

ENMET Corporation
PO Box 979
Ann Arbor, MI 48106-0979

**Toxic Gas and Oxygen
Electrochemical
Sensor/Transmitter
Installation Manual**

80003-133
July 2004

Table of Contents

INTRODUCTION	1
1.0 UPON RECEIPT	1
1.1 UNPACK.....	1
1.2 CHECK ORDER.....	1
1.3 SERIAL NUMBERS.....	1
2.0 MOUNTING AND WIRING	2
2.1 INSTALLATION OF SENSOR/TRANSMITTER.....	3
3.0 INITIAL CALIBRATION	4
4.0 STANDARD RANGES, CALIBRATION GASES, VOLTAGE READINGS AT CALIBRATION POINTS AND APPROXIMATE TIMES TO SENSOR STABILIZATION	5
5.0 ENMET PART NUMBERS	6
5.1 REPLACEMENT SENSORS	6
5.2 CALIBRATION GASES.....	6
<i>Calibration Gases and Accessories</i>	6
6.0 WARRANTY	7
APPENDIX A: INTERFERENCE TABLE	8

List of Illustrations

FIGURE 1: SENSOR/TRANSMITTER, EXTERNAL FRONT VIEW	2
FIGURE 1A: SENSOR/TRANSMITTER 10015-1105, EXTERNAL FRONT VIEW	2
FIGURE 2: SENSOR/TRANSMITTER 4 – 20MA IN NEMA-4 PACKAGE, INTERNAL VIEW	3
FIGURE 2A: SENSOR/TRANSMITTER 4 – 20MA IN NEMA-4 PACKAGE, INTERNAL VIEW	3
FIGURE 3: CALIBRATION SETUP, 4 – 20MA SENSOR/TRANSMITTER	4
TABLE 1: ELECTROCHEMICAL SENSORS	5

Introduction

The **ENMET** toxic and oxygen sensor/transmitters (S/T) model EN series are two wire 4-20mA devices. The housing is a sealed NEMA-4 aluminum enclosure. The sensor/transmitter operates on 15 to 36VDC and can be connected to any control that utilizes a 4-20mA output. When connecting the sensor/transmitter to a control consult installation instructions and manuals for that control or contact **ENMET** or your **ENMET** distributor.

NOTE: *All specifications stated in this manual may change without notice.*

1.0 Upon Receipt

1.1 Unpack

Unpack the sensor/transmitter (S/T) 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, against the purchase order. Verify that the S/T is received as ordered. Each S/T is labeled with its target gas. 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 sensor/transmitter is serialized. These numbers are on tags on the equipment and are on record in an **ENMET** database.

2.0 Mounting and Wiring

Each sensor/transmitter circuit and sensor are in a NEMA-4 aluminum enclosure, which has a combination liquid and RFI O-ring in the cover. When used with an appropriate liquid tight conduit fitting, the enclosure is sealed to the environment. The interior of a typical S/T is shown in Figure 2.

When determining location of S/T here are 3 main factors to consider.

- ◆ Density of gas to be detected: high for gases lighter than air and low for gases heavier than air
- ◆ Leak point: determination of the probable source of a leak
- ◆ In the flow of air in ventilated rooms.

Mount the sensor/transmitter to an appropriate stable vertical surface with the sensor facing downward.

CAUTION: Since the sensor/transmitter detects gas only at the sensor location, pay attention to the possible sources of gas, the density of the gas, locations where the gas may be confined and locations where the gas may damage or injure property or personnel, when choosing locations of sensor/transmitters.

Mount the sensor/transmitter using the two mounting holes in the corners of the enclosure. For maximum RFI protection the enclosure should be grounded to earth ground, either by means of the mounting screws, a conductive conduit, or a wire connected to earth ground.

