

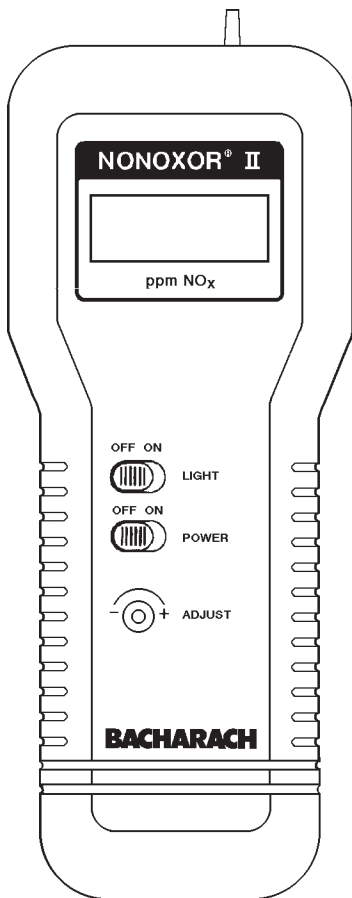
# BACHARACH<sup>®</sup>

# NONOXOR<sup>®</sup> II

INSTRUCTION 19-9120  
Portable NO<sub>x</sub> Analyzer



Part No. 19-7036 & 19-7042  
Rev. 6 - September 1997



**Bacharach, Inc.**

621 Hunt Valley Circle, New Kensington, PA 15068  
PH: 724-334-5000 • FAX: 724-334-5001 • Web: [www.bacharach-inc.com](http://www.bacharach-inc.com)  
E-mail: [help@bacharach-inc.com](mailto:help@bacharach-inc.com)

# WARRANTY

Bacharach, Inc. warrants to Buyer that at the time of delivery this Product will be free from defects in material and manufacture and will conform substantially to Bacharach Inc.'s applicable specifications. Bacharach's liability and Buyer's remedy under this warranty are limited to the repair or replacement, at Bacharach's option, of this Product or parts thereof returned to Seller at the factory of manufacture and shown to Bacharach Inc.'s reasonable satisfaction to have been defective; provided that written notice of the defect shall have been given by Buyer to Bacharach Inc. within one (1) year after the date of delivery of this Product by Bacharach, Inc.

Bacharach, Inc. warrants to Buyer that it will convey good title to this Product. Bacharach's liability and Buyer's remedy under this warranty of title are limited to the removal of any title defects or, at the election of Bacharach, to the replacement of this Product or parts thereof that are defective in title.

All expendable items, such as electrochemical sensors, are warranted for a period of six months.

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## Declaration of Conformity

Manufacturer's Name: Bacharach, Inc.  
Manufacturer's Address: 621 Hunt Valley Circle  
New Kensington, PA 15068

European Operations: Bacharach Europe  
Sovereign House, Queensway  
Leamington Spa  
Warwickshire CV31 3JR  
England

Product Name: NONOXOR II

### Conforms to the following product specifications

EMC: European Directive 89/336/EEC  
EN 500081-1 (Emissions)  
EN 500082-1 (Immunity)

## WARNING!

Because this instrument is used to detect and monitor materials and conditions which are listed by OSHA or others as potentially hazardous to personnel and property, the information in this manual must be fully understood and utilized to ensure that the instrument is operating properly and is both used and maintained in the proper manner by qualified personnel. An instrument that is not properly calibrated, operated and maintained by qualified personnel is likely to provide erroneous information, which could prevent user awareness of a potentially hazardous situation for the instrument user, other personnel and property.

If, after reading the information in this manual, the user has questions regarding the operation, application or maintenance of the instrument, supervisory or training assistance should be obtained before use. Assistance is available by calling your nearest Bacharach Service Center.

## 1 INTRODUCTION

The Nonoxor<sup>®</sup> II is a commercial-grade portable instrument designed to display oxide of nitrogen ( $\text{NO}_x$ ) concentrations gas between 0 and 2000 ppm. This instrument shows the level of  $\text{NO}_x$  in a gas sample by drawing the sample into its sensor chamber by a built-in motorized pump. Part #19-7036 comes with a probe. Part #19-7042 comes without a probe (All non-probe related functions remain the same in this instruction).

Other features and accessories of the Nonoxor II include: A large, back-lit Liquid Crystal Display (LCD), which allows the display to be read in any lighting condition from direct sun-light to total darkness; a semi-detachable elastic strap that permits the instrument to be either hand held, or hung on nearby objects; a rigid stainless steel probe with handle, connected to a flexible hose that allows gas samples to be taken from cramped and confined areas (alternate probes and condensate traps may be used).

