

740D and 750D

General Purpose Baratron® Capacitance Manometer



Today's industrial manufacturing processes require stability, repeatability, and accuracy in measuring pressure and vacuum. MKS has applied its expertise in capacitance sensor design to the 740D and 750D compact Baratron® capacitance manometers for use in industrial, analytical, and electronic measurement applications. The flexible product design makes it ideal either for new processing systems or for retrofits into existing processing systems.

The 740D and 750D Baratron capacitance manometers are rugged, industrial-grade pressure and vacuum transducers that use MKS proprietary sensor and electronics designs for superior accuracy, repeatability, and long-term signal stability. All exposed sensor surfaces are made from Inconel® nickel alloys for exceptional resistance to corrosion

from a wide variety of aggressive chemicals. The sensor is also fully welded, guaranteeing safety to equipment operators from accidental exposure to dangerous chemicals. This advanced sensor and its electronics are mounted in a rugged stainless steel enclosure that can withstand harsh environments.

The 740D product is referenced to atmospheric pressure, and thus offers Full Scale measurement ranges from 20 to 3000 psig (1.4 to 204 bar). The 750D is an absolute transducer (referenced to high vacuum), and thus offers Full Scale measurement ranges from 10 Torr (13 mbar) to 3000 psia (204 bar). Both products are available with a wide variety of fittings, output signals, and electrical connectors for maximum configurability.

Product Features

- Signal outputs available as two-wire 4-20 mA, 0-5VDC, or 0-10VDC
- Overpressure limit of two times Full Scale or 45 psia (whichever is greater) with no degradation in performance
- Available with absolute (referenced to vacuum) or gage (referenced to atmosphere) calibrations
- For use in industrial, analytical, and electronic measurement applications
- Flexible design for new systems or for retrofits
- Proven MKS capacitance technology yields a measurement resolution of 1 part in 10,000



Key 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
- MKS proprietary sensor and electronics designs for superior accuracy, repeatability, and long-term signal stability

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 gage 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 gages, whose accuracy and reliability are a function of the precision of the gage 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 $\pm 0.1\%$ 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.

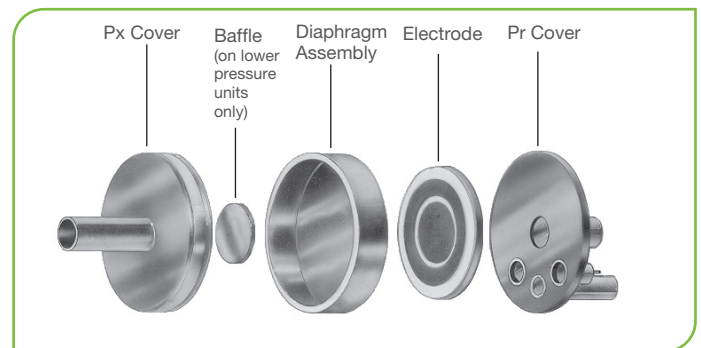


Figure 1. An exploded diagram of an MKS pressure sensor

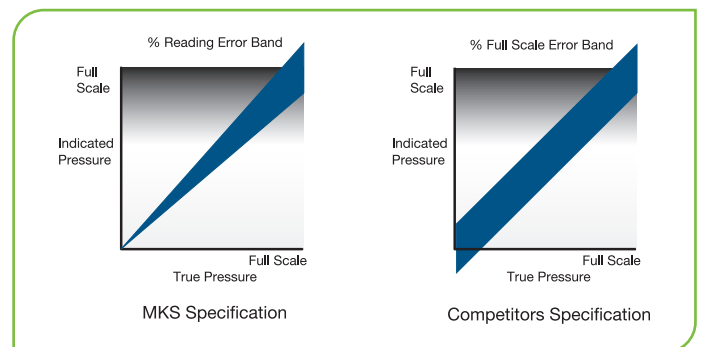


Figure 2. Comparison of MKS accuracy expressed as percent of Reading versus competitors accuracy as percent of Full Scale

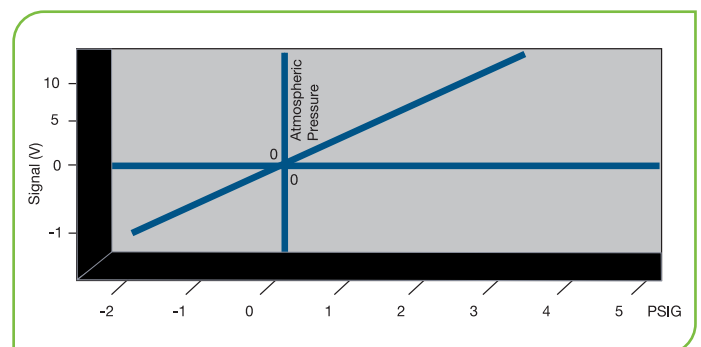
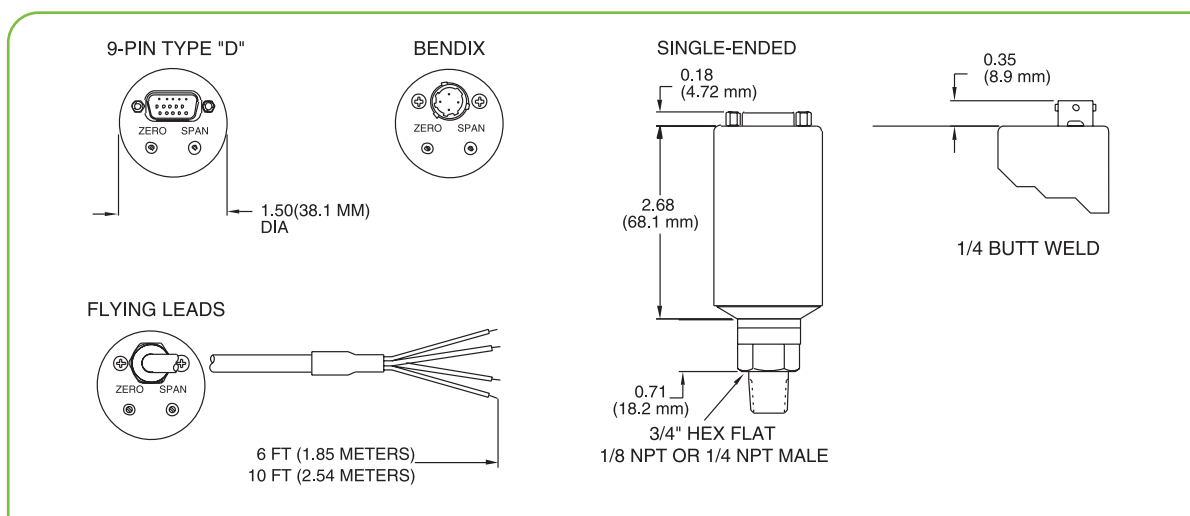


