MODEL 720
OPERATING INSTRUCTIONS

ISO 9001 Certified

1-800-257-3872 **TOLL FREE**
1-978-264-0292 **FAX**
sales@setra.com **EMAIL**
www.setra.com **WEB**

Setra offers a complete line of products for these industries:

Industrial

HVAC

Test & Measurement

Barometric

Ultra High Purity/Sanitary

Contents

1.0 Introduction

Setra's Vactron Model 720 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 (hPa), kPa or psia.

The Model 720 operates from a 14-30 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 720 is pin for pin compatible with other 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 720 has easy access to multi-turn potentiometers for fine zero and span adjustments. Inconel is used for all wetted materials for compatibility with corrosive gases. A wide range of pressure/vacuum fittings are available.

The high accuracy pressure sensing element used in the Model 720 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 unique custom integrated circuit utilizing a patented charge balance principle.

Excellent zero stability and barometric insensitivity is achieved through the patented sensor design. The Model 720 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 720. If the Model 720 appears damaged, notify Setra Systems or your supplier immediately. Retain packaging materials for inspection. Do not use if damaged. If the Model 720 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 -50 to +125°C.

The Model 720 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 720 (which may cause measurement errors), we recommend that you install the Model 720 vertically with the tube facing down. Outline drawings showing the external dimensions are shown in Figure 1.

To connect the Model 720 to your system use the appropriate hardware for the type of fitting:

- Use a Cajon® Ultra Torr type of compression coupling to connect to the O.5" OD tube.
- Use an O-ring/centering ring and clamp to connect to the NW16, 25 and 40 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 8 VCR™ Style Face Seal Fitting and sealing washer to connect to the female swivel 8 VCR™ Style Face Seal Fitting.

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

Figure 1: Outline drawing of 9-pin D connector, 0.5" OD tube.

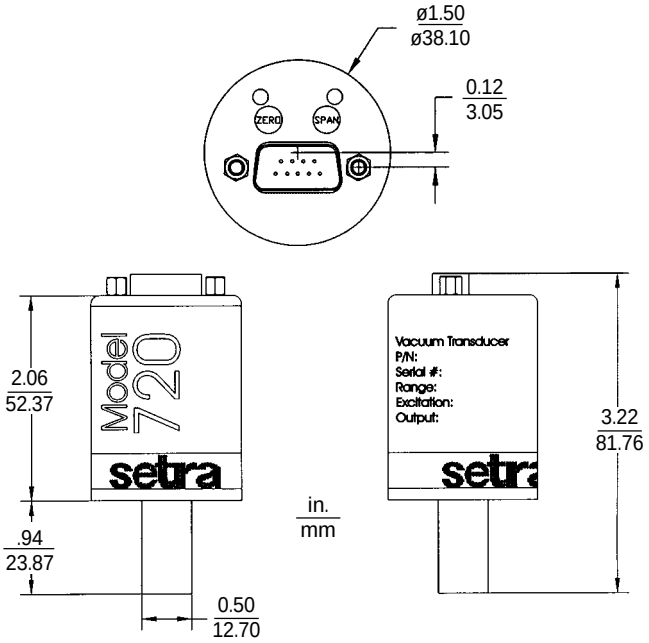
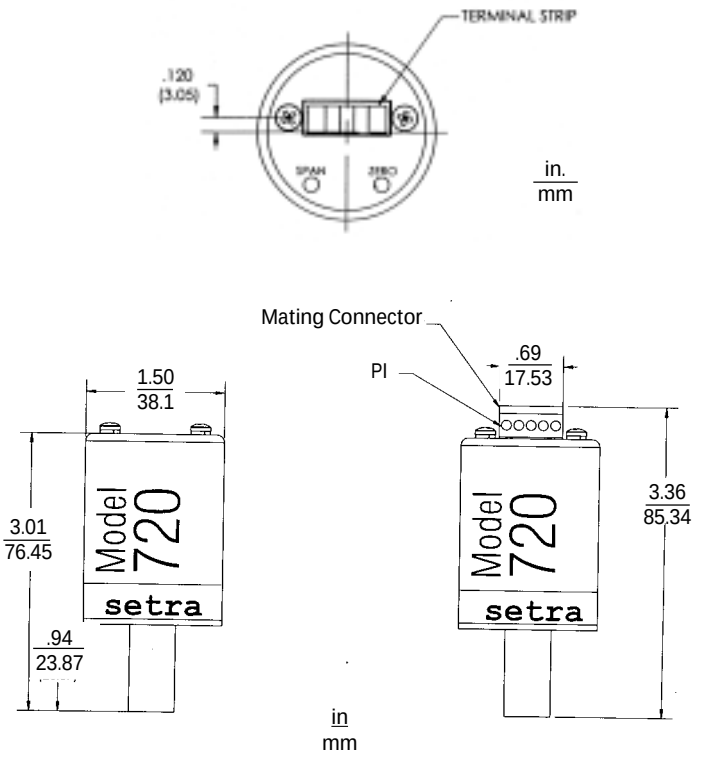


Figure 2: Outline drawing of 5-pin terminal strip, 0.5" OD tube.