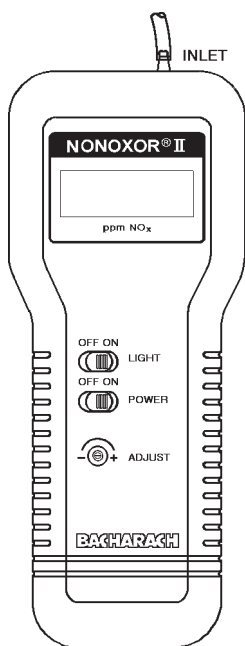


Figure 1. Nonoxor<sup>®</sup> II

## 2 TECHNICAL CHARACTERISTICS

NO <sub>x</sub> Display Range .....	0-1999 ppm NO <sub>x</sub>
Accuracy .....	±10 ppm or ±5% of reading whichever is greater
Response Time .....	90% of final value within 40 sec.
Battery Requirements .....	1.5 V, "C" cells, Qty. 4
Operating Time* .....	14-16 hours, alkaline cells
Operating Temp. Range .....	23 to 104°F (-5 to 40°C)
Relative Humidity .....	10-85% non-condensing
Weight (w/o batteries).....	12 ozs. (341 grams)
Dimensions .....	8.6 x 3.5 x 2.9 in. (218 x 89 x 74 mm)

\* *Times are with the backlight turned off. Continuous use of the backlight will decrease battery life.*

## 3 PREPARING THE NONOXOR II FOR OPERATION

To prepare the instrument for operation, you must install four "C" size batteries, and (if desired) install the hose and probe as described in the following paragraphs.

For your convenience, and to ensure that the instrument will provide reliable NO<sub>x</sub> indications, the NO<sub>x</sub> sensor is installed and the instrument calibrated on a known nitric oxide concentration at the factory.

### 3.1 Battery Installation

Detach the elastic strap's metal clip at the bottom of the instrument, and slide off the battery cover as shown in Figure 2. Then while observing proper battery polarity, install four "C" size batteries into the instrument's battery compartment. (Recommended battery types: Duracell Alkaline or equivalent). After the batteries are installed, replace the battery cover and the elastic-strap clip.

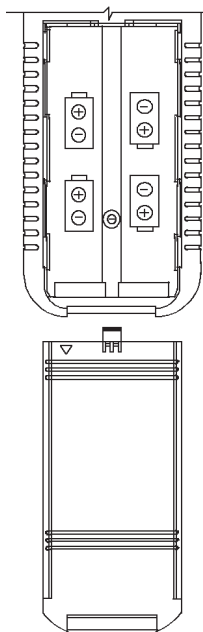


Figure 2. Battery Installation

If batteries are accidentally installed in the wrong polarity, a positive temperature coefficient (PTC) thermistor will protect the instrument's electronic circuitry. The instrument will operate once batteries are properly installed and the PTC thermistor is allowed to cool.

## 3.2 Probe Installation

The probe comes disassembled. To add the probe tip:

- Loosen but **DO NOT REMOVE** the Knurled Nut (03-2023) on the main part of the Probe Assembly (19-3076).
- Insert probe tube into Extended Adapter Block (19-3072).
- Hand tighten the Knurled Nut (03-2023) then add 1/4 turn to snug probe to the rest of the probe assembly.

**NOTE:** *In order to prevent the possibility of misplacing the Front (03-2024) and Back (03-2025) Ferrules, loosen but **DO NOT REMOVE** the Knurled Nut (03-2023) before inserting or removing the Probe Tube (19-3073).*

Install the probe by sliding the end of its tubing over the gas inlet port on the top right side of the instrument as shown in Figure 3. The tubing may be difficult to slide over the gas inlet port of the unit for the first time. This was done intentionally to allow for a snug fit. Use a little dish washing liquid diluted in water or heat the end of the tube in hot tap water to help it slide onto the port.

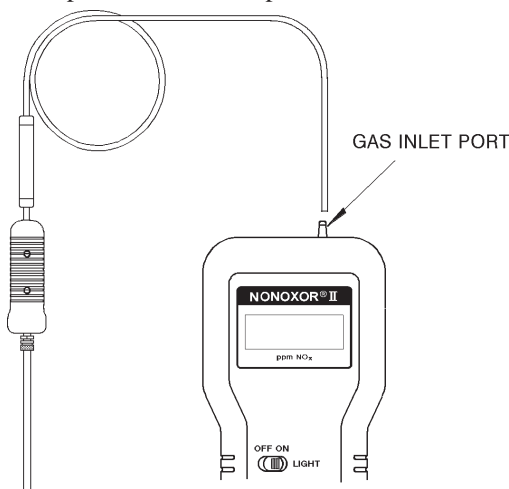


Figure 3. Probe Installation


## 4 OPERATION

To operate the Nonoxor II, you simply . . .

