ToxCO®

User manual

CE
2797

Helping to determine levels of CO poisoning.

Important Information/Reminders

NOTE: Only technical data and no patient data is collected by Bedfont®.

WARNING: Please read the manual before use.

WARNING: Never use alcohol or cleaning agents containing alcohol or other organic solvents as these vapours will damage the electrochemical sensor inside.

WARNING: Under no circumstances should the instrument be immersed or splashed with liquid.

WARNING: Breath tests must only be carried out with Bedfont® accessories. Failure to do so may cause incorrect readings.

WARNING: The mouthpieces are single patient use only and can be used for a maximum of 3 tests. Further re-use could cause incorrect readings and could increase the risk of cross infection. The mouthpiece should be disposed of after use, in accordance with local waste disposal guidance.

WARNING: Patients should exhale for the duration of time indicated by the device during a breath test. Failure to do so may cause incorrect readings.

WARNING: To ensure a breath sample is taken at the correct flow rate, the device must be held upright at all times during a breath test.

WARNING: Do not block the exhaust ports on the device at any time. Blocking the exhaust ports may cause erroneous readings.

CAUTION: Ensure the device is used within the stated operating temperature and humidity ranges. Operating temperature is 0-50ºC. Operating humidity is 15-90% RH (non-condensing).

CAUTION: Portable and mobile RF communications equipment can affect the ToxCO® device.

NOTE: When selecting an accessory for the ToxCO® device, please be advised that an accessory not recommended by Bedfont® may result in loss of performance and damage to the ToxCO® device. The product warranty does not cover product failure or damage resulting from use with non-approved accessories.

NOTE: See Bedfont's infection control and maintenance guidelines for further information on infection control.

NOTE: Please do not attempt to modify the equipment in any way or use accessories not specified by the manufacturer. Any attempt to do so, will invalidate the warranty and may compromise the safety of the device.

NOTE: Bedfont® will make available on request service training to appropriately qualified personnel.

Contents

Introduction

Carbon monoxide is a toxic, odourless, colourless, tasteless gas[1]. It is formed from incomplete combustion of organic material at high temperatures with an insufficient oxygen supply[3]. When inhaled, CO competes successfully with oxygen in the bloodstream to form carboxyhaemoglobin (COHb). This starves the body tissues of the oxygen vital for 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, gender and inhalation intensity[9]. The half-life is about 5 hours with no treatment (normal environmental conditions), 1.5 hours if 100% oxygen is given and 0.58 hours if hyperbaric oxygenation at 100% oxygen is given[8].

Breath carbon monoxide is measured in parts per million (ppm) and blood carboxyhaemoglobin in percentages (%COHb). The two measurements are compatible and convertible, CO relating to lung/breath and COHb to blood gas as demonstrated by the conversion graph in the appendix. The device displays %COHb, but can also display in ppm if selected in the settings. CO ppm readings indicate the levels of poisonous inhaled CO, while the %COHb reading shows the percentage of vital oxygen that has been replaced in the bloodstream[7].

Clinical research has demonstrated that 'the concentration of carbon monoxide in end-expired air after breath holding correlates closely with carboxyhaemoglobin concentration'[3].

Operation of the ToxCO® is straightforward; a D-piece™ sampling system and face mask sampling modes allow the user to test a patient independent of their consciousness, whilst the ambient sampling mode helps to safeguard the user by alerting them if they are entering areas with high levels of CO.

A colour touchscreen ensures ease of operation, and all readings are automatically logged. Additionally, all breath test readings can be tagged with a name, place or patient ID for quick reference at a later date and time.

The ToxCO® not only helps to reduce unnecessary hospital admissions through instant screening but also helps to save the lives of patients and staff, one breath at a time.

Definitions

WARNING: indicates a potentially hazardous situation, which, if not avoided, may result minor or moderate injury.

CAUTION: indicates a potentially hazardous situation, which, if not avoided, may result in damage to the device.

NOTE: used to call attention to notable information that should be followed during use.

Compliance

The ToxCO® device is CE marked according to the Medical Device Directive 93/42/EEC.

Please refer to the 'Safety Information' section of this manual for more information on the compliance of the ToxCO® device.

Intended Use

The ToxCO® breath Carbon Monoxide device and its accessories are used in the screening of Carbon Monoxide (CO) poisoning and calculation of the carboxyhaemoglobin (COHb) level. The ToxCO® breath carbon monoxide device can be used by health professionals in medical institutions and emergency medical services where carbon monoxide exposure is suspected for paediatric, adult, and unconscious patients.

Contraindications

There are no known contraindications.

