



MODEL 730

CE and RoHS Compliant

OPERATING INSTRUCTIONS



1-800-257-3872 TOLL FREE

1-978-264-0292 FAX

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1.0 Introduction

Setra's Model 730 capacitance manometer is a temperature compensated, absolute pressure transducer designed for accurate and repeatable vacuum measurements. Various full scale ranges are available from 10 Torr up to 1000 Torr. The units of measurement may be specified in Torr (mmHg), mBar, kPa, or PSIA.

The Model 730 operates from a 12-30 VDC power supply and provides a 0-10 VDC signal output that is linear with pressure and independent of gas composition. It can also be supplied with a 0-5 VDC output, which operates from 9-30 VDC power supply. The Model 730 is pin for pin compatible with competitive capacitance manometers. Superior EMI/RFI performance is achieved by the use of a metal case in conjunction with surge and ESD suppression components and RFI filtering on the inputs and outputs. The Model 730 has easy access to multi-turn potentiometers for fine zero adjustments. Inconel is used for all wetted materials for compatibility with corrosive gases. A wide range of process connections are available.

The high accuracy pressure sensing element used in the Model 730 is Setra's patented variable capacitance sensor. A centrally located feedthrough

assembly supports a circular electrode in close proximity to the back surface of the diaphragm. Together, the electrode and diaphragm form a variable capacitor within a small reference vacuum chamber. As the pressure increases, the diaphragm deflects and the gap between the electrode and diaphragm reduces, causing an increase in the capacitance. This change in capacitance

is detected and converted to a highly accurate linear DC electronic signal by Setra's high frequency precision diode bridge circuit.

Excellent zero stability and barometric insensitivity is achieved through the patented sensor design. The Model 730 sensor contains no fragile or complex parts as found in ceramic based capacitance manometers. The all welded construction eliminates stability issues inherent in other designs due to frictional contact between dissimilar materials.

2.0 Mechanical Installation

Remove all packaging material and the protective flange cover and visually check the Model 730. If the Model 730 appears damaged, notify Setra Systems or your supplier immediately. Retain packaging materials for inspection. Do not use if damaged. If the Model 730 is not going to be used

immediately, then replace the protective flange cover and store in an area where the temperature range is controlled between -20 to +85°C.

The Model 730 can be mounted in any orientation on the vacuum system. To avoid the buildup of debris or condensable material in the measurement cavity of the Model 730 (which may cause measurement errors), we recommend that you install the Model 730 vertically with the tube facing down. Outline drawings showing the external dimensions are shown in Figure 1 (see below).

To connect the Model 730 to your system use the appropriate hardware for the type of fitting:

- Use a Swagelock® Ultra Torr vacuum fitting to connect to the 0.5" or 0.25" OD tube.
- Use an O-ring/centering ring and clamp to connect to the NW16 or 25 flange options.

Note: A stepped O-ring carrier may be used to connect the NW16 flange to an NW10 flange on the system.

- Use a Male 4 VCR™ or 8 VCR™ Face Seal Fitting and sealing gasket to connect to the female swivel 4 VCR™ or 8 VCR™ Style Face Seal Fitting.

Note: Tighten fittings in accordance with the manufacturer's specifications.

Figure 1: Outline Drawing of Model 730 with 9-pin D-sub and 0.5" and 0.25" OD Tube.

