Digital Tachometer

AP1000

Features:

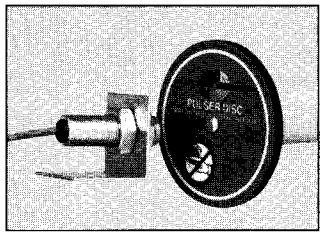
- **Field Programmable**
- **Displays Rates From 0–9,999 or Time In Process (Optional)**
- **Highly Accurate**
- **Simple Installation**
- **Complete System Including Sensor and Magnetic Disc**
- **Bright .3-Inch High Efficiency LED Displays**
- **Panel Mount Meter**

Description:

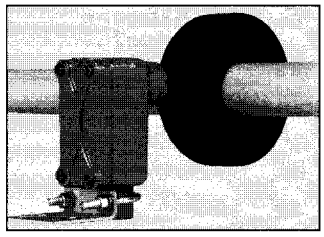
The AP1000 Series Digital Tachometer System combines accuracy and reliability in a rugged, compact housing. Each tachometer system includes a pulser disc or wrap to be mounted on the monitored shaft, a digital sensor with mounting bracket, and a panel-mount display with a built-in power supply. Standard input power is 115Vac; 230 or 12Vac, and 12 or 24Vdc are optional. The AP1000, because of its flexibility, can be used in a wide variety of monitoring and process control applications.

Principle of Operation:

A pulser disc or wrap is mounted on the monitored shaft. As the magnetic targets on the pulser disc or wrap rotate in front of the Hall Effect sensor, a digital signal is transmitted to the AP1000's electronics. This signal has a frequency proportional to the rotational speed of the monitored shaft. The AP1000 translates this signal into Hertz or any programmed user unit, such as RPM, FPM, or GPM, and displays it on the front panel LEDs.



Sensing Head and Pulser Disc



Optional Explosionproof Sensor and Pulser Wrap

Pulser Disc:

The end of the shaft to be monitored must be center drilled to a depth of 1/2-inch with a No. 21 drill and tapped for 10-32UNF. After applying Loctite® or a similar adhesive on the threads to keep the pulser disc tight, the pulser disc should be attached, decal side out, with the supplied 10-32UNF machine screw and lock washer.

Pulser Wrap (optional):

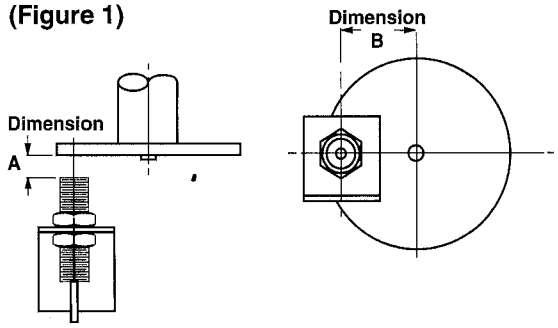
Pulser Wraps are custom manufactured to fit the shaft they will be mounted on. When the wrap is shipped, four Allen-head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft, reinsert the screws and torque them to 8 foot pounds.

Sensor Installation:

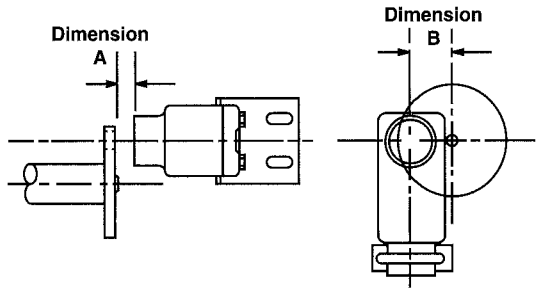
The standard sensor is supplied with a mounting bracket and two jam nuts. The explosionproof sensor is supplied with a slotted mounting bracket. Sensors should be installed so the center line of the magnets pass in front of the center of the sensor as the disc or wrap rotates. When using the pulser disc, the center of the magnetized area of the disc, shown as Dimension B in figures 1 and 3, is 1-3/4 inches from the center hole of the disc.

The gap distance between the sensor and the disc or wrap, Dimension A in the diagrams, is 3/8 inch ±1/8 inch. To achieve the proper gap distance, adjust the jam nuts holding the standard sensor in the mounting bracket, or adjust the position of the explosionproof sensor using the slots on its mounting bracket.

