CO Screen
Operating Manual

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CONTENTS

Package Contents

The CO Screen is supplied with:

1. CO Screen (Cat. No. CO50)
2. 22 mm plastic mouthpiece adapter (Pack of 10 Cat. No. IP10)
3. 22 mm reducing connector for calibration (Cat. No. CSC01)
4. PP3 9V Lithium battery (Cat. No. PP3LB)
5. 4 Disposable cardboard mouthpieces (Box of 500 Cat. No. MP500)
6. Soft shell carry case (Cat. No. CS102)
7. Operating Manual (Cat. No. OPM01)
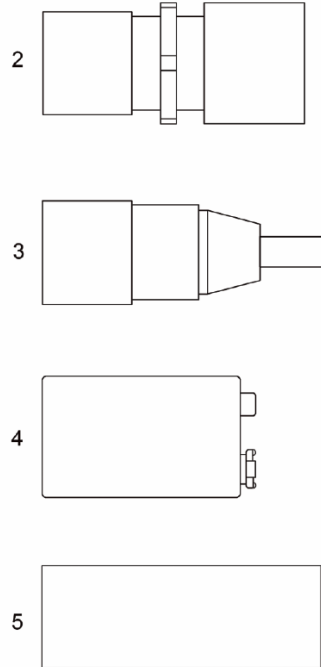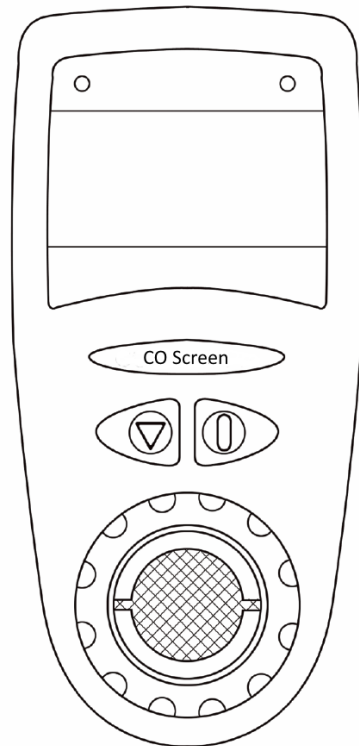
Keypad Interface

= ON/OFF Power button

= Select Function button

* See cleaning guidance on page 10.

Overview

The CO Screen is a handheld portable battery-operated device used for measuring the concentration of carbon monoxide (CO) in the breath and calculating the percentage of carboxyhaemoglobin (%COHb) in the blood.

It is designed to be used primarily as a screening tool for smoking cessation, but it can also be used by Accident & Emergency departments, GP surgeries and by the fire fighting service. In smoking cessation clinics it is used for checking the subject's progress and compliance. A&E clinicians, GPs and fire fighters can use the device to quickly assess the level of suspected CO poisoning.

It is easy to use, very accurate and requires a single breath into the device to display percentage of carboxyhaemoglobin (%COHb) and PPM (parts per million).

Operation

Insert the 9V PP3 lithium battery (supplied) by removing the battery cover and clipping the battery in place, and then replace the battery cover. Insert the plastic mouthpiece adapter followed by a cardboard mouthpiece.

Turn the CO Screen ON by pressing power key ▷ . The device will display the version number before starting the countdown timer. Request the subject to hold his/her breath until the countdown reaches zero. By default the countdown timer is set for 10 second. At zero, the unit will display the blow icon.
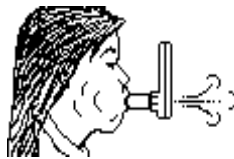
The subject should place their lips around the cardboard mouthpiece and blow gently and continue blowing until their lungs are completely empty. CO is collected in the last portion of the breath (alveolar breath).

The CO Screen will beep and show the final reading in %COHb (Carboxyhaemoglobin). By pressing the select key ⊲, the reading changes to PPM (parts per million). Pressing again reverts back to %COHb.

⚠️   The maximum reading the CO Screen can measure is 60 %COHb (375 PPM). Any reading above that will be displayed as - - - (over range).

Coloured lights are there to represent and provide a visual display of the resulting %COHb reading. The coloured lights represent the following:

0 – 9.9 %COHb   = Green Light
10 – 19.9 %COHb   = Yellow Light
20 – 29.9 %COHb   = Red Light
30+ %COHb   = Flashing Red Light

After examining the readings, the unit can either be switched off using the ON/OFF power key ▷, or another measurement can be carried out by pressing the select ⊲ key for at least three seconds.

