



SERIES 3520 TRACE OXYGEN ANALYZER



(Product shown with optional flow meter and pressure regulator)

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WARRANTY

Alpha Omega Instruments Corp. warrants the products delivered to be free from defects in material and workmanship at the time of delivery to the FOB point specified in the purchase order, its liability under this warranty being limited to repairing or replacing, at Alpha Omega Instruments option, items (excluding the oxygen sensor) which are returned to it prepaid within two (2) years from the date of shipment and found to Seller's satisfaction to be defective.

Alpha Omega Instruments one (1) year sensor warranty offers protection for one full year from the date of shipment of the Series 3520 Portable Oxygen Analyzer. Any sensor from a Series 3520 Portable Oxygen Analyzer that fails under normal use must be returned to Seller prepaid and, if such sensor is determined by Seller to be defective, Seller shall provide Buyer a replacement sensor. Buyer must provide the serial number of the analyzer from which the sensor has been removed. If a sensor is found to be defective and a new one issued, the warranty of the replacement sensor (s) is for a period of one year from the date of shipment. At times, it may be necessary to ship a replacement sensor in advance of receiving one returned for warranty claim. In such cases, if the returned sensor is not covered under warranty, the user will be charged the full price of a replacement sensor. In no event shall Alpha Omega Instruments Corp. be liable for consequential damages. **NO PRODUCT IS WARRANTED AS BEING FIT FOR A PARTICULAR PURPOSE AND THERE IS NO WARRANTY OF MERCHANTABILITY.**

This warranty applies only if:

- (i) the items are used solely under the operating conditions and manner recommended in this manual, specifications, or other literature;
- (ii) the items have not been misused or abused in any manner or repairs attempted thereon;
- (iii) written notice of the failure within the warranty period is forwarded to Alpha Omega Instruments Corp. and, the directions received for properly identifying items returned under warranty are followed;
- (iv) the return notice authorizes Alpha Omega Instruments Corp. to examine and disassemble returned products to the extent the Company deems necessary to ascertain the cause of failure.

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Disclaimer of Warranty

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**SECTION 1.0
SPECIFICATIONS**

PERFORMANCE

Measurement Ranges (parts per million)

0-50, 0-100, 0-500, 0-1,000, 0-5,000, 0-10,000, and 0-20,000

Accuracy¹: + 1% of full scale.

Linearity: + 1% of full scale.

Response Time: 90% of full scale response in less than 10 seconds (typical). The response time for ranges of 0-50 PPM or less depend to a great extent on the design of the sample delivery system including the materials used.

Sensor Type: Long-life Ambient Temperature Electrochemical Sensor (Optional CO₂ Resistant Sensor Available).

Temperature Compensation: Standard.

Operating Temperature Range: 40° to 104° F (5° to 40° C)
<40° F (5° C) use heated sensor enclosure
>104° F (40° C) cooling of sample gas/sensor required

Warranty: Two years electronics one year sensor.

ELECTRICAL

Display: 3-1/2 digit liquid crystal display (4-1/2 digit for the 0-5,000, 0-10,000, and 0-20,000 ppm range instruments).

Input Power: Powered from eight AA Rechargeable NICAD batteries with built-in universal AC battery charger.

Analog Output: No analog output.

SAMPLE GAS CHARACTERISTICS

Sample Flow Rate: 1.0 to 2.0 standard cubic feet per hour (SCFH).
0.5 to 1.0 liters/ minute (LPM).

Sample Gas Temperature: 40° to 104° F (5° to 40° C)

Sample Gas Pressure Limits: 0.1 to 1.5 psig (0.007 to 0.1 kg/cm²).

Entrained Solids: <3 mg/ft³: no in-line filter required
>3 mg/ft³: in-line filter is required

¹ Stated at constant temperature and pressure.

Hydrocarbon Mist: <0.7 mg/ft³: no in-line filter required
>0.7 mg/ft³: in-line filter is required

CONSTRUCTION

Enclosure: Polycarbonate rated NEMA 1.

Dimensions: 6.5 inches (165.1 mm) height
6.5 inches (165.1 mm) width
7.8 inches (196.9 mm) height
Note: All dimensions are without optional equipment

Gas Connections: 1/4" stainless steel compression fittings.