- Set its POWER switch to ON,
- Wait for the instrument to warm up (approx. 1 minute),
- Zero the display (if necessary),
- Take a gas sample.

Detailed operating procedures are presented below:

### 4.1 Power ON/OFF

Turn on the instrument by sliding its POWER switch to ON. Observe that when power is first applied, all numerical LCD segments are tested for  1888 5-15 seconds; after which, the LCD shows the detected NO<sub>x</sub> level. (A minus sign may appear during power up as the sensor stabilizes.) Turn off the instrument by sliding the POWER switch to OFF.


**Important!** *Bias voltage must be maintained on the sensor at all times in order to ensure proper NO<sub>x</sub> readings. This means that there must be good batteries installed in the instrument even when it's switched off. If the batteries go dead, or are removed, the sensor will need to restablize (see Section 4.7) after the installation of fresh batteries.*

### 4.2 Zeroing the Instrument

After being turned on and warmed up for at least 1 minute, the instrument should indicate 000 ±2 ppm in fresh air. If the instrument needs to be zeroed, proceed as follows:

1. Ensure that the instrument is sampling air that is free of NO.

**NOTE:** *An indication that the instrument was not zeroed in fresh air is when a large negative NO<sub>x</sub> display appears when the instrument is moved into another area.*

2. Using a 1/8" flat-blade screwdriver, turn the ADJUST potentiometer until the LCD shows 0 ppm. The display shows negative numbers for zeroing purposes. *An instrument can be considered zeroed with a display bounce of up to ±2 ppm.* 

## 4.3 Backlight ON/OFF

The LCD can be read in low-light areas by setting the front panel LIGHT switch to ON. The backlight stays on until turned off, or until the POWER switch is set to OFF.

## 4.4 Using the Strap

The instrument's elastic strap allows the unit to be either hand-held, or hung on nearby objects.

By sliding your hand between the instrument and its elastic strap, you can hold onto the Nonoxor II with a minimum of effort. The instrument's front panel slide switches can then be actuated by your thumb for one-handed operation. Or, by releasing the metal clip at the bottom of the instrument's case, you can hang the instrument by its strap on nearby objects such as nails, sheet metal, or valve handles.

## 4.5 Using the Probe

A rigid stainless steel probe with handle, connected to a flexible hose with sample filter can be used to draw a gas sample into the instrument from the room, boilers, and other combustible furnaces.

Both hose and probe are detachable from the instrument when sampling without the probe, or when sampling with a different probe is desired.

**Important:** *If condensation is observed within the hose, do not allow water level to build up to a point where it cuts off flow.*

## 4.6 Interpreting the Display

**Gas Display** The LCD shows NO<sub>x</sub> levels in the range from 0 to 1999 ppm. The display on the right indicates an NO<sub>x</sub> level of 40 ppm.

A rectangular LCD display showing the number 040 in a digital font.

**Overrange** When the gas sample exceeds 1999 ppm, a "1" is displayed on the LCD. To clear an overrange condition, leave instrument turned on and sample fresh air until the LCD returns to displaying NO<sub>x</sub>.

A rectangular LCD display showing the number 1 in a digital font.

**Low Battery Indications** When the battery voltage becomes low, the “LO BAT” indicator appears. Although the instrument will continue to operate and give NO<sub>x</sub> readings under these conditions, the batteries should be replaced as soon as possible.



When battery voltage becomes too low for the instrument to operate, a “-1” is displayed on the LCD. No NO<sub>x</sub> readings are provided under these conditions.



## 4.7 Long-Term Storage

Bias voltage must be maintained on the sensor at all times in order to ensure proper NO<sub>x</sub> readings. This means that there must be good batteries installed in the instrument even when it's switched off. If the batteries go dead, or are removed, the sensor will need to restablize after the instillation of fresh batteries. Restabilization times vary proportionally to the amount of time the sensor is left without power. See Table 4-1 for typical restabilization times.

**Table 4-1. Sensor Restabilization Times**

Time without Power	Typical Restabilization Times
Less than 15 min.	Less than 1 min.
Less than 1 Hr.	Less than 5 min.
Less than 2 days	Less than 4 hr.
Greater than 2 days	Up to 2 days

## 5 MAINTENANCE

The Nonoxor II needs to be calibrated at regular intervals to ascertain that it still meets its accuracy specification. A regular calibration schedule should be established between you and your nearest Bacharach Service Center, unless your facility has the necessary calibration equipment and personnel trained in the maintenance of gas-detection equipment. Detailed calibration procedures are provided upon request from the factory. Detailed maintenance procedures and parts lists are provided in the Service Manual (19-9166).

