

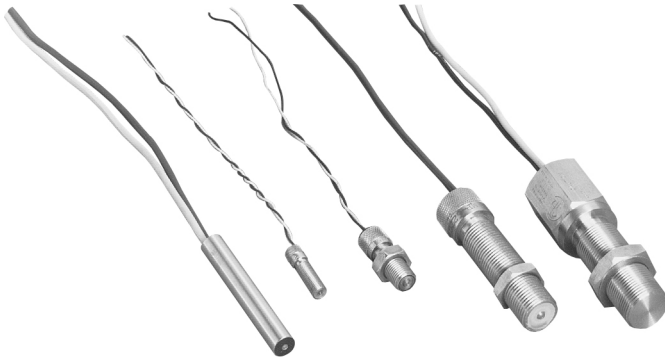
# Magnetic Pickups & In-Line Pre-amplifier

Simple, Reliable & Economical Speed Sensors for:

SPEED SWITCHES  
 DIGITAL TACHOMETERS  
 FREQUENCY TO DC CONVERTERS

### FEATURES INCLUDE

- NO EXT. POWER NEEDED
- WIDE OPERATING TEMPERATURE RANGE
- EPOXY ENCAPSULATED, MECHANICALLY RUGGED
- IMPERVIOUS TO DIRT, OIL & WATER
- NO MAINTENANCE REQUIRED
- LOW COST
- M12 CONNECTOR (MODEL SPECIFIC)



## DESCRIPTION OF OPERATION

A Magnetic Pickup consists of a permanent magnet, a pole-piece, and a sensing coil encapsulated in a cylindrical case. An object (*target*) of iron, steel, or other magnetic material, passing closely by the pole-piece causes distortion of the magnetic flux field, which in turn generates a signal voltage. The magnitude of the signal voltage depends on the relative size and magnetism of the target, its speed of approach, and how close it passes the pole-piece.

Magnetic Pickups are most frequently used to sense passing teeth on a gear, sprocket, or timing belt wheel. They can also be used to sense bolt-heads, key-ways, or other fast moving metallic targets. Typical targets and resulting signal wave forms are shown below in Fig. 1.

## SELECTING A MAGNETIC PICKUP

Selecting a magnetic pickup is a matter of matching a pickup to a gear (*or other target*), to provide enough input signal to a tachometer, speed-switch, or other device for operation at the required minimum speed. The open-circuit output from a magnetic pickup is directly proportional to speed, and once the minimum operating speed conditions have been met, increased signal will occur at higher speeds.

The "1-Volt Threshold Speed" column in the Application and Ordering Table (*next pg.*) provides a convenient guide for estimating minimum operating speeds. This value is the linear surface-speed of a reference gear required to generate a 1-Volt peak, open-circuit output at an air-gap of 0.005". The reference gear listed for each pickup is near the optimum size for that pickup, as defined by the criteria in Fig. 1B. The RPM listed is for a reference gear with 60 teeth running at that surface-speed. Gears with larger teeth provide about the same or somewhat more output at the same surface-speed, while gears with smaller teeth or fewer number of teeth yield lower outputs. Figures 1C - 1F need a very high surface speed to generate a 1-Volt peak. The "Minimum Gear Size" column lists the Diametral Pitch size at which the output drops to 40-60% of the output when the reference gear is used. Gears with very small teeth in relation to the pole-piece diameter, deliver greatly reduced outputs, as

shown in Fig. 1A. Threshold outputs when using targets other than gear teeth can be estimated by their relative size with respect to the reference gear teeth. For more information on gears, definitions and relationships, see the Sensing Gears Bulletin (LP0167).

The 1-Volt Threshold Speeds are based on a 0.005" air-gap. In applications where this air-gap cannot be maintained or where the air-gap can vary due to eccentricity of the sensing gear, a correction factor can be applied from the curve in Fig 2. The effect of electrical loading is usually minimal at low speeds and low output frequencies, however, output voltage drop due to loading at high frequency or with low impedance inputs can be estimated based on the Output Impedance data.

Magnetic Pickups are recommended for speed related sensing applications. They are not recommended for counting applications, since loss of counts will occur at low speeds. For devices not designed to accept a magnetic pickup input, the Red Lion Controls model ASTC can be used to convert the magnetic pickup output into an NPN open collector output. The ASTC can detect magnetic pickup outputs as low as 20 mV, which allows for operating speeds below the specified 1-Volt threshold speed.

