

# INSTRUCTION MANUAL

## EC50 ToxCO

Breath Carbon Monoxide  
Monitor

**Bedfont**  
INSTRUMENTS

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BSEN ISO9001

Please read this manual  
before using the ToxCO

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## CONTENTS

1. The EC50 ToxCO
2. Carbon Monoxide (ppm)/Carboxyhaemoglobin (%COHb) Correlation
3. Packing List
4. Display and Functions
5. Operating Instructions
6. Calibration Procedure
7. What to do IF... A Trouble Shooting Guide
8. Technical Specification
9. References
10. Guarantee and Customer Service

**THE BEDFONT EC50 ToxCO**  
Breath Carbon Monoxide Monitor

**INTRODUCTION**

**1. THE EC50 ToxCO**

Welcome to the EC50 ToxCO. It is probably the most user-friendly, accurate and rapid lung-breath Carbon Monoxide (CO) and bloodstream Carboxyhaemoglobin (COHb) monitoring system yet developed.

Clear, rapid displayed readings give instant feedback of results, to which a diagnosis of possible CO poisoning can be made.

**2. CARBON MONOXIDE (ppm)/CARBOXYHAEMOGLOBIN**

Carbon Monoxide is a toxic, odourless, colourless, tasteless gas. It is formed from incomplete combustion of organic material at high temperatures with an insufficient Oxygen supply. When inhaled, CO competes successfully with Oxygen in the bloodstream to form COHb. This starves the body tissues of the Oxygen vital to repair, regeneration and general living.

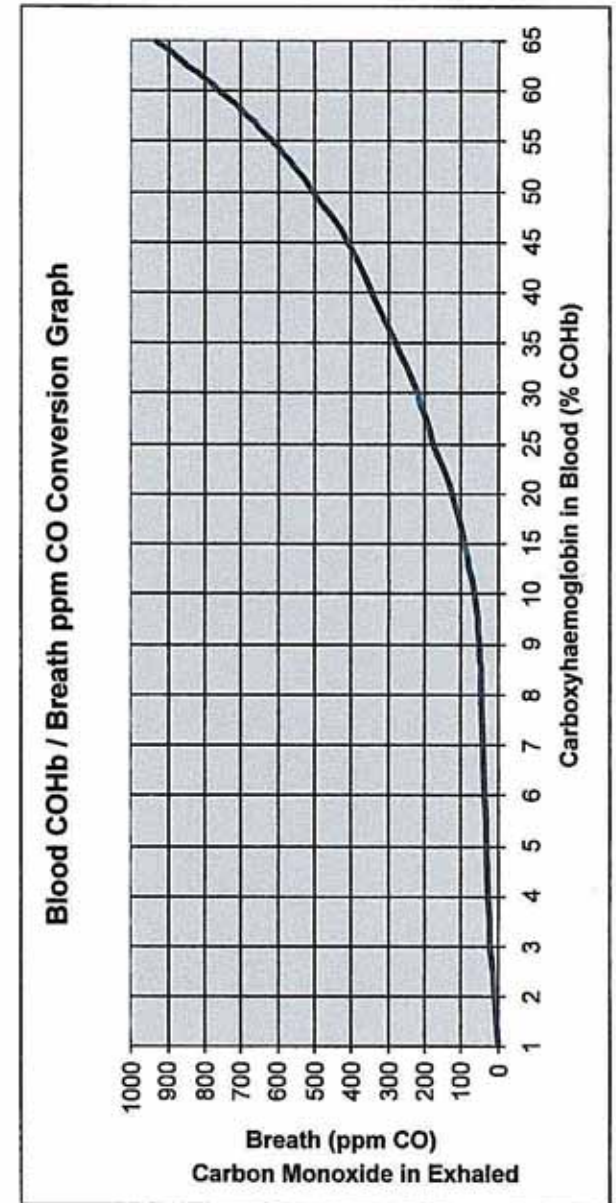
CO can remain in the bloodstream for up to 24 hours, depending on a range of factors including physical activity, sex and inhalation intensity. The half life is about 5 hours with no treatment (normal environment conditions). 1.5 hours normal 100% oxygenation. 0.58 hours hyperbaric oxygenation 100% Oxygen.