💡   To save the battery, the unit will switch OFF automatically after three minutes if not used.

If there is CO gas present on the sensor (possibly from the last test), the unit will display
                          There is already some
                                CO on the
                                 Sensor
Press the select ⊲ key to start again. If the problem persists, please consult your dealer.

Warning/Cautions

⚠️ If higher than expected levels of CO are displayed this could be due to CO poisoning and medical attention should be immediately sort.

⚠️ The CO Screen has a cross-sensitivity to hydrogen (from some gastro-intestinal disorders) which may affect the reading.

⚠️ Cleaning with products that contain alcohol may result in permanent damage to the sensor. *See spares for non-alcohol wipes*.

⚠ The battery should be changed when the low battery icon appears on the display.

The disposable cardboard mouthpieces are single-use only. Re-use of these single use mouthpieces can increase the risk of cross infection and the mouthpiece should be disposed of after use by the patient.

User Menu

The menu allows the user to either calibrate the unit or set the environment mode option. To enter User Menu, switch ON the unit with select key ◁ pressed. Do not release the select key ◁ until the User Menu appears.

User Menu

Calibrate
Breath Hold Time
Set Light Colours
Exit

The first option is highlighted. To move between options, press the select key ◁ momentarily (< 0.5 S). To select the highlighted option, press the select key ◁ for at least 3 seconds.

Calibration

The device should be recalibrated at least once every year. Calibration gas can be purchased from MD Diagnostics Ltd, *see spares for full ordering details*.

To calibrate the device, perform the following steps:

1. Connect the control valve (Cat No CV20) to the 100 ppm gas cylinder. Cat. No. C20100 calibration gas cylinder shown in the diagram above.
2. Connect the short plastic tubing reducing connector (Cat No CSC01).
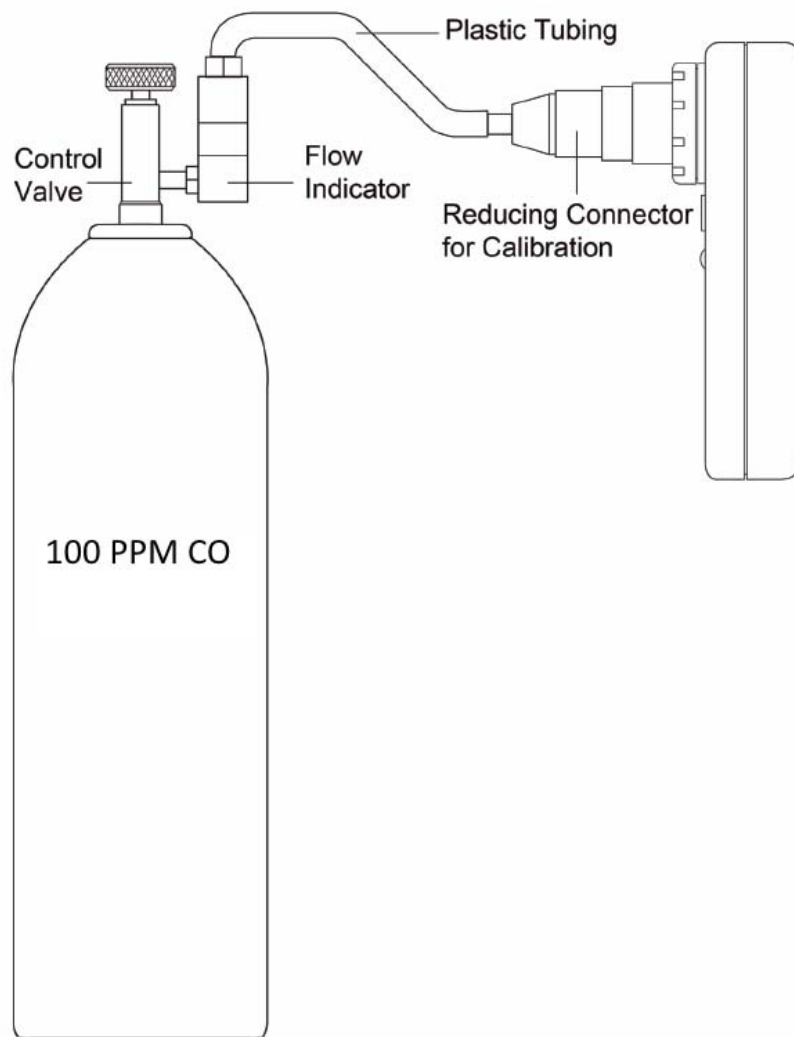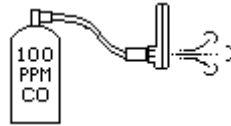3. Switch ON the device with the select key ◁ pressed until the device displays 'Calibration'. Release the select key ◁.
4. The unit will countdown from 10 to 0 and then will display the calibration icon.

