



Temposonics®
Intrinsically Safe Position Sensors

*Ordering Guide &
Installation and Instruction Manual*

*Part Number 550420
Revision D 2/20/98*

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GENERAL INFORMATION

MTS PHONE NUMBERS	
To place orders:	Contact your local distributor or call: 1-800-633-7609 or 919-677-0100
Application questions:	1-800-633-7609
Service:	1-800-248-0532
Fax:	919-677-0200
SHIPPING ADDRESS	HOURS
MTS SYSTEMS CORPORATION Sensors Division 3001 Sheldon Drive Cary, North Carolina 27513	<i>Monday - Thursday</i> 8:00 a.m. to 6:30 p.m. EST or EDT <i>Friday</i> 8:00 a.m. to 4:30 p.m. EST or EDT

1. INTRODUCTION

Temposonics position sensors can be used in hazardous environments when connected to approved safety barriers. Factory Mutual approval permits the use of intrinsically safe Temposonics position sensors in Class I, Division 1, Groups A, B, C, and D hazardous locations (see Table 1A below).

Table 1A Hazardous Location Classifications

Class I			
Flammable Gases or Vapors			
Division 1			
May exist because of repair or maintenance operations, or leakage			
<ul style="list-style-type: none"> • Release concentration because of breakdown or faulty operation of equipment or process • Faulty operation of process which causes simultaneous failure of electrical equipment 			
Group A	Group B	Group C	Group D
Atmospheres containing Acetylene	Atmospheres such as: <ul style="list-style-type: none"> • Butadiene • Ethylene Oxide • Propylene Oxide • Acrolein • Hydrogen 	Atmospheres such as: <ul style="list-style-type: none"> • Cyclopropane • Ethyl Ether • Ethylene 	Atmospheres such as: <ul style="list-style-type: none"> • Acetone • Alcohol • Ammonia • Benzene • Benzol • Butane • Gasoline • Hexane • Lacquer Solvent Vapors • Naptha • Natural Gas • Propane

Intrinsic Safety (IS) is based on the principle of restricting the electrical energy transmitted into a hazardous area, thereby ensuring that any sparks or heated surfaces that may occur as a result of electrical failures are insufficient to cause ignition. With intrinsically safe systems, a safe operating environment is provided for personnel and equipment -- voltages are low and no threat of an explosion exists.

2. SYSTEM COMPONENTS

COMPONENTS -- INTRINSICALLY SAFE SYSTEMS:

- Temposonics I Linear Displacement Transducer
- (1 ea.) MTL-728 Shunt Diode Safety Barrier (P/N 370140)
- (2 ea.) MTL-710 Shunt Diode Safety Barrier (P/N 370141)
- 24-28 Vdc Power Supply (P/N 380009)
- ± 15 Vdc Power Supply -- required with digital systems and some analog system configurations
- 5 Vdc power Supply -- required with digital systems
- A signal conditioning interface module (see Figure 1.1 -- 'Signal Conditioning')

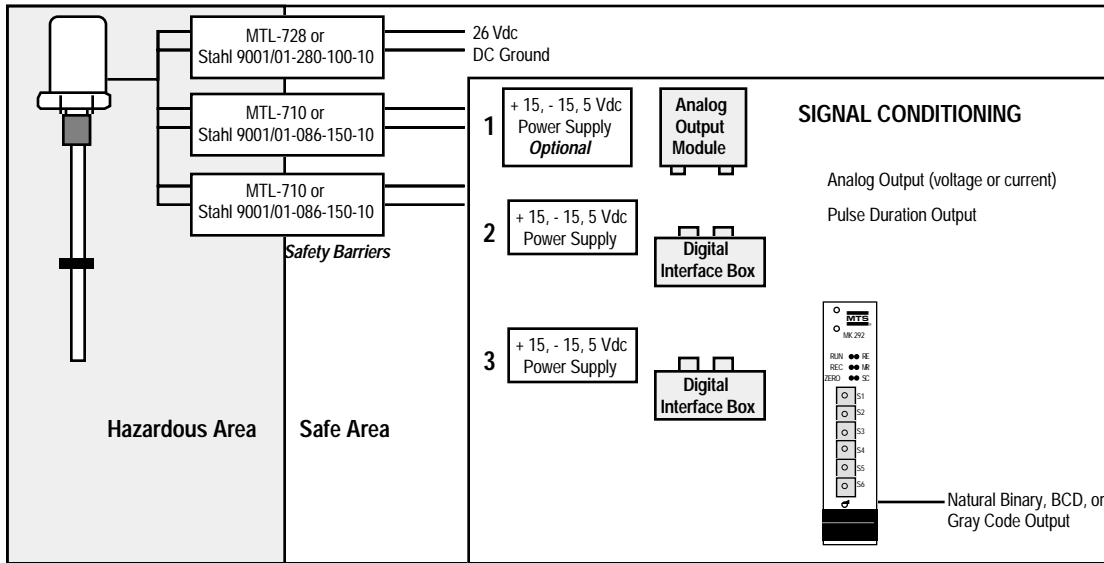


Figure 1.1
Typical System Configuration

2.1 System Specifications

Parameter	Specification
Input Voltage:	<ul style="list-style-type: none"> • Position Sensor: 26 Vdc • Interface Modules: ± 12 to ± 15 Vdc • Counter Card: 5 Vdc
Displacement:	Up to 25 feet (7620 millimeters)
Dead Space:	For stroke lengths up to 200 inches: 5 inches (127 millimeters) For stroke lengths over 200 inches: 7 inches (177.8 millimeters)
Sensor Styles:	<p>3 Styles:</p> <ol style="list-style-type: none"> 1) Standard, dust-tight 2) Ruggedized, dust-tight (similar to NEMA 1) 3) Ruggedized, splash-proof (similar to NEMA 4)
Non-linearity:	$< \pm 0.05\%$ of full scale or ± 0.002 inch (± 0.05 mm), whichever is greater
Repeatability:	$\pm 0.001\%$ of full scale or ± 0.0001 inch (± 0.002 mm), whichever is greater
Frequency Response:	Stroke dependent, 200 to 50 Hz for strokes ranging from 12 to 100 inches (305 to 2540 mm). Wider response is available. For digital systems, output is updated at discreet intervals.
Temperature Coefficient: Transducer (length dependent): Electronics:	3 ppm/°F (5.4 ppm/°C) < 0.00011 in./°F (< 0.00503 mm/°C)
Operating Temperature Head Electronics: Transducer Rod: Analog Output Module: Digital Interface Module MK 292 Digital Output Module	- 40 to 150 °F (- 40 to 66 °C) - 40 to 185 °F (- 40 to 85 °C) - 40 to 180 °F (- 40 to 82 °C) 35 to 150°F (2 to 65°C) 32 to 140°F (0 to 60°C)
Sensor Operating Pressure:	Factory Mutual certified to 3000 psi continuous, 8000 psi static
Outputs (absolute) Analog: Digital:	Standard: 0 to 10 Vdc (others voltage outputs are available), Optional: 4 - 20 mA Natural Binary, BCD, Gray Code
Velocity Output (optional)	0 to ± 10 Vdc, polarity of output defines direction of travel <i>(optional 4-20 mA velocity output is available -- contact MTS for details)</i>
Magnet Requirement:	Part Number: 201542 (standard) or 201554 if sensor stroke length is over 200 inches
Mounting Distances:	<ul style="list-style-type: none"> • Temposonics position sensor to safety barriers: 200 feet maximum • Temposonics position sensor to Digital Interface Box: up to 200 feet with Belden 9931 cable • Digital Interface Box to MK 292 Module up to 300 feet with Belden 8227 cable • Temposonics position sensors to Analog Output Module: up to 200 feet with Belden 9931 cable

Specifications are subject to change without notice. Consult MTS for verification of specifications critical to your application.

3. HOW TO ORDER SYSTEM COMPONENTS

3.1 Temposonics Intrinsically Safe Position Sensor

I 6

Enclosure Style _____
 1 = Standard, dust-tight (similar to NEMA 1)
 2 = Ruggedized, dust-tight (similar to NEMA 1)
 3 = Ruggedized, splash-proof (similar to NEMA 4)

Stroke Length Units _____
 U = U.S. Customary (inches and tenth -- xxx.x inches)
 M = Metric (millimeters)

Stroke Length _____
The value to enter depends on stroke length units indicated above.
For example:
 0120 = 12.0 inches or 120 mm
 1200 = 120.0 inches or 1200 mm

Null/Dead Space _____
 5 = 5 in. dead space, 2 in. null—standard for strokes up to 200 inches
 7 = 7 in. dead space, 2 in. null—standard for strokes over 200 inches
 9 = Special (must be specified at time of order)

Cable/Connector (See IMPORTANT NOTE below) _____
 1 = 5 ft. cable with standard, 6-pin connector (for use with Enclosure Style "1")
 2 = 5 ft. cable with pigtail connection (for use with Enclosure Style "1")
 3 = No cable -- extension cable required, connector attached directly to head assembly (for use with Enclosure Styles "2" or "3")
 4 = 25 ft. cable with standard, 6-pin connector (for use with Enclosure Style "1")

IMPORTANT NOTE

Consult Applications Engineering for any installation with cable lengths that exceed 200 feet of total distance between the position sensor and the external conditioning module (analog or digital).

