

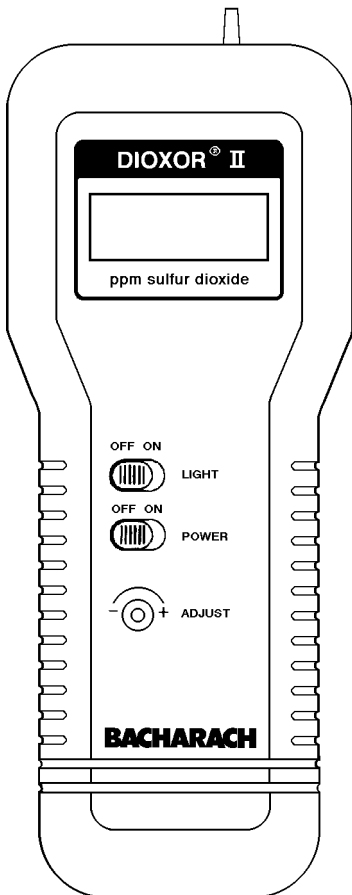
# BACHARACH<sup>®</sup>

## DIOXOR<sup>®</sup> II

INSTRUCTION 19-9121  
Portable SO<sub>2</sub> Analyzer  
Part No. 19-7038 & 19-7043



Rev. 5 - September 1997



### Bacharach, Inc.

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## Declaration of Conformity

Manufacturer's Name: Bacharach, Inc.  
Manufacturer's Address: 625 Alpha Drive  
Pittsburgh, PA 15238 USA

European Operations: Bacharach Instruments International  
Kongensgade No. 58  
DK-6070 Christisnfeld  
Denmark

Product Name: DIOXOR II

### Conforms to the following product specifications

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

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## 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

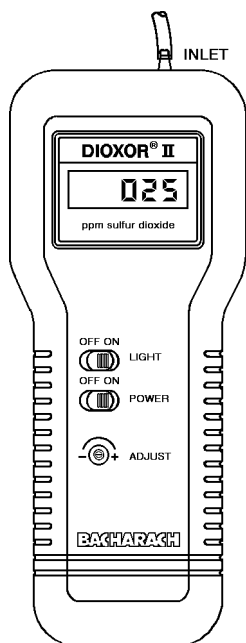


Figure 1. Dioxor II

The Dioxor<sup>®</sup> II is a commercial-grade portable instrument designed to display concentrations of sulfur dioxide (SO<sub>2</sub>) gas between 0 and 2000 ppm. This instrument shows the presence of SO<sub>2</sub> in a gas sample by drawing the sample into its sensor chamber by a built-in motorized pump. Part #19-7038 comes with a probe. Part #19-7043 comes without a probe (All non-probe related functions remain the same in this instruction).

Other features and accessories of the Dioxor 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 with sample filter that allows gas samples to be taken from cramped and confined areas (alternate probes and condensate traps may be used).

## 2 TECHNICAL CHARACTERISTICS

SO <sub>2</sub> Display Range .....	0-1999 ppm SO <sub>2</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 inches (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 DIOXOR 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 SO<sub>2</sub> indications, the SO<sub>2</sub> sensor is installed and the instrument calibrated on a known SO<sub>2</sub> 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.

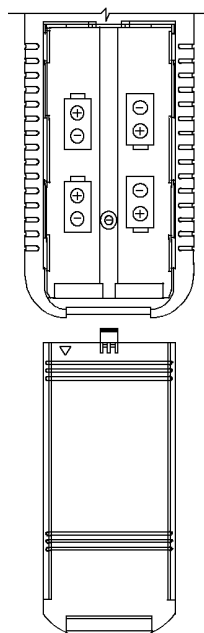


Figure 2. Battery Installation

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.

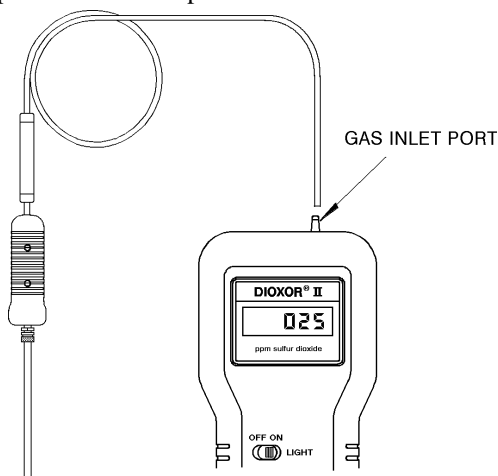


Figure 3. Probe Installation

## 4 OPERATION

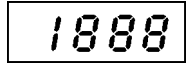
To operate the Dioxor II, you simply . . .

- 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 5-15 seconds; after which, the LCD shows the detected SO<sub>2</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!** When storing the instrument for extended periods of time, remove the batteries and ensure that the POWER switch is OFF. The OFF position places a short across the SO<sub>2</sub> sensor, thus keeping the sensor from being destabilized while not in use.

