effect Speed Sensors

AI-Tek Bi-directional, zero velocity sensors are self-calibrating to the specific customer application and provide two independent frequency outputs and a direction signal output to indicate change in direction of the sensed, ferrous target.

The Bi-directional sensor can also be referred to as a dual channel sensor since it utilizes two Hall effect sensing elements, physically offset from each other. Each element generates a single channel of target information, identical in frequency and polarity, but offset in the time domain (phase shifted). Special circuits inside the sensor are designed to calibrate each channel to its application target, then analyze these two channels of information for a phase lead / lag condition. The direction output will then provide a logic 1 level for clockwise or a logic 0 for counterclockwise rotation, assuming proper sensor orientation.

It is the customer's responsibility to determine whether the product is proper for customer's use and application.

Bi-Directional, Dual Channel, Hall Effect Speed Sensors

Specifications

Power Supply

Power Supply Voltage:
10 - 28 Vdc

Power Supply Current:
100 mA maximum

Outputs

Output Voltage:
Essentially square wave fanout to 10 TTL inputs

TTL Compatible: (See Figure 1)
40% to 60% duty cycle
Logic 0: +.6 Vdc maximum
Logic 1: +4 to +5.0 Vdc @ 5mA

Supply Tracking: (See Figure 2)
40% to 60% duty cycle
Logic 0: +.6 Vdc maximum
Logic 1: $V_O = \frac{V_S \times R_L}{R_L + 2.2k}$

Direction Logic:
Output high (Logic 1) with rotation toward notch

Output Impedance:
2.2K Ohms ±5%

Output Current:
20 mA sink max., 1.0 mA source max.

Reverse Battery Voltage: -30 Vdc

Rise/Fall Time: 5 mμ/3mμ typical

Mechanical

Target Frequency: 0 to 15 kHz

Target Performance:

DIAMETRAL PITCH	AIRGAP RANGE (Inches)
8	.051 - .160
10	.020 - .140
12	.010 - .120
20	.010 - .100
24	.005 - .050
32	.005 - .040

Environmental

Operating Temperature:
-40°C to +125°C

Thermal Shock:
100 cycles air to air (-40° to +130°C)
1 min. ramp time with 30 min. soak

Salt Spray:
Per MIL-STD-202, method 201, test cond. B,
5% NaCl for 48 hrs. No visible corrosion

Humidity:
92% RH@ 40°C for 90 hrs. No visible corrosion.

Dielectric Strength:
Per MIL-STD-202, method 301, 1000 Vrms
(60Hz) for 5 sec. leads to case. 1.0 mA max. leakage.

Insulation Resistance:
Per MIL-STD-202, method 302, 500 Vdc for 30
sec. leads to case. 100 mega-ohm min.

Vibration:
Per MIL-STD-202, resonant frequency search,
sine method 204, test cond. C&D (20g);
random method 214a, test cond. A&B (7.56g) for 15 min.

Shock:
Per MIL-STD-202, method 213b (sawtooth),
test cond. H&I (100g, 6 ms), 3 shocks,
mutually perpendicular planes

EMC:
Design principles consistent with BS/EN and MIL-STD's for EMC hardness

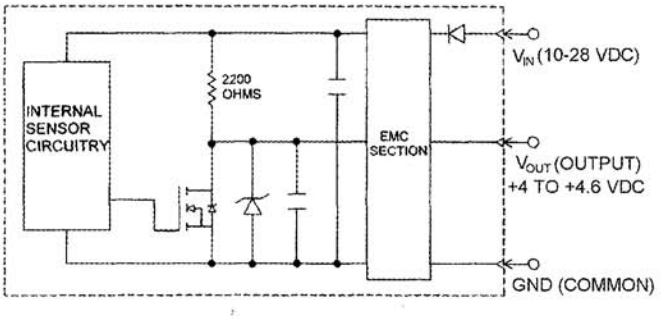
Materials

Housing:
300 series stainless steel

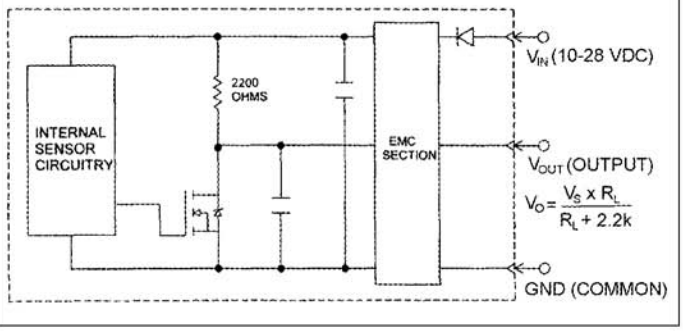
Cable:
AWG #22 Irradiated cross-linked polyolefin,
125°C, 5 lead wires

Channel phasing: 45° to 135°
Sensor must be aligned. Target rotation toward notch/flat results in Logic 1 direction output.