3.2 Extension Cables

I S

Cable Type _____
 S = Standard (Belden 9931)
 H = Heavy Duty (Belden 9730)

Length (ft.) _____
Examples: 25 ft. = 025; 100 ft. = 100
Maximum Length: 200 ft.

Mating Connector _____
 1 = Standard, P/N 370018
 (For use with sensor Enclosure Style "1")
 2 = Ruggedized, P/N 370011
 (For use with sensor Enclosure Style "2", refer to Section 3.1 above and Figure 3.1 on next page)
 3 = Ruggedized, P/N 370062
 (For use with sensor Enclosure Style "3", refer to Section 3.1 above and Figure 3.1 on next page.
 Also, this connector is available with standard cable only—not compatible with Heavy Duty cable)

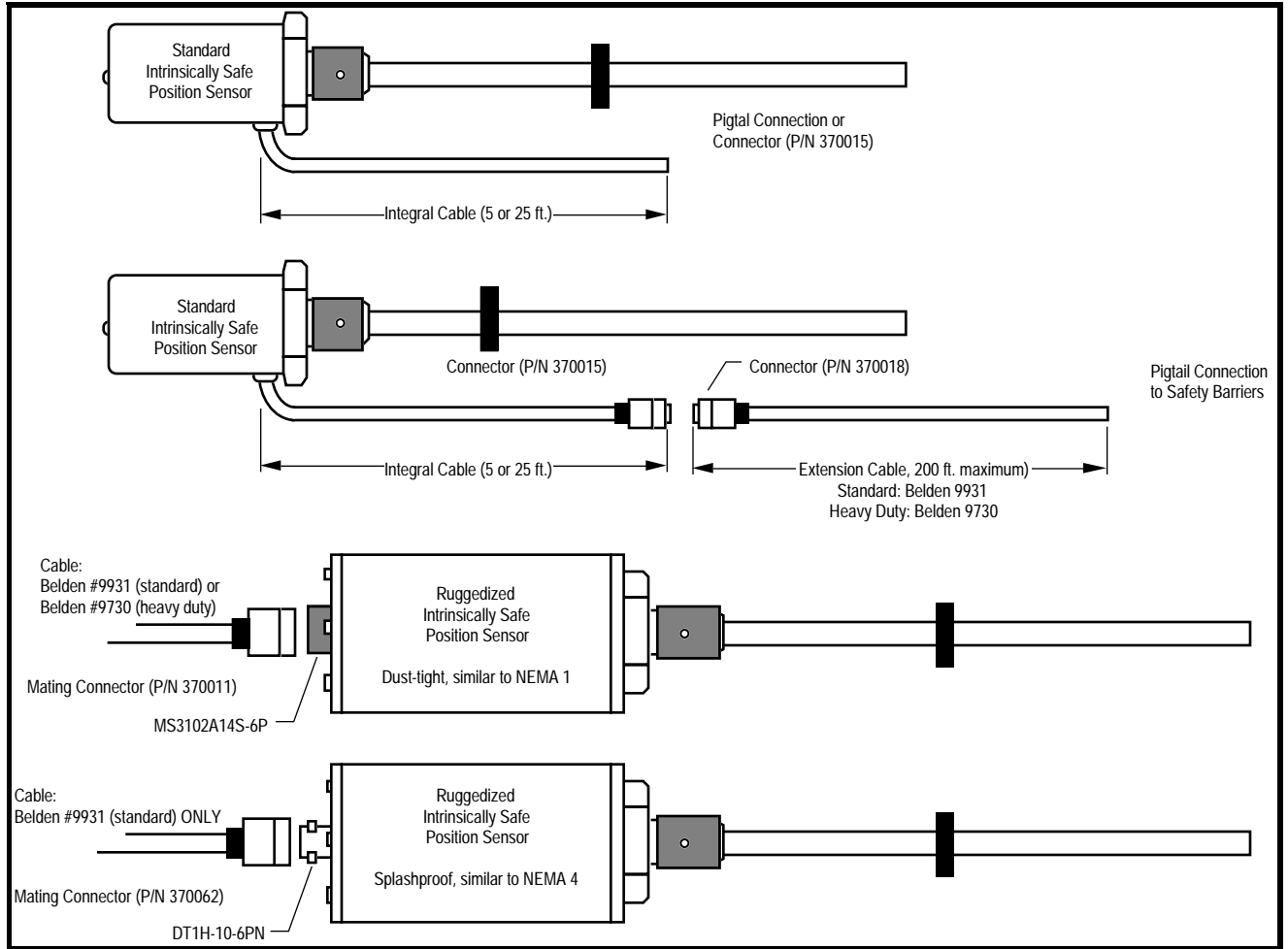


Figure 3.1
*Temposonics Intrinsically Safe
 Position Sensor Configurations*

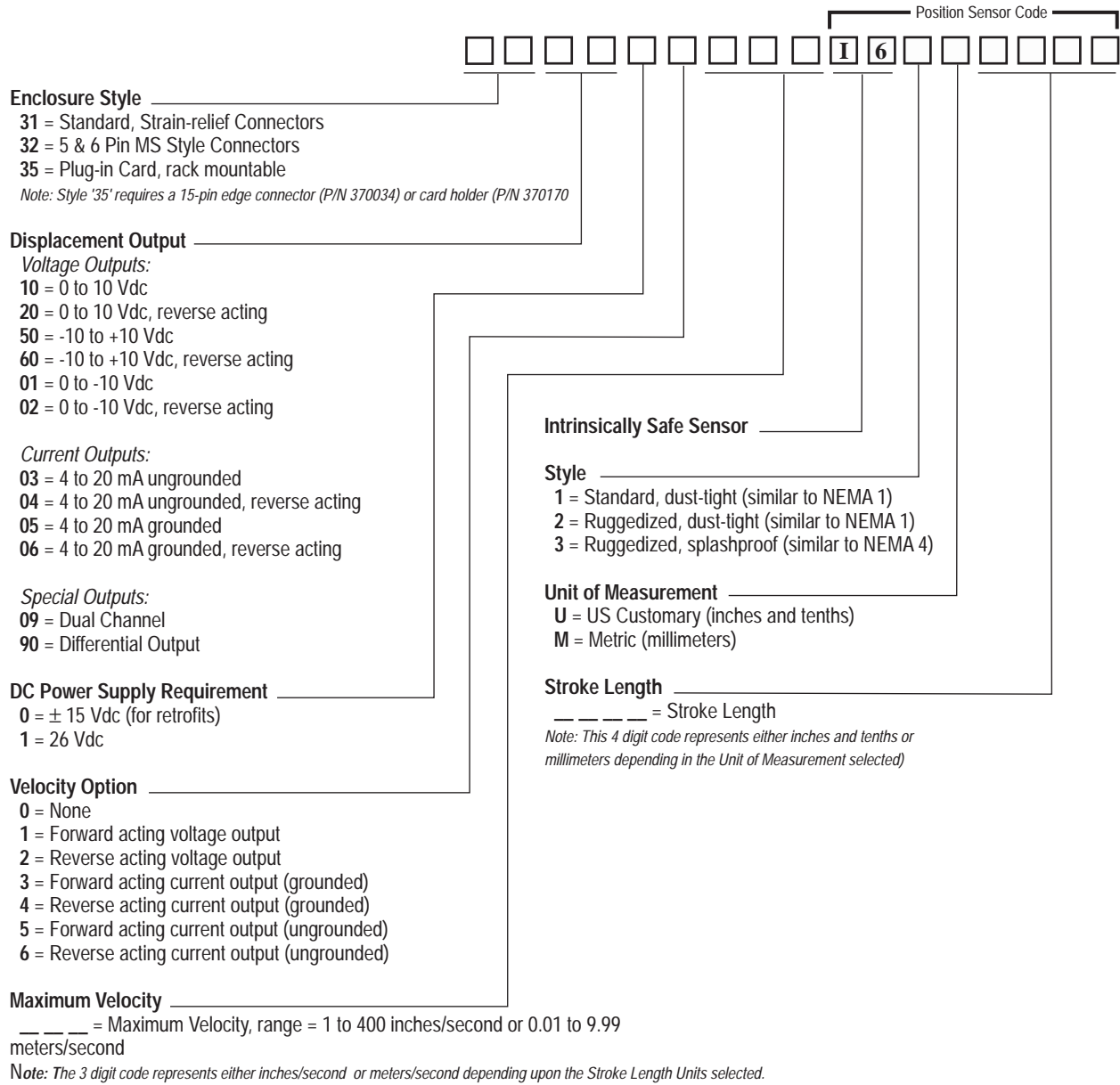
NOTES:

1. Safety Barriers are hard-wired using a pigtail connection.
2. Maximum cable length between the Temposonics position sensor and the safety barrier is 200 feet.