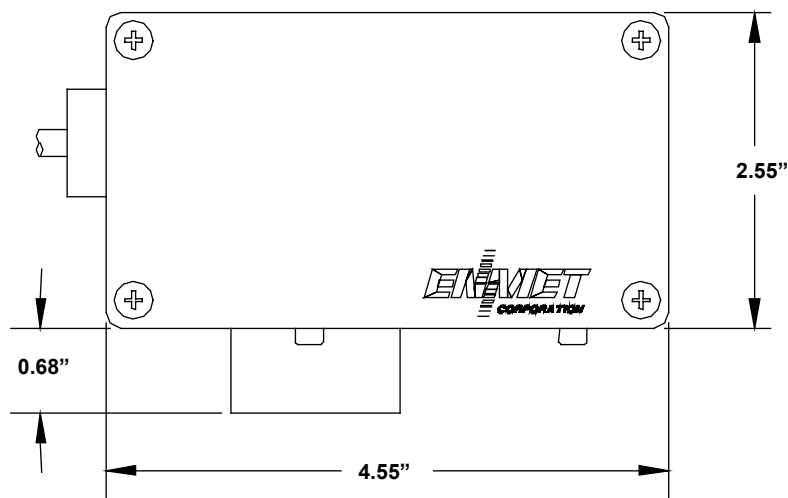


Figure 1: Sensor/Transmitter, External Front View

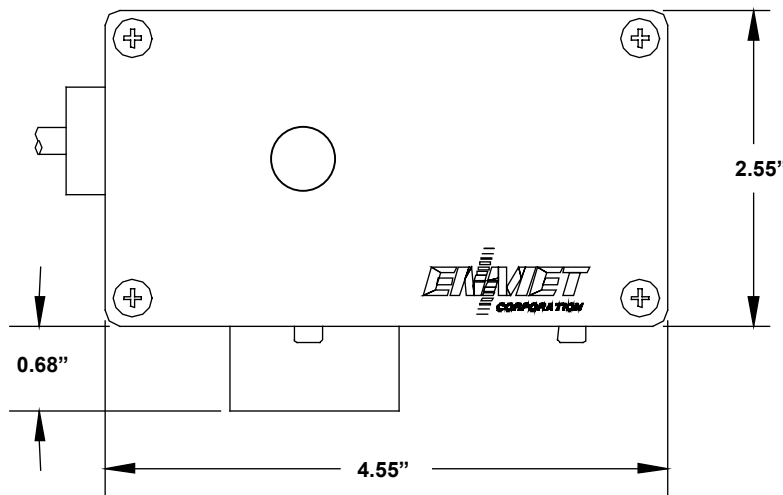


Figure 1a: Sensor/Transmitter 10015-1105, External Front View

2.1 Installation of Sensor/Transmitter

1. Remove the cover, and mount the S/T in a location appropriate for the application. Use the enclosure mounting holes as shown in Figure 2. The sensor faces down. Pay particular attention to the source and density of the target gas in choosing the S/T location.
2. The hole in the left side wall of the S/T enclosure is sized to accommodate a liquid tight conduit fitting. Run conduit from the S/T to the control. If intrinsically safe barriers are supplied, because the S/Ts are in a classified location, follow the applicable electrical code provisions for intrinsically safe wiring. Run two wires through conduit. If the conduit is metallic and does not contain other wiring likely to generate interference signals, unshielded insulated wires can be used. Otherwise, use two wire shielded cable and ground the shield to the S/T enclosure. The S/T enclosure should be grounded to earth ground for maximum RFI protection.
3. Connect the plus wire to TB1-1 and the minus wire to TB1-2 on the S/T circuit board, as shown in Figure 2.

CAUTION: Before connecting S/T to CONTROL remove the power source to CONTROL. Failure to do so may cause damage to sensitive components.