SECTION 2.0 SYSTEM DESCRIPTION

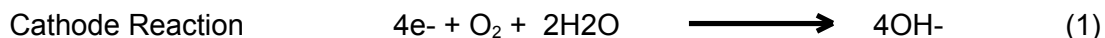
General Description

The Series 3520 Portable Oxygen Analyzer is a portable trace oxygen analyzer designed to provide accurate and dependable trace oxygen measurements in a variety of gases. The analyzer enclosure is made from durable polycarbonate and is rated NEMA 1 for general purpose service. The instrument is powered from eight AA NICAD batteries that are mounted internal to the analyzer. Recharging of the batteries is done with a 115 VAC/60 Hz adapter that is shipped with the instrument. Options include a pressure regulator, flowmeter, in-line filter, and pump.

Advanced Sensor Technology

The Series 3520 Portable Oxygen Analyzer features an advanced trace oxygen sensor. The sensor is a lead-oxygen battery comprised of a lead anode, a gold plated cathode, and an electrolyte consisting of potassium hydroxide. All types of electrochemical transducers have three primary components; a cathode, anode, and electrolyte. In the Alpha Omega Instruments advanced sensor, the cathode is the sensing electrode or the site where chemical reduction of the oxygen takes place.

The chemical reactions are as follows:



In the above reaction, four electrons combine with one oxygen molecule to produce four hydroxyl ions. This cathodic half-reaction occurs simultaneously with the following anodic half-reaction:



The anode (lead) is oxidized (in a basic media) to lead oxide and in the process, two electrons are transferred for each atom of lead that is oxidized. The sum of the half-reactions (1) and (2) results in the overall reaction (3):



From this reaction it can be seen that the sensor is very specific for oxygen providing there are no gaseous components in the sample stream capable of oxidizing lead. The only likely compounds that meet this requirement are the halogens (iodine, bromine, chlorine, and fluorine).

In reaction (1), four electrons are transferred for each oxygen molecule undergoing reaction. In order to be reacted, and oxygen molecule must diffuse through both the sensing membrane and the thin film of electrolyte maintained between the sensing membrane and the upper surface of the cathode. The rate at which oxygen molecules reach the surface of the cathode determines the electrical output. This rate is directly proportional to the concentration of oxygen in the gaseous mixture surrounding the sensor cell.

SECTION 3.0 INSTALLATION PROCEDURES

Unpacking the Instrument

Upon opening the shipping container, carefully unpack the analyzer to check if the outer surfaces have been damaged. If so, report the findings immediately to Alpha Omega Instruments who will provide further instructions. If there is no apparent damage, check the contents to ensure all items were shipped. In some cases, items may be backordered.



All damage and shortage claims must be made known to Alpha Omega Instruments within 10 days after receipt of shipment.

Powering the Series 3520 Portable Oxygen Analyzer

The Series 3520 Portable Oxygen Analyzer is powered from eight AA NICAD batteries that are mounted internal to the instrument. Recharging of the batteries is done with a 115 VAC/60 Hz adapter that is shipped with the analyzer. To power up the instrument, place the front panel on/off switch to the "ON" position. When the Series 3520 Portable Oxygen Analyzer is attached to the AC/DC adapter, the NICAD batteries are being charged at the same time. If the batteries are allowed to run below the level where normal operation can be sustained, the charge time will be approximately 16 hours. In the event the batteries need to be replaced, use only **NICAD batteries** (Panasonic Type P-60AAR or equivalent). Use of any other type of battery may damage the instrument and void the warranty.

Recharging the NICAD Batteries

The Series 3520 will provide in excess of 48 hours (without the optional pump) of continued operation before battery recharging is required. If the pump is in use, up to 12 hours of continued use can be achieved. To recharge the NICAD batteries, connect the 3.5 mm plug from the 12 VDC wall mounted AC/DC adapter to the jack located on the rear of the instrument (see Figure 1.0). Allow 16 hours to fully recharge the batteries. Though the analyzer can be used while recharging, if the optional pump is in use during this time recharging will take an additional 5-10% longer.

Replacing the NICAD Batteries

The internal NICAD batteries are located in two banks of 4 size AA NICAD battery trays accessible on the top of the instrument. If battery replacement becomes necessary the following steps should be followed:



Use only Panasonic Type P-60AAR or equivalent NICAD batteries with the Series 3520 Portable Oxygen Analyzer

To remove a battery pack tray, push the tabs (located at each end of the tray) towards each other to release the latches and pull the trays out from the enclosure.