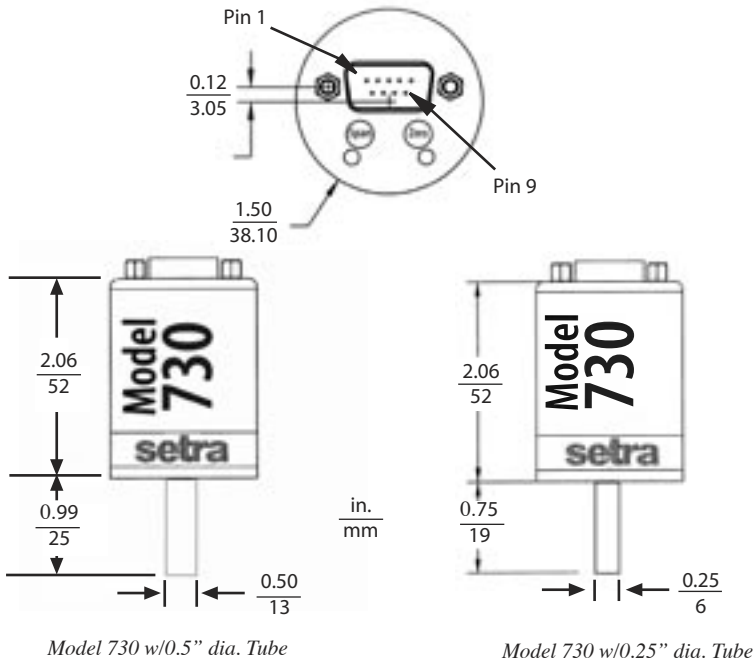
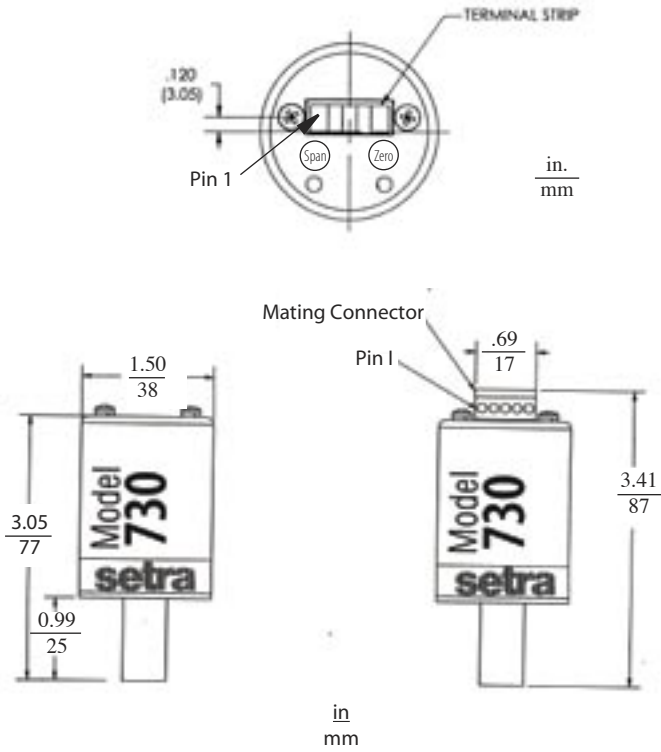
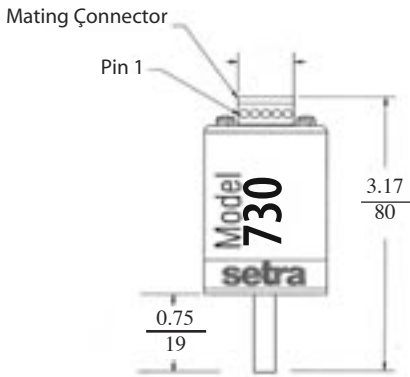


Figure 2: Outline Drawing of Model 730 with 5-pin Terminal Strip, and 0.5" and 0.25" OD Tube.

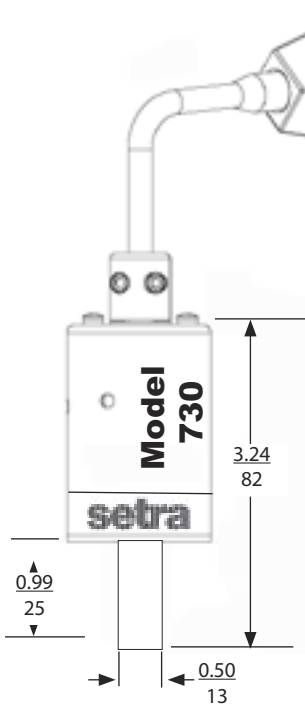
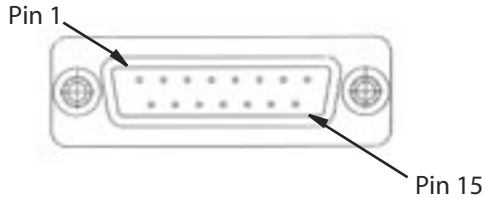