Instrument Layout
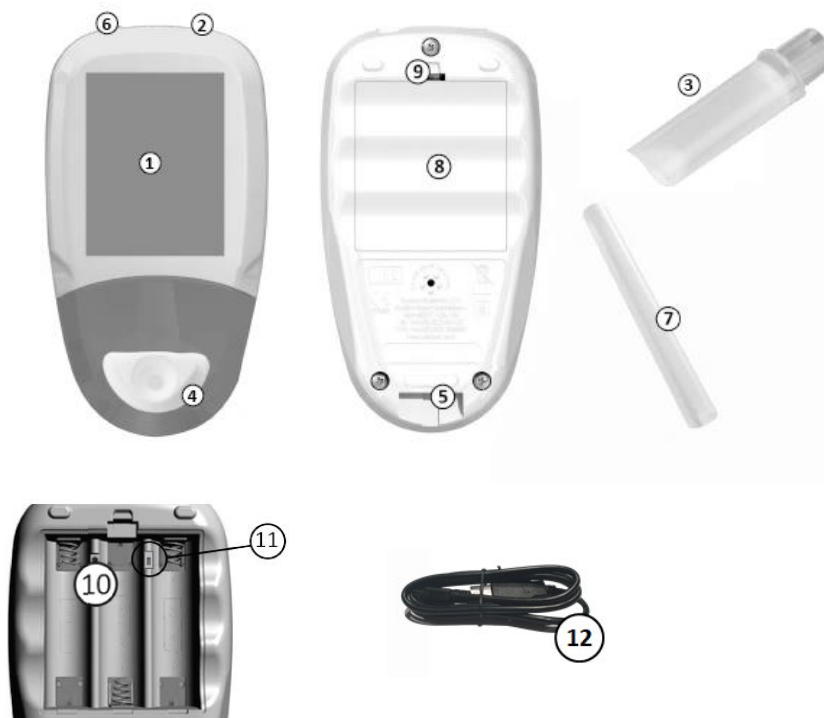
|	
1. Display	7. Single-use SteriBreath™ Eco mouthpiece
2. Power button	8. Battery compartment
3. Breath sampling D-piece™	9. Battery compartment clip
4. D-piece™ aperture	10. Reset button
5. Exhaust port for breath sample	11. Programming switch
6. USB connector (for use with ToxCOdata™ software)	12. USB cable (1.0m)

User Interface
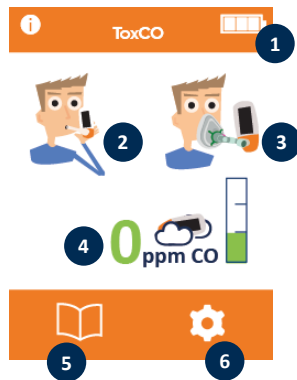
Home Screen

1. Battery status
2. Breath test
3. Face mask breath test
4. Ambient test
5. Patient profiles
6. Settings
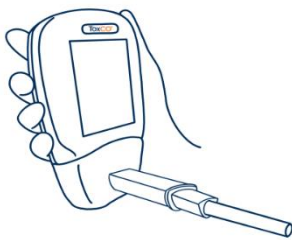
Taking a breath test
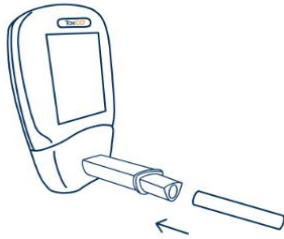
Attach a breath sampling D-piece™ and SteriBreath™ Eco mouthpiece.
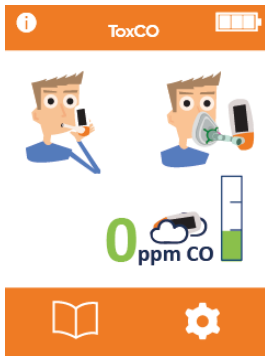
Turn on the device by pressing the power button once.

Press the breath test icon on screen.

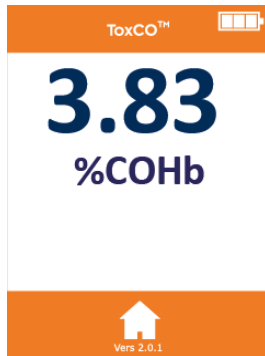Inhale and hold breath for the pre-set 15 second countdown as shown on screen. If unable to hold breath for full 15 seconds, the timer can be adjusted in the settings.

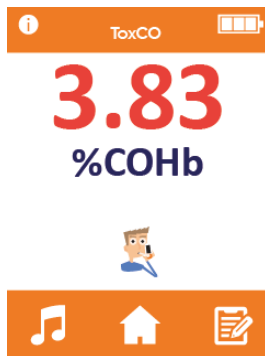Press the home button at any time to cancel the breath test.

A beep will sound during the last three seconds of the countdown.

Blow slowly into mouthpiece, aiming to empty lungs completely.

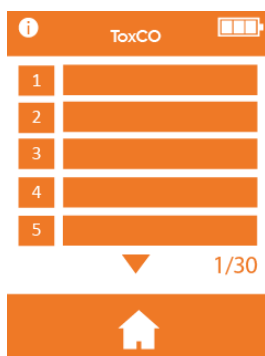The %COHb and equivalent ppm levels will rise and hold on-screen.