Breath Carbon Monoxide is measured in parts per million (ppmCO) and blood Carboxyhaemoglobin in percentages (%COHb). But the two are compatible and convertible, CO relating lung/breath and COHb to blood gas. The ToxCO usually displays COHb, but can be automatically converted to COppm.

Clinical research has demonstrated that a useful relationship between Carbon Monoxide and Carboxyhaemoglobin is obtained after a short period of breath-holding by the person.

CO readings demonstrate the levels inhaled of poisonous CO, while the COHb reading shows the percentage of vital Oxygen that has been replaced in the bloodstream.

Many government bodies stipulate a maximum CO exposure in industrial environments as 50ppm CO for no more than eight hours time-weighted average.



### 3. PACKING LIST

1. ToxCO
2. T-piece Sampling System
3. Cardboard disposable mouthpieces (x3)
4. Calibration adaptor
5. Adult face mask
6. Child face mask
7. Infant face mask
8. Face mask Sampling System
9. Calibration screwdriver
10. Battery
11. Operating manual
12. Carrying case

### 4. DISPLAYS AND FUNCTIONS

The LCD gives a three digit display, low battery symbol, ppmCO, and %COHb indicators. In addition, the LCD shows a 15 second countdown during which the patient holds a lungful of breath before providing the end-tidal breath sample.

The Auto Zero enables the operator to zero the instrument before use, ensuring accurate readings every time.

Once the end-tidal breath sample has been obtained and blood %COHb readings shown on the LCD, the highest value remains on the LCD. The user can, by pressing the black ppm button, show the patient's breath CO levels expressed in ppm. Thus, in a single operation, COHb and CO levels are demonstrated effectively and accurately.

### 5. OPERATING INSTRUCTIONS

#### Step 1

Ensure battery is located in battery compartment. Switch ON/OFF switch to ON position. If low battery symbol is displayed, switch instrument off and replace 9 volt alkaline battery which is located in the battery compartment. Then repeat from step 1.

#### Step 2

Display will show 000 followed by a descending %COHb value.

#### Step 3

Wait for display value to fall and become stable. After warm up period (approximately 30 seconds), press and hold the red ZERO button. The display will show 5 E t, followed by C H L, and finally 00 (approximately 3 seconds). Release red ZERO button.

#### Step 4

Connect T-piece Sampling System with cardboard disposable mouthpiece inserted into instrument. Ensure all connections are firmly pressed together.

#### Step 5

Press the green GO button within 2½ minutes and ask the patient to hold his/her breath during the 15 second countdown period. (NOTE:- If the green GO button is not pressed within 2½ minutes, the display may briefly show E t followed by real time monitoring. To get back to the 00 message, the red ZERO button should be pressed and held, until the display shows 5 E t, followed by C H L and finally 00 (approximately 3 seconds) then repeat from step 4. The patient should then exhale slowly and gently, emptying the lungs as far as possible. A powerful exhalation may dislodge the valve and will not necessarily provide the desired end-tidal air sample. Alternatively, if children or people unable to give samples are to be monitored, a modified sampling technique can be used.



This consists of a specially constructed breathing system which allows exhaled breath to be directed to the instrument's sensor for analysis. The appropriate size face mask should be placed over the nose and mouth of the patient, care being taken to avoid leaks around the mask cushion. The patient can then breathe normally, whilst being encouraged to exhale as much as possible.



This procedure can start either after the 15 second countdown or during it. The display can then be observed to ensure the maximum reading is obtained.