TTL Compatible Fig. 1



Supply Tracking Fig. 2

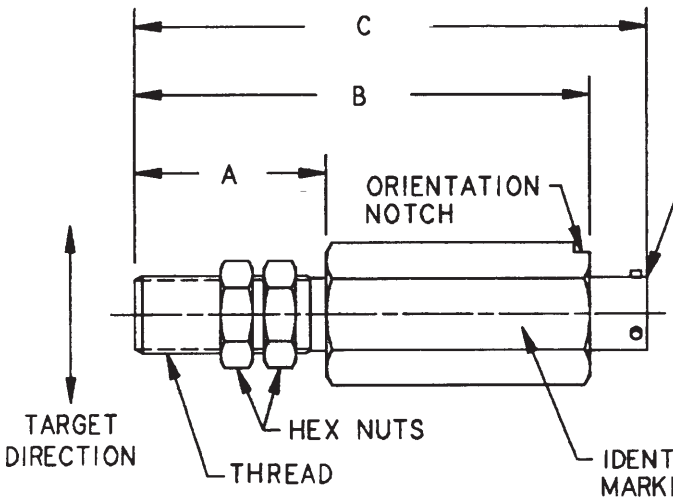


Note: Either output will work with any AI-Tek Tachometer.

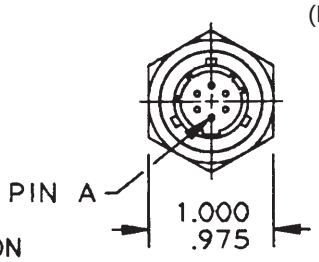
Bi-Directional, Dual Channel, Hall Effect Speed Sensors - 5/8 and 3/4 Threads

Bi-Directional, Hex Body with 6 Pin Connector

Net Weight: 9 oz. max



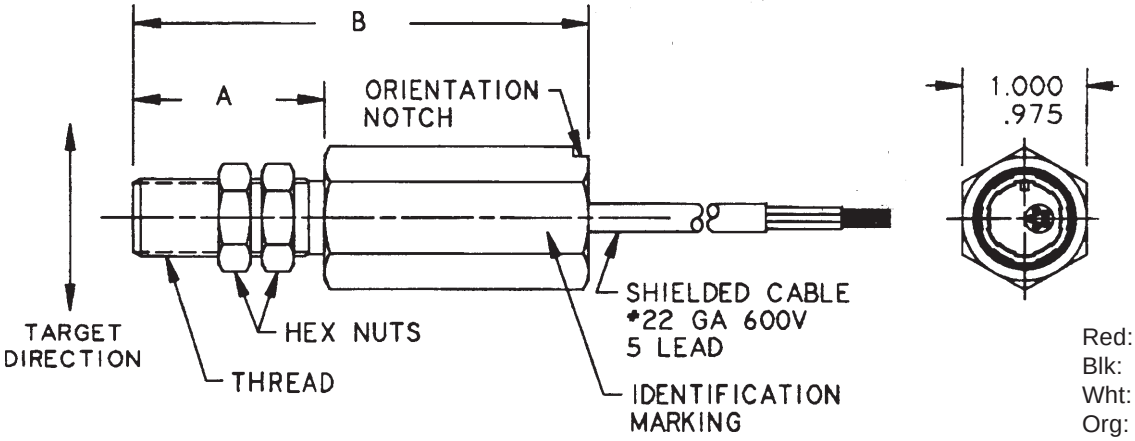
(A) Ch. A out
(B) Not used
(C) Ch. B out
(D) Direct. out
(E) + Supply power
(F) DC Common



(Select cable from group "C" see index)

Part Num.	Thread	"A" Dim.	"B" Dim.	"C" Dim. (max.)	Output
BH1512-001	.625-18UNF-2A	1.500 (38.1)	3.375 (85.7)	3.875 (98.4)	TTL Compatible
BH1522-001					Supply Tracking
BH1512-002		2.750 (69.9)	4.625 (117.5)	5.125 (130.2)	TTL Compatible
BH1522-002					Supply Tracking
BH1612-001	.750-20UNEF-2A	1.500 (38.1)	3.375 (85.7)	3.875 (98.4)	TTL Compatible
BH1622-001					Supply Tracking
BH1612-002		2.750 (69.9)	4.625 (117.5)	5.125 (130.2)	TTL Compatible
BH1622-002					Supply Tracking

Bi-Directional, Hex Body with Cable



Red: + Supply power
Blk: DC Common
Wht: Ch. A Out
Org: Ch. B Out
Grn: Direct. Out