When the test is finished, the breath test, home and patient profile icons will appear at the bottom of the screen.

The alarm may be muted by pressing the mute button.

To repeat breath test, press the breath test icon and repeat steps.

To return to the home screen, press the home icon.

Results save automatically in the breath test log however, there is the option to tag a result with a place, patient's name or ID. To tag a result, press the patient profile icon and enter the place/ID/patient's name. Press the save button.

Remove the D-piece™ between tests to purge sensor with fresh air.

The unit will also power off after 8 hours of inactivity to save power. The display dims after 5 minutes and turns off after 15 minutes.

Taking a face mask test

NOTE: The face mask testing protocol has been developed for use on patients aged 6 years and over, with a respiration rate of between 12-20 breaths per minute. If face mask testing is used outside of these specifications, this may result in decreased accuracy of readings.
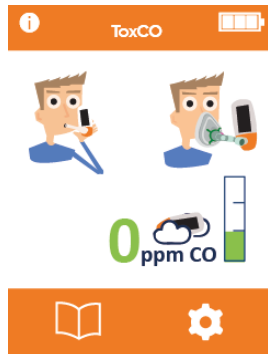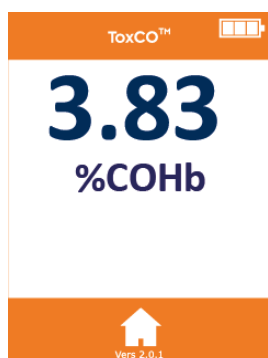

Attach a new face mask sampling system in conjunction with the D-piece™. Turn on the device by pressing the power button once.
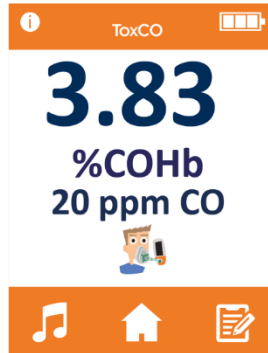
Press the face mask breath test option.

Inhale and exhale into the face mask, the device will take the reading in real-time.

Sampling will last 60 seconds as the %COHb/ppm levels rise and then hold at the peak level. The result will be shown onscreen.
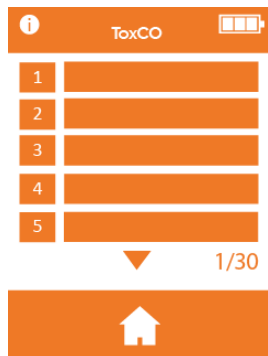
When the test is finished, the face mask breath test, music, home and save icons will appear at the bottom of the screen.

The alarm may be muted by pressing the mute button.

To repeat breath test, press the face mask breath test icon and repeat steps.

To return to the home screen, press the home icon.

Results save automatically in the breath test log however, there is the option to tag a result with a place, patient's name or ID. To tag a result, press the patient profile icon and enter the place/ID/patient's name. Press the save button.

Remove the face mask sampling system between tests to purge sensor with fresh air.

To switch off, press and hold the power button for 3 seconds. The unit will also power off after 8 hours of inactivity to save power. The display dims after 5 minutes and turns off after 15 minutes.

Ambient monitoring

The ambient air can be tested to check for CO in the environment using the ToxCO®, alerting users to high CO levels in the atmosphere. Once switched on the device will start to sample immediately and the real-time reading will be shown on the home screen at all times, updating every second.

When a CO threshold is breached, the device will log this event and continue to log the live reading every minute. The logging will continue for 8 hours or until the device is switched off. Access the log by pressing the history icon.

CO thresholds

Ambient alarm thresholds are pre-set as per Acute Exposure Guideline Levels (AEGL's)[12]:

Colour	ppm	Audible alert
Green	<100	No audible alert
Amber	100-199	1 short beep every 2 seconds
Red	≥200	3 short beeps every 3 seconds

Both thresholds can be reduced so that they are triggered at lower levels but cannot be increased to be triggered at higher levels. When an alarm is triggered, the device will automatically start to log in the history each minute for 8 hours or until the device is switched off, so that incidents can be pinpointed to a time and date. Breath test pre-set thresholds are as follows.

