



SERIES 501T

CARBON MONOXIDE ANALYZER

OPERATION MANUAL



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1. ABOUT NYAD CO ANALYZER

Your CO analyzer is a self-contained unit capable of measuring the concentration of Carbon Monoxide. The range is 0 to 2,000 parts per million by volume (ppmv). The CO analyzer features two adjustable alarm contacts.

- Analog or digital (optional) signals with adjustable zero and span values and in addition to these features, a “One Touch Cal” auto-calibration function.

2. INSTALLATION

How to Install your CO Analyzer into service:

- a) Connect a regulated source of sample air to the 1/8” FNPT connection on the bottom of the enclosure labeled “INLET”. The inlet pressure should be between 15-20 psig. The recommended sample flow rate should be between .4 and .8 SCFH. Refer to the flowmeter on the front panel.
- b) Connect the instrument to a power source;
120/220 VAC 50/60 Hz, or 12VDC in some units.
- c) Turn the POWER switch to ON.
 - Note: Model COA-521T does not have a power switch.
- d) The CO analyzer will cycle through its diagnostic routine followed by current CO concentration value. The analyzer has been factory calibrated but a “bump” test should be performed to ensure accuracy.

3. THE SENSOR

The CO sensor is an electrochemical cell which has a life expectancy of about 2 years. Since the cell is an electrochemical device which is self-depleting, the cell output will gradually decrease as it is used.

LIFE EXPECTANCY:

APPROXIMATELY 6 MONTHS IN CONTAINER

APPROXIMATELY 3 YEARS IN AIR

RECOMMENDED REPLACEMENT INTERVAL EVERY 2 YEARS

4. THE ELECTRONICS

The electronics section of the NYAD Series 501T CO Analyzers is microprocessor based. The NYAD CO sensor produces a millivolt output. The signal enters the receiver section of the main electronic board which then shapes and amplifies the incoming signal and directs it to the microprocessor. The signal is amplified and converted to engineering units using memory-resident tables containing the relationship between signal and engineering units. The end product of this electronic process is displayed in terms of parts per million by volume (PPMV).

At this point, the processor performs three functions:

- 1) Allows for the two adjustable alarm contacts (SPDT relays).
- 2) Analog or Digital output signals.
- 3) Displays the measured values on a 4-digit LCD display.

Nyad offers two analog outputs:

- 0-5 volt DC or a
- 4-20mA current output.

Other analog and digital outputs are available and can be factory set as 0-1VDC, RS232 or RS485. The zero point and span of these outputs are adjustable in the software.

5. STARTUP DISPLAY

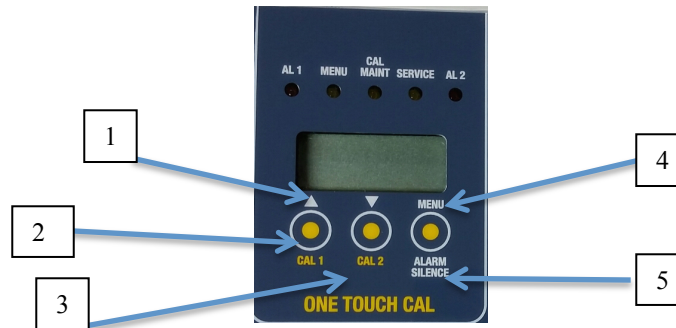
After the analyzer has been installed, all electrical connections have been made and power turned on, the instrument will proceed through its power-up routine with the display and indicators stepping through the following sequence:

- a) Displays all segments ON and all LED indicators ON for one second. This step verifies the operation of those devices.
- b) Displays the word NYAD for one second.
- c) The display indicates the version of the current operating system software.
 - All LED indicators are off followed by INT and CO.

The last step in the startup routine is the display of the current CO value. In approximately six seconds, any alarm conditions will be shown on AL1 and/or AL2 red LED alarm indicator and the audible alarm will sound.

6. FRONT PANEL CONTROLS

The NYAD Series 501T CO Analyzers have three control buttons located on the front panel that allows the operator to interact with the instrument.



1) UP Arrow and DOWN Arrow Button -

- a) Changes the value of set point, outputs, and constants.
- b) Changes the calibration values.
- c) Changes toggle function “Hi and Lo”

2) **CAL 1** - This button is used during “One Touch Cal” calibration process using 10 ppm CO span gas.