NOTE: People with lung diseases or chest ailments may not be able to achieve the 15 second breath-hold. In such cases, initiate the 15 second countdown, wait for 0.0 %COHb to show on the LCD, and then instruct the patient to inhale. Hold breath as long as possible, and exhale through the Sampling System mouthpiece. Alternatively, if people with contagious diseases are being analysed, Bedfont recommend the Sampling System be replaced.

### Step 6

The display will then flash while the %COHb value is rising and become constant once the maximum value is reached. Pressing the black ppm button will show the corresponding ppm value, and on release will revert back to display the %COHb value. The maximum value will then be stored on the display until step 7 or switch off.

### Step 7

If any further readings are required, remove T-piece and press and release the green GO button, which reverts back to real time monitoring. Allow the display to fall below 0.5 %COHb. Press the red ZERO button to allow the display to show GO. Repeat from step 4.

**Note:- Always allow display to fall below 0.5 %COHb  
In addition this applies when no further readings are to be taken, and the unit is to be switched off.**

## 6 CALIBRATION PROCEDURE

For continued accurate use, calibration on a monthly basis is recommended.

### Step 1

Ensure battery is located in battery compartment. Switch ON/OFF switch to ON position. If low battery symbol is displayed, **switch instrument off** and replace 9 volt alkaline battery which is located in the battery compartment. Then repeat from step 1.

### Step 2

Display will show **888**, followed by a descending %COHb value.

### Step 3

Wait for display to fall and become stable. After warm up period (approximately 30 seconds) press and hold red ZERO button. The display will show **SEt**, followed by **CRt** and finally **GO** (approximately 3 seconds).

### Step 4

Ensuring that the valve is in the OFF position, screw the Fine Control Valve (FCV) and Flow Indicator (FI) assembly to the gas can. This is best done by screwing the gas can into the valve.

### Step 5

With the tubing, connect the Calibration Adaptor and the Flow Indicator. (Warming the end of the tubing will assist connection).

### Step 6

Insert the Calibration Adaptor into the clear section of the T-piece Sampling System. Ensure all connections are firmly pressed together.



### Step 7

Press the green GO button until 0:15 appears on the LCD, indicating initiation of the 15 second countdown.

### Step 8

At the end of the countdown, 0.0 %COHb should appear on the LCD. If it does not, repeat the sequence from step 1. When 0.0 %COHb shows on the LCD, calibration may proceed.

### Step 9

Insert the T-piece Sampling System into the ToxCO sensor housing, ensuring that it is correctly seated.

### Step 10

Open the Fine Control Valve (FCV) and allow the gas to flow at 0.5 litres/minute. To maintain this, adjust the flow so the ball in the Flow Indicator remains at the lower line.

### Step 11

Allow gas to flow through the instrument for 1½ minutes to ensure accurate calibration, again monitoring the rate of flow.

### Step 12

If after 1½ minutes, the LCD does not show between 8.5% and 9.5%, press and release the green GO button and using the screwdriver, adjust the SPAN control on the underside of the instrument, until display shows between 8.5% and 9.5% COHb. Turning anti-clockwise will increase the reading and turning clockwise will decrease value. Alternatively, the ppm button can be pressed and 50ppm can be set on the display.



### Step 13

Turn off the gas flow, remove T-piece Sampling System and disconnect the Calibration Adaptor from the T-piece Sampling System.

### Step 14

Unscrew the Fine Control Valve and Flow Indicator from the gas can and store safely. If valve is left in can, the gas could escape.

### Step 15

Let the ToxCO stand for approximately one minute to allow the reading to decrease before further use.



## 7. What to do IF...

**There is no LCD or panel response under gas when sampling with new batteries?**  
Return the equipment immediately to Bedfont Scientific Ltd or the local representative. Under no circumstances attempt to locate and correct the fault yourself.

**LCD readings are erratic and unsteady?**  
Check battery strength by switching the unit off and then back on again. If the LOW BATTERY warning appears, change the battery.

