

4.8 Technical Specifications:

Topic	Mini	Micro
Gas detected	CO	CO
Concentration range	0–500ppm	0–500ppm
Detection principle	Sealed electrochemical sensor	
Meter	Liquid crystal display LCD	
Sampling system	Two flutter-valve T-piece (2 section assembly)	
Mouthpieces	Cardboard disposable (paediatric size)	
Warm-up time	Less than 10 seconds	
Response time	Less than 30 seconds	
Operating temp. range	0–40° Centigrade	
Operating humidity range	0–100% RH (Hydrophobic filter protects sensor from condensed water vapour)	
Operating sensor life	2–3 years, guaranteed 6 months	
Sensor selectivity	Negligible interference from alcohol and other organic species under normally encountered situations. 20ppm hydrogen gives less than 4ppm reading.	
Power supply	5×C (1.5v) alkaline batteries	1×(9v) alkaline battery
Dimensions	D178mm (7ins) W162mm (6.4ins) H103mm (4.0ins)	D63mm (2.5 ins) W85mm (3.4ins) H144mm (5.7ins)
Weight	Approx 2Kg (4.4lbs)	Approx 225gm (8oz)
Construction material	Steel	Plastic



OPERATOR'S MANUAL

FOR THE
**MINI AND MICRO II
SMOKERLYZERS®**

**BREATH TESTING CARBON MONOXIDE
MONITORS FOR SMOKING EDUCATION
AND CESSATION PRACTICE**

Scientific contributions to
industrial and international health



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FM 31664

PRECISION GAS TECHNOLOGY

4.5 Accessories and Parts. (Prices on application):

Part No.	Description
EC50-CC3	Durable red injection-moulded plastic Mini Smokerlyzer® carrying case.
EC50-CC4	Durable black injection-moulded plastic Micro II Smokerlyzer® carrying case.
EC50-DMP	Pack of 200 disposable mouthpieces.
MM-PMP	Pack of 250 disposable mouthpieces.
EC50-HP	Pack of 500 disposable mouthpieces.
EC50-CALIB	Calibration Kit, sufficient for 5–10 calibration checks (fits either model).
EC50-CAN	Replacement can of calibration gas.
EC50-NSS	Pack of 10 disposable sampling systems.
EC50-TT	Calibration and zeroing screwdriver.
EC50-COS	Replacement electro-chemical sensor.
EC50-CA	Calibration Adaptor.
EC50-L	Leaflet – “Stopping Smoking and Carbon Monoxide” a guide to Health Educators and counselled smokers. Packs of five leaflets.
EC50-DISK	Horrorsmokes computer program for use with Smokerlyzers® ; IBM compatible, in MS-DOS and BBC versions. (Specify 3.5 or 5.25 inch disk.)
EC50-VIDEO 1	Smokerlyzer® Training Video.
EC50-SP	“The Smiling Face of Death” – a hard-hitting slide presentation, available in audio visual or slide and programme note formats.
EC50-POST	A vibrant, informative A3 poster for waiting room and counselling area display, showing how smoking and CO affects the body.

THE BEDFONT SMOKERLYZERS®

1. INTRODUCTION:

1.1 The Smokerlyzer® :

WELCOME to the Smokerlyzer® . It is probably the most user-friendly, non-invasive, accurate and rapid lung-breath Carbon Monoxide (CO) and bloodstream Carboxyhaemoglobin (COHb) monitoring system yet developed. In a single operation, it enables you to show smokers the potential damage they are doing to themselves and others, counsel them on stopping and illustrate their progress when giving up smoking.

Working without blood or saliva samples, Smokerlyzers® help build patient confidence. Clear, rapidly displayed readings give instant feedback of results, generating confidence and maintaining the will to persevere – and all from a single breath.

1.2 You and the Smoker:

As the Cessation Counsellor, you are privileged. Patients seek your help and guidance. Smokers are addicts of nicotine, but it is the CO that does the real damage.

Smokers need help, not lectures. The Smokerlyzer® offers a vital opportunity for real patient contact. To maximise that opportunity, you must understand the smoker, which is why this manual was written by a former heavy smoker who knows the difficulties of giving up.

