



High Accuracy Systems

PRODUCT SELECTION GUIDE

TYPES 690A, 698A, 590A, 615A, AND 616A SENSORS TYPE 670B SIGNAL CONDITIONER

The MKS High Accuracy Baratron® Pressure Measurement Systems combine advanced capacitance diaphragm sensor technology and solid state electronics with the features demanded by today's process and metrology engineers to make precision pressure measurement easy – whether on the production line or in the research or metrology laboratory. If your principal concern is accurate pressure measurement, or you need to measure pressure over a very wide range, the MKS High Accuracy Systems are ideal solutions. Long considered standards of pressure measurement in both industry and research, MKS high accuracy Baratron systems are completely modular with a full selection of pressure ranges, levels of accuracy, options, and accessories that ensure there's a system exactly right for your application.



Sensor Description

All MKS high-accuracy sensors are single-ended dual-electrode/AC bridge devices that are extremely stable and designed to minimize the effect of temperature changes. They measure pressure from 25,000 mmHg (500 psi) to 10^{-5} mmHg, with accuracies ranging from 0.25% to 0.05% of Reading. Models are available in absolute and differential configurations, and bakeable versions are offered for use in ultrahigh vacuum or high temperature applications. They are constructed of Inconel® and stainless steel, allowing use with many wet, dirty, or corrosive gases.

Type 690A (Absolute) **Type 590A (Absolute)** **Type 698A (Differential)**

The Types 690, 590, 698 are designed for high accuracy pressure measurements in process or metrology environments. By incorporating temperature control into the head, the accuracy is improved to as high as 0.05% of Rdg. The 690 absolute and 698 differential operate at 45°C and the Type 590 is temperature controlled to 70°C. The Type 590A's higher temperature-controlled sensor is recommended for processes where a condensable gas or its byproducts can be expected.

Type 615A (Bakeable, Absolute) **Type 616A (Bakeable, Differential)**

The Types 615 and 616 are ideal choices for applications where higher temperatures are necessary, such as high vacuum systems where bakeout is occasionally needed, in vapor pressure measurements, and some semiconductor processes. The Type 615A absolute manometer operates from 15° to 200°C and is bakeable up to 400°C. The Type 616A differential product operates up to 300°C, and can also be baked to 400°C.

Features & Benefits

- Excellent thermal stability due to extremely low temperature coefficients
- Highest accuracy pressure measurement instruments available
- Designed for use with Type 670B Signal Conditioner
- Ideal for calibration Transfer Standards
- CE Mark Compliant – meets requirements for European Union
- Six decades of measurement often eliminates several transducers with limited resolution



Sensor Ordering Information

Type 690 & Type 590 Absolute Pressure Sensors

Ordering Code Example: 690A11TRC	Code	Configuration
Type 690 Absolute Pressure Sensor	690A	690A
Type 590 Absolute Pressure Sensor	590A	
Pressure Range (mmHg)		
0.1 mmHg (Type 690 only)	.1T	11T
1 mmHg	01T	
10 mmHg	11T	
100 mmHg	12T	
1000 mmHg	13T	
5000 mmHg	53T	
10,000 mmHg	14T	
15,000 mmHg	RBT	
20,000 mmHg	24T	
25,000 mmHg	RCT	
Fittings		
Swagelok 4 VCR female	R	R
Accuracy		
±0.12% of Reading	C	C
±0.08% of Reading (Type 690 only)	B	
±0.05% of Reading (Type 690 only, 1 through 1000 mmHg ranges)	A	

Type 698 Differential Pressure Sensor

Ordering Code Example: 698A11TRC	Code	Configuration
Type 698 Differential Pressure Sensor	698A	698A
Pressure Range (mmHg)		
0.1 mmHg	.1T	11T
1 mmHg	01T	
10 mmHg	11T	
100 mmHg	12T	
1000 mmHg	13T	
Fittings		
Swagelok 4 VCR female	R	R
Accuracy		
Unidirectional Calibration		C
±0.12% of Reading	C	
±0.08% of Reading	B	
±0.05% of Reading (1 through 1000 mmHg ranges only)	A	
Bidirectional Calibration		
±0.25% of Reading (1 through 1000 mmHg ranges only)	E	
±0.15% of Reading (1 through 1000 mmHg ranges only)	D	

