



MODEL 761

Absolute Capacitance Manometer

OPERATING INSTRUCTIONS



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SS761 RevB. 12/2014

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11.0 RETURN OF SETRA SYSTEMS PRODUCT-DECLARATION

(Form 761ERN)

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.

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

SECTION 3: List of Substances in Contact with the Product

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 information. I have followed the Return of Setra Systems Product Procedure.

Signed: _____ Date: _____

1.0 Introduction

Setra's Model 761 capacitance manometer is a temperature compensated, vacuum manometer designed for accurate and repeatable vacuum measurements.

The Model 761 operates from a 13-30 VDC power supply and provides a 0-10 VDC or 0-5 VDC signal output that is linear with pressure and independent of gas composition. It is configured with a 15 pin D-Sub with "plug and play" industry standard pinouts. The Model 761 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. 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 761 has been developed from Setra's patented variable capacitance sensing technology. An electrically isolated, centrally located feed through 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 decreases, 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 circuit.

Excellent zero stability and thermal insensitivity are achieved through the patented sensor design. The Model 761 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 761. If the Model 761 appears damaged, notify Setra Systems or your supplier immediately. Retain packaging materials for inspection. Do not use if damaged. If the Model 761 is not going to be used immediately, replace the protective flange cover and store in an area where the temperature range is controlled between -20 to +80°C.

The Model 761 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 761 (which may cause measurement errors), we recommend that you install the Model 761 vertically with the tube facing down. Outline drawings showing the external dimensions are shown in Figures 1 - 3.

To connect the Model 761 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 0.5" OD tube.
- Use an O-ring/centering ring and corresponding 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 or clamps in accordance with the manufacturer's specifications.

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.

10.0 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:

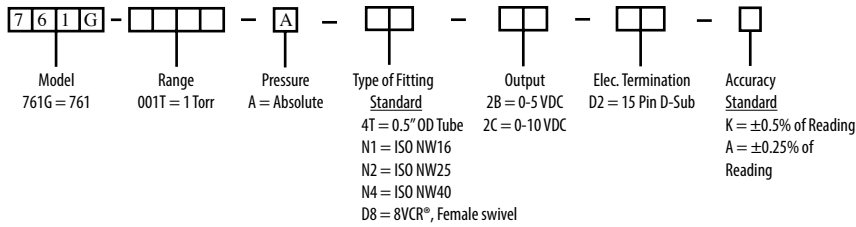
- a) the product has not been subjected to abuse, neglect, accident, incorrect wiring not our own, improper installation or servicing, or use in violation of instructions furnished by SETRA;
- b) the product has not been repaired or altered by anyone except SETRA or its authorized service agencies;
- 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.



8.0 Reordering Data

Example: To order a 1 Torr FS unit with ISO NW16 fitting, 0-10 VDC output, 15 pin D-Sub connector and an accuracy of ±0.25% Reading, the order code would be: 761G001TAN12CD2A.

9.0 Returning the Model 761 for Repair

Setra Systems cannot accept a Model 761 for repair unless the Form 761ERN is completed. Contact Setra Systems for an ERN Number or the Form 761ERN. Form 761ERN 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.
4. Identify any hazardous material used with product.

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.

Figure 1: Outline drawing of 15 pin D connector, 0.5" OD tube.

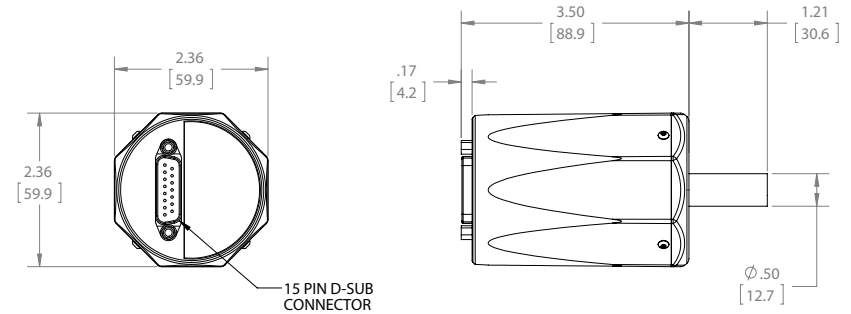


Figure 2: Outline drawing showing optional ISO NW vacuum fitting.

