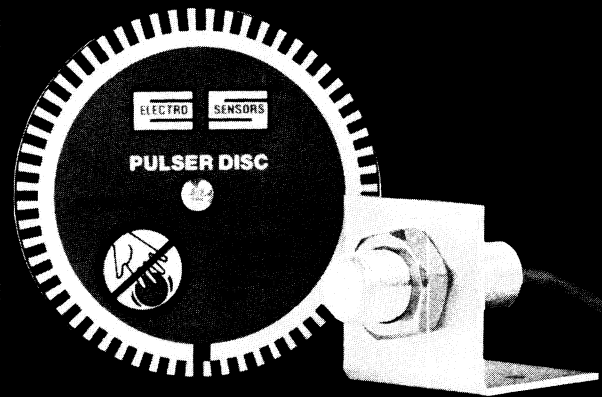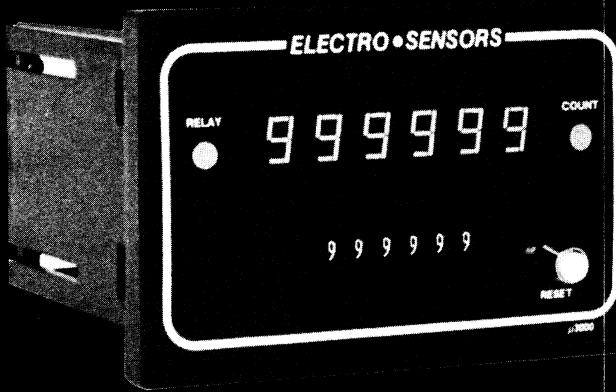# Predetermining Counter

ELECTRO SENSORS Micro 3000

Bi-Directional Counting Optional

Features:

• **Advanced Microprocessor Circuitry • Precise Field Programmable Prescale • Schmitt Trigger Input Accepts All Types of Transducers • High Intensity Four or Six Digit LED Displays • Thumbwheel Adjustable Preset For Relay Output With Automatic or Manual Reset • Front Panel Indication of Count Pulse Input • Programmable Decimal Point • Front Panel Indication of Relay Status • Fuse Protected 115Vac Power Supply • Overvoltage Protection on Input • Available as a Complete Counting System**

Options:

• **Up/Down Counting for Positioning • JIC Dust Tight Enclosure Mounting • NEMA 4 Enclosure Mounting • Standby Battery Backup Power Source • 230Vac Power Input**

Description:

Versatility is the keynote word to describe the Micro 3000 digital counting system. Now you can monitor and control production with one compact counting system that will adapt to any application. The secret of the Micro 3000's remarkable adaptability lies in its field programmable prescale network. This feature permits you to display production units or events no matter what the ratio is between signal input and the actual materials to be counted.

Input versatility is another plus. The Micro 3000 will accept inputs from nearly all types of transducers, relays, switch contacts, or Electro Sensors non-contacting sensing head and signal generating magnetic pulser disc. A Schmitt trigger input circuit assures a smooth bounce free count with optimum electrical noise rejection.

The digital display features bright high efficiency LED's and you may choose from a 4 or 6 digit model with a selectable decimal point.

A thumbwheel preset is a standard feature of the Micro 3000. The preset allows you to set a predetermined number in the counter's memory and when that number is reached, a momentary or latched relay actuation will occur. This 5 amp SPDT relay output may be used to recycle or shut down the process, or to alert the machine operator that the end of a count cycle has been reached. Relay reset may be automatic with an adjustable time delay or it can be manually reset, locally or remotely.

The Micro 3000's versatility is further enhanced by an optional auto bi-directional feature that will permit up and down counting. This is useful where an occasional shaft reversal is encountered or it can precisely monitor forward and reverse equipment positioning.

The Micro 3000 counter is available as a complete counting system designed for simple installation. The basic system includes the panel mount style counter with 115Vac power supply, (230Vac optional) a digital transducer with mounting bracket, 10 feet of cable and a magnetic pulser disc for end of shaft mounting.