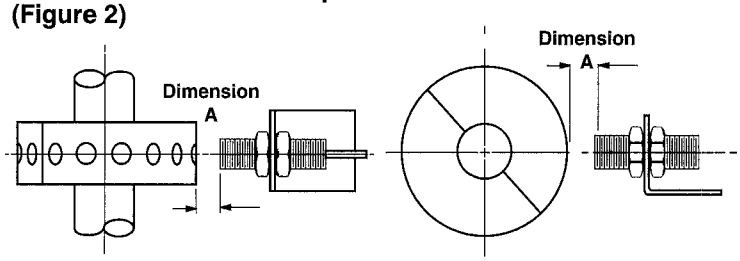
Standard Sensor and Disc (Figure 1)



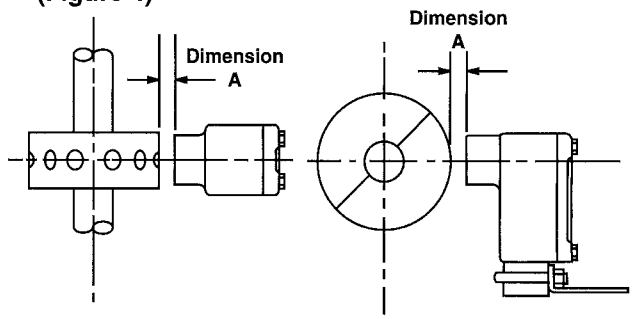
Explosionproof Sensor and Disc (Figure 3)



Standard Sensor and Wrap (Figure 2)



Explosionproof Sensor and Wrap (Figure 4)

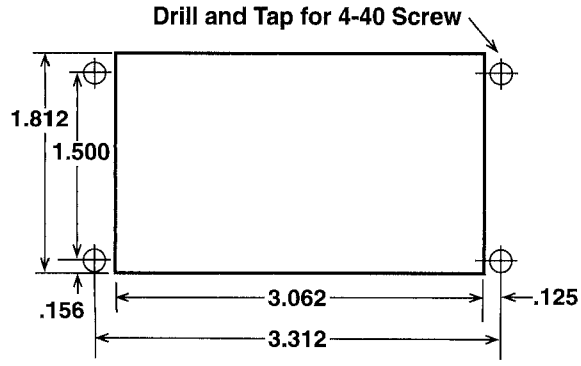


Meter Installation:

Figure 5 shows the cutout for installation of the AP1000 meter in a panel. Four #4-40 flathead screws are provided to secure the meter to the panel. The front bezel of the AP1000 is removable allowing access to the screw holes. To remove the bezel, gently pry the frame upward while pulling it off.

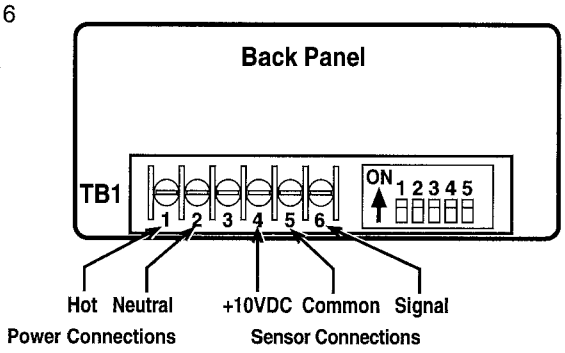
Cutout for Panel Mounting:

figure 5



Wiring Connection Diagram:

figure 6



Five Position DIP Switch (ON Activates Position):

1. Pull up (NPN) Sensor
2. Pull Down (PNP) Sensor
3. Extra Filtering (2-Wire Magnetic Pickup)
4. Mag. Level (2-Wire Magnetic Pickup)
5. Front Panel Lock-Out (for Calibration Security)
6. Logic Level Turn 1,2,3,4 Off

Note: The default settings will allow you to display RPM without a decimal point. From 1 to 9999 you don't need to change any variables using our sensor and disc/wrap to display RPM.

Sensor Connections:

Sensor connections are made on terminal strip TB1 (see figure 6). Refer to the table below for the proper connections.

Terminal	Sensor Model 906-907	All Other ESI Sensor Models	Magnetic Pickup
TB1-4 Supply	Red	Red	N/A
TB1-6 Signal	Black	Clear	(+)
TB1-5 Ground	Clear/Shield	Black/Shield	(–)

Input Power:

Input Power Connections are made on terminal strip TB1 (see figure 6). Refer to the table below for the proper connections.

115 Vac (Standard)		230 Vac (Optional)	
Hot	TB1-1	Hot	TB1-1
Neutral	TB1-2	Hot	TB1-2
12 and 24 Vdc (Optional)		**12 and 24 Vac (Optional)**	
Positive (+)	TB1-1	High	TB1-1
Negative (–)	TB1-2	Low	TB1-2

Calibrating the Display:

Note: The default settings are for Electro-Sensors Standard Sensor Systems.