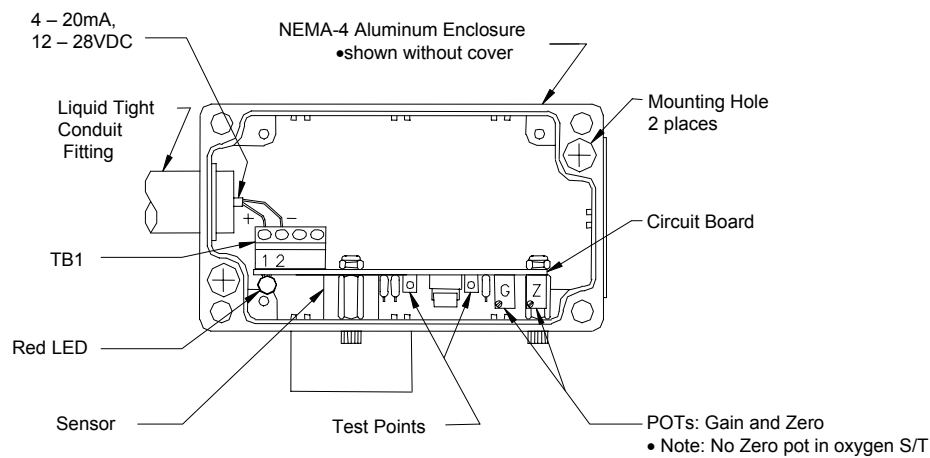


Figure 2: Sensor/Transmitter 4 – 20mA in NEMA-4 Package, Internal View

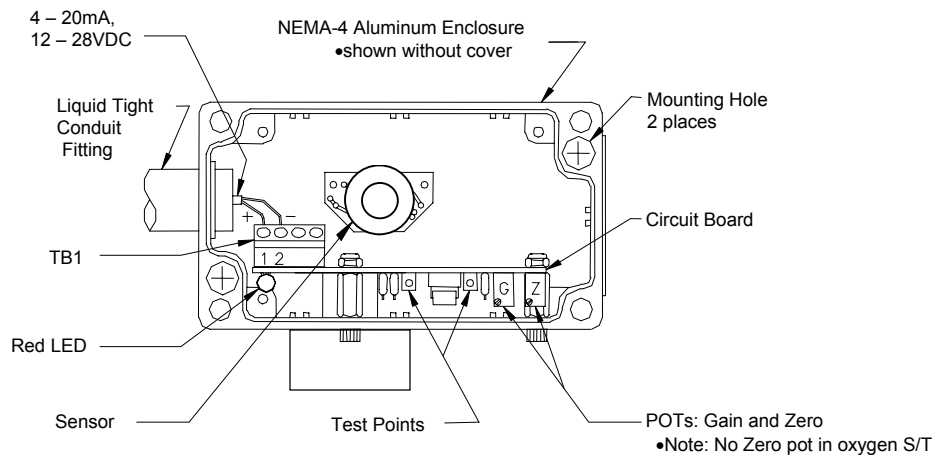


Figure 2a: Sensor/Transmitter 4 – 20mA in NEMA-4 Package, Internal View

3.0 Initial Calibration

The S/T is pre-calibrated at the factory before shipment, and initial field calibration should result in only fine-tuning of the circuit. In all cases allow the S/Ts to stabilize; this may take as much as an hour depending on the type of sensor and the length of time it has been inactive. The S/T output is monitored with a voltmeter by means of the test points on the S/T circuit board see figure 2; the transfer function is:

$$4mA = 100\text{ mv} \quad 20ma = 500\text{ mv}$$

tolerance: + or - 5 mv

On Toxic sensor/transmitters the LED also indicates current flow; it is dim at 4mA and bright at 20mA. When the sensor is stable and is in air uncontaminated by the target gas, adjust zero to 4mA = 100mv with the zero potentiometer, see Figure 2.

If a calibration kit was purchased and field calibration is desired, apply the span gas to the sensor. The regulator of the calibration adapter screws into the top of the gas cylinder; the cup of the adapter slips into the hub of the sensor/transmitter, see Figure 3. Allow the gas to flow for the time indicated in Table 1 in Section 4.0 and observe that the reading is stable. Adjust the gain potentiometer on the S/T board to the appropriate output while monitoring the voltmeter. The voltage readings for standard ranges are given in Table 1 in Section 4.0.

If the sensor/transmitter has a non-standard range, and/or a non-standard calibration gas is used do a linear interpolation to determine the voltage reading at the calibration point.

Example: toxic, if the maximum range is 100ppm = 20ma, and a 25ppm gas is used, adjust the gain potentiometer so that the display reads 25 or the voltmeter reads 200mv.

$$(25/100)(500-100) + 100 = 200\text{mv}$$

Example: oxygen, the maximum range is 30.0% = 20mA, and a 20.9 gas is used, adjust the gain potentiometer so the display reads 20.9 or the voltmeter reads 379mv.

$$(20.9/30)(500-100) + 100 = 379\text{mv}$$

Remove the span gas and replace the S/T cover.