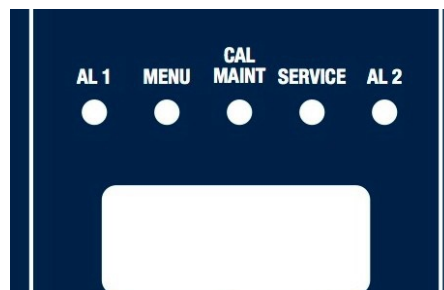
3) **CAL 2** - This button is used during “One Touch Cal” calibration process using 20 ppm CO span gas.

4) **MENU** - Pressing the MENU button allows the operator to view the current settings.

Pressing and holding the MENU button allows the operator to have access, interrogate, and reset the other major functions incorporated into this analyzer, namely, Alarm 1 and 2, Outputs, Toggles, Factory Codes and Calibration settings.

5) **ALARM SILENCE**– This button is used to temporarily silence the audible alarm. The audible alarm will automatically reactivate in 10 minutes.

LED INDICATORS



AL1 Red LED Alarm 1 indicator will illuminate indicating the CO value has exceeded the Alarm 1 set-point value.

MENU Yellow LED indicator

- Solid Yellow - MENU disabled. Available for viewing current settings only.
- Slow Blinking Yellow - “ONE TOUCH CAL” enabled. User in calibration mode.
- Fast Blinking Yellow - MENU enabled. User access available.

CAL MAINT Yellow LED indicator will illuminate indicating Calibration is required.

SERVICE Yellow LED indicator will illuminate indicating CO sensor replacement is required.

AL2 Red LED Alarm 2 indicator will illuminate indicating the CO value has exceeded Alarm 2 set-point value.

FLOWMETER

Nyad model COA-551T is equipped with a flowmeter which allows the user to visually see the rate of flow in SCFH.

- Recommended flow rate is between .4 to .8 SCFH.

7. ACTIVATION MENU

In normal operations, the MENU button is disabled. The user will only be able to view the current settings set by the factory. **To change factory settings such as Alarm 1 and Alarm 2 set-points, Outputs Hi and Lo, the “MENU” must be activated by a Certified Technician.**

To activate the “MENU”

- 1) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the DOWN arrow button to change the value to 135.
- 2) Press the MENU button to the desired location and use the UP arrow or DOWN arrow button to change settings.

Note: Once changes are made, the display will automatically default in about 10 seconds, flash “CO” and return to the current measure CO value. Also, once you scroll through the entire menu, the display will automatically default and return to nor-mal operations).

8. SILENCING AUDIBLE ALARM

To silence the audible alarm, press the “ALARM SILENCE” button once. The audible alarm will be temporarily disabled and will automatically reactivate in 10 minutes.

9. SETTING ALARM POINTS

This analyzer has two adjustable alarm set points and relays as factory standard. When the measured value of CO concentration exceeds the set point for a sustained period of about 6 seconds, the alarm condition will become activated. The SPDT relay (Alarm 1) is energized as is the red front-panel LED indicator, AL1.

To determine the current setting for ALARM 1, press the MENU button. The display will show AL1 and then default to the current value. If this value is acceptable, the display will automatically default in about 10 seconds and flash-“CO” and return to the current measured CO value.

To change ALARM 1 (AL 1) set-point the “MENU” must be activated by a Certified Technician as described in Section 7. *“Activation Menu”*

- a) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the DOWN arrow button to change the value to 135.
- b) Press the MENU button, AL 1 will momentary display followed by the current Alarm 1 set-point value. Press the UP arrow or DOWN arrow to change Alarm 1 value.

To change ALARM 2 (AL 2) set-point, proceed exactly as described above after pressing the MENU button to display AL2 and its current value.

If the measured value of CO concentration is higher than the ALARM 1 or ALARM 2 settings, the corresponding LED will illuminate above the display and energize the alarm relay thus activating any warning devices connected to it.

Alarm Toggle Function

Nyad Series 501T Analyzers are equipped with a toggle function (A1 1t and A2 2t). Set these “Hi” when detecting increasing CO and “Lo” when detecting decreasing CO.