Type 615 Absolute and 616 Differential Pressure Sensors¹

Ordering Code Example: 615A11TRC	Code	Configuration	
Type 615 Absolute Pressure Sensor	615A	615A	
Type 616 Differential Pressure Sensor	616A		
Pressure Range (mmHg)			
1 mmHg	01T	11T	
10 mmHg	11T		
100 mmHg	12T		
1000 mmHg	13T		
5000 mmHg	53T		
10,000 mmHg	14T		
15,000 mmHg	RBT		
20,000 mmHg	24T		
Fittings			
Swagelok 4 VCR female	R		R
Accuracy			
±0.12% of Reading (10 through 20,000 mmHg ranges only)	C	C	
±0.15% of Reading (1 mmHg range only)	E		

¹When ordering, specify calibration temperature. If no temperature is specified, sensor will be calibrated at room temperature.



High Accuracy Series*



Sensor Type	Type of Measurement	Pressure Ranges (mmHg F.S.)	Resolution (of F.S.)	Accuracy % of Rdg. (± temp. coeff.)	Useable Measurement Range (F.S. to)
690A	Absolute	0.1	1 x 10 ⁻⁶	S: 0.12% Rdg. O: 0.08% Rdg.	2 ⁻³ x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
		1, 10, 100, 1000	1 x 10 ⁻⁶	S: 0.12% Rdg. O: 0.08% Rdg.	2 ⁻³ x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
				O: 0.05% Rdg.	1 x 10 ⁻⁵ F.S.
		5000, 10000, 15000, 20000, 25000	1 x 10 ⁻⁶	S: 0.12% Rdg. O: 0.08% Rdg.	2 ⁻³ x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
				O: 0.08% Rdg.	1 x 10 ⁻⁵ F.S.
		590A	Absolute	1, 10, 100, 1000	1 x 10 ⁻⁶
5000, 10000, 15000, 20000, 25000	1 x 10 ⁻⁶			S: 0.12% Rdg.	2 ⁻³ x 10 ⁻⁵ F.S.
698A	Differential	0.1	1 x 10 ⁻⁶	S: 0.12% Rdg. O: 0.08% Rdg.	2 ⁻³ x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
		1, 10, 100, 1000	1 x 10 ⁻⁶	S: 0.12% Rdg. O: 0.15% Rdg. ⁽⁵⁾	2 ⁻³ x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
				S: 0.25% Rdg. O: 0.08% Rdg.	1 x 10 ⁻⁵ F.S. 1 x 10 ⁻⁵ F.S.
				O: 0.05% Rdg.	1 x 10 ⁻⁵ F.S.
		615A	Absolute	1	1 x 10 ⁻⁶
10, 100, 1000	1 x 10 ⁻⁶			S: 0.12% Rdg.	5 x 10 ⁻⁵ F.S.
5000, 10000, 15000, 20000	1 x 10 ⁻⁶			S: 0.12% Rdg.	5 x 10 ⁻⁵ F.S.
616A	Differential	1	1 x 10 ⁻⁶	S: 0.25% Rdg.	5 x 10 ⁻⁵ F.S.
		10, 100, 1000	1 x 10 ⁻⁶	S: 0.12% Rdg.	5 x 10 ⁻⁵ F.S.
		5000, 10000, 15000, 20000	1 x 10 ⁻⁶	S: 0.12% Rdg.	5 x 10 ⁻⁵ F.S.

* All High Accuracy Sensors listed above are fully CE compliant to EMC Directive 2004/108/EC when used with overall metal braided shielded cables, properly grounded at both ends.

S = Standard accuracy for particular range/calibration.

O = Optional accuracy for particular range/calibration.

Notes:

(1) Specification applies when sensor is used with suitable customer-supplied heater and temperature controller.

(2) For differential sensors: overpressure limits specified in above table are only for P_x > P_r. For reverse overpressure (P_r > P_x) on differential sensors, overpressure limit is 125% of F.S.