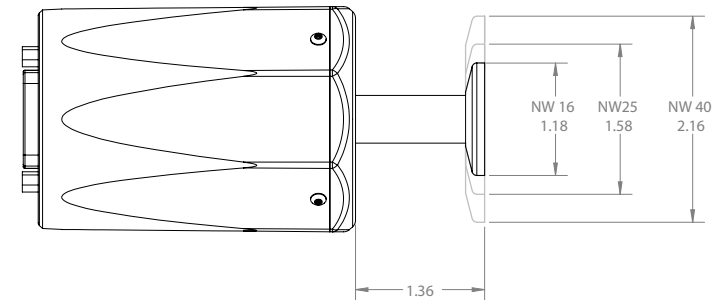
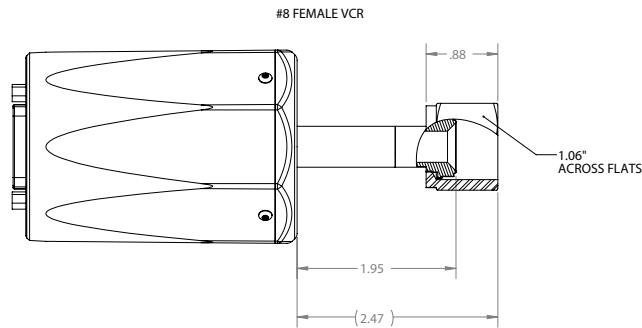


Figure 3: Outline drawing showing optional VCR™ style face seal vacuum fitting.



3.0 Electrical Installation

The Model 761 operates from a 13-30 VDC power supply. The Model 761 is factory configured for either a 0-5 VDC output or 0-10 VDC output.

The pin out for the D-sub, 15 pin connector is shown in Figure 5, page 5. A schematic diagram of the recommended electrical connections to the D-sub, 15 pin connector is shown in Figure 6, page 5.

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 761 meets CE mark requirements and complies with EMC Directive 2004/108/EC. 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. Belden 9941 cable or equivalent is recommended.

Note 3: It is recommended that the 761 be powered with a linear power supply. Inappropriately used switching power supplies can degrade performance.

Note 4: Do not operate this product in an explosive environment.

7.0 Specifications

Performance Data:	
Accuracy ^{1,2,3} :	< ± 0.5% of Reading Optional < ± 0.25% of Reading
Resolution:	≤ 0.005% FS
Long Term Stability:	< ± 0.25% FS/YR, excluding environmental effects
Thermal effects	
Compensated Range:	15 to +40°C
Zero Shift:	< ± 0.02% FS / °C
Span Shift:	< ± 0.04% RDG / °C
Proof Pressure:	45 psia
Burst Pressure:	> 100psi
Operating Temperature:	5 to +50°C
Storage Temperature:	-20 to +80°C

Electrical Data:	
Connector:	15 pin D-Sub
Excitation:	13 to 30 VDC for 0-10 VDC 9 to 30 VDC for 0-5 VDC
Output:	0 - 10 V DC or 0 - 5 V DC
Output Maximum Load:	> 10 k ohms
Power Consumption:	< 10 mA
EMC Performance:	2004/108/EC
Response Time:	< 20 msec

Physical Description:	
Case:	Powder Coated Cast Aluminum
Pressure Fittings:	0.5" OD Tube; other fittings available; see reorder data page
Wetted Materials ⁴ :	Inconel [®]
Measurement cavity volume ⁵ :	< 5 cc
Weight:	< 14oz

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 ±0.50% reading or ±0.005% FS. (For the optional accuracy, this becomes the greater of ±0.25% reading or ±0.005% FS).
2. Includes non-linearity, non-repeatability and hysteresis
3. Units calibrated at nominal 20°C
4. Wetted material is for 0.5" tube option only. Other flange options will add stainless steel.
5. Maximum cavity volume including the 0.5" OD tube volume. Other flange options will add wetted volume.

6.0 Maintenance & Troubleshooting

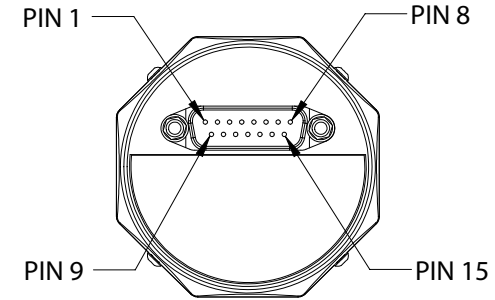
There are no general maintenance requirements for the Model 761 other than periodic zero adjustment. If the unit fails to operate when received or if the unit appears damaged, notify Setra Systems or your supplier immediately. Retain packaging materials for inspection. Do not use if damaged. If the Model 761 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, please contact a Setra Systems applications engineer for further assistance.