- To

Factory Defaults	
AL 1t	Hi
Al 2t	Hi

 view the current setting for AL 1t, press the MENU button two times.
- The display will show AL1t followed by Hi or Lo.
- Press the MENU button two more times, AL2t will be displayed followed by Hi or Lo.
- If these settings are acceptable, the display will automatically default in about 10 seconds, flash “CO” and return to the current measured CO value.

***To change the settings for AL1t or AL2t, the “MENU” must be activated by a Certified Technician as described in Section 7**

- a) Press and hold the MENU button for about 10 seconds until CODE is displayed.
 - The MENU LED will begin to blink fast. Press the DOWN arrow button to change the value to 135.
- b) Press the MENU button two times, “AL1t” will be displayed followed by Hi or Lo. Press the UP or DOWN arrow button to change settings.
- c) Press the MENU button two more times “AL2t” will be displayed followed by Hi or Lo. Press the UP or DOWN arrow button to change settings. Press the MENU six times.

The display will default back to the current measured CO value or in about 10 seconds, the display will automatically default, flash “CO” and return to the current measured CO value.

10. SETTING ANALOG AND DIGITAL OUTPUTS

The NYAD Series 501T Analyzers features a 0-5 VDC and 4-20mA analog output as factory standard. This signal is linearly proportional to ppm CO. To view the current output settings:

a) Press the MENU button five times. “oPHi” will be displayed. The display will then show the CO concentration (50 ppm default) corresponding to the Hi end (5 VDC) of the analog output scale.

b) Press the MENU button more one time, the display will now read “oPLo” and then show the CO concentration (0 ppm default) corresponding to the Lo end (0 VDC) of the analog output scale.

To change span values from those set at the factory, the “MENU” must be activated by a Certified Technician as described in Section 7. “Activation Menu”.

a) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the DOWN arrow button to change the value to 135.

- ***Digital Ouput***

The Series 501T Analyzers features an optional digital output port. The user has a choice of format, either RS-232 or RS-485.

The RS-232 option can be accessed from a standard DB-9 connector located on the bottom of the enclosure or rear panel.



The RS-485 option uses a 25' 3 wire cable Red, Green, Black.

A = Red

B= Green

Ground = Black

To activate the digital output, the “MENU” must be activated by a *Certified Technician* as described in Section 7.

Activating RS232:

- a) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the UP arrow button to change the value to 159.
- b) Press the MENU button nine times. The display will show PORT. Press the UP or DOWN arrow and select 0232 (RS232) or 0485 (RS4850). Press the MENU seven times. The display will default back to the current measured CO value or in about 10 seconds, the display will automatically default, flash “CO” and return to the current measured CO value.
- The digital output is now activated and a constant data stream will be sent every second with the following information:

Data Output format:

\$UNITS, Display_data, Output, ALARM1, ALARM2,
ERROR#1, Line_checksum<CR><LF>

Example: \$CO, 1.4, 0.238, 0, 0, 0, 1177<CR><LF>

11. DEFAULT VALUES

Series 501T Analyzers are preset at the factory with the following standard values:

- **Function ppmv**
- AI 1 5
- AI 2 10
- Output (oPHi) 50
- Output (oPLo) 00

These settings can be changed to values most suitable for your application.

12. REFERENCE MENU

AL 1	Dry Relay Contact - Alarm 1
AL 2	Dry Relay Contact - Alarm 2
A1 1t	Toggle Alarm 1 “Hi or Lo”
A2 2t	Toggle Alarm 2 “Hi or Lo”
oPHi	Analog Output “Hi”
oPLo	Analog Output “Lo”
CAL 1	Calibration using 10 PPM span gas
CAL 2	Calibration using 20 PPM span gas
CAL	“One Touch Cal” Calibration Mode
No CO	Sensor not detecting CO
EroP	Operator Error

13. CAL MAINTENANCE - "One Touch Cal"

WARNING

High carbon monoxide concentrations are toxic. Take appropriate ventilation precautions when calibrating with a span gas.

CALIBRATION PROCEDURE

Calibration interval should be carried out once a month and can be performed by a non-certified technician. The "Cal Maintenance" LED will illuminate indicating calibration is required.

