

ENMET Corporation

PO Box 979

Ann Arbor, MI 48106-0979

**TDX – Series
Explosionproof
Oxygen & Toxic Gas
Sensor/Transmitter
Operating Manual**

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MCN-204; 06/24/99

MCN-219; 06/30/99

MCN-269, 02/08/02

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1.0 Introduction

The TDX-Series gas detection unit accurately monitors low concentrations of a designated toxic gas. An electrochemical sensor design produces a linear response to low gas concentrations, providing accurate signal output for recorder equipment interface.

NOTE: *All specifications stated in this manual are subject to change without notice.*

1.1 Unpack

Unpack the TDX-Series and examine it for shipping damage. If such damage is observed, notify both **ENMET** customer service personnel and the commercial carrier involved immediately.

Regarding Damaged Shipments

NOTE: It is your responsibility to follow these instructions. If they are not followed, the carrier will not honor any claims for damage.

- This shipment was carefully inspected, verified and properly packaged at our company and delivered to the carrier in good condition.
- When it was picked up by the carrier at **ENMET**, it legally became your company's property.
- If your shipment arrives damaged:
 - Keep the items, packing material, and carton "As Is." Within 5 days of receipt, notify the carrier's local office and request immediate inspection of the carton and the contents.
 - After the inspection and after you have received written acknowledgment of the damage from the carrier, contact **ENMET** Customer Service for return authorization and further instructions. Have your Purchase Order and Sales Order numbers available.
- ENMET** either repairs or replaces damaged equipment and invoices the carrier to the extent of the liability coverage, usually \$100.00. Repair or replacement charges above that value are your company's responsibility.
- The shipping company may offer optional insurance coverage. **ENMET** only insures shipments with the shipping company when asked to do so in writing by our customer. If you need your shipments insured, please forward a written request to **ENMET** Customer Service.

Regarding Shortages

If there are any shortages or questions regarding this shipment, please notify **ENMET** Customer Service within 5 days of receipt at the following address:

ENMET Corporation
680 Fairfield Court
Ann Arbor, MI 48108
734-761-1270 734-761-3220 Fax

1.2 Check Order

Check the contents of the shipment against the purchase order. Verify that the TDX-Series is received as ordered. If there are accessories on the order, ascertain that they are present. Check the contents of calibration kits. Notify **ENMET** customer service personnel of any discrepancy immediately.

1.3 Serial Numbers

Each TDX-Series is serialized. These numbers are on tags on the equipment and are on record in an **ENMET** database.

2.0 Operation

TDX-Series Unit can be of single or multi-channel configuration. Each unit monitors the gas concentration at a single remote location and consists of a sensor, transmitter. The sensor/transmitter without local read out can be connected to a controller module via 2-conductor shield cable. The transmitter converts the direct output signal of the sensor into a standard 4-20mA DC signal. The sensor/transmitter is mounted at a strategic location to monitor the designated hazardous gas in ambient air.

3.0 Description of Components

3.1 Description of Sensor

Sensor: The sensor consists of an electrochemical cell. As the designated gas passes through the cell membrane, it reacts with the electrolyte to produce a small electrical current proportional to the partial pressure of gas in the area.

3.2 Description of Transmitter

Cover Screws: These screws fasten the face cover to the transmitter unit. Face cover must be removed for installation or for performing calibration adjustments.

Cable Entry: This fitting provides strain relief entry for cable from the controller module.

Zero Adjust screw: This screw is used to adjust the zero setting during calibration.

Span Adjust screw: This screw is used to adjust the sensitivity during calibration.

Terminal Strip: This terminal is used to connect the 24VDC power from a controller unit. (See installation for proper wiring.)