The Micro 3000 has a time proven field performance record of versatility in difficult industrial applications where flexibility and accuracy are essential.

Operating Principle of Standard Electro-Sensors System

The standard system utilizes a magnetic pulser disc or wrap mounted on a rotating shaft. When the shaft rotates, magnetic pulses are generated which are picked up by our digital sensing head. The Micro 3000 recognizes each pulse as the specific value that was programmed into its prescale. Each pulse value then updates the displayed count.

ELECTRO • SENSORS

Installation Instructions
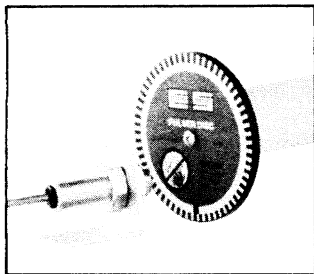
Transducer & Pulser Disc
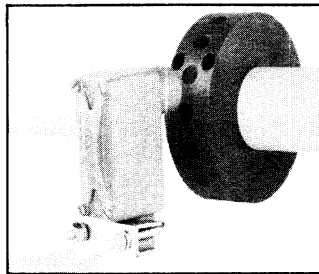
Optional Explosion-Proof Transducer and Pulser Wrap.

Pulser disc

The end of the shaft to be monitored must be center drilled to a depth of ½″ with a No. 21 drill and tapped for 10-32UNF. After applying Locite or a similar adhesive on the threads to keep the pulser disc tight, the pulser disc should be attached, decal side out, with a 10-32UNF machine screw.
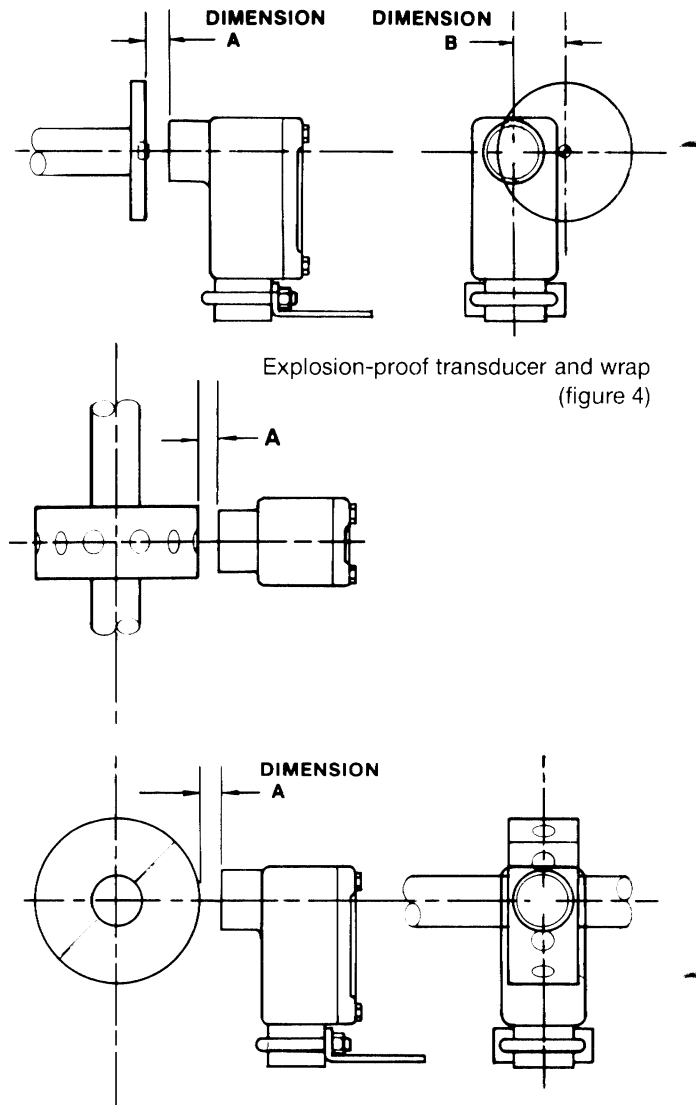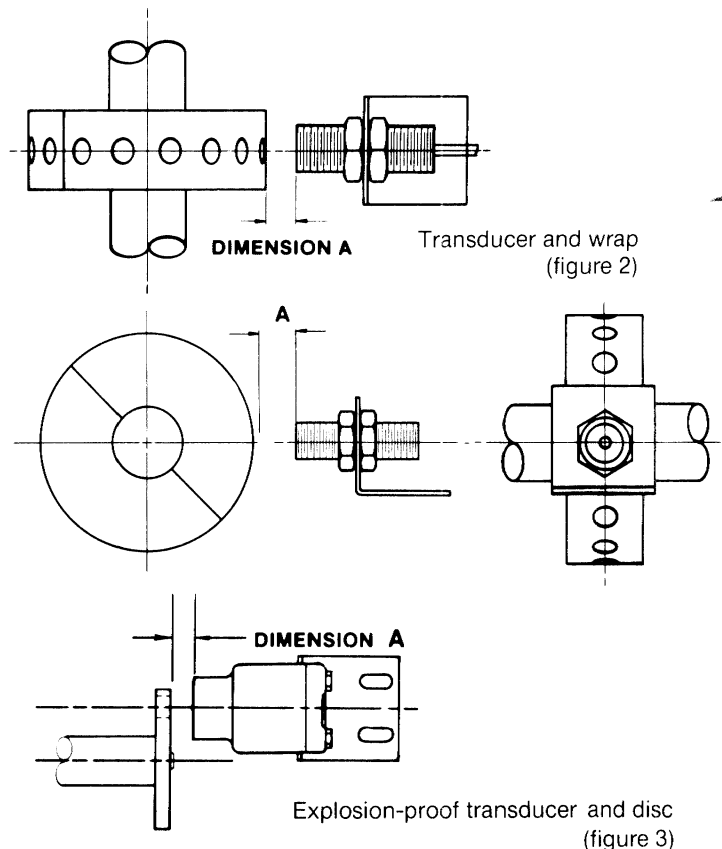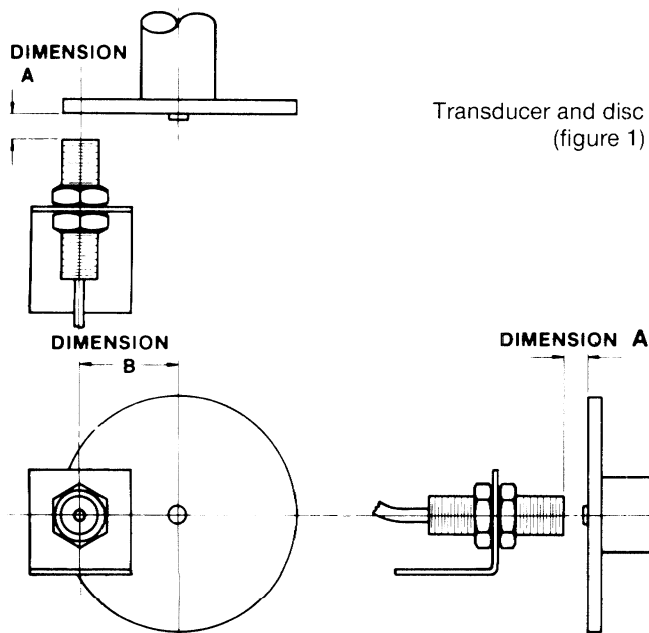
Pulser wrap (optional)

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 and screw together so the wrap fits the shaft tightly. Wraps are custom made to fit a specific diameter.

Transducer Installation

The standard transducer is supplied with a mounting bracket and two jam nuts on the transducer itself. The explosion-proof transducer is supplied with a slotted mounting bracket. Transducers should be installed so the center of the transducer passes through the center line of the magnets as they rotate.

