

Introducing Ai-Tek Instruments' Speed Sensors

Unlock precision and reliability with Ai-Tek Instruments' extensive range of speed sensors. Our catalog highlights a selection of standard units meticulously crafted through years of design expertise, ensuring swift solutions tailored to your speed control and indication needs. While we offer a large variety of specialized designs catering to unique applications, our standard lineup promises versatility and adaptability.

Crafted to withstand the rigors of industrial, automotive, and aerospace environments, Ai-Tek speed sensors guarantee uninterrupted operation even in the harshest conditions. Engineered to combat challenges like vibration, shock, extreme temperatures, and corrosive atmospheres, our sensors assure longevity and dependability. Whether it is elevated temperatures, varied speeds, specific targets, or precision timing, our sensors excel, utilizing innovative technologies like variable reluctance and Hall effect to translate motion into electronic signals.

Explore our comprehensive catalog available through our network of distributors, offering a myriad of options to suit your needs. Cannot find the perfect match? Reach out to your local distributor, and we will work to tailor a solution to your specifications. As a global leader in speed sensor innovation, Ai-Tek Instruments guarantees unbeatable performance at a competitive price point.

Elevate your control and protection circuits with Ai -Tek's Passive Magnetic Sensors. Leveraging variable reluctance technology, these sensors require minimal components and boast no moving parts, ensuring reliability even in extreme conditions. From aircraft engines to automobile wheels, our sensors offer:

- High reliability
- Effortless installation
- Longevity without moving parts
- Self-powered operation
- Versatile shapes and sizes
- Simple alignment
- Adaptability to any environment

From consumer products to high-precision automotive systems and aircraft controls, Ai-Tek's variable reluctance and hall effect sensors deliver unparalleled performance.

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

The information contained herein is subject to change without notice. Refer to the factory for verification of any details.

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

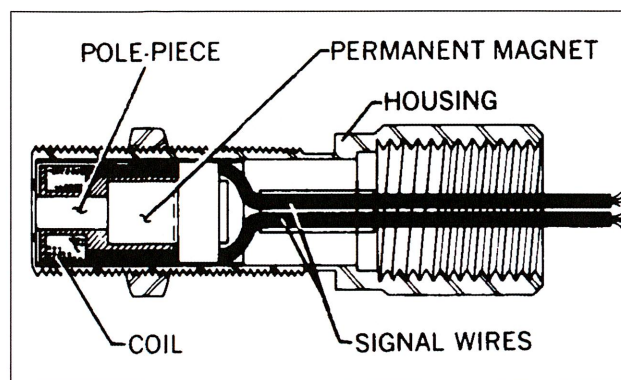


Figure 1 - Internal configuration of typical sensors.

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.

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

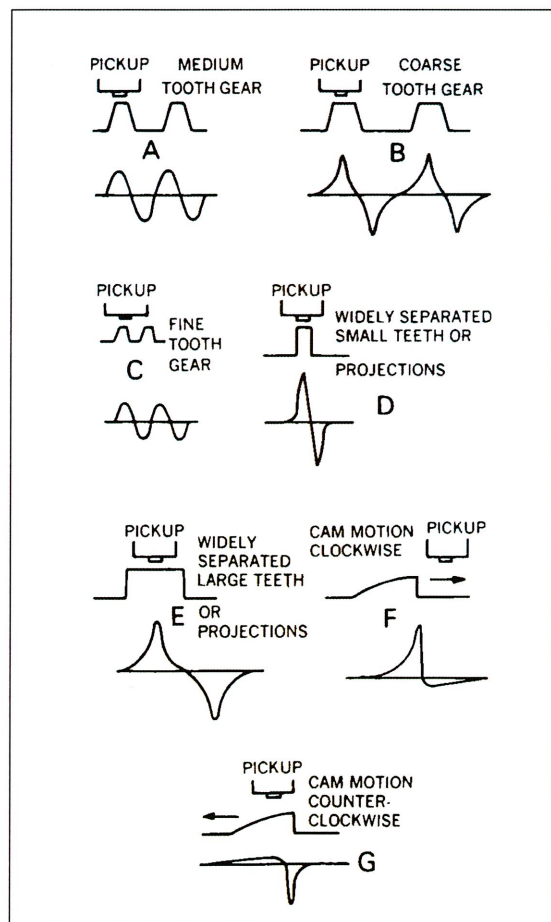


Figure 3 - Generated voltage waveforms.

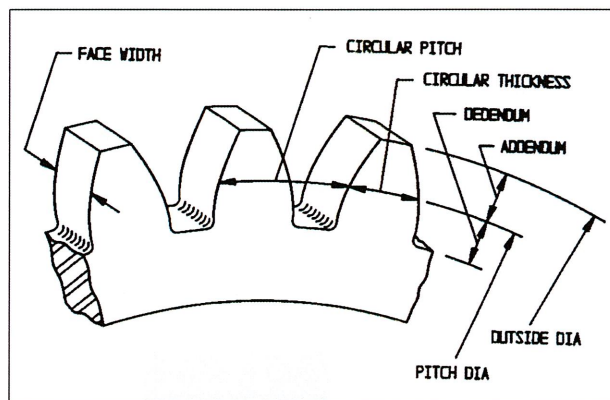


Figure 2 - Common terms used in defining gears.

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.