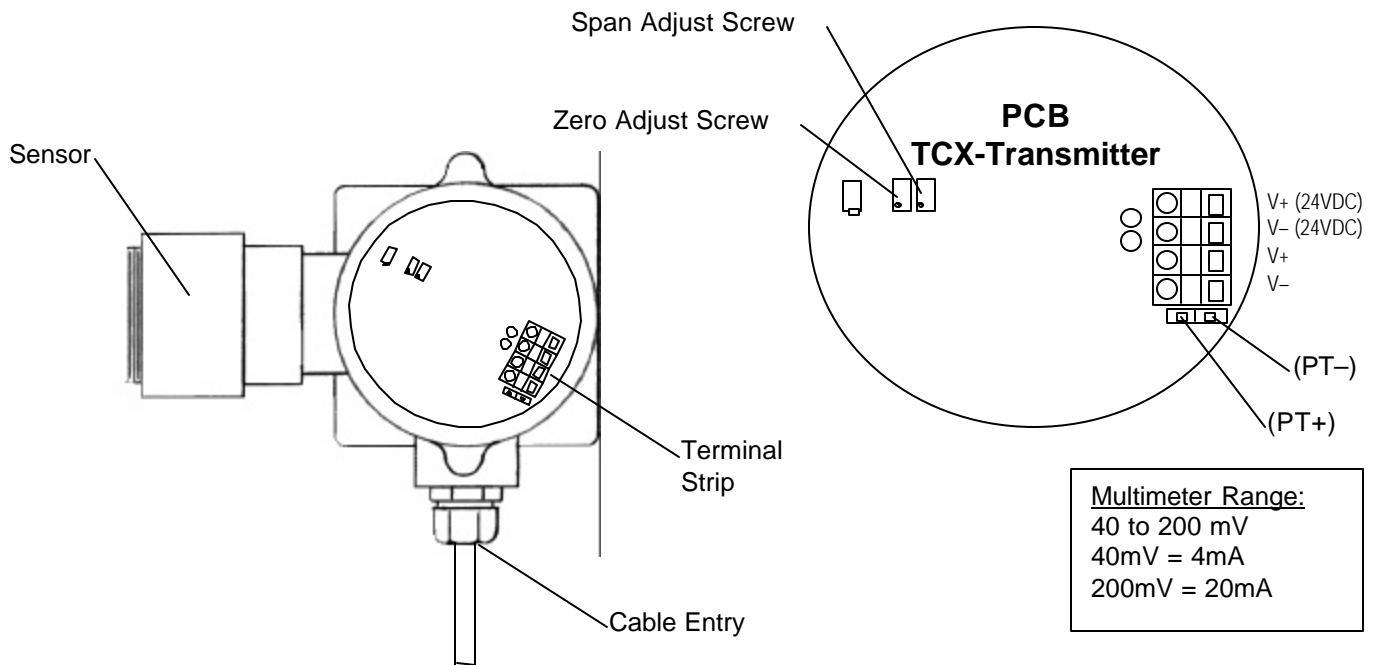


Figure 1: Sensor/Transmitter Module Diagram

4.0 Installation of the TDX-Series Unit

When determining locations for sensor/transmitter to a controller module, keep in mind the following:

- Maximum distance between sensor/transmitter and controller module is 3200 ft.

NOTE Recommend transmission cable between transmitter and controller module to be AWG18 or equivalent, 2 core shielded cable type. To accommodate a 4-20mA signal at 24VDC.

A wiring diagram for sensor/transmitter to controller module is shown in Figure 2.

A Dimensional Diagram is shown in Figure 2a.

After system is properly installed and power applied, allow 2 hours for warm up and stabilization, then proceed to verify calibration.