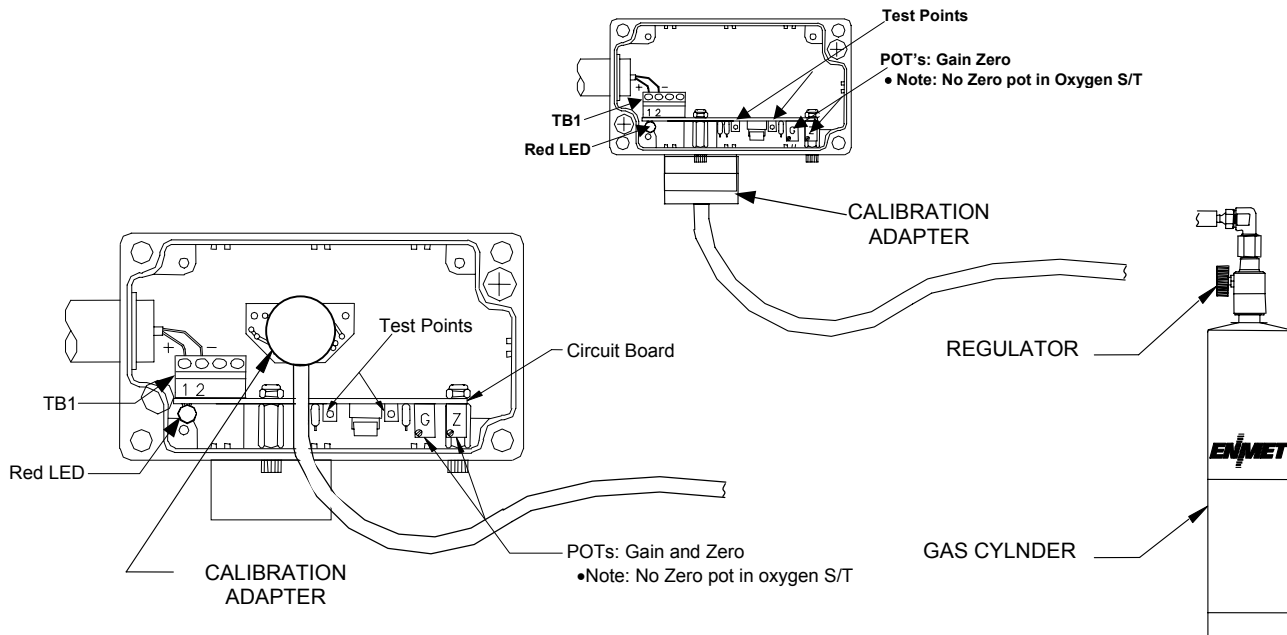


Figure 3: Calibration Setup, 4 – 20mA Sensor/Transmitter

4.0 Standard Ranges, Calibration Gases, Voltage Readings at Calibration Points and Approximate Times to Sensor Stabilization