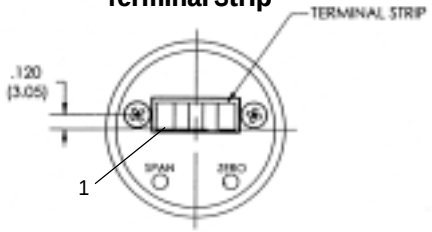
3.0 Electrical Installation

The model 720 operates from a 14-30 VDC regulated power supply for the 0-10 VDC output, or a 9-30 VDC regulated power supply for the 0-5 VDC output. The pin outs for the 5 Pin terminal strip and D-sub 9 Pin connector are shown in Figures 3 and 4 below.

Note 1: 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 transducer.

Note 2: The Model 720 meets CE mark requirements and complies with EMC Directive 89/336/EEC. To ensure compliance when installed, an overall metal braided shielded cable (and metal shielded connectors for the D sub connector option) connected to chassis ground at both ends is required.

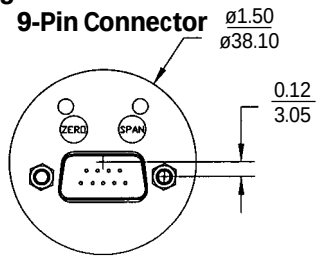
Fig. 3: Pin out of 5-Pin Terminal Strip



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

in.
mm

Fig. 4: 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

4.0 OPERATION

For most accurate pressure measurement, allow the Model 720 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 720 is linear with pressure; e.g., for a 10 VDC FS Model 720, 10 VDC equals 100% FS output; 1 VDC equals 10% FS output.

Table 1 indicates the lowest pressures available for reading and pressure control for each range of the Model 720. The lowest suggested pressure available for reading is limited by the resolution and the accuracy of the Model 720. 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 signal output of 50 mV.

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
500 Torr	0.250 Torr	2.50 Torr
1000 Torr	0.500 Torr	5.00 Torr
10 mbar / hPa	0.005 mbar / hPa	0.05 mbar / hPa
100 mbar / hPa	0.05 mbar / hPa	0.5 mbar / hPa
1000 mbar / hPa	0.5 mbar / hPa	5 mbar / hPa
1 psia	0.0005 psia	0.005 psia
2 psia	0.0010 psia	0.010 psia
5 psia	0.0025 psia	0.025 psia
10 psia	0.0050 psia	0.050 psia
20 psia	0.0100 psia	0.100 psia

5.0 Calibration & Adjustment

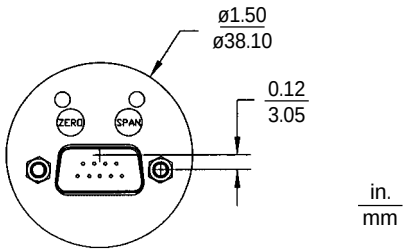
5.1 Checking & Zero Adjustment

After installation on a system, the Model 720 may require initial zero adjustment. Figure 5 shows the location of the zero adjustment potentiometer.

Use a digital voltmeter to view the signal output of the Model 720. Adjust the signal output of the Model 720 to be 0.001 to –0.001 mV. Make this adjustment at a pressure at least 1/2 decade below the Model 720's resolution; e.g., for a 10 Torr FS unit the zero pressure should be less than 5E-4 Torr. For a 1000 Torr unit, a pressure less than 0.050 Torr is sufficient.

The Zero potentiometer is a multi–turn potentiometer providing very fine adjustment of the zero over a +/- 250 mV range.

Figure 5 : 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 720 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 720 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 720 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 2.
	Readout display short circuit or incorrect impedance	Ensure impedance of readout unit is > 10 kΩ
Signal output reads over-range	Incorrect wiring	Ensure wiring conforms to diagrams in Section 4.2
	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 kΩ .
	Incorrect wiring polarity to readout display	Ensure wiring conforms to diagrams in Section 4.2
Unstable signal	Chassis ground not connected	Ensure common chassis ground between unit, power supply and display.
	Unstable or unregulated supply	Use a regulated power supply power supply as specified in Section 2.
	Electrical noise on chassis ground	Ensure common chassis ground between unit, power supply and display.