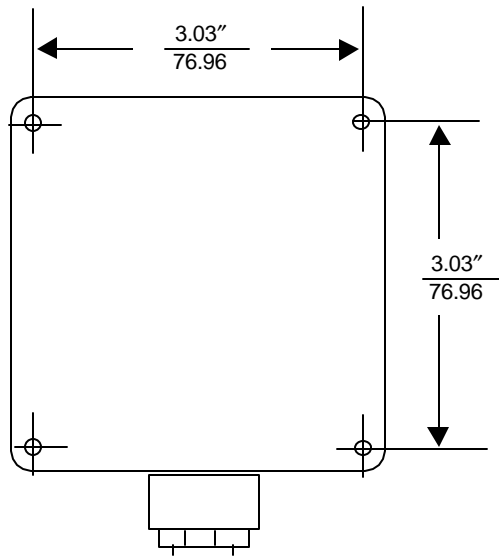


Figure 2a: Mounting Dimensions Diagram

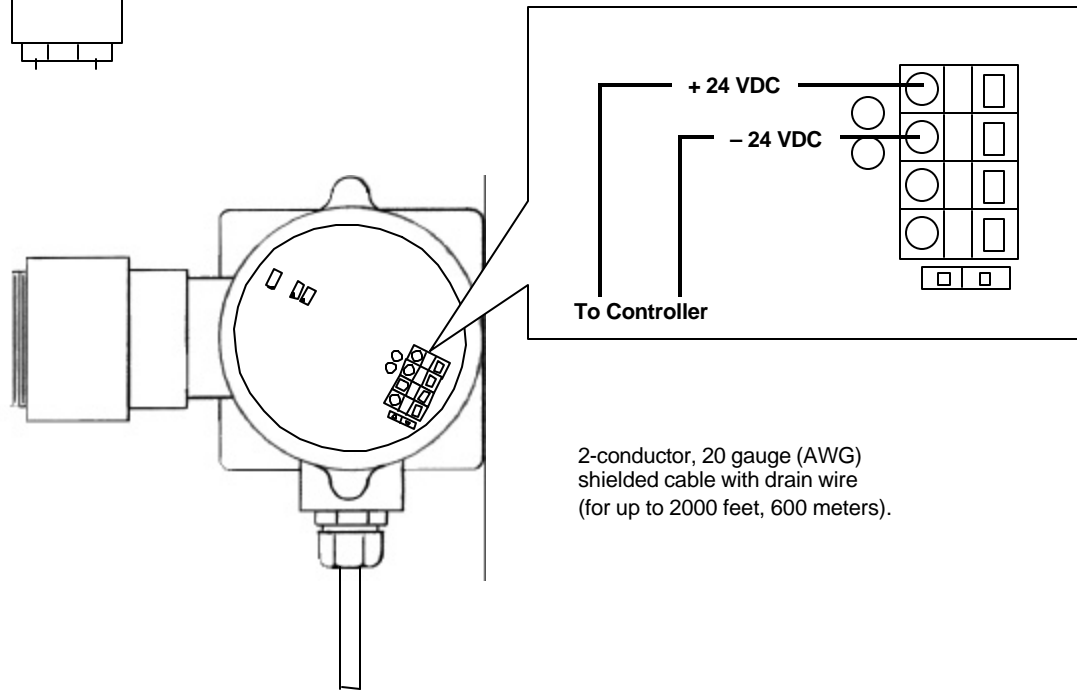


Figure 2: System Wiring Diagram

5.0 Calibration of the TDX-Series Unit

5.1 Checking Channel Response to Gas

The TDX system is supplied precalibrated. After initial installation, the sensor should be checked with calibration/test gas to confirm gas response. This test should be performed periodically (once every 3 – 4 months).

To check if the sensor requires calibration, introduce an appropriate calibration gas (gas of known concentration) to the sensor. If there is a discrepancy of more than 10% between the voltage reading on the transmitter and the known concentration of the gas, then the transmitter should be recalibrated.