Model 730 w/0.5" dia. Tube

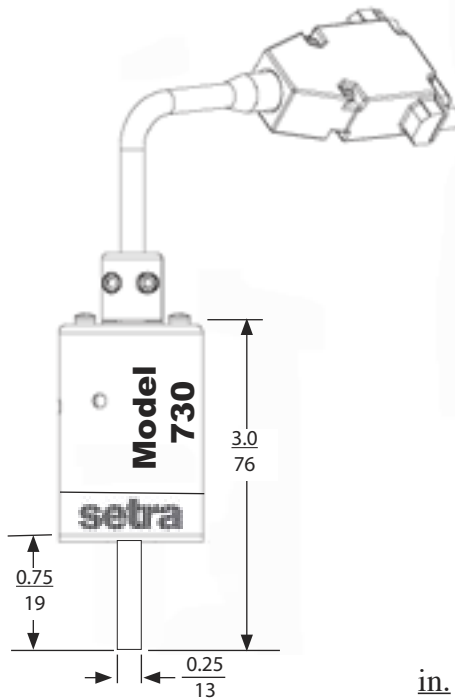


Model 730 w/0.25" dia. Tube

Figure 3: Outline Drawing of Model 730 with 6-inch cable and 15-pin D-sub Terminal Strip, 0.5" and 0.25" OD Tube.



Model 730 w/0.5" dia. Tube



Model 730 w/0.25" dia. Tube

in.
mm

3.0 Electrical Installation

The model 730 operates from a 12-30 VDC regulated power supply for the 0-10 VDC output version or from a 9-30 VDC regulated power supply for the 0-5 VDC output version. Either version can be specified with a 5 Pin terminal strip, 9 Pin D-sub, or 15 Pin D-sub on a 6 inch pigtail. Mating connectors are provided with the terminal strip version. The pinouts for each option are shown in figures 4, 5, and 6, Page 6.

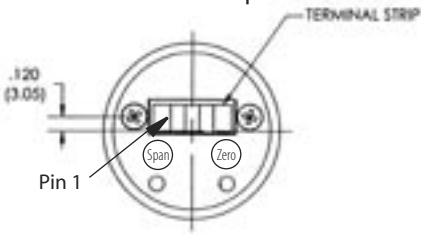
The ground of any external power supply and readout system should be the same as the transducer ground (chassis ground) to minimize any possible ground loops, which may effect the performance and stability of the system.

3.1 Wiring Guidelines

The Model 730 is compliant with the Electro Magnetic Compatibility Directive 2004/108 EC, which tests for radio frequency emissions and immunity, provided the following wiring guidelines are adhered to:

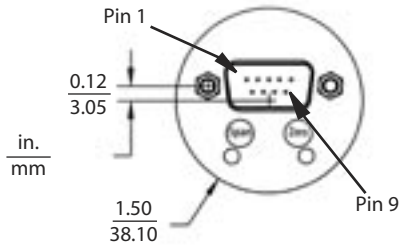
1. All interconnecting cables must have overall metal braid and foil shields covering all wires and be properly grounded at each end.
2. The cable connectors must have a metal case and it must be in direct contact with the cable braided shield for the entire circumference of the cable. A single wire from the shield to the connector case will not be effective.
3. The connectors must make good contact, about 0.01 ohms, to the transducer's case (chassis).
4. Versions with the 5 pin terminal strip connector option must be used with a suitable clamp on ferrite such as the Fair-rite part number 0461164281 which is included with each unit. The ferrite should be assembled as close to the connector as possible to meet CE EMI requirements.

Fig. 4: Pin-out of 5-Pin Terminal Strip



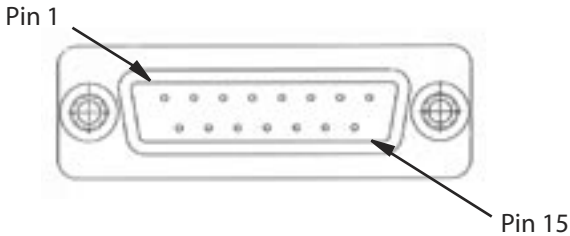
Pin Location	Function
1	Power Supply Common
2	Signal Output Common
3	+Signal Output
4	Case Ground
5	Power Supply +VDC

Fig. 5: Pin-out of D-sub 9-Pin Connector



Pin Location	Function
1	+Signal Output
9	Power Supply Common
4	Power Supply + VDC
8	Signal Output Common
2,3,5,6,7	Not Used

Fig. 6: Pin-out of Cable Assembly D-sub 15-Pin Connector



Pin Location	Function
2	+Signal Output
5	Power Supply Common
7	Power Supply + 15 VDC
12	Signal Output Common
15	Chassis Ground
1, 3, 4, 6, 8, 9, 10, 11, 13, 14	Not Used

4.0 OPERATION

For most accurate pressure measurement, allow the Model 730 to warm up for at least 15 minutes. After installation, periodically check the zero output reading to verify correct output. Adjust the zero potentiometer if incorrect (See Section 5 for zero adjustment instructions).