Replace the defective batteries immediately and properly dispose of them. Be sure the replacement batteries are Panasonic Type P-60AAR or equivalents. Do not mix battery types and use only the NICAD types described in this manual. Use of other types of batteries may result in damage to the analyzer and will void its warranty. After replacing the batteries, install the trays making sure that they are fully inserted into their holder and that the tabs have fully latched.

Battery Status Check

As stated previously, the Series 3520 Portable Oxygen Analyzer is equipped with an analyzer on/off power switch. This switch serves three functions. When placed in the middle "OFF" position, all power to the instrument has been removed. This is the recommended position for storage, when recharging the batteries, or replacing the sensor. When placed in the "ON" position, the analyzer is powered and will display the measured oxygen value of the sample gas. If the optional pump has been included with the Series 3520 Portable Oxygen Analyzer, placing the switch in the "ON" position also energizes the pump on/off switch. The third position associated with this switch allows the user to check the status of the batteries. By placing the switch in the "Battery" position, the digital display indicates the voltage of the battery pack. If the battery voltage indicated in the panel meter is 6 volts or less, recharging is necessary. Caution: If the Series 3520 is equipped with a pump, be sure the pump is operating when checking the batteries. The "Battery" check position is designed to be momentary so it cannot be left in that position permanently.

SECTION 4.0 Operating Procedures

Gas System Pressure Limits

For sample gases and/or calibration gases that are under pressure, it is imperative that the sample gas pressure to the sensor be kept to under 1 pound per square inch. If it is expected to be in excess of 1.0 psi, a pressure regulator should be used. There is no automatic pressure correction so operation at a constant pressure will provide optimum measuring conditions. Vacuums to 12.5 psia are permissible. Any vacuum level greater than that should be avoided as it will cause irreparable damage to the sensor.

Range Identification

The Series 3520 Portable Oxygen Analyzer is available in seven (7) different ranges. To identify the specific range of the analyzer in question, please refer to the original purchase order document or invoice from Alpha Omega Instruments. In it, you will find a model number starting with the number "3520". The letter immediately following "3520" is the range identifier. The various ranges, with their associated identifier, are as follows:

Range (ppm)	Identifier
0-50	B
0-100	C
0-500	D
0-1,000	E
0-5,000	F
0-10,000	G
0-20,000	H

Sample Connections

The sample flow connections to the Series 3520 Portable Trace Oxygen Analyzer are standard ¼" compression fittings. Referencing the model number designation once again, a number "1" directly after the range identifier indicates that the instrument has been supplied with standard compression fittings.

Electrical Output

The Series 3520 Portable Oxygen Analyzer is not equipped with an analog output for use with a recorder, datalogger, etc.

Analyzer Storage

When the Series 3520 Portable Trace Oxygen Analyzer is not in use, it may be stored in any position. If stored in an atmosphere where the temperature is greatly different from the temperature where it will be used, the instrument should be allowed to come into equilibrium with the operating ambient temperature before use. Under no circumstances should the Series 3520 Portable Trace Oxygen Analyzer be exposed to temperatures below 32°F. Doing so will damage the sensor and void the warranty.

SECTION 5.0 CALIBRATION PROCEDURES

Routine Span Gas Calibration Checks

The Series 3520 Portable Trace Oxygen Analyzer has been calibrated at the factory prior to shipment. However, with the potential hazards associated with shipping instrumentation, it is advisable that the analyzer be given a system calibration check prior to start-up. Alpha Omega Instruments trace oxygen sensors feature high accuracy and excellent long term stability characteristics. As a result, routine maintenance is kept to a minimum. As is the case with all gas analyzers, it is advisable to periodically check the overall system calibration. The frequency of these checks is often determined by in-house calibration protocols. If none exists, Alpha Omega Instruments Corp. recommends a calibration check be made once every 2-3 months.