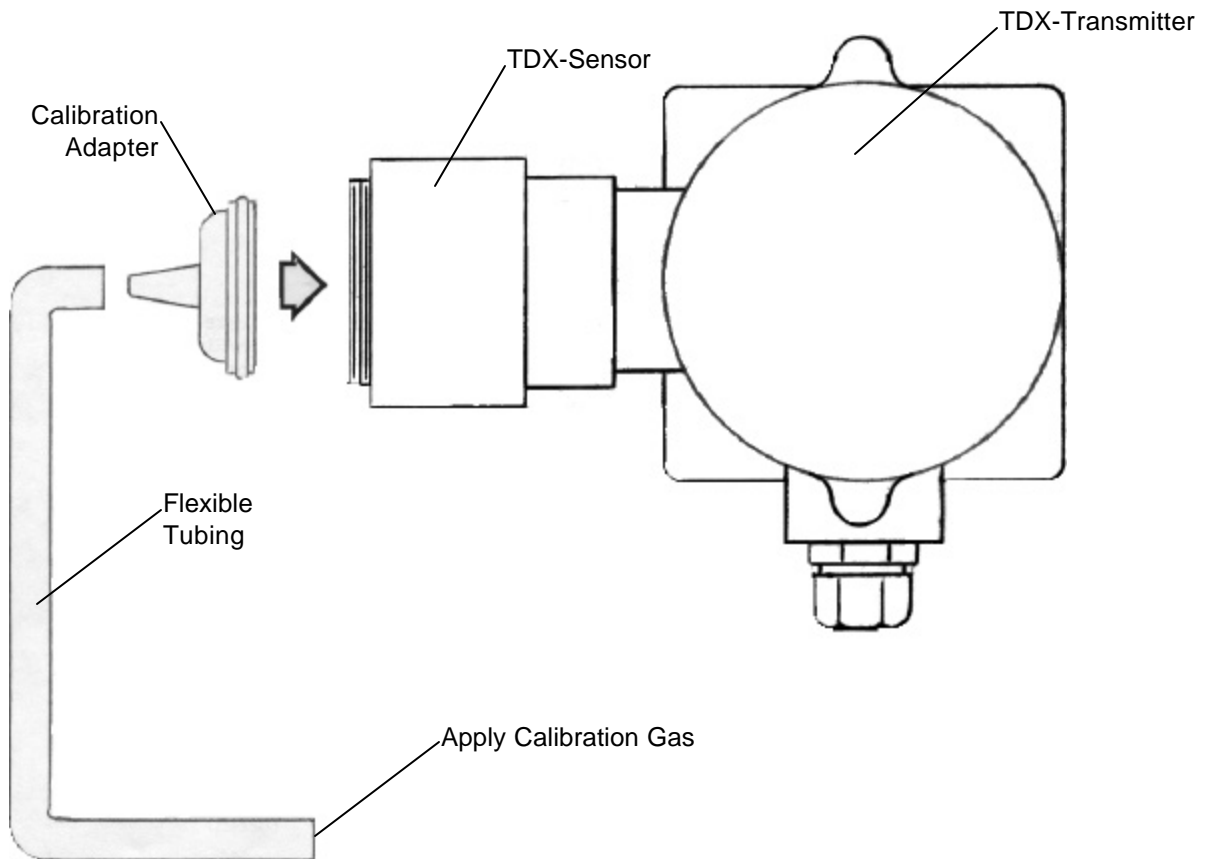


Figure 3: Calibration Diagram

5.2 Calibration of a Channel

5.2.1 Zero Point Adjustment

TOXIC ZERO POINT ADJUSTMENT:

Toxic Zero point adjustment is accomplished by exposing the sensor to clean, contaminant-free air for a few minutes. The signal may be measured, by a standard millivoltmeter located between (PT+) and (PT-) as shown in Figure 1.

Adjust the **ZERO ADJUST SCREW** to accomplish this reading.

Toxic zero setting: At 0 ppm the signal should read 40mV = 4mA

OXYGEN ZERO POINT ADJUSTMENT:

It is normally not necessary to adjust the zero adjust screw for oxygen. This may be done to obtain optimum linearity across the entire range (0 – 30% by vol.), if a new sensor is installed or the zero adjust screw has been accidentally changed.

To set zero, it is necessary to expose the oxygen sensor to pure 100% nitrogen until a stable reading is obtained. This can require flowing the nitrogen for 20 to 30 minutes.

Oxygen zero setting: The signal at 100% nitrogen/zero oxygen should read 40mV = 4mA.