## 6 PARTS/SERVICE

### 6.1 Parts List

Item	Part No.
Battery Cover	19-3029
Probe/Hose Assy.	19-3076

### 6.2 Bacharach Sales/Service Centers

#### California

7281 Garden Grove Blvd.,  
Suite H  
Garden Grove, CA 92841  
Phone: 714-895-0050  
Fax: 714-895-7950  
E-mail: calservice@bacharach-inc.com

#### Indiana

8618 Louisiana Place  
Merrillville, IN 46410  
Phone: 219-736-6178  
Fax: 219-736-6269  
E-mail: indservice@bacharach-inc.com

#### New Jersey

7300 Industrial Park  
Rte. 130, Bldg. 22  
Pennsauken, NJ 08110  
Phone: 856-665-6176  
Fax: 856-665-6661  
E-mail: njservice@bacharach-inc.com

#### Pennsylvania

621 Hunt Valley Circle  
New Kensington, PA 15068  
Phone: 724-334-5051  
Fax: 724-334-5723  
E-mail: help@bacharach-inc.com

#### Texas

5151 Mitchelldale, B-4  
Houston, TX 77092  
Phone: 713-683-8141  
Fax: 713-683-9437  
E-mail: txservice@bacharach-inc.com

#### Canada

Bacharach of Canada, Inc.  
151 Bentley Street Unit #6  
Markham, Ontario L3R 3X9 Canada  
Phone: 905-470-8985  
Fax: 905-470-8963  
E-mail: bachcan@idirect.com

#### México

Bacharach de México  
Playa Regatas No. 473 Tercer Piso  
Col. Militar Marte  
Delegación Iztacalco, 08830  
México D.F.  
México  
Phones: 011-5255-5634-7740  
011-5255-5634-7741  
FAX: 011-5255-5634-7738  
E-mail: bacharach@prodigy.net.mx

#### Denmark

Bacharach Instruments Int'l  
P.O. Box 44  
39 Lindegade  
DK 6070 Christiansfeld  
Denmark  
Phone: 011/45 74 563171  
Fax: 011/45 74 563178  
E-mail: mail@bacharach.dk

#### Europe

Bacharach Europe  
Sovereign House, Queensway  
Leamington Spa  
Warwickshire CV31 3JR  
England  
Phone: (01926) 338111  
Fax: (01926) 338110

## 7 PROPERTIES & HAZARDS OF OXIDES OF NITROGEN

### Properties:

Nitric oxide (NO) at room temperature is a colorless, non-flammable, toxic gas that when mixed with air forms brown fumes of nitrogen dioxide (NO<sub>2</sub>), which is extremely reactive and a strong oxidizing agent.

In light commercial and residential combustion applications, nitric oxide gas is typically present with nitrogen dioxide in a ratio of one part NO<sub>2</sub> to nineteen parts NO. At normal ambient temps., nitric oxide combines with atmospheric oxygen to form nitrogen dioxide at a rate dependent on the concentration of oxygen and the square of the concentration of the concentration of nitric oxide.

### Physiological Effects:

Nitric oxide, with the attendant formation of nitrogen dioxide, results in a strong respiratory irritant, which may be fatal. Symptoms may be moderate at first, and include tightness in the chest, headaches, irritation of the eyes, nausea, and a slow loss of strength. Delayed symptoms may be severe and cause increased difficulty in breathing, and pulmonary edema (abnormal fluid buildup in the lungs). Untreated cases could lead to eventual death.

### PPM Level Attributes:

**25 ppm** - Eight-hour time-weighted average (TWA) exposure limit set by (OSHA)<sup>[1][2]</sup>.

**100 to 150 ppm** - Exposure for 30-60 min. could lead to delayed pulmonary edema.

**200 to 700 ppm** - A few breaths may result in fatal pulmonary edema after 5-8 hours have passed.

## **First Aid:**

Move the victim to fresh air and administer oxygen. If breathing has stopped, give artificial respiration. The main objective of the treatment is to provide an adequate supply of oxygen to the tissues so as to prevent, or at least minimize, the development of pulmonary edema. Oxygen must be supplied as soon as possible in amounts adequate to maintain the normal color of the skin and mucous membranes. Seek medical attention immediately.

## **References:**

[1] *Code of Federal Regulations*, Title 19 CFR Parts 1900-1910 (Labor), Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

[2] *Threshold Limit Values and Biological Exposure Indices*, 1989-90 ed., American Conference of Governmental Industrial Hygienists (ACGIH), 6500 Glenway Ave., Bldg. D-7, Cincinnati, OH 45211.