mks
Technology for Productivity

Pressure Measurement & Control

WWW.MKSINST.COM

Types 740B, 750B

BARATRON® PRESSURE TRANSDUCERS

Today's manufacturing processes require pressure/vacuum transducers that are reliable, repeatable, and accurate. MKS Instruments Inc., with over 40 years experience using capacitance manometer technology, has designed a smaller, more rugged, capacitance-based pressure transducer.

The heart of the transducer is the extremely accurate and repeatable, capacitance-based pressure sensor. The sensor is complemented with a sophisticated, stable electronics package to further optimize performance. Higher accuracy, long-term stability, and low temperature coefficients produce the repeatability required for today's process pressure measurements.

The all-welded, all-Inconel construction of the 740/750 Series Pressure Sensor is compatible with the most aggressive of media. In addition, this all-welded construction allows for higher overpressure tolerances that reduce errors due to line pressure spikes. High burst pressure ratings contribute to overall system safety. The transducer is housed in a rugged stainless steel enclosure to withstand harsh environments (4-20 mA versions are available with NEMA 3 ratings).

Repeatability is a function of accuracy, so MKS combines superb accuracy with excellent repeatability to provide the best value for an overall performing general purpose pressure transducer.

Features & Benefits

- Self-contained sensor and signal conditioner in a compact and rugged enclosure
- All-welded Inconel® sensor construction allows for use with most corrosive media
- Proven MKS capacitance technology yields a measurement resolution of 1 part in 10,000
- Signal outputs available as two-wire 4-20 mA, 0-5 VDC or 0-10 VDC (4-20 mA version rated non-incendive Class 1, Div. II, Groups A & B and is also available in a NEMA 3 version)
- Overpressure limit of two times Full Scale or 45 psia (whichever is greater) with no degradation in performance
- Available as absolute or gage
- Applications include: general purpose, hydraulics and pneumatics, process control, level measurement and barometric pressure

Theory of Operation

MKS transducers are based on capacitance manometer technology and contain a sensor and signal conditioner. The sensor is made up of a tensioned metal diaphragm, one side of which is exposed to the media whose pressure is to be measured. The other (reference) side contains an electrode assembly placed in a reference cavity (see Figure 1). Absolute transducers have the reference side factory-sealed to a high vacuum (10^{-7} mmHg). For gage units, the reference side is open to atmosphere. The diaphragm deflects with changing pressure — force per unit area — causing a capacitance change between the diaphragm and the adjacent electrode assembly. The high level output signal, current, or DC voltage is linear with pressure, amplified, and self-compensated for thermal stability with ambient temperature changes. Capacitance manometers should be zeroed on installation. This zero adjustment has no effect on the actual calibration; it is similar to adjusting a dial gauge to zero psig at the prevailing barometric pressure.

Accuracy

The accuracy of the 740/750 Series is specified as percent of Reading, and includes hysteresis and non-linearity. Since many processes operate at pressures somewhere below Full Scale, the percent of Reading specification provides greater accuracy at the operating pressure. (See Figure 2)

Unlike strain gauges, whose accuracy and reliability are a function of the precision of the gauge itself and how well it is bonded to the surface, MKS pressure transducers are not subject to the additional uncertainties caused by the bonding. MKS capacitance-based pressure transducers have proven their accuracy and repeatability in application after application. The capacitance design is also much less susceptible to temperature changes.

Repeatability

In order to maintain repeatable manufacturing processes, day to day, month after month, a pressure measurement source that will provide reliable and repeatable outputs on a continuous basis with the lowest possible error is needed. The 740/750 Series General Purpose Pressure Transducers have a repeatability specification of ±0.1% of Reading. It is this percentage of Reading specification that gives end-users tighter process control (smaller deviations) over percent of Full Scale error — especially useful in applications requiring higher accuracy at the lower ends of the pressure measurement range.

Compound Calibration

MKS offers compound calibration on 740 Series gage pressure units. Compound calibration utilizes a single transducer to measure a composite of pressure and vacuum. More simply defined, this is the ability to measure pressure above and below barometric pressure. Compound calibration allows the user to evacuate a container or chamber to a vacuum and then backfill to a specified pressure.