Table 3A Position Sensor Cable Connections

Connector Pin #	C A B L E		Functional Description
	Belden 9931 (standard)	Belden 9730 (heavy duty)	
A	Red	Red	26 V
B	Black	Black <i>(twisted with Red wire)</i>	Common
C	Brown	Green	Return Pulse
D	Blue	Black <i>(twisted with Green wire)</i>	Common
E	White	White	Interrogation Pulse
F	Green	Black <i>(twisted with White wire)</i>	Common

3.3 Analog Output Module for Intrinsically Safe Systems



3.3.1 Accessories for AOM

- 5 pin female MS connector (P/N 370017)
- 6 pin female MS connector (P/N 370015)

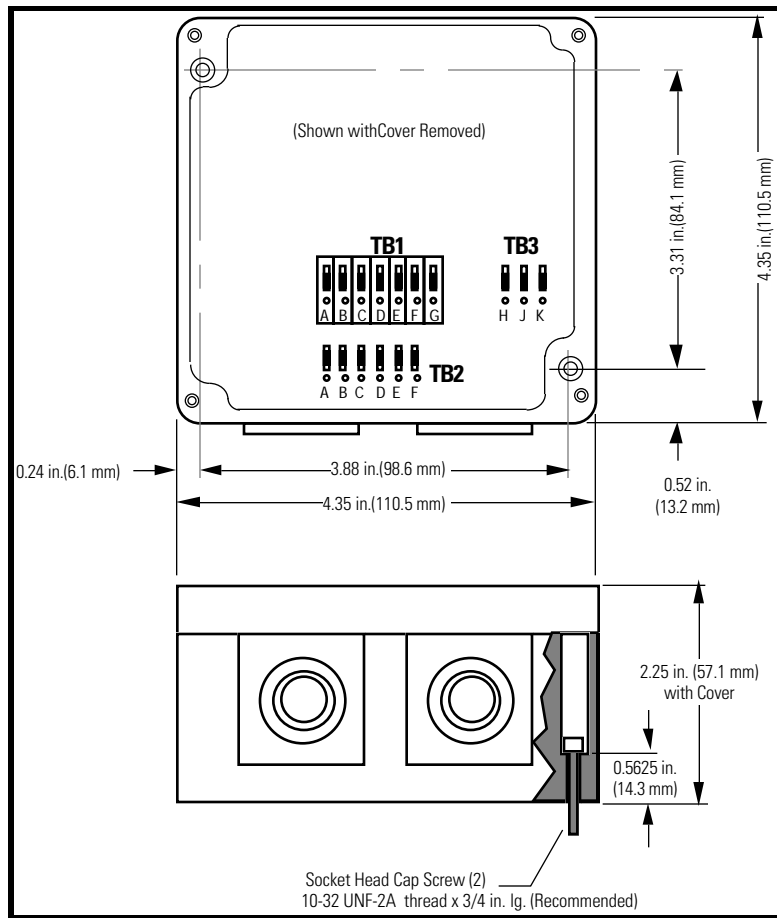


Figure 3.2
Analog Output Module Dimensions

3.4 Digital Interface Box for Intrinsically Safe Systems

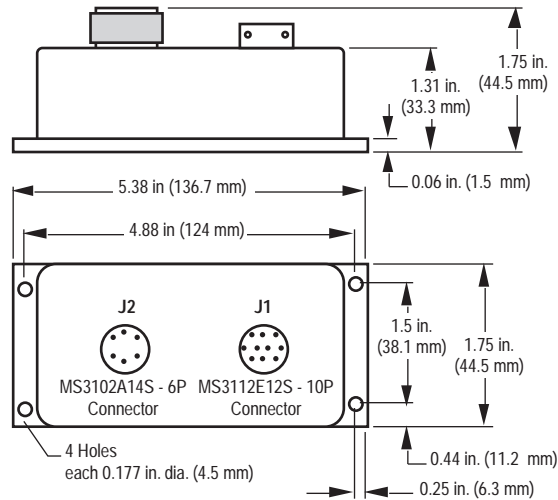
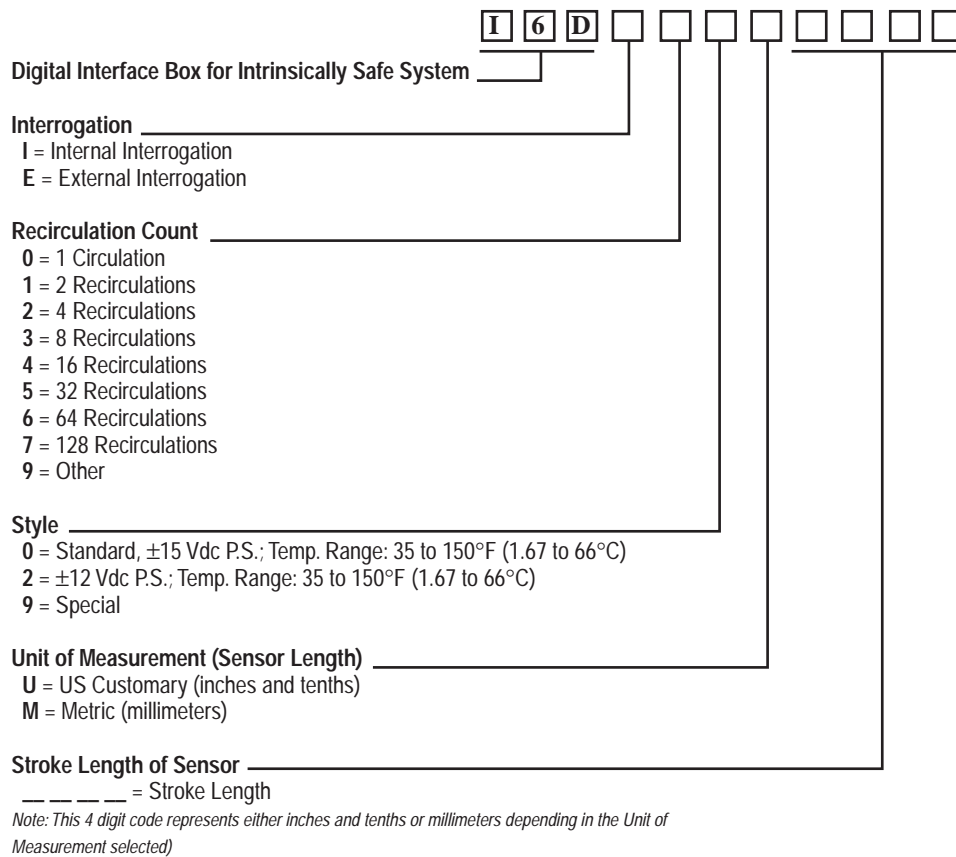


Figure 3.3
 Digital Interface Box Dimensions

3.4.1 Accessories for Digital Interface Box

- 10-pin female MS connector (P/N 370013)
- 6-pin female MS connector (P/N 370015)

3.5 MK 292 Digital Output Module for Intrinsically Safe System

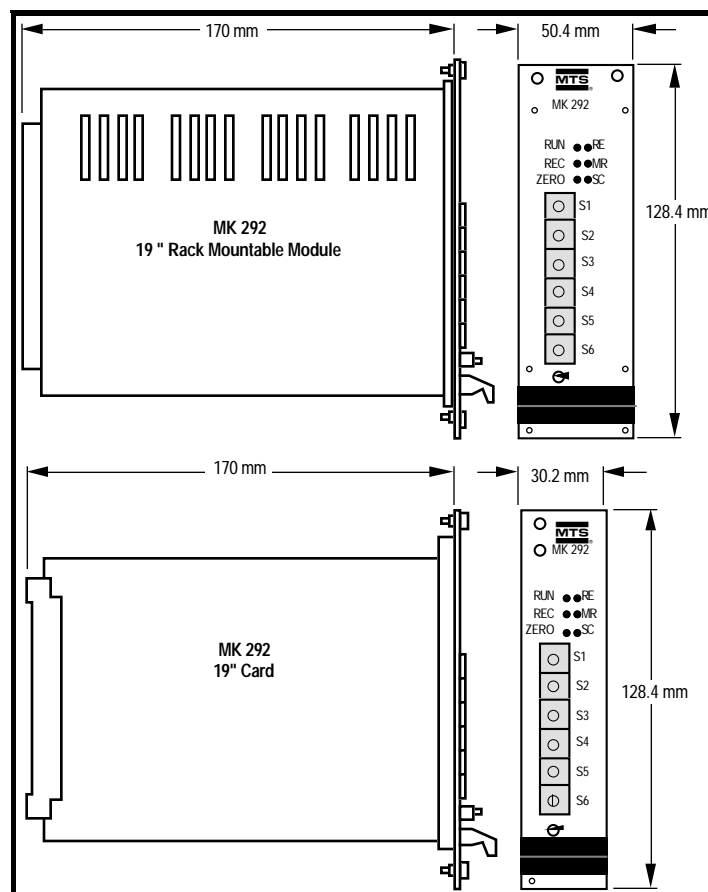
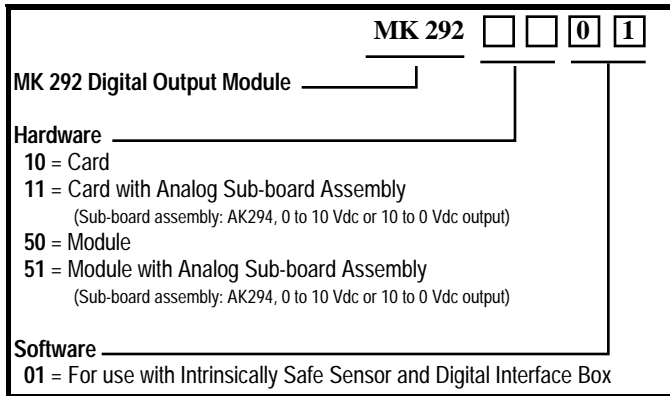