Calibration Gas

The oxygen sensor used in the Series 3520 Portable Trace Oxygen Analyzer has a linear output. As a result, it can be calibrated using a single calibration gas as long as the test is performed accurately. The calibration gas should contain a defined concentration of oxygen with a balance of nitrogen (N₂). The actual concentration of oxygen should be chosen based on the range of the instrument. The factory recommends the calibration gas should be somewhere between 30%-70% of the analyzer's full scale range. For instance, if the analyzer has a range of 0-1,000 ppm, the calibration gas should contain between 300-700 ppm O₂/balance N₂. Most major gas manufacturers are good sources for calibration gases.

Procedure for Checking Calibration

1. Select a cylinder of calibration gas as described above.
2. When selecting a pressure regulator to use with the cylinder gas, it is advisable to use a two-stage regulator with the second stage capable of delivering a gas sample at a pressure of under 1.0 psig. Also, be sure to choose a regulator with a metal diaphragm, preferably stainless steel.
3. In addition to the selection of the pressure regulator, care must be given to choose the correct sample tubing materials. For trace oxygen measuring applications, stainless steel tubing should be used. An alternate choice is copper.



DO NOT USE RUBBER OR PLASTIC TUBING. AIR CONTAINS 209,000 PPM OF OXYGEN. A MINUTE LEAK OF AIR INTO EITHER THE CALIBRATION GAS OR SAMPLE GAS LINE CAN CAUSE SIZEABLE ERRORS IN READINGS. LEAKAGE CAN BE THROUGH CRACKS IN THE TUBING OR BY DIFFUSION THROUGH THE TUBING.

4. Install a flowmeter on the discharge side of the sensor. Because the flowmeter is on the discharge side, the materials of construction are of no significance to the trace oxygen readings obtained.

5. Place power on to the Series 3520 Portable Trace Oxygen Analyzer and set the calibration gas flow rate to 0.5 liter per minute (LPM). Monitor the analyzers response to the calibration gas, waiting until a stable reading has been established.
6. Once the reading has stabilized, check the system for gas leaks. This is best done when step 5 has been completed. An easy method of determining the leak integrity of the system is to vary the flow rate of the calibration gas. If increasing the flow rate from 0.5 LPM to 1 LPM causes a drop in the reading, there is a good chance that somewhere between the gas source and inlet to the sensor there is a leak. Check all gas fittings, connections, etc. using Snoop liquid leak detector (Snoop is a registered trademark of NUPRO Co., 4800 East 345th Street, Willoughby, Ohio 44094).
7. The reading in the LCD should now display the oxygen concentration of the calibration gas. BE SURE TO ALLOW THE READING TO COME INTO EQUILIBRIUM BEFORE MAKING ANY ADJUSTMENTS.
8. If the oxygen value read from the LCD differs from the calibration gas, a span adjustment should be made. Locate the calibration potentiometer on the front panel of the instrument. To adjust the meter reading to equal that of the calibration gas, slide the locking mechanism located at the base of the potentiometer to the left. Turn the adjustment knob so that the value displayed in the meter equals that of the calibration gas and allow the reading to stabilize for 2-3 minutes. Lock the adjustment knob by sliding the locking mechanism to the right being careful not to inadvertently turn the adjustment knob in the process. Calibration has been completed and normal operation can be resumed.

Zero Adjustment

Alpha Omega Instrument's Trace Oxygen Sensor is specific for oxygen. When there is no oxygen present, the output from the sensor is zero. This coupled with the inherent linear characteristics of the sensor allow the user to use a single point calibration as means of calibrating the system. NO ZERO CALIBRATION IS REQUIRED.

SECTION 6.0 REPLACEMENT OF THE OXYGEN SENSOR

Alpha Omega Instruments oxygen sensor is designed to operate for prolonged periods of time without needing replacement. However, in time the sensor's output will drop to a level where replacement becomes the prudent course of action. A good indication of this is when there is an increase in the requirement for routine calibration. When this happens, a replacement sensor should be ordered directly from the factory.

To install a new sensor follow the directions below:

1. Shut-off power to the analyzer and disconnect the gas inlet and outlet lines from the sensor housing.



IT IS ADVISABLE TO KEEP A LOW PPM GAS FLOWING THROUGH THE SENSOR HOUSING WHILE THE SENSOR IS BEING REPLACED. IT IS IMPORTANT THAT WHEN A NEW SENSOR IS INSTALLED, THE TIME BETWEEN WHEN IT WAS UNPACKED AND FIRST EXPOSED TO CALIBRATION GAS SHOULD BE KEPT TO AN ABSOLUTE MINIMUM. THEREFORE, THE AMOUNT OF TIME TAKEN IS A FUNCTION OF HOW LONG THE SENSOR WAS EXPOSED TO AIR DURING REPLACEMENT. WHEN A NEW SENSOR IS INSTALLED, IT MAY TAKE APPROXIMATELY ONE HOUR TO REACH EQUILIBRIUM ON A CALIBRATION GAS.