**The ToxCO returns consistently low readings or none at all?**  
Check the condition of the Flutter Valves inside the Sampling System. Under frequent use, saliva deposits can cause valves to stick. DO NOT attempt to clean them but replace the complete Sampling System immediately.

If, after replacement, there is no improvement in performance, return the ToxCO to Bedfont Scientific Ltd or the local representative.

**The LOW BATTERY warning shows on the LCD?**  
Switch unit off and change battery immediately. Replacement battery must be of good quality.

**Your ToxCO is dropped or immersed in liquid?**

Return the instrument to Bedfont Scientific Ltd or the local representative for checking.

**NEVER, UNDER ANY CIRCUMSTANCES, ATTEMPT TO IMMERSE THE SENSOR IN ANY FLUID. THE SENSOR IS A SEALED UNIT WHICH DOES NOT NEED STERILISING. DO NOT ATTEMPT TO REPLACE OR MODIFY THE SENSOR YOURSELF.**

**8. TECHNICAL SPECIFICATION**

Gas Detected:	Carbon Monoxide (CO)
Concentration Range:	0-999ppm
Calibration Flowrate:	0.5 litres/minute
Detection Principle:	Electrochemical sensor
Accuracy:	+/-5% of reading
Hydrogen Cross Interference:	<10% @20°C
Alcohol Cross Interference:	Negligible
Display:	Liquid Crystal Display
Power Input:	PP3 alkaline battery (9v 6LF22/Equiv)
Note:	to avoid long start up times, ensure ToxCO is switched OFF if battery is removed.
Warm up Time:	Typically less than 30 seconds
Response Time:	Under 30 seconds to 90% FSD
Drift:	Typically less than 2% signal loss/month

Operating Temperature Range: 0-40°C

Operating Humidity Range: 0-100%

Sensor Operating Life: 2-3 years. 6 months warranty

Sensor Sensitivity: 1ppm

Dimensions: 63 (D) x 85 (W) x 144 (H)mm

Weight Including Battery: Approx. 225 grammes

Construction: Plastic

Recommended Storage Temperature: 0-30°C

Meets the essential requirements of the Medical Device Directive 93/42/EEC Annex V. Certificate No. CE:01469.

**9. REFERENCES**

The following clinical and research references are available from Bedfont.

Low Cost Carbon Monoxide Monitors in Smoking Assessment; Jarvis, Belcher, Vesey, Hutchinson, (Thorax 1986; 41; 886-887)  
Evaluation of a Portable Measure of Carbon Monoxide; Irving, Phil, Clark, Crombie, Smith, (Preventive Medicine 1988; 17; 109-115)

**10. GUARANTEE AND CUSTOMER SERVICE**

**INSTRUMENT GUARANTEE**

**BEDFONT INSTRUMENTS WARRANTS PORTABLE INSTRUMENTS OF ITS OWN MANUFACTURE (BATTERIES, FUSES, LAMPS, TUBING, FITTINGS AND FILTERS EXCEPTED) TO BE FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF SHIPMENT. BEDFONT'S SOLE OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIRING OR REPLACING, AT ITS CHOICE, ANY ITEM COVERED UNDER THIS WARRANTY WHEN SUCH ITEM IS RETURNED INTACT, PREPAID, TO BEDFONT SCIENTIFIC LTD OR THE LOCAL REPRESENTATIVE.**

**NOTE: SENSORS ARE GUARANTEED FOR A PERIOD OF SIX MONTHS FROM THE DATE OF SHIPMENT FROM BEDFONT.**

**THESE WARRANTIES ARE AUTOMATICALLY INVALIDATED IF THE PRODUCTS ARE REPAIRED, ALTERED OR OTHERWISE TAMPERED WITH BY UNAUTHORISED PERSONNEL, OR HAVE BEEN SUBJECT TO MISUSE, NEGLIGENCE OR ACCIDENT.**