Not all smokers come to you willingly. Some, pressured into quitting by employers, workmates, family or medical advisers, may well feel anger and resentment. Their view may well be that they have done nothing “illegal”.

Others may be frightened. They know they should stop, but do not know how they will manage without tobacco. They look to you for confidence, understanding and answers. With Smokerlyzer® you can provide all of this and more .

Willpower is vital in stopping smoking. But it has to be generated and maintained. When the going gets rough, willpower needs boosting. Smokerlyzers® are invaluable, charting progress and thus, maintaining the determination to succeed.

YOUR SMOKERLYZER® IS NOW CORRECTLY CALIBRATED AND
READY FOR ANOTHER SIX MONTHS' ACCURATE USE.

NOTES:

- a) All Smokerlyzers® are factory-calibrated prior to despatch.
- b) Always use good quality alkaline batteries.
- c) Never attempt to calibrate when the low battery warning shows on the LCD.
- d) Zero once only during each calibration procedure.
- e) Use only Bedfont Calibration Kits containing a known, accurate gas mixture of 50ppm Carbon Monoxide (CO) in air.
- f) The SPAN adjustment is for use ONLY when calibrating the instrument. It should NEVER be used for any other reason.

With or without the additional elements, Bedfont Smokerlyzers® present a sobering picture of smoking damage and graphic reasons for stopping – with enough shock effect to attract and concentrate the attention.

1.5 Carbon Monoxide (CO)/Carboxyhaemoglobin (%COHb) correlation:

Carbon Monoxide is a toxic, odourless, colourless, tasteless gas. Harmful in any concentration, it can kill. It is formed from incomplete combustion at high temperatures with an insufficient oxygen supply – at the end of a cigarette. When inhaled, CO competes successfully with Oxygen in the bloodstream to form COHb. This starves body tissue of the oxygen vital to repair, regeneration and general living. To compensate, the heart works harder constantly – a contributory factor in heart disease.

Although natural CO in the body varies between individuals and with surroundings – town or country – smokers have much higher CO levels than non-smokers.

CO concentration is time-related, at its highest just after a cigarette or pipe. Concentration also increases with tobacco consumption throughout the day. Further, CO can remain in the bloodstream for up to 24 hours, depending on a range of factors including, physical activity, sex of smoker and inhalation intensity.

Carbon Monoxide is measured in parts per million (ppmCO) and Carboxyhaemoglobin in percentages (%COHb). But the two are comparable and convertible, CO relating lung/breath and COHb to blood gas.

Clinical research has demonstrated that a useful relationship between Carbon Monoxide (CO) and Carboxyhaemoglobin (%COHb) is obtained after a short period of breath-holding by the subject.

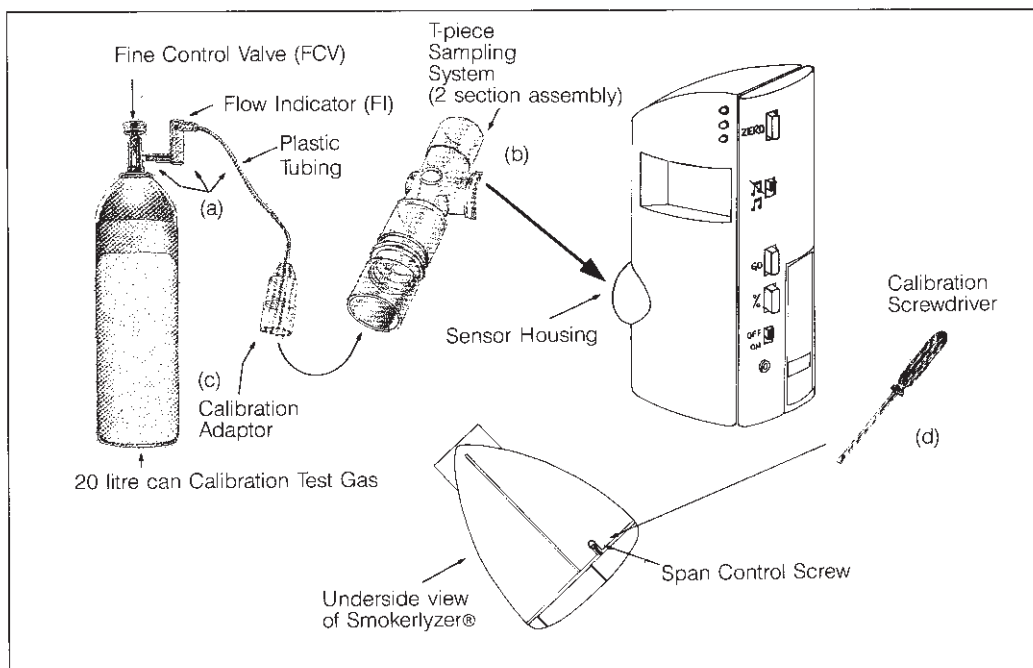
CO readings demonstrate the levels inhaled of poisonous CO, while the COHb reading shows the percentage of vital oxygen that has been replaced in the bloodstream. The conversion chart on page 5 may be copied to provide each patient with a personal record for reference and for future use as a measure of progress.

