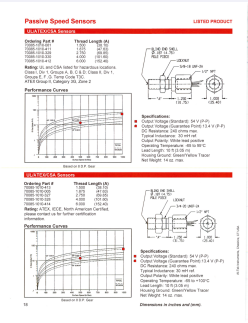


FIELD INSTALLATION QUICK GUIDE

Installation Instructions

AI-Tek 70085-1010-412

Passive variable-reluctance speed sensor



PRODUCT	70085-1010-412
THREAD	5/8-18 UNF-2A
THREAD LENGTH	6.000 in / 152.40 mm
TERMINATION	10 ft wire leads

01 CONFIRM THE ORDERED CONFIGURATION

Sensor type	Passive variable reluctance
Guaranteed output	13.4 V P-P
Operating range	-65 to +95 deg C
Housing ground	Green/yellow tracer
Approval	UL/CSA hazardous-location listed

02 MECHANICAL MOUNTING

- Confirm the complete 70085-1010-412 model before installation.
- Inspect the 5/8-18 mounting thread, locknut, pole piece and wire leads.
- Position the pole piece toward the ferrous target without physical contact.
- Set the air gap from the machine drawing; manufacturer output references use 0.030 in.
- Secure the locknut without twisting or damaging the sensor leads.

Passive Speed Sensors

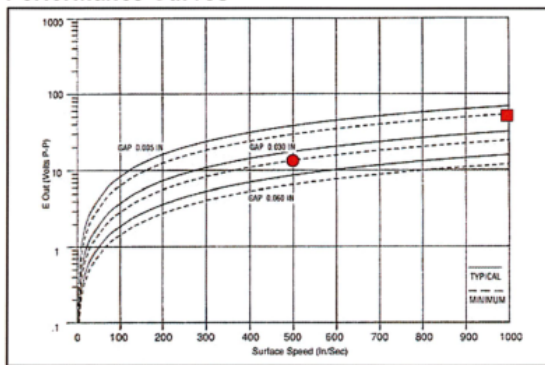
LISTED PRODUCT

UL/ATEX/CSA Sensors

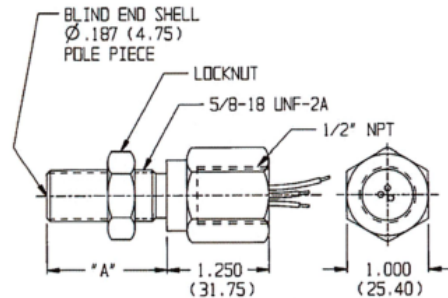
Ordering Part #	Thread Length (A)
70085-1010-081	1.500 (38.10)
70085-1010-411	1.875 (47.63)
70085-1010-329	2.750 (69.85)
70085-1010-330	4.000 (101.60)
70085-1010-412	6.000 (152.40)

Rating: UL and CSA listed for hazardous locations.
Class I, Div 1, Groups A, B, C & D; Class II, Div 1,
Groups E, F, G, Temp Code T3C.
ATEX Group II, Category 3G, Zone 2

Performance Curves



Based on 8 D.P. Gear



Specifications:

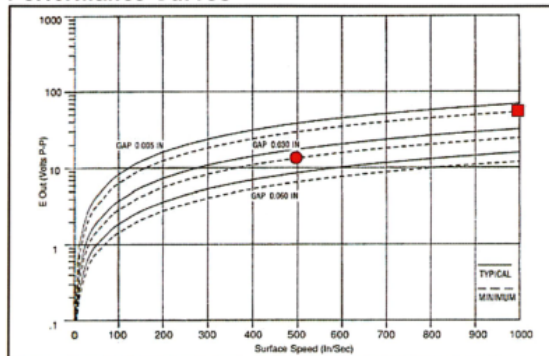
- Output Voltage (Standard): 54 V (P-P)
- Output Voltage (Guarantee Point): 13.4 V (P-P)
- DC Resistance: 240 ohms max.
- Typical Inductance: 30 mH ref.
- Output Polarity: White lead positive
- Operating Temperature: -65 to 95°C
- Lead Length: 10 ft (3.05 m)
- Housing Ground: Green/Yellow Tracer
- Net Weight: 14 oz. max.