Figure 3.4
MK 292 Module Dimensions

4. MECHANICAL INSTALLATION

4.1 Installing a Temposonics Position Sensor

Before beginning installation, be sure you know the following dimensions (as illustrated in Figures 4-1 to 4-3.):

- Null Space
- Stroke
- Dead Zone

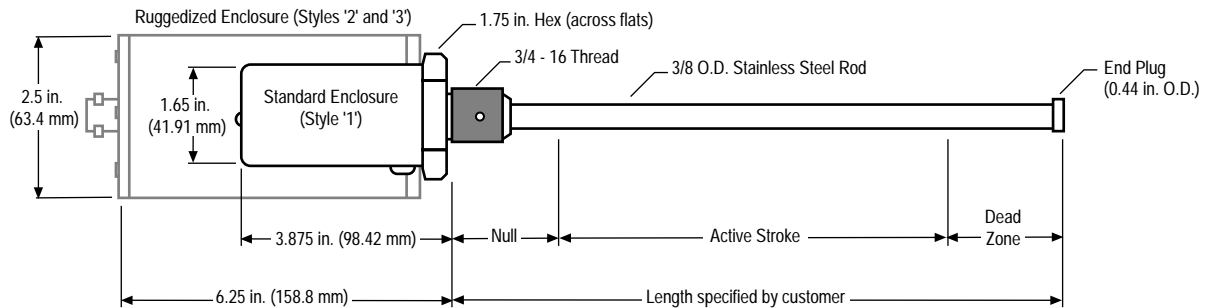


Figure 4.1
Temposonics Intrinsicly Safe Position Sensor Dimension

1. Use the 3/4 inch (19 mm), 16 UNF thread of the position sensor to mount it at the selected location. Leave room to access the hex head. If a pressure or moisture seal is required, install an O-ring (type MS 28778-8 is recommended) in the special groove. Use the hex head to tighten the position sensor assembly.
2. Install the permanent magnet over the sensor rod. Mount the permanent magnet to the movable device whose displacement will be measured. To minimize the effect of magnetic materials (i.e. iron, steel, etc.) on the magnetic field of the permanent magnet, ensure the minimum spacing requirements are met as shown in Figures 4.2a-c. (Any non-magnetic materials can be in direct contact with the permanent magnet without affecting performance.)

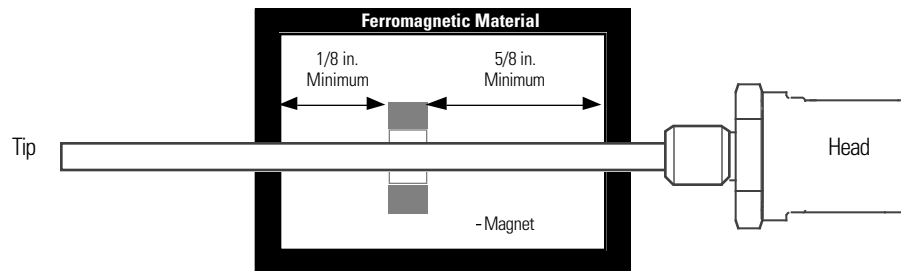


Figure 4.2a
Minimum Magnet Clearance Using Magnetic Supports

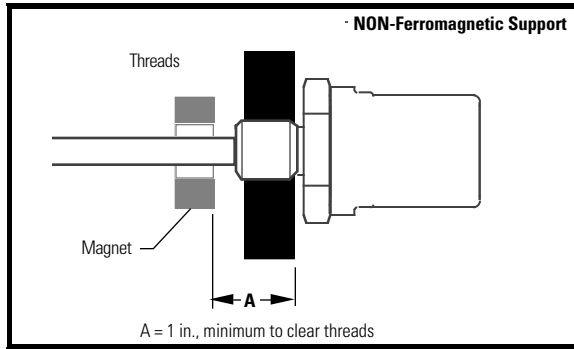


Figure 4.2b

Minimum Null Space Using Non-Magnetic Support

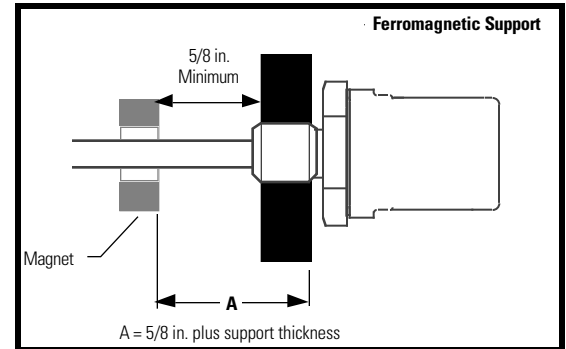


Figure 4.2c

Minimum Null Space Using Magnetic Support

Notes:

1. The magnet must not contact ferromagnetic materials (such as iron or steel). Clearances are required between the surface of the magnet and ferromagnetic material, as shown. Non-ferrous material (such as copper, brass, or 300 series stainless steel) may contact the magnet without affecting sensor performance.
2. Standard Null Space is 2 inches. There is no maximum limit for Null Space. Less than 2 inches can be specified if magnet clearances meet requirements illustrated above.

NOTE

Clearance between the magnet and the sensor rod is not critical. However, contact between the components will cause wear over time. The installation of supports and/or readjustment of the supports is recommended if the magnet contacts the sensor rod.

3. Move the permanent magnet full-scale to check that it moves freely. If not (if the magnet rubs on the sensor rod) you can correct this by mounting a support bracket to the end of the position sensor. Long sensors may need additional supports to be attached to the sensor rod. Transducer supports are described later in this section.

4.2 Types of Sensor Supports

Long sensors (48 inches or longer) may require supports to maintain proper alignment between the sensor rod and the permanent magnet. When sensor rod supports are used, special, open-ended permanent magnets are required.

Transducer supports attached to the active stroke length must be made of a non-ferrous material, thin enough to permit the permanent magnet to pass without obstruction. Because the permanent magnet does not enter the dead zone, supports connected within the dead zone may be made of any material. The main types of supports are loop, channel, and guide pipe supports.

4.2.1 Loop Supports

Loop supports are fabricated from non-ferrous materials, thin enough to permit free movement of the magnet. Loop supports are recommended for straight position sensors. They may be used alone or with channel supports. Figure 4.3 illustrates the fabrication of a loop support.

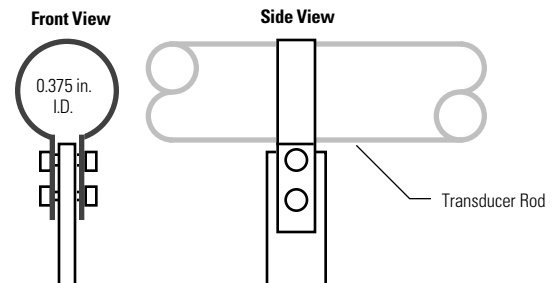


Figure 4.3
Loop Support

NOTE

When open magnets are used, ensure the sensor rod remains within the inside diameter of the magnet throughout the length of the stroke. If the sensor rod is allowed to enter the cut out area of an open magnet, the output signal could attenuate or be lost. See Figure 4.6.

4.2.2 Channel Supports

Channel supports, being typically straight, are normally used with rigid sensors. A channel support consists of a straight channel with loop supports mounted at intervals. The loop supports are required to keep the sensor rod within the channel. Figure 4.4 shows a channel support. Channel supports are available from various manufacturers or may be fabricated.

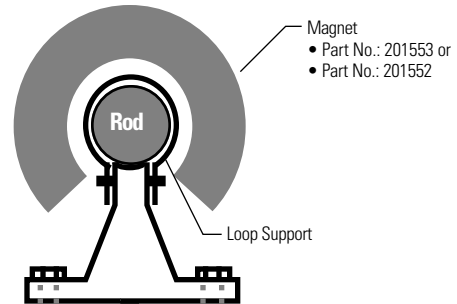


Figure 4.4
Channel Support

4.2.3 Guide Pipe Supports

A guide pipe support is constructed of non-ferrous material, straight or bent to the desired shape. As shown in Figure 4.5, both inside and outside dimensions of the pipe are critical:

- Because the sensor rod is installed inside the pipe, the inside diameter of the pipe must be large enough to clear the rod.
- The outside diameter of the pipe must be small enough to clear the magnet.

Refer to pipe manufacturers' specifications and dimensions (schedule 10, 40, etc.) to select the appropriate size pipe. Guide pipe is typically supported at each end of the pipe.

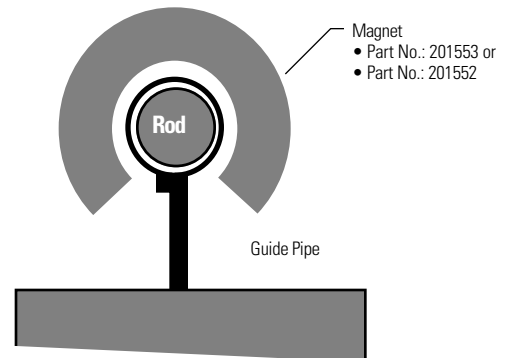


Figure. 4.5
Guide Pipe Support

4.3 Open Magnets

When using an open magnet, make sure the rod is positioned at all times within the "active" zone of the magnet. The position sensor cannot operate properly unless the entire stroke of the sensor rod is located within this zone. The active zone, as shown in Figure 4.6, lies within the inside diameter of the magnet.