The signal output of the Model 730 is linear with pressure; e.g., for a 10 VDC FS Model 730, 10 VDC equals 100% FS output; 1 VDC equals 10% FS output.

Table 1 indicates the lowest pressures recommended for reading and pressure control for each range of the Model 730. The lowest suggested pressure for reading is limited by the resolution and the accuracy of the Model 730. This is directly related to the electrical noise on the signal output and can be significantly effected by incorrect electrical ground connection, or connection to an electronically noisy power supply or readout instrument. Improved results may be obtained if the transducer is operated in an environment with stable temperature and air flow. The lowest recommended pressure used for control applications, such as a closed loop downstream pressure control system, is based on a minimal signal output of 50 mV.

Note 1: if the unit has been exposed to sudden environmental changes, allow at least 2 hours before making any adjustments.

Table 1: Recommended Lowest Pressures
Available for Reading & Pressure Control

Full Scale Range	Recommended Lowest Pressure Reading	Recommended Lowest Pressure for Control
10 Torr	0.005 Torr	0.05 Torr
20 Torr	0.010 Torr	0.10 Torr
50 Torr	0.025 Torr	0.25 Torr
100 Torr	0.050 Torr	0.50 Torr
200 Torr	0.100 Torr	1.00 Torr
1000 Torr	0.500 Torr	5.00 Torr
10 mbar	0.005 mbar	0.05 mbar
100 mbar	0.05 mbar	0.5 mbar
1000 mbar	0.5 mbar	5 mbar
1 kPa	0.0005 kPa	0.005 kPa
2 kPa	0.0010 kPa	0.010 kPa
5 kPa	0.0025 kPa	0.025 kPa
10 kPa	0.0050 kPa	0.050 kPa
20 psia	0.0100 psia	0.100 psia

5.0 Calibration & Adjustment

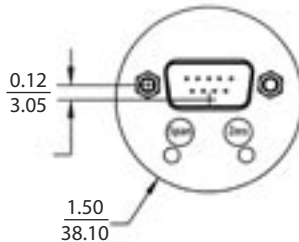
5.1 Checking & Zero Adjustment

After installation on a system, the Model 730 should be zeroed. Figure 7 shows the location of the zero adjustment potentiometer.

Note: Before making adjustments be sure to allow the Model 730 to warm up and pump down sufficiently to the system base pressure. This time will vary depending on range and system conductance. A minimum of 15 minutes is suggested.

Use a digital voltmeter to view the signal output of the Model 730. Adjust the signal output of the Model 730 to be 0.001 to -0.001 V. Make this adjustment at a pressure at least 1/2 decade below the Model 730's resolution; e.g., for a 10 Torr FS unit the zero pressure should be less than $5E-5$ Torr. For a 1000 Torr unit, a pressure less than 0.050 Torr is acceptable.

Figure 7 : Location of Calibration Adjustment Potentiometers



5.2 Span (Full Scale) Adjustment and Calibration

The Zero adjustment is the only adjustment that should be made in the field. Span (Full Scale) adjustments require a calibrated and certified reference standard and should only be attempted by qualified personnel. Return the Model 730 to Setra Systems for periodic calibration, Span (Full Scale) Adjustment and Calibration adjustments and servicing.

6.0 Maintenance & Troubleshooting

There are no general maintenance requirements for the Model 730 other than periodic zero adjustment. If the unit fails to operate when received or if the unit appears damaged, notify Setra Systems or your supplier immediately. Retain packaging materials for inspection. Do not use if damaged. If the Model 730 is not going to be used immediately then replace the protective flange cover and store in suitable conditions described in Section 2.