Figure 3. Compound Calibration

Specifications		Absolute	Gage
Media		Gas, Liquid	Gas, Liquid
Pressure Ranges		10 Torr to 3000 psia (13 mbar to 204 bar)	20 Torr to 3000 psig (1.4 to 204 bar)
Accuracy (includes non-linearity, hysteresis and non-repeatability)		<ul style="list-style-type: none"> • ±1% Reading • 0.1% Full Scale 	<ul style="list-style-type: none"> • ±1% Reading • 0.1% Full Scale
Repeatability		±0.1% of Reading	±0.1% of Reading
Resolution (output)		0.01% of Full Scale	0.01% of Full Scale
Ambient Operating Temperature		0° to 50°C	0° to 50°C
Temperature Effect	Zero Span	<ul style="list-style-type: none"> • 0.02% of Full Scale/°C • 0.04% of Reading/°C 	<ul style="list-style-type: none"> • 0.02% of Full Scale/°C • 0.04% of Reading/°C
Response Time		<20 msec	<20 msec
Excitation	0-5 VDC output 0-10 VDC output 4-20 mA output	<ul style="list-style-type: none"> • +13 to 32 VDC @ 10 mA max. • +13 to 32 VDC @ 10 mA max. • +13 to 32 VDC 	<ul style="list-style-type: none"> • +13 to 32 VDC @ 10 mA max. • +13 to 32 VDC @ 10 mA max. • +13 to 32 VDCmA
Electrical Termination		<ul style="list-style-type: none"> • 9-pin D-subminiature • Bendix PTO 4-Pin • 6 ft (2m) flying lead 	<ul style="list-style-type: none"> • 9-pin D-subminiature • Bendix PTO 4-Pin • 6 ft (2m) 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 >1000 psi	100 psia or 10× Full Scale whichever is greater 5× Full Scale	100 psig or 10× Full Scale whichever is greater 5× Full Scale
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	0.5 lbs (0.2 kg)	0.5 lbs (0.2 kg)
Compliance		CE	CE



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

Ordering Code Example: 750D33PFA2GA	Code	Configuration
Model		
Gage Single-ended Transducer Absolute Single-ended Transducer	740D 750D	750D
Pressure Range		
Gage (For compound calibrations, consult Applications Engineering) 20 psig 50 psig 100 psig 200 psig 250 psig 500 psig 1000 psig 2000 psig 3000 psig Absolute 10 mmHg 20 mmHg 50 mmHg 100 mmHg 200 mmHg 500 mmHg 1000 mmHg 2000 mmHg 3000 mmHg 20 psia 50 psia 100 psia 250 psia 500 psia 1000 psia 2000 psia 3000 psia	21P 51P 12P 22P RDP 52P 13P 23P 33P 11T 21T 51T 12T 22T 52T 13T 23T 33T 21P 51P 12P RDP 52P 13P 23P 33P	33P
Fittings		
½" OD Tube* ¼" OD Weld Stub 4 VCR® Male 4 VCR Female 8 VCR Female 8 VCO® Female ¼" NPT Female** ¼" NPT Male** 1/8" NPT Female** 1/8" NPT Male** NW-16KF* 1.33" OD Conflat****	BA BB CB CD CE DA FA FB FF FE GA HA	FA
Input/Output		
+13 to 32 VDC input/0– 10VDC output +13 to 32 VDC input/0– 5VDC output +13 to 32VDC excitation/4–20 mA output	2 3 4	2
Accuracy		
1.0% of Reading 0.1% Full Scale (Best Fit Straight Line)	G R	G
Connector		
9-pin male D-subminiature 15-pin male high-density D-subminiature 9-pin D-subminiature on flying lead 4-pin Bendix PTO Flying Leads – 6 ft (2 m) Flying Lead with 15-pin male D-subminiature	A C G D F K	A

*Available only on Full Scale ranges of 1000 Torr or less

**Not available for 10 or 50 Torr Full Scale ranges

***Available only for Full Scale ranges of 1000 psi or less