4.3 Calibrating the Micro II Smokerlyzer® :

- a) Calibrating your Micro II Smokerlyzer® at six-monthly intervals will ensure accurate readings throughout the life of the instrument.

This simple operation takes about five minutes, but, before starting, check that you have all the required accessories, as follows:

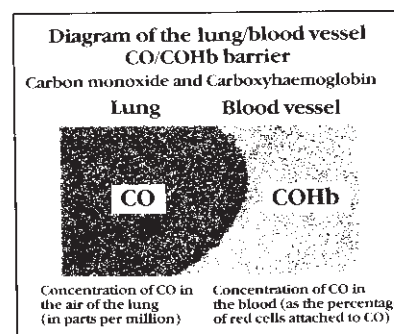
- 1) Bedfont Calibration Kit, consisting of:
20 litre can of 50ppm Carbon Monoxide (CO) in air;
Fine Control Valve (FCV) and Flow Indicator (FI) with length of plastic tubing;
- 2) Calibration Adaptor
- 3) Sampling System (2 section T-Piece assembly);
- 4) Screwdriver.



- b) Familiarisation. Lay all the parts out on a table. Compare them with the illustration above and become thoroughly familiar with them.

1.6

The table shows the equivalent values of breath carbon monoxide (CO) and carboxyhaemoglobin (COHb).



Note: As a very rough guide, CO in parts per million can be obtained by multiplying COHb by 6.

CO (ppm)	The CO/COHb table	COHb (%)
90		15
85		14
80		13
75		12
70		11
65		10
60		9
55		8
50		7
45		6
40		5
35		4
30	Heavy smoker	3
25		2
20		1
15	Light smoker	0
10		
5	Non smoker	
0		

CO concentration in parts per million Blood COHb concentration as a percentage

4.2.1. To Calibrate the Instrument:

READ CAREFULLY AND ENSURE THAT YOU UNDERSTAND THE INSTRUCTIONS BELOW. DO NOT TAKE ANY SHORT CUTS.