Sensor Specifications

Temp. Coefficients Zero Span (F.S.°C) (Rdg. °C)		Volume (cc) Px Pr		Maximum Over-Pressure	Maximum Line Pressure	Operating Temperature Range (°C)	Materials Exposed to Gases Px Pr		Fittings
30 ppm	100 ppm	2.5	N/A	40 psia	N/A	15° - 40°C	Inconel®, Stainless Steel	N/A	Swagelok® 4 VCR®
30 ppm	100 ppm								
15 ppm	20 ppm	2.5	N/A	45 psia	N/A	temperature regulated at 45°C			
4 ppm	20 ppm								
4 ppm	20 ppm								
15 ppm	20 ppm	14	N/A	125% F.S.	N/A				
4 ppm	20 ppm								
15 ppm	20 ppm	2.5	N/A	45 psia	N/A	40° - 65°C	Inconel, Stainless Steel	N/A	Swagelok 4 VCR
15 ppm	20 ppm	14	N/A	125% F.S.	N/A	temperature regulated at 70°C			
30 ppm	100 ppm	3.5	25	40 psid (2)	150 psig	15° - 40°C	Inconel, Stainless Steel	Inconel, Stainless Steel, Alumina, Palladium Glass	Swagelok 4 VCR
30 ppm	100 ppm								
15 ppm	20 ppm	3.5	25	45 psid (2)	150 psig	temperature regulated at 45°C			
4 ppm	20 ppm								
4 ppm	20 ppm								
4 ppm	20 ppm								
40 ppm (1)	30 ppm (1)	2.5	N/A	45 psi	N/A	15° - 200°C (6)	Inconel, Stainless Steel	N/A	standard Swagelok 4 VCR; optional 2¾" CF or mini-CF, rotatable or non- rotatable (4)
40 ppm (1)	30 ppm (1)	2.5	N/A	45 psi	N/A				
40 ppm (1)	30 ppm (1)	14	N/A	125% F.S.	N/A	bakeable to 400°C			
40 ppm (1)	30 ppm (1)	2.5	19	45 psi	150 psig	15° - 300°C (3, 6)	Inconel, Stainless Steel	Inconel, Stainless Steel, Alumina, Palladium Glass	standard Swagelok 4 VCR; optional 2¾" CF or mini-CF, rotatable or non- rotatable (4)
40 ppm (1)	30 ppm (1)	2.5	19	45 psi (2)	150 psig				
40 ppm (1)	30 ppm (1)	14	5	125% F.S.	150 psig	bakeable to 400°C			

- (3) Temperature of 300°C achievable with high temperature pre-amp cable option; consult Applications Engineering at 1-800-227-8766 for ordering information. (Standard cable maximum operating temperature is 200°C.)
- (4) Available only on Full Scale ranges from 1 mmHg to 1000 mmHg.
- (5) 0.15% of Reading and 0.25% of Reading accuracies on Type 698 sensors are for bidirectional calibrations.
- (6) Sensors are calibrated at only one temperature within this operating range. Please provide calibration temperature when ordering. If no temperature is indicated, sensor will be calibrated at room temperature.



Type 670B Electronics/Display Unit

The Type 670B Display Unit has a front panel that allows for full control of all the instrument's features. All functions can be monitored and controlled via the RS-232 or IEEE-488 interface. Range switching may be done manually or automatically with the 670B, selecting the lowest possible on-scale range. A key-lock switch on the front panel determines Local or Remote control. The 670B may be used with any sensor Full Scale and will display pressure in any one of 12 engineering units. Sensor response time may be set for 1, 40, or 400 msec, and a data averaging feature allows the user to average signals from 0.1 to 10 seconds, to optimize the pressure readings for transients or noisy pressures.