When using a pulser disc (figs. 1 or 3) the pick-up gap (dimension A) should be adjusted between 1/16" and 1/4" for proper operation. This is achieved by adjusting the jam nuts on the standard transducer and adjusting position of the explosion-proof transducer through the use of the slotted mounting bracket. **Dimension B is 1 3/4"** from the center hole of a disc.

When using a pulser wrap (figs. 2 or 4), dimension A must be between 1/16" and 1/4".

DIMENSION A

Transducer and disc
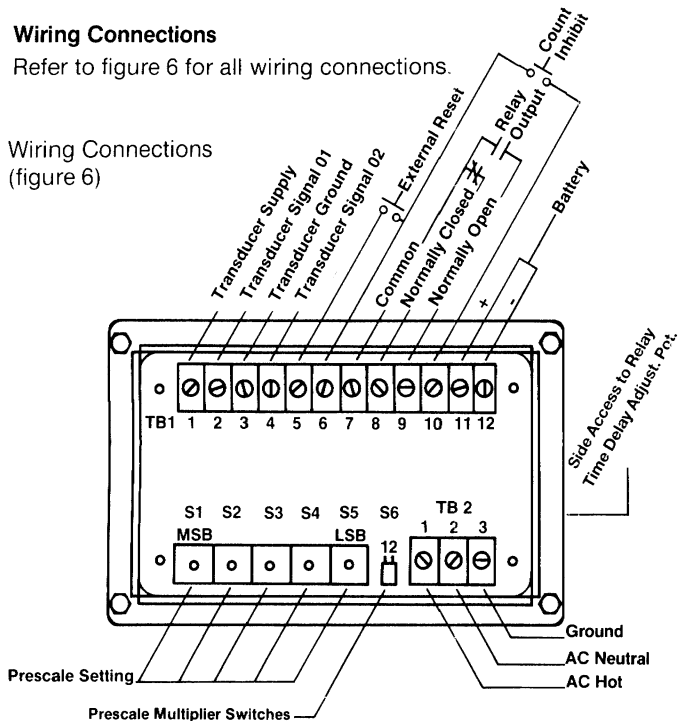(figure 1)

DIMENSION B

DIMENSION A

DIMENSION A

Transducer and wrap
(figure 2)

A

DIMENSION A

Explosion-proof transducer and disc
(figure 3)

DIMENSION A   DIMENSION B

Explosion-proof transducer and wrap
(figure 4)

A

DIMENSION A

Meter Installation

Figure 5 illustrates the cutout necessary for installation of the digital meter in the panel.

Cutout Panel Mounting (figure 5)

5.280 ± .005

3.280 ± .005
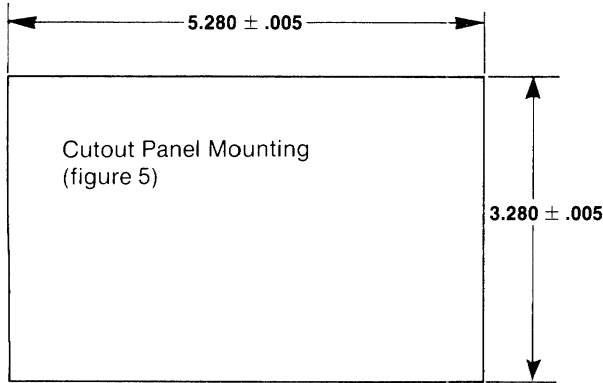
Wiring Connections

Refer to figure 6 for all wiring connections.

Wiring Connections (figure 6)

Prescale Setting

Prescale Multiplier Switches

Ground
AC Neutral
AC Hot

Transducer:

Transducer connections are made via terminal strip TB1. Refer to the table below for proper connections.

Terminal #	Description	Sensor Model 906-907-909	Sensor Model 930-931-1101-1102
TB1-1	Transducer Supply	Red	Red
TB1-2	Transducer Signal	Black	Clear
TB1-3	Transducer Ground	Clear/Shield	Black/Shield

Prescale Multiplier Switches

Position 1	2	Multiply
ON	ON	X1
OFF	ON	X10
ON	OFF	X100

Position

1   2

Down
On

Up
Off
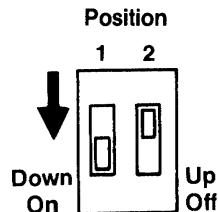
Programming the Prescale

NOTE:

Anytime the 5 digit prescale number or the multiplier switches are changed, power must be removed. If power is not cycled, the counter will continue to see the previous number or switch setting.