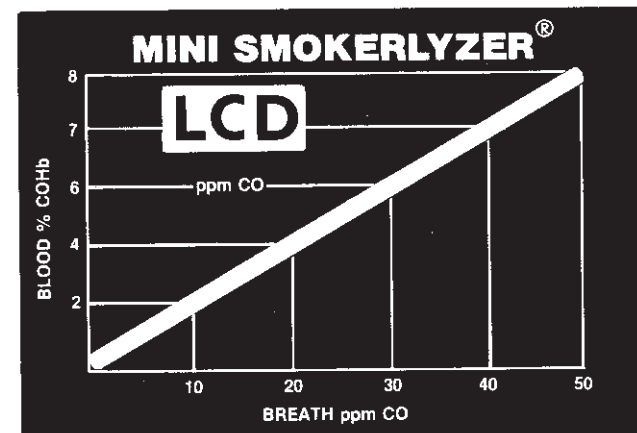
- a) Switch the Smokerlyzer® on. N.B. If the Low Battery symbol appears on the LCD, stop and replace ALL five batteries immediately. Ensure that replacements are alkaline batteries of the same standard and quality. Under no circumstances attempt calibration when the low battery symbol is displayed.
- b) Ensuring that the valve is in the OFF position, screw the Fine Control Valve/Flow Indicator (FCV/FI) onto the gas can.
- c) Using the plastic tubing, connect the Flow Indicator (FI) and Calibration Adaptor.
- d) Insert Calibration Adaptor into the clear (unobstructed) section of the T-Piece Sampling System.
- e) If any reading above 000 shows on the LCD, insert the screwdriver into the ZERO control and adjust until 000 or 001 is displayed.
- f) Insert the Sampling System into the Remote Sensor Handle.
- g) Open the FCV to achieve a gas flow rate of 0.5–1.0 litre/minute, indicated when the ball in the Flow Indicator (FI) floats between the bottom and middle lines. Maintain an even gas flow, adjusting as necessary.
- h) Allow gas to flow through the instrument for four minutes minimum, checking the rate of flow at all times.
- i) If, after four minutes, the LCD does not read 50ppm, insert the screwdriver into the SPAN control (first removing the protective cap) and adjust until the LCD is steady on 50ppm.
- j) Turn off gas supply, remove sampling system and calibration adaptor and replace protective cover on Span control. (If the calibration adaptor and sampling system are not disconnected from the can, gas will escape.)
- k) Unscrew the fine control valve from the gas can and store safely.
- l) Let the Smokerlyzer® stand while the reading decreases. If you find that the reading does not fall back to 000 after calibrating, DO NOT RE-CALIBRATE. The sensor has become saturated during calibration and needs time to adjust.

YOUR SMOKERLYZER® IS NOW CORRECTLY CALIBRATED AND READY FOR ANOTHER SIX MONTHS' USE.

2.2 The Displays

The display panel shows two readings:

- The small LCD digital display shows parts per million Carbon Monoxide (ppmCO), providing an accurate analysis of lung/breath gas.
- The main panel shows the relationship between lung/breath CO and Carboxyhaemoglobin (%COHb) in the bloodstream, illustrating how smoking effect extends far beyond the lungs.



For patient and client use, coloured lights drive the message home:-

GREEN = 0–10ppm CO (non-smoker)
AMBER = 11–20ppm CO (light smoker)
RED = 21–100ppm CO (heavy smoker).

4. SERVICE AND MAINTENANCE

INFORMATION FOR MINI AND MICRO II SMOKERLYZERS®

4.1 General Maintenance:

Smokerlyzer® maintenance is easy, and made even easier with the Smokerlyzer® Training Video. This is available, either on a two week loan, or for purchase and a useful accessory, from Bedfont.

A regular wipedown with a cloth moistened in dilute disinfectant solution and well wrung-out is the only cleaning necessary. Do not allow moisture to enter the LCD display unit or the Sensor area.

Regular checks of the T-Piece Sampling System is required. Do not attempt to clean it. If it becomes dirty or sticky, replace the whole sampling system.

A routine calibration check should be programmed at six month intervals.

The only other maintenance required is a regular battery check, replacing ALL batteries when low.

- g) Select the audible signal function (if preferred) by pressing the round button below the On-Off Switch.
- h) Ask the patient to take a deep breath, hold it for 15 seconds, and then breathe out steadily and gently into the mouthpiece, ensuring a good, tight seal with the lips. The patient must empty the lungs as far as possible to obtain the best possible sample of alveolar air.
- i) Wait for the maximum reading to show on the LCD and note the result. At the same time, invite the patient to watch both digital and coloured displays increasing.
- j) Clear the system for the next patient by removing the T-Piece Sampling System and exposing the Sensor to room air.
- k) Change the Cardboard Disposable Mouthpiece and you are ready for the next patient.