2. At the base of the sensor housing are four hex screws. Remove the screws and then carefully separate the two halves of the sensor housing.



WHEN SEPARATING THE TWO HALVES OF THE SENSOR, NEVER TWIST THE TWO AS THIS WILL CAUSE DAMAGE TO THE SPRING LOADED PINS. BE CAREFUL NOT TO BEND THESE PINS WHEN THE SENSOR HALVES ARE APART.

3. Remove the old sensor from the bottom half of the sensor housing.



THE SENSOR CONTAIN A SMALL AMOUNT OF CAUSTIC ELECTROLYTE. WHEN DISCARDING SPENT SENSORS, CARE SHOULD BE GIVEN NOT TO PUNCTURE THE SENSOR OR TAKE IT APART. DISCARD THE SENSOR ACCORDING TO LOCAL STATE OR COUNTY GUIDELINES.

4. Remove the existing O ring and examine the grooves in the inner and outer halves of the sensor housing to be sure they are clean. Replace the O ring with the new one supplied with the sensor.
5. Remove the new sensor from its package. Before installing it in the outer section (the one containing the gas fittings), **REMOVE THE CAP** and then install the sensor with the two gold

rings facing towards the sensor half that contains the spring loaded pins.

6. Take the two halves of the sensor housing and align them so the socket head screws can be reinstalled. Hand tighten the socket head screws being careful to do so evenly.
7. Reconnect the gas lines and begin processing gas through the sensor housing.
8. Calibrate the analyzer according to Section 5.0.

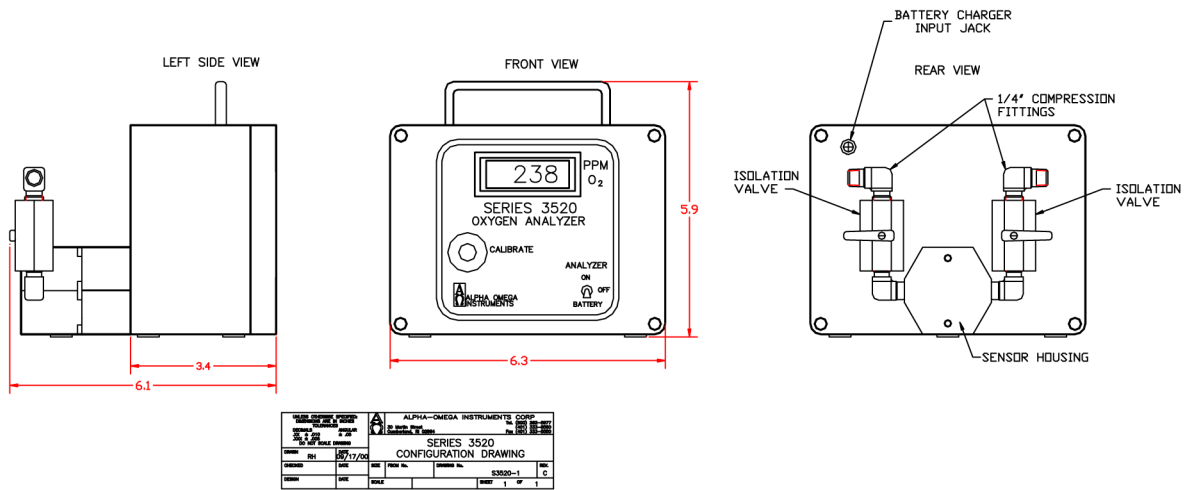


FIGURE 1.0

NOTE OF CAUTION

The Series 3520 Portable Trace Oxygen Analyzer is equipped with isolation valves on the inlet and outlet of the sensor housing. When the analyzer is not in use, these valves must be kept in the closed position (valve handle positioned perpendicular to the valve body). Prior to shutting down the analyzer it is strongly advised that the gas trapped within the sensor housing have an oxygen concentration **less** than the full range of the instrument. For instance, if the full range of the analyzer is 1,000 ppm, prior to shutting down the analyzer (includes closing the isolation valves), the oxygen concentration displayed on the meter should be less than 1,000 ppm. By doing this, the life of the trace oxygen sensor will be greatly extended and the overall performance of the Series 3520 Portable Trace Oxygen Analyzer will be enhanced.

