



Please read this manual  
before using the Gastrolyzer

## EC60 Gastrolyzer Breath Hydrogen (H<sub>2</sub>) Monitor

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Hydrogen (H<sub>2</sub>) is generated in the intestinal lumen by bacterial action on carbohydrates in the large or small intestine. This resultant H<sub>2</sub> diffuses into the bloodstream and thence to the alveoli, after which it can be detected in expiratory air. Levitt (1969)<sup>1</sup> demonstrated the correlation between intestinal lumen H<sub>2</sub> production and H<sub>2</sub> excretion in expiratory air. Thus, accurate measurement of H<sub>2</sub> in parts per million (ppm) in expiratory air reveals abnormal breakdown and/or malabsorption of carbohydrates.

The Bedfont Gastrolyzer provides a simple, user-friendly sampling technique with specific H<sub>2</sub> detection, which is reliable, inexpensive, and rapid<sup>2</sup>.

Operation is straightforward. A T-piece Sampling System enables end-expired breath to be sampled easily and hygienically, using one-time disposable cardboard tube mouthpieces. A modified sampling technique enables children or people unable to give a sample to be monitored with a minimum of fuss, while neonates in incubators can be monitored simply by linking the Gastrolyzer to the expiratory limb of a ventilator. Alternatively, a face mask arrangement can be adopted.

Obtaining readings could hardly be easier. The built-in LCD display shows results in seconds, and stores the maximum value until 'switch off'. Thus technical analysis employing skilled personnel becomes redundant and, being fully portable with its own power source, the unit can be used in any location.

The Bedfont Gastrolyzer is supplied with full operating instructions, while maintenance amounts to no more than changing batteries when required, calibration at regular intervals and keeping clean by wiping down with a damp cloth.

The Gastrolyzer Portable Breath Hydrogen Monitor uses as its principle of detection a sealed electrochemical sensor which is specific to H<sub>2</sub>. The sensor is of the micro fuel cell type, designed to be maintenance free and stable over long periods of time. Because of the unique diffusion barrier, the sensor is unaffected by normal temperatures and has a linear response to H<sub>2</sub> concentration independent of pressure.

The Gastrolyzer can be used for the analysis of Carbohydrate Breakdown Deficiency Detection, Carbohydrate Malabsorption Detection, Lactose Intolerance Diagnosis, Bacterial Overgrowth Diagnosis and Determination of Time Passage Through Gut.

<sup>1</sup> Levitt, M.D. (1969): Production and excretion of Hydrogen gas in man. *New Engl. J.Med.* 281:122-127

<sup>2</sup> Fleming, S.C. (1990): Evaluation of hand-held Hydrogen monitor in the diagnosis of intestinal lactose deficiency. *Ann.Clin.Biochem.* 1990;499-500

## Step 6

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

## Step 7

At the end of the countdown, 0ppm H<sub>2</sub> should appear on the LCD. If it does not, repeat the sequence from step 1. When 0ppm shows on the LCD, calibration may proceed.

## Step 8

Insert the Sampling Plug into the Gastrolyzer sensor housing. Ensure it is firmly pushed in place to prevent leakage of the calibration gas.

## Step 9

Open the Fine Control Valve and allow the gas to flow at 1.0 litres/minute. To maintain this, adjust the flow so the ball in the Flow Indicator remains at the centre line.

## Step 10

Connect 60ml syringe to the T-Piece Sampling System and draw sample slowly into syringe.

## Step 11

Disconnect syringe from T-Piece Sampling System and connect to sampling plug. Depress syringe (note: you will feel a high back pressure, which is to protect the sensors) and maintain steady pressure. If after the syringe has been emptied, the LCD does not show between 195 and 205ppm, press and release the green GO button and using the screwdriver, adjust the SPAN control on the underside of the instrument, until a reading of between 195 and 205ppm is displayed. Turning anti-clockwise will increase the reading and turning clockwise will decrease value.

## Step 12

Turn off the gas flow and remove T-piece Sampling System.

If further readings are required, repeat from step 7 of operating instructions. Otherwise, switch unit to 'OFF' position.