Colour	Description	Reading (%COHb & ppm)
Blue	Normal (non-smoker) reading	%COHb ≤0-2.00ppm = 0.9
Red	Abnormal CO level on breath requiring further investigation	%COHb >2ppm = 10+

This threshold for colour change can be adjusted up or down to suit local regulations.
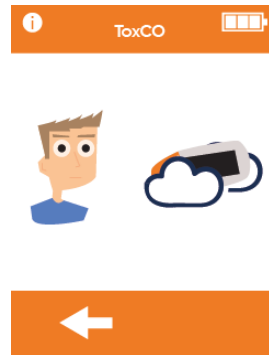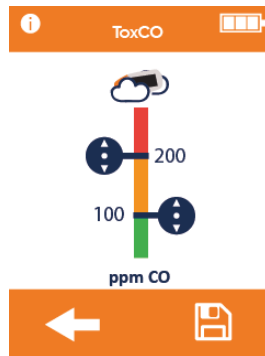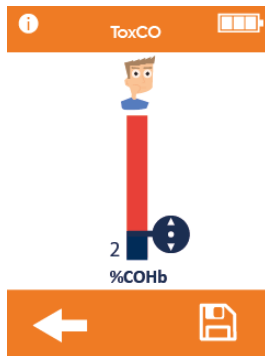
Adjusting test thresholds
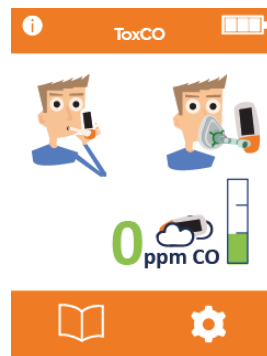
Turn on the device by pressing the power button once. Press the settings icon.


Press the traffic light icon.

Press the breath test icon or ambient icon depending on which threshold is to be adjusted.

Drag the threshold indicators up or down to the desired concentration; the ppm values for breath testing will adjust automatically with the %COHb.

Pressing the save button will save the changes; pressing the back arrow will abort the changes and return to the previous screen.
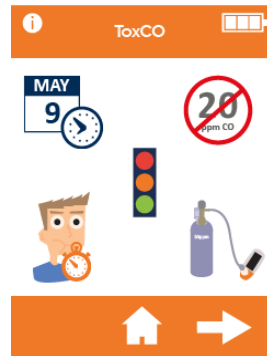
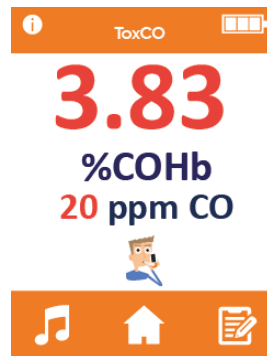## Enabling & disabling ppm readings
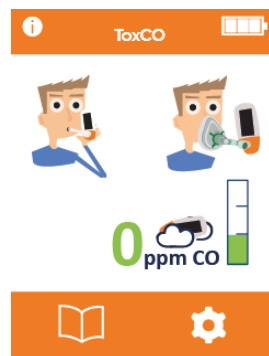
Enabling ppm readings

The ToxCO® is programmed to only show the %COHB when a breath test is taken, however it is possible to also display the reading in ppm.
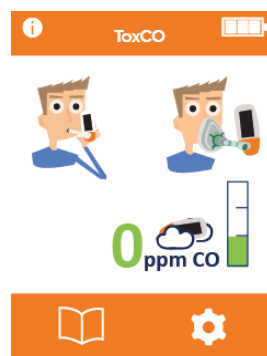
To enable the ppm display, go to the settings.
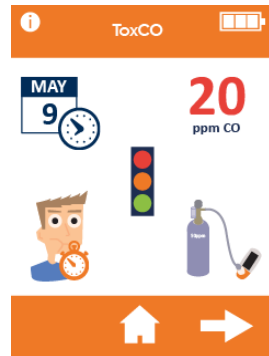
Press the crossed out ppm icon.

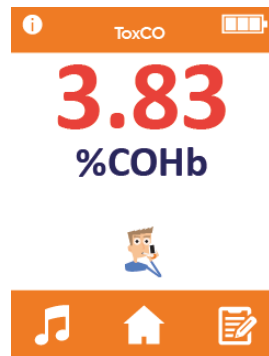The breath test will look like this once the ppm readings have been enabled.

Disabling ppm readings

To disable the ppm display, go to the settings.
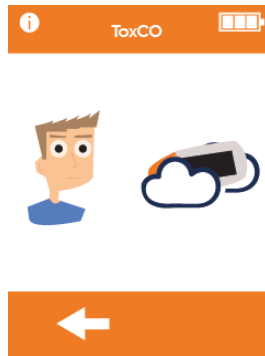
Press the ppm icon.

The breath test will look like this once the ppm readings have been disabled.

Reviewing history

The ToxCO® will record/log in its history every breath test but also ambient readings when an alarm threshold is triggered for up to 500 readings for 8 hours or until the device is switched off.
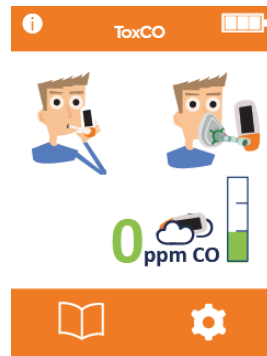

To access the history, press the history icon.

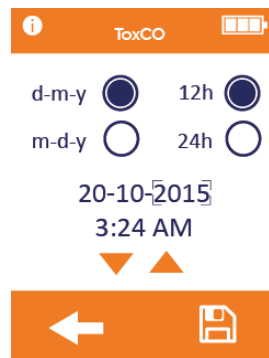Select either the breath test icon or the ambient icon.