Refer to figure 6 for the location of the calibration adjustments. All units are factory calibrated to your specifications. Should it be necessary to recalibrate the unit, the following procedure should be followed:

Rotational Pickup Systems

1. Determine what the unit of measure is, I.E., inches, feet, yards, cartons, gallons, etc.
2. Determine the number of units to be counted in one revolution of the monitored shaft. Observe fractional accuracy if necessary.
3. Determine the number of signal pulses that your transducer will generate in one revolution. A standard Electro-Sensors transducer, used with a 16 magnet disc will generate 8 pulses per revolution.
4. Insert your numbers into this formula:

Example #1

$$\frac{\text{units of measure per revolution}}{\text{number of pulses per revolution}} = \text{value of one pulse (prescale setting)}$$

5. The value of one pulse may now be entered into the five rotary BCD switches, working from left to right. The left digit being the Most Significant Bit (MSB), and the farthest right digit being the Least Significant Bit (LSB). Assume for now that the decimal point is to the far left. Example follows:

MSB   LSB

00000

decimal point
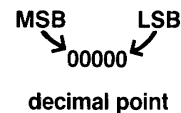
6. Now adjust the multiplier switches to place the decimal in the correct position X1, X10, X100. Example follows:

$$\frac{\text{16 bottles per revolution}}{\text{8 pulses per revolution}} = 2.0000$$

Enter .20000 into the prescale switches

Note: The decimal must be moved one place to the right so the multiplier switches should be set to "X10".

Example #2

$$\frac{\text{3 cartons per revolution}}{\text{60 pulses per revolution}} = .05000$$

MSB   LSB

Enter   .05000 into the prescale switches

Note: Decimal is already in the correct position, so the multiplier switches should be set to "X1".

For counting applications using pickup devices such as photoelectric beams or switch contacts, you must determine the number of contact closures per unit to be counted. If you have only one contact closure per unit, enter .1000 in the prescale and set the multiplier switches to X10 (1.0000). If you have more than one contact closure per unit to be counted use this formula:

$$\frac{1 \text{ unit count}}{\text{contact closures per unit}} = \text{prescale setting}$$

Example #3

The photoelectric sensors contacts close 24 times for one case of bottles.

Example in formula:

$$\frac{1 \text{ case}}{24 \text{ contact closures}} = .04166$$

Set .04166 in the prescale switches and set the multiplier switches to "X1".

IMPORTANT NOTICE:

A decimal point in the display will require special consideration when setting the multiplier switches. The decimal point is passive in the display, in other words the counter does not know it is there. To permit the display to read correctly, it is necessary to set the multiplier to a corresponding higher power of ten, based on the desired position of the decimal in the display.

Example #4

Display: 00000.0 gallons decimal point in tens place

$$\frac{48 \text{ gallons per revolution}}{8 \text{ Pulses per revolution}} = 6.0000$$

MSB   LSB

Prescale setting: ↘.60000↙
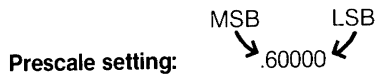
Normally the multiplier switch would be set to X10 (6.0000), but since in this example we desire a decimal in the tenths place in the display, (00000.0). The proper multiplier switch setting is X100.

Should the multiplication capacity be exceeded in the Micro 3000, it may be remedied by adjusting the internal logic switches (S-3), to move the decimal point to the right or eliminating it. See figure 7, for a listing of logic switch functions and figure 8, for their respective locations. Note: Power need not be turned off when changing logic switch functions.