5.2.2 Span Calibration Adjustment

A calibration gas is required for span adjustment. A calibration gas is either the same gas which the sensor is designed to detect or a specified correlation gas. The calibration gas should be at a concentration close to the full scale concentration of the transmitter range. Calibration gases may consist of gas cylinders, kit generated gases, permeation tube-generated gases, etc.; any of these are acceptable, as long as the concentration of the gas is known and is close to the transmitter full-scale concentration.

To perform the span adjustment, the calibration gas is introduced to the sensor at a low, constant flow rate (0.5 liters per minute).

After 1-2 minutes, the **SPAN ADJUST SCREW** located inside the transmitter is adjusted so the signal measured between (PT+) and (PT-) can be obtained by using the formula shown.

$$\left(\left(\frac{16 \times (\text{Gas Concentration})}{\text{Range of Sensor}} \right) + 4 \right) \times 10 = \text{mV Across (PT)}$$

Toxic Example: Calibrate a hydrogen sulfide transmitter to a range of 0 – 100 ppm using a calibration gas concentration of 100 ppm:

$$\left(\left(\frac{16 \times 100}{100} \right) + 4 \right) \times 10 = 200 \text{ mV Across (PT)}$$

Oxygen Examples:

1. Calibrate an oxygen transmitter to a range of 0 – 30% B.V. using a calibration gas concentration of 19.5% B.V.:

$$\left(\left(\frac{16 \times 19.5}{30} \right) + 4 \right) \times 10 = 144 \text{ mV Across (PT)}$$

2. Calibrate an oxygen transmitter to a range of 0 – 30% B.V. using clean fresh ambient air ,20.9 by volume: The signal at 20.9% B.V. should read 151.5 mV = 15.1mA.

5.2.3 Applying Calibration Gas

To apply calibration gas, carry out the following steps:

1. Apply the test gas of known concentration to the sensor using the calibration adapter provided (See Figure 3.).
2. Wait for a stable reading to be obtained. (1-2 minutes is a suitable period of time).
3. Adjust the **SPAN ADJUST SCREW** (See Figure 1) until the correct reading across (PT+) and (PT-) is shown.
4. Remove the calibration gas and adapter.
5. Calibration is now complete.

6.0 TDX Sensor Life and Replacement

Gas sensors (three-electrode type) are designed for a minimum life span of 2 years. Oxygen sensors (two electrode type) are designed for a life of 12 months. It is a question of customer policy whether the sensor is replaced automatically after this time or when the sensor fails to calibrate.

7.0 Maintenance

Maintenance consists of periodic calibration and sensor replacement when needed.

8.0 Calibration Kits

ENMET offers calibration kits for all gases monitored.

9.0 WARRANTY

ENMET warrants new instruments to be free from defects in workmanship and material under normal use for a period of one year from date of shipment from **ENMET**. The warranty covers both parts and labor excluding instrument calibration and expendable parts such as calibration gas, filters, batteries, etc... Equipment believed to be defective should be returned to **ENMET** within the warranty period (transportation prepaid) for inspection. If the evaluation by **ENMET** confirms that the product is defective, it will be repaired or replaced at no charge, within the stated limitations, and returned prepaid to any location in the United States by the most economical means, e.g. Surface UPS/RPS. If an expedient means of transportation is requested during the warranty period, the customer is responsible for the difference between the most economical means and the expedient mode. **ENMET** shall not be liable for any loss or damage caused by the improper use of the product. The purchaser indemnifies and saves harmless the company with respect to any loss or damages that may arise through the use by the purchaser or others of this equipment.

This warranty is expressly given in lieu of all other warranties, either expressed or implied, including that of merchantability, and all other obligations or liabilities of **ENMET** which may arise in connection with this equipment. **ENMET** neither assumes nor authorizes any representative or other person to assume for it any obligation or liability other than that which is set forth herein.

NOTE: When returning an instrument to the factory for service:

- Be sure to include paperwork.
- A purchase order, return address and telephone number will assist in the expedient repair and return of your unit.
- Include any specific instructions.
- For warranty service, include date of purchase
- If you require an estimate, please contact **ENMET** Corporation.