Changing date & time

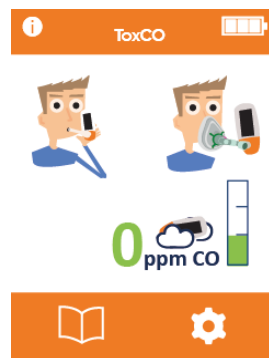To change the date & time, press the settings icon.

Press the date & time icon.

Select either d-m-y or m-d-y for the date format and 12h or 24h for the time format. With the 12h format, there is also the option to select between am and pm.

Dates and times are then adjusted by selecting the number to change and pressing the up or down arrows to decrease/increase. Press to save settings or to abort changes and return the previous screen.
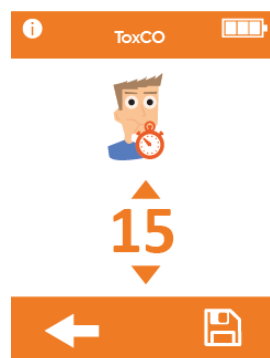
Changing breath hold time

To change the breath hold time, press the settings icon.

Press the breath-hold time icon.

Changing the breath-hold time is accomplished by pressing the up or down arrow to decrease/increase the time in seconds.

Press the save icon to save setting or the back arrow to abort changes and return to the previous screen.

Technical Specification

Breath and Facemask test Concentration range (CO)	0-50%COHb/0-600ppm
Display	Full-colour touchscreen
Detection principle	Electrochemical sensor
Repeatability	≤±5% difference on consecutive readings
Breath and Ambient Test Accuracy	≤±3ppm/10% – whichever is greater*
Facemask Test Accuracy	±70%
Power	3 x AA (LR6 or equivalent) – up to 1000 minutes 1 x CR2032 Lithium coin cell
T_{90} response time	<30 seconds
Operating temperature	0-50°C
Storage/transport temperature	0-50°C
Operating/storage/transport pressure	Atmospheric ±10%
Operating humidity	15-90% non-condensing
Storage/transport humidity	0-95%
Expected sensor operating life	2 years
Sensor sensitivity	1ppm
Sensor drift	<5% per annum
Dimensions	Approx. 37 x 77 x 140 mm
Weight	Approx. 215g (including batteries)
Materials	Case: polycarbonate/ABS blend with anti-microbial additive D-piece™: polypropylene SteriBreath™ Eco: paper OneBreath™: polypropylene
H_2 cross interference	≤6%

*Readings of >500ppm at temperatures between 0-14°C can decrease accuracy to ≤±3ppm/15%.

Safety information and device symbols

Degree of protection against electric shock	Type BF applied part
Type of protection against electric shock	Internally powered equipment
Degree of protection against ingress of liquid	IPXO - not protected against water ingress
Degree of safety application in the presence of a flammable anaesthetic mixture with air, oxygen or nitrous oxide	Equipment not suitable for use in the presence of flammable mixtures.
Caution	⚠
Direct current	⎓
CE mark	CE 2797
Type BF applied part	🚶
Dispose of according to WEEE	🗑
Serial number	SN
Consult electronic instructions for use	📖
Unique device identification	UDI
Manufacture by and date	🏭
Manufacture date	📅
Indicator of Medical Device	MD
Bedfont® logo	bedfont

Environment

The ToxCO® complies with the directive EN60601-1-2:2015 4th edition electromagnetic compatibility.

Electromagnetic immunity
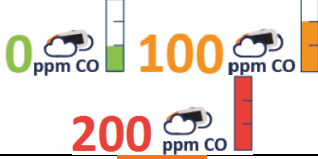
The ToxCO® complies with the directive EN60601-1-2 electromagnetic compatibility but can be affected by cellular phones and by electromagnetic interference exceeding the levels specified in EN55011:2007 Class B.
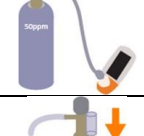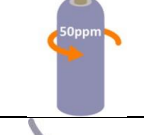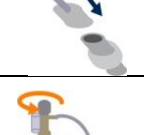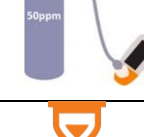
Guidance and manufacturer's declaration: Electromagnetic immunity			
The ToxCO® is intended for use in the electromagnetic environment specified below. The customer or the user of the ToxCO® should ensure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment guidance**
Electrostatic Discharge (ESD) IEC 61000-4-2	±8kV contact ±15kV air	±8kV contact ±15kV air	Floor should be wood, concrete or ceramic floor tile. If floors are covered with synthetic material the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-5	–	–	–
Surge IEC61000-4-5	–	–	–
Voltage dips, short interruptions and voltage variations on power supply. IEC 61000-4-11	–	–	–
Power frequency (50/60Hz) Magnetic field IEC 61000-4-8	30 A/m	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location environment.