Table 1: Electrochemical Sensors

Gas	Symbol	Range* (ppm)	Calibration Gas	Correlation	Reading (mV)	Stabilize (min.)	ENMET Gas Part Number
Ammonia	NH ₃	0 – 100	25ppm NH ₃		200	4	03218-025
Arsine (2)	AsH ₃	0 – 0.5	0.5ppm PH ₃	0.375ppmAsH ₃	400	3	03202-005
Boron Trichloride	BCl ₃	0 – 30	10ppm HCl	10ppm BCl ₃	233	3	03202-010
Carbon Monoxide	CO	0 – 100	50ppm CO		300	2	03219-050
Chlorine (2)	Cl ₂	0 – 10	5ppm Cl ₂		300	4	03231-005
Chlorine Dioxide	ClO ₂	0 – 1.0	0.3ppm ClO ₂ **		220	4	**
Dichlorosilane	SiH ₂ Cl ₂	0 – 30	10ppm HCl	3ppm SiH ₂ Cl ₂	140	3	03202-010
Ethylene Oxide	C ₂ H ₄ O	0 – 30	5ppm C ₂ H ₄ O		167	3	03232-005
Fluorine (2)	F ₂	0 – 10	3ppm Cl ₂	7.5ppm F ₂	400	3	03231-003
Hydrogen	H ₂	0 – 1000	800ppm H ₂		420	3	03227-800
Hydrogen Bromide	HBr	0 – 30	5ppm HCl	25ppm HBr	433	3	03202-005
Hydrogen Chloride (2)	HCl	0 – 30	10ppm HCl		233	3	03202-010
Hydrogen Cyanide	HCN	0 – 30	10ppm HCN		233	2	03203-010
Hydrogen Fluoride (1)	HF	0 – 10	5ppm Cl ₂	3ppm HF	220	4	03202-005
Hydrogen Sulfide	H ₂ S	0 – 100	20ppm H ₂ S		180	2	03214-020
Nitrogen Dioxide	NO ₂	0 – 30	5ppm NO ₂		167	2	03233-005
Nitric Oxide	NO	0 – 100	25ppm NO		200	1.5	03234-025
Oxygen	O ₂	0 – 30 %	20.9% O ₂		379	2	03296-209
Ozone (1)	O ₃	0 – 1.0	0.3ppm O ₃ **		220	3	**
Phosgene (1)	COCl ₂	0 – 1.0	0.66ppm COCl ₂ **		364	4	**
Phosphine (2)	PH ₃	0 – 1.0	0.5ppm PH ₃		300	1.5	03205-005
Silane	SiH ₄	0 – 30	5 ppm SiH ₄		167	2	03306-005
Silicon Tetrachloride	SiCl ₄	0 – 30	5ppm HCl	25ppm SiCl ₄	433	3	03202-005
Sulfur Dioxide	SO ₂	0 – 30	10ppm SO ₂		233	1.5	03215-010

NOTE: All specifications stated in this manual may change without notice.

- (1) Require use of Sample Draw System.
- (2) Recommended use of Sample Draw System, for enhanced sensitivity and speed of response.

*0 = 4mA = 100mV, upper point = 20mA = 500 mV

**Gas not available in cylinders, a gas generator must be used

NOTE: If a non-standard range and/or a non-standard calibration gas are used, utilize the equations in Section 3.0 to determine voltage readings.

5.0 ENMET Part Numbers

5.1 Replacement Sensors

Sensor Gas Type	ENMET Part Number
Chlorine	67020-0100
Hydrogen Sulfide	67020-0201
Hydrogen Cyanide	67020-0300
Hydrogen Chloride	67020-0400
Sulfur Dioxide (with H ₂ S filter)	67016-0500
Phosgene	67020-0600
Hydrogen Fluoride	67020-0700
Ozone	67020-0803
Oxygen	67016-1106
Oxygen MRI	67013-008
Carbon Monoxide: For S/T P/N ending in -1203	67020-1201
Carbon Monoxide: For S/T P/N ending in -1207	67016-1200
Fluorine	67020-1400
Hydrogen	67020-1500
Nitrogen Dioxide	67020-1700
Nitric Oxide	67020-1750
Ammonia	67020-2400
Arsine	67020-4001
Phosphine	67020-4002
Silane	67020-4003

5.2 Calibration Gases

Calibration Gases and Accessories

Calibration gas part numbers are given in Table 1, in Section 4.0.

Adapter Style	ENMET Part Number
For Ammonia, Nitric oxide, Hydrogen chloride, Hydrogen cyanide	02506-001
For Chlorine and Hydrogen sulfide	02506-002
For Sulfur dioxide and Nitrogen dioxide	02506-003
For Oxygen and Carbon monoxide	02506-000
Calibration Cap (required with all adapters)	03620-010
Calibration Cap Reactive Gases	Contact ENMET
Calibration Cap Catalytic Sensor	03620-012
Calibration Regulator w/cal cup Oxygen, MRI	03600-002
Ozone generator, 0.5 to 5.0 ppm at 1.0 lpm	04055-0800

6.0 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.

There is a Repair Return Form on the last pages of this manual. This form can be copied or used as needed.