5. Attach the connector and open the control valve (anti-clockwise) until the ball in the flow indicator is between the two marks. This will supply gas of approximately 0.50 L/min.
6. Apply this flow until the device beeps after 20 seconds. The device will display the gas concentration reading.
7. If the reading is not 100 ppm, press the select key ◁ for at least 3 seconds to accept the new calibration value. The device will say 'done' and then will show 100 ppm.

💡 Switch OFF the device if the calibration was incorrectly performed. Do not press the select key ◁.

⚠ To prevent incorrect calibration, only the readings within the range of 80-120 can be calibrated. An 'Error' message will be displayed if the calibration is accepted for readings outside this range.

8. Switch OFF the device; wait for a minute and it is now ready for use.
9. It is the responsibility of the user to ensure that the device is calibrated periodically (at least once a year).

Setting Breath Hold Time

The breath hold time is only applicable in the Environment mode operation. After the environment reading, the unit will countdown the timer during which time the subject is encouraged to hold the breath. The hold time can be set from the following:

> None
> 5 Seconds
> 10 Seconds
> 15 Seconds
> 20 Seconds
> 25 Seconds
> 30 Seconds

Select the required time, and press the press select key ◁ for at least 3 seconds. The unit will restart with the new setting.

Set Light Colours

The LED light indicator colours can be set different value if required. Press select key ◁ momentarily to increment the value. The value will increment to 60 before turning round to 0. So to decrement the value, one has to go all the way round to 0 and then reach the desired value. To accept the reading, press the select key ◁ for 3 seconds.

Note: The Green value is for indicator to show green up to that level.
The Yellow value is for indicator to show yellow up to that level.
The Red value is for indicator to show red up to that level.
Any value above the red value will be displayed as flashing red.
To switch off the indication, set the value to 0.

Battery Life

The 9V PP3 Lithium battery should provide at least 30 hours of continuous use. When the battery is low, the battery low icon will be displayed for three seconds when the device is switched on.

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The device can still be used, but it is advisable to replace the battery.

💡 It is recommended to use a PP3 Lithium battery.

⚠️ The device will need recalibration after the replacement of the battery. *Duracell notification - Alkaline batteries can be safely disposed of with normal household waste. Never dispose of batteries in fire because they could explode.*

If the battery is very low such that the reading is not reliable, the device will display the 'battery dead' icon and will not operate until the battery is replaced.

Power Saving

To save battery power, the device will automatically turn itself OFF three minutes after the last key press. Do not remove the battery unless the device is not going to be used for a very long time. Remember, calibration will be required when the battery is reconnected.

💡 To prevent the device from switching OFF, press the select key ◁ within three minutes of the last press or when the reading is first displayed.

Cleaning

It is recommended that the plastic mouthpiece adapter is replaced after approximately 250 tests. Between tests, it can be cleaned using mild detergent solution, then rinsed with water and left to dry thoroughly.

The device can be cleaned using non-alcohol wipes (s*ee spares).* Please be careful not to touch the surface of the sensor or allow moisture to do the same.

⚠ Cleaning with products that contain alcohol may result in permanent contamination of the sensor.

Servicing

If your unit requires servicing then please contact your authorised distributor or MD Diagnostics Ltd directly.

⚠ The CO Sensor should be replaced every two years.

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Spares

Catalogue Number	Description
C20100	20 litre can 100ppm CO balance air
C20110L	110 litre can 100ppm CO balance air
CV20	Control valve for 20 litre can
CV110	Control valve for 110 litre can
FC100	Fuel cell for CO Sensor
MP500	Mouthpieces 500 per box
FM200	Bacterial filtered mouthpiece 200 per box
IP10	Intermediate plastic adaptors 10 per pack
TDW01	Bacterial cleansing wipes 125 wipes per tub
TDW12	Bacterial cleansing wipes 12 tubs per case
PP3LB	9v PP3 Lithium battery