If a decimal point for extreme resolution in the display (000.000), is still highly desirable, it may be obtained by increasing the number of pulses per count or revolution. This is achieved by using a different type of pickup such as an optical encoder or gear with more teeth, etc., to provide more pulses or, "More Resolution per Revolution".

Example #5

Display 000.000

decimal point in thousands place

$$\frac{38\text{mm of platinum wire per revolution}}{1270 \text{ pulses per revolution (optical encoder)}} = .02992$$
prescale setting

Set .29920 in prescale switches, set the multiplier switches to X100 to account for decimal in the thousandths place in the display.

Reminder: Don't forget to cycle power after changing prescale and multiplier switching settings.
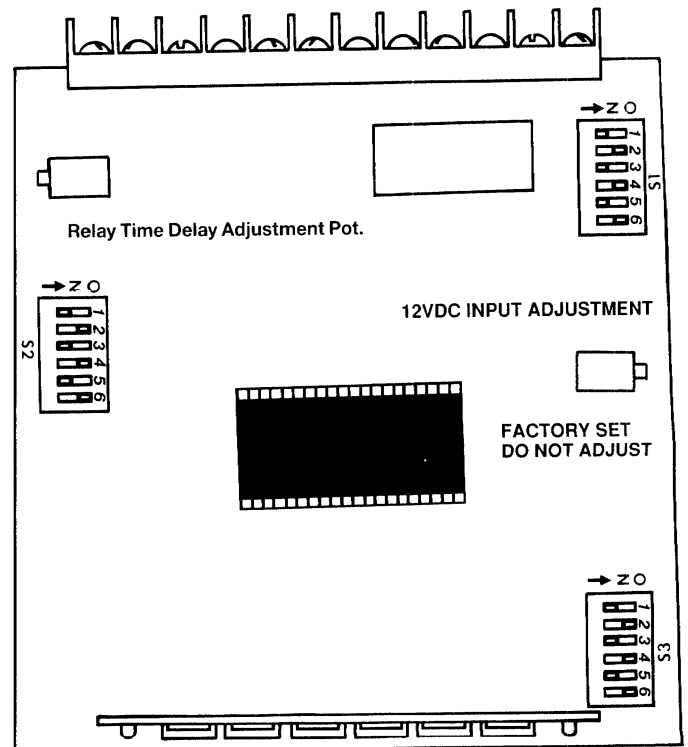

By following the ordering information for the Micro3000 in the price list, you may select one of these operating modes to be set up at our factory. Should you desire to program a new operating mode for your counter, follow this procedure.

1. Remove all wiring to terminal strips on rear of counter. Take care to tag wires so they may be replaced on the correct terminal later.
2. Remove the four captive screws on the face of the counter and remove counter face and gently slide out the two internal circuit boards.
3. Refer to figure 8, to locate switch blocks S1, S2, and S3 on the display circuit board.
4. Select the operating mode required by switching ON the appropriate switches and turning OFF all other switches.

Decimal Point Selection:

S3-1	XXXXXX.	To select the position of the decimal point in the display, choose the appropriate switch and slide into the left "ON" position. Leave all other switches OFF.
S3-2	XXXXX.X	
S3-3	XXXX.XX	
S3-4	XXX.XXX	
S3-5	XX.XXXX	
S6-6	X.XXXXX	

Basic Functions of the Micro3000 (figure 8)

Relay Time Delay Adjustment Pot.

S2

12VDC INPUT ADJUSTMENT

FACTORY SET
DO NOT ADJUST

S1

S3

## Eight Basic Functions of the Micro3000 Counter

Select the desired mode and turn on the proper switches. Turn off all switches not used.