Appendix A: Interference Table

For Selected Sensors

Ammonia (3E-100 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
ethanol	1000	1
isopropanol	450	1
hydrogen sulfide	14	10
methanol	1200	3
hydrogen	1000	80
carbon monoxide	300	100
sulfur dioxide	25	-21
nitrogen dioxide	50	25
hydrogen cyanide	10	-18

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
chlorine	5
unsaturated hc (ethylene)	1.0 %
saturated hydrocarbons	abundant

Carbon Monoxide (3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
hydrogen	1000	450
nitric oxide	100	25

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
ammonia	100
chlorine	5
hydrogen cyanide	10
ethylene	2.0 % *
carbon dioxide	5,000
methane	10,000
sulfur dioxide	10 *
hydrogen sulfide	10 *
nitrogen dioxide	10 *
isopropanol	1,025 *
gasoline vapor	saturated *

* With onboard filter; continuous high level exposure may reduce the filter efficiency

Chlorine (3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
hydrogen sulfide	10	-0.3
sulfur dioxide	5	-1.2
nitrogen dioxide	5	0.1
bromine	1	1.0
chlorine dioxide	0.32	0.3
ammonia	1,000	-1.1

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
carbon monoxide	300
carbon dioxide	100,000
nitrogen	100. %
hydrogen chloride	20
hydrocarbons, general	% range
hydrogen	1,000
ethanol	6.6 %
ammonia	65

Hydrogen Sulfide (3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
carbon monoxide	100	3
chlorine	20	-1
ethylene	500	2
hydrogen	100	5
hydrogen	20,000	100
hydrogen cyanide	10	1
sulfur dioxide	10	3

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
ammonia	100
carbon dioxide	5,000
methane	10,000
sulfur dioxide	3
nitrogen dioxide	10

Hydrogen Cyanide(2E 30 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
hydrogen sulfide	15	40†
chlorine	5	-1*
nitrogen dioxide	15	-40†

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen chloride	10*
methane	2000
carbon monoxide	300
carbon dioxide	5,000
gasoline	300
sulfur dioxide	50*
nitric oxide	100
chlorinated HC's	<200

†Long term exposure may destroy sensor

*with onboard filter; continuous high level exposure may reduce the filter efficiency

Sulfur Dioxide(4S sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
hydrogen sulfide	20	40*
nitrogen dioxide	10	-11
chlorine	10	-10

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
carbon monoxide	100
nitric oxide	50
hydrogen	10,000

*With onboard filter; continuous high level exposure may reduce the filter efficiency

Hydrogen Chloride(3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
hydrogen bromide	5	5
hydrogen sulfide	14	30
sulfur dioxide	5	3.5
chlorine	5	1
hydrogen cyanide	14	1
arsine	330 ppb	.4
ethanol	6.6%	6

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
carbon monoxide	300
carbon dioxide	5000
nitrogen	100%
hydrocarbons	% range
hydrogen	1000
phosgene	.5
chlorinated hydrocarbons	% range
ammonia	300

Hydrogen Fluoride (3E 10 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
chlorine or bromine	1	.51
sulfur dioxide	2	2
hydrogen chloride	5	.75

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
alcohols (i.e. IPA)	1000
ammonia	100
hydrogen	1000
carbon monoxide	50
carbon dioxide	10%
unsaturated HC(ethylene)	1%
hydrogen sulfide	20

Fluorine (3E 10 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
chlorine	1	2
hydrogen sulfide	10	-1
sulfur dioxide	5	-3.2
nitrogen dioxide	5	.5
bromine	1	3
ammonia	1000	-3.1

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
carbon monoxide	300
carbon dioxide	100000
nitrogen	100%
hydrogen chloride	10
hydrocarbons	% range
hydrogen	1000
hydrogen cyanide	10
ethanol	4%

Hydrogen (2E 2000 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
carbon monoxide	50	0
ethylene	500	0
sulfur dioxide	2	0
isopropanol	1090	180

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
ammonia	100
carbon dioxide	1000
chlorine	5
hydrogen cyanide	10
hydrogen sulfide	10*
methane	10000
nitrogen dioxide	10
sulfur dioxide	2

*With onboard filter; continuous high level exposure may reduce the filter efficiency

Nitric Oxide (3E 100 sensor)

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen	1000
carbon monoxide	1000
carbon dioxide	10000
sulfur dioxide	50
chlorine	5
nitrogen dioxide	100
saturated HC, alcohols	abundant

Nitrogen Dioxide (3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
chlorine	1	3
ozone	1	0.7

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen chloride	5
nitrogen oxide	100
hydrogen	1000
carbon monoxide	1000
carbon dioxide	10000
saturated HC, alcohols	abundant
sulfur dioxide	50
ammonia	30

