



Pressure &

Vacuum Measurement Solutions

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R740C, R750C

BARATRON GENERAL PURPOSE CAPACITANCE MANOMETERS WITH TRIP RELAYS

Today's industrial manufacturing processes require stability, repeatability, and accuracy in measuring pressure and vacuum. MKS has applied its expertise in capacitance sensor design in the new R740C and R750C compact Baratron® capacitance manometers that are designed for use in industrial, analytical, and electronic measurement applications. The products' flexible design allow it to be used either for new processing systems, or for retrofits into existing processing systems.

The R740C and R750C Baratrons 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® or Incoloy® 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 two (2) independently-adjusted electromechanical trip relays allow the product to be used to directly control external components such as pumps, valves, and other equipment.

The R740C product is referenced to atmospheric pressure, and thus offers Full Scale measurement ranges from 20 to 3000 PSIG (1.4 to 204 bar). The R750C 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). The products have a standard linear 0-10 VDC analog output signal in addition to the trip relays.

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
- Linear 0-10 VDC analog output plus two (2) independently-adjusted trip relays
- 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



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.

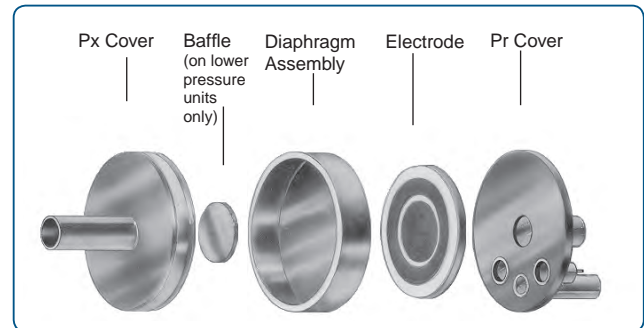


Figure 1 —
An exploded diagram of an MKS pressure sensor

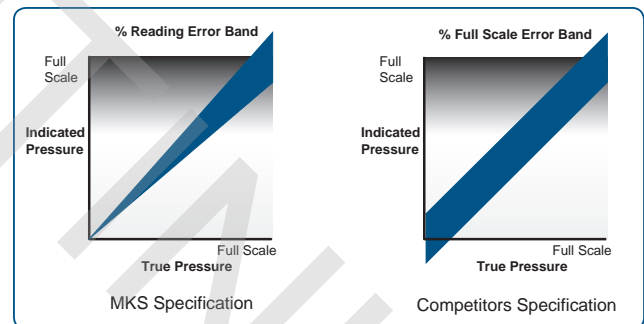


Figure 2 —
Comparison of MKS accuracy expressed as percent of Reading versus competitors accuracy as percent of Full Scale

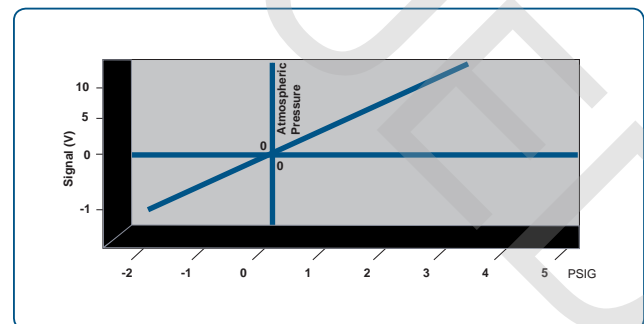


Figure 3 —
Compound Calibration



Specifications

Pressure Ranges

Accuracy (includes non-linearity, hysteresis and non-repeatability)

Repeatability

Resolution (Analog Output)

Ambient Operating Temperature

Temperature Effect

Zero

Span

Response Time

Maximum Overpressure

Burst Pressure

FS ranges of 1000 PSI or less

FS ranges of more than 1000 PSI

Internal Volume

Exposed Materials

Input Voltage

Analog Output Signal

Electrical Connector

Relay Specifications

Factory Default Trip Relay Settings

Weight

Compliance

Available Fittings

R740C: 20 to 3000 PSI (1.4 to 204 bar) gauge,
R750C: 10 Torr (13 mbar) to 3000 PSI (204 bar) absolute
±1% of Reading