Figure 4.6
Active Zone for Open Magnets

4.4 Spring Loading or Tensioning

The sensor rod can be spring loaded or tensioned using a stationary weight. Attach a spring mechanism or weight to the dead zone of the sensor rod with a clamping device -- make sure that the clamp does not deform the rod. The maximum weight or spring tension is 5 to 7 lbs.

4.5 Cylinder Installation

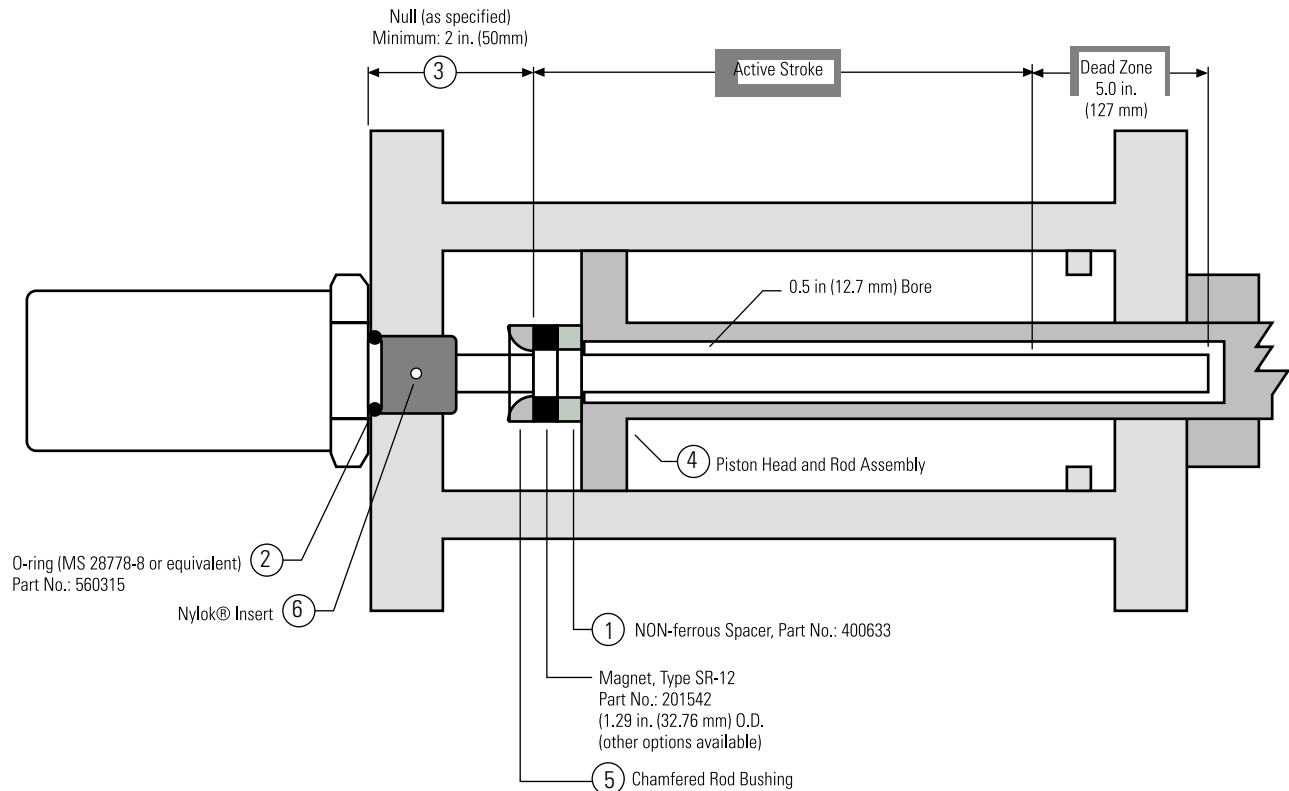
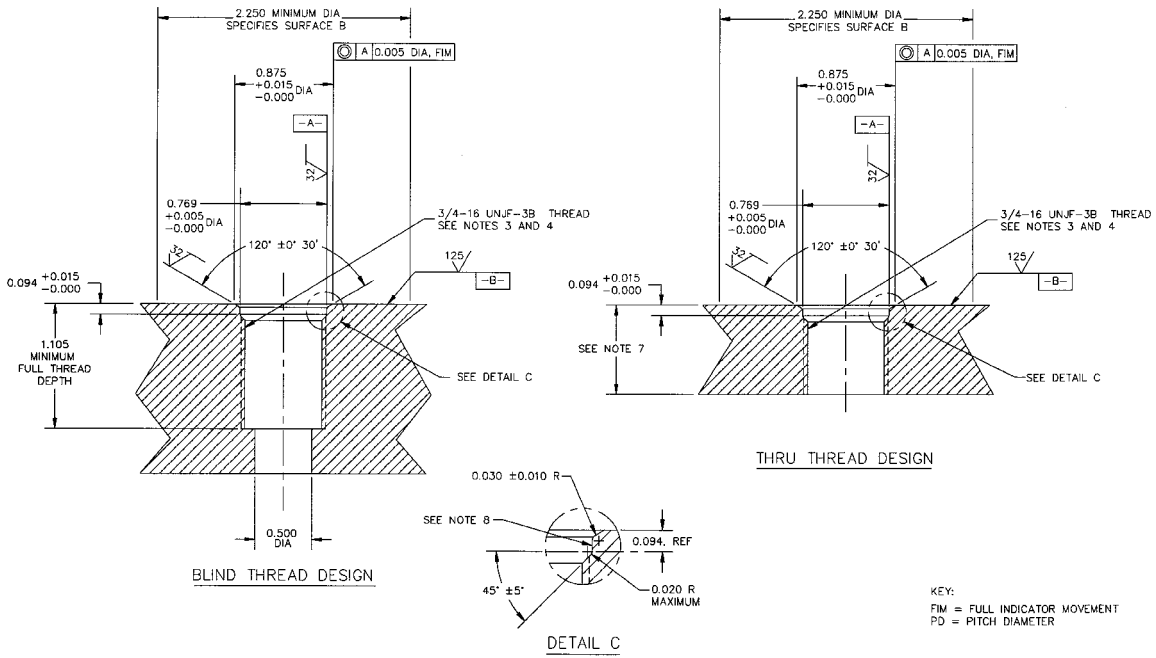


Figure 4.7
Typical Cylinder Installation

Figure 4.7 shows a typical cylinder installation. Review the following before attempting this type of installation.

- Use a non-ferrous (plastic, brass, Teflon®, etc.) spacer [1] to provide 1/8 inch (32 mm) minimum space between the magnet and the piston.
- An O-ring groove [2] is provided at the base of the hex for pressure sealing. MTS uses mil-standard MS33514 for the O-ring groove. Refer to mil-standard MS33649 or SAE J514 for machining of mating surfaces.
- The null space [3] is specified according to the installation design and cylinder dimensions. The analog output module provides a null adjustment. Make sure that the magnet can be mounted at the proper null position.
- The piston head [4] shown in Figure 4.7 is typical. For some installations, depending on the clearances, it may be desired to countersink the magnet.
- A chamfered rod bushing [5] should be considered for strokes over 5 feet (1.5 meters) to prevent wear on the magnet as the piston retracts. The bushing should be made from Teflon or similar material.
- A Nylok self locking insert [6] is provided on the threads. An O-ring groove is provided at the base of the hex head for pressure sealing.
- The recommended bore for the cylinder rod is 1/2 inch (13 mm). The 0.375 in. sensor rod includes a 0.44 in. (12 mm) end plug. Use standard industry practices for machining and mounting of all components. Consult the cylinder manufacturer for applicable SAE or military specifications.



NOTES:

1. Dimensions and tolerances based on ANSI Y14.5-1982.
2. MTS has extracted all pertinent information from MS33649 to generate this document.
3. PD must be square with surface B within 0.005 FIM across 2.250 dia minimum.
4. PD must be concentric with 2.250 dia within 0.030 FIM and with 0.769 dia within 0.005 FIM.
5. Surface texture ANSI B46.1-1978.
6. Use o-ring MTS part number 560315 for correct sealing.
7. The thread design shall have sufficient threads to meet strength requirements of material used.
8. Finish counter-bore shall be free from longitudinal and spiral tool marks. Annular tool marks up to 32 micro-inches maximum will be permissible.

Figure 4.8
O-ring Boss Detail

4.6 Installing Magnets

If the null adjustment is inadequate, you can design a coupler with adjustments to mount the magnet to the measured member.

