

**Fermilab**

**Particle Physics Division  
Mechanical Department Calibration  
Standards/Procedures**

**Number:** MD-CALPROC-018

**Date:** 6/26/2009

**Manufacturer:** Setra

**Model:** Operating Instructions for Model 280E/C280E Pressure  
Transducer and Pressure Transmitter

**Reviewer(s):** *James E. Tweed*

**This Procedure is used for:**

Calibration of Setra pressure transmitters.



## Operating Instructions

### Models 280E/C280E Pressure Transducer and Pressure Transmitter Three-Wire, Voltage Output—Two Wire, Current Output

#### General Information

Your Setra transducer has been carefully calibrated before shipment to you and, it should be handled with the same care given any precision instrument. Pressure ranges and dimensions are reported on the specification bulletin for the transducer.

#### Installation

Do not use in ambient conditions corrosive to stainless steel, submerge in liquids, subject to spray or drip, or in a high vibration environment. The 280 Series is slightly sensitive to acceleration in the pressure fitting axis, less than 0.05 psi/g typical. Factory calibrated in the vertical position, with pressure port downward, this position often minimizes potential damage from dripping of pressure system piping.

#### Installation of pressure fitting:

For very high pressure we suggest using a sealant such as Loctite hydraulic sealant. For other pressure ranges, standard sealants such as teflon pipe tape generally are satisfactory. For the most sensitive pressure ranges, excessive torquing of a metal pressure fitting may cause slight zero shift which may be trimmed out using zero adjustment. Use of plastic fittings often shows no noticeable zero shift. The torquing effect does not appreciably affect linearity or sensitivity. Use the wrench flats on the 280E or C280E when attaching to fittings.

Installation with FM approved Explosion Proof/Weatherproof enclosure:

1. Conduit Seals shall be placed no more than 18" from the enclosure.
2. Cables with gas/vapor tight continuous sheath, capable of transmitting gas or vapor through the cable core, shall be sealed per National Electric Code (NEC) for Class 1, Division 1 (most current revision).
3. Caution: Do not open cover while circuits are live.

#### Atmospheric Reference (Gage pressure units only)

Lower range units are subject to excessive thermal zero shift unless vented to atmosphere. The 280E Series gage pressure transducers and transmitters are vented to atmosphere at the connector end where the edge card protrudes from the case. Do not seal around the edge card.

#### Electrical Connections

##### **280E (.030 - 5.03 VDC output)**

##### **For 24 VDC Excitation (Nominal)**

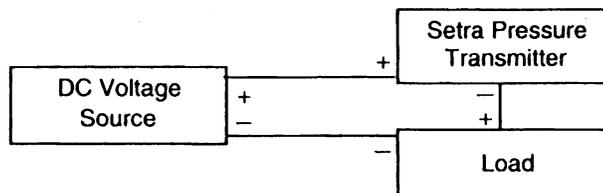
- |       |   |
|-------|---|
| + IN  | Connect to 15-30 VDC Power Supply.                |
| + OUT | Connect to Control of Pressure Monitor.           |
| COM.  | Connect as Common Return Lead for + IN and + OUT. |

#### **Caution:**

Care must be taken when installing this transducer that the excitation voltage is not applied to the output lead by mistake. Excitation power, or voltage in excess of 30 VDC, inadvertently applied to the output lead may damage the electrical circuit. Shielding or other precautions should also be provided to assure that transient voltages in excess of 30 VDC are not applied to the output lead.

##### **C280E (4-20 mA output)**

The circuit is designed to operate as a true two-wire 4 to 20 milliampere pressure transmitter and will deliver rated current into any external load between zero and 800 ohms.



**CAUTION:** The C280E Series is designed to have current flow in one direction only — please observe polarity. We suggest that the electrical cable shield be connected to the system's loop circuit ground, thereby improving electrical noise rejection.

Excitation

Minimum supply voltage (VDC) =  $18 + 0.02 \times (\text{resistance of receiver plus line})$ .