Variable Summary

Variable 1: Maximum Input Frequency (default = 240.0)
Variable 2: User Units at Maximum Input Frequency (default = 1800)
Variable 3: Display Update Rate (default = 0.5 sec)

Rates for Variable 3

Input Frequency	Update Rate
0 – 9999 Hz	from .5 to 8.5 sec

Display Calibration:

The AP1000 Tachometer is factory calibrated to display the shaft speed in RPM, using a pulser disc or wrap, and a Hall Effect sensor. The AP1000 meter can be calibrated to display speed in units other than RPM. To calibrate for other units remove the bezel by gently prying the frame of the bezel up while pulling it off. The four button keypad is used for calibrating the display, see figure 7. The first two variables are needed for linear display in user units, the third is for customizing the display update time. To enter the change variable mode, have the AP1000 powered up and DIP switch position 5 = OFF. Pressing the ENT key once will illuminate the VAR LED and Pr1 will be displayed for 1 second. After 1 second, the value of Variable 1 (Max Hertz) is displayed. The far right digit of Variable 1 will flash on and off, indicating this digit has the focus and can be changed by using the up arrow key. To change another digit in Variable 1, use the left arrow key to change the focus to the next digit. The decimal point key can be used to add or remove a decimal point. When Variable 1 contains the correct value, press the ENT key once. Pressing the ENT key will store the value of Variable 1 in non-volatile memory and will display Pr2 for one second. After one second the value of Variable 2 will be displayed Variable 2 represents the user units for the input frequency programmed into Variable 1. For example, if 1800 Hz is programmed into Variable 1 and this corresponds to 1000 bottles/minute, program 1000 into Variable 2. Then, when an 1800 Hz input signal is fed into the AP1000, it will display 1000. If a 900 Hz input signal is presented, the AP1000 will display 500. After programming variable 2 with the desired user units, press the ENT key once to store Variable 2. Pr3 will be displayed for 1 second, then the value of Variable 3 will be displayed. Variable 3 represents the time between display updates. Increasing the time between the updates will average more information and reduce the 'bouncing' effect on the display for unstable input signals. Press the ENT key to store Variable 3. The display will return to displaying either RATE or Hz depending on which was displayed prior to programming the Variables.

Displays:

Rate:

At power up, the AP1000 will display RATE in user units. The equation used to generate the display is the following:

$$\text{Display} = \frac{\text{User Units (Variable 2)}}{\text{Max frequency (Variable 1)}} \times \text{Input Signal Frequency}$$

The decimal point will always be placed in the same location as it is programmed in Variable 2.

Hz:

$$\text{Hz} = \frac{\text{RPM X PPR}}{60}$$

If the up arrow is pressed while RATE is displayed, the display will change to Hz. This display is simply the input signal frequency detected on terminal TB1-6. The decimal point will always be placed in the same location as it is programmed in Variable 1. To toggle back to RATE display, press the up arrow key again.

Set Variables Back to Factory Default:

To return variables back to factory defaults:

Variable 1 = 240.0 Variable 2 = 1800 Variable 3 = 000.5

Turn power off, depress arrow keys. Reapply power while keeping the two arrow keys pressed until the software revision appears on the display (i.e. 01.00). When the arrow keys are released, the AP1000 will continue with normal operation applying the default values to calibrate the display.

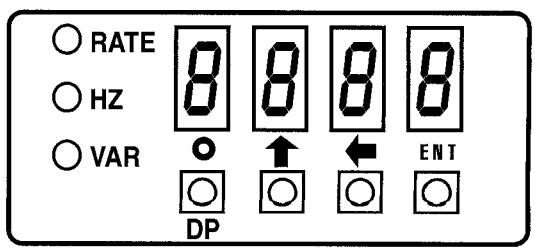
Front Panel Lockout:

To protect the values programmed into the variables, set DIP switch position 5 to ON.

Display Calibration Diagram:

figure 7

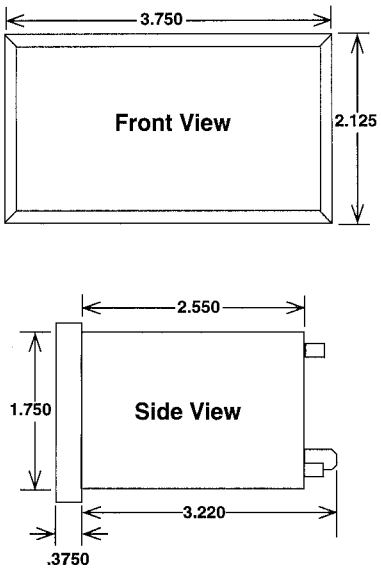
Front Panel
with Bezel Removed



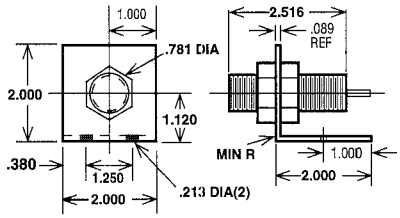
Electro-Sensors, Inc. Digital Tachometer • AP1000

