Setra Model 227
Ultra High Purity 1 1/8" Down-Mount
"C" Seal and "W" Seal Pressure Transducer

1.0 GENERAL INFORMATION

Every Model 227 has been tested and calibrated before shipment. Model 227 performance specifications are listed on Page 6 of this Guide.

Setra Systems 227 pressure transducers measure gauge, compound or absolute pressure and convert this pressure to a proportional high level analog output. Two output versions are offered: A voltage output of 5 VDC FSO (Full Scale Output) and 10 VDC FSO), and a current output of 4 to 20 mA .
Note: These instructions are also available on our website at www.setra.com.

1.1 EMC Certification

This product complies with EN61326 Electrical Equipment for Measurement, Control and Laboratory use – EMC Requirements for Minimum Requirements and Industrial Locations. Special caution should be taken to meet Standard EN61000-4-5: 1995 Surge Immunity if any of the following conditions apply to the installation: The product is installed outside; all or any part of the cable is exposed to the outside; the cable is greater than 30 meters in length. In order to meet the Surge Immunity requirements, the following conditions must be followed during installation:

1. Shielded cable must be used, and the shield must be tied to earth ground (not power supply ground) on at least one end of the cable shield/drain wire. The shield must be maintained all the way from sensor to the power supply.
2. If unshielded cable is used, an earth grounded metal conduit fitting can be used to replace the shielded cable.
3. For a sensor with a metal body or enclosure, the body/enclosure must be grounded to earth. If a protective metal housing is used, the metal housing should be grounded to earth
4. If a protective plastic housing is used, the housing must be able to withstand at least 2 KV from the housing to earth ground, without damaging the circuit.

2.0 MECHANICAL INSTALLATION

2.1 Media Compatibility

Model 227 transducers are designed to be used with any gas or liquid compatible with 316L Stainless Steel. Never submerge the transducers in any liquid.

2.2 Environment

The operating temperature limits of the 227 are as follows:

Operating Temperature Range °F (°C)	-40 to +185 (-40 to +85)
Compensated Temperature Range °F (°C)	+15 to +150 (-9 to +65)

Operating temperature limits with Option N1 are as follows:

Operating Temperature Range °F (°C)	-22 to +176 (-30 to +80)
Compensated Temperature Range°F (°C)	+15 to +150 (-9 to +65)

2.3 Pressure Fittings

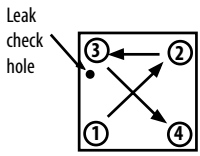

Diagram 1

Mounting - Model 227 pressure transducers are supplied with 1.125" down-mount "C" or "W" seal base. (*Note: The torque values listed are typical for most systems, please adjust the values to fit your system.*) The tightening sequence forms a leak tight seal between the base block and the unit. Using 4 screws to install the unit, follow the torque sequence pattern in Diagram 1. Use a torque driver and torque all 4 screws to 25 in. lbs, repeat sequence and torque all 4 screws to 35 in. lbs, then repeat sequence for 45 in. lbs.

2.4 Venting

Model 227 gauge or compound transducers are vented through the electronics housing.

3.0 ELECTRICAL INSTALLATION

3.1 Voltage Output Units

The Model 227 voltage output transducer is supplied with a 6ft. multiconductor cable, Bayonet style connector, or D-Sub style connectors. The voltage output is either 5 VDC FSO or 10 VDC FSO. Diagram 2 shows electrical connection wiring for voltage output transducers, and the excitation required.

CONNECTOR PIN WIRING FOR VOLTAGE TRANSDUCERS

	CABLE	BAYONET	9 PIN D-SUB	15 PIN D-SUB
CONNECTION	WIRE	PIN	PIN	PIN
+ EXCITATION	RED	A	4	7
+ OUTPUT	GREEN	B	1	2
– OUTPUT	WHITE	C	8	12
– EXCITATION	BLACK	D	9	5
CASE GND	DRAIN	SHELL	SHELL	SHELL
EXCITATION:	10-30 VDC FOR 0.2 TO 5.2 VDC and 0 to 5 VDC 13-30 VDC FOR 0.2 TO 10.2 VDC and 0 to 10 VDC			

Diagram 2

Note 1: Model 227 can be wired as a 3-wire device by connecting – OUTPUT and –EXCITATION and drain wire to a common ground. However, accuracy may be reduced due to increase in resistance.

