LMA-3D
Sensitive, Fast NO_2 Detector

Features

- Detection limits of <10 pptV
- Response time 0.2 sec. Uses chemiluminescence
- Measures NO_2 directly without converters
- Linear response from 10 pptV - 4 ppmV
- Output ranges of 4 ppbV to 4 ppmV (full scale analog)
- Lightweight, rugged and portable (handle on top)
- Operates on 12V DC from either AC adapter or battery
- Internal rechargeable battery provides 30 minute backup

Designed and Manufactured by

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The LMA–3D NO_2 detector is a highly-sensitive, fast, lightweight, portable analyzer for the continuous measurement of NO_2 in air. Together with its companion, the LNC-3D NOx converter, the sum of NO_2 and NO can be measured.

Principle of Operation

The unit operates by detecting the chemiluminescence produced when NO_2 encounters a surface wetted with a specially formulated solution, Luminol II. Sample air is drawn into the reaction chamber by an internal sample pump. A photomultiplier tube views the light emitted from a fabric surface.

Instrument Description

The solution is continuously supplied to the top of the wick by a peristaltic pump. The exhaust of the reaction chamber flows in two paths. Most of the air flows directly to the sample pump. The waste liquid is carried by the remaining air to the waste bottle and that air continues to the sample pump.

An automatic zeroing system is provided to remove any residual drift of the baseline signal from the photomultiplier tube. In the zero mode, the NO_2 is scrubbed from the sample air stream.

An automatic (or manual) flush cycle supplies de-ionized water to the reaction vessel on a daily basis in order to keep crystals from building up in the reaction vessel.

The resulting signal from the photomultiplier is proportional to the concentration of NO_2 in the air. After temperature and pressure corrections, the measurement is reported in mixing ratio units (ppbV). When commanded, the instrument applies linearity corrections to extend the linear range from 2 to 50 ppbV to 0.0 to 4 ppmV.

The one liter feed and waste bottles are located on the back of the instrument. This amount of solution will provide for continuous operation for more than 15 days before requiring refilling Both the solution and the pump tubing can be changed without opening the instrument.

Applications

The LMA-3D measures NO_2 directly. Together with the LNC-3D, a true measure of NOx is achieved. The interferences from NOy that plague thermal-converter "NOx Box" techniques are avoided.

The LMA-3D/LNC-3D pair is often employed in flux emission measurements of NOx from soils.

The LMA-3D is fast and sensitive enough to be used in eddy correlation NO_2 flux measurements. The data throughput can be adjusted to a maximum of 5 Hz while still providing a sensitivity of 0.2 ppbV during this short sample interval.

It is ideal for NO_2 measurements from airborne platforms where sampling speed, small size, and light weight is important.

Control of the instrument

The LMA-3D is controlled from the front panel by a single spin knob that also can be pressed to give the Enter and Editing commands. The four line display normally shows NO_2 or NOx mixing ratio on the top line and instrumental status on the bottom. The other two lines can be assigned to any of the parameters such as temperature, pressure, or a 24 second running average of NO_2 or NOx. The instrument can be remotely controlled by either TTL signals or by RS232 commands.

Calibration of the instrument is carried out by setting the span pot on the front panel when a known mixing ratio of NO_2 is supplied to the instrument.

Interferences

Careful formulation of the Luminol II solution minimizes interferences. For measurements above 5 ppbV, interference from ozone is not observed. For clean air measurements, the use of a special ozone scrubber is recommended to eliminate a residual ozone interference of 1.0% of ozone.

PAN produces an NO_2 signal equivalent to 25% of PAN. For measurements in smog, a special zero scrubber is available to remove the PAN interference.

Specifications

Detection Limit:	<10 pptV
Zero Drift:	<50 pptV per day
Response Time:	0.2 seconds
Integration Time:	Running averages of 0.2, 0.4, 0.8, 1.6, 3.2 and 24 s
Resolution:	0.001, 0.01, 0.1 ppbV
Range:	0 **-** 4 ppmV
Data Output:	4 x 40 Character LCD, 3 Channels of Analog 0.1 to 4.1 V with selectable output ranges 4, 8, 20, 40, 80, 200, 400, 800, ppbV, 2, 4 ppmV, RS232 in and out.
Operating Temp.:	5 to 40 degrees C 5 to 95% rel. humidity
Physical Dim.:	33 (H) x 38 (D) x 25 (W) cm 13 (H) x 15 (D) x 10 (W) inches Weight 9.5 Kg, 20 lbs
Pwr Requirements:	8 - 15 VDC <40 Watts, supplied with converter 110/240 VAC, 50-400 Hz
Internal Battery	Backup for 30 min.
Consumables:	Luminol II Solution Zero & Ozone scrubbers Air filters

CE certification