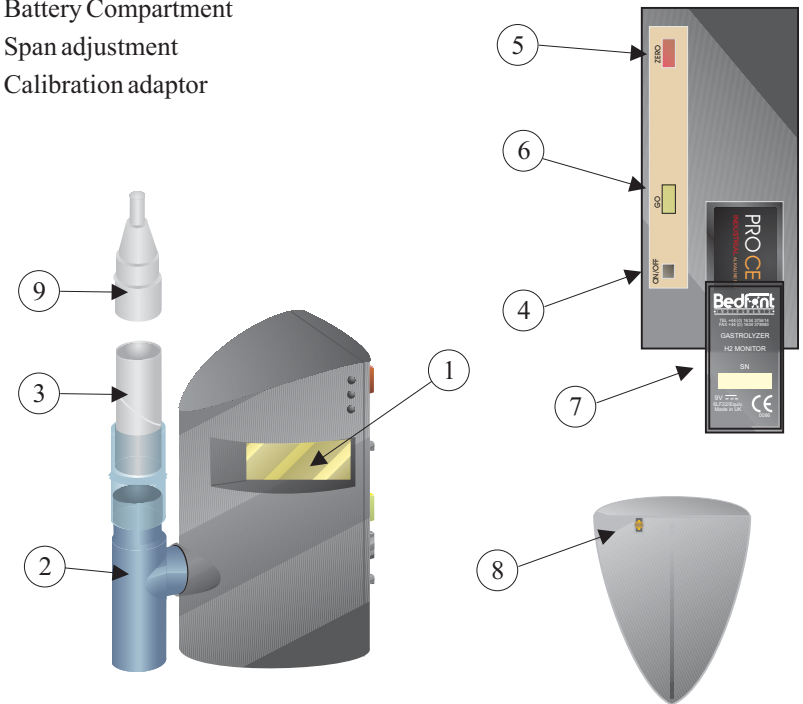


The LCD gives a three digit display, low battery symbol and ppm indicator. It displays the patient's end-tidal breath H<sub>2</sub> reading in ppm. In addition, the LCD shows a 15 second countdown during which the patient holds a lungful of breath before providing the end-tidal breath sample.

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

Key:

1. LCD Display
2. T-piece sampling system
3. Disposable cardboard mouthpiece
4. ON/OFF Switch
5. ZERO button
6. GO button
7. Battery Compartment
8. Span adjustment
9. Calibration adaptor



## Remote Paediatric Tidal Sampling System



Allows breath from paediatric patients to be sampled. The syringe attachment allows these samples to be 'injected' into the Gastrolyzer for analysis.

## Remote End-tidal Sampling System

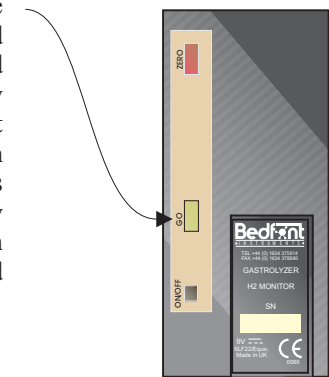


Breath samples can be stored and transported in bags and subsequently analysed by the Gastrolyzer.

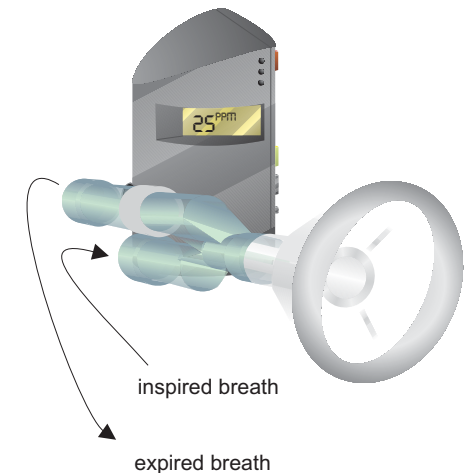
The syringe attachment allows these samples to be injected into the Gastrolyzer for analysis.

## Step 5

Press the GO button within 2½ minutes and ask the patient to hold his/her breath during the 15 second countdown period. (If the GO button is not pressed within 2½ minutes, the display will show EEE followed by real time monitoring. To get back to the GO message, the red ZERO button should be pressed and held, until the display shows SEE followed by ERL and finally GO (approximately 3 seconds) then repeat from step 5. 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 infants 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 instruments 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 breath 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 0ppm 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.