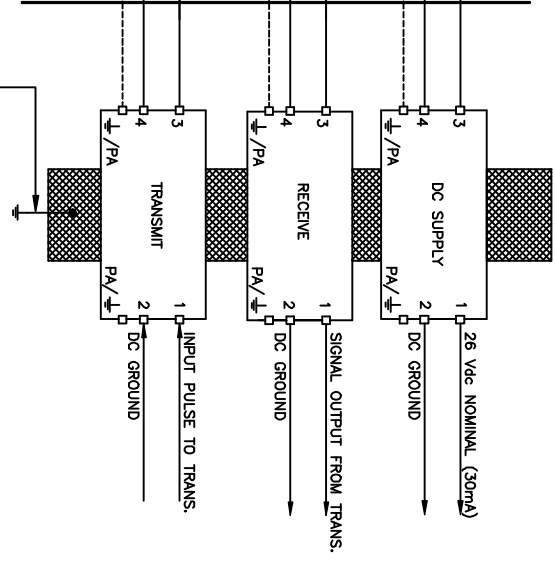
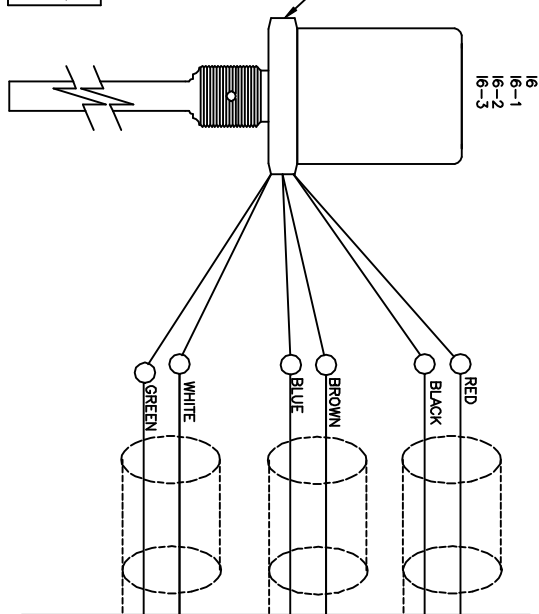
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MTS
TEMPSONICS TRANSDUCER
APPROVED FOR MODELS:

HAZARDOUS LOCATION
CLASS I, DIV. 1, GROUP A,B,C,D

NONHAZARDOUS LOCATION OR APPROVED HAZARDOUS LOCATION
ANY CHANGES IN THIS LOCATION MAY AFFECT INTRINSIC SAFETY.

FRAME OF TRANSDUCER MUST BE CONNECTED TO POWER SUPPLY GROUND (DC GROUND). THERE MUST BE A CONNECTION BETWEEN POWER SUPPLY GROUND AND FRAME OF EQUIPMENT ON WHICH TRANSDUCER IS MOUNTED. ONE CENTRAL GROUND IS DESIRABLE. RESISTANCE BETWEEN THE FRAME OF THE EQUIPMENT ON WHICH THIS TRANSDUCER IS MOUNTED AND TRANSDUCER SHALL BE ≤ 0.1 OHM.



THIS CONNECTION MUST BE MADE TO DISTRIBUTION PANEL GROUND AND BE LESS THAN 1 OHM TO EARTH GROUND.

BARRIER MFG.	BARRIER MODEL NUMBER	FUNCTION	Voc VOLTS	Isc mA	Ca MAX. CLASS I, DIVISION 1, GROUPS A, B, C, D	La MAX. CLASS I, DIVISION 1, GROUP A, B, C, D
ELCON INSTRUMENTS	9001/01-086-150-10	TRANSMIT	8.6	146.2	5.90	1.70
ELCON INC.	9110/01-086-150-10	RECEIVE	8.6	146.2	5.90	1.70
R. STAHL INC.	9001/01-280-100-10	DC SUPPLY	28.0	100.0	0.14	3.60
MTL INC.	110+ OR 710+	TRANSMIT	10.0	200	3.00	0.95
MTL INC.	110+ OR 710+	RECEIVE	10.0	200	3.00	0.95
MTL INC.	128+ OR 728+	DC SUPPLY	28.0	93	0.13	4.02
ELCON INC.	1660-0D-AS-FF	TRANSMIT	7.12	288.5	12	0.5
ELCON INC.	1660-0D-AS-FF	RECEIVE	7.12	288.5	12	0.5
ELCON INC.	1680-0S-P-FF	DC SUPPLY	28.7	94	0.12	4.1
ELCON INC.	MB4/2/8cc OR MB4/4/8cc 8cc	TRANSMIT	12.2	247	1.3	0.5
ELCON INC.	MB4/2/8cc OR MB4/4/8cc 8cc	RECEIVE	12.2	247	1.3	0.5
ELCON INC.	MB4/Z/18+	DC SUPPLY	31.8	103.9	0.095	3.5

NOTES:

1. FACTORY MUTUAL RESEARCH CORPORATION APPROVED FOR INTRINSICALLY SAFE CLASS 1, DIVISION 1, GROUPS A, B, C, D. USE GENERAL PURPOSE ENCLOSURES MEETING THE REQUIREMENTS OF ANSI/S 82 IN A HAZARDOUS OR CLASS 1, DIVISION 2, GROUPS A, B, C AND D HAZARDOUS LOCATIONS.
USE FMRC APPROVED OR NRTL LISTED DUST IGNITION-PROOF ENCLOSURE FOR ENVIRONMENTAL PROTECTION IN CLASS II, DIVISION 2, GROUPS E, F AND G AND CLASS III, DIVISION 2 HAZARDOUS LOCATIONS
2. ELECTRONIC EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 VOLTS RMS. CABLE SETS THAT ARE RUN TOGETHER MUST HAVE SUFFICIENT INSULATION TO WITHSTAND 250 VOLTS BETWEEN SETS.
3. INSTALLATION DRAWING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ANSI/S 70 ARTICLE 504.
4. THE INTRINSICALLY SAFE FIELD WIRING SHALL BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE ANSI/S 70 AND LOCAL CODES.
5. RECEIVE/TRANSMIT CABLES CONNECTED TO THE BARRIERS SHALL BE LOW CAPACITY CABLES OF 14. pF OR LESS/FOOT (REFERENCE BELDEN 97/30, UL 2493) FOR LENGTHS OF 40 TO 200 FEET. WIRE GAUGE SHALL BE 24 AWG OR HEAVIER.
6. WHEN USING THE R. STAHL RECEIVE/TRANSMIT BARRIER (9001/01-086-150-10), THE RECEIVE/TRANSMIT CABLE FOR CABLE LENGTHS OF 200 TO 500 FEET, BELDEN 9182 (UL 2802) TWIN AXIAL SHALL BE USED. THE SHIELD MUST BE GROUNDED ON BOTH ENDS. THE DC SUPPLY BARRIER (R. STAHL 9001/01-280-100-10) WILL HAVE 20 AWG TWISTED WIRES.
7. WHEN USING THE MTL RECEIVE/TRANSMIT BARRIERS (MTL 110+ OR 710+), THE RECEIVE/TRANSMIT CABLE FOR CABLE LENGTHS OF 200 TO 100 FEET, BELDEN 9182 (UL 2802) TWIN AXIAL SHALL BE USED. THE SHIELD IS NOT REQUIRED. THE RECEIVE/TRANSMIT CABLE FOR CABLE LENGTHS OF 200 TO 100 FEET, BELDEN 9182 (UL 2802) TWIN AXIAL SHALL BE USED. TWISTED WIRES (SHIELD IS NOT REQUIRED). THE SHIELD MUST BE GROUNDED ON BOTH ENDS. THE DC SUPPLY BARRIER (MTL 128+ OR 728+) WILL HAVE 20 AWG TWISTED WIRES (SHIELD IS NOT REQUIRED).

NO	REVISION	DATE	BY	DESCRIPTION
K	8-95	WB	2911	REDRAWN-COMBINED 2 SHITS INTO 1, ADD NEW VENDOR.
J	8-95	WB	2974	CHANGED MODEL NUMBERS: INT-F-0000 TO 16, INT-H-0000 TO 16-3, INT-R-0000 TO 16-2, INT-S-0000 TO 16-1.
H	7-94	RB	2721	ADDED PAGE 2
G	8-92	CW	2330	ADDED RESISTANCE TO NOTE (< 0.1 OHMS)
F	2-91	RB	1982	CHG. REVISION NOTE REVERSED CABLE NOTES
E	1-91	RB		REDRAWN ON CAD FORMERLY IS-1020
D	3-87			ADDED APPROVED FOR TABLE
C	4-86			ADDED OPTIONAL MTL NUMBERS
B	6-85			ADDED GROUP, DIV. AND CLASS NOTES
A				ADDED CABLE NOTES & MISC NOTES

UNLESS OTHERWISE SPECIFIED

XX = ± 0.05
XX.0 = ± 0.1
ANGULAR = ± 1'

REMOVE BURRS AND CHAMP EDGES 0.05 MAX

DIM LIMITS HELD AFTER PLATING OR CONVERSION GATING

FULL DEPTHS ARE TO FULL DIAMETER

FULL THREADS

FINISH MATERIAL

NO NET SCALE DRAWING

REVISION DATE

DESIGNER: R. BARBER 7/15/94

CHECKER: D. JOHNSON

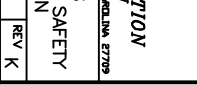
PROJECT: MTS TEMPSONICS

SCALE: DRAWING SIZE

TITLE: MTS TEMPSONICS TRANSDUCER AND SAFETY BARRIER SELECTION

DWG NO: 650512

REV: K



5.2 Analog Systems -- Power Supply and Sensor Connections

SYSTEM	
•	Temposonics Position Sensor
•	Analog Output Module w/Strain-relief Connectors
•	26 Vdc Power Supply
•	±15 Vdc Power Supply