670B Features & Benefits

- Microprocessor-based electronics unit provides power, signal conditioning, and display for operating all MKS High Accuracy Baratron pressure sensors
- Analog and digital input/output signals facilitate interfacing to computers and process control systems
- Two built-in alarm relays provide process pressure trip points
- CE Mark compliant – meets requirements for European Union¹

670B Specifications

Compatible Sensors & Ranges

Display

Resolution

Engineering Units

Ranges

Response Time

Data Averaging

Outputs

Analog

Impedance
Connectors

Digital

RS-232 Connector
IEEE-488 Connector

Process Trip Point Relays

Operating Temperature Range

Power Required

Size

MKS Type 590, 615, 616, 690, 698, from 0.1 to 25,000 mmHg (Torr) F.S.

2-line LCD, readings updated twice/second
3½, 4½, or 5½ digits, user-selectable (Note: Useable system resolution depends upon sensor choice and application.)
Torr, mTorr, mmHg, mbar, Pa, kPa, inHg, inH₂O, cmH₂O, psi, % of F.S., ppm of F.S. (All user-selectable)

x1, x0.1, x0.01 of sensor F.S., manual or auto-ranging

1, 40, or 400 msec, user-selectable

0.1 to 10 sec, user-selectable

0 to ±10 VDC on each range into >10K Ω load
<1

I/O: 37-pin female Type "D", Remote signal: 9-pin male Type "D"

9-pin male Type "D"

24-pin female IEEE-488. 1 standard pin assignment.

Two, 24 VAC/DC @ 1 Amp resistive (contact ratings)
Two LEDs on front panel indicate status of each relay

15° to 40° C

90-132 or 180-264 VAC, 50-60 Hz, 75 VA (max.) IEC-AC power line connector

88 mm H x 240 mm W x 234 mm D (3.5" H x 9.5" W x 9.25" D)

¹Fully compliant to EMC Directive 2004/108/EC when used with an overall metal braided shielded cable, properly grounded at both ends.
Also compliant to Low Voltage Directive 72/23/EEC.

Type 670B Ordering Information

Ordering Code Example: 670Bxyz

Type 670B Electronics/Display Unit

Interface (xyz)

RS-232
IEEE-488

Code

670B

D21
D81

Configuration

670B

D21



Accessories

Rack Mounts

The RM-6 Rack Mount Kit is used to adapt any half-rack instrument (3 1/2" x 9 1/2") to full-rack size (3 1/2" x 19").

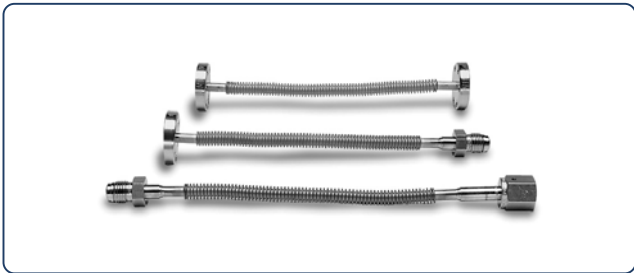
Isolation Valves

To decrease the frequency of zero adjustment, it is recommended that a simple manual or air-actuated bellows-type isolation valve, such as MKS Part No. 108818 (NC11 Cleaned), be installed between a low range absolute sensor head and the processing system.



Bellows Adapters

Frequently it is desirable, because of mechanical configuration or system vibration, to attach the Baratron sensor to the processing system using flexible bellows couplings. All flexible tubing is 321 stainless steel, 1/4" diameter, and available in 6" and 12" active bellows lengths. The use of flexible bellows minimizes thermal expansion effects on sensor zero induced by hard plumbing to the system.



Type 274B Three-channel Sensor Multiplexer

The Type 274B provides operation of one, two, or three high accuracy sensors with a single Type 670 Electronics Unit. The 274B provides heater power for temperature-controlled sensors (Types 690, 698, 590). All sensors are kept warmed up and ready for reading by the 670. The 670 can sequentially read any one of the sensors, as selected by a switch on the 670's front panel, or by a remote ground closure.