±0.1% of Reading

±0.01% of Full Scale (FS)

0°C to 50°C

0.02% of FS/°C

0.04% of Reading/°C

20 msec

45 PSI or 2x FS (whichever is greater)

100 PSI or 10x FS (whichever is greater)

5x FS

4.7 cm³

Inconel®, Incoloy®, and 316L stainless steel

±15 VDC (± 5%) @ 35 mA (max)

0-10 VDC into > 10 k Ω load

15-pin D-subminiature

(2) independently-adjusted DPDT contacts adjustable between 0.5% and 100% of FS. Relays are UL listed and rated at 1.0 amps @ 30 VDC or 0.3 amps @ 30VAC. Relay setpoints and operating directions can be adjusted by customers from exterior of product.

Trip Relay A energizes below 55% of Full Scale range, and Trip Relay B energizes above 55% of Full Scale range. Custom relay settings available on special order; contact MKS Applications for details and pricing.

1.0 lbs (0.4 kg)

CE

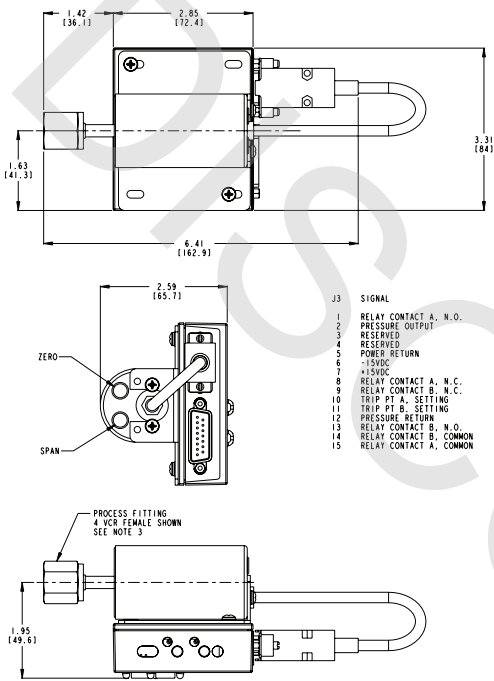
1/4" (6.3 mm) OD tube, 4 VCR® male and female, 8 VCR female, 8 VCO® female, NPT*, NW16-KF**, and 1.33" (33.8 mm) OD CF***



Figure 4 —
R740C, R750C with external slide switches



Ordering Information



Dimensional Drawing —

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

Ordering Code Example: R750C13TCE2GG

R740C/R750C Baratron Pressure Transducers	Code	Configuration
Gage Single-ended Transducer	R740C	R750C
Absolute Single-ended Transducer	R750C	
Pressure Ranges		
<i>Gage (R740C models only)</i>		
20 psig	21P	13T
50 psig	51P	
100 psig	12P	
200 psig	22P	
250 psig	RDP	
500 psig	52P	
1000 psig	13P	
2000 psig	23P	
3000 psig	33P	
<i>Absolute (R750C models only)</i>		
10 mmHg	11T	CE
20 mmHg	21T	
50 mmHg	51T	
100 mmHg	12T	
500 mmHg	52T	
1000 mmHg	13T	
50 psia	51P	
100 psia	12P	
3000 psia	33P	
Fittings		
1/2" OD Tube*	BA	CE
1/4" OD Weld Stub	BB	
4 VCR® Male	CB	
4 VCR Female	CD	
8 VCR Female	CE	
8 VCO® Female	DA	
1/4" NPT Female**	FA	
1/4" NPT Male**	FB	
1/8" NPT Female**	FE	
1/8" NPT Male**	FF	
NW-16KF*	GA	
1.33" OD Conflat®***	HA	
Input/Output		
±15 VDC (±5%) input/0-10 VDC output	2	2
Accuracy		
1.0% Reading	G	G
Trip Point Setting		
Standard Setting (relays activate above trip points)	G	G
Optional Setting (relays activate below trip points)	S	

*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



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