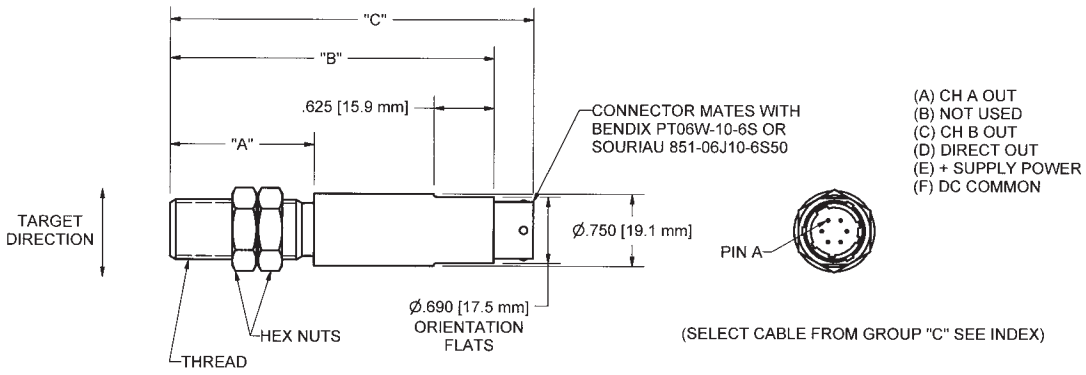
Part Num.	Thread	"A" Dim.	"B" Dim.	Cable Length	Output
BH1512-013	.625-18UNF-2A	1.500 (38.1)	3.375 (85.7)	10 ft. (3.05m)	TTL Compatible
BH1522-013					Supply Tracking
BH1512-014		2.750 (69.9)	4.625 (117.5)		TTL Compatible
BH1522-014					Supply Tracking
BH1612-013	.750-20UNEF-2A	1.500 (38.1)	3.375 (85.7)		TTL Compatible
BH1622-013					Supply Tracking
BH1612-014		2.750 (69.9)	4.625 (117.5)		TTL Compatible
BH1622-014					Supply Tracking

Net Weight: 16 oz. max

Dimensions in inches and (mm).

Bi-Directional, Dual Channel, Hall Effect Speed Sensors - 5/8 and 3/4 Threads

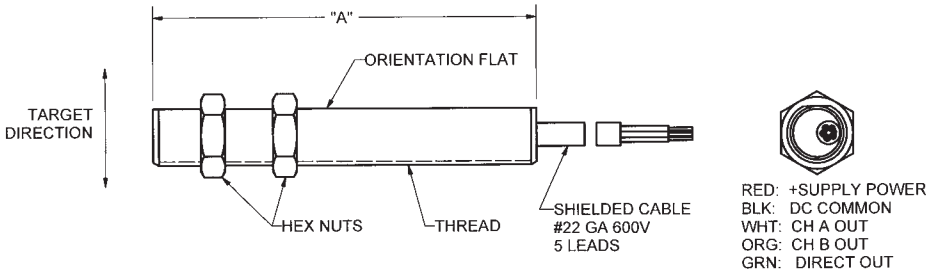
Bi-Directional, Round Body with Connector



Part Num.	Thread	"A" Dim.	"B" Dim.	"C" Dim. (max.)	Output
BH1512-005	.625-18 UNF-2A	1.500 (38.1)	3.375 (85.7)	3.875 (98.4)	TTL Compatible
BH1522-005					Supply Tracking
BH1512-006		2.750 (69.9)	4.625 (117.5)	5.125 (130.2)	TTL Compatible
BH1522-006					Supply Tracking
BH1612-005	.750-20 UNEF-2A	1.500 (38.1)	3.375 (85.7)	3.875 (98.4)	TTL Compatible
BH1622-005					Supply Tracking
BH1612-006		2.750 (69.9)	4.625 (117.5)	5.125 (130.2)	TTL Compatible
BH1622-006					Supply Tracking

Net Weight: 6 oz. max

Bi-Directional, Fully Threaded with Cable



Part Num.	Thread	"A" Dim.	Cable Length	Output
BH1512-009	.625-18 UNF-2A	4.000 (101.6)	10 ft. (3.05m)	TTL Compatible
BH1522-009				Supply Tracking
BH1512-010		6.000 (152.4)		TTL Compatible
BH1522-010				Supply Tracking
BH1612-009	.750-20 UNEF-2A	4.000 (101.6)		TTL Compatible
BH1622-009				Supply Tracking
BH1612-010		6.000 (152.4)		TTL Compatible
BH1622-010				Supply Tracking

Net Weight: 11 oz. max

Dimensions in inches and (mm).