If no obvious damage has occurred, a few simple checks can be made to verify proper installation. Table 2 shows the solution to common problems with the installation. If none of these problems/solutions are applicable, then please contact a Setra Systems applications engineer for further assistance.

Table 2: Common Installation Problems & Solutions

Problem	Cause	Solution
No signal output	Incorrect or no supply voltage	Ensure power supply is used as specified in Section 3.
	Readout display short circuit or incorrect impedance	Ensure impedance of readout unit is $> 10 \text{ k}\Omega$
Signal output reads over-range	Incorrect wiring	Ensure wiring conforms to diagrams in Section 3.0
	Potential difference between chassis ground of unit , power supply and readout / display	Ensure common chassis ground between unit, power supply and display.
Signal output reads under-range	Incorrect zero adjustment	Adjust zero per section 5.1
	Readout display incorrect impedance	Ensure impedance of readout unit is $> 10 \text{ k}\Omega$.
	Incorrect wiring polarity to readout display	Ensure wiring conforms to diagrams in Section 3.0
Unstable signal supply	Chassis ground not connected	Ensure common chassis ground between unit, power supply and display.
	Unstable or unregulated power supply	Use a regulated power supply as specified in Section 3.0.
	Electrical noise on chassis ground	Ensure common chassis ground between unit, power supply, and display.

7.0 Specifications

Performance Data:

Accuracy ¹	$\pm 0.5\%$ of Reading Optional $\pm 0.25\%$ of Reading
Resolution:	Infinite. Limited only by output noise level ($\leq 0.005\%$ FS)
Thermal effect:s	
Compensated Range:	0 to +50°C
Zero Shift:	$< \pm 0.25\%$ FS/50 °C
Span Shift:	$< \pm 1.35\%$ Rdg/50°C
Long Term Stability	$\pm 0.5\%$ FS/Yr, excluding environmental effects
Proof Pressure:	45 psia

Environmental Data:

Operating Temperature:	0 to +80°C
Storage Temperature:	-20 to +85°C

Electrical Data (Voltage):

Connectors:	9 Pin D-Sub, 15 Pin D-sub on 6" Pigtail, or 5 pin Terminal Strip
Excitation/Output:	12 to 30 VDC for 0 to 10 VDC output 9 to 30 VDC for 0 to 5 VDC output
Output Load:	$> 10 \text{ K}\Omega$ load
Power Consumption:	$< 200 \text{ mW}$
Time Constant:	$< 20 \text{ ms}$
EMC Performance:	Complies with EMC Directive 2004/108EC

Physical Description:

Case:	Stainless steel
Vacuum Fittings:	0.25" or 0.5" OD Tube; other fittings available; see specification sheet
Wetted Materials ² :	Inconel [®]
Measurement cavity volume ³ :	$< 6.0 \text{ cc}$
Weight (approx):	$< 250 \text{ g}$
Agency Compliance	EU RoHS Compliant CE

Notes:

1. Accuracy is expressed as % of reading. However, near Zero, the accuracy is limited by the resolution of the instrument. So, the accuracy is more correctly stated as the greater of $\pm 0.5\%$ reading or $\pm 0.01\%$ of Full Scale.. (For the optional accuracy, this becomes the greater of $\pm 0.25\%$ reading or $\pm 0.01\%$ FS).
2. Wetted material is for 0.5" tube option only. Other flange options will add stainless steel.
3. Maximum cavity volume including the 0.5" OD tube volume of 0.26 in^3 (4.28 cc).

8.0 Returning the Model 730 for Repair

Please contact a Setra application engineer (800-257-3872, 978-263-1400) before returning unit for repair to review information relative to your application. Many times only minor field adjustments may be necessary. If it is necessary to return the unit, please us the following:

When returning the Model 730, please use the "Repair Order Return Form" (example below) found on our website at <http://www.setra.com/tra/repairs/pdf/webrepair.pdf>. Note: If the form is not completely filled out, the unit will not be repaired and will be returned at the owner's expense.