To calibrate the CO sensor use a certified sample 10 ppm or 20 ppm CO span gas balanced in air. The calibration gas concentration can be changed in the menu settings if you are using anything other than 10 ppm or 20 ppm span gas.

To begin the "One Touch Cal" calibration process:

- 1) Turn sample air off.
- 2) Attach 10 or 20 PPM CO span gas to the Calibration Port. If using a gauge, start the flow rate between 200 and 500 cc/min.
(Refer to the gauge on the gas cylinder and not the flow meter on the analyzer). Allow the displayed CO value to stabilize to a constant value.

If a gauge is not being used, the flowmeter on the panel can be referenced. Turn on the flow and adjust until the flowmeter shows between .4 and .8 SCFH/

- 3) To activate the "One Touch Cal", press and hold the MENU button for 5 seconds, "CAL" will momentarily display followed by the current CO value. The MENU LED will start blinking.
- 4) Select "One Touch Cal" CAL 1 or CAL 2. The display will show CAL 1 for 10 ppm or CAL 2 for 20 ppm followed by CO 10 or CO 20. The MENU LED will stop blinking and the CAL MAINT LED will now turn off.
- 5) Turn off and remove span gas. Allow 5-10 minutes for the CO value to return to zero.

To disable "One Touch Cal" while in calibration mode, press and hold the MENU button for 5 seconds. The MENU LED will stop blinking and the analyzer will momentarily default back to the current measured CO value.

Calibrating with other CO Span Gases:

To use CO span gases other than 10 ppm or 20 ppm, the "MENU" must be activated by a Certified Technician as described in Section 7. "*Activation Menu*"

- a) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the UP arrow button to change the value to 159.
- b) Press the MENU button seven times. The display will show CAL2 followed by 20. Change the value to the desired gas value by using the UP arrow or DOWN arrow button.
- c) Press the MENU button nine times, the display will default back to the current measured CO value or in about 10 seconds, the display will automatically default, flash "CO" and return to the current measured CO value.

Begin the calibration process using "One Touch Cal" CAL 1 or CAL 2 as described in Section 13: "*Calibration Procedure*"

14. Replacing the CO Sensor

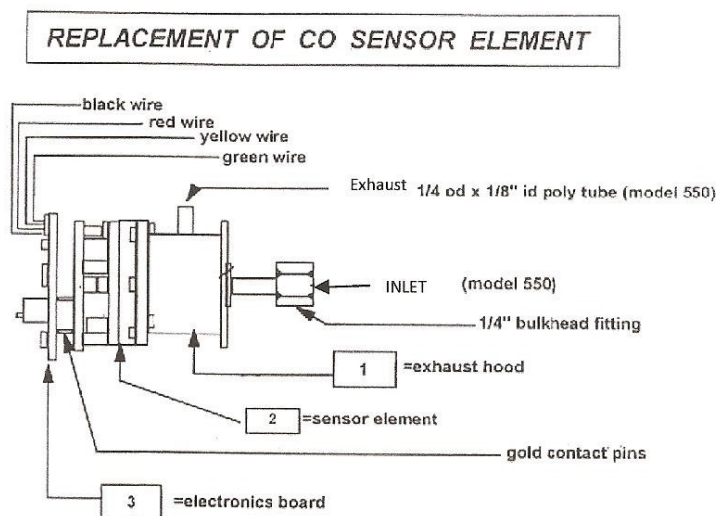
DANGER

Disconnect power to the unit before performing any maintenance to the control board.

WARNING

The carbon monoxide sensor contains corrosive acid. Do not attempt to open. Before disposing of sensor place it in a polyethylene bag and tie securely. Dispose of sensor in accordance with all applicable regulations.

- a) Remove the plastic cover on model COA-551T or chassis cover on models COA-531T and COA-541T
- b) Remove the front panel:
 - (Two thumb screws on model COA-551T).
- c) Carefully pull the complete sensor module counter clock wise until it is free of the input fitting.
- d) Remove the electronic board from the assembly by pulling it away from the sensor where it is held by three connector pins. Next, remove the sensor from its flow chamber by unscrewing the three small screws holding it in place. Discard the depleted cell and replace it with the new one. Reassemble the cell by following the above instructions in reverse.