Type 274B Ordering Information

Ordering Code Example: 274B

Type 274B Three-Channel Sensor Multiplexer

Code

274B

Configuration

274B

Cabling Ordering Information

Type 670B or 274B Sensor to 698, 690, or 590 Sensors
(also works for older 390 and 398)

CB270-2-10 (10ft length)
CB270-2-20 (20ft length)
CB270S-2-10 (10ft, shielded)
CB270S-2-20 (20ft, shielded)

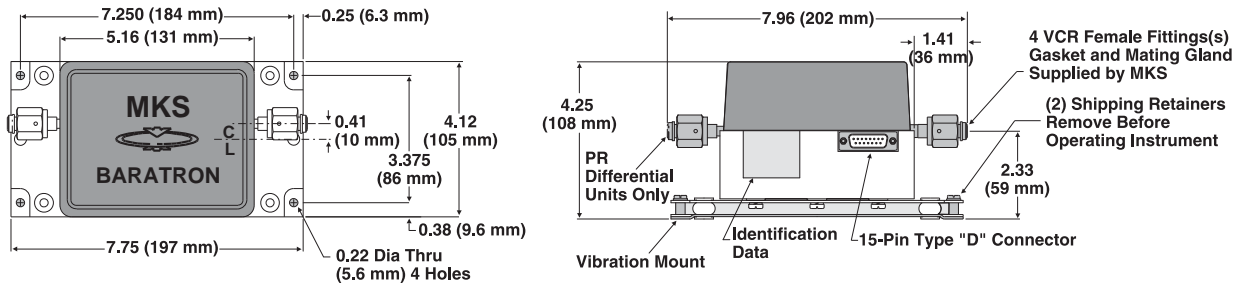
Type 670B or 274B Sensor to 615 or 616 Sensors
(also works for older 315 and 316)

CB270-1-10 (10ft length)
CB270-1-20 (20ft length)
CB270S-1-10 (10ft, shielded)
CB270S-1-20 (20ft, shielded)

For cables longer than 20 ft, Consult Factory.

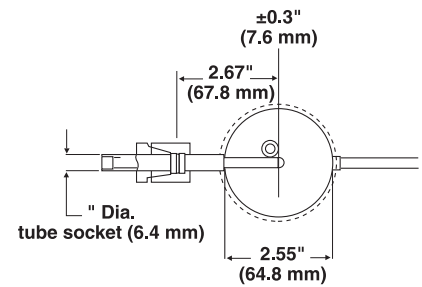
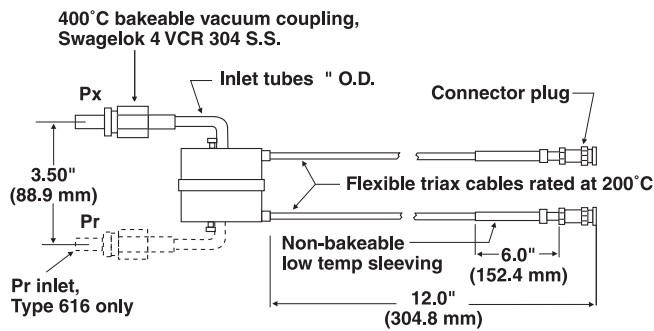


Dimensional Drawings

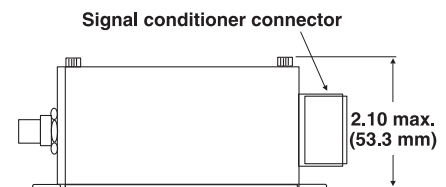
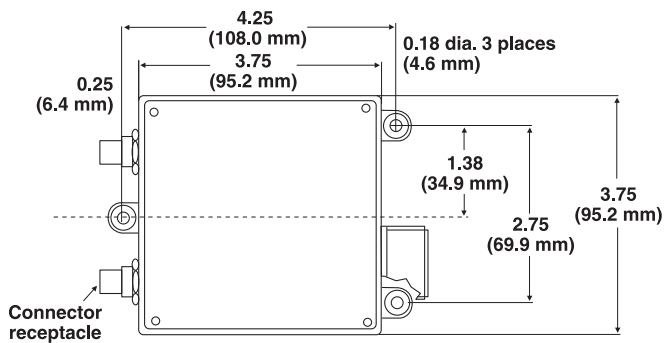


Type 690, 698 and 590—

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



Preamplifier Unit for 615 and 616 Sensor Heads



Type 615 and 616—

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



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