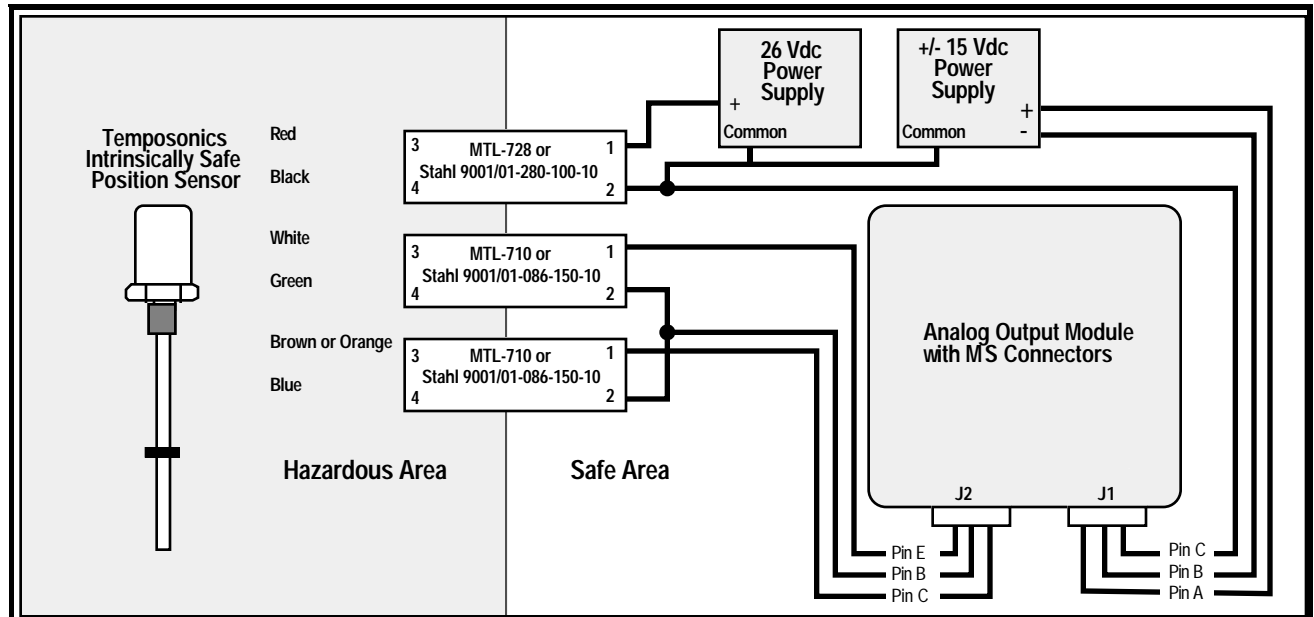


Figure 5.2
Analog Output Module w/ Strain-relief Connectors

SYSTEM	
•	Temposonics Position Sensor
•	Analog Output Module w/MS-Style Connectors
•	26 Vdc Power Supply
•	±15 Vdc Power Supply

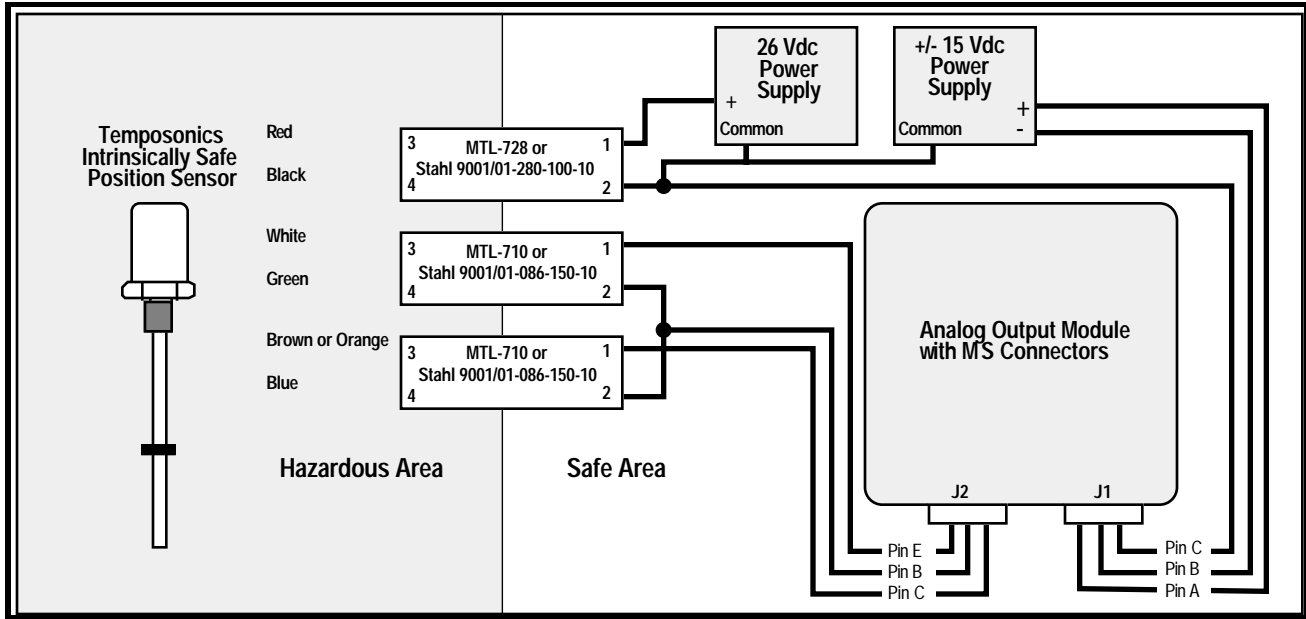


Figure 5.3
Analog Output Module w/MS Style Connectors

SYSTEM	
•	Temposonics Position Sensor
•	Analog Output Module w/Strain-relief Connector and 24 Vdc power supply option
•	26 Vdc Power Supply

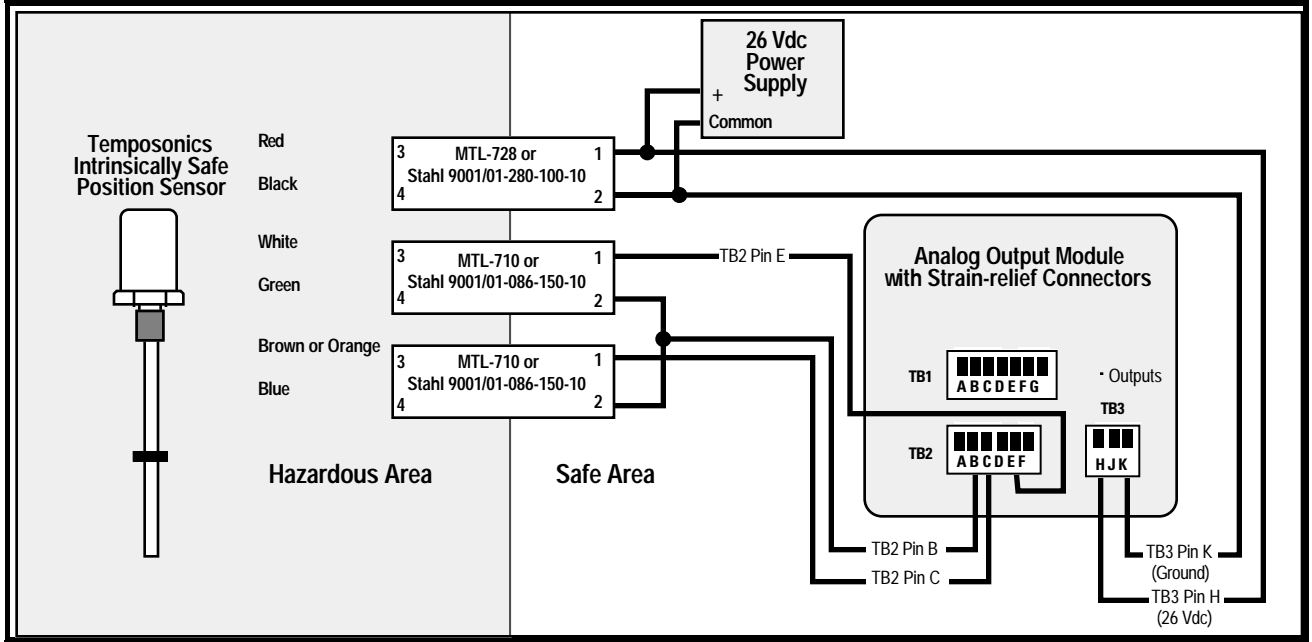


Figure 5.4
Analog Output Module w/ Strain-relief Connectors and 24 V Power Supply Option

SYSTEM	
•	Temposonics Position Sensor
•	Analog Output Module w/MS-Style Connectors and 24 Vdc power supply option
•	26 Vdc Power Supply