10.1 Product Identification

Product Name	Oxygen Sensor Model Prefix 3SEN
Synonyms	Electrochemical Sensor, Galvanic Fuel Cell
Manufacturer	Alpha Omega Instruments Corp. 40 Albion Road, Lincoln, RI 02865
Emergency Phone Number	401.333.8580
Preparation / Revision	January 1, 1995
Date	
Notes	<ul style="list-style-type: none"> ❑ Oxygen sensors are sealed, contain protective coverings and in normal conditions do not present a health hazard. ❑ Information applies to electrolyte unless otherwise noted.

10.2 Specific Generic Ingredients

Carcinogens at levels >0.1%	None
Others at levels > 1.0%	Potassium Hydroxide, Lead
CAS Number	Potassium Hydroxide = KOH 1310-58-3, Lead = Pb 7439-92-1
Chemical (Synonym) and Family	Potassium Hydroxide (KOH) – Base, Lead (Pb) – Metal

10.3 General Requirements

Use	Potassium Hydroxide - electrolyte, Lead - anode
Handling	Rubber or latex gloves, safety glasses
Storage	Indefinitely

10.4 Physical Properties

Boiling Point Range	100 to 115° C
Melting Point Range	KOH -10 to 0° C, Lead 327° C
Freezing Point	-40 to 0° C
Molecular Weight	KOH = 56, Lead = 207
Specific Gravity	1.09 @ 20° C
Vapor Pressure	Not applicable
Vapor Density	Not applicable
pH	> 14
Solubility in H ₂ O	Complete
% Volatiles by Volume	None
Evaporation Rate	Similar to water
Appearance and Odor	Colorless, odorless aqueous solution

10.5 Fire and Explosion Data

Flash and Fire Points	Not applicable
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Flammable Limits	Not flammable
Extinguishing Method	Not applicable
Special Fire Fighting Procedures	Not applicable
Unusual Fire and Explosion Hazards	Not applicable

10.6 Reactivity Data

Stability	Stable
Conditions Contributing to Instability	None
Incompatibility	Avoid contact with strong acids
Hazardous Decomposition Products	None
Conditions to Avoid	None

10.7 Spill or Leak

Steps if material is released	<ul style="list-style-type: none"> □ Sensor is packaged in a sealed plastic bag, check the sensor inside for electrolyte leakage. □ If the sensor leaks inside the plastic bag or inside an analyzer sensor housing do not remove it without rubber or latex gloves and safety glasses and a source of water. □ Flush or wipe all surfaces repeatedly with water or wet paper towel (fresh each time).
Waste Disposal Method	In accordance with federal, state and local regulations

10.8 Health Hazard Information

Primary Route(s) of Entry	Ingestion, eye and skin contact
Exposure Limits	Potassium Hydroxide - ACGIH TLV 2 mg/cubic meter; Lead - OSHA PEL .05 mg/cubic meter
Ingestion	Electrolyte could be harmful or fatal if swallowed. Oral LD50 (RAT) = 2433 mg/kg
Eye	Electrolyte is corrosive and eye contact could result in permanent loss of vision.
Skin	Electrolyte is corrosive and skin contact could result in a chemical burn.
Inhalation	Liquid inhalation is unlikely.
Symptoms	<ul style="list-style-type: none"> □ Eye contact - burning sensation. □ Skin contact - soapy slick feeling.
Medical Conditions Aggravated	None

Carcinogenic	☐ NTP Annual Report on Carcinogens - not listed
Reference Data	☐ LARC Monographs - not listed
	☐ OSHA - not listed
Other	Lead is listed by some states as a chemical known to cause birth defects or other reproductive harm.