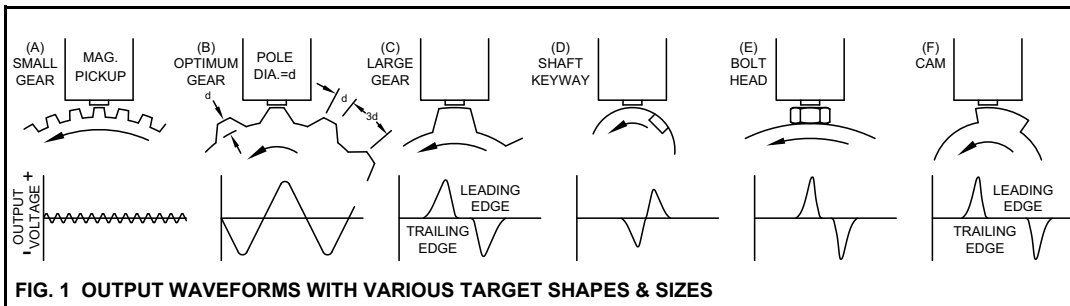


FIG. 1 OUTPUT WAVEFORMS WITH VARIOUS TARGET SHAPES & SIZES

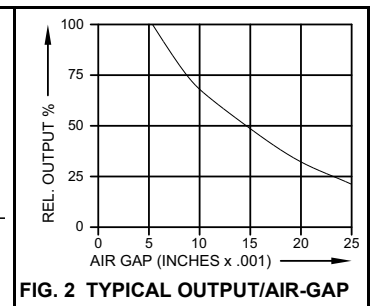


FIG. 2 TYPICAL OUTPUT/AIR-GAP

# MAGNETIC PICKUP APPLICATION & ORDERING INFORMATION

MODEL NO.	DIMENSIONS	1-VOLT THRESHOLD SPEED (1)	MINIMUM GEAR PITCH (2)	TEMP. RANGE °C	OUTPUT IMPEDANCE	PART NUMBER
MP-25TA		135 in/sec 1000 RPM 60T 24 D.P. Ref. Gear	48 D.P.	-40 to +107	130 Ω ±20% 15 mH	MP25TA00
MP-37TA		33 in/sec 200 RPM 60T 20 D.P. Ref. Gear	32 D.P.	-40 to +107	340 Ω ±20% 44 mH	MP37TA00
MP-37TAC1		33 in/sec 200 RPM 60T 20 D.P. Ref. Gear	32 D.P.	-40 to +107	340 Ω ±20% 44 mH	MP37TAC1
MP-37CA		30 in/sec 180 RPM 60T 20 D.P. Ref. Gear	32 D.P.	-40 to +107	300 Ω ±30% 65 mH	MP37CA00
MP-62TA		10 in/sec 50 RPM 60T 16 D.P. Ref. Gear	24 D.P.	-40 to +107	1200 Ω ±20% 400 mH	MP62TA00
MP-62TAC1		10 in/sec 50 RPM 60T 16 D.P. Ref. Gear	24 D.P.	-40 to +107	1200 Ω ±20% 400 mH	MP62TAC1
MP-62TB		20 in/sec 100 RPM 60T 16 D.P. Ref. Gear	24 D.P.	-40 to +107	1200 Ω ±20% 400 mH	MP62TB00
MP-75TX Explosion Proof (3)		30 in/sec 100 RPM 60T 10 D.P. Ref. Gear	12 D.P.	-73 to +93	230 Ω ±20% 100 mH	MP75TX00

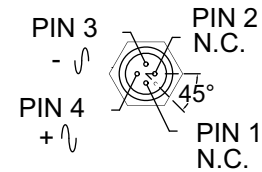
**NOTES:**

- Surface speed, of listed reference gear, is @ 0.005" air-gap.
- Gear pitch where output will drop to 40-60% of that generated by the reference gear size, at the same surface speed.
- UL Listed CSA Certified, Class I Group A, B, C and D; Class II Group E, F and G. (AI-TEK Instruments) PN#AIRPAX/70085-1010-005, UL File #E40545 (N), CSA File #042648.
- Polarity, all pickups: white output lead goes positive with respect to black when target approaches pole.
- 2-Wire shielded cable is recommended for all magnetic pickup outputs. Connect the shield to the "COMMON" or "GROUND" terminal of the instrument being used. DO NOT run Magnetic Pickup signal leads in conduit, troughs, or bundles with other power or control voltage lines.

6. Lead length of magnetic pickup should not be extended. An ASTC0000 can be used to convert the magnetic pickup signal to NPN Open Collector style output, which allows for a much greater transmission distance.

7. M12 unit color codes for CCM12S01 cable used with MP37TAC1 and MP62TAC1 is:

- PIN 3 - Blue (-)
- PIN 4 - Black (+)
- PIN 2 - NC
- PIN 1 - NC



**ACCESSORIES**

MODEL NO.	DESCRIPTION	PART NUMBER
ASTC	In-Line Amplifier	ASTC0000
CCM	Mating Cable With M12 Connector, 1 Meter In Length	CCM12S01



Do not dispose of unit in trash - Recycle