### 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, switch unit off and replace battery.

**The Gastrolyzer 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 Gastrolyzer 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 Gastrolyzer is dropped or immersed in liquid?**

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

**Note: the instrument can be wiped with a damp cloth using a mild detergent. Never, under any circumstances, attempt to immerse the sensor in any fluid or apply neat alcohol. The sensor is a sealed unit which does not need sterilising. Do not attempt to replace or modify the sensor yourself.**

**All accessories supplied are disposable. Replacement parts can be purchased from Bedfont scientific ltd.**

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, **turn unit off** and replace 9 volt alkaline battery which is located in the battery compartment.

### Step 2

Display will show 888, followed by a descending ppm H<sub>2</sub> value.

Note: The sensor may take 2 minutes to warm up and also may show NEG on the display, but this is to be expected.

### Step 3

Wait for display value to flash which indicates the sensor has warmed up. Press and hold red ZERO button. The display will show 555, followed by CAL, and finally 00 (approximately 3 seconds) if the displayed value is positive, or CAL followed by 00 if the display shows NEG. Release red ZERO button.

### Step 4

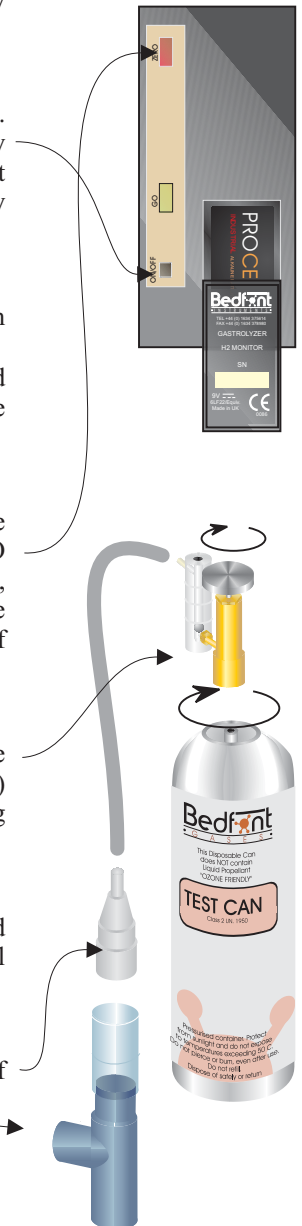
Ensuring that the valve is in the OFF position, screw the Fine Control Valve (FCV) and Flow Indicator (FI) assembly to the gas can. This is best done by screwing the gas can into the valve.

### 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.



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1. Gastrolyzer with LCD display and integral sensor
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
13. Stickers (To be used for children so the instrument looks more fun!)

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, neglect or accident.

### Step 1

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

### Step 2

Display will show 888 followed by a descending ppm H<sub>2</sub> value.

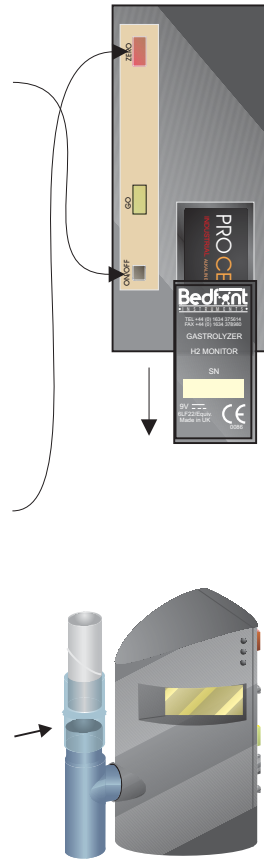
Note: The sensor may take 2 minutes to warm up and also may show nEe on the display, but this is to be expected.

### Step 3

Wait for display to flash which indicates the sensor has warmed up. Press and hold red ZERO button. The display will show 5Ee, followed by eRL, and finally eB (approximately 3 seconds) if the display value is positive, or eRL followed by eB if the display shows nEe. Release red ZERO button.

### Step 4

Connect T-Piece Sampling System with cardboard disposable mouthpiece. Ensure all connections and sampling system are pushed firmly in place to prevent leaking of sample.



### CALIBRATION PROCEDURE FOR USE WITH ASYRINGE

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, turn unit off and replace 9 volt alkaline battery which is located in the battery compartment.