Ozone (3E 1 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
chlorine	1	0.80
fluorine	100ppb	0.07
germane	1	1
nitrogen dioxide	1	0.09

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen sulfide	1
sulfur dioxide	2
phosphine	100 ppb
carbon monoxide	300
carbon dioxide	5000
nitrogen	100%
nitrogen monoxide	10
hydrocarbons	% range
hydrogen	1000
hydrogen cyanide	10
ammonia	10
hydrogen fluoride	3.8
hydrochloric acid	10

Arsine (2E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
phosphine	100 ppb	110
chlorine	5	-400
hydrogen cyanide	10	100
ammonia	100	10
diborane	100	35
silane	1	100
germane	1.1	100
hydrogen selenide	50 ppb	5

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen sulfide	1*
sulfur dioxide	2
hydrochloric acid	5
carbon monoxide	300
carbon dioxide	5000
nitrogen	100 %
hydrocarbons	% range
hydrogen	1000

*With onboard filter; continuous high level exposure may reduce the filter efficiency

Phosgene (3E sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
ammonia	50	5, drops to 0 in short time
abundant change in humidity		yes

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen sulfide	1*
sulfur dioxide	2
hydrochloric acid	5*
carbon monoxide	300
carbon dioxide	5000
nitrogen	100%
chlorine	1
hydrocarbons	% range
hydrogen	1000

*With onboard filter; continuous high level exposure may reduce the filter efficiency

Silane (3E 50 sensor)

The following gases cause a reading:

Interferant Gas/Vapor	Interferant Concentration in ppm	Instrument Reading in ppm
chlorine	0,5	-4
hydrogen cyanide	10	1
ammonia	100	<1
diborane	100	0.4
arsine	1	0.7
germane	1	1
disilane	5	yes
phosphine	300ppb	0.2

The following gases or vapors have been tested and do not cause a reading:

Interferant Gas/Vapor	Concentration in ppm
hydrogen sulfide	1*
sulfur dioxide	2
hydrochloric acid	5‡
carbon monoxide	300
carbon dioxide	5000
nitrogen	100%
chlorine	1,5
hydrocarbons	% range
hydrogen	1000
hydrogen fluoride	3.8
hydrogen selenide	50ppb

*With onboard filter; continuous high level exposure may reduce the filter efficiency

‡Short term gas exposure (min.)

Notes:



PO Box 979
680 Fairfield Court
Ann Arbor, Michigan 48106-0979
734.761.1270 Fax 734.761.3220

Returning an Instrument for Repair

ENMET instruments may be returned to the factory or any one of our Field Service Centers for regular repair service or calibration. The **ENMET** Repair Department and Field Service Centers also perform warranty service work.

When returning an instrument to the factory or service center for service, paperwork must be included which contains the following information:

- A purchase order number or reference number.
- A contact name with return address, telephone and fax numbers
- Specific instructions regarding desired service or description of the problems being encountered.
- Date of original purchase and copy of packing slip or invoice for warranty consideration.
- If a price estimate is required, please note it accordingly *and be sure to include a fax number.*

Providing the above information assists in the expedient repair and return of your unit.

Failure to provide this information can result in processing delays.

ENMET charges a one hour minimum billing for all approved repairs with additional time billed to the closest tenth of an hour. All instruments sent to **ENMET** are subject to a minimum \$30 evaluation fee, even if returned unrepaired. Unclaimed instruments that **ENMET** has received without appropriate paperwork or attempts to advise repair costs that have been unanswered, after a period of 60 days, may be disposed of or returned unrepaired COD with the evaluation fee.

Service centers may have different rates or terms. Be sure to contact them for this information.

Repaired instruments are returned by UPS/FedEx Ground and are not insured unless otherwise specified. If expedited shipping methods or insurance is required, it must be stated in your paperwork.

Note: Warranty of customer installed components.

If a component is purchased and installed in the field, and fails within the warranty term, it can be returned to **ENMET** and will be replaced, free of charge, per **ENMET**'s returned goods procedure.

If the entire instrument is returned to **ENMET** Corporation with the defective item installed, the item will be replaced at no cost, but the instrument will be subject to labor charges at half of the standard rate.