		159 Swanson Road, Boxborough, MA 01719 Repair Dept. Fax #: 978-266-2158 Repair Dept. Phone #: 978-266-2194
CALIBRATION & SERVICE ORDER RETURN FORM		
♦ All lines must be filled out. Returns that arrive without this form or the proper paperwork will be rejected or held pending proper paperwork. ♦ Please note: All non-warranty returns or items in warranty deemed to be customer fault, will have an evaluation fee . If you decide you do not want an item repaired or the return is deemed beyond repair the evaluation fee will apply.		
CONTACT NAME: _____		EMAIL ADDRESS: _____
COMPANY: _____		DATE OF RETURN: _____
PHONE NUMBER: _____	FAX NUMBER: _____	
IF PO: A PURCHASE ORDER & NOT TO EXCEED: (ACKNT ARE REQUIRED)	IF CREDIT CARD: CARD #, EXP DATE, / CARDHOLDER (OPTIONAL), CONTACT SERVICE DEPT WITH CE INFORMATION: _____	
MODEL / PART # AND QTY: _____	SERIAL NUMBER: _____	
<input type="checkbox"/> Expedite, 1-3 days (\$50 fee added to service order) <input type="checkbox"/> RUSH, 5-7 days <input type="checkbox"/> Std time, 2-3 weeks <input type="checkbox"/> Calibration Only <input type="checkbox"/> Cert needed <input type="checkbox"/> Failure Analysis (Please note: The Expedite fee is waived if unit is determined to be a Setra/Dolan-Jenner defect and is within the warranty period).		
*Reason for return: A description of the problem is required for us to evaluate units for repair.		
Other notes, comments or special handling: _____		
Any product that has been used with Hazardous Materials (any material other than inert gas) must be 100% purged and must be accompanied by a MSDS sheet. Product must be labeled, sealed, and tagged accordingly. Setra will not accept delivery of any product exposed to chemicals or biological process without written evidence of decontamination or laboratory analysis and proof the biological process is not harmful. Setra will not, under any circumstances accept product exposed to radioactive materials and due to the potential of cross contamination can not accept product that has been used on semiconductor copper processing.		
Hazardous chemicals: <u>Y / N</u> (circle one)		
List of Chemicals used: _____		
Has unit been purged?	Yes No	Purged with what? _____
Has unit been flushed?	Yes No	Flushed with what? _____
Has unit been decontaminated?	Yes	Explain Process: _____
Billing address: _____	Shipping address: _____	
Method of Shipment: _____ PPD: _____ Collect: _____ Account # _____		
♦ Please remove all fittings and power cords before returning parts for service. ♦ Scale orders should be returned to us with the pan and power cord.		

Calibration Services

Setra maintains a complete calibration facility that is traceable to the National Institute of Standards & Technology (NIST). If you would like to recalibrate or recertify your Setra pressure transducers or transmitters, please call our Repair Department at 800-257-3872 (978-263-1400) for scheduling.

9.0 Warranty & Limitation of Liability

SETRA warrants its products to be free from defects in materials and workmanship, subject to the following terms and conditions: Without charge, SETRA will repair or replace products found to be defective in materials or workmanship within the warranty period; provided that:

- a) the product has not been subjected to abuse, neglect, accident, incorrect wiring not our own, improper installation or servicing, or use in violation of instructions furnished by SETRA;
- b) the product has not been repaired or altered by anyone except SETRA or its authorized service agencies;
- c) the serial number or date code has not been removed, defaced, or otherwise changed; and
- d) examination discloses, in the judgment of SETRA, the defect in materials or workmanship developed under normal installation, use and service;
- e) SETRA is notified in advance of and the product is returned to SETRA transportation prepaid.

Unless otherwise specified in a manual or warranty card, or agreed to in writing and signed by a SETRA officer, SETRA pressure and acceleration products shall be warranted for one year from date of sale.

The foregoing warranty is in lieu of all warranties, express, implied or statutory, including but not limited to, any implied warranty of merchantability for a particular purpose.

SETRA's liability for breach of warranty is limited to repair or replacement, or if the goods cannot be repaired or replaced, to a refund of the purchase price. SETRA's liability for all other breaches is limited to a refund of the purchase price. In no instance shall SETRA be liable for incidental or consequential damages arising from a breach of warranty, or from the use or installation of its products.

No representative or person is authorized to give any warranty other than as set out above or to assume for SETRA any other liability in connection with

159 Swanson Road, Boxborough, MA 01719-130
Tel: 800-257-3872/978-263-1400, Fax 978-264-029
Email: sales@setra.com, Web: www.setra.com