	10V/m (1kHz 80%) 80MHz-2.7GHz		10V/m (1kHz 80%) 80MHz-2.7GHz		Portable and mobile RF communications equipment should be used no closer to the ToxCO® than the recommended separation distance calculated from the equation appropriate to the frequency of the transmitter. Interference may occur in the vicinity of equipment marked with the following symbol:
Conducted RF IEC 61000-4-6 Radiated RF IEC 61000-4-3	385 MHz	27 V/m	385 MHz	27 V/m	
	450 MHz	28 V/m	450 MHz	28 V/m	
	710 MHz	9 V/m	710 MHz	9 V/m	
	745 MHz	9 V/m	745 MHz	9 V/m	
	780 MHz	9 V/m	780 MHz	9 V/m	
	810 MHz	28 V/m	810 MHz	28 V/m	
	870 MHz	28 V/m	870 MHz	28 V/m	
	930 MHz	28 V/m	930 MHz	28 V/m	
	1720 MHz	28 V/m	1720 MHz	28 V/m	
	1845 MHz	28 V/m	1845 MHz	28 V/m	
	1970 MHz	28 V/m	1970 MHz	28 V/m	
	2450 MHz	28 V/m	2450 MHz	28 V/m	
	5240 MHz	9 V/m	5240 MHz	9 V/m	
	5500 MHz	9 V/m	5500 MHz	9 V/m	
	5785 MHz	9 V/m	5785 MHz	9 V/m	

Device and display symbols

Description	ToxCO®
Battery condition: full	
Battery condition: low	
Battery condition: empty	
Breath test	
Face mask test	
Ambient air test	
Settings	
Create/Edit tag	
Inhale	
Hold breath	

Countdown timer	15
Exhale	
ppm reading	**20** ppm CO
%COHb reading	**3.83** **%COHb**
Ambient CO reading	0 ppm CO 100 ppm CO 200 ppm CO
Home	
Change D-piece™	
Change CO test thresholds	
Save	
Change breath hold time	
History	
Next step	
Previous step	
Increase	
Decrease	
Selected	
Unselected	
Slider (for adjusting up or down)	2 %COHb

Red thermometer: temperature too hot to calibrate	
Blue thermometer: temperature too cold to calibrate	
Countdown to sensor change	SEN01 15/03/20
Change sensor	SEN01 15/03/20
Home screen when the sensor change is overdue	 ppm CO
Calibrate device reminder	 50ppm
Calibration overdue	 50ppm
Start calibration	 50ppm
Attach flow meter to gas canister	 50ppm
Attach calibration adaptor to D-piece™	
Attach D-piece™ to device and turn on gas flow	 50ppm
Unit calibrating	

Calibration successful	✓
Calibration failed	✗
Zero failed	0 ✗
Retry calibration	⟳
Information	ⓘ
Number of tests taken	Test No. 1001
Last calibration date	Cal date 05/12/16
Serial number	Serial No. CT001232
Sensor change due date	Sensor date 05/12/06
Firmware version number	Firmware V 4.05

Maintenance

Routine maintenance

1. Mouthpieces should be replaced after every use.
2. Hands should be washed regularly in accordance with infection control practice.
3. Please do not attempt to modify the equipment in any way or use accessories not specified by the manufacturer. Any attempt to do so will invalidate the warranty and may compromise the safety of the device.
4. Bedfont® will make available upon request service training to appropriately qualified persons.
5. Holding the reset button down for 30 seconds will perform a complete device reset. This will clear any saved data and revert all settings to the factory defaults. After performing a reset, the device will need to have the date/time set and be calibrated before it can be used.
6. Do not use the ToxCO® in an oxygen rich atmosphere.
7. It is recommended that the ToxCO® is calibrated every 6 months, however a calibration MUST be performed within 12 months, using 50ppm CO calibration gas. Please refer to the calibration procedure for more information.
8. The sensor requires replacement every 2 years.
9. Failure to comply with any calibration and sensor replacement requirements will automatically invalidate the unit's warranty.
10. Replace the batteries when indicated by the empty symbol.
11. Bedfont® recommends removal of the batteries when the device is not used for prolonged periods of time to prevent leakage.

12. Replace the breath sampling D-piece™ every 30 days or if visibly soiled or contaminated. The ToxCO® will give a reminder during start-up when the D-piece™ should be replaced, see 'change D-piece™' symbol.

13. The sensor should be replaced every 2 years. 60 days prior to the sensor change, a countdown to sensor change symbol will be shown with the date on which the sensor should be changed. This can be ignored by pressing until the date at which the sensor should be changed arrives. At this point, the change sensor symbol will be shown. Change sensor if trained to do so by an approved Bedfont® engineer or send to Bedfont® or the local distributor.