AP 1000 Dimensional Drawings: Dimensions in Inches

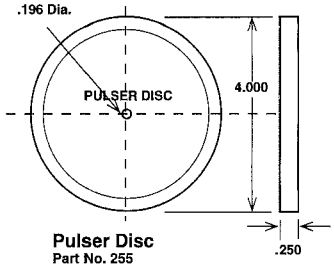
AP Series Meter



Digital Sensing Head
Part No.906
Stock No. 775-000500



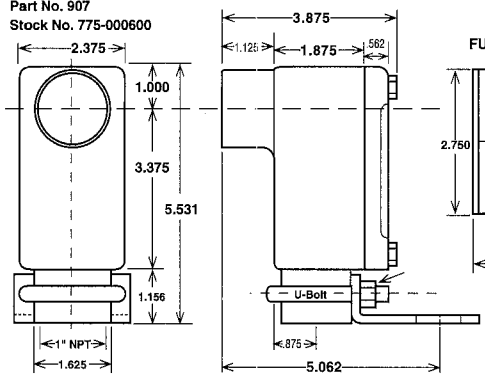
End of Shall Pulser Disc



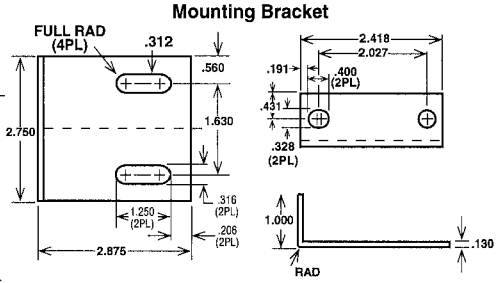
Pulser Disc
Part No. 255
Stock No. 700-000200

Explosionproof Sensor
Part No. 907
Stock No. 775-000600

***Sensing Head Dimensions are ±.062**



Mounting Bracket



AP1000 General Specifications:

Input Power:

Standard	115 Vac ±10%
Optional	230 Vac, 24 Vac, 24 Vdc, 12 Vdc, 12 Vac
Frequency	50 — 60 Hz
Wattage	2.4 VA

Input Signal:

Type	NPN, PNP, Magnetic Pickup, Logic
Input Impedance	2200 Ohms
Nominal Amplitude	5 Volts
Minimum Amplitude	3 Volts
Maximum Frequency	.01 – 9999 Hz

Output Signal:

Transducer Supply	10 Vdc, 50 mA Maximum

Electrical Connections:

Terminal Block	Screw-Type with Wire Clamping Plate

Display:

Type	.3 Inch Height Segmented LED
Resolution	4 Digits
Accuracy	±1 Digit

Physical/Environmental:

Enclosure Material	Noryl 255
Operating Temperature	0°C to +70°C*
Storage Temperature	-65°C to +70°C*
Shipping Weight (System)	2 lb

Pulser Disc:

Material	Nylon® 12 (Standard)
Dimensions	4 inch Diameter X 1/4-inch Thick
Operating Temperature	-40°C to +60°C*
Maximum Speed Range	Consult Factory

Pulser Wrap:

Material	PVC or Aluminum
Dimensions	I.D. (shaft diameter) +3 Inch = O.D. 1.5 Inch Thickness
Operating Temperature	-40°C to +60°C*
Maximum Speed Range	Consult Factory

Sensor:

Material (Sensor Body)	Aluminum
Material (Mounting Bracket)	Steel
Thread Size (Std. Sensor)	3/4-16 UNF
Output Type	Open Collector, Current Sinking, 20mA Maximum
Signal Cable	3-Conductor Shielded, 10-feet Supplied
Maximum Cable Length	1500-Feet
Operating Temperature	-40°C to +60°C*
Air Gap	3/8 ±1/8 inch

Optional Explosionproof Sensor:

Signal Cable	3-Conductor Shield, 10-feet Included
Housing and Cover	Cast Aluminum, C.S.A. Approved U.L. Rated: Class I Group D; Class II Group E, F, G; Class III

**Higher Temperature Ranges Available. Consult Factory*

Spare Parts List	Stock No.	Part No.
Pulser Disc (Nylon 12)	700-000200	255
Pulser Disc (Aluminum)	700-001500	255A
Standard Digital Sensing Head	775-000500	906
XP Digital Sensing Head	775-000600	907
Sensor Cable	610-000200	.....
Pulser Wraps	Consult Factory	.....

Specifications Subject to Change Without Notice.

CALL TOLL FREE FOR MORE INFORMATION

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