Specifications

Gas Detected	Carbon Monoxide
Concentration Range	0-60 %COHb (375 PPM)
Detection Sensor Used	Electrochemical fuel cell
Sensitivity	1 % COHb
Accuracy (repeatability)	±2%
Operating Temperature	5-35 degrees Celsius
Operating Pressure	Atmospheric 10%
Operating Humidity	30% to 90% RH
Operating Altitude	Sea level to 6000 ft
Storage Temperature	-20 to + 70° C
Storage Humidity	10% to 90% RH
Hydrogen cross-sensitivity	<12% at 20˚ C
Sensor Life	2 - 5 years, 2 years warranty
Sensor Drift	<2% per month
Display	128 X 64 pixel Graphic LCD
Power Supply	Single 9V PP3 battery
Weight (approximate)	160g including battery
Dimensions	135mm x 65mm x 60mm
Indicator levels	Green 0 – 9.9 %COHb
	Yellow 10 – 19.9 %COHb
	Red 20 – 29.9 %COHb
	Flashing red 30+ %COHb

Symbols

CE In accordance with Directive 93/42/EEC

0120

Type B Device

Environment

This instrument complies with directive EEC89/336 electromagnetic compatibility but may be affected by cellular phones and by electromagnetic interference exceeding levels specified in EN 50082-1:1992

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Important information regarding Electromagnetic Compatibility (EMC)

Medical devices may be susceptible to electromagnetic interference from other devices such as PC's and mobile telephones. Electromagnetic interference may impair the operation of the medical device and could create a potentially unsafe situation.
In order to regulate the requirements for EMC, to limit unsafe product situations, BS EN 60601-1-2 standard has been implemented. This

standard defines the levels of Immunity to electromagnetic interference as well as the levels of electromagnetic Emissions for medical devices.

As a medical device the CO Screen conforms to BS EN60601-1-2 standard for both Immunity and Emissions.

Guidance and Manufacturer's Declaration – Electromagnetic Immunity			
The CO Screen is intended for use in the electromagnetic environment specified below. The customer or the user should assure that it is used in such an environment.			
Immunity Test	**IEC 60601 Test level**	**Compliance level**	**Electromagnetic environment guidance**
Radiated Immunity IEC 61000-4-3	10V/m	10V/m	Avoid use in environments likely to exceed 10V/m
Electrostatic Discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	No restrictions in the intended environment
Electrical fast transient/ burst IEC 61000-4-4	N/A	N/A	None
Surge IEC 61000-4-5	N/A	N/A	None
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	N/A	N/A	None
Power Frequency (50/60 Hz) magnetic field IEC 61000-4-8	N/A	N/A	None
NOTE: UT is the a.c. mains voltage prior to application of the test level.			

Guidance and Manufacturer's Declaration - Electromagnetic Emissions

The CO Screen is intended for use in the electromagnetic environment specified below. The customer or the user should assure that it is used in such an environment.

Emissions Test	Compliance level	Electromagnetic environment guidance
RF Emissions CISPR 11	Group 1	The CO Screen uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class B	The CO Screen can be used in domestic, light and heavy industrial environments.
Harmonic emissions IEC 61000-3-2	[Not Applicable]	
Voltage fluctuations / flicker emissions IEC 61000-3-3	[Not Applicable]	
	[See 5.2.2.1 c) and Figure 1]	The CO Screen is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplied buildings used for domestic purposes.
	[See 5.2.2.1 c) and Figure 1]	The CO Screen is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplied buildings used for domestic purposes.
RF Emissions CISPR 14-1	Complies	The CO Screen is not suitable for interconnection with other equipment.
RF Emissions CISPR 15	Complies	The CO Screen is not suitable for interconnection with other equipment.

Guidance and Manufacturer's Declaration - Electromagnetic Immunity

The CO Screen is intended for use in the electromagnetic environment specified below. The customer or the user should assure that it is used in such an environment.

Immunity Test	IEC 60601 Test level	Compliance level	Electromagnetic environment guidance
			Portable and mobile RF communications equipment should be

			used no closer to any part of the CO Screen, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 KHz to 80 MHz	[V1] V	$d = [\frac{3.5}{V1}]\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	[E1] V/m	$d = [\frac{3.5}{E1}]\sqrt{P}$ 80 MHz to 800 MHz $d = [\frac{7}{E1}]\sqrt{P}$ …… 800 MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a, should be less than the compliance level is each frequency range. b Interference may occur in the vicinity of equipment marked with the following symbol: (((•)))

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

a   Field strengths from fixed transmitters, such as base stations for radio (cellular / cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RD transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the CO Check is used exceeds the applicable RD compliance level above, the CO Screen should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the CO Screen.

b   Over the frequency range 150 KHz to 80 MHz, field strength should be less that [V1] V/m