14. Additional technical information can be made available on request; please contact Bedfont® the local distributor.

Cleaning

1. The ToxCO is integrated with antimicrobial technology for optimum infection control and has proven bacterial protection efficacy. Bedfont® recommends wiping the instrument and D-piece™ external surfaces between each patient with an alcohol-free wipe specifically designed for this purpose. A list of approved wipes can be found here: https://www.bedfont.com/cleaning-bedfont-monitors. The D-piece™ cannot be sterilised.

2. NEVER use alcohol or cleaning agents containing alcohol or other organic solvents as long term exposure to these vapours will damage the H_2 sensor inside.

3. Under no circumstances should the instrument be immersed in liquid or splashed with liquid.

Calibration

The ToxCO® is calibrated at 21°C (±4°C) before leaving Bedfont®. The ToxCO® must be calibrated within 17-25°C as this is the temperature at which Bedfont® recommend it is to be used.

It is recommended that the ToxCO® is calibrated every 6 months, however a calibration MUST be performed within 12 months, using 50ppm CO calibration gas. Please refer to the 'calibration procedure' for more information.

Turn on the device by pressing the power button once.

Press the settings icon.

Press the cylinder icon once to proceed.

The device must be zeroed, this will happen automatically.

Do not connect the gas at this stage.

If it is too cold to calibrate (<17°C) a blue thermometer will be shown onscreen.

Move the ToxCO® to a warmer area and try again later.

If it is too hot to calibrate (>25°C) a red thermometer will be shown onscreen.

Move the ToxCO® to a cooler area and try again later.

Ensure the fine control valve is in the off position.

Screw the fine control valve and flow indicator assembly to the gas can. This is best done by screwing the gas can into the valve.

Once this has been successfully carried out, the first step of the calibration process will be shown onscreen.

Allow the gas to flow at 1.0 litre per minute.

Allow the gas to flow through the instrument for the duration of the test, again monitoring the rate of flow.

A successful calibration will be indicated by the tick icon, press the home icon to return to the home screen.

A failed calibration will be indicated by the red cross icon, press the rotating arrow icon to attempt calibration again – if the problem persists see 'troubleshooting' or call the local supplier of Bedfont® products.

Return to the home screen by pressing the home icon.

Troubleshooting

The unit fails to turn on

If the unit fails to turn on, replace the batteries.
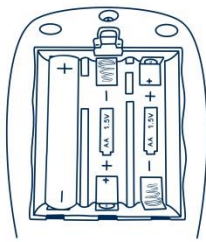
Ensure that the batteries are inserted the correct way around, matching the symbols moulded into the plastic.

The sensor has drifted out of specification

The ToxCO® is calibrated before leaving Bedfont®. However, Bedfont® recommends if the instrument could be reading incorrectly, try the test again with another device, if available, to get a comparison.

Alternatively, check the functionality using Bedfont® check gas or send it back to Bedfont®. The check gas required is Bedfont® 50ppm carbon monoxide in air.

Before beginning, ensure that 'display ppm values' is enabled. Please refer to the 'enabling/disabling ppm reading' section of this manual.

If the final displayed value is less than 45ppm or higher than 55ppm, stop the test and perform a calibration, following the instructions below.

ToxCOdata™ software – connecting to the PC

Place one end of the connection lead into the USB socket on the top of the ToxCO®.
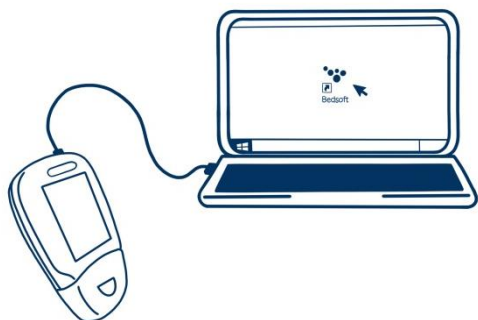
Connect the other end to the USB port on the PC.

Before starting the software, ensure that the ToxCO® is connected to the PC and switched on. Double click the ToxCOdata™ icon on the PC to start the program. Refer to the supplied documentation for how to operate ToxCOdata™. It is recommended that this software is downloaded and installed on a stand-alone computer, not connected to a network, to ensure optimum patient data security. If this software will be installed on a shared network, please ensure that both a domain account and a Bedsoft product account with a secure password has been set up to protect patient data.

Returns procedure

If the ToxCO® requires servicing, please contact the local Bedfont® Customer Service Department, distributor or supplier before returning any goods.

1. The customer repairs department will need to be supplied with the device serial number and description of the fault. Once this information has been received, a returns/ ticket number will be issued. Please state the returns/ticket number on the outside of the box when returning the device, and ensure that a telephone number, fax number, and full return address are clearly stated.

2. The product must also be decontaminated before it is returned according to the local regulations. Bedfont® can provide a decontamination certificate to complete, which also needs to be attached to the outside of the box. Failure to do so will result in the product being subject to Bedfont® decontamination procedure and will delay the service/repair and may incur costs.