Switches (On)	Functions

1. Up Count (Totalizer)

S1 — 3	Manual Reset (Count Up Mode)
S1 — 5	Manual Reset

2. Up Count, Momentary Relay Continuous Count

S1 — 2	Momentary Closure
S1 — 3	Manual Reset
S1 — 5	Manual Reset
S2 — 4	Relay Output (Count Up)

3. Up Count, Momentary Relay Automatic Reset

S1 — 2	Momentary Relay Automatic Reset
S1 — 3	Manual Reset
S1 — 6	Automatic Reset
S2 — 4	Relay Output (Count Up)

4. Up Count Relay Latch Continuous Count

S1 — 3	Manual Reset (Up Count)
S1 — 5	Manual Reset
S2 — 4	Relay Output (Count Up)

5. Up Count, Relay Latch Hold Count

S1 — 3	Manual Reset (Up Count)
S1 — 5	Manual Reset
S2 — 4	Relay Output (Up Count)
S2 — 6	Count Inhibit

6. Down Count, Momentary Relay at 0, Automatic Reset

S1 — 4	Down Count
S1 — 5	Manual Reset
S1 — 2	Momentary Closure
S2 — 1	Manual Reset (Down Count)
S2 — 2	Automatic Reset (Down Count)
S2 — 3	Relay Output (Down Count)

7. Down Count, Momentary Relay at 0, Hold at 0

S1 — 2	Momentary Closure
S1 — 4	Down Count
S1 — 5	Manual Reset
S2 — 1	Manual Reset (Down Count)
S2 — 3	Relay Output (Down Count)
S2 — 6	Count Inhibit

8. Down Count, Relay Latch, Hold at 0

S1 — 4	Down Count
S1 — 5	Manual Reset
S2 — 1	Manual Reset
S2 — 3	Relay Output (Down Count)
S2 — 6	Count Inhibit

Micro 3000 Dimensional Drawings

Dimensions in inches
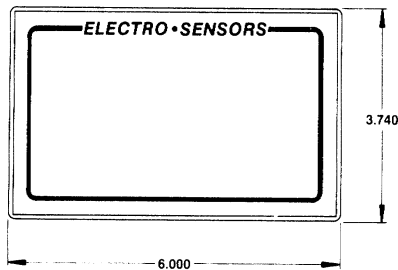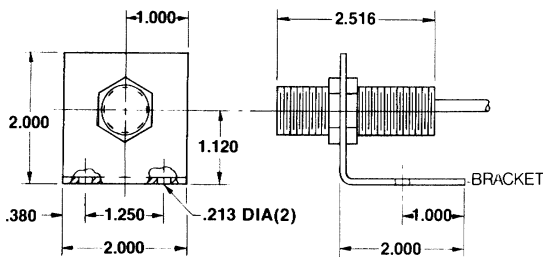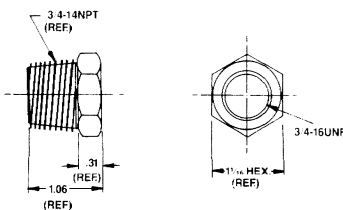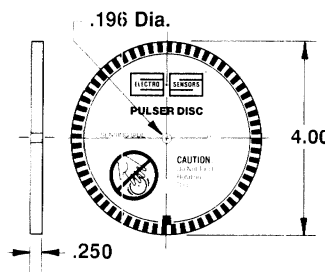

Front View

Digital Sensing Head

Model 906
S/N 775-000500
Model 906-B Bidirectional
S/N 775-000504

Optional Conduit Adapter for Standard Digital Sensing Head

Model 259-M
S/N 271-000100

Side View

Model 255
S/N 700-000200

Explosion Proof Sensing Head

Model 907
S/N 775-000600
Model 907-B Bidirectional
S/N 775-006100

Mounting Bracket
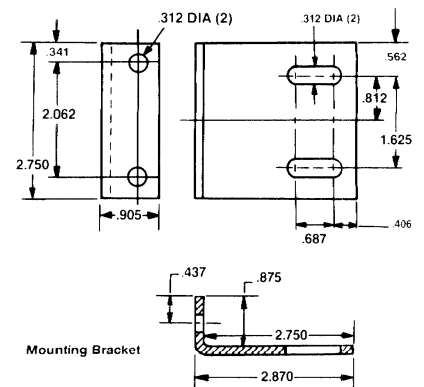
Micro 3000 Specifications:

Input Power:
Voltage .... 115 ±10% Vac
Current .... 1/8 Amp
Frequency 48-62Hz

Input Signal:
Amplitude .... 12Volt NOM, 60V max.
Frequency .... 0-10KHz high rate, 100Hz low rate max. with contact
Minimum Pulse Width 5µs
Type .... Open Collector, Contact Closure or Logic
Transducer Supply .... 12Vdc, 50mA max.