3.2 Current Output Units

(and w/N1 option, see Notes 2 and 3.)

The Model 227 is a two-wire loop-powered 4 to 20mA current output unit and delivers rated current into any external load of 0-800 ohms. The Model 227 is available with 6ft. of multiconductor cable, Bayonet style connector or D-Sub style connectors. Diagram 3 shows electrical connection wiring for current output transducers.

CONNECTOR PIN WIRING FOR CURRENT TRANSMITTERS

	CABLE	BAYONET	9 PIN D-SUB	15 PIN D-SUB
CONNECTION	WIRE	PIN	PIN	PIN
+ EXCITATION	RED	A	4	7
– EXCITATION	BLACK	D & B	9	5
CASE GND	DRAIN	SHELL	SHELL	SHELL

Minimum Supply Voltage = 10 + 0.02 x Loop Resistance
Maximum Supply Voltage = 30 + 0.004 x Loop Resistance

Diagram 3

Note 1: The transducer case and integral connector Shell are electrically connected.

The power supply must be a DC voltage source with a voltage range between 10 VDC and 30 VDC measured between the + and - terminals. The unit is calibrated at the factory with a 24 VDC loop supply voltage and a 250 ohm load.

Current must flow in one direction only - **Please observe polarity**. (See Diagram 4) We suggest the cable shield Drain Wire be connected to the system's loop circuit ground for optimum electrical noise reduction. On transducers with integral connectors (e.g., on Bayonet, or D-sub connector types), connection to transducer case ground can be achieved by connecting the cable drain/shield wire to the mating cable-mounted connector shell (see Note 1)

Note 1: The transducer case and integral Bayonet Connector shell, D-sub Connector Shell, and Mini Din shell clips are electrically connected.

Note 2: ETL Listed to UL1604 Standards: The current output unit (excluding units ordered with the Mini Din Shell) may be installed in UL1604 Class 1 Hazardous (Classified) Group A, B, C, D, Division 2 locations if the unit is ordered for these locations. (This is denoted by an N1 designation in the Part Number, 12th and 13th digits.) Safety barriers are not required as long as the unit is operated under normal conditions with a maximum excitation voltage of 30 VDC between the input terminals.

Note 3: ATEX 94/9/EC Approved: Special hazardous area instructions for 227 transducers (with the N1 suffix) with ATEX approval: The 227 transducer (with the N1 suffix) is designed for use in hazardous areas indoor applications with ATEX rating: Non-incendive II 3G Eex nL IIC T4 X -30℃<Ta<+80℃. (Note: Units ordered with the Mini Din Shell are not ATEX approved for use in hazardous locations.)

- The device can only be used for "Indoor Applications".
- Power must be turned off before connecting or disconnecting.
- For the connector version, the connector must be secured before applying power and DO NOT SEPARATE WHEN ENERGIZED.
- The shielded cable must be used and the drain wire of the cable must be connected to the earth ground. The drain wire of the cable must connect to the connector metal outer shell for the connector version.
- The maximum allowable transient disturbance must not exceed more than 40% of the maximum excitation voltage.

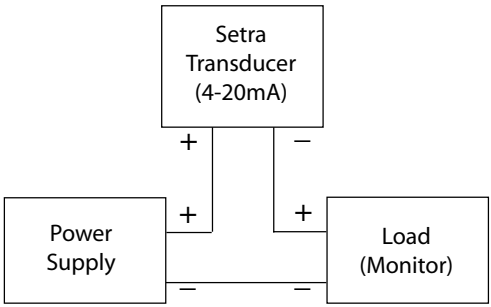

Diagram 4

4.0 CALIBRATION

The 227 transducer is factory calibrated to the specific input pressure range vs. output voltage or current and should require no field adjustment. For absolute pressure ranges, the zero can be adjusted with full vacuum applied to the pressure port. For compound ranges, the zero

should be adjusted with the unit at atmospheric pressure and the output adjusted as noted in Diagrams 5 & 6 on pages 4 & 5. Zero and span adjustments can be made by turning the rotatable access cover to expose the zero and span potentiometers. *Be certain to close the rotatable cover after adjustments are made.*