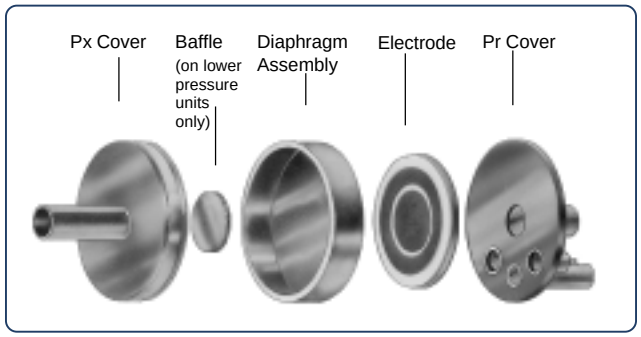


Figure 1 —

An exploded diagram of an MKS pressure sensor

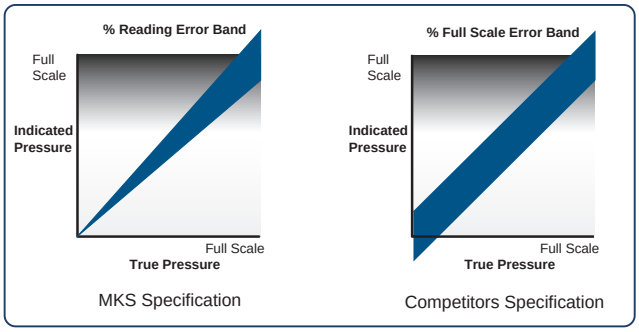


Figure 2 —

Comparison of MKS accuracy expressed as percent of Reading versus competitors accuracy as percent of Full Scale

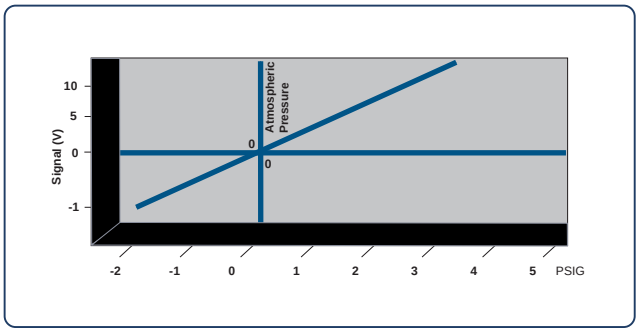


Figure 3 —

Compound Calibration

Specifications

	Absolute	Gage
Media	Gas, Liquid	Gas, Liquid
Pressure Ranges	10 mmHg to 1000 mmHg 50 psia to 3000 psia	20 to 3000 psig
Accuracy (includes non-linearity and hysteresis)	±1% Reading	±1% Reading
Repeatability	±0.1% of Reading	±0.1% of Reading
Resolution (output)	0.01% of F.S.	0.01% of F.S.
Ambient Operating Temperature	0° to 50°C	0° to 50°C
Temperature Effect		
Zero	0.02% of F.S./°C	0.02% of F.S./°C
Span	0.04% of Rdg/°C	0.04% of Rdg/°C
Response Time	<20 msec	<20 msec
Excitation		
0-5 VDC output	+13 to 32 VDC @ 10 mA max.	+13 to 32 VDC @ 10 mA max.
0-10 VDC output	+13 to 32 VDC @ 10 mA max.	+13 to 32 VDC @ 10 mA max.
4-20 mA output	+13 to 32 VDC (Rated Class I, Div. II, Groups A & B as an option)	+13 to 32 VDC (Rated Class I, Div. II, Groups A & B as an option)
Electrical Termination	9-pin Type "D" Bendix PTO 4-Pin 6 ft. flying lead	9-pin Type "D" Bendix PTO 4-Pin 6 ft. flying lead
Overload-Safe	45 psia or 2× Full Scale, whichever is greater	45 psig or 2× Full Scale whichever is greater
Overload-Burst		
up to 1000 psi F.S.	100 psia or 10× F.S. whichever is greater	100 psig or 10× F.S. whichever is greater
>1000 psi F.S.	5× F.S.	5× F.S.
Internal Volume		
Single-ended	0.3 cu. in.	0.3 cu. in.
Wetted Parts Material	Inconel and 316L S.S.	Inconel and 316L S.S.
Weight		
Single-ended	8 oz.	8 oz.
CE Mark Status	Fully CE compliant to EMC Directive 89/336/EEC when used with an overall metal braided shielded cable, properly grounded at both ends.	