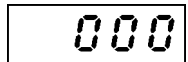
### 4.2 Zeroing the Instrument

After being turned on and warmed up for at least 1 minute, the instrument should indicate 000 ±5 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 sulfur dioxide.

**NOTE:** An indication that the instrument was not zeroed in fresh air is when a large negative SO<sub>2</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 ±3 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 Dioxor 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.

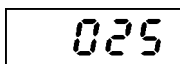
Both hose and probe are detachable from the instrument when sampling without the probe, or when sampling with a different probe is desired.

**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 SO<sub>2</sub> levels in the range from 0 to 1999 ppm. The display on the right indicates an SO<sub>2</sub> level of 025 ppm.



025

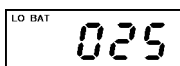
## Overrange

When the gas sample exceeds 1999 ppm, a “1” is displayed on the LCD. To clear an overrange condition, leave the instrument turned on and sample fresh air until the LCD returns to displaying SO<sub>2</sub>.

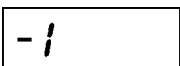


## Low Battery Indications

When the battery voltage becomes low, the “LO BAT” indicator appears. Although the instrument will continue to operate and give SO<sub>2</sub> readings under these conditions, the batteries should be replaced as soon as possible.



When the battery voltage becomes too low for the instrument to operate, a “-1” is displayed on the LCD. No SO<sub>2</sub> readings are provided under these conditions.



## 4.7 Long-Term Storage

When storing the Dioxor II for extended periods of time, set its POWER switch to OFF and remove the batteries. The POWER OFF position places a short across the SO<sub>2</sub> sensor, thus keeping it from being destabilized while not in use.

## 5 MAINTENANCE

The Dioxor 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

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

### 6.2 Bacharach Sales/Service Centers

#### United States

Bacharach S/S Center  
625 Alpha Drive  
Pittsburgh, PA 15238  
(412) 963-2164/2157  
(412) 963-2640 FAX

Bacharach S/S Center  
8618 Louisiana Place  
Merrillville, IN 46410  
(219) 736-6178  
(219) 736-6269 FAX

Bacharach S/S Center  
7300 Industrial Park  
Rt. 130, Bldg. 22  
Pennsauken, NJ 08110  
(609) 665-6176  
(609) 665-6661 FAX

Bacharach S/S Center  
5151 Mitchelldale, B-4  
Houston, TX 77092  
(713) 683-8141  
(713) 683-9437 FAX

Bacharach S/S Center  
7281 Garden Grove Blvd.  
Suite H  
Garden Grove, CA 92841  
(714) 895-0050  
(714) 895-7950 FAX

#### International

Bacharach, Instruments Int'l  
58 Kongensgade  
DK 6070 Christiansfeld  
Denmark  
45 (74) 563171  
45 (74) 563178 FAX

Bacharach of Canada  
101 Amber Street, Unit #1  
Markham, Ontario L3R 3B2  
(905) 470-8985/8039  
(905) 470-8963 FAX

## 7 HAZARDS OF SULFUR DIOXIDE

### Properties:

Sulfur dioxide (SO<sub>2</sub>) is a colorless, nonflammable gas that has a strong pungent odor, is twice as heavy as air, and is highly corrosive to ordinary metals when mixed with water vapor.

### Physiological Effects:

Exposure to sulfur dioxide gas in low concentrations produces an irritating affect on the mucous membranes of the eyes, nose, throat, and lungs due to the formation of sulfurous acid as the gas comes in contact with the moisture on these surfaces.

Acute exposure through inhalation may result in dryness and irritation of the nose and throat, choking, sneezing, coughing, and broncho-spasm. Severe overexposure may cause death through pulmonary edema (abnormal fluid buildup in the lungs), or from respiratory arrest. Prolonged or repeated exposure may cause impaired lung function, bronchitis, hacking cough, nasal irritation and discharge, increased fatigue, alteration in the senses of taste and smell, and longer duration of common colds.

### PPM Level Attributes:

- |                       |  |
|-----------------------|--|
| <b>1 ppm</b>          | Injurious to plant foliage.  |
| <b>2 ppm</b>          | Eight-hour time-weighted average (TWA) exposure limit set by the U.S. Occupational Safety and Health Administration (OSHA) <sup>[1][2]</sup> . |
| <b>3 ppm</b>          | Noticeable odor.   |
| <b>6 to 300 ppm</b>   | Immediate irritation of the nose and throat.   |
| <b>300 to 500 ppm</b> | Immediately dangerous to life.   |

## **First Aid:**

Move victims to fresh air. If breathing has ceased, begin artificial respiration immediately. Administer oxygen if exposure has been severe and breathing is difficult. Seek medical attention immediately.

## **References:**

[1] *Code of Federal Regulations*, Title 29 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.

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