4.1 Voltage Output Zero Adjustment

While monitoring the voltage between the positive output (+OUT) and common (COM), with the pressure port open to atmosphere or with zero pressure applied, the zero may be adjusted by turning the zero potentiometer screw.

For the 5 VDC Full Scale Output, the tolerance on zero and span settings is ±25mV. For the 10 VDC Full Scale Output, the tolerance on zero and span settings is ±50mV. For absolute pressure ranges, the zero and span should be adjusted with a full vacuum applied. See Diagram 5 below for nominal "installed" output at atmospheric pressure for compound pressure ranges.

NOMINAL "INSTALLED" OUTPUT AT ATMOSPHERIC PRESSURE

PSI Compound Range	5 VDC Full Scale Outputs		10 VDC Full Scale Outputs	
	0.2 to 5.2 Voltage (VDC)	0 to 5 VDC Voltage (VDC)	0.2 to 10.2 Voltage (VDC)	0 to 10 VDC Voltage (VDC)
-14.7 to 25	2.051	1.851	3.903	3.703
-14.7 to 50	1.336	1.136	2.472	2.272
-14.7 to 100	0.841	0.641	1.482	1.282
-14.7 to 250	0.478	0.278	0.755	0.555
-14.7 to 500	0.343	0.143	0.486	0.286
-14.7 to 1000	0.272	0.072	0.345	0.145
-14.7 to 3000	0.224	0.024	0.249	0.049

Bar Compound Range	5 VDC Full Scale Outputs		10 VDC Full Scale Outputs	
	0.2 to 5.2 Voltage (VDC)	0 to 5 VDC Voltage (VDC)	0.2 to 10.2 Voltage (VDC)	0 to 10 VDC Voltage (VDC)
-1 to 1.7	2.052	1.851	3.904	3.704
-1 to 3.4	1.336	1.136	2.473	2.273
-1 to 7	0.825	0.625	1.450	1.250
-1 to 17	2.494	0.278	0.756	0.556
- 1 to 35	0.339	0.139	0.478	0.278
-1 to 70	0.270	0.070	0.341	0.141
-1 to 200	0.225	0.025	0.250	0.050

Diagram 5

4.2 Voltage Output Span Adjustment

(Complete the zero adjustment before setting span.)

Span or full scale output adjustments should only be performed using an accurate pressure standard (electronic manometer, digital pressure gauge, etc.), with at least comparable accuracy to the 227 transducer (±0.25% FS). With full scale pressure applied to the pressure port, the span may be adjusted by turning the span potentiometer screw. The span (full scale) output is factory set to within ±25 mV for the 5 VDC FS output or ±50mV for the 10 VDC FS output.

4.3 Current Output Zero Adjustment

While monitoring the current output, with zero pressure applied or with the pressure port open to atmosphere, the zero may be adjusted by turning the zero potentiometer screw. The factory setting is 4mA (±0.08mA).

See Diagram 6 below for nominal "installed" output at atmospheric pressure for compound pressure ranges.

NOMINAL "INSTALLED" OUTPUT AT ATMOSPHERIC PRESSURE

BAR COMPOUND RANGE	CURRENT OUTPUT (mA)
-1 to 1.7	9.92
-1 to 3.4	7.63
-1 to 7	6.00
-1 to 17	4.88
-1 to 35	4.44
-1 to 70	4.22
-1 to 200	4.07

PSI COMPOUND RANGE	CURRENT OUTPUT (mA)
-14.7 to 25	9.92
-14.7 to 50	7.63
-14.7 to 100	6.05
-14.7 to 250	4.89
-14.7 to 500	4.46
-14.7 to 1000	4.23
-14.7 to 3000	4.08

Diagram 6

4.4 Current Output Span Adjustment

Span or full scale output adjustments should only be performed using an accurate pressure standard (electronic manometer, digital pressure gauge, etc.) with at least comparable accuracy to the 227 transducer (±0.25% FS). With full scale pressure applied to the pressure port, the span may be adjusted by turning the span potentiometer screw. The span (full scale) output is factory set to within ±0.08mA.