Display:
Type .... .43" LED
Range .... 4 or 6 Digit

Output Relay:
Type .... Form C
Rating .... 5A, 115Vac Resistive
Timing Range .... .1 to 8 sec.
Timing Adjustment .... 15 turn potentiometer

Physical/Environmental:
Storage Temperature ...... −40° to 85°C
Operating Temperature .... 0° to 70°C
Enclosure .... 3.75"H x 6.00"W x 5.47"D

Miscellaneous:
Input Pull-up 2200Ω
"Auto Reset"
　Max. Frequency 2000Hz

Pulser Disc Model 255:
Material .... Nylon 12 (standard) Aluminum (optional)
Dimensions .... 4" diameter x 0.25" thick
Operating Temperature .... −40° to 60°C*
Maximum Speed .... Consult Factory

Pulser Wrap:
Material .... PVC (std), Aluminum (optional)
Dimensions .... I.D. = shaft diameter, O.D. = I.D. + 3, Width = 1.5" (std) or .625" (optional narrow wrap)**
Operating Temperature .... −40° to 60°C*
Maximum Speed .... Consult Factory

Standard Digital Sensor Model 906:
Material .... Aluminum
Thread Size .... 3/4−16 UNF
Mounting Bracket and
　Jam Nuts .... Steel, plated

Output Type .... Open Collector, current sinking, 10mA max.
Signal Cable .... 22 AWG, 3 Conductor Shielded, 10 feet supplied
Maximum Cable Run .... 1500 feet
Operating Temperature ..... −40° to 60°C*
Sensing Distance .... 1/16" to 1/4"

Bidirectional Sensor Model 906-B:
Same as 906 except –
Output Type .... Quadrature, Open Collector, Current Sinking, 20mA max.
Signal Cable .... 22 AWG, 4 Conductor Shielded, 10 feet supplied

Optional Explosion Proof Sensor Model 907:
Material, Transducer Body ... Cast aluminum, C.S.A. approved U.L. rated: Class I Group C,D; Class II Group E,F,G; Class III
Material, Mounting Bracket .. Steel, plated
Output Type .... Open Collector, Current Sinking, 10mA max.
Signal Cable .... 22 AWG, 3 Conductor Shielded, 10 feet supplied
Maximum Cable Run ...... 1500 feet

Explosion Proof Bidirectional Sensor Model 907-B:
Same as 907 except –
Output Type .... Quadrature, Open Collector, Current Sinking, 20mA max.
Signal Cable .... 22 AWG, 4 Conductor Shielded, 10 feet supplied

* Higher temperature ranges available – Consult factory.
** For shaft sizes of 4" or less the O.D. for .625" wide wraps is 7".

Specifications Subject to Change Without Notice

Micro 3000 Spare Parts List:

	Stock No.	Part No.
Micro 3400, 4 Digit Counter (w/o Preset) .	800-002000	-
Micro 3400, 4 Digit Counter (w/ Preset) ..	800-002001	-
Micro 3600, 6 Digit Counter (w/o Preset) .	800-002002	-
Micro 3600, 6 Digit Counter (w/ Preset) ..	800-002003	-
Standard Digital Sensor	775-000500	906
Standard Bidirectional Digital Sensor	775-000504	906-B
Explosion Proof Digital Sensor	775-000600	907
Explosion Proof Bidirectional Sensor	775-006100	907-B
4" Diameter Nylon Pulser Disc	700-000200	255
Male Conduit Adapter for Standard Sensor	271-000100	259-M
Standard Sensor Cable, 3 Conductor	610-000200	213-A
Standard Sensor Cable, 4 Conductor	610-000500	-

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