15. “Service” - CO SENSOR REPLACEMENT

The Nyad CO sensor should be replaced every **two years** and should be performed by a **Certified Technician**. The “Service” LED will illuminate indicating when the CO sensor replacement is required.

After replacing the CO sensor, the Service LED indicator must be reset. To reset, the “MENU” must be activated by a Certified Technician as described in Section 7. Activation Menu.

- a) Press and hold the MENU button for about 10 seconds until CODE is displayed. The MENU LED will begin to blink fast. Press the UP arrow button to change the value to 159.
- b) Press the MENU button 10 times, the display will show “SSer”. Press the UP arrow button to change the value to 1.
- c) The “Service” LED will now turn off.
- d) The sensor is now ready for calibration.
 - Refer to Section 13. Calibration Procedure

NOTE:

CALIBRATION IS REQUIRED AFTER REPLACING THE CO SENSOR.



CARBON MONOXIDE DANGER LEVELS

**Levels of Carbon Monoxide are considered dangerous.
The chart below shows the health effects of CO exposure.**

CO concentration (parts per million)	Symptoms
50	No adverse effects with 8 hours of exposure.
200	Mild headache after 2-3 hours of exposure.
400	Headache and nausea after 1-2 hours of exposure.
800	Headache, nausea, and dizziness after 45 minutes; collapse and loss of consciousness after 1 hour of exposure.
1,000	Loss of consciousness after 1 hour of exposure.
1,600	Headache, nausea, and dizziness after 20 minutes of exposure.
3,200	Headache, nausea, and dizziness after 5-10 minutes; collapse and loss of consciousness after 30 minutes of exposure.
6,400	Headache and dizziness after 1-2 minutes; loss of consciousness and danger of death after 10-15 minutes of exposure.
12,800	Immediate physiological effects, loss of consciousness and danger of death after 1-3 minutes of exposure

The U.S. Standards for CO levels are as followed:

Maximum of 35 ppm of CO for 1-hour exposure:

- Not to be exceeded more than once per year.

Maximum of 9 ppm of CO for 8-hour exposure:

- Not to be exceeded more than once per year.

Specifications	
Model Numbers	COA-521T (OEM), COA-531T (Rack Mount), COA-541T (Panel Mount), COA-551T, (Nema 4), COA-571T (Nema-7X)
Units	PPM (Parts Per Million)
Standard Display Alarm Analog Output Power Memory Inlet Calibration Audible Alarm Mini-Rate Flowmeter	Backlit 4 Digit LCD, 0.5" High Dual Dry Relay Contacts (SPDT 1A@120V) 0-5VDC or 4-20mA (Adjustable zero and span) 120/220VAC 50/60 Hz, 1W Max Non-Volatile Data Memory 1/8" FNPT "One Touch Cal" Auto Calibration 95 db, frequency 2700 to 3700 Hz 0-1.0 SCFH
Options Digital Output Power	RS232, RS485 12V
Sensor	
Response Time Operating Humidity Inlet Pressure Operating Temperature Sensor Life in Air Sensor Shelf Life Replacement Sensor Warranty Calibration Gas Calibration Interval Sample Flow.	90% in 30 seconds 15 to 90% RH non-condensing 30-35 lbs Max -20° to +50° C Up to 24 Months at 30° C 1 Year Every 2 years 1 Year CO span gas balance air Once a month Between .4 and .8 SCFH or 200-500 cc/min
Enclosures	
OEM NEMA-4 Panel Rack Nema-7X	5.75"Wx6.75"Hx2.4"D 9.5"W x 6.25"H x 3.5"D 10"W x 5.25"H x 6"D 19"W x 5.25"H x 6"D 8.37"Wx9.87"Wx6.53"D

Troubleshooting Guide

Symptoms	Remedy
<p>ELECTRONICS</p> <p>Unit will not cycle</p> <p>Startup routine not normal</p> <p>Display is blank with power on</p> <p>Display has missing segments</p>	<p>Please contact NYAD for verbal evaluation. Unit will likely need to be sent to NYAD for further evaluation.</p>
<p>ERROR CODES</p> <p>ErOp (Error Operator)</p> <p>E-Lo</p> <p>No CO</p>	<p>Output out of range. Set output Lo and Hi. See Section 10 Setting Output.</p> <p>Replace CO sensor or CO round electronics.</p> <p>Sensor not detecting CO Gas. Make sure all connections are secure. Replace CO sensor</p>

Warranty

WARRANTY TERMS

Nyad, Inc. warrants to the original purchaser that all parts used in the construction or fabrication of the Nyad Equipment will be free from defects in materials and factory workmanship, under normal use and service for **five years** from the date of delivery.