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Exposure Limits	Potassium Hydroxide - ACGIH TLV 2 mg/cubic meter; Lead - OSHA PEL .05 mg/cubic meter
Ingestion	Electrolyte could be harmful or fatal if swallowed. Oral LD50 (RAT) = 2433 mg/kg
Eye	Electrolyte is corrosive and eye contact could result in permanent loss of vision.
Skin	Electrolyte is corrosive and skin contact could result in a chemical burn.
Inhalation	Liquid inhalation is unlikely.
Symptoms	Eye contact - burning sensation. Skin contact - soapy slick feeling.
Medical Conditions Aggravated	None
Carcinogenic Reference Data	NTP Annual Report on Carcinogens - not listed LARC Monographs - not listed OSHA - not listed
Other	Lead is listed by some states as a chemical known to cause birth defects or other reproductive harm.

ADDENDUM 1

**OPTIONAL
Sample Line Block & Bleed / Sensor-Isolation
Sample Gas Delivery System**

Part no.: 3ISO-BB

Recommended for "portable/trans-portable" Trace O₂ Analysis applications

Spot or Intermittent Trace O₂ Readings at Different Sample Tap Locations

If your analyzer has been equipped with the above option, please read below.

The "Sample Line Block & Bleed / Sensor-Isolation Gas Delivery System" option serves as a convenient means to "PURGE" (or "BLEED") the sample line before switching the sensor over to the "SAMPLE" position, yet simultaneously keeping the sensor in an "Isolated" state (with a pre-purged, low-O₂ background gas atmosphere sealed inside). Upon relocation and connection to subsequent gas samples, the Alpha Omega Instruments Trace Oxygen Analyzer is, therefore, *primed-and-ready-to-go* to make a trace O₂ reading, because:

1. The O₂ sensor is already reading and equilibrated on a low O₂ sample, immediately prior to switching over to the next gas sample.
2. At the same time, immediately prior to being switched over to the next sample, also, the sample line is completely "pre-purged" by the next gas sample (purging out all of the previous gas sample, and (or) any possibility of entrained air).

The "Sample Line Block & Bleed / Sensor-Isolation Gas Delivery System" option utilizes the analyzer's own sample conditioning components [i.e., pump, regulator, flowmeter, filter(s), etc.] to perform the "PURGE" (bleed) operation.

Regardless of whether each gas sample is under pressure (with flow controlled by a regulator or needle valve) or under vacuum conditions (aspirated by a sample pump or other means), Used as a flow pre-set adjustment, and because the pressure differential across the sensor is negligible.

CAUTION: It is essential for the sensor's longevity and performance below 100 ppm that the retained gas inside the sensor housing after isolation is at a low trace O₂ level (below the highest range of the instrument).

ADDENDUM 1 CONTINUED...
OPERATION

1. Ensure that the Analyzer is ON, and that the “Block & Bleed / Sensor Isolation 4-way Sample Selector Valve” is pointing toward the “BLEED / BYPASS” label (or toward the port connected to the base of the flowmeter).
2. Connect the Sample Gas to the ¼” compression Sample Inlet Fitting on “Block & Bleed / Sensor Isolation 4-way Sample Selector Valve.” (Note: this is the only unused port connection).
3. Using available sample pump, regulator, or other flow controls, establish the suggested 0.5 slpm (0.2 to 1.2 slpm) sample flow.

Note: While in the “BLEED / BYPASS” position, the sample gas is re-directed from the sample inlet to the outlet, “bypassing” the sensor. Bleed the sample line for a few seconds to a few minutes (depending upon sample line length, any filter bowls or other “dead volumes”, etc.).

CAUTION: Before following step 4 below, both sensor isolation ball valves must be in the open position. Not doing so may damage the oxygen sensor.

4. Switch the “Block & Bleed / Sensor Isolation Four-Way sample Selector Valve” to the “MEASURE” position (pointing toward the sensor housing). Verify that the flow rate remains the same.
5. After allowing enough time on the sample for a sufficiently stable O₂ reading, switch back to the “BLEED/BYPASS” position.

Note: **ENSURE** that the O₂ reading while in the “BLEED / BYPASS” position (Bypass & Bleed / Sensor Isolation) state is **BELOW 1,000ppm.**

Otherwise, purge the sensor out IMMEDIATELY using a better purity purge gas.

ADDENDUM 1 CONTINUED...

**Sample Line Block & Bleed / Sensor-Isolation
Sample Gas Delivery System**

Part no.: 3-BLBL/ISO-SS