### Step 2

Display will show 888, followed by a descending ppm H<sub>2</sub> value.

Note: The sensor may take 2 minutes to warm up and also may show nEe on the display, but this is to be expected.

### Step 3

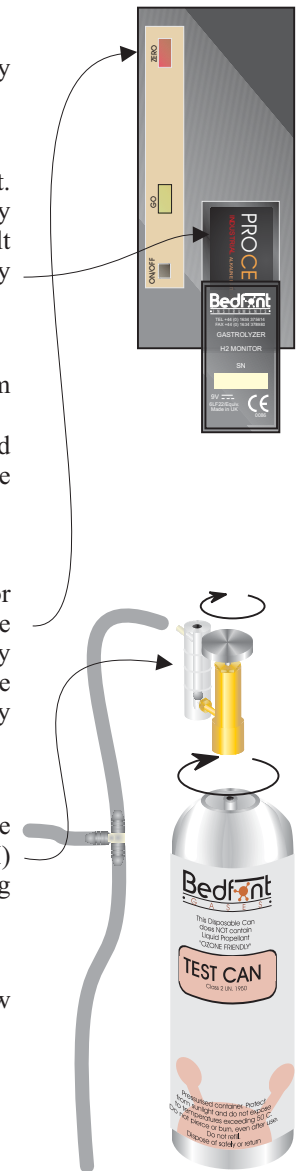
Wait for display value to flash which indicates the sensor has warmed up. Press and hold red ZERO button. The display will show 5Ee, followed by eRL, and finally eB (approximately 3 seconds) if the displayed value is positive, or eRL followed by eB if the display shows nEe. Release red ZERO button.

### 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

Connect the shorter end of the tubing to the Flow Indicator.

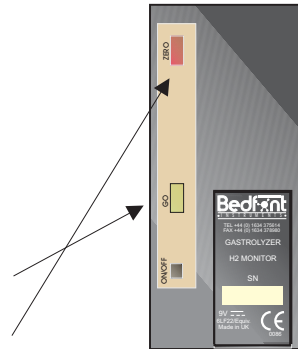


### Step 6

The display will then flash while the ppm H2 value is rising and become constant once the maximum value is reached. 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 GO button, which reverts back to real time monitoring. Allow the display to fall below 3ppm. Press the red ZERO button to allow the display to show GO. Repeat from step 4.



Gas Detected:	Hydrogen (H2)
Concentration Range:	0-999ppm
Calibration Flowrate:	0.5 litres/minute
Detection Principle:	Electrochemical sensor
Accuracy:	+/-2% of reading
Carbon Monoxide Cross Interference:	<15%
Alcohol Cross Interference:	Negligible
Display:	Liquid Crystal Display
Power Input:	PP3 alkaline battery (9v, 6LF22/Equiv)
Note:	to avoid long start up times, ensure Gastrolyzer is switched OFF if battery is removed.
Warm up Time:	Typically less than 120 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 Temp:	0-30°C

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

## Step 7

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

## Step 8

At the end of the countdown, 0ppm H<sub>2</sub> should appear on the LCD. If it does not, repeat the sequence from step 1. When 0ppm shows on the LCD, calibration may proceed.

## Step 9

Insert the T-piece Sampling System into the Gastrolzyer sensor housing, ensuring that all connections and sampling system are firmly pushed in place to prevent leakage of the calibration gas.

## Step 10

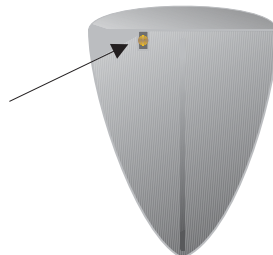
Open the Fine Control Valve and allow the gas to flow at 0.5 litres/minute. To maintain this, adjust the flow so the ball in the Flow Indicator remains at the lower line.

## 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 195 and 205ppm, press and release the GO button and using the screwdriver, adjust the SPAN control on the underside of the instrument, until a reading of between 195 and 205ppm is displayed. Turning anti-clockwise will increase the reading and turning clockwise will decrease value.



## 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

If further readings are required, repeat from step 7 of operating instructions. Otherwise, switch unit to 'OFF' position.