Warranty coverage provides the necessary repairs or parts replacement found by Nyad, Inc. to be defective due to bad workmanship or faulty materials.

LIMITATIONS OF WARRANTY

Nyad Equipment is restricted to inspection (FOB the Factory) before warranty is determined, unless other arrangements have been made by Nyad and the original purchaser. This warranty does not apply to routine service/maintenance, calibrations, repairs and replacement of the carbon monoxide sensor every twenty-four (24) months in accordance with manufacturer's recommendation, or replacements made necessary by fire or water damage, or accident to or improper installation by others, alteration, misuse or abuse to the Nyad Equipment. This warranty does not cover labor charges or cost incurred for time and expense by other service agencies or personnel involved in maintaining the Nyad Equipment.

Application of this Warranty is further conditioned upon the following:

- **Installation.** The Nyad Equipment must be properly installed in accordance with Nyad's installation procedures and instructions.
- **Proper Maintenance and Operation.** The Nyad Equipment must be properly maintained and operated in accordance with Nyad's maintenance and operating procedures. All service parts must be acquired from Nyad or its authorized representative.
- **No Alteration.** The Nyad Equipment must not have been modified or altered from its original conditions at the date of delivery or installation.

Failure to comply with any of these conditions will void this Warranty.

RETURN POLICY

Before returning any items (except for recalibration service and repairs) you must call: 925.270-3971

- 8:30 a.m. – 5:00 p.m. PST. Monday through Friday for approval.

Exceptions for special order.

Returns for special orders will have 30% restocking fee and must be approved.

- Items returned in damaged or altered conditions which cannot be resold as new will not be accepted for return.
- All returned items are subject to inspection for use and damage before credit is issued.

Manufacture Warranty/Defective Claims –

You may return product to us for rework, exchange and/or request a full refund/credit.

- Request must be made from the original purchaser.
- Upon receipt of a returned item, Nyad will evaluate and determine the warranty claim.

Damaged Items –

It is the responsibility of the original purchaser to inspect the packages for damages/defect upon receipt of goods.

- If product is damaged in transit to you, Nyad must be notified immediately (within 24 hours) so that Nyad can submit a claim to our freight carrier.

Lost Packages –

Lost Packages must be reported within 30 days of shipment date and verification from the freight carrier that product has not been delivered. Nyad does not insure packages unless requested by the customer.

- Please contact or email us for further important instructions on filing a lost or damaged package claim.

TECHNICAL SUPPORT

Nyad, Inc. will offer Technical Support via telephone or email. All technical support shall be related to the Nyad Equipment only. Any other technical issues involving other products and services to the Nyad Equipment will not be the responsibility of Nyad, Inc.

Warranty/Technical Support:

Phone: (925) 270-3971
Contact: sales@nyad.com

NFPA COMPLIANT

- The Nyad Carbon Monoxide Analyzers meet or exceed CGA Grade-D specifications for air quality as adopted by Federal OSHA.
- The Nyad Carbon Monoxide Analyzers' quality standards meet or exceed OSHA 1910.134 requirements.
- When the components are used in accordance with the manufacturer's instructions and recommendations, the "analyzer" meets or exceeds federal regulations presently in force.
- The Nyad Carbon Monoxide Analyzer shall be calibrated monthly and the Carbon Monoxide Sensor shall be replaced every 2 years for accuracy in accordance to the manufactures recommendation.

- 1) OSHA REGULATIONS (Standard-29 CFR)
Respiratory Protection 1910.134 1910.134(i)(1)(ii)(C)
- 2) Carbon monoxide (CO) content of 5—10 ppm or less.

Nyad Carbon Monoxide Analyzer detection range is 0-2,000 ppm and is equipped with alarms when safe levels (5—10 ppm) are exceeded.