Maximum supply voltage (VDC) =  $32 + 0.004 \times (\text{resistance of receiver plus line})$ .

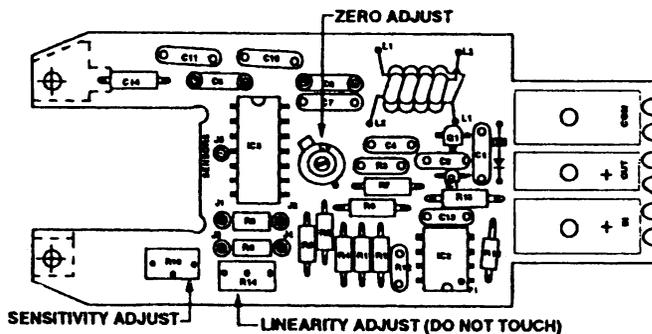
Calibrated at factory using a 250 ohm load at 24 VDC.

Variations in the power supply voltage cause less than 0.02 mA change in the transmitter's current output, per volt change in the power supply.

Termination

Spade terminals are provided and can be crimped onto each (16-22 AWG) conductor. If you prefer, an optional edge card connector is available (Setra P/N 280202) for quick disconnect of cable from transducer. A protective cover is provided for the electrical terminals. The material is polyvinyl chloride (PVC). It fits closely over the end of the electrical cable, screw terminals and first 3/4" of transducer cover. It protects the electrical connection from inadvertent contact with splashing or dripping fluids.

**280E (0-5 VDC output)**



Adjustments (with cover removed)  
**CAUTION: TURN OFF EXCITATION POWER DURING COVER REMOVAL OR REPLACEMENT.**

Zero Pressure Output

Factory adjusted to 30mV nominal and can be adjusted by the air trim capacitor as shown in diagram. Changing zero may begin to change sensitivity. **Note: This product has a 1/2% FS cover effect for zero only (span is not effected). Please take the cover effect into consideration when adjusting the zero pressure output.**

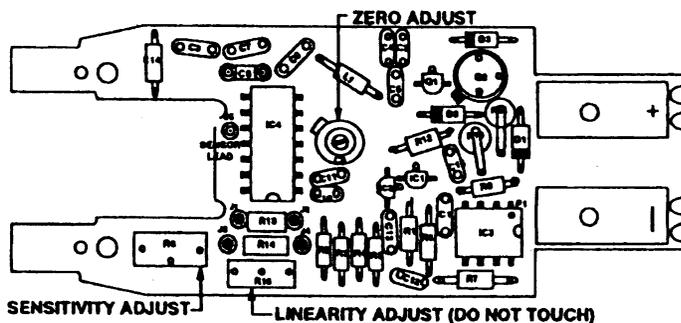
Sensitivity

Can be adjusted by potentiometer as shown on diagram. Unit factory adjusted to order specifications.

Other Adjustment

Adjusted at factory. Do not touch.

**C280E (4-20 mA output)**



Adjustments (with cover removed)  
**CAUTION: TURN OFF EXCITATION POWER DURING COVER REMOVAL OR REPLACEMENT.**

Zero Pressure Output

Zero output can be adjusted  $\pm 0.2$  milliamperes about the nominal 4 mA. The zero adjustment is the air capacitor shown in the diagram. Changing zero may begin to change sensitivity. **This product has a 1/2% FS cover effect for zero only (span is not effected). Please take the cover effect into consideration when adjusting the zero pressure output.**

#### Span Adjustment

Span can be adjusted approximately  $\pm 0.5$  mA from the nominal 16 mA full scale span. The span adjustment potentiometer is located as shown in the diagram, and may be adjusted without affecting linearity calibration.

#### Other Adjustment

Adjusted at factory. Do not touch.

#### **RETURNING PRODUCTS FOR REPAIR**

Please contact Setra (1-800-257-3872, 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  
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 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 1-800-257-3872 (978-263-1400) for scheduling, cost and turnaround estimates.

Thank you,  
Setra Systems, Inc.

### **LIMITED WARRANTY AND 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 a writing 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.