7.0 Specifications

Performance Data:

Accuracy (RSS)[1] : < ± 0.5% of Reading
Optional < ± 0.25% of Reading

Resolution: 0.01% FS

Thermal effects
- Compensated Range: 0 to +50°C
- Zero Shift: < ± 0.005% FS / °C
- Span Shift: < ± 0.027% Rdg / °C

Proof Pressure: 45 psia

Operating Temperature: -20 to +80°C

Storage Temperature: -40 to +125°C

Electrical Data:

Connector:	9 pin D sub
Excitation/Output:	14-30 VDC for 0-10 VDC output 9-30 VDC for 0-5 VDC output
Output Maximum Load:	<10 KΩ load
Power Consumption:	< 200 mW
Time Constant:	< 20 ms
EMC Performance:	Complies with EMC Directive 89/336/EEC

Physical Description:

Case:	Stainless steel
Vacuum Fittings:	0.5" OD Tube; other fittings available; specification sheet
Wetted Materials[2]:	Inconel®
Measurement cavity volume[3]:	<6.2 cc
Weight:	137 g

Notes:

1. Root sum of the squares (RSS) of linearity, hysteresis and non-repeatability. Accuracy is expressed as % of reading. However, near Zero, the accuracy is limited by the resolution of the ±0.1% instrument. So, the accuracy is more correctly stated as the greater of ±0.5% reading. (For the optional accuracy, this becomes the greater of ±0.25% reading or ±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 cm^3).

8.0 Returning the Model 720 for Repair

Setra Systems cannot accept a Model 720 for repair unless the Form 720ERN is completed. Contact Setra Systems for an ERN Number or the Form 720ERN. Form 720ERN is included in this guide on page 15.

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. When returning a product to Setra, the material should be carefully packaged and shipped prepaid to:

Setra Systems, Inc.
159 Swanson Road
Boxborough, MA 01719-1304
Attn: Repair Department

To assure prompt handling, please supply the following information and include it inside the package of returned material:

1. Name and phone number of person to contact.
2. Shipping and billing instructions.
3. Full description of the malfunction.

Notes: Please remove any pressure fittings and plumbing that you have installed and enclose any required mating electrical connectors and wiring diagrams. Allow approximately 3 weeks after receipt at Setra for the repair and return of the unit. Non-warranty repairs will not be made without customer approval and a purchase order to cover repair charges.

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 the sale of its products.

10.0 RETURN OF SETRA SYSTEMS PRODUCT-DECLARATION
(Form 720ERN)

EXPECTED RETURN NUMBER

You must:

- Know about all of the substances which have been used and produced in the product before you complete this Declaration.
- Contact your supplier if you have any questions and for an ERN Number.
- Send this form to your supplier with the return of the product.

SECTION 1: *Product*

A. Model Number

B. Serial Number

C. Has the product been used, tested or operated?

❑ Yes - Go to Section 2 ❑ No - Go to Section 4

SECTION 2: *Substances in Contact with the Product*

A. Radioactive* ❑ Yes ❑ No

B. Biologically Active ❑ Yes ❑ No

C. Dangerous to Human Health and Safety? ❑ Yes ❑ No

* Note: Your supplier will not accept delivery of any products that are contaminated with radioactive substances, unless you:

- Decontaminate the products
- Provide proof of decontamination

YOU MUST CONTACT YOUR SUPPLIER FOR ADVICE BEFORE YOU RETURN SUCH PRODUCTS

If you have answered "no" to all of these questions, go to Section 4.

SECTION 3: *List of Substances in Contact with the Product*

Substance Name	Chemical Symbol	Precautions Required (e.g., use protective gloves, etc.)	Actions Required After Spillage or Human Contact
1.			
2.			
3.			
4.			
5.			
6.			

SECTION 4: *Return Information*

Reason for return and symptoms of malfunction:

If you have a warranty claim:

- Who did you buy the product from?:
- Give the supplier's invoice number or your purchase order number:

SECTION 5: *Declaration*

Print your Name: Print Your Job Title:

Print Your Company Name:

Print Your Address:

Telephone Number: Date of Product Return:

I have made reasonable inquiry and I have supplied accurate information in this Declaration. I have not withheld any

SS2054 Rev.B 08/28/01

159 Swanson Road, Boxborough, MA 01719-1304
Tel: 800-257-3872/978-263-1400, Fax 978-264-0292
Email: sales@setra.com, Web: www.setra.com