UL/ATEX/CSA Sensors

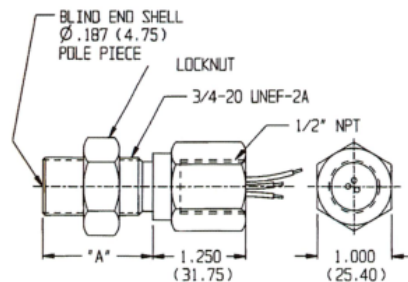
Ordering Part #	Thread Length (A)
70085-1010-413	1.500 (38.10)
70085-1010-005	1.875 (47.63)
70085-1010-327	2.750 (69.85)
70085-1010-328	4.000 (101.60)
70085-1010-414	6.000 (152.40)

Rating: ATEX, IECE, North American Certified,
please contact us for further certification
information.

Performance Curves



Based on 8 D.P. Gear



Specifications:

- Output Voltage (Standard): 54 V (P-P)
- Output Voltage (Guarantee Point): 13.4 V (P-P)
- DC Resistance: 240 ohms max.
- Typical Inductance: 30 mH ref.
- Output Polarity: White lead positive
- Operating Temperature: -65 to +100°C
- Lead Length: 10 ft (3.05 m)
- Housing Ground: Green/Yellow Tracer
- Net Weight: 14 oz. max.

Dimensions in inches and (mm).

TARGET, GAP AND SIGNAL CHECK

Principles of Operation

The internal construction of the typical **AI-Tek** variable reluctance sensor is a magnet, pole piece and coil (See figure 1). A magnetic field (lines of flux) extends from the magnet, through the pole piece and coil out into the air space at the end of the sensor. The return path of the magnetic field is from the air space to the other end of the magnet. As a ferrous object approaches the tip of the pole piece, the magnetic field increases and then decreases as the object moves away from the pole piece. The snap or the rapid change in the magnetic field induces an AC voltage signal in the coil. With an ideal target and

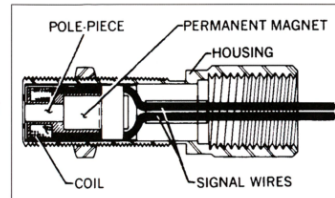


Figure 1 - Internal configuration of typical sensors.

matching sensor, the induced voltage is in the shape of a sine wave.

As can be seen, the generated frequency signal is directly proportional to the number of ferrous objects passing the pole piece per unit time. The amplitude of the voltage output is proportional to the speed of the ferrous objects passing the pole piece.

Many applications of **AI-Tek** magnetic sensors use gears as targets. Typical sensor output wave forms with various targets are illustrated in Figure 3. Testing sensors with gears rather than other ferrous discontinuities such as sprockets, keyways, boltheads, etc. is because the output is predictable and repeatable. See Figure 2 for commonly used gear terminology.

$$\text{Diametral Pitch} = \frac{\text{No. of Teeth} + 2}{\text{Outside Dia. of Gear (in.)}}$$

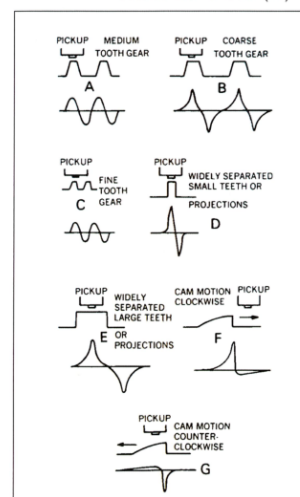


Figure 3 - Generated voltage waveforms.

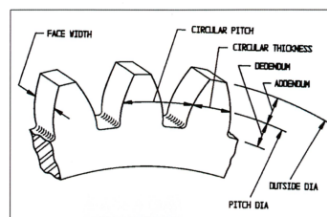


Figure 2 - Common terms used in defining gears.

The performance of a sensor can be easily defined when using a gear for a target; it also allows for estimated performance with alternate targets. **AI-Tek** sensors are tested with AGMA standard gears; the performance curves are included in this catalog.

AI-Tek Instruments differs from most sensor manufacturers in the presentation of performance curves and test parameters. Most existing data is specified at a surface speed of 1000 in/sec and 0.005 in. air gap; we feel that a 0.030 in. air gap and 500 in. sec. surface speed (1800 RPM motor with 5 to 6 in. dia. gear) are more realistic parameters to specify performance.

- Use a ferrous gear or target with suitable tooth size and spacing for the sensor pole piece.
- Route signal leads away from high-current wiring and preserve the documented polarity.
- Verify the connected instrument provides sufficiently high input impedance for the passive signal.
- Rotate the target under controlled conditions and confirm stable amplitude and frequency.
- Test zero-speed, underspeed or overspeed action required by the machine protection logic.

SOURCE ATTRIBUTION

Prepared from AI-Tek official selection, listed-product and principles documents.