5.0 MODEL 227 PERFORMANCE SPECIFICATIONS

Accuracy RSS* (at constant temperature.)	±1.0% Reading
	±0.25% FS
Non-Linearity, BFSL	±0.15% FS
Hysteresis	0.20% FS
Non-Repeatability	0.02% FS

*RSS of Non-Linearity, Non-Repeatability and Hysteresis.

Thermal Effects	
Compensated Range °F(°C)	+15 to +150 (-9 to +65)
Zero Shift %FS/100°F (50°C)	±2.0 (±1.8)
Span Shift %FS/100°F (50°C)	±2.0 (±1.8)
Environmental	
Temperature	
Operating** °F(°C)	-40 to +185 (-40 to 85)
Storage °F(°C)	-40 to +185 (-40 to 85)
Current unit ordered with Option N1:	
Operating** °F (°C)	-22 to +176 (-30 to +80)
Storage °F (°C)	-22 to +176 (-30 to +80)

**Operating temperature limits of the electronics only. Pressure media temperatures may be considerably higher or lower.

6.0 RETURNING PRODUCTS 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. When returning a product to Setra, the material should be carefully packaged, accompanied by the "Service/ Repair/Calibration Order Return" form on page 7 and shipped to :

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

Note: Return order form is also available on Setra's web site @ www.setra.com.

To assure prompt handling, please supply the following information and include it inside the package or returned material (Return Order Form provided on page 7):

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.

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.

SERVICE/REPAIR/CALIBRATION ORDER RETURN FORM

Setra Systems, Inc.

159 Swanson road
Boxborough, MA 01719
Repair Dept. Fax #: 978-266-2158/Phone #: 978-266-2194

- **All lines must be filled out.**
- **This form must accompany all returns. Returns that arrive with no information will be rejected.**

CONTACT NAME: EMAIL ADDRESS:
COMPANY: DATE:
PHONE NUMBER: FAX NUMBER:

PURCHASE ORDER WITH "NOT TO EXCEED" AMOUNT	CREDIT CARD #, EXP. DATE / CARDHOLDER NAME:

MODEL / PART # AND QTY: _____ SERIAL NUMBER/S: _____

☐ EXPEDITE , 1-3 days ($50 FEE) ☐ RUSH, 5-7 days ☐ STD TIME, 2-3 weeks
☐ CALIBRATION ONLY ☐ CERT NEEDED ☐ FAILURE ANALYSIS

REASON FOR RETURN/DESCRIPTION OF PROBLEM: _____

NOTES/COMMENTS OR SPECIAL HANDLING _____

Any product that has been used with Hazardous Materials must be 100% purged and should be accompanied by a MSDS sheet, bagged, sealed, and tagged accordingly. **Setra will not accept delivery of any product exposed to chemicals, radioactive agents, or biological process without evidence of decontamination or laboratory analysis, and proof the biological process is not harmful.**

Hazardous chemicals: Yes No (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	No	Explain Process:
All wetted surfaces have been removed:	Yes	No	

Billing Address:	Shipping Address

Method of Shipment: _____
(circle one) PPD: Yes Collect: Yes Please list account # _____

7.0 WARRANTY AND LIMITATION OF LIABILITY

SETRA warrants its Model 227 Transducer products to the original consumer purchaser against defects for a period of one year from the date of sale by SETRA, as shown in its shipping documents. Without charge, SETRA will repair or replace products found to have manufacturing defects within the warranty period.

The serial number or date code must not have been removed, defaced or otherwise changed. SETRA must be notified in advance of any returns; any products returned to SETRA must be transportation prepaid. 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.

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