Notes:

- a) If the low battery symbol shows on the LCD, change ALL batteries for a new batch of reliable make. USE ONLY GOOD QUALITY ALKALINE BATTERIES.
- b) You do not have to re-zero after each sample.
- c) Zero the Smokerlyzer® once per day only.
- d) DO NOT adjust the Span Adjustment Control – This is used only when calibrating the instrument against a known gas mixture, (See 4.2: Calibrating the Mini Smokerlyzer®).
- e) Your Smokerlyzer® has been calibrated prior to despatch. It is ready for immediate use after zeroing.

2.4 Demonstrations:

Demonstrations are vital to achieving maximum equipment effect and patient attention. They also form an essential part of the patient's stop smoking education.

- Obtain a general room reading in ppmCO by removing the T-Piece Sampling System and exposing the sensor to the air.
- Take a mouthful of smoke – better still; have a patient do it – blow it into the mouthpiece and watch the reading go off the scale.
- Simply hold a lit cigarette near the sensor (T-Piece removed).
- Sample a non-smoker to show the ppmCO levels to be expected after quitting.

By comparing these four results, you can offer visible, positive proof of the toxic effect of tobacco abuse.

- e) Press and release the red AUTO ZERO button, which will cause the LCD to display SET and then GO.

Analysing a lung/breath sample:

- f) Hand the Smokerlyzer® to the patient and ask him/her to inhale deeply. When the patient is fully inhaled, press the GO button and have him/her hold breath during the displayed 15 second countdown period. If the audible signal is selected, the final three seconds of countdown are marked by three short bleeps and a final long one, warning the patient to be ready to exhale. Exhalation should be controlled and gentle, emptying the lungs as far as possible. A powerful exhalation may dislodge the filter and will not necessarily provide the desired alveolar air sample.

Obviously, 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 0ppm to show on the LCD, and then instruct the patient to inhale, hold breath for as long as they can, and exhale through the Sampling System mouthpiece.

- g) Wait for the maximum reading to show on the LCD and note the result.
- h) If the patient/client's Carboxyhaemoglobin (%COHb) level is required, this can be obtained simply by pressing the black % button. The ppmCO reading on the LCD will change to %COHb and will continue until the % button is released.
- i) To prepare for the next breath sample, remove the T-Piece Sampling System from the Sensor Housing. Detach and replace the cardboard Disposable Mouthpiece.

3.2 Displays and Functions:

The LCD gives a three digit display, low battery symbol, ppmCO and %COHb indicators. It displays the patient's lung/breath CO reading in ppm and Carboxyhaemoglobin in the bloodstream in percentage. In addition, the LCD shows a 15 second countdown during which the patients holds a lungful of breath before providing the lung/breath sample.

The three LED's (Green, Amber and Red) give an immediate indication of the patient's smoking habit, providing additional psychological impact to the LCD ppmCO reading. The LED's will flash and then stay on in sequence, demonstrating CO levels in the lung, as follows:-

LCD READING	GREEN LED	AMBER LED	RED LED
0–10ppm CO (non-smoker)	FLASHES	OFF	OFF
11–20ppm CO (light smoker)	ON	FLASHES	OFF
21+ ppm CO (heavy smoker)	ON	ON	FLASHES

The Audible Bleeper (🎵) is an optional device, providing additional impact to the LCD readout. When switched on, it bleeps repetitively, increasing in speed as the ppm rate passes 10 and rises. The tone does not increase above 100ppm. This function can be turned off (🎵) without affecting performance of the instrument. Also, when counting down for a breath sample, the Audible Bleeper, if activated, will sound for the final three seconds, preparing the patient to breathe out. (Refer to GO function on Page 12 for full details.)

The Auto Zero enables the operator to zero the instrument before each breath sample, ensuring accurate readings everytime. However, this function should be used carefully and only in accordance with the operating instructions, as it is only effective within certain parameters (See Operating Instructions, 3.3). Pushing the Auto Zero beyond these limits may cause the LCD to display the message "Err" (Error). After an excessively high CO reading, the sensor will take slightly longer to return to ambient CO readings.