Table 2: Common Installation Problems & Solutions

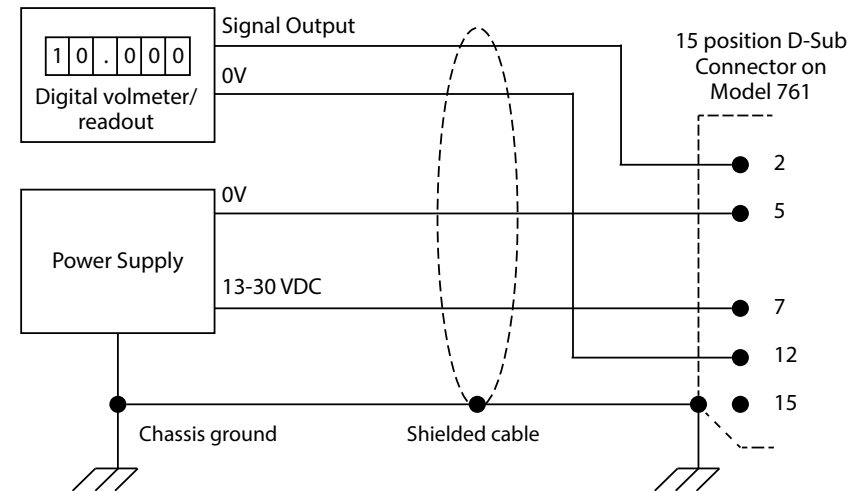
Problem	Cause	Solution
No signal output	Incorrect or no supply voltage	Ensure power supply is used as specified in Section 2
	Readout display short circuit or incorrect impedance	Ensure impedance of readout unit is >10 kΩ
Signal output reads over-range	Incorrect wiring	Ensure wiring conforms to diagrams in Section 4.2
	Potential difference between chassis ground of unit, power supply & readout/display	Ensure common chassis ground between unit, power supply & 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	Use a regulated power supply as specified in Section 2
	Electrical noise on chassis ground	Ensure common chassis ground between power supply & display

Figure 5: Pin out of D-sub Connector (Code D2)



Pin Location	Function
2	Signal Output
5	Power Supply Common
7	Power Supply, 13-30 VDC
12	Signal Output Common
15	Chassis Ground
1,3,4,6,8,9,10,11,13,14	Not used

Figure 6: Electrical Connection Schematic – D-sub 15-pin Connector



4.0 OPERATION

Mechanically connect the Model 761 to the vacuum chamber. As explained in Section 2, then electrically connect as shown in Section 3. For the most accurate pressure measurement, allow the Model 761 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).

If the unit was just received or stored at an extreme temperature, allow 12 hours for it to acclimate. It is recommended that the Model 761 zero output be nulled after installation.

The signal output of the Model 761 is linear with pressure; e.g., for a 10 VDC FS Model 761, 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 761. The lowest suggested pressure available for reading is limited by the resolution and the accuracy of the Model 761. 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
1 Torr	5×10^{-4} Torr	5×10^{-3} Torr

5.0 Calibration & Adjustment

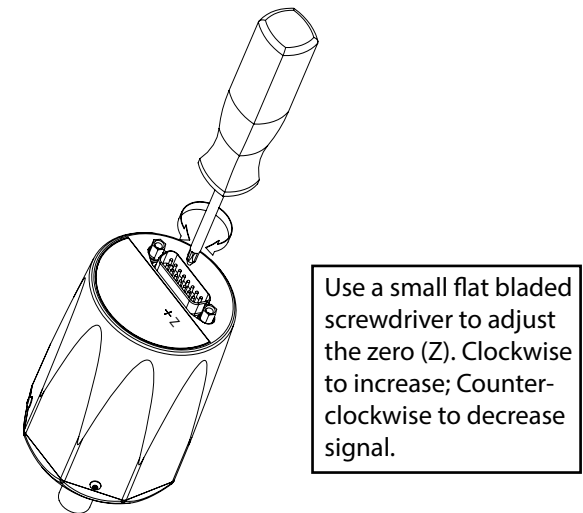
5.1 Checking & Adjustment of Zero Output

After installation on a system, the Model 761 may require initial zero adjustment. Figure 9 shows the location of the zero adjustment potentiometer. The access hole next to the "Z" on the label identifies the Zero potentiometer.

Use a digital voltmeter with 0.0005 VDC resolution to view the signal output of the Model 761. Adjust the signal output of the Model 761 to be 0.001 to -0.001 V. Make this adjustment at a pressure at below the Model 761's resolution; e.g., for a 1 Torr FS unit the zero pressure should be less than $5E-5$ Torr .

The Zero potentiometer is a multi-turn potentiometer providing very fine adjustment of the zero over a +/- 200 mV range.

Figure 9 : 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) and linearity adjustments require a calibrated and certified reference standard and should only be attempted by qualified personnel. Return the Model 761 to Setra Systems for periodic calibration, Span (Full Scale) Adjustment and Calibration adjustments and servicing. Adjusting any output other than zero voids the factory calibration.