Type LDM

Power Supply
(Part Number 118375)

Accessories

Local Display Module

The MKS Local Display Module (LDM) mounts directly to any 740/750 Series Baratron Pressure Transducer to provide a convenient local readout. The LDM is ideal for applications involving host computers that have no real-time data display. It reduces setup and downtime by always providing a quick status monitor. No additional cabling is required to support the LDM as it is installed in-line, and uses the same power and signal wires normally supplied for the transducers. It is secured by either a Bendix® or Type "D" connector on the top of the transducer and mounts so that the zero pot is not inhibited. For more information about the LDM, please contact our Applications Engineering Department.

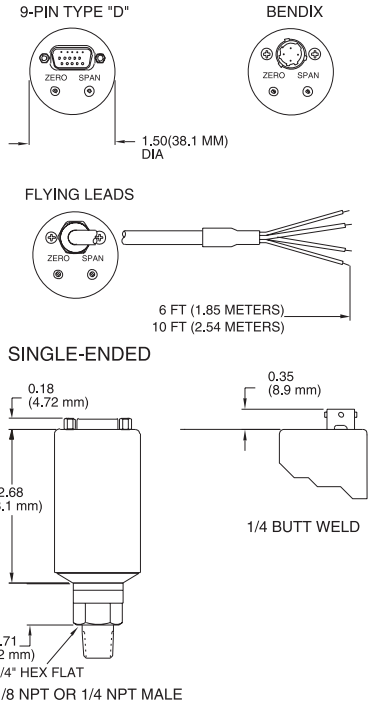
Power Supply

The MKS Power Supply Module provides a convenient method to provide input power to the 740/750 Series Transducer and the LDM. The plug-in power supply module is complete with a six foot cable and mating connectors. For more information on the power supply (Part number 118375), contact an MKS Applications Engineer at (800)227-8766 or (978)975-2350.

Ordering Information

Ordering Code Example: 750B33PFA2GA

740B/750B Baratron Pressure Transducers	Code	Configuration
Gage Single-ended Transducer	740B	750B
Absolute Single-ended Transducer	750B	
Pressure Ranges		
Gage (For compound calibrations, consult Applications Engineering)		33P
20 psig	21P	
50 psig	51P	
100 psig	12P	
200 psig	22P	
250 psig	RDP	
500 psig	52P	
1000 psig	13P	
2000 psig	23P	
3000 psig	33P	
Absolute		
10 mmHg	11T	
50 mmHg	51T	
100 mmHg	12T	
500 mmHg	52T	
1000 mmHg	13T	
50 psia	51P	
100 psia	12P	
3000 psia	33P	
Fittings		
Single-ended		FA
1/4-NPT Female	FA	
1/4-NPT Male	FB	
1/8-NPT Male	FE	
1/8-NPT Female	FF	
(consult Applications Engineering for special fitting requirements)		
Input/Output		
+13 to 32 VDC input/ 0 to 10 VDC output	2	2
+13 to 32 VDC input/ 0 to 5 VDC output	3	
+13 to 32 VDC excitation/ 4 to 20 mA output	4	
Accuracy		
1.0% of Reading	G	G
Connector		
9-Pin male, Type “D”	A	A
4-Pin Bendix, male	D	
Flying Leads, 6 feet	F	
4-Pin Bendix, male, NEMA 3 (4-20 MA only)	N	



Dimensional Drawing —

Note: Unless otherwise specified, dimensions are nominal values in inches (mm referenced).

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