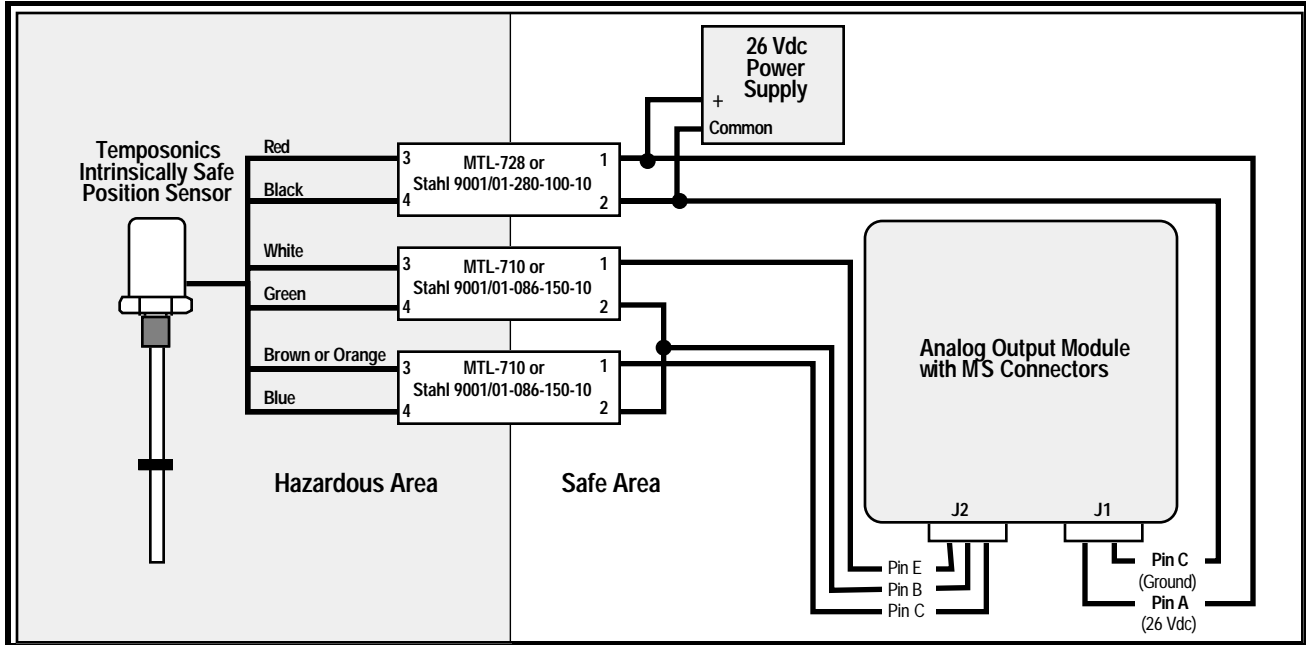


Figure 5.5
Analog Output Module w/MS Style Connectors and 24 V Power Supply Option

5.2.1 Analog Output Module (AOM) Output Connections (TB1)

Table 5A Standard AOM

<i>Strain Relief Connection</i>	<i>MS Connector Pin Designation</i>	<i>Function</i>
TB1		
A	D	(+) Displacement Output
B	E	(-) Displacement Output Return
C	n/a	n/a
D	n/a	n/a

Table 5B AOM w/Velocity Output Option

<i>Strain Relief Connection</i>	<i>MS Connector Pin Designation</i>	<i>Function</i>
TB1		
A	D	(+) Displacement Output
B	-	(-) Displacement Output Return
C	E	(+) Velocity Output
D	-	(-) Velocity Output

Table 5C AOM w/Dual Channel Option

<i>Strain Relief Connection</i>	<i>MS Connector Pin Designation</i>	<i>Function</i>
TB1		
A	D	Channel 1 (+) Displacement Output
E	E	Channel 2 (+) Displacement Output
C	n/a	n/a
D	n/a	n/a

5.3 Digital Systems -- Power Supply and Sensor Connections

SYSTEM
• Temposonics Position Sensor
• Digital Interface Box
• 26 Vdc Power Supply
• Power Supplies: + 15, - 15, and 5 Vdc

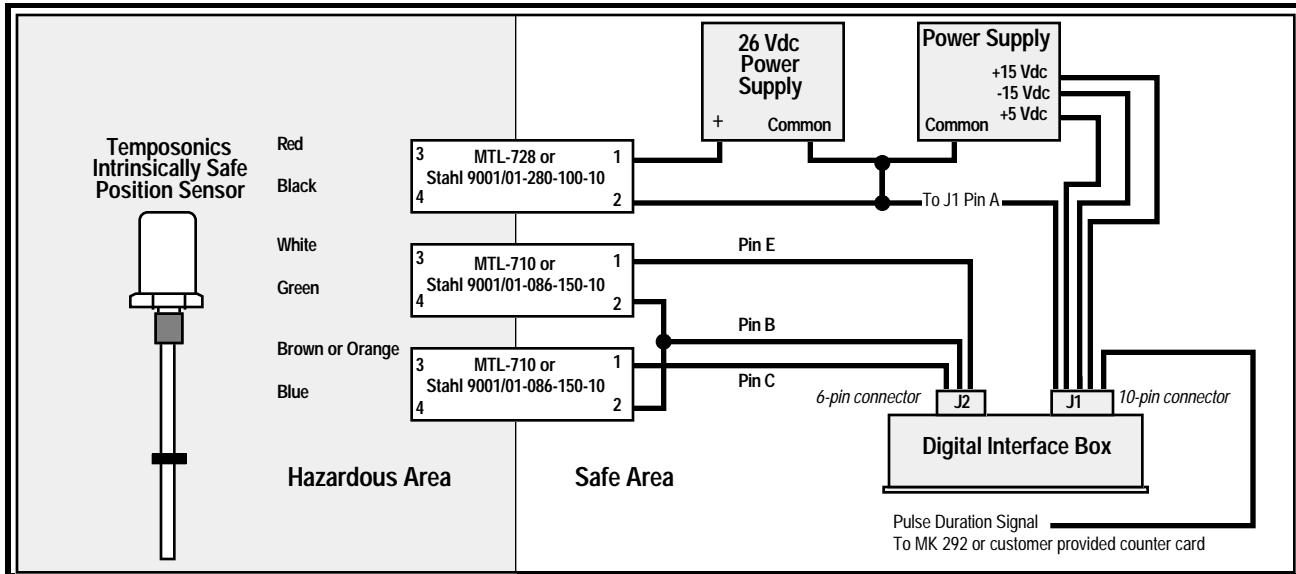


Figure 5.6
Digital System

5.3.1 Digital Systems -- Digital Interface Box J1 Connections

Table 5D Digital Interface Box J1 Connections

J1/Pin #	Function
A	DC Common
B	- 15 Vdc Power
C	+ 5 Vdc Power
D	(-) External Interrogation Pulse
E	(+) External Interrogation Pulse
G	(+) Gate Output
H	+ 15 Vdc Power
J	Case Ground
K	(-) Gate Output

5.4 MK 292 Digital Output Module Connections

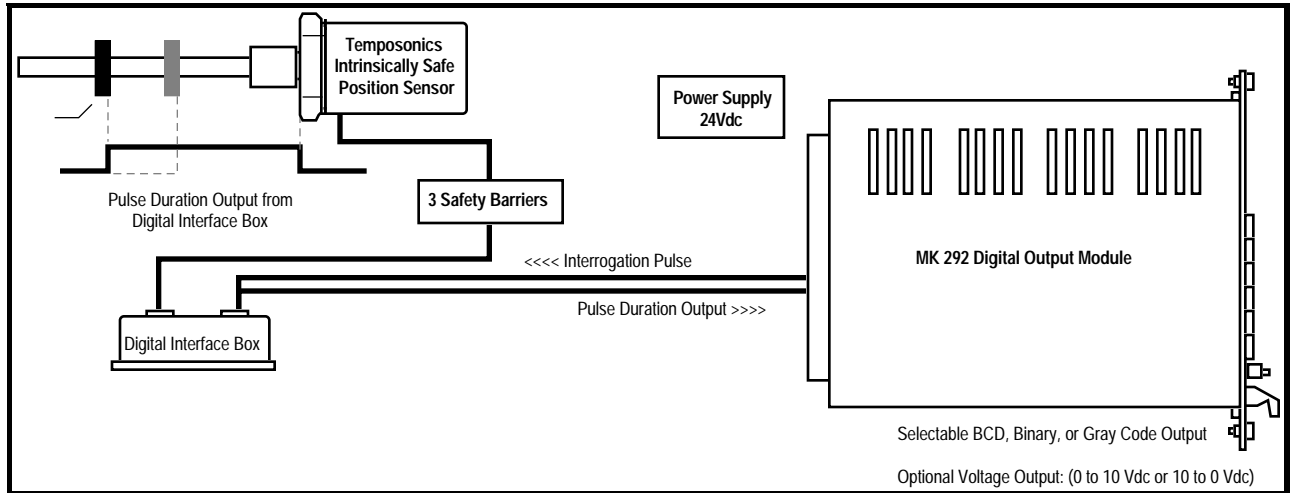


Figure 5.7
*Typical System Configuration --
Intrinsically Safe Position Sensor, Digital Interface Box,
and MK 292 Module*

NOTICE:

Refer to document number 550414 (MK 292 Digital Output Module Installation Manual and Ordering Guide) for details on the installation, wiring, and programming of the MK 292 Module.