3. Bedfont® advises that a courier service is used when returning devices. This enables goods to be insured for loss or damage in transit. When the goods are received, an email stating so will be sent.

4. If the device has been returned for repair it will then be examined and an 'engineer's report' and quotation for the repair will be sent, which will also include an authorisation form. Complete the authorisation form, and ensure that an 'official purchase order number' is included. Please contact the customer repairs department if an 'official purchase order number' cannot be provided.

5. If the device is still in warranty and the fault is covered by warranty, see 'warranty' section of this manual, Bedfont® will repair it and return it with an 'engineer's report', free of charge.

6. If the repair is not carried out, a handling fee will be charged. Ensure that a completed authorisation form with an 'official purchase order number' is returned.

7. The equipment will be returned as soon as Bedfont® has received all relevant paperwork. A carriage fee will be charged if the device is no longer in warranty.

Spares

SteriBreath™ Eco mouthpiece	SteriBreath™ Eco mouthpieces are both cost effective and compact. They are individually sealed for optimum infection control.
D-piece™	The D-piece™ is used to attach a SteriBreath™ Eco mouthpiece to the device. The D-piece™ has an integrated infection control filter which removes and traps >99% of airborne bacteria and >97% of viruses[14]. The D-piece™ should be changed every four weeks or more often if visibly soiled. An automatic reminder will appear on the screen every 28 days.
Face mask sampling system	This sampling system is single patent use and allows the patient to breathe normally through a face mask in order to produce a breath sample. Also available in adult, adolescent and infant sizes.

Warranty

Bedfont® Scientific Limited warrants the ToxCO® (excluding batteries and sensor) to be free of defects in materials and workmanship for a period of 5 years from the date of shipment, subject to

service and maintenance requirements. Bedfont's sole obligation under this warranty is limited to repairing or replacing, at its choice, any item covered under this warranty when such an item is returned, intact and prepaid, to Bedfont® or the local representative.

These warranties are automatically invalidated if the products are repaired, altered, have had the void labels removed or have been otherwise tampered with by unauthorised personnel, or have been subject to misuse, neglect or accident.

Never dispose of any electronic instrument or batteries in domestic waste. At the end of the product's life, contact Bedfont® or its distributor for disposal instructions.

Appendix

Breath test/face mask test interpretation chart[10,12]

Key			
Colour	%COHb	Range	Interpretation
●	0 - 2	Normal	Indicates normal %COHb level in the blood of a non-smoker
●	2+	Abnormal	Further medical assistance required

IMPORTANT
If there is any doubt, patient should be sent for formal assessment at hospital.
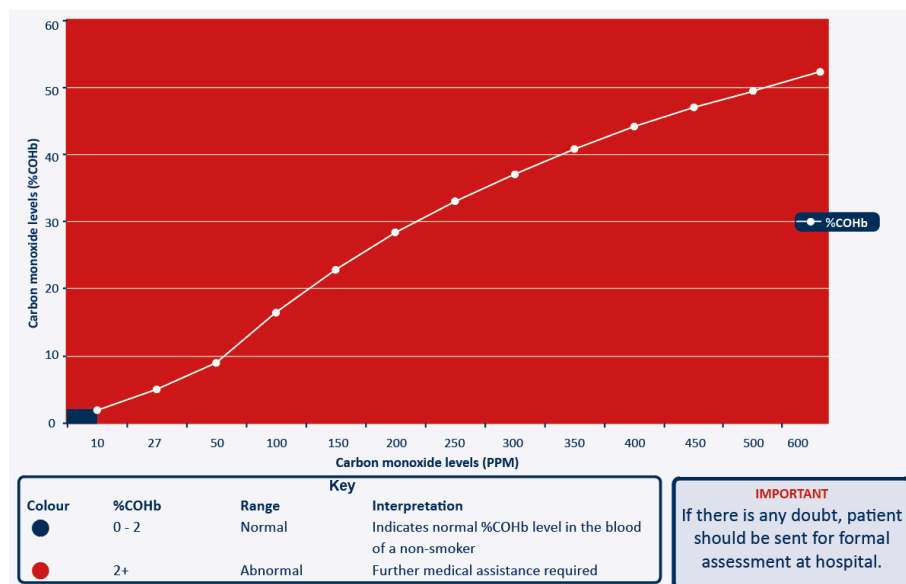
Acute Exposure Guideline Levels (AEGL's)[13]

ppm	10 min	30 min	60 min	4 hr	8 hr
AEGL-1	-	-	-	-	-
AEGL-2	420	150	83	33	27
AEGL-3	1700	600	330	150	130

1. The level of the chemical in air at or above which the general population could experience notable discomfort

2. The level of the chemical in air at or above which there may be irreversible or other serious long-lasting effects or impaired ability to escape

3. The level of chemical in air at or above which the general population could experience life-threatening health effects or death

IMPORTANT
If there is any doubt responder should not enter site until it is made safe

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